
The Nautical Almanac 2017



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The Nautical Almanac

Table of Contents

Part	Page
Calendar, yearly	3
Formulas	4-5
Explanation of The Nautical Almanac pages	6-9

Note! Monthly almanac page numbers are found at the bottom of each page	
January	2
February	22
March	40
April	62
May	82
June	102
July	122
August	142
September	164
October	184
November	204
December	224

Note! Increments and Corrections are found on the pdf page numbers below	
Increments and Corrections	254
Navigational Star Chart	274



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2017

January

M	Tu	W	Th	F	Sa	Su
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

February

M	Tu	W	Th	F	Sa	Su
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28					

March

M	Tu	W	Th	F	Sa	Su
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

April

M	Tu	W	Th	F	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

May

M	Tu	W	Th	F	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

June

M	Tu	W	Th	F	Sa	Su
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

July

M	Tu	W	Th	F	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

August

M	Tu	W	Th	F	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September

M	Tu	W	Th	F	Sa	Su	
					1	2	3
4	5	6	7	8	9	10	
11	12	13	14	15	16	17	
18	19	20	21	22	23	24	
25	26	27	28	29	30		

October

M	Tu	W	Th	F	Sa	Su
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

November

M	Tu	W	Th	F	Sa	Su
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

December

M	Tu	W	Th	F	Sa	Su	
					1	2	3
4	5	6	7	8	9	10	
11	12	13	14	15	16	17	
18	19	20	21	22	23	24	
25	26	27	28	29	30	31	

Celestial Navigation

useful Formulas

About Calculators

The Casio *fx-300ES Plus* is an inexpensive calculator at about 11 USD. It features *natural input* so you enter a formula just as it would be written on paper. Entering degrees, minutes and seconds is very simple. The Casio *fx-300ES Plus* has 9 memory locations and you can review many of the previous entries you make using a special key on the calculator.

Determine Hc using a calculator

The formula

$$Hc = \text{asin}[\sin(\text{Declination}) * \sin(\text{Latitude}) + \cos(\text{Latitude}) * \cos(\text{Declination}) * \cos(\text{LHA})]$$

As it would be entered into the Casio calculator

$$\text{Sin}^{-1}(\text{Sin}(\text{Ap Latitude}) \times \text{Sin}(\text{Declination}) + \text{Cos}(\text{Ap Latitude}) \times \text{Cos}(\text{Declination}) \times \text{Cos}(\text{LHA}))$$

Declination is the declination of the Celestial body you're observing. When the heavenly body's declination is *Contrary name* to your Ap Latitude enter a negative sign before it.

Latitude is the Latitude where you are, think you are or where you would like to determine Hc for. Typically, you'll be using an *Assumed position Latitude* or *Ap Latitude* as it's called.

In Western Longitudes

LHA is the Local Hour Angle which is derived from subtracting your whole number value of Longitude (Assumed or otherwise) from the whole number value of **GHA** (Greenwich Hour Angle).

In Eastern Longitudes

LHA, in **Eastern Longitudes**, is determined by rounding up the GHA figure to the next highest whole degree figure then adding the DR. Longitude to GHA to obtain LHA. Only add the whole degree DR. Longitude figure to the rounded up whole degree GHA figure. If the resulting LHA figure is greater than 360° then subtract 360° from the figure to obtain the LHA.

Why would you want to determine Hc using a calculator?

It's faster than looking up in Pub. No. 249 and Pub. No. 229, highly accurate and you don't need a lot of printed out pages of Latitudes from Pub. No. 249 and Pub. No. 229. Pub. No. 249 Vol. 2 & 3 don't cover any declination greater than 29 degrees so you'd have to use Pub. No. 229 which is extremely large.

Celestial Navigation

Determine Z

$$Z = \text{acos}[(\sin(\text{Declination}) - \sin(\text{Ap Latitude}) \times \sin(\text{Hc})) \div (\cos(\text{Ap Latitude}) \times \cos(\text{Hc}))]$$

As it would be entered into the Casio calculator...

$$\text{Cos-1}((\text{Sin}(\text{Declination}) - \text{Sin}(\text{AP Latitude}) \times \text{Sin}(\text{Hc})) \div (\text{Cos}(\text{AP Latitude}) \times \text{Cos}(\text{Hc}))$$

If the heavenly body's declination is *Contrary name* to the Ap Latitude enter a negative sign before it.

To obtain Zn see the rules below for Northern and Southern latitudes.

Determine Z independent of Hc

$$Z = \tan^{-1}\left(\frac{\sin \text{LHA}}{(\cos L \tan d) - (\sin L \cos \text{LHA})}\right)$$

"L" is latitude and "d" is declination. When the heavenly body's declination is *Contrary name* to your Ap Latitude enter a negative sign before it.

As it would be entered into the Casio calculator...

$$Z = \tan^{-1}((\sin(\text{LHA}) \div (\cos(\text{AP latitude}) \times \tan(\text{declination}) - (\sin(\text{AP latitude}) \times \cos(\text{LHA})))$$

The sign convention used in the calculation of this azimuth formula is as follows:

from Bowditch Chapter 22 CALCULATIONS AND CONVERSIONS, page 331

- 1) If latitude and declination are of contrary name, declination is treated as a negative quantity;
- 2) If the local hour angle is greater than 180°, it is treated as a negative quantity. If the azimuth angle as calculated is negative, add 180° to obtain the desired value.

To obtain Zn apply the following rules

In Northern Latitudes	In Southern Latitudes
LHA greater than 180°....Zn=Z	LHA greater than 180°....Zn= 180° - Z
LHA less than 180°.....Zn=360° - Z	LHA less than 180°.....Zn= 180° + Z

Determine Refraction

$$0.96 \div \text{Tan of } (H_e)$$

Determine Dip using feet

$$0.97 \times (\text{Square Root of } H_e \text{ (Height of Eye) in feet})$$

Determine Dip using meters

$$1.76 \times (\text{Square Root of } H_e \text{ (Height of eye) in meters})$$



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Explanation of The Nautical Almanac Daily Pages

1	Date based on GMT/UT
2	Time based on GMT/UT (this is just integral hour only)
3	Mer. pass - meridian passage of Aries at the Prime Meridian- Greenwich- 0°. Time figure is GMT/UT.
4	GHA v correction and Declination d correction. The amount to correct v and d for is determined by the minutes and seconds of time of the planet observation and is found in the <i>Increments and Corrections</i> pages of The Nautical Almanac. The Increments and Corrections pages are also known as <i>The Yellow Pages</i> as that's the color of the paper in the USNO published Nautical Almanac.
4a	m- is the <i>magnitude</i> or brightness of the planet. A bright planet will have a <i>minus</i> sign beside the figure. A fainter planet will have no sign beside its magnitude figure.
5	Stars- SHA, Sidereal Hour Angle, and Declination. 59 stars are listed. Typically, only 57 stars are used for navigational purposes in both Northern and Southern Hemispheres.
6	Mer. pass - planet meridian passage time at the Prime Meridian- Greenwich- 0°. Time figure is GMT/UT.
7	SHA - planet <i>SHA</i> at the time of meridian passage at the Prime Meridian- Greenwich- 0°. Planet SHA is calculated by subtracting planet GHA from Aries GHA. Time figure is GMT/UT.
8	Horizontal parallax - for Venus and Mars.
9	Date based on GMT/UT
10	Time based on GMT/UT (this is just integral hour only)
11	SD - Semi-diameter of the Sun. One half of the angular width of the Sun as observed on earth.
12	d- the amount the declination of the Sun changes per hour. If there's a minus sign beside the declination figure in the Dec column then the Sun is in the Southern hemisphere.
13	The Moon's GHA v correction. The amount to correct the Moon's GHA using v is determined by the minutes and seconds of time of the Moon's observation and is found in the <i>Increments and Corrections</i> pages of The Nautical Almanac. The Increments and Corrections pages are also known as <i>The Yellow Pages</i> as that's the color of the paper in the USNO published Nautical Almanac.
14	SD - Semi-diameter of the Moon. One half of the angular width of the Moon, as observed on earth.
15	<p>The Moon's declination d correction. It's the amount of declination the Moon changes per hour. However the amount to correct the Moon's declination using d is determined by the minutes and seconds of time of the Moon's observation and is found in the <i>Increments and Corrections</i> pages of The Nautical Almanac. The d correction is <i>algebraically</i> added.</p> <p>An easy way to determine whether to <i>add</i> or <i>subtract</i> the d correction found in the <i>Increments and Corrections</i> pages is by examining the Moon's declination trend in The Nautical Almanac. If the declination is increasing (regardless of its sign + or -) from the integral hour of the observation you made then add the d increment and increase the value of the declination. If the declination is decreasing (regardless of its sign + or -) from the integral hour of the observation you made then subtract the d increment and decrease the value of the declination. Make sure to put the sign "back on" the corrected declination so you know which hemisphere the Moon's in.</p> <p>The Increments and Corrections pages are also known as <i>The Yellow Pages</i> as that's the color of the paper in the USNO published Nautical Almanac.</p>
16	HP - the angle between two lines, one from the center of the Moon to the center of the Earth, the other from the center of the Moon to the edge of the Earth. This angle is about 56', but it changes slightly from day to day as the distance to the Moon changes along its elliptical path around the Earth. <i>Source- starpath.com</i>
17	Sun- Eqn. of Time - Equation of Time is the difference between GMT/UT and LAN at Greenwich. The figures listed are for GMT/UT at 00 ^h and 12 ^h . If you look at Mer. Pass just to the right of the Eqn. of Time you'll find, approximately, when the Sun crosses The Prime Meridian (at Greenwich). The figures in the 12 ^h column indicate, approximately, how many minutes and seconds are subtracted, or added, to 12 to determine when Local Apparent Noon is at The Prime Meridian. You can calculate, approximately, when LAN is at your Longitude by adding, or subtracting the amount of time difference between you and

	Greenwich and the Equation of Time.
17 <i>continued</i>	Example- May 30, 2016. Mer. Pass is at UT 11:57. 12^h is 02:25. This means <i>subtract</i> 2 minutes and 25 seconds from UT 12 to calculate when Meridian Passage is at Greenwich. So at W 075° meridian passage would occur at about- 12 hours + 5 hours <i>MINUS</i> 2 minutes and 25 seconds, or UT 16:57:35.
18	Sun- Mer. Pass just to the right of the Eqn. of Time is the approximate GMT/UT when the Sun crosses The Prime Meridian (at Greenwich) for that specific date.
19	Moon- Mer. Pass- is the approximate GMT/UT when the Moon crosses The Prime Meridian (at Greenwich) or The International Date Line for that specific date. Upper means the GMT/UT when the Moon crosses The Prime Meridian (Greenwich) and Lower means the GMT/UT when the Moon crosses The International Date Line (180°).
20	Moon- Age- this is the number of days past a new Moon. Typically, there are 29 days in a lunar month.
20 <i>continued</i>	Moon- %- the amount of the Moon's illumination. 100% would be a full moon. 49% would be about ½ of the Moon is illuminated.
21* <i>see note at bottom</i>	(morning) Twilight- Naut.- the approximate GMT/UT when morning Nautical Twilight begins. Nautical twilight is the time when the center of the sun is 12° below the horizon and the horizon is visible enough to be used for marine sextant observations. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
21* <i>see note at bottom</i>	(morning) Twilight- Civil- the approximate GMT/UT of morning civil twilight starts when the geometric center of the sun is 6° below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
21* <i>see note at bottom</i>	Sunrise- the approximate GMT/UT when the Sun is 0° 50' (semi-diameter plus refraction) below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
21* <i>see note at bottom</i>	(evening) Twilight- Naut.- the approximate GMT/UT of when evening Nautical Twilight ends. Nautical twilight is the time when the center of the sun is 12° below the horizon and the horizon is no longer visible enough to be used for sextant observations. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
21* <i>see note at bottom</i>	(evening) Twilight- Civil- the approximate GMT/UT of evening civil twilight that ends when the geometric center of the sun is 6° below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
21* <i>see note at bottom</i>	Sunset- the approximate GMT/UT when the Sun is 0° 50' (semi-diameter plus refraction) below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
22* <i>see note at bottom</i>	Moonrise- the approximate GMT/UT when the Moon is about 0° 05' to 0° 10' below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time under the specific day. The USNO has a more detailed explanation of this here- http://aa.usno.navy.mil/faq/docs/RST_defs.php
22* <i>see note at bottom</i>	Moonset- the approximate GMT/UT when the Moon is about 0° 05' to 0° 10' below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time under the specific day. The USNO has a more detailed explanation of this here- http://aa.usno.navy.mil/faq/docs/RST_defs.php

* **Note-** Time of Sunrise, Sunset, Moonrise, Moonset and twilight is based on GMT/UT of the event at 0° (Greenwich). To determine the GMT/UT time at your Longitude add or subtract the time difference between your AP Longitude and Greenwich.

21

9

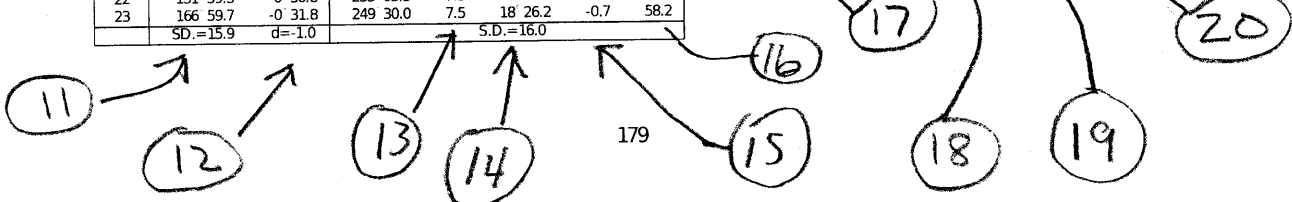
Sun				Moon				Twilight						
Wed	GHA	Dec	GHA	v	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
0	181 44.1	0 37.3	304 57.5	6.7	14 25.9	7.3	60.0	72	03:00	04:32	05:40	18:02	19:10	20:40
1	196 44.3	0 36.3	319 23.2	6.7	14 33.2	7.2	60.0	70	03:20	04:40	05:41	18:01	19:03	20:21
2	211 44.5	0 35.3	333 48.9	6.7	14 40.4	7.1	59.9	68	03:36	04:46	05:42	18:01	18:56	20:06
3	226 44.7	0 34.4	348 14.6	6.7	14 47.5	7.0	59.9	66	03:48	04:52	05:43	18:00	18:51	19:54
4	241 45.0	0 33.4	2 40.3	6.7	14 54.5	6.9	59.9	64	03:58	04:56	05:44	17:60	18:47	19:45
5	256 45.2	0 32.4	17 06.0	6.7	15 01.3	6.8	59.9	62	04:06	05:00	05:45	17:59	18:43	19:37
6	271 45.4	0 31.5	31 31.7	6.7	15 08.1	6.7	59.9	60	04:13	05:03	05:45	17:59	18:40	19:30
7	286 45.6	0 30.5	45 57.4	6.6	15 14.8	6.6	59.8	58	04:19	05:06	05:45	17:58	18:37	19:24
8	301 45.8	0 29.5	60 23.0	6.6	15 21.4	6.5	59.8	56	04:24	05:09	05:46	17:58	18:35	19:19
9	316 46.1	0 28.5	74 48.6	6.6	15 27.8	6.4	59.8	54	04:29	05:11	05:46	17:58	18:33	19:15
10	331 46.3	0 27.6	89 14.3	6.6	15 34.2	6.3	59.8	52	04:33	05:13	05:47	17:58	18:31	19:11
11	346 46.5	0 26.6	103 39.9	6.6	15 40.4	6.2	59.8	50	04:36	05:14	05:47	17:57	18:30	19:08
12	1 46.7	0 25.6	118 05.5	6.6	15 46.6	6.1	59.7	48	04:39	05:15	05:47	17:57	18:29	19:05
13	16 46.9	0 24.7	132 31.1	6.6	15 52.6	6.0	59.7	46	04:41	05:15	05:47	17:57	18:28	19:03
14	31 47.2	0 23.7	146 56.7	6.6	15 58.5	5.9	59.7	44	04:42	05:16	05:48	17:56	18:27	19:01
15	46 47.4	0 22.7	161 22.3	6.6	16 04.3	5.8	59.7	42	04:43	05:17	05:48	17:56	18:26	18:59
16	61 47.6	0 21.7	175 47.9	6.6	16 10.0	5.6	59.6	40	04:44	05:17	05:49	17:56	18:25	18:57
17	76 47.8	0 20.8	190 13.5	6.6	16 15.6	5.5	59.6	38	04:45	05:18	05:49	17:56	18:24	18:55
18	91 48.1	0 19.8	204 39.1	6.6	16 21.1	5.4	59.6	36	04:46	05:18	05:49	17:56	18:23	18:54
19	106 48.3	0 18.8	219 04.7	6.6	16 26.5	5.3	59.6	34	04:46	05:18	05:49	17:56	18:22	18:53
20	121 48.5	0 17.8	233 30.3	6.6	16 31.7	5.2	59.5	32	04:47	05:19	05:49	17:56	18:21	18:52
21	136 48.7	0 16.9	247 55.8	6.6	16 36.9	5.1	59.5	30	04:47	05:19	05:49	17:56	18:20	18:51
22	151 48.9	0 15.9	262 21.4	6.6	16 41.9	5.0	59.5	28	04:47	05:20	05:49	17:56	18:19	18:50
23	166 49.2	0 14.9	276 47.0	6.6	16 46.8	4.9	59.5	26	04:48	05:20	05:49	17:56	18:18	18:50

10

Thu	GHA	Dec	GHA	v	Dec	d	HP
0	181 49.4	0 14.0	291 12.6	6.6	16 51.6	4.7	59.4
1	196 49.6	0 13.0	305 38.2	6.6	16 56.3	4.6	59.4
2	211 49.8	0 12.0	320 03.7	6.6	17 00.9	4.5	59.4
3	226 50.0	0 11.0	334 29.3	6.6	17 05.4	4.4	59.4
4	241 50.3	0 10.1	348 54.9	6.6	17 09.7	4.3	59.3
5	256 50.5	0 09.1	3 20.5	6.6	17 13.9	4.2	59.3
6	271 50.7	0 08.1	17 46.1	6.6	17 18.0	4.1	59.3
7	286 50.9	0 07.1	32 11.7	6.6	17 22.0	3.9	59.3
8	301 51.1	0 06.2	46 37.3	6.6	17 25.9	3.8	59.2
9	316 51.4	0 05.2	61 03.0	6.6	17 29.7	3.7	59.2
10	331 51.6	0 04.2	75 28.6	6.6	17 33.4	3.6	59.2
11	346 51.8	0 03.3	89 54.2	6.6	17 36.9	3.5	59.2
12	1 52.0	0 02.3	104 19.9	6.7	17 40.3	3.4	59.1
13	16 52.2	0 01.3	118 45.5	6.7	17 43.6	3.2	59.1
14	31 52.5	0 00.3	133 11.2	6.7	17 46.8	3.1	59.1
15	46 52.7	-0 00.6	147 36.9	6.7	17 49.9	3.0	59.1
16	61 52.9	-0 01.6	162 02.6	6.7	17 52.8	2.9	59.0
17	76 53.1	-0 02.6	176 28.3	6.7	17 55.6	2.8	59.0
18	91 53.3	-0 03.6	190 54.0	6.7	17 58.4	2.7	59.0
19	106 53.6	-0 04.5	205 19.7	6.7	18 01.0	2.5	59.0
20	121 53.8	-0 05.5	219 45.5	6.8	18 03.4	2.4	58.9
21	136 54.0	-0 06.5	234 11.3	6.8	18 05.8	2.3	58.9
22	151 54.2	-0 07.4	248 37.1	6.8	18 08.0	2.2	58.9
23	166 54.4	-0 08.4	263 02.9	6.8	18 10.2	2.1	58.9

Lat.	Moonrise			Moonset		
	Wed	Thu	Fri	Wed	Thu	Fri
72	18:08	17:50	-	14:16	16:35	-
70	18:50	19:09	19:53	13:35	15:15	16:30
68	19:19	19:48	20:37	13:07	14:37	15:46
66	19:40	20:15	21:06	12:46	14:10	15:17
64	19:58	20:36	21:28	12:29	13:49	14:55
62	20:12	20:53	21:45	12:15	13:33	14:37
60	20:24	21:07	21:60	12:04	13:19	14:23
58	20:35	21:19	22:12	11:53	13:07	14:10
56	20:44	21:30	22:23	11:45	12:57	13:59
54	20:52	21:39	22:33	11:37	12:48	13:50
52	20:60	21:47	22:41	11:30	12:40	13:41
50	21:06	21:54	22:49	11:24	12:32	13:34
45	21:20	22:10	23:05	11:10	12:17	13:17
40	21:32	22:23	23:19	10:59	12:04	13:04
35	21:42	22:35	23:30	10:49	11:53	12:53
30	21:51	22:44	23:40	10:41	11:44	12:43
20	22:06	23:01	23:57	10:27	11:27	12:26
10	22:20	23:16	-	10:14	11:13	12:11
0	22:32	23:30	-	10:02	10:60	11:57
-10	22:45	23:43	-	09:51	10:46	11:43
-20	22:59	23:58	-	09:38	10:32	11:28
-30	23:14	-	00:15	09:24	10:16	11:10
-35	23:23	-	00:25	09:16	10:06	11:00
-40	23:34	-	00:36	09:06	09:56	10:49
-45	23:46	-	00:50	08:55	09:43	10:35
-50	-	00:01	01:06	08:42	09:27	10:19
-52	-	00:08	01:14	08:36	09:20	10:11
-54	-	00:16	01:22	08:29	09:12	10:03
-56	-	00:24	01:32	08:22	09:03	09:53
-58	-	00:34	01:43	08:13	08:53	09:42
-60	-	00:46	01:55	08:03	08:41	09:29

Day	Sun			Moon		Age
	Eqn. of Time 00 ^m	Mer. 12 ^h	Mer. Pass.	Mer. Pass. Upper	Mer. Pass. Lower	
21	06:56	07:07	11:52	03:48	16:17	20(71%)
22	07:17	07:28	11:52	04:46	17:14	21(60%)
23	07:38	07:49	11:52	05:43	18:11	22(49%)



22

January 01, 02 ,03 (Sun., Mon., Tue.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Sun	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass					
0	100°50.2	-13°41.9	130°38.5	-13°41.9	119°24.8	-8°48.6	260°48.8	-7°03.6	200°08.3	-21°52.4	260°48.8	-7°03.6	200°08.3	-21°52.4	Alpheratz	357°41.0	29°11.2			
1	115°52.6	-13°40.8	145°38.4	-13°40.8	134°25.5	-8°47.8	275°51.0	-7°03.7	215°10.5	-21°52.4	275°51.0	-7°03.7	215°10.5	-21°52.4	Ankaa	353°13.4	-42°13.1			
2	130°55.1	-13°39.7	160°38.3	-13°39.7	149°26.2	-8°47.1	290°53.2	-7°03.8	230°12.6	-21°52.5	290°53.2	-7°03.8	230°12.6	-21°52.5	Schedar	349°37.7	56°38.0			
3	145°57.6	-13°38.6	175°38.2	-13°38.6	164°27.0	-8°46.3	305°55.5	-7°03.9	245°14.8	-21°52.5	305°55.5	-7°03.9	245°14.8	-21°52.5	Diphda	348°53.4	-17°53.8			
4	161°00.0	-13°37.5	190°38.1	-13°37.5	179°27.7	-8°45.6	320°57.7	-7°04.0	260°17.0	-21°52.5	320°57.7	-7°04.0	260°17.0	-21°52.5	Achernar	335°25.0	-57°09.4			
5	176°02.5	-13°36.4	205°38.0	-13°36.4	194°28.4	-8°44.8	335°59.9	-7°04.1	275°19.1	-21°52.5	335°59.9	-7°04.1	275°19.1	-21°52.5	Hamal	327°57.9	23°32.5			
6	191°05.0	-13°35.3	220°37.9	-13°35.3	209°29.1	-8°44.1	351°02.1	-7°04.1	290°21.3	-21°52.5	351°02.1	-7°04.1	290°21.3	-21°52.5	Polaris	316°23.9	89°20.3			
7	206°07.4	-13°34.2	235°37.8	-13°34.2	224°29.8	-8°43.3	6°04.3	-7°04.2	305°23.4	-21°52.6	6°04.3	-7°04.2	305°23.4	-21°52.6	Akamar	315°16.3	-40°14.6			
8	221°09.9	-13°33.1	250°37.7	-13°33.1	239°30.5	-8°42.6	21°06.5	-7°04.3	320°25.6	-21°52.6	21°06.5	-7°04.3	320°25.6	-21°52.6	Menkar	314°12.3	4°09.2			
9	236°12.4	-13°32.0	265°37.6	-13°32.0	254°31.2	-8°41.8	36°08.7	-7°04.4	335°27.8	-21°52.6	36°08.7	-7°04.4	335°27.8	-21°52.6	Mirfak	308°36.5	49°55.3			
10	251°14.8	-13°30.9	280°37.6	-13°30.9	269°31.9	-8°41.1	51°11.0	-7°04.5	350°29.9	-21°52.6	51°11.0	-7°04.5	350°29.9	-21°52.6	Aldebaran	290°46.3	16°32.4			
11	266°17.3	-13°29.8	295°37.5	-13°29.8	284°32.6	-8°40.3	66°13.2	-7°04.6	5°32.1	-21°52.6	66°13.2	-7°04.6	5°32.1	-21°52.6	Rigel	281°09.4	-8°11.2			
12	281°19.7	-13°28.7	310°37.4	-13°28.7	299°33.4	-8°39.6	81°15.4	-7°04.7	20°34.2	-21°52.7	81°15.4	-7°04.7	20°34.2	-21°52.7	Capella	280°30.4	46°00.8			
13	296°22.2	-13°27.6	325°37.3	-13°27.6	314°34.1	-8°38.8	96°17.6	-7°04.8	35°36.4	-21°52.7	96°17.6	-7°04.8	35°36.4	-21°52.7	Bellatrix	278°29.1	6°21.7			
14	311°24.7	-13°26.5	340°37.2	-13°26.5	329°34.8	-8°38.1	111°19.8	-7°04.9	50°38.5	-21°52.7	111°19.8	-7°04.9	50°38.5	-21°52.7	Elnath	278°09.2	28°37.1			
15	326°27.1	-13°25.4	355°37.1	-13°25.4	344°35.5	-8°37.3	126°22.0	-7°04.9	65°40.7	-21°52.7	126°22.0	-7°04.9	65°40.7	-21°52.7	Alnilam	275°43.6	-1°11.7			
16	341°29.6	-13°24.3	10°37.0	-13°24.3	359°36.2	-8°36.6	141°24.3	-7°05.0	80°42.9	-21°52.7	141°24.3	-7°05.0	80°42.9	-21°52.7	Betelgeuse	270°58.4	7°24.4			
17	356°32.1	-13°23.2	25°37.0	-13°23.2	14°36.9	-8°35.8	156°26.5	-7°05.1	95°45.0	-21°52.8	156°26.5	-7°05.1	95°45.0	-21°52.8	Canopus	263°54.5	-52°42.5			
18	11°34.5	-13°22.1	40°36.9	-13°22.1	29°37.6	-8°35.0	171°28.7	-7°05.2	110°47.2	-21°52.8	171°28.7	-7°05.2	110°47.2	-21°52.8	Sirius	258°31.2	-16°44.4			
19	26°37.0	-13°21.0	55°36.8	-13°21.0	44°38.3	-8°34.3	186°30.9	-7°05.3	125°49.3	-21°52.8	186°30.9	-7°05.3	125°49.3	-21°52.8	Adara	255°10.2	-28°59.9			
20	41°39.5	-13°19.9	70°36.7	-13°19.9	59°39.1	-8°33.5	201°33.1	-7°05.4	140°51.5	-21°52.8	201°33.1	-7°05.4	140°51.5	-21°52.8	Procyon	244°56.8	5°10.8			
21	56°41.9	-13°18.8	85°36.7	-13°18.8	74°39.8	-8°32.8	216°35.4	-7°05.5	155°53.7	-21°52.8	216°35.4	-7°05.5	155°53.7	-21°52.8	Pollux	243°24.4	27°58.9			
22	71°44.4	-13°17.7	100°36.6	-13°17.7	89°40.5	-8°32.0	231°37.6	-7°05.6	170°55.8	-21°52.8	231°37.6	-7°05.6	170°55.8	-21°52.8	Avior	234°16.4	-59°33.9			
23	86°46.9	-13°16.6	115°36.5	-13°16.6	104°41.2	-8°31.3	246°39.8	-7°05.6	185°58.0	-21°52.9	246°39.8	-7°05.6	185°58.0	-21°52.9	Suhail	222°50.2	-43°30.1			
Mer.pass.:17:13			v-0.1 d1.1 m-4.2			v0.7 d0.8 m0.9			v2.2 d-0.1 m-1.8			v2.2 d-0.0 m0.5			Miaplacidus			221°38.3	-69°47.1	
															Alphard			217°53.5	-8°44.0	
															Regulus			207°40.7	11°52.9	
															Dubhe			193°48.6	61°39.3	
															Denebola			182°31.1	14°28.6	
															Gienah			175°49.7	-17°38.0	
															Acrux			173°06.4	-63°11.2	
															Gacrux			171°58.1	-57°12.2	
															Alioth			166°18.8	55°51.8	
															Spica			158°28.8	-11°14.8	
															Alcaid			152°57.2	49°13.6	
															Hadar			148°44.6	-60°26.9	
															Menkent			148°04.9	-36°26.9	
															Arcturus			145°53.6	19°05.9	
															Rigel Kent.			139°48.7	-60°53.9	
															Zubenelg.			137°02.9	-16°06.5	
															Kochab			137°20.9	74°05.0	
															Alphecca			126°09.3	26°39.5	
															Antares			112°23.6	-26°27.9	
															Atria			107°23.7	-69°03.1	
															Sabik			102°10.1	-15°44.5	
															Shaula			96°19.1	-37°06.7	
															Rasalhague			96°04.6	12°33.1	
															Etamin			90°45.6	51°29.3	
															Kaus Aust.			83°41.0	-34°22.4	
															Vega			80°37.8	38°48.1	
															Nunki			75°55.7	-26°16.3	
															Altair			62°06.3	8°54.9	
															Peacock			53°16.1	-56°40.8	
															Deneb			49°30.2	45°20.7	
															Enif			33°45.0	9°57.3	
															Alnair			27°41.1	-46°52.8	
															Fomalhaut			15°21.6	-29°32.1	
															Scheat			13°51.2	28°10.6	
															Markab			13°36.1	15°17.9	
															2017/1/1			SHA	Mer.pass	
															Venus			29°48.3	15:18	
															Mars			18°34.6	16:02	
															Jupiter			159°58.6	06:36	
															Saturn			99°18.1	10:38	
															2017/1/2			SHA	Mer.pass	
															Venus			28°47.1	15:18	
															Mars			17°52.6	16:00	
															Jupiter			159°52.7	06:32	
															Saturn			99°10.8	10:34	
															2017/1/3			SHA	Mer.pass	
															Venus			27°46.4	15:18	
															Mars			17°10.6	15:59	
															Jupiter			159°46.9	06:29	
															Saturn			99°03.5	10:31	
															Horizontal paralax					
															Venus:			0.2		
															Mars:			0.1		
Mer.pass.:17:05			v-0.1 d1.1 m-4.2			v0.7 d0.8 m0.9			v2.2 d-0.1 m-1.8			v2.2 d-0.0 m0.5								

Sun				Moon										
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
									Naut.	Civil	Sunrise	Sunset	Civil	Naut.
0	179°08.4	-22°59.9	147°06.1	11.1	-15°20.2	6.2	56.0	72	08:23	10:39	--	--	13:30	15:46
1	194°08.1	-22°59.7	161°36.2	11.1	-15°13.9	6.3	56.1	70	08:04	09:48	--	--	14:21	16:05
2	209°07.8	-22°59.5	176°06.3	11.1	-15°07.6	6.4	56.1	68	07:49	09:16	--	--	14:53	16:20
3	224°07.5	-22°59.3	190°36.4	11.1	-15°01.2	6.5	56.1	66	07:37	08:52	10:25	13:43	15:17	16:32
4	239°07.2	-22°59.1	205°06.5	11.1	-14°54.7	6.5	56.1	64	07:26	08:33	09:48	14:21	15:35	16:42
5	254°06.9	-22°58.9	219°36.6	11.1	-14°48.1	6.6	56.1	62	07:17	08:18	09:22	14:47	15:50	16:52
6	269°06.6	-22°58.7	234°06.8	11.2	-14°41.4	6.7	56.2	60	07:09	08:05	09:02	15:07	16:03	16:60
7	284°06.3	-22°58.5	248°36.9	11.2	-14°34.7	6.8	56.2	58	07:02	07:54	08:45	15:24	16:15	17:07
8	299°06.0	-22°58.3	263°07.1	11.2	-14°27.9	6.9	56.2	56	06:55	07:44	08:31	15:38	16:24	17:13
9	314°05.7	-22°58.1	277°37.3	11.2	-14°21.0	6.9	56.2	54	06:50	07:35	08:19	15:50	16:33	17:19
10	329°05.4	-22°57.8	292°07.5	11.2	-14°14.0	7.0	56.2	52	06:44	07:27	08:08	16:01	16:41	17:24
11	344°05.1	-22°57.6	306°37.7	11.2	-14°07.0	7.1	56.3	50	06:39	07:20	07:58	16:10	16:48	17:29
12	359°04.8	-22°57.4	321°07.9	11.2	-13°59.9	7.2	56.3	45	06:28	07:05	07:38	16:30	17:04	17:41
13	14°04.5	-22°57.2	335°38.1	11.2	-13°52.7	7.2	56.3	40	06:18	06:52	07:22	16:46	17:17	17:51
14	29°04.2	-22°57.0	350°08.4	11.2	-13°45.4	7.3	56.3	35	06:09	06:40	07:08	17:00	17:28	17:60
15	44°04.0	-22°56.8	4°38.6	11.3	-13°38.0	7.4	56.3	30	06:00	06:30	06:56	17:12	17:38	18:08
16	59°03.7	-22°56.6	19°08.9	11.3	-13°30.6	7.5	56.4	20	05:44	06:12	06:35	17:33	17:57	18:24
17	74°03.4	-22°56.3	33°39.2	11.3	-13°23.1	7.5	56.4	10	05:28	05:55	06:17	17:51	18:14	18:40
18	89°03.1	-22°56.1	48°09.5	11.3	-13°15.6	7.6	56.4	0	05:12	05:38	06:00	18:08	18:30	18:56
19	104°02.8	-22°55.9	62°39.8	11.3	-13°07.9	7.7	56.4	-10	04:53	05:20	05:43	18:25	18:48	19:15
20	119°02.5	-22°55.7	77°10.1	11.3	-13°00.2	7.7	56.4	-20	04:31	05:00	05:25	18:43	19:08	19:37
21	134°02.2	-22°55.5	91°40.4	11.3	-12°52.4	7.8	56.5	-30	04:03	04:36	05:03	19:05	19:32	20:05
22	149°01.9	-22°55.2	106°10.8	11.3	-12°44.6	7.9	56.5	-35	03:45	04:21	04:51	19:18	19:47	20:23
23	164°01.6	-22°55.0	120°41.1	11.4	-12°36.7	8.0	56.5	-40	03:22	04:03	04:36	19:32	20:05	20:46
SD.=16.3 d=0.2 S.D.=15.3								-45	02:52	03:41	04:18	19:50	20:27	21:15
								-50	02:09	03:13	03:57	20:11	20:55	21:58
								-52	01:43	02:58	03:46	20:22	21:10	22:24
								-54	01:04	02:41	03:34	20:34	21:27	23:02
								-56	--	02:20	03:20	20:47	21:47	--
								-58	--	01:52	03:04	21:03	22:15	--
								-60	--	01:10	02:45	21:22	22:56	--
								Moonrise			Moonset			
								Lat.	Sun	Mon	Tue	Sun	Mon	Tue
								72	11:58	11:49	11:41	17:38	19:29	21:19
								70	11:30	11:31	11:31	18:04	19:45	21:27
								68	11:09	11:17	11:22	18:25	19:58	21:33
								66	10:52	11:05	11:15	18:40	20:09	21:39
								64	10:39	10:55	11:09	18:53	20:17	21:44
								62	10:27	10:47	11:04	19:04	20:25	21:48
								60	10:17	10:40	10:59	19:14	20:31	21:51
								58	10:08	10:34	10:55	19:22	20:37	21:54
								56	10:01	10:28	10:52	19:29	20:42	21:57
								54	09:54	10:23	10:49	19:35	20:46	21:59
								52	09:48	10:18	10:46	19:41	20:50	22:02
								50	09:42	10:14	10:43	19:46	20:54	22:04
								45	09:30	10:05	10:37	19:57	21:02	22:08
								40	09:20	09:57	10:32	20:06	21:08	22:12
								35	09:12	09:51	10:28	20:14	21:14	22:15
								30	09:04	09:45	10:24	20:21	21:19	22:17
								20	08:51	09:35	10:18	20:33	21:27	22:22
								10	08:40	09:26	10:12	20:43	21:35	22:26
								0	08:29	09:18	10:07	20:53	21:41	22:30
								-10	08:18	09:10	10:01	21:02	21:48	22:34
								-20	08:07	09:01	09:56	21:12	21:56	22:38
								-30	07:54	08:51	09:49	21:24	22:04	22:42
								-35	07:46	08:45	09:45	21:30	22:08	22:45
								-40	07:37	08:38	09:41	21:38	22:14	22:48
								-45	07:27	08:31	09:36	21:47	22:20	22:51
								-50	07:15	08:21	09:30	21:57	22:27	22:55
								-52	07:09	08:17	09:27	22:02	22:31	22:57
								-54	07:03	08:12	09:24	22:07	22:34	22:59
								-56	06:56	08:07	09:21	22:13	22:38	23:01
								-58	06:48	08:01	09:17	22:20	22:43	23:04
								-60	06:38	07:54	09:13	22:27	22:48	23:06
								Sun			Moon			
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age	
									00 ^h	12 ^h	Upper	Lower		
								1	03:27	03:41	12:03	14:40	02:16	3(10%)
								2	03:55	04:09	12:04	15:29	03:05	4(17%)
								3	04:23	04:36	12:04	16:18	03:54	5(26%)
SD.=16.3 d=0.2 S.D.=15.6														

h		Sun				Moon										
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight				
									Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	178°47.5	-22°43.1	111°37.3	11.5	-4°57.4	10.5	57.6	72	08:19	10:29	--	--	13:43	15:52		
1	193°47.2	-22°42.8	126°07.8	11.5	-4°46.8	10.5	57.7	70	08:01	09:42	--	--	14:29	16:10		
2	208°46.9	-22°42.6	140°38.4	11.5	-4°36.3	10.6	57.7	68	07:47	09:12	11:27	12:45	14:60	16:25		
3	223°46.6	-22°42.3	155°08.9	11.5	-4°25.7	10.6	57.7	66	07:35	08:49	10:19	13:52	15:22	16:37		
4	238°46.3	-22°42.0	169°39.4	11.5	-4°15.1	10.6	57.7	64	07:25	08:31	09:44	14:27	15:40	16:47		
5	253°46.1	-22°41.8	184°09.9	11.5	-4°04.4	10.7	57.7	62	07:16	08:16	09:19	14:52	15:55	16:56		
6	268°45.8	-22°41.5	198°40.4	11.5	-3°53.7	10.7	57.8	60	07:08	08:04	08:59	15:12	16:08	17:03		
7	283°45.5	-22°41.2	213°10.9	11.5	-3°43.0	10.7	57.8	58	07:01	07:53	08:43	15:28	16:18	17:10		
8	298°45.2	-22°41.0	227°41.4	11.5	-3°32.3	10.7	57.8	56	06:55	07:43	08:29	15:42	16:28	17:17		
9	313°44.9	-22°40.7	242°11.8	11.5	-3°21.6	10.8	57.8	54	06:49	07:35	08:18	15:54	16:37	17:22		
10	328°44.6	-22°40.4	256°42.3	11.4	-3°10.8	10.8	57.9	52	06:44	07:27	08:07	16:04	16:44	17:28		
11	343°44.4	-22°40.2	271°12.7	11.4	-2°60.0	10.8	57.9	50	06:39	07:20	07:58	16:13	16:51	17:32		
12	358°44.1	-22°39.9	285°43.1	11.4	-2°49.1	10.8	57.9	45	06:28	07:05	07:38	16:33	17:07	17:43		
13	13°43.8	-22°39.6	300°13.5	11.4	-2°38.3	10.9	57.9	40	06:18	06:52	07:22	16:49	17:19	17:53		
14	28°43.5	-22°39.4	314°43.9	11.4	-2°27.4	10.9	58.0	35	06:09	06:41	07:09	17:03	17:31	18:02		
15	43°43.2	-22°39.1	329°14.3	11.4	-2°16.5	10.9	58.0	30	06:01	06:31	06:57	17:14	17:41	18:10		
16	58°43.0	-22°38.8	343°44.6	11.3	-2°05.6	10.9	58.0	20	05:45	06:12	06:36	17:35	17:59	18:26		
17	73°42.7	-22°38.5	358°14.9	11.3	-1°54.6	11.0	58.0	10	05:30	05:56	06:19	17:53	18:15	18:41		
18	88°42.4	-22°38.3	12°45.3	11.3	-1°43.7	11.0	58.1	0	05:13	05:39	06:02	18:09	18:32	18:58		
19	103°42.1	-22°38.0	27°15.5	11.3	-1°32.7	11.0	58.1	-10	04:55	05:22	05:45	18:26	18:49	19:16		
20	118°41.8	-22°37.7	41°45.8	11.3	-1°21.7	11.0	58.1	-20	04:33	05:02	05:27	18:44	19:09	19:38		
21	133°41.6	-22°37.4	56°16.1	11.2	-1°10.7	11.0	58.1	-30	04:05	04:38	05:05	19:05	19:32	20:05		
22	148°41.3	-22°37.1	70°46.3	11.2	-0°59.7	11.0	58.2	-35	03:47	04:24	04:53	19:18	19:47	20:23		
23	163°41.0	-22°36.9	85°16.5	11.2	-0°48.6	11.0	58.2	-40	03:25	04:06	04:39	19:32	20:04	20:45		
SD.=16.3 d=0.3 S.D.=15.7								-45	02:56	03:45	04:21	19:49	20:26	21:14		
								-50	02:14	03:16	03:60	20:11	20:54	21:56		
								-52	01:49	03:02	03:50	20:21	21:08	22:20		
								-54	01:13	02:46	03:38	20:32	21:24	22:55		
								-56	--	02:25	03:25	20:46	21:45	--		
								-58	--	01:59	03:09	21:01	22:11	--		
								-60	--	01:20	02:50	21:20	22:48	--		
								Moonrise			Moonset					
								Lat.	Wed	Thu	Fri	Wed	Thu	Fri		
								72	11:34	11:27	11:20	23:08	--	00:59		
								70	11:30	11:29	11:28	23:09	--	00:53		
								68	11:26	11:30	11:35	23:10	--	00:49		
								66	11:24	11:32	11:41	23:11	--	00:45		
								64	11:21	11:33	11:45	23:12	--	00:42		
								62	11:19	11:34	11:49	23:12	--	00:39		
								60	11:17	11:35	11:53	23:13	--	00:37		
								58	11:16	11:35	11:56	23:13	--	00:34		
								56	11:14	11:36	11:59	23:14	--	00:33		
								54	11:13	11:37	12:02	23:14	--	00:31		
								52	11:12	11:37	12:04	23:15	--	00:29		
								50	11:10	11:38	12:06	23:15	--	00:28		
								45	11:08	11:39	12:11	23:16	--	00:25		
								40	11:06	11:40	12:15	23:16	--	00:22		
								35	11:04	11:41	12:18	23:17	--	00:20		
								30	11:03	11:41	12:21	23:17	--	00:18		
								20	11:00	11:43	12:27	23:18	--	00:15		
								10	10:58	11:44	12:31	23:18	--	00:12		
								0	10:56	11:45	12:36	23:19	--	00:09		
								-10	10:53	11:46	12:40	23:20	--	00:06		
								-20	10:51	11:47	12:45	23:20	--	00:03		
								-30	10:48	11:49	12:51	23:21	23:60	--		
								-35	10:47	11:50	12:54	23:21	23:58	--		
								-40	10:45	11:51	12:58	23:21	23:55	--		
								-45	10:43	11:52	13:02	23:22	23:53	--		
								-50	10:41	11:53	13:07	23:22	23:50	--		
								-52	10:40	11:54	13:09	23:23	23:48	--		
								-54	10:38	11:54	13:12	23:23	23:47	--		
								-56	10:37	11:55	13:15	23:23	23:45	--		
								-58	10:36	11:56	13:18	23:23	23:43	--		
								-60	10:34	11:57	13:22	23:24	23:41	--		
								Sun			Moon					
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age				
									00 ^h	12 ^h	Pass	Upper	Lower			
								4	04:50	05:04	12:05	17:07	04:42	6(36%)		
								5	05:17	05:31	12:05	17:56	05:31	7(47%)		
								6	05:44	05:57	12:05	18:48	06:22	8(58%)		
SD.=16.3 d=0.3 S.D.=16.0																

January 10, 11, 12 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	109°42.4	130°39.4	-9°37.3	122°01.0	-6°04.0	268°52.8	-7°20.6	207°55.7	-21°56.2	Alpheratz	357°41.1	29°11.2
1	124°44.9	145°39.5	-9°36.1	137°01.8	-6°03.3	283°55.1	-7°20.7	222°57.9	-21°56.2	Ankaa	353°13.5	-42°13.1
2	139°47.4	160°39.7	-9°34.9	152°02.5	-6°02.5	298°57.4	-7°20.8	238°00.0	-21°56.2	Schedar	349°37.7	56°38.0
3	154°49.8	175°39.8	-9°33.8	167°03.2	-6°01.7	313°59.6	-7°20.8	253°02.2	-21°56.2	Diphda	348°53.4	-17°53.8
4	169°52.3	190°39.9	-9°32.6	182°04.0	-6°00.9	329°01.9	-7°20.9	268°04.4	-21°56.3	Achernar	335°25.0	-57°09.4
5	184°54.7	205°40.0	-9°31.4	197°04.7	-6°00.2	344°04.2	-7°21.0	283°06.6	-21°56.3	Hamal	327°57.9	23°32.5
6	199°57.2	220°40.1	-9°30.3	212°05.5	-5°59.4	359°06.4	-7°21.0	298°08.7	-21°56.3	Polaris	316°27.2	89°20.3
7	214°59.7	235°40.2	-9°29.1	227°06.2	-5°58.6	14°08.7	-7°21.1	313°10.9	-21°56.3	Akamar	315°16.4	-40°14.6
8	230°02.1	250°40.3	-9°27.9	242°06.9	-5°57.9	29°11.0	-7°21.2	328°13.1	-21°56.3	Menkar	314°12.4	4°09.2
9	245°04.6	265°40.4	-9°26.7	257°07.7	-5°57.1	44°13.3	-7°21.2	343°15.2	-21°56.3	Mirfak	308°36.5	49°55.3
10	260°07.1	280°40.6	-9°25.6	272°08.4	-5°56.3	59°15.5	-7°21.3	358°17.4	-21°56.4	Aldebaran	290°46.3	16°32.4
11	275°09.5	295°40.7	-9°24.4	287°09.1	-5°55.5	74°17.8	-7°21.4	13°19.6	-21°56.4	Rigel	281°09.4	-8°11.2
12	290°12.0	310°40.8	-9°23.2	302°09.9	-5°54.8	89°20.1	-7°21.4	28°21.8	-21°56.4	Capella	280°30.5	46°00.8
13	305°14.5	325°40.9	-9°22.1	317°10.6	-5°54.0	104°22.3	-7°21.5	43°23.9	-21°56.4	Bellatrix	278°29.1	6°21.6
14	320°16.9	340°41.0	-9°20.9	332°11.3	-5°53.2	119°24.6	-7°21.5	58°26.1	-21°56.4	Elnath	278°09.2	28°37.1
15	335°19.4	355°41.2	-9°19.7	347°12.1	-5°52.5	134°26.9	-7°21.6	73°28.3	-21°56.4	Alnilam	275°43.6	-1°11.7
16	350°21.9	10°41.3	-9°18.6	2°12.8	-5°51.7	149°29.2	-7°21.7	88°30.4	-21°56.4	Betelgeuse	270°58.4	7°24.3
17	5°24.3	25°41.4	-9°17.4	17°13.6	-5°50.9	164°31.4	-7°21.7	103°32.6	-21°56.5	Canopus	263°54.5	-52°42.6
18	20°26.8	40°41.5	-9°16.2	32°14.3	-5°50.1	179°33.7	-7°21.8	118°34.8	-21°56.5	Sirius	258°31.1	-16°44.4
19	35°29.2	55°41.7	-9°15.1	47°15.0	-5°49.4	194°36.0	-7°21.9	133°37.0	-21°56.5	Adara	255°10.2	-28°60.0
20	50°31.7	70°41.8	-9°13.9	62°15.8	-5°48.6	209°38.3	-7°21.9	148°39.1	-21°56.5	Procyon	244°56.8	5°10.8
21	65°34.2	85°41.9	-9°12.7	77°16.5	-5°47.8	224°40.5	-7°22.0	163°41.3	-21°56.5	Pollux	243°24.3	27°58.9
22	80°36.6	100°42.0	-9°11.5	92°17.2	-5°47.1	239°42.8	-7°22.1	178°43.5	-21°56.5	Avior	234°16.3	-59°33.9
23	95°39.1	115°42.2	-9°10.4	107°18.0	-5°46.3	254°45.1	-7°22.1	193°45.6	-21°56.6	Suhail	222°50.2	-43°30.1
Mer.pass.:16:38		v0.1 d1.2 m-4.2		v0.7 d0.8 m1.0		v2.3 d-0.1 m-1.9		v2.2 d-0.0 m0.5		Miaplacidus	221°38.2	-69°47.2
										Alphard	217°53.4	-8°44.1
										Regulus	207°40.7	11°52.9
										Dubhe	193°48.5	61°39.3
										Denebola	182°31.0	14°28.5
										Gienah	175°49.7	-17°38.1
										AcruX	173°06.3	-63°11.3
										Gacrux	171°58.0	-57°12.2
										Alioth	166°18.7	55°51.8
										Spica	158°28.7	-11°14.9
										Alcaid	152°57.1	49°13.5
										Hadar	148°44.5	-60°26.9
										Menkent	148°04.8	-36°26.9
										Arcturus	145°53.5	19°05.9
										Rigel Kent.	139°48.6	-60°53.9
										Zubenelg.	137°02.9	-16°06.5
										Kochab	137°20.8	74°05.0
										Alphecca	126°09.2	26°39.5
										Antares	112°23.5	-26°27.9
										Atria	107°23.6	-69°03.1
										Sabik	102°10.1	-15°44.5
										Shaula	96°19.0	-37°06.7
										Rasalhague	96°04.5	12°33.0
										Etamin	90°45.5	51°29.3
										Kaus Aust.	83°41.0	-34°22.3
										Vega	80°37.8	38°48.1
										Nunki	75°55.7	-26°16.3
										Altair	62°06.3	8°54.9
										Peacock	53°16.1	-56°40.8
										Deneb	49°30.2	45°20.6
										Enif	33°45.0	9°57.3
										Alnair	27°41.2	-46°52.8
										Fomalhaut	15°21.6	-29°32.1
										Scheat	13°51.2	28°10.6
										Markab	13°36.1	15°17.9
										2017/1/1	SHA	Mer.pass
										Venus	20°57.0	15:17
										Mars	12°18.6	15:51
										Jupiter	159°10.4	06:04
										Saturn	98°13.3	10:07
										2017/1/1	SHA	Mer.pass
										Venus	20°00.7	15:17
										Mars	11°37.1	15:50
										Jupiter	159°05.8	05:60
										Saturn	98°06.2	10:03
										2017/1/1	SHA	Mer.pass
										Venus	19°05.0	15:17
										Mars	10°55.7	15:49
										Jupiter	159°01.3	05:56
										Saturn	97°59.2	09:60
										Horizontal parallax		
										Venus:		0.2
										Mars:		0.1
Mer.pass.:16:30		v0.2 d1.2 m-4.3		v0.7 d0.8 m1.0		v2.3 d-0.1 m-1.9		v2.2 d-0.0 m0.5				

January 13, 14 ,15 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	112°39.9	130°49.7	-8°12.8	122°54.2	-5°08.4	271°36.8	-7°25.2	210°32.1	-21°57.3	Alpheratz	357°41.1	29°11.2
1	127°42.3	145°49.9	-8°11.6	137°55.0	-5°07.6	286°39.1	-7°25.2	225°34.3	-21°57.3	Ankaa	353°13.5	-42°13.1
2	142°44.8	160°50.1	-8°10.4	152°55.7	-5°06.9	301°41.4	-7°25.3	240°36.5	-21°57.3	Schedar	349°37.7	56°38.0
3	157°47.2	175°50.3	-8°09.2	167°56.5	-5°06.1	316°43.7	-7°25.4	255°38.7	-21°57.3	Diphda	348°53.4	-17°53.8
4	172°49.7	190°50.5	-8°08.0	182°57.2	-5°05.3	331°46.0	-7°25.4	270°40.8	-21°57.4	Achernar	335°25.1	-57°09.4
5	187°52.2	205°50.6	-8°06.9	197°57.9	-5°04.5	346°48.3	-7°25.5	285°43.0	-21°57.4	Hamal	327°57.9	23°32.5
6	202°54.6	220°50.8	-8°05.7	212°58.7	-5°03.8	1°50.6	-7°25.5	300°45.2	-21°57.4	Polaris	316°28.4	89°20.4
7	217°57.1	235°51.0	-8°04.5	227°59.4	-5°03.0	16°52.9	-7°25.6	315°47.4	-21°57.4	Akamar	315°16.4	-40°14.6
8	232°59.6	250°51.2	-8°03.3	243°00.2	-5°02.2	31°55.2	-7°25.6	330°49.5	-21°57.4	Menkar	314°12.4	4°09.2
9	248°02.0	265°51.4	-8°02.1	258°00.9	-5°01.4	46°57.5	-7°25.7	345°51.7	-21°57.4	Mirfak	308°36.5	49°55.3
10	263°04.5	280°51.6	-8°01.0	273°01.7	-5°00.7	61°59.7	-7°25.8	0°53.9	-21°57.4	Aldebaran	290°46.3	16°32.4
11	278°07.0	295°51.8	-7°59.8	288°02.4	-4°59.9	77°02.0	-7°25.8	15°56.1	-21°57.5	Rigel	281°09.4	-8°11.2
12	293°09.4	310°52.0	-7°58.6	303°03.1	-4°59.1	92°04.3	-7°25.9	30°58.2	-21°57.5	Capella	280°30.4	46°00.8
13	308°11.9	325°52.1	-7°57.4	318°03.9	-4°58.3	107°06.6	-7°25.9	46°00.4	-21°57.5	Bellatrix	278°29.1	6°21.6
14	323°14.3	340°52.3	-7°56.2	333°04.6	-4°57.6	122°08.9	-7°26.0	61°02.6	-21°57.5	Elnath	278°09.2	28°37.1
15	338°16.8	355°52.5	-7°55.0	348°05.4	-4°56.8	137°11.2	-7°26.1	76°04.8	-21°57.5	Alnilam	275°43.6	-1°11.7
16	353°19.3	10°52.7	-7°53.9	3°06.1	-4°56.0	152°13.5	-7°26.1	91°06.9	-21°57.5	Betelgeuse	270°58.4	7°24.3
17	8°21.7	25°52.9	-7°52.7	18°06.9	-4°55.2	167°15.8	-7°26.2	106°09.1	-21°57.5	Canopus	263°54.5	-52°42.6
18	23°24.2	40°53.1	-7°51.5	33°07.6	-4°54.5	182°18.1	-7°26.2	121°11.3	-21°57.6	Sirius	258°31.1	-16°44.5
19	38°26.7	55°53.3	-7°50.3	48°08.4	-4°53.7	197°20.4	-7°26.3	136°13.5	-21°57.6	Adara	255°10.2	-28°60.0
20	53°29.1	70°53.5	-7°49.1	63°09.1	-4°52.9	212°22.7	-7°26.3	151°15.6	-21°57.6	Procyon	244°56.8	5°10.8
21	68°31.6	85°53.7	-7°47.9	78°09.8	-4°52.1	227°25.0	-7°26.4	166°17.8	-21°57.6	Pollux	243°24.3	27°58.9
22	83°34.1	100°53.9	-7°46.8	93°10.6	-4°51.4	242°27.2	-7°26.5	181°20.0	-21°57.6	Avior	234°16.3	-59°33.9
23	98°36.5	115°54.1	-7°45.6	108°11.3	-4°50.6	257°29.5	-7°26.5	196°22.2	-21°57.6	Suhail	222°50.2	-43°30.1
Mer.pass.:16:26		v0.2 d1.2 m-4.3		v0.7 d0.8 m1.0		v2.3 d-0.1 m-1.9		v2.2 d-0.0 m0.5		Miaplacidus	221°38.2	-69°47.2
										Alphard	217°53.4	-8°44.1
										Regulus	207°40.7	11°52.9
										Dubhe	193°48.4	61°39.3
										Denebola	182°31.0	14°28.5
										Gienah	175°49.6	-17°38.1
										Acrux	173°06.2	-63°11.3
										Gacrux	171°57.9	-57°12.2
										Alioth	166°18.6	55°51.8
										Spica	158°28.7	-11°14.9
										Alcaid	152°57.1	49°13.5
										Hadar	148°44.4	-60°26.9
										Menkent	148°04.7	-36°26.9
										Arcturus	145°53.5	19°05.9
										Rigel Kent.	139°48.5	-60°53.9
										Zubenelg.	137°02.8	-16°06.5
										Kochab	137°20.7	74°05.0
										Alphecca	126°09.2	26°39.5
										Antares	112°23.5	-26°27.9
										Atria	107°23.6	-69°03.1
										Sabik	102°10.0	-15°44.5
										Shaula	96°19.0	-37°06.7
										Rasalhague	96°04.5	12°33.0
										Etamin	90°45.5	51°29.3
										Kaus Aust.	83°41.0	-34°22.3
										Vega	80°37.8	38°48.0
										Nunki	75°55.7	-26°16.3
										Altair	62°06.3	8°54.9
										Peacock	53°16.1	-56°40.7
										Deneb	49°30.2	45°20.6
										Enif	33°45.0	9°57.3
										Alnair	27°41.2	-46°52.8
										Fomalhaut	15°21.6	-29°32.1
										Scheat	13°51.2	28°10.6
										Markab	13°36.1	15°17.8
										2017/1/1	SHA	Mer.pass
										Venus	18°09.9	15:16
										Mars	10°14.4	15:48
										Jupiter	158°57.0	05:53
										Saturn	97°52.3	09:56
										2017/1/1	SHA	Mer.pass
										Venus	17°15.3	15:16
										Mars	9°33.1	15:46
										Jupiter	158°52.8	05:49
										Saturn	97°45.4	09:53
										2017/1/1	SHA	Mer.pass
										Venus	16°21.3	15:16
										Mars	8°51.8	15:45
										Jupiter	158°48.8	05:45
										Saturn	97°38.5	09:49
										Horizontal parallax		
										Venus:		0.2
										Mars:		0.1
Mer.pass.:16:18		v0.2 d1.2 m-4.3		v0.7 d0.8 m1.0		v2.3 d-0.1 m-1.9		v2.2 d-0.0 m0.5				

h Sun				Moon										
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	177°51.2	-21°28.6	351°12.2	6.2	17°20.2	-4.8	59.5	72	08:02	09:55	--	--	14:24	16:17
1	192°51.0	-21°28.2	5°37.4	6.3	17°15.3	-4.9	59.4	70	07:47	09:20	--	--	14:59	16:32
2	207°50.8	-21°27.8	20°02.8	6.4	17°10.3	-5.0	59.4	68	07:35	08:55	10:37	13:42	15:24	16:44
3	222°50.6	-21°27.4	34°28.1	6.4	17°05.2	-5.1	59.4	66	07:25	08:36	09:55	14:24	15:43	16:54
4	237°50.3	-21°26.9	48°53.6	6.5	17°00.0	-5.3	59.4	64	07:16	08:20	09:27	14:52	15:59	17:03
5	252°50.1	-21°26.5	63°19.1	6.6	16°54.7	-5.4	59.3	62	07:08	08:07	09:06	15:13	16:12	17:10
6	267°49.9	-21°26.1	77°44.7	6.6	16°49.3	-5.5	59.3	60	07:02	07:56	08:49	15:30	16:23	17:17
7	282°49.6	-21°25.6	92°10.4	6.7	16°43.8	-5.6	59.3	58	06:56	07:46	08:34	15:44	16:33	17:23
8	297°49.4	-21°25.2	106°36.1	6.8	16°38.2	-5.7	59.2	56	06:50	07:37	08:22	15:57	16:41	17:29
9	312°49.2	-21°24.8	121°01.9	6.8	16°32.4	-5.8	59.2	54	06:45	07:30	08:11	16:07	16:49	17:34
10	327°48.9	-21°24.4	135°27.8	6.9	16°26.6	-5.9	59.2	52	06:40	07:23	08:02	16:17	16:56	17:38
11	342°48.7	-21°23.9	149°53.8	7.0	16°20.7	-6.0	59.2	50	06:36	07:16	07:53	16:25	17:02	17:43
12	357°48.5	-21°23.5	164°19.8	7.1	16°14.7	-6.1	59.1	45	06:26	07:02	07:35	16:43	17:16	17:53
13	12°48.2	-21°23.1	178°45.9	7.1	16°08.6	-6.2	59.1	40	06:17	06:51	07:20	16:58	17:28	18:01
14	27°48.0	-21°22.6	193°12.1	7.2	16°02.4	-6.3	59.1	35	06:09	06:40	07:08	17:11	17:38	18:09
15	42°47.8	-21°22.2	207°38.3	7.3	15°56.1	-6.4	59.0	30	06:01	06:31	06:57	17:22	17:48	18:17
16	57°47.5	-21°21.7	222°04.7	7.4	15°49.7	-6.4	59.0	20	05:47	06:14	06:38	17:41	18:04	18:31
17	72°47.3	-21°21.3	236°31.1	7.5	15°43.2	-6.5	59.0	10	05:33	05:59	06:21	17:57	18:20	18:46
18	87°47.1	-21°20.9	250°57.6	7.5	15°36.6	-6.6	58.9	0	05:17	05:43	06:05	18:13	18:35	19:01
19	102°46.9	-21°20.4	265°24.1	7.6	15°29.9	-6.7	58.9	-10	05:00	05:27	05:50	18:29	18:51	19:18
20	117°46.6	-21°20.0	279°50.8	7.7	15°23.2	-6.8	58.9	-20	04:40	05:09	05:33	18:45	19:10	19:38
21	132°46.4	-21°19.6	294°17.5	7.8	15°16.3	-6.9	58.9	-30	04:14	04:46	05:13	19:05	19:32	20:04
22	147°46.2	-21°19.1	308°44.3	7.8	15°09.4	-7.0	58.8	-35	03:57	04:32	05:01	19:17	19:45	20:21
23	162°46.0	-21°18.7	323°11.2	7.9	15°02.4	-7.1	58.8	-40	03:36	04:16	04:48	19:30	20:02	20:41
SD.=16.3 d=0.4 S.D.=16.2								-45	03:10	03:56	04:32	19:46	20:21	21:08
								-50	02:32	03:30	04:12	20:05	20:47	21:45
								-52	02:11	03:17	04:03	20:15	20:60	22:05
								-54	01:44	03:02	03:52	20:25	21:14	22:32
								-56	00:58	02:45	03:40	20:37	21:32	23:14
								-58	--	02:22	03:26	20:51	21:54	--
								-60	--	01:53	03:09	21:07	22:23	--
								Moonrise			Moonset			
								Lat.	Fri	Sat	Sun	Fri	Sat	Sun
								72	15:08	17:14	19:08	11:14	11:02	10:54
								70	15:49	17:37	19:21	10:32	10:37	10:38
								68	16:17	17:56	19:32	10:04	10:17	10:26
								66	16:38	18:10	19:42	09:42	10:02	10:15
								64	16:54	18:22	19:49	09:25	09:49	10:07
								62	17:08	18:32	19:56	09:10	09:38	09:59
								60	17:20	18:41	20:01	08:58	09:29	09:53
								58	17:30	18:48	20:06	08:48	09:21	09:47
								56	17:38	18:55	20:10	08:39	09:14	09:42
								54	17:46	19:01	20:14	08:30	09:07	09:37
								52	17:53	19:06	20:18	08:23	09:01	09:33
								50	17:59	19:11	20:21	08:16	08:56	09:29
								45	18:13	19:21	20:28	08:02	08:45	09:21
								40	18:24	19:30	20:34	07:51	08:35	09:14
								35	18:33	19:37	20:39	07:40	08:27	09:08
								30	18:41	19:43	20:43	07:32	08:20	09:03
								20	18:56	19:55	20:51	07:16	08:07	08:54
								10	19:08	20:04	20:57	07:03	07:56	08:46
								0	19:20	20:13	21:04	06:50	07:46	08:38
								-10	19:31	20:22	21:10	06:38	07:35	08:30
								-20	19:44	20:32	21:17	06:24	07:24	08:22
								-30	19:58	20:43	21:24	06:08	07:11	08:12
								-35	20:06	20:50	21:28	05:59	07:04	08:07
								-40	20:15	20:57	21:33	05:49	06:55	08:01
								-45	20:26	21:05	21:39	05:37	06:45	07:53
								-50	20:39	21:15	21:46	05:22	06:33	07:44
								-52	20:45	21:20	21:49	05:15	06:27	07:40
								-54	20:52	21:25	21:52	05:07	06:21	07:36
								-56	20:60	21:31	21:56	04:58	06:14	07:31
								-58	21:08	21:37	22:00	04:48	06:06	07:25
								-60	21:17	21:44	22:05	04:37	05:57	07:19
								Sun			Moon			
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age		
									00 ^h	12 ^h	Pass	Upper	Lower	
								13	08:35	08:46	12:08	00:36	13:05	15(99%)
								14	08:57	09:08	12:09	01:32	13:59	16(95%)
								15	09:19	09:29	12:09	02:25	14:50	17(89%)
SD.=16.3 d=0.5 S.D.=15.8														

January 16, 17 ,18 (Mon., Tue., Wed.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Mon	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	115°37.3	131°05.2	-6°47.4	123°47.9	-4°12.5	274°22.3	-7°29.1	213°08.9	-21°58.3	Alpheratz	357°41.1	29°11.1					
1	130°39.7	146°05.5	-6°46.2	138°48.7	-4°11.8	289°24.6	-7°29.2	228°11.1	-21°58.3	Ankaa	353°13.5	-42°13.1					
2	145°42.2	161°05.7	-6°45.1	153°49.4	-4°11.0	304°26.9	-7°29.3	243°13.3	-21°58.3	Schedar	349°37.8	56°38.0					
3	160°44.7	176°06.0	-6°43.9	168°50.2	-4°10.2	319°29.2	-7°29.3	258°15.5	-21°58.3	Diphda	348°53.4	-17°53.8					
4	175°47.1	191°06.2	-6°42.7	183°50.9	-4°09.4	334°31.5	-7°29.4	273°17.6	-21°58.4	Achernar	335°25.1	-57°09.4					
5	190°49.6	206°06.5	-6°41.5	198°51.7	-4°08.7	349°33.8	-7°29.4	288°19.8	-21°58.4	Hamal	327°58.0	23°32.5					
6	205°52.1	221°06.7	-6°40.3	213°52.4	-4°07.9	4°36.1	-7°29.5	303°22.0	-21°58.4	Polaris	316°29.8	89°20.4					
7	220°54.5	236°07.0	-6°39.1	228°53.2	-4°07.1	19°38.4	-7°29.5	318°24.2	-21°58.4	Akamar	315°16.4	-40°14.6					
8	235°57.0	251°07.3	-6°37.9	243°53.9	-4°06.3	34°40.7	-7°29.6	333°26.4	-21°58.4	Menkar	314°12.4	4°09.2					
9	250°59.4	266°07.5	-6°36.7	258°54.7	-4°05.5	49°43.0	-7°29.6	348°28.5	-21°58.4	Mirfak	308°36.6	49°55.3					
10	266°01.9	281°07.8	-6°35.5	273°55.4	-4°04.8	64°45.4	-7°29.7	3°30.7	-21°58.4	Aldebaran	290°46.3	16°32.4					
11	281°04.4	296°08.0	-6°34.3	288°56.1	-4°04.0	79°47.7	-7°29.7	18°32.9	-21°58.5	Rigel	281°09.4	-8°11.2					
12	296°06.8	311°08.3	-6°33.2	303°56.9	-4°03.2	94°50.0	-7°29.8	33°35.1	-21°58.5	Capella	280°30.5	46°00.8					
13	311°09.3	326°08.6	-6°32.0	318°57.6	-4°02.4	109°52.3	-7°29.8	48°37.3	-21°58.5	Bellatrix	278°29.1	6°21.6					
14	326°11.8	341°08.8	-6°30.8	333°58.4	-4°01.7	124°54.6	-7°29.9	63°39.4	-21°58.5	Elnath	278°09.2	28°37.1					
15	341°14.2	356°09.1	-6°29.6	348°59.1	-4°00.9	139°56.9	-7°29.9	78°41.6	-21°58.5	Alnilam	275°43.6	-1°11.8					
16	356°16.7	11°09.4	-6°28.4	3°59.9	-4°00.1	154°59.2	-7°30.0	93°43.8	-21°58.5	Betelgeuse	270°58.4	7°24.3					
17	11°19.2	26°09.6	-6°27.2	19°00.6	-3°59.3	170°01.5	-7°30.0	108°46.0	-21°58.5	Canopus	263°54.5	-52°42.6					
18	26°21.6	41°09.9	-6°26.0	34°01.4	-3°58.5	185°03.9	-7°30.1	123°48.2	-21°58.6	Sirius	258°31.1	-16°44.5					
19	41°24.1	56°10.2	-6°24.8	49°02.1	-3°57.8	200°06.2	-7°30.1	138°50.4	-21°58.6	Adara	255°10.2	-28°60.0					
20	56°26.5	71°10.5	-6°23.6	64°02.9	-3°57.0	215°08.5	-7°30.1	153°52.5	-21°58.6	Procyon	244°56.8	5°10.8					
21	71°29.0	86°10.7	-6°22.4	79°03.6	-3°56.2	230°10.8	-7°30.2	168°54.7	-21°58.6	Pollux	243°24.3	27°58.9					
22	86°31.5	101°11.0	-6°21.3	94°04.4	-3°55.4	245°13.1	-7°30.2	183°56.9	-21°58.6	Avior	234°16.3	-59°34.0					
23	101°33.9	116°11.3	-6°20.1	109°05.1	-3°54.7	260°15.4	-7°30.3	198°59.1	-21°58.6	Suhail	222°50.2	-43°30.1					
Mer.pass.:16:14			v0.3 d1.2 m-4.3			v0.7 d0.8 m1.0			v2.3 d-0.1 m-1.9			v2.2 d-0.0 m0.5			Miaplacidus 221°38.1 -69°47.2		
															Alphard 217°53.4 -8°44.1		
															Regulus 207°40.6 11°52.9		
															Dubhe 193°48.4 61°39.3		
															Denebola 182°31.0 14°28.5		
															Gienah 175°49.6 -17°38.1		
															Acrux 173°06.2 -63°11.3		
															Gacrux 171°57.9 -57°12.2		
															Alioth 166°18.6 55°51.8		
															Spica 158°28.6 -11°14.9		
															Alcaid 152°57.1 49°13.5		
															Hadar 148°44.4 -60°26.9		
															Menkent 148°04.7 -36°26.9		
															Arcturus 145°53.4 19°05.9		
															Rigel Kent. 139°48.5 -60°53.9		
															Zubenelg. 137°02.8 -16°06.5		
															Kochab 137°20.6 74°05.0		
															Alphecca 126°09.2 26°39.5		
															Antares 112°23.5 -26°27.9		
															Atria 107°23.5 -69°03.1		
															Sabik 102°10.0 -15°44.5		
															Shaula 96°19.0 -37°06.7		
															Rasalhague 96°04.5 12°33.0		
															Etamin 90°45.5 51°29.2		
															Kaus Aust. 83°41.0 -34°22.3		
															Vega 80°37.7 38°48.0		
															Nunki 75°55.7 -26°16.3		
															Altair 62°06.3 8°54.9		
															Peacock 53°16.1 -56°40.7		
															Deneb 49°30.2 45°20.6		
															Enif 33°45.0 9°57.2		
															Alnair 27°41.2 -46°52.8		
															Fomalhaut 15°21.7 -29°32.1		
															Scheat 13°51.2 28°10.6		
															Markab 13°36.1 15°17.8		
															2017/1/1 SHA Mer.pass		
															Venus 15°28.0 15:15		
															Mars 8°10.6 15:44		
															Jupiter 158°45.0 05:42		
															Saturn 97°31.6 09:46		
															2017/1/1 SHA Mer.pass		
															Venus 14°35.1 15:15		
															Mars 7°29.5 15:43		
															Jupiter 158°41.3 05:38		
															Saturn 97°24.9 09:43		
															2017/1/1 SHA Mer.pass		
															Venus 13°42.9 15:14		
															Mars 6°48.4 15:42		
															Jupiter 158°37.8 05:34		
															Saturn 97°18.1 09:39		
															Horizontal paralax		
															Venus: 0.2		
															Mars: 0.1		
Mer.pass.:16:06			v0.3 d1.2 m-4.3			v0.8 d0.8 m1.0			v2.3 d-0.0 m-1.9			v2.2 d-0.0 m0.5					

January 19, 20 ,21 (Thu., Fri., Sat.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Thu	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass		
0	118°34.7	131°26.0	-5°21.6	124°42.0	-3°16.5	277°09.1	-7°32.5	215°46.1	-21°59.2	Alpheratz	357°41.1	29°11.1					
1	133°37.1	146°26.3	-5°20.4	139°42.8	-3°15.7	292°11.5	-7°32.6	230°48.3	-21°59.3	Ankaa	353°13.5	-42°13.1					
2	148°39.6	161°26.7	-5°19.3	154°43.5	-3°14.9	307°13.8	-7°32.6	245°50.5	-21°59.3	Schedar	349°37.8	56°38.0					
3	163°42.1	176°27.0	-5°18.1	169°44.3	-3°14.2	322°16.1	-7°32.7	260°52.7	-21°59.3	Diphda	348°53.5	-17°53.8					
4	178°44.5	191°27.3	-5°16.9	184°45.0	-3°13.4	337°18.4	-7°32.7	275°54.8	-21°59.3	Achernar	335°25.1	-57°09.4					
5	193°47.0	206°27.7	-5°15.7	199°45.8	-3°12.6	352°20.8	-7°32.7	290°57.0	-21°59.3	Hamal	327°58.0	23°32.5					
6	208°49.5	221°28.0	-5°14.5	214°46.5	-3°11.8	7°23.1	-7°32.8	305°59.2	-21°59.3	Polaris	316°31.1	89°20.4					
7	223°51.9	236°28.3	-5°13.3	229°47.3	-3°11.0	22°25.4	-7°32.8	321°01.4	-21°59.3	Akamar	315°16.4	-40°14.6					
8	238°54.4	251°28.7	-5°12.1	244°48.0	-3°10.3	37°27.8	-7°32.9	336°03.6	-21°59.3	Menkar	314°12.4	4°09.2					
9	253°56.9	266°29.0	-5°10.9	259°48.8	-3°09.5	52°30.1	-7°32.9	351°05.8	-21°59.4	Mirfak	308°36.6	49°55.3					
10	268°59.3	281°29.3	-5°09.7	274°49.6	-3°08.7	67°32.4	-7°33.0	6°08.0	-21°59.4	Aldebaran	290°46.4	16°32.4					
11	284°01.8	296°29.7	-5°08.5	289°50.3	-3°07.9	82°34.8	-7°33.0	21°10.1	-21°59.4	Rigel	281°09.4	-8°11.2					
12	299°04.3	311°30.0	-5°07.3	304°51.1	-3°07.2	97°37.1	-7°33.0	36°12.3	-21°59.4	Capella	280°30.5	46°00.8					
13	314°06.7	326°30.4	-5°06.1	319°51.8	-3°06.4	112°39.4	-7°33.1	51°14.5	-21°59.4	Bellatrix	278°29.1	6°21.6					
14	329°09.2	341°30.7	-5°04.9	334°52.6	-3°05.6	127°41.8	-7°33.1	66°16.7	-21°59.4	Elnath	278°09.2	28°37.1					
15	344°11.6	356°31.0	-5°03.7	349°53.3	-3°04.8	142°44.1	-7°33.2	81°18.9	-21°59.4	Alnilam	275°43.6	-1°11.8					
16	359°14.1	11°31.4	-5°02.5	4°54.1	-3°04.0	157°46.4	-7°33.2	96°21.1	-21°59.4	Betelgeuse	270°58.4	7°24.3					
17	14°16.6	26°31.7	-5°01.4	19°54.8	-3°03.3	172°48.7	-7°33.2	111°23.3	-21°59.5	Canopus	263°54.5	-52°42.6					
18	29°19.0	41°32.1	-5°00.2	34°55.6	-3°02.5	187°51.1	-7°33.3	126°25.5	-21°59.5	Sirius	258°31.1	-16°44.5					
19	44°21.5	56°32.4	-4°59.0	49°56.3	-3°01.7	202°53.4	-7°33.3	141°27.6	-21°59.5	Adara	255°10.2	-29°00.0					
20	59°24.0	71°32.8	-4°57.8	64°57.1	-3°00.9	217°55.7	-7°33.4	156°29.8	-21°59.5	Procyon	244°56.8	5°10.8					
21	74°26.4	86°33.1	-4°56.6	79°57.9	-3°00.1	232°58.1	-7°33.4	171°32.0	-21°59.5	Pollux	243°24.3	27°58.9					
22	89°28.9	101°33.5	-4°55.4	94°58.6	-2°59.4	248°00.4	-7°33.4	186°34.2	-21°59.5	Avior	234°16.3	-59°34.0					
23	104°31.4	116°33.8	-4°54.2	109°59.4	-2°58.6	263°02.8	-7°33.5	201°36.4	-21°59.5	Suhail	222°50.2	-43°30.2					
Mer.pass.:16:03			v0.3 d1.2 m-4.3			v0.8 d0.8 m1.0			v2.3 d-0.0 m-1.9			v2.2 d-0.0 m0.5			Miaplacidus 221°38.1 -69°47.2		
															Alphard 217°53.4 -8°44.1		
															Regulus 207°40.6 11°52.9		
															Dubhe 193°48.4 61°39.3		
															Denebola 182°31.0 14°28.5		
															Gienah 175°49.6 -17°38.1		
															Acrux 173°06.2 -63°11.3		
															Gacrux 171°57.9 -57°12.2		
															Alioth 166°18.6 55°51.8		
															Spica 158°28.6 -11°14.9		
															Alcaid 152°57.0 49°13.5		
															Hadar 148°44.3 -60°26.9		
															Menkent 148°04.7 -36°26.9		
															Arcturus 145°53.4 19°05.9		
															Rigel Kent. 139°48.4 -60°53.9		
															Zubenelg. 137°02.8 -16°06.5		
															Kochab 137°20.6 74°04.9		
															Alphecca 126°09.1 26°39.5		
															Antares 112°23.5 -26°27.9		
															Atria 107°23.5 -69°03.0		
															Sabik 102°10.0 -15°44.5		
															Shaula 96°19.0 -37°06.7		
															Rasalhague 96°04.5 12°33.0		
															Etamin 90°45.5 51°29.2		
															Kaus Aust. 83°40.9 -34°22.3		
															Vega 80°37.7 38°48.0		
															Nunki 75°55.7 -26°16.3		
															Altair 62°06.3 8°54.9		
															Peacock 53°16.1 -56°40.7		
															Deneb 49°30.2 45°20.6		
															Enif 33°45.0 9°57.2		
															Alnair 27°41.2 -46°52.8		
															Fomalhaut 15°21.7 -29°32.1		
															Scheat 13°51.3 28°10.6		
															Markab 13°36.1 15°17.8		
															2017/1/1 SHA Mer.pass		
															Venus 12°51.3 15:14		
															Mars 6°07.3 15:40		
															Jupiter 158°34.5 05:31		
															Saturn 97°11.4 09:36		
															2017/1/2 SHA Mer.pass		
															Venus 12°00.3 15:13		
															Mars 5°26.3 15:39		
															Jupiter 158°31.3 05:27		
															Saturn 97°04.8 09:32		
															2017/1/2 SHA Mer.pass		
															Venus 11°10.0 15:13		
															Mars 4°45.3 15:38		
															Jupiter 158°28.2 05:23		
															Saturn 96°58.2 09:29		
															Horizontal parallax		
															Venus: 0.2		
															Mars: 0.1		
Mer.pass.:15:55			v0.4 d1.2 m-4.3			v0.8 d0.8 m1.1			v2.3 d-0.0 m-1.9			v2.2 d-0.0 m0.5					

Sun								Moon							
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	177° 20.6	-20° 20.2	279° 45.5	14.6	-3° 59.1	-9.6	54.9	72	07:47	09:30	--	--	14:53	16:36	
1	192° 20.4	-20° 19.6	294° 19.1	14.6	-4° 08.7	-9.6	54.9	70	07:34	09:01	11:03	13:20	15:22	16:49	
2	207° 20.2	-20° 19.1	308° 52.8	14.6	-4° 18.3	-9.6	54.9	68	07:24	08:40	10:09	14:14	15:43	16:59	
3	222° 20.0	-20° 18.6	323° 26.4	14.7	-4° 27.8	-9.5	54.9	66	07:15	08:23	09:36	14:46	15:60	17:08	
4	237° 19.8	-20° 18.1	338° 00.1	14.7	-4° 37.3	-9.5	54.8	64	07:07	08:10	09:13	15:10	16:13	17:16	
5	252° 19.6	-20° 17.5	352° 33.7	14.7	-4° 46.8	-9.5	54.8	62	07:01	07:58	08:54	15:29	16:25	17:22	
6	267° 19.5	-20° 17.0	7° 07.4	14.7	-4° 56.3	-9.5	54.8	60	06:55	07:48	08:39	15:44	16:35	17:28	
7	282° 19.3	-20° 16.5	21° 41.1	14.7	-5° 05.8	-9.4	54.8	58	06:49	07:39	08:26	15:57	16:44	17:33	
8	297° 19.1	-20° 15.9	36° 14.8	14.7	-5° 15.2	-9.4	54.8	56	06:45	07:31	08:15	16:08	16:52	17:38	
9	312° 18.9	-20° 15.4	50° 48.5	14.7	-5° 24.6	-9.4	54.8	54	06:40	07:24	08:05	16:18	16:59	17:43	
10	327° 18.7	-20° 14.9	65° 22.2	14.7	-5° 33.9	-9.3	54.7	52	06:36	07:18	07:56	16:27	17:05	17:47	
11	342° 18.5	-20° 14.3	79° 55.9	14.7	-5° 43.3	-9.3	54.7	50	06:32	07:12	07:48	16:35	17:11	17:51	
12	357° 18.3	-20° 13.8	94° 29.6	14.7	-5° 52.6	-9.3	54.7	45	06:23	06:59	07:31	16:51	17:24	17:60	
13	12° 18.1	-20° 13.3	109° 03.3	14.7	-6° 01.8	-9.3	54.7	40	06:15	06:48	07:18	17:05	17:34	18:07	
14	27° 17.9	-20° 12.7	123° 37.0	14.7	-6° 11.1	-9.2	54.7	35	06:08	06:39	07:06	17:17	17:44	18:15	
15	42° 17.8	-20° 12.2	138° 10.7	14.7	-6° 20.3	-9.2	54.6	30	06:01	06:30	06:56	17:27	17:52	18:22	
16	57° 17.6	-20° 11.7	152° 44.5	14.7	-6° 29.4	-9.2	54.6	20	05:47	06:14	06:38	17:45	18:08	18:35	
17	72° 17.4	-20° 11.1	167° 18.2	14.7	-6° 38.6	-9.1	54.6	10	05:34	05:56	06:22	18:00	18:22	18:48	
18	87° 17.2	-20° 10.6	181° 51.9	14.7	-6° 47.7	-9.1	54.6	0	05:20	05:45	06:07	18:15	18:37	19:02	
19	102° 17.0	-20° 10.1	196° 25.6	14.7	-6° 56.8	-9.1	54.6	-10	05:04	05:30	05:53	18:29	18:52	19:18	
20	117° 16.8	-20° 09.5	210° 59.3	14.7	-7° 05.8	-9.0	54.6	-20	04:44	05:13	05:37	18:45	19:09	19:37	
21	132° 16.6	-20° 09.0	225° 33.1	14.7	-7° 14.8	-9.0	54.5	-30	04:20	04:52	05:18	19:04	19:30	20:02	
22	147° 16.5	-20° 08.5	240° 06.8	14.7	-7° 23.8	-9.0	54.5	-35	04:04	04:39	05:07	19:15	19:43	20:18	
23	162° 16.3	-20° 07.9	254° 40.5	14.7	-7° 32.7	-8.9	54.5	-40	03:45	04:23	04:55	19:27	19:58	20:37	
SD.=16.3 d=0.5 S.D.=15.0								-45	03:20	04:05	04:40	19:42	20:16	21:01	
								-50	02:46	03:41	04:21	19:60	20:40	21:35	
								-52	02:27	03:29	04:13	20:08	20:52	21:53	
								-54	02:04	03:16	04:03	20:18	21:05	22:15	
								-56	01:32	02:60	03:52	20:29	21:21	22:47	
								-58	--	02:40	03:39	20:41	21:40	--	
								-60	--	02:15	03:24	20:56	22:04	--	
								Moonrise			Moonset				
								Lat.	Thu	Fri	Sat	Thu	Fri	Sat	
								72	00:13	01:50	03:28	10:27	10:20	10:13	
								70	00:07	01:37	03:07	10:35	10:34	10:34	
								68	00:02	01:27	02:52	10:42	10:46	10:51	
								66	--	01:19	02:39	10:47	10:55	11:05	
								64	--	01:12	02:28	10:52	11:03	11:17	
								62	--	01:06	02:19	10:56	11:10	11:26	
								60	--	01:01	02:11	10:60	11:16	11:35	
								58	--	00:56	02:04	11:03	11:21	11:42	
								56	--	00:52	01:58	11:05	11:26	11:49	
								54	--	00:49	01:53	11:08	11:30	11:54	
								52	--	00:45	01:48	11:10	11:34	11:60	
								50	--	00:42	01:44	11:12	11:38	12:05	
								45	--	00:36	01:35	11:17	11:45	12:15	
								40	--	00:31	01:27	11:21	11:51	12:24	
								35	--	00:26	01:20	11:24	11:57	12:31	
								30	--	00:22	01:14	11:27	12:02	12:38	
								20	--	00:15	01:04	11:32	12:10	12:49	
								10	--	00:09	00:55	11:37	12:18	12:59	
								0	--	00:04	00:47	11:41	12:24	13:08	
								-10	23:58	--	00:39	11:45	12:31	13:18	
								-20	23:52	--	00:30	11:50	12:39	13:28	
								-30	23:45	--	00:20	11:55	12:47	13:39	
								-35	23:41	--	00:15	11:58	12:52	13:46	
								-40	23:37	--	00:08	12:01	12:58	13:54	
								-45	23:32	--	00:01	12:05	13:04	14:02	
								-50	23:26	23:52	--	12:10	13:12	14:13	
								-52	23:23	23:48	--	12:12	13:16	14:18	
								-54	23:20	23:43	--	12:15	13:20	14:24	
								-56	23:17	23:38	--	12:17	13:24	14:30	
								-58	23:13	23:33	23:55	12:20	13:29	14:36	
								-60	23:09	23:27	23:47	12:23	13:35	14:44	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age		
									00 ^h	12 ^h	Pass	Upper	Lower		
								19	10:38	10:47	12:10	05:30	17:52	21(54%)	
								20	10:56	11:05	12:11	06:13	18:35	22(45%)	
								21	11:13	11:21	12:11	06:57	19:19	23(35%)	
SD.=16.3 d=0.6 S.D.=14.8															

January 22, 23, 24 (Sun., Mon., Tue.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sun	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	121°32.1	131°52.3	-3°55.8	125°36.5	-2°20.4	279°57.5	-7°35.3	218°23.7	-22°00.1	Alpheratz	357°41.1	29°11.1					
1	136°34.6	146°52.7	-3°54.6	140°37.2	-2°19.6	294°59.8	-7°35.4	233°25.9	-22°00.1	Ankaa	353°13.5	-42°13.1					
2	151°37.0	161°53.1	-3°53.4	155°38.0	-2°18.8	310°02.2	-7°35.4	248°28.1	-22°00.1	Schedar	349°37.8	56°38.0					
3	166°39.5	176°53.5	-3°52.2	170°38.7	-2°18.0	325°04.5	-7°35.4	263°30.3	-22°00.1	Diphda	348°53.5	-17°53.8					
4	181°42.0	191°54.0	-3°51.0	185°39.5	-2°17.2	340°06.9	-7°35.5	278°32.5	-22°00.2	Achernar	335°25.1	-57°09.4					
5	196°44.4	206°54.4	-3°49.8	200°40.3	-2°16.5	355°09.2	-7°35.5	293°34.7	-22°00.2	Hamal	327°58.0	23°32.5					
6	211°46.9	221°54.8	-3°48.6	215°41.0	-2°15.7	10°11.6	-7°35.5	308°36.9	-22°00.2	Polaris	316°32.3	89°20.4					
7	226°49.3	236°55.2	-3°47.4	230°41.8	-2°14.9	25°13.9	-7°35.6	323°39.1	-22°00.2	Akamar	315°16.4	-40°14.6					
8	241°51.8	251°55.6	-3°46.2	245°42.5	-2°14.1	40°16.3	-7°35.6	338°41.3	-22°00.2	Menkar	314°12.4	4°09.2					
9	256°54.3	266°56.0	-3°45.0	260°43.3	-2°13.3	55°18.6	-7°35.6	353°43.4	-22°00.2	Mirfak	308°36.6	49°55.3					
10	271°56.7	281°56.4	-3°43.8	275°44.1	-2°12.6	70°21.0	-7°35.7	8°45.6	-22°00.2	Aldebaran	290°46.4	16°32.4					
11	286°59.2	296°56.8	-3°42.7	290°44.8	-2°11.8	85°23.3	-7°35.7	23°47.8	-22°00.2	Rigel	281°09.5	-8°11.2					
12	302°01.7	311°57.3	-3°41.5	305°45.6	-2°11.0	100°25.7	-7°35.7	38°50.0	-22°00.2	Capella	280°30.5	46°00.8					
13	317°04.1	326°57.7	-3°40.3	320°46.3	-2°10.2	115°28.0	-7°35.7	53°52.2	-22°00.3	Bellatrix	278°29.1	6°21.6					
14	332°06.6	341°58.1	-3°39.1	335°47.1	-2°09.4	130°30.4	-7°35.8	68°54.4	-22°00.3	Elnath	278°09.2	28°37.1					
15	347°09.1	356°58.5	-3°37.9	350°47.9	-2°08.7	145°32.7	-7°35.8	83°56.6	-22°00.3	Alnilam	275°43.6	-1°11.8					
16	2°11.5	11°58.9	-3°36.7	5°48.6	-2°07.9	160°35.1	-7°35.9	98°58.8	-22°00.3	Betelgeuse	270°58.4	7°24.3					
17	17°14.0	26°59.4	-3°35.5	20°49.4	-2°07.1	175°37.5	-7°35.9	114°01.0	-22°00.3	Canopus	263°54.6	-52°42.6					
18	32°16.5	41°59.8	-3°34.3	35°50.1	-2°06.3	190°39.8	-7°35.9	129°03.2	-22°00.3	Sirius	258°31.1	-16°44.5					
19	47°18.9	57°00.2	-3°33.1	50°50.9	-2°05.5	205°42.2	-7°36.0	144°05.4	-22°00.3	Adara	255°10.2	-29°00.0					
20	62°21.4	72°00.6	-3°31.9	65°51.6	-2°04.8	220°44.5	-7°36.0	159°07.6	-22°00.3	Procyon	244°56.8	5°10.8					
21	77°23.8	87°01.1	-3°30.7	80°52.4	-2°04.0	235°46.9	-7°36.0	174°09.8	-22°00.3	Pollux	243°24.3	27°58.9					
22	92°26.3	102°01.5	-3°29.6	95°53.2	-2°03.2	250°49.2	-7°36.0	189°12.0	-22°00.4	Avior	234°16.3	-59°34.0					
23	107°28.8	117°01.9	-3°28.4	110°53.9	-2°02.4	265°51.6	-7°36.1	204°14.2	-22°00.4	Suhail	222°50.1	-43°30.2					
Mer.pass.:15:51			v0.4 d1.2 m-4.3			v0.8 d0.8 m1.1			v2.3 d-0.0 m-1.9			v2.2 d-0.0 m0.5					
2017/1/2			SHA			Mer.pass											
Venus			10°20.2			15:12											
Mars			4°04.4			15:37											
Jupiter			158°25.4			05:19											
Saturn			96°51.6			09:25											
2017/1/2			SHA			Mer.pass											
Venus			9°31.1			15:11											
Mars			3°23.5			15:36											
Jupiter			158°22.7			05:16											
Saturn			96°45.1			09:22											
2017/1/2			SHA			Mer.pass											
Venus			8°42.7			15:11											
Mars			2°42.6			15:34											
Jupiter			158°20.2			05:12											
Saturn			96°38.7			09:18											
Horizontal parallax			Venus: 0.2														
			Mars: 0.1														
Mer.pass.:15:47			v0.4 d1.2 m-4.3			v0.8 d0.8 m1.1			v2.4 d-0.0 m-1.9			v2.2 d-0.0 m0.5					
2017/1/2			SHA			Mer.pass											
Venus			10°20.2			15:12											
Mars			4°04.4			15:37											
Jupiter			158°25.4			05:19											
Saturn			96°51.6			09:25											
2017/1/2			SHA			Mer.pass											
Venus			9°31.1			15:11											
Mars			3°23.5			15:36											
Jupiter			158°22.7			05:16											
Saturn			96°45.1			09:22											
2017/1/2			SHA			Mer.pass											
Venus			8°42.7			15:11											
Mars			2°42.6			15:34											
Jupiter			158°20.2			05:12											
Saturn			96°38.7			09:18											
Horizontal parallax			Venus: 0.2														
			Mars: 0.1														
Mer.pass.:15:43			v0.5 d1.2 m-4.3			v0.8 d0.8 m1.1			v2.4 d-0.0 m-1.9			v2.2 d-0.0 m0.5					

Sun								Moon							
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	177°07.6	-19°40.7	247°55.3	13.8	-13°56.9	-6.6	54.2	72	07:38	09:17	--	--	15:08	16:47	
1	192°07.5	-19°40.1	262°28.1	13.8	-14°03.5	-6.5	54.2	70	07:27	08:51	10:39	13:46	15:33	16:58	
2	207°07.3	-19°39.5	277°00.9	13.7	-14°10.0	-6.5	54.2	68	07:17	08:32	09:55	14:29	15:53	17:07	
3	222°07.1	-19°39.0	291°33.6	13.7	-14°16.4	-6.4	54.2	66	07:09	08:16	09:27	14:58	16:08	17:15	
4	237°07.0	-19°38.4	306°06.3	13.7	-14°22.8	-6.3	54.2	64	07:02	08:03	09:05	15:20	16:21	17:22	
5	252°06.8	-19°37.8	320°39.0	13.7	-14°29.1	-6.3	54.2	62	06:56	07:53	08:47	15:37	16:32	17:28	
6	267°06.6	-19°37.2	335°11.6	13.6	-14°35.3	-6.2	54.2	60	06:51	07:43	08:33	15:51	16:41	17:34	
7	282°06.5	-19°36.7	349°44.2	13.6	-14°41.5	-6.2	54.2	58	06:46	07:35	08:21	16:04	16:50	17:39	
8	297°06.3	-19°36.1	4°16.8	13.6	-14°47.6	-6.1	54.2	56	06:41	07:27	08:10	16:14	16:57	17:43	
9	312°06.1	-19°35.5	18°49.3	13.5	-14°53.7	-6.0	54.2	54	06:37	07:21	08:01	16:24	17:04	17:47	
10	327°06.0	-19°34.9	33°21.8	13.5	-14°59.7	-6.0	54.2	52	06:33	07:15	07:52	16:32	17:10	17:51	
11	342°05.8	-19°34.3	47°54.3	13.5	-15°05.6	-5.9	54.2	50	06:29	07:09	07:45	16:39	17:15	17:55	
12	357°05.6	-19°33.8	62°26.7	13.4	-15°11.4	-5.8	54.2	45	06:21	06:57	07:29	16:55	17:27	18:03	
13	12°05.5	-19°33.2	76°59.1	13.4	-15°17.2	-5.8	54.2	40	06:14	06:46	07:16	17:08	17:38	18:11	
14	27°05.3	-19°32.6	91°31.5	13.4	-15°23.0	-5.7	54.2	35	06:07	06:37	07:04	17:20	17:47	18:17	
15	42°05.1	-19°32.0	106°03.9	13.3	-15°28.6	-5.6	54.2	30	06:00	06:29	06:55	17:30	17:55	18:24	
16	57°05.0	-19°31.4	120°36.2	13.3	-15°34.2	-5.6	54.2	20	05:47	06:14	06:37	17:46	18:10	18:37	
17	72°04.8	-19°30.9	135°08.4	13.3	-15°39.8	-5.5	54.2	10	05:35	06:00	06:22	18:01	18:24	18:49	
18	87°04.6	-19°30.3	149°40.7	13.2	-15°45.2	-5.4	54.2	0	05:21	05:46	06:08	18:15	18:37	19:03	
19	102°04.5	-19°29.7	164°12.9	13.2	-15°50.6	-5.4	54.2	-10	05:05	05:32	05:54	18:30	18:52	19:18	
20	117°04.3	-19°29.1	178°45.0	13.1	-15°56.0	-5.3	54.2	-20	04:47	05:15	05:39	18:45	19:09	19:37	
21	132°04.2	-19°28.5	193°17.2	13.1	-16°01.2	-5.2	54.2	-30	04:23	04:54	05:21	19:03	19:29	20:00	
22	147°04.0	-19°27.9	207°49.3	13.1	-16°06.4	-5.2	54.2	-35	04:08	04:42	05:10	19:13	19:41	20:15	
23	162°03.8	-19°27.4	222°21.3	13.0	-16°11.5	-5.1	54.2	-40	03:49	04:27	04:58	19:25	19:56	20:34	
SD.=16.3 d=0.6 S.D.=14.8								-45	03:25	04:09	04:44	19:39	20:13	20:57	
								-50	02:53	03:47	04:26	19:56	20:36	21:29	
								-52	02:36	03:35	04:18	20:05	20:47	21:46	
								-54	02:14	03:22	04:09	20:14	20:60	22:07	
								-56	01:46	03:07	03:58	20:24	21:15	22:34	
								-58	00:57	02:49	03:46	20:36	21:32	23:19	
								-60	--	02:26	03:32	20:50	21:55	--	
								Moonrise			Moonset				
								Lat.	Sun	Mon	Tue	Sun	Mon	Tue	
								72	05:11	07:04	--	10:02	09:45	--	
								70	04:38	06:09	07:36	10:36	10:40	10:51	
								68	04:15	05:37	06:52	10:60	11:13	11:36	
								66	03:57	05:13	06:23	11:18	11:37	12:06	
								64	03:43	04:54	06:00	11:34	11:56	12:28	
								62	03:30	04:39	05:43	11:46	12:12	12:46	
								60	03:20	04:26	05:28	11:57	12:25	13:01	
								58	03:11	04:15	05:16	12:07	12:36	13:13	
								56	03:03	04:06	05:05	12:15	12:46	13:24	
								54	02:56	03:57	04:56	12:22	12:55	13:34	
								52	02:50	03:50	04:47	12:29	13:03	13:42	
								50	02:44	03:43	04:40	12:35	13:10	13:50	
								45	02:32	03:29	04:24	12:48	13:25	14:06	
								40	02:22	03:17	04:10	12:58	13:37	14:20	
								35	02:14	03:07	03:59	13:08	13:48	14:31	
								30	02:06	02:58	03:49	13:16	13:57	14:41	
								20	01:53	02:43	03:33	13:30	14:13	14:58	
								10	01:42	02:29	03:18	13:42	14:27	15:14	
								0	01:31	02:17	03:04	13:53	14:40	15:28	
								-10	01:21	02:05	02:51	14:05	14:53	15:42	
								-20	01:10	01:52	02:36	14:17	15:07	15:57	
								-30	00:57	01:37	02:20	14:31	15:23	16:14	
								-35	00:50	01:28	02:10	14:39	15:32	16:24	
								-40	00:42	01:18	01:59	14:49	15:43	16:35	
								-45	00:32	01:07	01:46	14:59	15:55	16:49	
								-50	00:20	00:53	01:30	15:13	16:10	17:05	
								-52	00:15	00:46	01:23	15:19	16:18	17:13	
								-54	00:09	00:39	01:15	15:26	16:25	17:22	
								-56	00:03	00:31	01:06	15:33	16:34	17:31	
								-58	--	00:22	00:55	15:42	16:44	17:42	
								-60	--	00:12	00:44	15:52	16:56	17:55	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age			
									00 ^h	12 ^h	Pass	Upper	Lower		
								22	11:30	11:38	12:11	07:42	20:05	24(27%)	
								23	11:45	11:53	12:11	08:28	20:51	25(19%)	
								24	12:00	12:08	12:12	09:15	21:40	26(12%)	
SD.=16.2 d=0.6 S.D.=14.9															

January 25, 26 ,27 (Wed., Thu., Fri.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Wed	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass		
0	124°29.5	132°24.4	-2°30.2	126°31.2	-1°24.2	282°47.4	-7°37.5	221°01.8	-22°00.9	236°04.0	-22°00.9	236°04.0	Alpheratz	357°41.1	29°11.1		
1	139°32.0	147°24.9	-2°29.0	141°32.0	-1°23.4	297°49.7	-7°37.5	236°04.0	-22°00.9	236°04.0	-22°00.9	236°04.0	Ankaa	353°13.5	-42°13.1		
2	154°34.4	162°25.4	-2°27.8	156°32.8	-1°22.6	312°52.1	-7°37.5	251°06.2	-22°00.9	251°06.2	-22°00.9	251°06.2	Schedar	349°37.8	56°38.0		
3	169°36.9	177°25.9	-2°26.6	171°33.5	-1°21.9	327°54.5	-7°37.6	266°08.4	-22°00.9	266°08.4	-22°00.9	266°08.4	Diphda	348°53.5	-17°53.8		
4	184°39.4	192°26.4	-2°25.4	186°34.3	-1°21.1	342°56.8	-7°37.6	281°10.6	-22°00.9	281°10.6	-22°00.9	281°10.6	Achernar	335°25.2	-57°09.4		
5	199°41.8	207°26.9	-2°24.3	201°35.0	-1°20.3	357°59.2	-7°37.6	296°12.8	-22°00.9	296°12.8	-22°00.9	296°12.8	Hamal	327°58.0	23°32.5		
6	214°44.3	222°27.4	-2°23.1	216°35.8	-1°19.5	13°01.6	-7°37.6	311°15.0	-22°01.0	311°15.0	-22°01.0	311°15.0	Polaris	316°33.6	89°20.4		
7	229°46.8	237°27.9	-2°21.9	231°36.6	-1°18.8	28°04.0	-7°37.7	326°17.2	-22°01.0	326°17.2	-22°01.0	326°17.2	Akamar	315°16.4	-40°14.6		
8	244°49.2	252°28.4	-2°20.7	246°37.3	-1°18.0	43°06.3	-7°37.7	341°19.4	-22°01.0	341°19.4	-22°01.0	341°19.4	Menkar	314°12.4	4°09.2		
9	259°51.7	267°28.9	-2°19.5	261°38.1	-1°17.2	58°08.7	-7°37.7	356°21.6	-22°01.0	356°21.6	-22°01.0	356°21.6	Mirfak	308°36.6	49°55.3		
10	274°54.2	282°29.4	-2°18.3	276°38.9	-1°16.4	73°11.1	-7°37.7	11°23.8	-22°01.0	11°23.8	-22°01.0	11°23.8	Aldebaran	290°46.4	16°32.4		
11	289°56.6	297°29.9	-2°17.1	291°39.6	-1°15.6	88°13.4	-7°37.8	26°26.0	-22°01.0	26°26.0	-22°01.0	26°26.0	Rigel	281°09.5	-8°11.2		
12	304°59.1	312°30.4	-2°16.0	306°40.4	-1°14.9	103°15.8	-7°37.8	41°28.2	-22°01.0	41°28.2	-22°01.0	41°28.2	Capella	280°30.5	46°00.8		
13	320°01.5	327°30.9	-2°14.8	321°41.1	-1°14.1	118°18.2	-7°37.8	56°30.4	-22°01.0	56°30.4	-22°01.0	56°30.4	Bellatrix	278°29.1	6°21.6		
14	335°04.0	342°31.4	-2°13.6	336°41.9	-1°13.3	133°20.6	-7°37.8	71°32.6	-22°01.0	71°32.6	-22°01.0	71°32.6	Elnath	278°09.2	28°37.1		
15	350°06.5	357°31.9	-2°12.4	351°42.7	-1°12.5	148°22.9	-7°37.9	86°34.8	-22°01.0	86°34.8	-22°01.0	86°34.8	Alnilam	275°43.6	-1°11.8		
16	5°08.9	12°32.4	-2°11.2	6°43.4	-1°11.7	163°25.3	-7°37.9	101°37.0	-22°01.1	101°37.0	-22°01.1	101°37.0	Betelgeuse	270°58.4	7°24.3		
17	20°11.4	27°32.9	-2°10.1	21°44.2	-1°11.0	178°27.7	-7°37.9	116°39.2	-22°01.1	116°39.2	-22°01.1	116°39.2	Canopus	263°54.6	-52°42.6		
18	35°13.9	42°33.4	-2°08.9	36°45.0	-1°10.2	193°30.1	-7°37.9	131°41.4	-22°01.1	131°41.4	-22°01.1	131°41.4	Sirius	258°31.1	-16°44.5		
19	50°16.3	57°33.9	-2°07.7	51°45.7	-1°09.4	208°32.4	-7°38.0	146°43.6	-22°01.1	146°43.6	-22°01.1	146°43.6	Adara	255°10.2	-29°00.0		
20	65°18.8	72°34.4	-2°06.5	66°46.5	-1°08.6	223°34.8	-7°38.0	161°45.8	-22°01.1	161°45.8	-22°01.1	161°45.8	Procyon	244°56.8	5°10.8		
21	80°21.3	87°34.9	-2°05.3	81°47.2	-1°07.8	238°37.2	-7°38.0	176°48.0	-22°01.1	176°48.0	-22°01.1	176°48.0	Pollux	243°24.3	27°58.9		
22	95°23.7	102°35.4	-2°04.1	96°48.0	-1°07.1	253°39.6	-7°38.0	191°50.2	-22°01.1	191°50.2	-22°01.1	191°50.2	Avior	234°16.3	-59°34.0		
23	110°26.2	117°36.0	-2°03.0	111°48.8	-1°06.3	268°41.9	-7°38.1	206°52.4	-22°01.1	206°52.4	-22°01.1	206°52.4	Suhail	222°50.1	-43°30.2		
Mer.pass.:15:39			v0.5 d1.2 m-4.3			v0.8 d0.8 m1.1			v2.4 d-0.0 m-1.9			v2.2 d-0.0 m0.5					
Miaplacidus			221°38.1			-69°47.3											
Alphard			217°53.3			-8°44.1											
Regulus			207°40.6			11°52.8											
Dubhe			193°48.3			61°39.3											
Denebola			182°30.9			14°28.5											
Genah			175°49.6			-17°38.1											
Acru			173°06.1			-63°11.3											
Gacrux			171°57.8			-57°12.2											
Alioth			166°18.5			55°51.8											
Spica			158°28.6			-11°14.9											
Alcaid			152°57.0			49°13.5											
Hadar			148°44.2			-60°26.9											
Menkent			148°04.6			-36°26.9											
Arcturus			145°53.4			19°05.9											
Rigel Kent.			139°48.3			-60°53.9											
Zubenelg.			137°02.7			-16°06.6											
Kochab			137°20.5			74°04.9											
Alphecca			126°09.1			26°39.4											
Antares			112°23.4			-26°27.9											
Atria			107°23.4			-69°03.0											
Sabik			102°10.0			-15°44.5											
Shaula			96°18.9			-37°06.7											
Rasalhague			96°04.5			12°33.0											
Etamin			90°45.4			51°29.2											
Kaus Aust.			83°40.9			-34°22.3											
Vega			80°37.7			38°48.0											
Nunki			75°55.6			-26°16.3											
Altair			62°06.2			8°54.8											
Peacock			53°16.1			-56°40.7											
Deneb			49°30.2			45°20.6											
Enif			33°45.0			9°57.2											
Alnair			27°41.2			-46°52.8											
Fomalhaut			15°21.7			-29°32.0											
Scheat			13°51.3			28°10.6											
Markab			13°36.1			15°17.8											
2017/1/2			SHA			Mer.pass											
Venus			7°54.9			15:10											
Mars			2°01.7			15:33											
Jupiter			158°17.8			05:08											
Saturn			96°32.3			09:15											
2017/1/2			SHA			Mer.pass											
Venus			7°07.8			15:09											
Mars			1°20.9			15:32											
Jupiter			158°15.7			05:04											
Saturn			96°25.9			09:11											
2017/1/2			SHA			Mer.pass											
Venus			6°21.4			15:08											
Mars			0°40.1			15:31											
Jupiter			158°13.7			05:00											
Saturn			96°19.7			09:07											
Horizontal parallax																	
Venus:						0.3											
Mars:						0.1											
Mer.pass.:15:31			v0.5 d1.2 m-4.4			v0.8 d0.8 m1.1			v2.4 d-0.0 m-2.0			v2.2 d-0.0 m0.6					

h		Sun		Moon				Twilight						
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
0	176°56.4	-18°57.9	213°48.5	11.3	-18°47.4	-1.1	54.8	72	07:29	09:04	11:34	12:53	15:22	16:57
1	191°56.2	-18°57.3	228°18.8	11.3	-18°48.4	-1.0	54.8	70	07:19	08:41	10:19	14:07	15:45	17:08
2	206°56.1	-18°56.7	242°49.1	11.3	-18°49.4	-0.9	54.8	68	07:10	08:23	09:42	14:44	16:03	17:16
3	221°55.9	-18°56.0	257°19.4	11.3	-18°50.3	-0.8	54.9	66	07:03	08:09	09:16	15:10	16:17	17:23
4	236°55.8	-18°55.4	271°49.6	11.2	-18°51.1	-0.7	54.9	64	06:57	07:57	08:56	15:30	16:29	17:29
5	251°55.6	-18°54.8	286°19.8	11.2	-18°51.8	-0.7	54.9	62	06:51	07:47	08:40	15:46	16:39	17:35
6	266°55.5	-18°54.2	300°50.0	11.2	-18°52.4	-0.6	54.9	60	06:46	07:38	08:27	15:59	16:48	17:40
7	281°55.4	-18°53.6	315°20.2	11.1	-18°52.9	-0.5	54.9	58	06:41	07:30	08:15	16:11	16:56	17:44
8	296°55.2	-18°52.9	329°50.3	11.1	-18°53.3	-0.4	54.9	56	06:37	07:23	08:05	16:21	17:03	17:49
9	311°55.1	-18°52.3	344°20.4	11.1	-18°53.7	-0.3	55.0	54	06:33	07:17	07:56	16:29	17:09	17:52
10	326°54.9	-18°51.7	358°50.5	11.1	-18°53.9	-0.2	55.0	52	06:30	07:11	07:49	16:37	17:15	17:56
11	341°54.8	-18°51.1	13°20.5	11.0	-18°54.0	-0.1	55.0	50	06:26	07:06	07:41	16:44	17:20	17:59
12	356°54.6	-18°50.4	27°50.6	11.0	-18°54.1	-0.0	55.0	45	06:19	06:54	07:26	16:60	17:31	18:07
13	11°54.5	-18°49.8	42°20.6	11.0	-18°54.0	0.1	55.0	40	06:12	06:45	07:14	17:12	17:41	18:14
14	26°54.4	-18°49.2	56°50.6	11.0	-18°53.9	0.2	55.1	35	06:05	06:36	07:03	17:23	17:50	18:20
15	41°54.2	-18°48.6	71°20.5	11.0	-18°53.7	0.3	55.1	30	05:59	06:28	06:53	17:32	17:57	18:26
16	56°54.1	-18°47.9	85°50.5	10.9	-18°53.4	0.4	55.1	20	05:47	06:14	06:37	17:48	18:12	18:38
17	71°53.9	-18°47.3	100°20.4	10.9	-18°52.9	0.5	55.1	10	05:35	06:00	06:23	18:03	18:25	18:50
18	86°53.8	-18°46.7	114°50.3	10.9	-18°52.4	0.6	55.1	0	05:22	05:47	06:09	18:16	18:38	19:03
19	101°53.7	-18°46.1	129°20.2	10.9	-18°51.8	0.7	55.1	-10	05:07	05:33	05:55	18:30	18:52	19:18
20	116°53.5	-18°45.4	143°50.0	10.8	-18°51.1	0.8	55.2	-20	04:49	05:17	05:41	18:44	19:08	19:36
21	131°53.4	-18°44.8	158°19.8	10.8	-18°50.3	0.8	55.2	-30	04:26	04:57	05:23	19:01	19:27	19:59
22	146°53.3	-18°44.2	172°49.7	10.8	-18°49.4	0.9	55.2	-35	04:11	04:45	05:13	19:11	19:39	20:13
23	161°53.1	-18°43.6	187°19.5	10.8	-18°48.4	1.0	55.2	-40	03:53	04:31	05:02	19:23	19:53	20:31
SD.=16.2 d=0.6 S.D.=15.0								-45	03:31	04:14	04:48	19:36	20:10	20:53
								-50	03:00	03:52	04:32	19:53	20:32	21:23
								-52	02:44	03:42	04:24	20:00	20:42	21:39
								-54	02:24	03:29	04:15	20:09	20:54	21:58
								-56	01:59	03:15	04:05	20:19	21:08	22:23
								-58	01:21	02:58	03:54	20:30	21:25	22:59
								-60	--	02:37	03:40	20:43	21:45	--
								Moonrise			Moonset			
								Lat.	Wed	Thu	Fri	Wed	Thu	Fri
								72	--	--	10:36	--	--	13:03
								70	08:46	09:24	09:38	11:23	12:30	14:01
								68	07:54	08:37	09:03	12:15	13:16	14:35
								66	07:22	08:07	08:38	12:48	13:46	14:59
								64	06:58	07:44	08:19	13:11	14:08	15:18
								62	06:39	07:26	08:03	13:30	14:26	15:33
								60	06:24	07:11	07:50	13:46	14:41	15:46
								58	06:11	06:58	07:38	13:59	14:54	15:58
								56	05:59	06:47	07:28	14:10	15:05	16:07
								54	05:49	06:38	07:19	14:20	15:14	16:16
								52	05:41	06:29	07:12	14:29	15:23	16:23
								50	05:33	06:21	07:04	14:37	15:30	16:30
								45	05:16	06:05	06:49	14:54	15:47	16:45
								40	05:02	05:51	06:37	15:08	16:00	16:57
								35	04:50	05:39	06:26	15:19	16:11	17:07
								30	04:40	05:29	06:17	15:30	16:21	17:16
								20	04:22	05:12	06:00	15:47	16:38	17:32
								10	04:07	04:57	05:46	16:02	16:53	17:45
								0	03:53	04:43	05:33	16:17	17:07	17:57
								-10	03:39	04:29	05:20	16:31	17:21	18:10
								-20	03:23	04:13	05:06	16:46	17:35	18:23
								-30	03:06	03:56	04:50	17:04	17:52	18:38
								-35	02:56	03:46	04:40	17:14	18:02	18:47
								-40	02:44	03:34	04:29	17:26	18:13	18:57
								-45	02:31	03:21	04:17	17:39	18:26	19:09
								-50	02:14	03:04	04:01	17:56	18:42	19:23
								-52	02:06	02:57	03:54	18:04	18:49	19:29
								-54	01:58	02:48	03:46	18:13	18:58	19:36
								-56	01:48	02:38	03:37	18:22	19:07	19:44
								-58	01:37	02:27	03:27	18:33	19:17	19:53
								-60	01:24	02:14	03:15	18:46	19:29	20:04
								Sun			Moon			
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age		
									00 ^h	12 ^h	Pass	Upper	Lower	
								25	12:15	12:22	12:12	10:04	22:29	27(6%)
								26	12:28	12:35	12:12	10:54	23:20	28(2%)
								27	12:41	12:47	12:12	11:45	00:10	29(0%)
SD.=16.2 d=0.6 S.D.=15.2														

January 28, 29 ,30 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	127°26.9	133°02.7	-1°05.3	127°26.2	-0°28.1	285°38.8	-7°39.1	223°40.4	-22°01.6	Alpheratz	357°41.1	29°11.1					
1	142°29.4	148°03.2	-1°04.1	142°27.0	-0°27.3	300°41.2	-7°39.1	238°42.6	-22°01.6	Ankaa	353°13.5	-42°13.1					
2	157°31.9	163°03.8	-1°03.0	157°27.8	-0°26.5	315°43.6	-7°39.1	253°44.8	-22°01.6	Schedar	349°37.9	56°38.0					
3	172°34.3	178°04.4	-1°01.8	172°28.5	-0°25.8	330°46.0	-7°39.1	268°47.0	-22°01.6	Diphda	348°53.5	-17°53.8					
4	187°36.8	193°05.0	-1°00.6	187°29.3	-0°25.0	345°48.3	-7°39.1	283°49.2	-22°01.6	Achernar	335°25.2	-57°09.4					
5	202°39.3	208°05.6	-0°59.4	202°30.1	-0°24.2	0°50.7	-7°39.1	298°51.4	-22°01.7	Hamal	327°58.0	23°32.5					
6	217°41.7	223°06.1	-0°58.3	217°30.8	-0°23.4	15°53.1	-7°39.2	313°53.6	-22°01.7	Polaris	316°35.0	89°20.4					
7	232°44.2	238°06.7	-0°57.1	232°31.6	-0°22.7	30°55.5	-7°39.2	328°55.8	-22°01.7	Akamar	315°16.4	-40°14.6					
8	247°46.6	253°07.3	-0°55.9	247°32.4	-0°21.9	45°57.9	-7°39.2	343°58.0	-22°01.7	Menkar	314°12.4	4°09.2					
9	262°49.1	268°07.9	-0°54.8	262°33.1	-0°21.1	61°00.3	-7°39.2	359°00.2	-22°01.7	Mirfak	308°36.6	49°55.3					
10	277°51.6	283°08.5	-0°53.6	277°33.9	-0°20.3	76°02.7	-7°39.2	14°02.4	-22°01.7	Aldebaran	290°46.4	16°32.4					
11	292°54.0	298°09.1	-0°52.4	292°34.7	-0°19.5	91°05.1	-7°39.2	29°04.6	-22°01.7	Rigel	281°09.5	-8°11.3					
12	307°56.5	313°09.7	-0°51.2	307°35.4	-0°18.8	106°07.5	-7°39.3	44°06.9	-22°01.7	Capella	280°30.5	46°00.9					
13	322°59.0	328°10.3	-0°50.1	322°36.2	-0°18.0	121°09.9	-7°39.3	59°09.1	-22°01.7	Bellatrix	278°29.1	6°21.6					
14	338°01.4	343°10.9	-0°48.9	337°37.0	-0°17.2	136°12.3	-7°39.3	74°11.3	-22°01.7	Elnath	278°09.2	28°37.1					
15	353°03.9	358°11.5	-0°47.7	352°37.7	-0°16.4	151°14.7	-7°39.3	89°13.5	-22°01.7	Alnilam	275°43.6	-1°11.8					
16	8°06.4	13°12.1	-0°46.6	7°38.5	-0°15.6	166°17.1	-7°39.3	104°15.7	-22°01.8	Betelgeuse	270°58.4	7°24.3					
17	23°08.8	28°12.6	-0°45.4	22°39.3	-0°14.9	181°19.5	-7°39.3	119°17.9	-22°01.8	Canopus	263°54.6	-52°42.7					
18	38°11.3	43°13.2	-0°44.2	37°40.0	-0°14.1	196°21.9	-7°39.3	134°20.1	-22°01.8	Sirius	258°31.1	-16°44.5					
19	53°13.8	58°13.8	-0°43.1	52°40.8	-0°13.3	211°24.3	-7°39.4	149°22.3	-22°01.8	Adara	255°10.2	-29°00.0					
20	68°16.2	73°14.4	-0°41.9	67°41.6	-0°12.5	226°26.7	-7°39.4	164°24.5	-22°01.8	Procyon	244°56.8	5°10.8					
21	83°18.7	88°15.0	-0°40.7	82°42.3	-0°11.8	241°29.1	-7°39.4	179°26.7	-22°01.8	Pollux	243°24.3	27°58.9					
22	98°21.1	103°15.7	-0°39.6	97°43.1	-0°11.0	256°31.5	-7°39.4	194°28.9	-22°01.8	Avior	234°16.3	-59°34.0					
23	113°23.6	118°16.3	-0°38.4	112°43.9	-0°10.2	271°33.9	-7°39.4	209°31.1	-22°01.8	Suhail	222°50.1	-43°30.2					
Mer.pass.:15:27			v0.6 d1.2 m-4.4			v0.8 d0.8 m1.1			v2.4 d-0.0 m-2.0			v2.2 d-0.0 m0.6			Miaplacidus 221°38.1 -69°47.3		
															Alphard 217°53.3 -8°44.1		
															Regulus 207°40.6 11°52.8		
															Dubhe 193°48.3 61°39.3		
															Denebola 182°30.9 14°28.5		
															Gienah 175°49.5 -17°38.1		
															Acruz 173°06.1 -63°11.3		
															Gacrux 171°57.7 -57°12.3		
															Alioth 166°18.5 55°51.8		
															Spica 158°28.6 -11°14.9		
															Alcaid 152°56.9 49°13.5		
															Hadar 148°44.2 -60°26.9		
															Menkent 148°04.6 -36°27.0		
															Arcturus 145°53.3 19°05.9		
															Rigel Kent. 139°48.3 -60°53.9		
															Zubenelg. 137°02.7 -16°06.6		
															Kochab 137°20.4 74°04.9		
															Alphecca 126°09.1 26°39.4		
															Antares 112°23.4 -26°27.9		
															Atria 107°23.3 -69°03.0		
															Sabik 102°09.9 -15°44.5		
															Shaula 96°18.9 -37°06.7		
															Rasalhague 96°04.4 12°33.0		
															Etamin 90°45.4 51°29.2		
															Kaus Aust. 83°40.9 -34°22.3		
															Vega 80°37.7 38°48.0		
															Nunki 75°55.6 -26°16.3		
															Altair 62°06.2 8°54.8		
															Peacock 53°16.0 -56°40.7		
															Deneb 49°30.2 45°20.6		
															Enif 33°45.0 9°57.2		
															Alnair 27°41.2 -46°52.8		
															Fomalhaut 15°21.7 -29°32.0		
															Scheat 13°51.3 28°10.5		
															Markab 13°36.1 15°17.8		
															2017/1/2 SHA Mer.pass		
															Venus 5°35.7 15:07		
															Mars 359°59.3 15:29		
															Jupiter 158°11.8 04:57		
															Saturn 96°13.4 09:04		
															2017/1/2 SHA Mer.pass		
															Venus 4°50.8 15:06		
															Mars 359°18.6 15:28		
															Jupiter 158°10.2 04:53		
															Saturn 96°07.3 09:00		
															2017/1/3 SHA Mer.pass		
															Venus 4°06.6 15:05		
															Mars 358°37.8 15:27		
															Jupiter 158°08.7 04:49		
															Saturn 96°01.2 08:57		
															Horizontal parallax		
															Venus: 0.3		
															Mars: 0.1		
Mer.pass.:15:19			v0.6 d1.2 m-4.4			v0.8 d0.8 m1.1			v2.4 d-0.0 m-2.0			v2.2 d-0.0 m0.6					

Sun								Moon							
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
									Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	176°46.8	-18°12.0	177°26.5	10.5	-16°03.3	5.6	56.3	72	07:19	08:51	10:53	13:35	15:37	17:09	
1	191°46.7	-18°11.3	191°56.0	10.5	-15°57.6	5.7	56.3	70	07:10	08:30	10:01	14:26	15:57	17:17	
2	206°46.6	-18°10.7	206°25.5	10.5	-15°51.8	5.8	56.3	68	07:03	08:14	09:29	14:58	16:13	17:25	
3	221°46.5	-18°10.0	220°55.0	10.5	-15°45.9	5.9	56.3	66	06:56	08:01	09:06	15:21	16:26	17:31	
4	236°46.4	-18°09.3	235°24.5	10.5	-15°40.0	6.0	56.4	64	06:50	07:50	08:48	15:39	16:37	17:37	
5	251°46.3	-18°08.7	249°54.0	10.5	-15°34.0	6.1	56.4	62	06:45	07:40	08:33	15:54	16:47	17:42	
6	266°46.1	-18°08.0	264°23.5	10.5	-15°27.8	6.2	56.4	60	06:41	07:32	08:20	16:07	16:55	17:46	
7	281°46.0	-18°07.4	278°53.0	10.5	-15°21.6	6.3	56.4	58	06:37	07:25	08:09	16:18	17:02	17:50	
8	296°45.9	-18°06.7	293°22.5	10.5	-15°15.3	6.3	56.5	56	06:33	07:18	08:00	16:27	17:09	17:54	
9	311°45.8	-18°06.0	307°52.1	10.5	-15°08.9	6.4	56.5	54	06:30	07:13	07:52	16:35	17:14	17:57	
10	326°45.7	-18°05.4	322°21.6	10.5	-15°02.5	6.5	56.5	52	06:26	07:07	07:44	16:43	17:20	18:01	
11	341°45.5	-18°04.7	336°51.1	10.6	-14°55.9	6.6	56.5	50	06:23	07:02	07:37	16:49	17:25	18:04	
12	356°45.4	-18°04.0	351°20.7	10.6	-14°49.3	6.7	56.5	45	06:16	06:52	07:23	17:04	17:35	18:11	
13	11°45.3	-18°03.4	5°50.3	10.6	-14°42.6	6.8	56.6	40	06:10	06:42	07:11	17:16	17:44	18:17	
14	26°45.2	-18°02.7	20°19.9	10.6	-14°35.8	6.8	56.6	35	06:04	06:34	07:01	17:26	17:53	18:23	
15	41°45.1	-18°02.0	34°49.4	10.6	-14°28.9	6.9	56.6	30	05:58	06:27	06:52	17:35	17:60	18:29	
16	56°45.0	-18°01.4	49°19.0	10.6	-14°21.9	7.0	56.6	20	05:47	06:13	06:36	17:50	18:13	18:40	
17	71°44.9	-18°00.7	63°48.6	10.6	-14°14.9	7.1	56.6	10	05:35	06:01	06:23	18:04	18:26	18:51	
18	86°44.7	-18°00.0	78°18.3	10.6	-14°07.8	7.2	56.7	0	05:23	05:48	06:10	18:17	18:38	19:04	
19	101°44.6	-17°59.4	92°47.9	10.6	-14°00.6	7.2	56.7	-10	05:08	05:34	05:57	18:30	18:52	19:18	
20	116°44.5	-17°58.7	107°17.5	10.6	-13°53.3	7.3	56.7	-20	04:51	05:19	05:42	18:44	19:07	19:35	
21	131°44.4	-17°58.0	121°47.2	10.7	-13°46.0	7.4	56.7	-30	04:29	05:00	05:26	18:60	19:26	19:57	
22	146°44.3	-17°57.4	136°16.8	10.7	-13°38.5	7.5	56.8	-35	04:15	04:49	05:16	19:09	19:37	20:11	
23	161°44.2	-17°56.7	150°46.5	10.7	-13°31.0	7.5	56.8	-40	03:58	04:35	05:06	19:20	19:50	20:27	
SD.=16.2 d=0.7 S.D.=15.4								-45	03:36	04:19	04:53	19:33	20:06	20:49	
								-50	03:07	03:58	04:37	19:49	20:27	21:17	
								-52	02:52	03:48	04:29	19:56	20:27	21:32	
								-54	02:34	03:37	04:21	20:04	20:48	21:50	
								-56	02:11	03:23	04:12	20:13	21:01	22:12	
								-58	01:40	03:08	04:01	20:24	21:17	22:42	
								-60	00:30	02:48	03:49	20:36	21:35	23:38	
								Moonrise			Moonset				
								Lat.	Sat	Sun	Mon	Sat	Sun	Mon	
								72	10:16	10:06	09:57	15:08	17:04	18:55	
								70	09:43	09:45	09:45	15:41	17:23	19:06	
								68	09:19	09:28	09:35	16:04	17:38	19:15	
								66	08:60	09:15	09:26	16:22	17:51	19:22	
								64	08:44	09:04	09:19	16:37	18:01	19:28	
								62	08:32	08:54	09:12	16:49	18:10	19:33	
								60	08:21	08:46	09:07	16:59	18:17	19:38	
								58	08:11	08:39	09:02	17:08	18:24	19:42	
								56	08:03	08:32	08:58	17:16	18:29	19:45	
								54	07:55	08:27	08:54	17:23	18:34	19:48	
								52	07:49	08:21	08:50	17:29	18:39	19:51	
								50	07:43	08:17	08:47	17:35	18:43	19:54	
								45	07:30	08:06	08:40	17:47	18:52	19:59	
								40	07:19	07:58	08:34	17:57	18:60	20:04	
								35	07:10	07:51	08:29	18:06	19:06	20:08	
								30	07:02	07:44	08:25	18:13	19:12	20:11	
								20	06:48	07:33	08:17	18:26	19:22	20:17	
								10	06:35	07:23	08:10	18:37	19:30	20:23	
								0	06:24	07:14	08:04	18:48	19:38	20:28	
								-10	06:12	07:05	07:57	18:58	19:46	20:32	
								-20	05:60	06:55	07:51	19:09	19:54	20:38	
								-30	05:46	06:44	07:43	19:22	20:04	20:43	
								-35	05:37	06:37	07:38	19:29	20:09	20:47	
								-40	05:28	06:30	07:33	19:37	20:15	20:50	
								-45	05:17	06:21	07:27	19:47	20:22	20:55	
								-50	05:04	06:10	07:20	19:59	20:31	20:60	
								-52	04:58	06:06	07:17	20:04	20:35	21:02	
								-54	04:51	06:00	07:13	20:10	20:39	21:05	
								-56	04:43	05:54	07:09	20:16	20:44	21:08	
								-58	04:34	05:48	07:04	20:24	20:49	21:11	
								-60	04:24	05:40	06:59	20:32	20:55	21:14	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age			
									00 ^h	12 ^h	Pass	Upper	Lower		
								28	12:53	12:58	12:12	12:35	00:10	0(0%)	
								29	13:04	13:09	12:13	13:26	01:00	1(2%)	
								30	13:14	13:19	12:13	14:15	01:50	2(7%)	
SD.=16.2 d=0.7 S.D.=15.6															
Sun								Moon							
0	176°41.5	-17°39.7	153°11.7	10.9	-10°00.2	9.2	57.3								
1	191°41.4	-17°39.0	167°41.7	11.0	-9°50.9	9.3	57.3								
2	206°41.3	-17°38.4	182°11.6	11.0	-9°41.6	9.4	57.3								
3	221°41.2	-17°37.7	196°41.6	11.0	-9°32.2	9.4	57.4								
4	236°41.1	-17°37.0	211°11.6	11.0	-9°22.7	9.5	57.4								
5	251°41.0	-17°36.3	225°41.6	11.0	-9°13.2	9.5	57.4								
6	266°40.9	-17°35.6	240°11.6	11.0	-9°03.7	9.6	57.4								
7	281°40.8	-17°34.9	254°41.6	11.0	-8°54.1	9.6	57.4								
8	296°40.7	-17°34.2	269°11.6	11.0	-8°44.4	9.7	57.5								
9	311°40.6	-17°33.5	283°41.6	11.0	-8°34.7	9.7	57.5								
10	326°40.5	-17°32.8	298°11.7	11.0	-8°24.9	9.8	57.5								
11	341°40.4	-17°32.2	312°41.7	11.0	-8°15.1	9.8	57.5								
12	356°40.3	-17°31.5	327°11.7	11.0	-8°05.3	9.9	57.5								
13	11°40.2	-17°30.8	341°41.8	11.1	-7°55.4	9.9	57.6								
14	26°40.1	-17°30.1	356°11.8	11.1	-7°45.4	10.0	57.6								
15	41°40.0	-17°29.4	10°41.9	11.1	-7°35.4	10.0	57.6								
16	56°39.9	-17°28.7	25°12.0	11.1	-7°25.4	10.1	57.6								
17	71°39.8	-17°28.0	39°42.1	11.1	-7°15.3	10.1	57.6								
18	86°39.7	-17°27.3	54°12.1	11.1	-7°05.1	10.2	57.7								
19	101°39.6	-17°26.6	68°42.2	11.1	-6°55.0	10.2	57.7								
20	116°39.5	-17°25.9	83°12.3	11.1	-6°44.7	10.2	57.7								
21	131°39.4	-17°25.2	97°42.4	11.1	-6°34.5	10.3	57.7								
22	146°39.3	-17°24.5	112°12.5	11.1	-6°24.2	10.3	57.7								
23	161°39.2	-17°23.8	126°42.6	11.1	-6°13.8	10.4	57.7								
SD.=16.2 d=0.7 S.D.=15.6															

January 31, 01 ,02 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	130°24.3	133°47.5	0°18.4	128°21.5	0°27.9	288°31.8	-7°40.0	226°19.5	-22°02.2	Alpheratz	357°41.1	29°11.1
1	145°26.8	148°48.2	0°19.6	143°22.2	0°28.7	303°34.2	-7°40.0	241°21.7	-22°02.3	Ankaa	353°13.6	-42°13.1
2	160°29.3	163°48.9	0°20.8	158°23.0	0°29.4	318°36.6	-7°40.0	256°23.9	-22°02.3	Schedar	349°37.9	56°38.0
3	175°31.7	178°49.6	0°21.9	173°23.8	0°30.2	333°39.0	-7°40.0	271°26.1	-22°02.3	Diphda	348°53.5	-17°53.8
4	190°34.2	193°50.2	0°23.1	188°24.5	0°31.0	348°41.4	-7°40.0	286°28.3	-22°02.3	Achernar	335°25.2	-57°09.4
5	205°36.7	208°50.9	0°24.2	203°25.3	0°31.8	3°43.8	-7°40.0	301°30.6	-22°02.3	Hamal	327°58.0	23°32.5
6	220°39.1	223°51.6	0°25.4	218°26.1	0°32.5	18°46.3	-7°40.0	316°32.8	-22°02.3	Polaris	316°36.5	89°20.4
7	235°41.6	238°52.3	0°26.5	233°26.8	0°33.3	33°48.7	-7°40.0	331°35.0	-22°02.3	Akamar	315°16.5	-40°14.6
8	250°44.1	253°53.0	0°27.7	248°27.6	0°34.1	48°51.1	-7°40.1	346°37.2	-22°02.3	Menkar	314°12.4	4°09.2
9	265°46.5	268°53.6	0°28.8	263°28.4	0°34.9	63°53.5	-7°40.1	1°39.4	-22°02.3	Mirfak	308°36.6	49°55.3
10	280°49.0	283°54.3	0°30.0	278°29.2	0°35.6	78°55.9	-7°40.1	16°41.6	-22°02.3	Aldebaran	290°46.4	16°32.4
11	295°51.5	298°55.0	0°31.1	293°29.9	0°36.4	93°58.3	-7°40.1	31°43.8	-22°02.3	Rigel	281°09.5	-8°11.3
12	310°53.9	313°55.7	0°32.3	308°30.7	0°37.2	109°00.8	-7°40.1	46°46.1	-22°02.3	Capella	280°30.5	46°00.9
13	325°56.4	328°56.4	0°33.4	323°31.5	0°38.0	124°03.2	-7°40.1	61°48.3	-22°02.4	Bellatrix	278°29.1	6°21.6
14	340°58.8	343°57.1	0°34.6	338°32.2	0°38.7	139°05.6	-7°40.1	76°50.5	-22°02.4	Elnath	278°09.3	28°37.1
15	355°01.3	358°57.8	0°35.7	353°33.0	0°39.5	154°08.0	-7°40.1	91°52.7	-22°02.4	Alnilam	275°43.6	-1°11.8
16	11°03.8	13°58.5	0°36.9	8°33.8	0°40.3	169°10.4	-7°40.1	106°54.9	-22°02.4	Betelgeuse	270°58.4	7°24.3
17	26°06.2	28°59.2	0°38.0	23°34.5	0°41.1	184°12.9	-7°40.1	121°57.1	-22°02.4	Canopus	263°54.6	-52°42.7
18	41°08.7	43°59.9	0°39.2	38°35.3	0°41.8	199°15.3	-7°40.1	136°59.4	-22°02.4	Sirius	258°31.2	-16°44.5
19	56°11.2	59°00.6	0°40.3	53°36.1	0°42.6	214°17.7	-7°40.1	152°01.6	-22°02.4	Adara	255°10.2	-29°00.1
20	71°13.6	74°01.3	0°41.4	68°36.8	0°43.4	229°20.1	-7°40.1	167°03.8	-22°02.4	Procyon	244°56.8	5°10.8
21	86°16.1	89°02.0	0°42.6	83°37.6	0°44.2	244°22.5	-7°40.1	182°06.0	-22°02.4	Pollux	243°24.3	27°58.9
22	101°18.6	104°02.7	0°43.7	98°38.4	0°44.9	259°25.0	-7°40.1	197°08.2	-22°02.4	Avior	234°16.3	-59°34.0
23	116°21.0	119°03.4	0°44.9	113°39.1	0°45.7	274°27.4	-7°40.2	212°10.4	-22°02.4	Suhail	222°50.1	-43°30.2
Mer.pass.:15:15		v0.7 d1.2 m-4.4		v0.8 d0.8 m1.1		v2.4 d-0.0 m-2.0		v2.2 d-0.0 m0.6		Miaplacidus	221°38.1	-69°47.3
										Alphard	217°53.3	-8°44.1
										Regulus	207°40.6	11°52.8
										Dubhe	193°48.3	61°39.3
										Denebola	182°30.9	14°28.5
										Gienah	175°49.5	-17°38.2
										Acrux	173°06.0	-63°11.3
										Gacrux	171°57.7	-57°12.3
										Alioth	166°18.4	55°51.8
										Spica	158°28.5	-11°14.9
										Alcaid	152°56.9	49°13.5
										Hadar	148°44.2	-60°26.9
										Menkent	148°04.6	-36°27.0
										Arcturus	145°53.3	19°05.9
										Rigel Kent.	139°48.3	-60°53.9
										Zubenelg.	137°02.7	-16°06.6
										Kochab	137°20.3	74°04.9
										Alphecca	126°09.1	26°39.4
										Antares	112°23.4	-26°27.9
										Atria	107°23.3	-69°03.0
										Sabik	102°09.9	-15°44.6
										Shaula	96°18.9	-37°06.7
										Rasalhague	96°04.4	12°33.0
										Etamin	90°45.4	51°29.2
										Kaus Aust.	83°40.9	-34°22.3
										Vega	80°37.7	38°47.9
										Nunki	75°55.6	-26°16.3
										Altair	62°06.2	8°54.8
										Peacock	53°16.0	-56°40.7
										Deneb	49°30.2	45°20.5
										Enif	33°45.0	9°57.2
										Alnair	27°41.2	-46°52.8
										Fomalhaut	15°21.7	-29°32.0
										Scheat	13°51.3	28°10.5
										Markab	13°36.1	15°17.8
										2017/1/3	SHA	Mer.pass
										Venus	3°23.2	15:04
										Mars	357°57.1	15:26
										Jupiter	158°07.4	04:45
										Saturn	95°55.1	08:53
										2017/2/1	SHA	Mer.pass
										Venus	2°40.6	15:03
										Mars	357°16.4	15:25
										Jupiter	158°06.3	04:41
										Saturn	95°49.2	08:50
										2017/2/2	SHA	Mer.pass
										Venus	1°58.8	15:02
										Mars	356°35.8	15:23
										Jupiter	158°05.4	04:37
										Saturn	95°43.3	08:46
										Horizontal parallax		
										Venus:		0.3
										Mars:		0.1
Mer.pass.:15:08		v0.7 d1.1 m-4.4		v0.8 d0.8 m1.1		v2.4 d-0.0 m-2.0		v2.2 d-0.0 m0.6				

h		Sun				Moon										
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight				
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.			
0	176°39.2	-17°23.1	141°12.7	11.1	-6°03.4	10.4	57.8	72	07:09	08:37	10:25	14:03	15:51	17:20		
1	191°39.1	-17°22.4	155°42.8	11.1	-5°53.0	10.4	57.8	70	07:01	08:19	09:44	14:44	16:09	17:28		
2	206°39.0	-17°21.7	170°13.0	11.1	-5°42.6	10.5	57.8	68	06:54	08:05	09:16	15:12	16:24	17:34		
3	221°38.9	-17°21.0	184°43.1	11.1	-5°32.1	10.5	57.8	66	06:49	07:53	08:55	15:33	16:36	17:40		
4	236°38.8	-17°20.3	199°13.2	11.1	-5°21.6	10.5	57.8	64	06:44	07:42	08:39	15:49	16:46	17:44		
5	251°38.7	-17°19.6	213°43.3	11.1	-5°11.0	10.6	57.9	62	06:39	07:34	08:25	16:03	16:54	17:49		
6	266°38.6	-17°18.9	228°13.4	11.1	-5°00.4	10.6	57.9	60	06:36	07:26	08:13	16:15	17:02	17:53		
7	281°38.5	-17°18.2	242°43.5	11.1	-4°49.8	10.6	57.9	58	06:32	07:19	08:03	16:25	17:09	17:56		
8	296°38.4	-17°17.5	257°13.7	11.1	-4°39.1	10.7	57.9	56	06:29	07:13	07:55	16:33	17:15	17:59		
9	311°38.3	-17°16.8	271°43.8	11.1	-4°28.4	10.7	57.9	54	06:25	07:08	07:47	16:41	17:20	18:03		
10	326°38.2	-17°16.1	286°13.9	11.1	-4°17.7	10.7	57.9	52	06:22	07:03	07:40	16:48	17:25	18:05		
11	341°38.1	-17°15.4	300°44.0	11.1	-4°07.0	10.8	58.0	50	06:20	06:59	07:33	16:54	17:29	18:08		
12	356°38.1	-17°14.7	315°14.1	11.1	-3°56.2	10.8	58.0	45	06:13	06:48	07:20	17:08	17:39	18:14		
13	11°38.0	-17°14.0	329°44.2	11.1	-3°45.4	10.8	58.0	40	06:07	06:40	07:08	17:19	17:48	18:20		
14	26°37.9	-17°13.3	344°14.3	11.1	-3°34.6	10.8	58.0	35	06:02	06:32	06:59	17:29	17:55	18:26		
15	41°37.8	-17°12.6	358°44.4	11.1	-3°23.7	10.9	58.0	30	05:57	06:25	06:50	17:37	18:02	18:31		
16	56°37.7	-17°11.9	13°14.5	11.1	-3°12.9	10.9	58.0	20	05:46	06:12	06:35	17:52	18:15	18:41		
17	71°37.6	-17°11.2	27°44.6	11.1	-3°02.0	10.9	58.1	10	05:35	06:01	06:22	18:05	18:27	18:52		
18	86°37.5	-17°10.5	42°14.7	11.1	-2°51.1	10.9	58.1	0	05:23	05:48	06:10	18:17	18:39	19:04		
19	101°37.4	-17°09.8	56°44.8	11.1	-2°40.1	10.9	58.1	-10	05:10	05:36	05:58	18:29	18:51	19:17		
20	116°37.4	-17°09.1	71°14.9	11.1	-2°29.2	11.0	58.1	-20	04:53	05:21	05:44	18:43	19:06	19:34		
21	131°37.3	-17°08.3	85°44.9	11.1	-2°18.2	11.0	58.1	-30	04:32	05:03	05:29	18:58	19:24	19:54		
22	146°37.2	-17°07.6	100°15.0	11.1	-2°07.2	11.0	58.1	-35	04:19	04:52	05:20	19:07	19:35	20:08		
23	161°37.1	-17°06.9	114°45.1	11.0	-1°56.2	11.0	58.2	-40	04:02	04:39	05:09	19:17	19:47	20:24		
SD.=16.2 d=0.7 S.D.=15.8								-45	03:42	04:24	04:57	19:29	20:03	20:44		
								-50	03:15	04:04	04:42	19:44	20:22	21:11		
								-52	03:01	03:54	04:35	19:51	20:31	21:25		
								-54	02:44	03:44	04:27	19:59	20:42	21:41		
								-56	02:23	03:31	04:18	20:08	20:54	22:01		
								-58	01:56	03:17	04:08	20:17	21:08	22:27		
								-60	01:12	02:59	03:57	20:29	21:26	23:07		
								Moonrise			Moonset					
								Lat.	Tue	Wed	Thu	Tue	Wed	Thu		
								72	09:50	09:44	09:37	20:46	22:37	--		
								70	09:44	09:44	09:43	20:49	22:33	--		
								68	09:39	09:43	09:48	20:52	22:31	--		
								66	09:35	09:43	09:52	20:55	22:28	--		
								64	09:32	09:43	09:55	20:57	22:26	23:57		
								62	09:28	09:43	09:58	20:58	22:25	23:52		
								60	09:26	09:43	10:01	20:60	22:23	23:48		
								58	09:23	09:43	10:04	21:01	22:22	23:44		
								56	09:21	09:43	10:06	21:02	22:21	23:40		
								54	09:19	09:43	10:08	21:04	22:20	23:37		
								52	09:17	09:43	10:09	21:05	22:19	23:34		
								50	09:16	09:43	10:11	21:05	22:18	23:32		
								45	09:12	09:43	10:14	21:07	22:16	23:26		
								40	09:09	09:43	10:17	21:09	22:15	23:22		
								35	09:06	09:43	10:20	21:10	22:14	23:18		
								30	09:04	09:43	10:22	21:12	22:12	23:14		
								20	09:00	09:43	10:26	21:14	22:10	23:08		
								10	08:57	09:43	10:30	21:15	22:09	23:03		
								0	08:53	09:43	10:33	21:17	22:07	22:58		
								-10	08:50	09:43	10:37	21:19	22:05	22:53		
								-20	08:47	09:43	10:40	21:20	22:03	22:47		
								-30	08:43	09:43	10:44	21:22	22:01	22:41		
								-35	08:40	09:43	10:47	21:23	21:60	22:38		
								-40	08:38	09:43	10:50	21:25	21:59	22:34		
								-45	08:35	09:43	10:53	21:26	21:57	22:29		
								-50	08:31	09:44	10:57	21:28	21:55	22:24		
								-52	08:29	09:44	10:59	21:28	21:54	22:21		
								-54	08:28	09:44	11:01	21:29	21:53	22:18		
								-56	08:26	09:44	11:03	21:30	21:52	22:15		
								-58	08:23	09:44	11:05	21:31	21:51	22:12		
								-60	08:21	09:44	11:08	21:32	21:50	22:08		
								Sun			Moon					
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age			
									00 ^h	12 ^h	Pass	Upper	Lower			
								31	13:23	13:28	12:13	15:05	02:40	3(13%)		
								1	13:32	13:36	12:13	15:54	03:29	4(22%)		
								2	13:40	13:43	12:13	16:45	04:19	5(32%)		
SD.=16.2 d=0.7 S.D.=16.0																

Sun		Moon												
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	176°33.3	-16°31.5	104°55.4	9.9	7°02.0	10.5	58.9	72	06:58	08:24	10:02	14:27	16:05	17:32
1	191°33.3	-16°30.8	119°24.3	9.9	7°12.5	10.5	58.9	70	06:51	08:08	09:28	15:01	16:21	17:38
2	206°33.2	-16°30.0	133°53.1	9.8	7°23.0	10.5	58.9	68	06:46	07:55	09:04	15:25	16:34	17:43
3	221°33.1	-16°29.3	148°21.9	9.8	7°33.4	10.4	58.9	66	06:41	07:44	08:45	15:44	16:45	17:48
4	236°33.1	-16°28.6	162°50.7	9.8	7°43.8	10.4	58.9	64	06:37	07:35	08:30	15:59	16:54	17:52
5	251°33.0	-16°27.8	177°19.4	9.7	7°54.2	10.3	58.9	62	06:33	07:27	08:17	16:12	17:02	17:56
6	266°32.9	-16°27.1	191°48.1	9.7	8°04.5	10.3	58.9	60	06:30	07:20	08:06	16:23	17:09	17:59
7	281°32.9	-16°26.3	206°16.8	9.6	8°14.8	10.3	58.9	58	06:27	07:14	07:57	16:32	17:15	18:02
8	296°32.8	-16°25.6	220°45.4	9.6	8°25.0	10.2	59.0	56	06:24	07:08	07:49	16:40	17:21	18:05
9	311°32.7	-16°24.9	235°13.9	9.5	8°35.2	10.2	59.0	54	06:21	07:03	07:41	16:47	17:25	18:08
10	326°32.7	-16°24.1	249°42.5	9.5	8°45.3	10.1	59.0	52	06:18	06:59	07:35	16:54	17:30	18:10
11	341°32.6	-16°23.4	264°11.0	9.5	8°55.4	10.1	59.0	50	06:16	06:54	07:29	16:60	17:34	18:13
12	356°32.5	-16°22.6	278°39.4	9.4	9°05.5	10.0	59.0	45	06:10	06:45	07:16	17:12	17:43	18:18
13	11°32.5	-16°21.9	293°07.8	9.4	9°15.5	10.0	59.0	40	06:05	06:37	07:05	17:23	17:51	18:24
14	26°32.4	-16°21.2	307°36.1	9.3	9°25.4	9.9	59.0	35	05:60	06:30	06:56	17:32	17:58	18:28
15	41°32.4	-16°20.4	322°04.4	9.3	9°35.3	9.9	59.0	30	05:55	06:23	06:48	17:40	18:05	18:33
16	56°32.3	-16°19.7	336°32.7	9.2	9°45.2	9.8	59.0	20	05:45	06:12	06:34	17:54	18:17	18:43
17	71°32.2	-16°18.9	351°00.9	9.2	9°55.0	9.8	59.1	10	05:35	06:00	06:22	18:06	18:28	18:53
18	86°32.2	-16°18.2	5°29.1	9.1	10°04.7	9.7	59.1	0	05:24	05:49	06:10	18:17	18:39	19:04
19	101°32.1	-16°17.4	19°57.2	9.1	10°14.4	9.7	59.1	-10	05:11	05:37	05:59	18:29	18:51	19:17
20	116°32.0	-16°16.7	34°25.3	9.1	10°24.0	9.6	59.1	-20	04:55	05:23	05:46	18:42	19:05	19:32
21	131°32.0	-16°15.9	48°53.3	9.0	10°33.6	9.5	59.1	-30	04:35	05:06	05:31	18:56	19:22	19:52
22	146°31.9	-16°15.2	63°21.3	9.0	10°43.1	9.5	59.1	-35	04:22	04:55	05:23	19:05	19:32	20:05
23	161°31.9	-16°14.5	77°49.3	8.9	10°52.5	9.4	59.1	-40	04:07	04:43	05:13	19:14	19:44	20:20
SD.=16.2 d=0.7 S.D.=16.1								-45	03:47	04:28	05:01	19:26	19:58	20:39
								-50	03:22	04:10	04:47	19:40	20:17	21:04
								-52	03:09	04:01	04:41	19:46	20:25	21:17
								-54	02:53	03:51	04:33	19:53	20:35	21:32
								-56	02:34	03:39	04:25	20:01	20:47	21:51
								-58	02:10	03:26	04:16	20:10	21:00	22:14
								-60	01:36	03:10	04:05	20:21	21:16	22:46
								Moonrise			Moonset			
								Lat.	Fri	Sat	Sun	Fri	Sat	Sun
0	176°31.8	-16°13.7	92°17.2	8.9	11°01.9	9.4	59.1	72	09:30	09:23	09:13	00:30	02:27	04:32
1	191°31.7	-16°13.0	106°45.0	8.8	11°11.2	9.3	59.1	70	09:43	09:44	09:48	00:19	02:07	03:58
2	206°31.7	-16°12.2	121°12.8	8.8	11°20.5	9.2	59.1	68	09:53	10:01	10:13	00:10	01:52	03:33
3	221°31.6	-16°11.5	135°40.5	8.7	11°29.7	9.2	59.1	66	10:02	10:14	10:33	00:03	01:39	03:15
4	236°31.6	-16°10.7	150°08.2	8.7	11°38.8	9.1	59.2	64	10:09	10:26	10:48	--	01:29	02:59
5	251°31.5	-16°10.0	164°35.9	8.6	11°47.9	9.0	59.2	62	10:15	10:36	11:02	--	01:20	02:47
6	266°31.5	-16°09.2	179°03.5	8.6	11°56.8	8.9	59.2	60	10:21	10:44	11:13	--	01:13	02:36
7	281°31.4	-16°08.5	193°31.0	8.5	12°05.8	8.9	59.2	58	10:26	10:51	11:23	--	01:06	02:27
8	296°31.3	-16°07.7	207°58.5	8.5	12°14.6	8.8	59.2	56	10:30	10:58	11:31	--	01:00	02:19
9	311°31.3	-16°07.0	222°26.0	8.4	12°23.4	8.7	59.2	54	10:34	11:04	11:39	--	00:55	02:12
10	326°31.2	-16°06.2	236°53.4	8.4	12°32.1	8.7	59.2	52	10:37	11:09	11:46	--	00:50	02:05
11	341°31.2	-16°05.5	251°20.8	8.3	12°40.8	8.6	59.2	50	10:41	11:14	11:52	--	00:46	01:59
12	356°31.1	-16°04.7	265°48.1	8.3	12°49.3	8.5	59.2	45	10:48	11:24	12:05	--	00:37	01:47
13	11°31.1	-16°04.0	280°15.3	8.2	12°57.8	8.4	59.2	40	10:54	11:33	12:16	--	00:29	01:37
14	26°31.0	-16°03.2	294°42.5	8.2	13°06.2	8.4	59.2	35	10:59	11:40	12:26	--	00:22	01:28
15	41°31.0	-16°02.4	309°09.7	8.1	13°14.5	8.3	59.3	30	11:03	11:47	12:34	--	00:17	01:20
16	56°30.9	-16°01.7	323°36.8	8.1	13°22.8	8.2	59.3	20	11:11	11:58	12:49	--	00:07	01:07
17	71°30.9	-16°00.9	338°03.8	8.0	13°31.0	8.1	59.3	10	11:18	12:09	13:02	23:58	--	00:55
18	86°30.8	-16°00.2	352°30.8	8.0	13°39.1	8.1	59.3	0	11:25	12:18	13:14	23:50	--	00:44
19	101°30.7	-15°59.4	6°57.8	7.9	13°47.1	8.0	59.3	-10	11:31	12:28	13:26	23:42	--	00:33
20	116°30.7	-15°58.7	21°24.7	7.9	13°55.0	7.9	59.3	-20	11:39	12:38	13:38	23:33	--	00:22
21	131°30.6	-15°57.9	35°51.6	7.8	14°02.9	7.8	59.3	-30	11:47	12:50	13:53	23:23	--	00:09
22	146°30.6	-15°57.2	50°18.4	7.8	14°10.6	7.7	59.3	-35	11:51	12:57	14:02	23:18	--	00:01
23	161°30.5	-15°56.4	64°45.1	7.7	14°18.3	7.6	59.3	-40	11:57	13:05	14:12	23:11	23:52	--
SD.=16.2 d=0.7 S.D.=16.1								-45	12:03	13:14	14:23	23:04	23:42	--
								-50	12:11	13:25	14:38	22:55	23:30	--
								-52	12:14	13:30	14:44	22:51	23:24	--
								-54	12:18	13:36	14:52	22:46	23:18	23:57
								-56	12:23	13:42	14:60	22:41	23:11	23:48
								-58	12:27	13:49	15:09	22:35	23:03	23:38
								-60	12:33	13:57	15:20	22:29	22:55	23:27
								Sun			Moon			
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age	
									00 ^h	12 ^h	Upper	Lower		
								3	13:47	13:50	12:13	17:37	05:11	6(42%)
								4	13:53	13:56	12:13	18:31	06:03	7(54%)
								5	13:58	14:00	12:14	19:27	06:58	8(65%)
SD.=16.2 d=0.8 S.D.=16.2														

February 06, 07 ,08 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	136°19.2	135°39.7	3°00.7	130°12.4	2°19.1	294°22.6	-7°40.0	231°39.5	-22°03.3	Alpheratz	357°41.2	29°11.1
1	151°21.6	150°40.6	3°01.8	145°13.2	2°19.9	309°25.0	-7°40.0	246°41.7	-22°03.3	Ankaa	353°13.6	-42°13.1
2	166°24.1	165°41.5	3°02.9	160°13.9	2°20.7	324°27.5	-7°40.0	261°43.9	-22°03.3	Schedar	349°37.9	56°38.0
3	181°26.6	180°42.4	3°04.0	175°14.7	2°21.4	339°29.9	-7°39.9	276°46.2	-22°03.3	Diphda	348°53.5	-17°53.8
4	196°29.0	195°43.3	3°05.1	190°15.5	2°22.2	354°32.4	-7°39.9	291°48.4	-22°03.4	Achernar	335°25.3	-57°09.4
5	211°31.5	210°44.2	3°06.2	205°16.3	2°23.0	9°34.8	-7°39.9	306°50.6	-22°03.4	Hamal	327°58.0	23°32.5
6	226°34.0	225°45.1	3°07.3	220°17.0	2°23.7	24°37.3	-7°39.9	321°52.9	-22°03.4	Polaris	316°39.1	89°20.4
7	241°36.4	240°46.0	3°08.4	235°17.8	2°24.5	39°39.8	-7°39.9	336°55.1	-22°03.4	Akamar	315°16.5	-40°14.6
8	256°38.9	255°47.0	3°09.4	250°18.6	2°25.3	54°42.2	-7°39.9	351°57.3	-22°03.4	Menkar	314°12.4	4°09.2
9	271°41.4	270°47.9	3°10.5	265°19.3	2°26.1	69°44.7	-7°39.9	6°59.5	-22°03.4	Mirfak	308°36.7	49°55.3
10	286°43.8	285°48.8	3°11.6	280°20.1	2°26.8	84°47.2	-7°39.9	22°01.8	-22°03.4	Aldebaran	290°46.4	16°32.4
11	301°46.3	300°49.7	3°12.7	295°20.9	2°27.6	99°49.6	-7°39.9	37°04.0	-22°03.4	Rigel	281°09.5	-8°11.3
12	316°48.7	315°50.6	3°13.8	310°21.7	2°28.4	114°52.1	-7°39.9	52°06.2	-22°03.4	Capella	280°30.5	46°00.9
13	331°51.2	330°51.5	3°14.9	325°22.4	2°29.1	129°54.5	-7°39.9	67°08.5	-22°03.4	Bellatrix	278°29.2	6°21.6
14	346°53.7	345°52.4	3°16.0	340°23.2	2°29.9	144°57.0	-7°39.8	82°10.7	-22°03.4	Elnath	278°09.3	28°37.1
15	1°56.1	0°53.3	3°17.1	355°24.0	2°30.7	159°59.5	-7°39.8	97°12.9	-22°03.4	Alnilam	275°43.7	-1°11.8
16	16°58.6	15°54.3	3°18.2	10°24.8	2°31.4	175°01.9	-7°39.8	112°15.2	-22°03.4	Betelgeuse	270°58.4	7°24.3
17	32°01.1	30°55.2	3°19.2	25°25.5	2°32.2	190°04.4	-7°39.8	127°17.4	-22°03.4	Canopus	263°54.6	-52°42.7
18	47°03.5	45°56.1	3°20.3	40°26.3	2°33.0	205°06.9	-7°39.8	142°19.6	-22°03.4	Sirius	258°31.2	-16°44.5
19	62°06.0	60°57.0	3°21.4	55°27.1	2°33.7	220°09.3	-7°39.8	157°21.9	-22°03.4	Adara	255°10.2	-29°00.1
20	77°08.5	75°58.0	3°22.5	70°27.8	2°34.5	235°11.8	-7°39.8	172°24.1	-22°03.5	Procyon	244°56.8	5°10.7
21	92°10.9	90°58.9	3°23.6	85°28.6	2°35.3	250°14.2	-7°39.8	187°26.3	-22°03.5	Pollux	243°24.3	27°58.9
22	107°13.4	105°59.8	3°24.7	100°29.4	2°36.0	265°16.7	-7°39.7	202°28.6	-22°03.5	Avior	234°16.3	-59°34.1
23	122°15.9	121°00.8	3°25.8	115°30.2	2°36.8	280°19.2	-7°39.7	217°30.8	-22°03.5	Suhail	222°50.1	-43°30.3
Mer.pass.:14:52		v0.9 d1.1 m-4.4		v0.8 d0.8 m1.2		v2.5 d0.0 m-2.0		v2.2 d-0.0 m0.6		Miaplacidus	221°38.1	-69°47.3
										Alphard	217°53.3	-8°44.2
										Regulus	207°40.5	11°52.8
										Dubhe	193°48.2	61°39.3
										Denebola	182°30.8	14°28.5
										Gienah	175°49.5	-17°38.2
										Acrux	173°06.0	-63°11.4
										Gacrux	171°57.7	-57°12.3
										Alioth	166°18.4	55°51.8
										Spica	158°28.5	-11°14.9
										Alcaid	152°56.9	49°13.5
										Hadar	148°44.1	-60°26.9
										Menkent	148°04.5	-36°27.0
										Arcturus	145°53.3	19°05.8
										Rigel Kent.	139°48.2	-60°53.9
										Zubenelg.	137°02.7	-16°06.6
										Kochab	137°20.2	74°04.9
										Alphecca	126°09.0	26°39.4
										Antares	112°23.3	-26°27.9
										Atria	107°23.2	-69°03.0
										Sabik	102°09.9	-15°44.6
										Shaula	96°18.8	-37°06.7
										Rasalhague	96°04.4	12°32.9
										Etamin	90°45.3	51°29.1
										Kaus Aust.	83°40.8	-34°22.3
										Vega	80°37.6	38°47.9
										Nunki	75°55.6	-26°16.3
										Altair	62°06.2	8°54.8
										Peacock	53°16.0	-56°40.6
										Deneb	49°30.2	45°20.5
										Enif	33°45.0	9°57.2
										Alnair	27°41.2	-46°52.7
										Fomalhaut	15°21.7	-29°32.0
										Scheat	13°51.3	28°10.5
										Markab	13°36.1	15°17.8
										2017/2/6	SHA	Mer.pass
										Venus	359°20.6	14:56
										Mars	353°53.2	15:18
										Jupiter	158°03.4	04:22
										Saturn	95°20.3	08:32
										2017/2/7	SHA	Mer.pass
										Venus	358°43.4	14:55
										Mars	353°12.6	15:17
										Jupiter	158°03.3	04:18
										Saturn	95°14.7	08:29
										2017/2/8	SHA	Mer.pass
										Venus	358°07.2	14:53
										Mars	352°32.0	15:16
										Jupiter	158°03.4	04:14
										Saturn	95°09.2	08:25
										Horizontal parallax		
										Venus:		0.3
										Mars:		0.1
Mer.pass.:14:44		v1.0 d1.1 m-4.4		v0.8 d0.8 m1.2		v2.5 d0.0 m-2.0		v2.2 d-0.0 m0.6				

February 09, 10 ,11 (Thu., Fri., Sat.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Thu	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec				
0	139°16.6	4°18.2	136°48.7	4°18.2	131°08.0	3°14.3	297°20.3	-7°39.0	234°20.4	-22°03.8	234°20.4	-22°03.8	Alpheratz	357°41.2	29°11.1	29°11.1				
1	154°19.1	4°19.2	151°49.7	4°19.2	146°08.8	3°15.0	312°22.8	-7°39.0	249°22.6	-22°03.8	249°22.6	-22°03.8	Ankaa	353°13.6	-42°13.1	-42°13.1				
2	169°21.5	4°20.3	166°50.7	4°20.3	161°09.6	3°15.8	327°25.3	-7°39.0	264°24.9	-22°03.8	264°24.9	-22°03.8	Schedar	349°37.9	56°38.0	56°38.0				
3	184°24.0	4°21.3	181°51.8	4°21.3	176°10.4	3°16.6	342°27.8	-7°39.0	279°27.1	-22°03.8	279°27.1	-22°03.8	Diphda	348°53.5	-17°53.8	-17°53.8				
4	199°26.5	4°22.4	196°52.8	4°22.4	191°11.1	3°17.3	357°30.3	-7°39.0	294°29.3	-22°03.8	294°29.3	-22°03.8	Achernar	335°25.3	-57°09.4	-57°09.4				
5	214°28.9	4°23.4	211°53.8	4°23.4	206°11.9	3°18.1	12°32.8	-7°38.9	309°31.6	-22°03.8	309°31.6	-22°03.8	Hamal	327°58.0	23°32.5	23°32.5				
6	229°31.4	4°24.5	226°54.9	4°24.5	221°12.7	3°18.8	27°35.2	-7°38.9	324°33.8	-22°03.8	324°33.8	-22°03.8	Polaris	316°40.4	89°20.4	89°20.4				
7	244°33.8	4°25.6	241°55.9	4°25.6	236°13.4	3°19.6	42°37.7	-7°38.9	339°36.1	-22°03.8	339°36.1	-22°03.8	Akamar	315°16.5	-40°14.6	-40°14.6				
8	259°36.3	4°26.6	256°56.9	4°26.6	251°14.2	3°20.4	57°40.2	-7°38.9	354°38.3	-22°03.8	354°38.3	-22°03.8	Menkar	314°12.5	4°09.2	4°09.2				
9	274°38.8	4°27.7	271°58.0	4°27.7	266°15.0	3°21.1	72°42.7	-7°38.9	9°40.5	-22°03.8	9°40.5	-22°03.8	Mirfak	308°36.7	49°55.3	49°55.3				
10	289°41.2	4°28.7	286°59.0	4°28.7	281°15.8	3°21.9	87°45.2	-7°38.8	24°42.8	-22°03.8	24°42.8	-22°03.8	Aldebaran	290°46.4	16°32.4	16°32.4				
11	304°43.7	4°29.8	302°00.1	4°29.8	296°16.5	3°22.7	102°47.6	-7°38.8	39°45.0	-22°03.8	39°45.0	-22°03.8	Rigel	281°09.5	-8°11.3	-8°11.3				
12	319°46.2	4°30.8	317°01.1	4°30.8	311°17.3	3°23.4	117°50.1	-7°38.8	54°47.3	-22°03.8	54°47.3	-22°03.8	Capella	280°30.5	46°00.9	46°00.9				
13	334°48.6	4°31.8	332°02.2	4°31.8	326°18.1	3°24.2	132°52.6	-7°38.8	69°49.5	-22°03.8	69°49.5	-22°03.8	Bellatrix	278°29.2	6°21.6	6°21.6				
14	349°51.1	4°32.9	347°03.2	4°32.9	341°18.9	3°24.9	147°55.1	-7°38.8	84°51.7	-22°03.8	84°51.7	-22°03.8	Elnath	278°09.3	28°37.1	28°37.1				
15	4°53.6	4°33.9	2°04.3	4°33.9	356°19.6	3°25.7	162°57.6	-7°38.8	99°54.0	-22°03.9	99°54.0	-22°03.9	Alnilam	275°43.7	-1°11.8	-1°11.8				
16	19°56.0	4°35.0	17°05.3	4°35.0	11°20.4	3°26.5	178°00.1	-7°38.7	114°56.2	-22°03.9	114°56.2	-22°03.9	Betelgeuse	270°58.4	7°24.3	7°24.3				
17	34°58.5	4°36.0	32°06.4	4°36.0	26°21.2	3°27.2	193°02.6	-7°38.7	129°58.5	-22°03.9	129°58.5	-22°03.9	Canopus	263°54.6	-52°42.7	-52°42.7				
18	50°01.0	4°37.1	47°07.4	4°37.1	41°22.0	3°28.0	208°05.0	-7°38.7	145°00.7	-22°03.9	145°00.7	-22°03.9	Sirius	258°31.2	-16°44.5	-16°44.5				
19	65°03.4	4°38.1	62°08.5	4°38.1	56°22.7	3°28.8	223°07.5	-7°38.7	160°03.0	-22°03.9	160°03.0	-22°03.9	Adara	255°10.2	-29°00.1	-29°00.1				
20	80°05.9	4°39.2	77°09.5	4°39.2	71°23.5	3°29.5	238°10.0	-7°38.7	175°05.2	-22°03.9	175°05.2	-22°03.9	Procyon	244°56.8	5°10.7	5°10.7				
21	95°08.3	4°40.2	92°10.6	4°40.2	86°24.3	3°30.3	253°12.5	-7°38.6	190°07.4	-22°03.9	190°07.4	-22°03.9	Pollux	243°24.3	27°58.9	27°58.9				
22	110°10.8	4°41.2	107°11.7	4°41.2	101°25.0	3°31.0	268°15.0	-7°38.6	205°09.7	-22°03.9	205°09.7	-22°03.9	Avior	234°16.3	-59°34.1	-59°34.1				
23	125°13.3	4°42.3	122°12.7	4°42.3	116°25.8	3°31.8	283°17.5	-7°38.6	220°11.9	-22°03.9	220°11.9	-22°03.9	Suhail	222°50.1	-43°30.3	-43°30.3				
Mer.pass.:14:40			v1.0 d1.1 m-4.4			v0.8 d0.8 m1.2			v2.5 d0.0 m-2.0			v2.2 d-0.0 m0.6			Miaplacidus			221°38.1	-69°47.4	-69°47.4
															Alphard			217°53.3	-8°44.2	-8°44.2
															Regulus			207°40.5	11°52.8	11°52.8
															Dubhe			193°48.2	61°39.3	61°39.3
															Denebola			182°30.8	14°28.5	14°28.5
															Gienah			175°49.5	-17°38.2	-17°38.2
															AcruX			173°05.9	-63°11.4	-63°11.4
															Gacrux			171°57.6	-57°12.3	-57°12.3
															Alioth			166°18.3	55°51.8	55°51.8
															Spica			158°28.5	-11°15.0	-11°15.0
															Alcaid			152°56.8	49°13.5	49°13.5
															Hadar			148°44.0	-60°27.0	-60°27.0
															Menkent			148°04.5	-36°27.0	-36°27.0
															Arcturus			145°53.3	19°05.8	19°05.8
															Rigel Kent.			139°48.1	-60°53.9	-60°53.9
															Zubenelg.			137°02.6	-16°06.6	-16°06.6
															Kochab			137°20.1	74°04.9	74°04.9
															Alphecca			126°09.0	26°39.4	26°39.4
															Antares			112°23.3	-26°27.9	-26°27.9
															Atria			107°23.1	-69°03.0	-69°03.0
															Sabik			102°09.9	-15°44.6	-15°44.6
															Shaula			96°18.8	-37°06.7	-37°06.7
															Rasalhague			96°04.4	12°32.9	12°32.9
															Etamin			90°45.3	51°29.1	51°29.1
															Kaus Aust.			83°40.8	-34°22.3	-34°22.3
															Vega			80°37.6	38°47.9	38°47.9
															Nunki			75°55.6	-26°16.3	-26°16.3
															Altair			62°06.2	8°54.8	8°54.8
															Peacock			53°16.0	-56°40.6	-56°40.6
															Deneb			49°30.2	45°20.5	45°20.5
															Enif			33°45.0	9°57.2	9°57.2
															Alnair			27°41.2	-46°52.7	-46°52.7
															Fomalhaut			15°21.7	-29°32.0	-29°32.0
															Scheat			13°51.3	28°10.5	28°10.5
															Markab			13°36.1	15°17.8	15°17.8
															2017/2/9			SHA	Mer.pass	
															Venus			357°32.1	14:52	14:52
															Mars			351°51.4	15:15	15:15
															Jupiter			158°03.7	04:10	04:10
															Saturn			95°03.8	08:21	08:21
															2017/2/1			SHA	Mer.pass	
															Venus			356°58.1	14:50	14:50
															Mars			351°10.9	15:13	15:13
															Jupiter			158°04.2	04:06	04:06
															Saturn			94°58.4	08:18	08:18
															2017/2/1			SHA	Mer.pass	
															Venus			356°25.2	14:48	14:48
															Mars			350°30.3	15:12	15:12
															Jupiter			158°04.9	04:02	04:02
															Saturn			94°53.1	08:14	08:14
															Horizontal parallax					
															Venus:			0.3	0.3	
															Mars:			0.1	0.1	
Mer.pass.:14:32			v1.1 d1.0 m-4.4			v0.8 d0.8 m1.2			v2.5 d0.0 m-2.1			v2.2 d-0.0 m0.6								

February 12, 13 ,14 (Sun., Mon., Tue.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Sun	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass					
0	142°14.0	5°32.5	138°07.4	5°32.5	132°03.7	4°09.0	300°19.7	-7°37.5	237°02.0	-22°04.2	330°22.2	-7°37.4	252°04.2	-22°04.2	Alpheratz	357°41.2	29°11.1			
1	157°16.5	5°33.5	153°08.6	5°33.5	147°04.5	4°09.7	315°22.2	-7°37.4	252°04.2	-22°04.2	330°24.7	-7°37.4	267°06.5	-22°04.2	Ankaa	353°13.6	-42°13.1			
2	172°18.9	5°34.5	168°09.8	5°34.5	162°05.3	4°10.5	330°24.7	-7°37.4	267°06.5	-22°04.2	345°27.2	-7°37.4	282°08.7	-22°04.2	Schedar	349°38.0	56°37.9			
3	187°21.4	5°35.5	183°11.0	5°35.5	177°06.0	4°11.2	345°27.2	-7°37.4	282°08.7	-22°04.2	0°29.7	-7°37.4	297°11.0	-22°04.2	Diphda	348°53.5	-17°53.8			
4	202°23.9	5°36.5	198°12.1	5°36.5	192°06.8	4°12.0	0°29.7	-7°37.4	297°11.0	-22°04.2	15°32.2	-7°37.3	312°13.2	-22°04.2	Achernar	335°25.3	-57°09.4			
5	217°26.3	5°37.5	213°13.3	5°37.5	207°07.6	4°12.8	15°32.2	-7°37.3	312°13.2	-22°04.2	30°34.8	-7°37.3	327°15.4	-22°04.2	Hamal	327°58.1	23°32.5			
6	232°28.8	5°38.5	228°14.5	5°38.5	222°08.4	4°13.5	30°34.8	-7°37.3	327°15.4	-22°04.2	237°09.1	4°14.3	342°17.7	-22°04.2	Polaris	316°42.0	89°20.4			
7	247°31.3	5°39.5	243°15.7	5°39.5	237°09.1	4°14.3	45°37.3	-7°37.3	342°17.7	-22°04.2	60°39.8	-7°37.2	357°19.9	-22°04.2	Akamar	315°16.5	-40°14.6			
8	262°33.7	5°40.5	258°16.9	5°40.5	252°09.9	4°15.0	60°39.8	-7°37.2	357°19.9	-22°04.2	75°42.3	-7°37.2	12°22.2	-22°04.2	Menkar	314°12.5	4°09.2			
9	277°36.2	5°41.5	273°18.0	5°41.5	267°10.7	4°15.8	75°42.3	-7°37.2	12°22.2	-22°04.2	90°44.8	-7°37.2	27°24.4	-22°04.2	Mirfak	308°36.7	49°55.3			
10	292°38.7	5°42.5	288°19.2	5°42.5	282°11.5	4°16.5	90°44.8	-7°37.2	27°24.4	-22°04.2	105°47.3	-7°37.2	42°26.7	-22°04.2	Aldebaran	290°46.4	16°32.4			
11	307°41.1	5°43.5	303°20.4	5°43.5	297°12.2	4°17.3	105°47.3	-7°37.2	42°26.7	-22°04.2	120°49.8	-7°37.1	57°28.9	-22°04.2	Rigel	281°09.5	-8°11.3			
12	322°43.6	5°44.5	318°21.6	5°44.5	312°13.0	4°18.0	120°49.8	-7°37.1	57°28.9	-22°04.2	135°52.3	-7°37.1	72°31.2	-22°04.2	Capella	280°30.6	46°00.9			
13	337°46.0	5°45.5	333°22.8	5°45.5	327°13.8	4°18.8	135°52.3	-7°37.1	72°31.2	-22°04.2	150°54.8	-7°37.1	87°33.4	-22°04.2	Bellatrix	278°29.2	6°21.6			
14	352°48.5	5°46.5	348°24.0	5°46.5	342°14.6	4°19.6	150°54.8	-7°37.1	87°33.4	-22°04.2	165°57.3	-7°37.1	102°35.7	-22°04.2	Elnath	278°09.3	28°37.1			
15	7°51.0	5°47.5	3°25.2	5°47.5	357°15.3	4°20.3	165°57.3	-7°37.1	102°35.7	-22°04.2	180°59.8	-7°37.0	117°38.0	-22°04.2	Alnilam	275°43.7	-1°11.8			
16	22°53.4	5°48.5	18°26.4	5°48.5	12°16.1	4°21.1	180°59.8	-7°37.0	117°38.0	-22°04.2	196°02.3	-7°37.0	132°40.2	-22°04.2	Betelgeuse	270°58.4	7°24.3			
17	37°55.9	5°49.5	33°27.6	5°49.5	27°16.9	4°21.8	196°02.3	-7°37.0	132°40.2	-22°04.2	211°04.8	-7°37.0	147°42.5	-22°04.2	Canopus	263°54.7	-52°42.7			
18	52°58.4	5°50.5	48°28.8	5°50.5	42°17.6	4°22.6	211°04.8	-7°37.0	147°42.5	-22°04.2	226°07.3	-7°36.9	162°44.7	-22°04.2	Sirius	258°31.2	-16°44.5			
19	68°00.8	5°51.5	63°30.0	5°51.5	57°18.4	4°23.3	226°07.3	-7°36.9	162°44.7	-22°04.2	241°09.8	-7°36.9	177°47.0	-22°04.3	Adara	255°10.3	-29°00.1			
20	83°03.3	5°52.5	78°31.2	5°52.5	72°19.2	4°24.1	241°09.8	-7°36.9	177°47.0	-22°04.3	256°12.4	-7°36.9	192°49.2	-22°04.3	Procyon	244°56.8	5°10.7			
21	98°05.8	5°53.5	93°32.4	5°53.5	87°20.0	4°24.8	256°12.4	-7°36.9	192°49.2	-22°04.3	271°14.9	-7°36.9	207°51.5	-22°04.3	Pollux	243°24.3	27°58.9			
22	113°08.2	5°54.5	108°33.6	5°54.5	102°20.7	4°25.6	271°14.9	-7°36.9	207°51.5	-22°04.3	286°17.4	-7°36.8	222°53.7	-22°04.3	Avior	234°16.3	-59°34.1			
23	128°10.7	5°55.5	123°34.9	5°55.5	117°21.5	4°26.3	286°17.4	-7°36.8	222°53.7	-22°04.3					Suhail	222°50.1	-43°30.3			
Mer.pass.:14:28			v1.2 d1.0 m-4.4			v0.8 d0.8 m1.2			v2.5 d0.0 m-2.1			v2.2 d-0.0 m0.6			Miaplacidus			221°38.1	-69°47.4	
															Alphard			217°53.3	-8°44.2	
															Regulus			207°40.5	11°52.8	
															Dubhe			193°48.2	61°39.3	
															Denebola			182°30.8	14°28.5	
															Gienah			175°49.4	-17°38.2	
															AcruX			173°05.9	-63°11.4	
															Gacrux			171°57.6	-57°12.3	
															Alioth			166°18.3	55°51.8	
															Spica			158°28.5	-11°15.0	
															Alcaid			152°56.8	49°13.5	
															Hadar			148°44.0	-60°27.0	
															Menkent			148°04.5	-36°27.0	
															Arcturus			145°53.2	19°05.8	
															Rigel Kent.			139°48.1	-60°53.9	
															Zubenelg.			137°02.6	-16°06.6	
															Kochab			137°20.1	74°04.9	
															Alphecca			126°09.0	26°39.4	
															Antares			112°23.3	-26°27.9	
															Atria			107°23.0	-69°03.0	
															Sabik			102°09.8	-15°44.6	
															Shaula			96°18.8	-37°06.7	
															Rasalhague			96°04.3	12°32.9	
															Etamin			90°45.3	51°29.1	
															Kaus Aust.			83°40.8	-34°22.3	
															Vega			80°37.6	38°47.9	
															Nunki			75°55.5	-26°16.3	
															Altair			62°06.2	8°54.8	
															Peacock			53°16.0	-56°40.6	
															Deneb			49°30.2	45°20.5	
															Enif			33°45.0	9°57.2	
															Alnair			27°41.2	-46°52.7	
															Fomalhaut			15°21.7	-29°32.0	
															Scheat			13°51.3	28°10.5	
															Markab			13°36.2	15°17.8	
															2017/2/1			SHA	Mer.pass	
															Venus			355°53.4	14:46	
															Mars			349°49.7	15:11	
															Jupiter			158°05.7	03:58	
															Saturn			94°47.9	08:11	
															2017/2/1			SHA	Mer.pass	
															Venus			355°22.9	14:44	
															Mars			349°09.1	15:10	
															Jupiter			158°06.7	03:54	
															Saturn			94°42.8	08:07	
															2017/2/1			SHA	Mer.pass	
															Venus			354°53.7	14:42	
															Mars			348°28.6	15:08	
															Jupiter			158°07.9	03:50	
															Saturn			94°37.8	08:03	
															Horizontal parallax					
															Venus:			0.3		
															Mars:			0.1		
Mer.pass.:14:20			v1.3 d1.0 m-4.4			v0.8 d0.8 m1.2			v2.5 d0.0 m-2.1			v2.3 d-0.0 m0.5								

h		Sun			Moon									
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	176°27.0	-13°41.9	344°40.9	10.8	9°37.8	-9.4	57.5	72	06:22	07:43	09:04	15:26	16:47	18:08
1	191°27.0	-13°41.1	359°10.8	10.9	9°28.4	-9.5	57.4	70	06:20	07:32	08:42	15:47	16:58	18:11
2	206°27.0	-13°40.2	13°40.7	10.9	9°18.9	-9.5	57.4	68	06:17	07:23	08:26	16:04	17:07	18:13
3	221°27.0	-13°39.4	28°10.6	11.0	9°09.4	-9.5	57.4	66	06:15	07:16	08:12	16:17	17:14	18:15
4	236°27.0	-13°38.6	42°40.6	11.1	8°59.8	-9.6	57.4	64	06:13	07:09	08:01	16:29	17:20	18:16
5	251°27.0	-13°37.7	57°10.7	11.1	8°50.3	-9.6	57.3	62	06:12	07:04	07:51	16:38	17:26	18:18
6	266°27.0	-13°36.9	71°40.9	11.2	8°40.6	-9.6	57.3	60	06:10	06:59	07:43	16:46	17:31	18:20
7	281°27.0	-13°36.1	86°11.1	11.2	8°31.0	-9.7	57.3	58	06:08	06:54	07:36	16:53	17:35	18:21
8	296°27.0	-13°35.2	100°41.4	11.3	8°21.3	-9.7	57.2	56	06:07	06:50	07:29	16:60	17:39	18:23
9	311°27.0	-13°34.4	115°11.7	11.4	8°11.6	-9.7	57.2	54	06:05	06:47	07:24	17:05	17:42	18:24
10	326°27.0	-13°33.6	129°42.1	11.4	8°01.8	-9.8	57.2	52	06:04	06:43	07:19	17:11	17:46	18:25
11	341°27.1	-13°32.7	144°12.5	11.5	7°52.0	-9.8	57.2	50	06:02	06:40	07:14	17:15	17:49	18:27
12	356°27.1	-13°31.9	158°43.1	11.5	7°42.2	-9.8	57.1	45	05:59	06:33	07:04	17:25	17:56	18:30
13	11°27.1	-13°31.1	173°13.6	11.6	7°32.3	-9.9	57.1	40	05:56	06:27	06:55	17:34	18:01	18:33
14	26°27.1	-13°30.2	187°44.3	11.7	7°22.5	-9.9	57.1	35	05:52	06:22	06:48	17:41	18:07	18:37
15	41°27.1	-13°29.4	202°14.9	11.7	7°12.6	-9.9	57.0	30	05:49	06:17	06:41	17:47	18:12	18:40
16	56°27.1	-13°28.5	216°45.7	11.8	7°02.6	-9.9	57.0	20	05:42	06:08	06:30	17:58	18:21	18:47
17	71°27.1	-13°27.7	231°16.5	11.8	6°52.7	-10.0	57.0	10	05:34	05:59	06:20	18:08	18:30	18:55
18	86°27.1	-13°26.9	245°47.3	11.9	6°42.7	-10.0	57.0	0	05:25	05:50	06:11	18:18	18:39	19:03
19	101°27.2	-13°26.0	260°18.2	11.9	6°32.7	-10.0	56.9	-10	05:14	05:40	06:01	18:27	18:49	19:14
20	116°27.2	-13°25.2	274°49.2	12.0	6°22.7	-10.0	56.9	-20	05:01	05:28	05:51	18:37	19:00	19:27
21	131°27.2	-13°24.4	289°20.2	12.0	6°12.7	-10.1	56.9	-30	04:44	05:14	05:39	18:49	19:14	19:44
22	146°27.2	-13°23.5	303°51.3	12.1	6°02.6	-10.1	56.8	-35	04:33	05:05	05:32	18:56	19:23	19:54
23	161°27.2	-13°22.7	318°22.4	12.2	5°52.5	-10.1	56.8	-40	04:20	04:55	05:24	19:04	19:32	20:07
SD.=16.2 d=0.8 S.D.=15.7														
							Moonrise							
							Moonset							
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Sun	Mon	Tue	Sun	Mon	Tue
0	176°27.2	-13°21.8	332°53.6	12.2	5°42.4	-10.1	56.8	72	18:15	19:59	21:40	09:03	08:56	08:50
1	191°27.2	-13°21.0	347°24.8	12.3	5°32.3	-10.1	56.8	70	18:24	20:02	21:37	08:51	08:51	08:50
2	206°27.3	-13°20.1	1°56.1	12.3	5°22.2	-10.1	56.7	68	18:32	20:05	21:34	08:41	08:46	08:50
3	221°27.3	-13°19.3	16°27.4	12.4	5°12.0	-10.2	56.7	66	18:39	20:07	21:32	08:33	08:42	08:50
4	236°27.3	-13°18.5	30°58.8	12.4	5°01.9	-10.2	56.7	64	18:45	20:09	21:30	08:26	08:39	08:50
5	251°27.3	-13°17.6	45°30.2	12.5	4°51.7	-10.2	56.6	62	18:49	20:10	21:29	08:20	08:36	08:50
6	266°27.3	-13°16.8	60°01.7	12.5	4°41.5	-10.2	56.6	60	18:54	20:12	21:28	08:15	08:33	08:50
7	281°27.3	-13°15.9	74°33.3	12.6	4°31.3	-10.2	56.6	58	18:57	20:13	21:26	08:11	08:31	08:50
8	296°27.4	-13°15.1	89°04.8	12.6	4°21.1	-10.2	56.6	56	19:01	20:14	21:25	08:07	08:29	08:50
9	311°27.4	-13°14.3	103°36.5	12.7	4°10.9	-10.2	56.5	54	19:03	20:15	21:24	08:03	08:27	08:50
10	326°27.4	-13°13.4	118°08.1	12.7	4°00.6	-10.2	56.5	52	19:06	20:16	21:24	07:60	08:26	08:50
11	341°27.4	-13°12.6	132°39.9	12.7	3°50.4	-10.2	56.5	50	19:09	20:17	21:23	07:57	08:24	08:50
12	356°27.4	-13°11.7	147°11.6	12.8	3°40.1	-10.2	56.4	45	19:14	20:18	21:21	07:50	08:21	08:50
13	11°27.5	-13°10.9	161°43.4	12.8	3°29.9	-10.3	56.4	40	19:18	20:20	21:20	07:45	08:18	08:50
14	26°27.5	-13°10.0	176°15.3	12.9	3°19.6	-10.3	56.4	35	19:22	20:21	21:19	07:40	08:16	08:50
15	41°27.5	-13°09.2	190°47.2	12.9	3°09.4	-10.3	56.4	30	19:25	20:22	21:18	07:35	08:14	08:50
16	56°27.5	-13°08.3	205°19.1	13.0	2°59.1	-10.3	56.3	20	19:31	20:24	21:16	07:28	08:10	08:49
17	71°27.5	-13°07.5	219°51.1	13.0	2°48.9	-10.3	56.3	10	19:36	20:26	21:14	07:21	08:06	08:49
18	86°27.6	-13°06.6	234°23.1	13.0	2°38.6	-10.3	56.3	0	19:41	20:27	21:13	07:15	08:03	08:49
19	101°27.6	-13°05.8	248°55.2	13.1	2°28.3	-10.3	56.2	-10	19:45	20:29	21:11	07:09	08:00	08:49
20	116°27.6	-13°04.9	263°27.3	13.1	2°18.0	-10.3	56.2	-20	19:50	20:31	21:10	07:02	07:57	08:49
21	131°27.6	-13°04.1	277°59.5	13.2	2°07.8	-10.3	56.2	-30	19:56	20:33	21:08	06:55	07:53	08:49
22	146°27.6	-13°03.2	292°31.7	13.2	1°57.5	-10.3	56.2	-40	19:59	20:34	21:07	06:50	07:51	08:49
23	161°27.7	-13°02.4	307°03.9	13.2	1°47.2	-10.3	56.1	-35	20:03	20:35	21:06	06:45	07:48	08:49
SD.=16.2 d=0.8 S.D.=15.5														
							Sun							
							Moon							
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Day	Eqn.of Time	Mer.	Mer.Pass.	Age		
0	176°27.7	-13°01.6	321°36.2	13.3	1°37.0	-10.3	56.1	12	14:12	14:12	12:14	01:03	13:28	15(97%)
1	191°27.7	-13°00.7	336°08.5	13.3	1°26.7	-10.3	56.1	13	14:11	14:10	12:14	01:52	14:15	16(93%)
2	206°27.7	-12°59.9	350°40.8	13.4	1°16.5	-10.3	56.0	14	14:09	14:08	12:14	02:38	15:01	17(87%)
3	221°27.8	-12°59.0	5°13.2	13.4	1°06.2	-10.2	56.0							
4	236°27.8	-12°58.2	19°45.6	13.4	0°56.0	-10.2	56.0							
5	251°27.8	-12°57.3	34°18.0	13.5	0°45.7	-10.2	56.0							
6	266°27.8	-12°56.4	48°50.5	13.5	0°35.5	-10.2	55.9							
7	281°27.9	-12°55.6	63°23.0	13.5	0°25.3	-10.2	55.9							
8	296°27.9	-12°54.7	77°55.6	13.6	0°15.1	-10.2	55.9							
9	311°27.9	-12°53.9	92°28.1	13.6	0°04.9	-10.2	55.9							
10	326°27.9	-12°53.0	107°00.8	13.6	0°05.3	-10.2	55.8							
11	341°28.0	-12°52.2	121°33.4	13.7	0°15.5	-10.2	55.8							
12	356°28.0	-12°51.3	136°06.1	13.7	0°25.7	-10.2	55.8							
13	11°28.0	-12°50.5	150°38.8	13.7	0°35.9	-10.2	55.7							
14	26°28.0	-12°49.6	165°11.5	13.7	0°46.0	-10.1	55.7							
15	41°28.1	-12°48.8	179°44.3	13.8	0°56.1	-10.1	55.7							
16	56°28.1	-12°47.9	194°17.0	13.8	1°06.2	-10.1	55.7							
17	71°28.1	-12°47.1	208°49.9	13.8	1°16.3	-10.1	55.6							
18	86°28.2	-12°46.2	223°22.7	13.9	1°26.4	-10.1	55.6							
19	101°28.2	-12°45.3	237°55.6	13.9	1°36.5	-10.1	55.6							
20	116°28.2	-12°44.5	252°28.4	13.9	1°46.6	-10.0	55.6							
21	131°28.2	-12°43.6	267°01.4	13.9	1°56.6	-10.0	55.5							
22	146°28.3	-12°42.8	281°34.3	13.9	2°06.6	-10.0	55.5							
23	161°28.3	-12°41.9	296°07.2	14.0	2°16.6	-10.0	55.5							
SD.=16.2 d=0.8 S.D.=15.3														

February 15, 16 ,17 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	145°11.4	139°37.1	6°43.0	132°59.4	5°03.2	303°20.7	-7°35.3	239°44.2	-22°04.5	Alpheratz	357°41.2	29°11.1	
1	160°13.9	154°38.4	6°43.9	148°00.2	5°03.9	318°23.2	-7°35.2	254°46.5	-22°04.5	Ankaa	353°13.6	-42°13.1	
2	175°16.4	169°39.8	6°44.9	163°01.0	5°04.7	333°25.8	-7°35.2	269°48.7	-22°04.5	Schedar	349°38.0	56°37.9	
3	190°18.8	184°41.1	6°45.8	178°01.7	5°05.4	348°28.3	-7°35.2	284°51.0	-22°04.5	Diphda	348°53.5	-17°53.8	
4	205°21.3	199°42.4	6°46.8	193°02.5	5°06.2	3°30.8	-7°35.1	299°53.2	-22°04.5	Achernar	335°25.3	-57°09.4	
5	220°23.7	214°43.8	6°47.7	208°03.3	5°06.9	18°33.3	-7°35.1	314°55.5	-22°04.5	Hamal	327°58.1	23°32.5	
6	235°26.2	229°45.1	6°48.7	223°04.0	5°07.7	33°35.9	-7°35.1	329°57.8	-22°04.5	Polaris	316°43.4	89°20.4	
7	250°28.7	244°46.5	6°49.6	238°04.8	5°08.4	48°38.4	-7°35.0	345°00.0	-22°04.5	Akamar	315°16.6	-40°14.6	
8	265°31.1	259°47.8	6°50.6	253°05.6	5°09.2	63°40.9	-7°35.0	0°02.3	-22°04.5	Menkar	314°12.5	4°09.2	
9	280°33.6	274°49.1	6°51.5	268°06.4	5°09.9	78°43.4	-7°35.0	15°04.5	-22°04.5	Mirfak	308°36.7	49°55.3	
10	295°36.1	289°50.5	6°52.4	283°07.1	5°10.7	93°46.0	-7°34.9	30°06.8	-22°04.5	Aldebaran	290°46.4	16°32.4	
11	310°38.5	304°51.8	6°53.4	298°07.9	5°11.4	108°48.5	-7°34.9	45°09.1	-22°04.5	Rigel	281°09.5	-8°11.3	
12	325°41.0	319°53.2	6°54.3	313°08.7	5°12.2	123°51.0	-7°34.9	60°11.3	-22°04.5	Capella	280°30.6	46°00.9	
13	340°43.5	334°54.6	6°55.3	328°09.5	5°12.9	138°53.6	-7°34.8	75°13.6	-22°04.5	Bellatrix	278°29.2	6°21.6	
14	355°45.9	349°55.9	6°56.2	343°10.2	5°13.7	153°56.1	-7°34.8	90°15.8	-22°04.5	Elnath	278°09.3	28°37.1	
15	10°48.4	4°57.3	6°57.1	358°11.0	5°14.4	168°58.6	-7°34.7	105°18.1	-22°04.5	Alnilam	275°43.7	-1°11.8	
16	25°50.9	19°58.6	6°58.1	13°11.8	5°15.2	184°01.1	-7°34.7	120°20.4	-22°04.5	Betelgeuse	270°58.4	7°24.3	
17	40°53.3	35°00.0	6°59.0	28°12.6	5°15.9	199°03.7	-7°34.7	135°22.6	-22°04.5	Canopus	263°54.7	-52°42.7	
18	55°55.8	50°01.4	6°59.9	43°13.3	5°16.6	214°06.2	-7°34.6	150°24.9	-22°04.6	Sirius	258°31.2	-16°44.6	
19	70°58.2	65°02.7	7°00.9	58°14.1	5°17.4	229°08.7	-7°34.6	165°27.1	-22°04.6	Adara	255°10.3	-29°00.1	
20	86°00.7	80°04.1	7°01.8	73°14.9	5°18.1	244°11.3	-7°34.6	180°29.4	-22°04.6	Procyon	244°56.8	5°10.7	
21	101°03.2	95°05.5	7°02.7	88°15.6	5°18.9	259°13.8	-7°34.5	195°31.7	-22°04.6	Pollux	243°24.3	27°58.9	
22	116°05.6	110°06.9	7°03.7	103°16.4	5°19.6	274°16.3	-7°34.5	210°33.9	-22°04.6	Avior	234°16.4	-59°34.1	
23	131°08.1	125°08.2	7°04.6	118°17.2	5°20.4	289°18.9	-7°34.5	225°36.2	-22°04.6	Suhail	222°50.1	-43°30.3	
Mer.pass.:14:16		v1.3 d0.9 m-4.4		v0.8 d0.7 m1.2		v2.5 d0.0 m-2.1		v2.3 d-0.0 m0.5		Miacplacidus		221°38.1	-69°47.4
										Alphard		217°53.3	-8°44.2
										Regulus		207°40.5	11°52.8
										Dubhe		193°48.1	61°39.4
										Denebola		182°30.8	14°28.5
										Gienah		175°49.4	-17°38.2
										AcruX		173°05.9	-63°11.4
										Gacrux		171°57.6	-57°12.3
										Alioth		166°18.3	55°51.8
										Spica		158°28.4	-11°15.0
										Alcaid		152°56.8	49°13.5
										Hadar		148°44.0	-60°27.0
										Menkent		148°04.5	-36°27.0
										Arcturus		145°53.2	19°05.8
										Rigel Kent.		139°48.1	-60°53.9
										Zubenelg.		137°02.6	-16°06.6
										Kochab		137°20.0	74°04.9
										Alphecca		126°08.9	26°39.4
										Antares		112°23.3	-26°27.9
										Atria		107°23.0	-69°03.0
										Sabik		102°09.8	-15°44.6
										Shaula		96°18.7	-37°06.7
										Rasalhague		96°04.3	12°32.9
										Etamin		90°45.3	51°29.1
										Kaus Aust.		83°40.8	-34°22.3
										Vega		80°37.6	38°47.9
										Nunki		75°55.5	-26°16.3
										Altair		62°06.2	8°54.8
										Peacock		53°15.9	-56°40.6
										Deneb		49°30.2	45°20.5
										Enif		33°45.0	9°57.2
										Alnair		27°41.2	-46°52.7
										Fomalhaut		15°21.7	-29°32.0
										Scheat		13°51.3	28°10.5
										Markab		13°36.2	15°17.8
										2017/2/1		SHA	Mer.pass
										Venus		354°25.7	14:40
										Mars		347°48.0	15:07
										Jupiter		158°09.3	03:46
										Saturn		94°32.8	07:60
										2017/2/1		SHA	Mer.pass
										Venus		353°59.1	14:38
										Mars		347°07.4	15:06
										Jupiter		158°10.8	03:42
										Saturn		94°27.9	07:56
										2017/2/1		SHA	Mer.pass
										Venus		353°33.8	14:36
										Mars		346°26.8	15:05
										Jupiter		158°12.6	03:38
										Saturn		94°23.1	07:53
										Horizontal parallax			
										Venus:		0.3	
										Mars:		0.1	
Mer.pass.:14:09		v1.4 d0.9 m-4.5		v0.8 d0.7 m1.2		v2.5 d0.0 m-2.1		v2.3 d-0.0 m0.5					

February 18, 19 ,20 (Sat., Sun., Mon.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	148°08.8	141°18.9	7°49.0	133°55.0	5°56.8	306°23.3	-7°32.5	242°27.2	-22°04.8	Alpheratz	357°41.2	29°11.1
1	163°11.3	156°20.4	7°49.9	148°55.8	5°57.6	321°25.8	-7°32.4	257°29.4	-22°04.8	Ankaa	353°13.6	-42°13.1
2	178°13.8	171°21.9	7°50.8	163°56.6	5°58.3	336°28.4	-7°32.4	272°31.7	-22°04.8	Schedar	349°38.0	56°37.9
3	193°16.2	186°23.4	7°51.7	178°57.3	5°59.0	351°30.9	-7°32.4	287°34.0	-22°04.8	Diphda	348°53.5	-17°53.8
4	208°18.7	201°24.9	7°52.5	193°58.1	5°59.8	6°33.5	-7°32.3	302°36.2	-22°04.8	Achernar	335°25.3	-57°09.4
5	223°21.2	216°26.4	7°53.4	208°58.9	6°00.5	21°36.0	-7°32.3	317°38.5	-22°04.8	Hamal	327°58.1	23°32.5
6	238°23.6	231°27.9	7°54.3	223°59.7	6°01.3	36°38.6	-7°32.2	332°40.8	-22°04.8	Polaris	316°44.7	89°20.4
7	253°26.1	246°29.5	7°55.2	239°00.4	6°02.0	51°41.1	-7°32.2	347°43.1	-22°04.8	Akamar	315°16.6	-40°14.6
8	268°28.6	261°31.0	7°56.0	254°01.2	6°02.8	66°43.7	-7°32.1	2°45.3	-22°04.8	Menkar	314°12.5	4°09.2
9	283°31.0	276°32.5	7°56.9	269°02.0	6°03.5	81°46.2	-7°32.1	17°47.6	-22°04.8	Mirfak	308°36.8	49°55.3
10	298°33.5	291°34.0	7°57.8	284°02.7	6°04.2	96°48.8	-7°32.1	32°49.9	-22°04.8	Aldebaran	290°46.5	16°32.4
11	313°35.9	306°35.6	7°58.7	299°03.5	6°05.0	111°51.3	-7°32.0	47°52.1	-22°04.8	Rigel	281°09.5	-8°11.3
12	328°38.4	321°37.1	7°59.5	314°04.3	6°05.7	126°53.9	-7°32.0	62°54.4	-22°04.8	Capella	280°30.6	46°00.9
13	343°40.9	336°38.6	8°00.4	329°05.1	6°06.4	141°56.4	-7°31.9	77°56.7	-22°04.8	Bellatrix	278°29.2	6°21.6
14	358°43.3	351°40.2	8°01.3	344°05.8	6°07.2	156°59.0	-7°31.9	92°58.9	-22°04.8	Elnath	278°09.3	28°37.1
15	13°45.8	6°41.7	8°02.1	359°06.6	6°07.9	172°01.5	-7°31.8	108°01.2	-22°04.8	Alnilam	275°43.7	-1°11.8
16	28°48.3	21°43.3	8°03.0	14°07.4	6°08.7	187°04.1	-7°31.8	123°03.5	-22°04.8	Betelgeuse	270°58.4	7°24.3
17	43°50.7	36°44.8	8°03.9	29°08.1	6°09.4	202°06.6	-7°31.7	138°05.8	-22°04.8	Canopus	263°54.7	-52°42.7
18	58°53.2	51°46.4	8°04.7	44°08.9	6°10.1	217°09.2	-7°31.7	153°08.0	-22°04.8	Sirius	258°31.2	-16°44.6
19	73°55.7	66°47.9	8°05.6	59°09.7	6°10.9	232°11.7	-7°31.7	168°10.3	-22°04.8	Adara	255°10.3	-29°00.1
20	88°58.1	81°49.5	8°06.5	74°10.5	6°11.6	247°14.3	-7°31.6	183°12.6	-22°04.8	Procyon	244°56.8	5°10.7
21	104°00.6	96°51.0	8°07.3	89°11.2	6°12.4	262°16.8	-7°31.6	198°14.8	-22°04.8	Pollux	243°24.3	27°58.9
22	119°03.0	111°52.6	8°08.2	104°12.0	6°13.1	277°19.4	-7°31.5	213°17.1	-22°04.8	Avior	234°16.4	-59°34.1
23	134°05.5	126°54.2	8°09.0	119°12.8	6°13.8	292°21.9	-7°31.5	228°19.4	-22°04.8	Suhail	222°50.1	-43°30.3
Mer.pass.:14:05		v1.5 d0.9 m-4.5		v0.8 d0.7 m1.2		v2.5 d0.0 m-2.1		v2.3 d-0.0 m0.5		Miaplacidus	221°38.1	-69°47.4
										Alphard	217°53.3	-8°44.2
										Regulus	207°40.5	11°52.8
										Dubhe	193°48.1	61°39.4
										Denebola	182°30.8	14°28.5
										Genah	175°49.4	-17°38.2
										Acrux	173°05.8	-63°11.4
										Gacrux	171°57.6	-57°12.4
										Alioth	166°18.2	55°51.8
										Spica	158°28.4	-11°15.0
										Alcaid	152°56.7	49°13.5
										Hadar	148°43.9	-60°27.0
										Menkent	148°04.4	-36°27.0
										Arcturus	145°53.2	19°05.8
										Rigel Kent.	139°48.0	-60°54.0
										Zubenelg.	137°02.6	-16°06.6
										Kochab	137°20.0	74°04.9
										Alphecca	126°08.9	26°39.4
										Antares	112°23.2	-26°27.9
										Atria	107°22.9	-69°03.0
										Sabik	102°09.8	-15°44.6
										Shaula	96°18.7	-37°06.7
										Rasalhague	96°04.3	12°32.9
										Etamin	90°45.2	51°29.1
										Kaus Aust.	83°40.7	-34°22.3
										Vega	80°37.6	38°47.9
										Nunki	75°55.5	-26°16.3
										Altair	62°06.2	8°54.8
										Peacock	53°15.9	-56°40.6
										Deneb	49°30.2	45°20.5
										Enif	33°45.0	9°57.2
										Alnair	27°41.2	-46°52.7
										Fomalhaut	15°21.7	-29°32.0
										Scheat	13°51.3	28°10.5
										Markab	13°36.2	15°17.8
										2017/2/1	SHA	Mer.pass
										Venus	353°10.0	14:33
										Mars	345°46.2	15:04
										Jupiter	158°14.4	03:34
										Saturn	94°18.3	07:49
										2017/2/1	SHA	Mer.pass
										Venus	352°47.7	14:31
										Mars	345°05.6	15:02
										Jupiter	158°16.5	03:30
										Saturn	94°13.7	07:45
										2017/2/2	SHA	Mer.pass
										Venus	352°27.0	14:28
										Mars	344°24.9	15:01
										Jupiter	158°18.8	03:26
										Saturn	94°09.1	07:42
										Horizontal parallax		
										Venus:		0.4
										Mars:		0.1
Mer.pass.:13:57		v1.6 d0.8 m-4.4		v0.8 d0.7 m1.2		v2.6 d0.0 m-2.1		v2.3 d-0.0 m0.5				

February 21, 22, 23 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec
0	151°06.3	143°14.1	8°49.8	134°50.5	6°49.9	309°27.4	-7°29.1	245°10.9	-22°05.0	Alpheratz	357°41.2 29°11.1
1	166°08.7	158°15.8	8°50.6	149°51.3	6°50.6	324°30.0	-7°29.0	260°13.2	-22°05.0	Ankaa	353°13.6 -42°13.0
2	181°11.2	173°17.5	8°51.4	164°52.1	6°51.3	339°32.6	-7°29.0	275°15.4	-22°05.0	Schedar	349°38.0 56°37.9
3	196°13.6	188°19.2	8°52.2	179°52.8	6°52.0	354°35.1	-7°28.9	290°17.7	-22°05.0	Diphda	348°53.5 -17°53.8
4	211°16.1	203°20.9	8°53.0	194°53.6	6°52.8	9°37.7	-7°28.9	305°20.0	-22°05.0	Achernar	335°25.4 -57°09.4
5	226°18.6	218°22.6	8°53.8	209°54.4	6°53.5	24°40.3	-7°28.8	320°22.3	-22°05.0	Hamal	327°58.1 23°32.5
6	241°21.0	233°24.3	8°54.6	224°55.1	6°54.2	39°42.8	-7°28.8	335°24.6	-22°05.0	Polaris	316°46.0 89°20.4
7	256°23.5	248°26.1	8°55.4	239°55.9	6°55.0	54°45.4	-7°28.7	350°26.8	-22°05.0	Akamar	315°16.6 -40°14.6
8	271°26.0	263°27.8	8°56.2	254°56.7	6°55.7	69°48.0	-7°28.7	5°29.1	-22°05.0	Menkar	314°12.5 4°09.2
9	286°28.4	278°29.5	8°57.0	269°57.5	6°56.4	84°50.5	-7°28.6	20°31.4	-22°05.0	Mirfak	308°36.8 49°55.3
10	301°30.9	293°31.2	8°57.8	284°58.2	6°57.2	99°53.1	-7°28.6	35°33.7	-22°05.0	Aldebaran	290°46.5 16°32.4
11	316°33.4	308°33.0	8°58.5	299°59.0	6°57.9	114°55.7	-7°28.5	50°36.0	-22°05.0	Rigel	281°09.5 -8°11.3
12	331°35.8	323°34.7	8°59.3	314°59.8	6°58.6	129°58.3	-7°28.5	65°38.2	-22°05.0	Capella	280°30.6 46°00.9
13	346°38.3	338°36.4	9°00.1	330°00.5	6°59.4	145°00.8	-7°28.5	80°30.2	-22°05.0	Bellatrix	278°29.2 6°21.6
14	1°40.8	353°38.2	9°00.9	345°01.3	7°00.1	160°03.4	-7°28.4	95°42.8	-22°05.0	Elnath	278°09.3 28°37.1
15	16°43.2	8°39.9	9°01.7	0°02.1	7°00.8	175°06.0	-7°28.3	110°45.1	-22°05.0	Alnilam	275°43.7 -1°11.8
16	31°45.7	23°41.7	9°02.5	15°02.8	7°01.5	190°08.5	-7°28.3	125°47.4	-22°05.0	Betelgeuse	270°58.4 7°24.3
17	46°48.1	38°43.4	9°03.3	30°03.6	7°02.3	205°11.1	-7°28.2	140°49.6	-22°05.0	Canopus	263°54.7 -52°42.8
18	61°50.6	53°45.2	9°04.0	45°04.4	7°03.0	220°13.7	-7°28.2	155°51.9	-22°05.0	Sirius	258°31.2 -16°44.6
19	76°53.1	68°46.9	9°04.8	60°05.2	7°03.7	235°16.3	-7°28.1	170°54.2	-22°05.0	Adara	255°10.3 -29°00.1
20	91°55.5	83°48.7	9°05.6	75°05.9	7°04.5	250°18.8	-7°28.1	185°56.5	-22°05.0	Procyon	244°56.8 5°10.7
21	106°58.0	98°50.4	9°06.4	90°06.7	7°05.2	265°21.4	-7°28.0	200°58.8	-22°05.0	Pollux	243°24.3 27°58.9
22	122°00.5	113°52.2	9°07.2	105°07.5	7°05.9	280°24.0	-7°27.9	216°01.1	-22°05.0	Avior	234°16.4 -59°34.2
23	137°02.9	128°54.0	9°07.9	120°08.2	7°06.7	295°26.6	-7°27.9	231°03.3	-22°05.0	Suhail	222°50.1 -43°30.3
Mer.pass.:13:53		v1.7 d0.8 m-4.4		v0.8 d0.7 m1.3		v2.6 d0.1 m-2.1		v2.3 d-0.0 m0.5		Miaplacidus	221°38.1 -69°47.4
										Alphard	217°53.3 -8°44.2
										Regulus	207°40.5 11°52.8
										Dubhe	193°48.1 61°39.4
										Denebola	182°30.8 14°28.5
										Genah	175°49.4 -17°38.2
										Acrux	173°05.8 -63°11.5
										Gacrux	171°57.5 -57°12.4
										Alioth	166°18.2 55°51.8
										Spica	158°28.4 -11°15.0
										Alcaid	152°56.7 49°13.5
										Hadar	148°43.9 -60°27.0
										Menkent	148°04.4 -36°27.0
										Arcturus	145°53.2 19°05.8
										Rigel Kent.	139°48.0 -60°54.0
										Zubenelg.	137°02.5 -16°06.6
										Kochab	137°19.9 74°04.9
										Alphecca	126°08.9 26°39.4
										Antares	112°23.2 -26°27.9
										Atria	107°22.9 -69°03.0
										Sabik	102°09.8 -15°44.6
										Shaula	96°18.7 -37°06.7
										Rasalhague	96°04.3 12°32.9
										Etamin	90°45.2 51°29.1
										Kaus Aust.	83°40.7 -34°22.3
										Vega	80°37.5 38°47.9
										Nunki	75°55.5 -26°16.3
										Altair	62°06.1 8°54.8
										Peacock	53°15.9 -56°40.6
										Deneb	49°30.2 45°20.4
										Enif	33°45.0 9°57.2
										Alnair	27°41.2 -46°52.7
										Fomalhaut	15°21.7 -29°32.0
										Scheat	13°51.3 28°10.5
										Markab	13°36.2 15°17.8
										2017/2/2	SHA Mer.pass
										Venus	352°07.8 14:25
										Mars	343°44.3 14:60
										Jupiter	158°21.2 03:22
										Saturn	94°04.6 07:38
										2017/2/2	SHA Mer.pass
										Venus	351°50.3 14:23
										Mars	343°03.6 14:59
										Jupiter	158°23.7 03:17
										Saturn	94°00.2 07:34
										2017/2/2	SHA Mer.pass
										Venus	351°34.5 14:20
										Mars	342°22.9 14:57
										Jupiter	158°26.5 03:13
										Saturn	93°55.9 07:31
										Horizontal parallax	
										Venus:	0.4
										Mars:	0.1
Mer.pass.:13:45		v1.8 d0.7 m-4.4		v0.8 d0.7 m1.3		v2.6 d0.1 m-2.1		v2.3 d-0.0 m0.5			

h		Sun					Moon					Twilight					
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.			
0	176°35.8	-10°34.0	244°52.4	11.8	-18°31.2	-1.9	54.6	72	05:43	07:01	08:13	16:15	17:28	18:47			
1	191°35.8	-10°33.1	259°23.3	11.8	-18°33.0	-1.8	54.6	70	05:44	06:55	07:59	16:29	17:34	18:45			
2	206°35.9	-10°32.2	273°54.1	11.8	-18°34.8	-1.7	54.6	68	05:45	06:50	07:48	16:40	17:39	18:43			
3	221°36.0	-10°31.3	288°24.9	11.8	-18°36.4	-1.6	54.7	66	05:46	06:45	07:39	16:50	17:43	18:42			
4	236°36.1	-10°30.4	302°55.6	11.7	-18°38.0	-1.5	54.7	64	05:47	06:42	07:31	16:57	17:47	18:42			
5	251°36.1	-10°29.5	317°26.3	11.7	-18°39.5	-1.4	54.7	62	05:47	06:39	07:24	17:04	17:50	18:41			
6	266°36.2	-10°28.6	331°57.0	11.7	-18°40.9	-1.3	54.7	60	05:47	06:36	07:18	17:10	17:52	18:41			
7	281°36.3	-10°27.7	346°27.6	11.6	-18°42.2	-1.3	54.7	58	05:48	06:33	07:13	17:15	17:55	18:41			
8	296°36.3	-10°26.8	0°58.2	11.6	-18°43.4	-1.2	54.7	56	05:47	06:31	07:08	17:19	17:57	18:41			
9	311°36.4	-10°25.9	15°28.8	11.6	-18°44.5	-1.1	54.8	54	05:47	06:28	07:04	17:23	17:60	18:41			
10	326°36.5	-10°25.0	29°59.4	11.5	-18°45.5	-1.0	54.8	52	05:47	06:26	07:01	17:27	18:02	18:41			
11	341°36.6	-10°24.1	44°29.9	11.5	-18°46.5	-0.9	54.8	50	05:47	06:24	06:57	17:31	18:03	18:41			
12	356°36.6	-10°23.2	59°00.4	11.5	-18°47.3	-0.8	54.8	45	05:46	06:20	06:50	17:38	18:08	18:42			
13	11°36.7	-10°22.2	73°30.9	11.5	-18°48.1	-0.7	54.8	40	05:45	06:16	06:43	17:44	18:11	18:43			
14	26°36.8	-10°21.3	88°01.3	11.4	-18°48.8	-0.6	54.8	35	05:43	06:12	06:38	17:49	18:15	18:44			
15	41°36.9	-10°20.4	102°31.8	11.4	-18°49.4	-0.5	54.9	30	05:41	06:09	06:33	17:54	18:18	18:46			
16	56°36.9	-10°19.5	117°02.2	11.4	-18°49.9	-0.4	54.9	20	05:37	06:02	06:25	18:02	18:25	18:50			
17	71°37.0	-10°18.6	131°32.5	11.3	-18°50.3	-0.4	54.9	10	05:31	05:56	06:17	18:10	18:31	18:56			
18	86°37.1	-10°17.7	146°02.9	11.3	-18°50.6	-0.3	54.9	0	05:25	05:49	06:10	18:17	18:38	19:02			
19	101°37.2	-10°16.8	160°33.2	11.3	-18°50.8	-0.2	54.9	-10	05:17	05:41	06:03	18:24	18:45	19:10			
20	116°37.3	-10°15.9	175°03.4	11.3	-18°50.9	-0.1	55.0	-20	05:06	05:32	05:55	18:32	18:54	19:20			
21	131°37.3	-10°15.0	189°33.7	11.2	-18°50.9	0.0	55.0	-30	04:52	05:21	05:46	18:41	19:05	19:34			
22	146°37.4	-10°14.1	204°03.9	11.2	-18°50.9	0.1	55.0	-35	04:43	05:14	05:41	18:46	19:12	19:43			
23	161°37.5	-10°13.2	218°34.1	11.2	-18°50.7	0.2	55.0	-40	04:33	05:06	05:35	18:52	19:20	19:53			
SD.=16.2		d=0.9	S.D.=14.9					-45	04:19	04:57	05:27	18:59	19:29	20:06			
								-50	04:02	04:45	05:19	19:07	19:41	20:23			
								-52	03:54	04:39	05:15	19:11	19:47	20:31			
								-54	03:44	04:32	05:11	19:15	19:53	20:41			
								-56	03:33	04:25	05:06	19:20	19:60	20:51			
								-58	03:21	04:17	05:00	19:25	20:08	21:04			
								-60	03:05	04:08	04:54	19:31	20:17	21:19			
								Moonrise			Moonset						
								Lat.	Tue	Wed	Thu	Tue	Wed	Thu			
								72	--	--	09:12	--	--	10:05			
								70	06:30	07:22	07:45	09:20	10:10	11:32			
								68	05:41	06:32	07:05	10:09	11:00	12:11			
								66	05:09	06:01	06:38	10:41	11:31	12:38			
								64	04:46	05:37	06:17	11:04	11:55	12:59			
								62	04:28	05:19	05:60	11:23	12:13	13:15			
								60	04:13	05:03	05:46	11:38	12:28	13:29			
								58	03:60	04:50	05:34	11:51	12:41	13:41			
								56	03:49	04:39	05:23	12:02	12:52	13:51			
								54	03:39	04:29	05:14	12:12	13:02	14:00			
								52	03:30	04:20	05:06	12:21	13:11	14:09			
								50	03:22	04:13	04:58	12:29	13:19	14:16			
								45	03:06	03:56	04:42	12:45	13:35	14:31			
								40	02:52	03:42	04:29	12:59	13:49	14:44			
								35	02:41	03:30	04:18	13:11	14:01	14:55			
								30	02:31	03:20	04:08	13:21	14:11	15:04			
								20	02:13	03:03	03:52	13:38	14:28	15:20			
								10	01:58	02:47	03:37	13:54	14:43	15:34			
								0	01:44	02:33	03:23	14:08	14:57	15:47			
								-10	01:30	02:19	03:09	14:22	15:11	16:01			
								-20	01:15	02:04	02:55	14:37	15:26	16:15			
								-30	00:58	01:46	02:38	14:55	15:43	16:30			
								-35	00:48	01:36	02:28	15:05	15:53	16:40			
								-40	00:37	01:25	02:17	15:16	16:05	16:50			
								-45	00:24	01:11	02:04	15:30	16:18	17:02			
								-50	00:07	00:54	01:48	15:47	16:34	17:17			
								-52	--	00:46	01:41	15:54	16:42	17:24			
								-54	--	00:38	01:32	16:03	16:51	17:32			
								-56	--	00:28	01:23	16:13	17:00	17:41			
								-58	--	00:17	01:12	16:24	17:11	17:50			
								-60	--	00:04	00:60	16:37	17:23	18:01			
								Day	Sun		Mer.	Moon		Age			
									Eqn.of Time	Pass		Mer.Pass.					
									00 ^h	12 ^h		Upper	Lower				
								21	13:37	13:33	12:13	07:55	20:20	24(26%)			
								22	13:30	13:26	12:13	08:45	21:10	25(18%)			
								23	13:22	13:18	12:13	09:35	22:00	26(11%)			
								S.D.=15.2									

February 24, 25 ,26 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	154°03.7	145°24.2	9°44.4	135°45.9	7°42.2	312°33.1	-7°25.1	247°55.4	-22°05.1	Alpheratz	357°41.2	29°11.0	
1	169°06.1	160°26.1	9°45.1	150°46.6	7°42.9	327°35.7	-7°25.1	262°57.6	-22°05.1	Ankaa	353°13.6	-42°13.0	
2	184°08.6	175°28.0	9°45.8	165°47.4	7°43.6	342°38.3	-7°25.0	277°59.9	-22°05.1	Schedar	349°38.0	56°37.9	
3	199°11.1	190°29.9	9°46.5	180°48.2	7°44.4	357°40.9	-7°24.9	293°02.2	-22°05.2	Diphda	348°53.6	-17°53.8	
4	214°13.5	205°31.9	9°47.2	195°48.9	7°45.1	12°43.5	-7°24.9	308°04.5	-22°05.2	Achernar	335°25.4	-57°09.4	
5	229°16.0	220°33.8	9°47.9	210°49.7	7°45.8	27°46.0	-7°24.8	323°06.8	-22°05.2	Hamal	327°58.1	23°32.5	
6	244°18.5	235°35.7	9°48.6	225°50.5	7°46.5	42°48.6	-7°24.8	338°09.1	-22°05.2	Polaris	316°47.3	89°20.4	
7	259°20.9	250°37.7	9°49.3	240°51.2	7°47.2	57°51.2	-7°24.7	353°11.4	-22°05.2	Akamar	315°16.6	-40°14.6	
8	274°23.4	265°39.6	9°50.0	255°52.0	7°48.0	72°53.8	-7°24.6	8°13.7	-22°05.2	Menkar	314°12.5	4°09.2	
9	289°25.9	280°41.6	9°50.7	270°52.8	7°48.7	87°56.4	-7°24.6	23°16.0	-22°05.2	Mirfak	308°36.8	49°55.3	
10	304°28.3	295°43.5	9°51.4	285°53.5	7°49.4	102°59.0	-7°24.5	38°18.3	-22°05.2	Aldebaran	290°46.5	16°32.4	
11	319°30.8	310°45.5	9°52.1	300°54.3	7°50.1	118°01.6	-7°24.5	53°20.5	-22°05.2	Rigel	281°09.6	-8°11.3	
12	334°33.2	325°47.4	9°52.8	315°55.1	7°50.8	133°04.2	-7°24.4	68°22.8	-22°05.2	Capella	280°30.6	46°00.9	
13	349°35.7	340°49.4	9°53.5	330°55.8	7°51.6	148°06.8	-7°24.3	83°25.1	-22°05.2	Bellatrix	278°29.2	6°21.6	
14	4°38.2	355°51.3	9°54.2	345°56.6	7°52.3	163°09.4	-7°24.3	98°27.4	-22°05.2	Elnath	278°09.3	28°37.1	
15	19°40.6	10°53.3	9°54.9	0°57.4	7°53.0	178°12.0	-7°24.2	113°29.7	-22°05.2	Alnilam	275°43.7	-1°11.8	
16	34°43.1	25°55.3	9°55.6	15°58.1	7°53.7	193°14.6	-7°24.2	128°32.0	-22°05.2	Betelgeuse	270°58.5	7°24.3	
17	49°45.6	40°57.2	9°56.3	30°58.9	7°54.4	208°17.2	-7°24.1	143°34.3	-22°05.2	Canopus	263°54.7	-52°42.8	
18	64°48.0	55°59.2	9°57.0	45°59.7	7°55.2	223°19.8	-7°24.0	158°36.6	-22°05.2	Sirius	258°31.2	-16°44.6	
19	79°50.5	71°01.2	9°57.6	61°00.4	7°55.9	238°22.3	-7°24.0	173°38.9	-22°05.2	Adara	255°10.3	-29°00.1	
20	94°53.0	86°03.2	9°58.3	76°01.2	7°56.6	253°24.9	-7°23.9	188°41.2	-22°05.2	Procyon	244°56.8	5°10.7	
21	109°55.4	101°05.1	9°59.0	91°02.0	7°57.3	268°27.5	-7°23.9	203°43.5	-22°05.2	Pollux	243°24.3	27°58.9	
22	124°57.9	116°07.1	9°59.7	106°02.7	7°58.0	283°30.1	-7°23.8	218°45.8	-22°05.2	Avior	234°16.4	-59°34.2	
23	140°00.3	131°09.1	10°00.4	121°03.5	7°58.8	298°32.7	-7°23.7	233°48.1	-22°05.2	Suhail	222°50.1	-43°30.4	
Mer.pass.:13:41		v1.9 d0.7 m-4.4		v0.8 d0.7 m1.3		v2.6 d0.1 m-2.1		v2.3 d-0.0 m0.5		Miaaplacidus		221°38.2	-69°47.5
										Alphard		217°53.3	-8°44.2
										Regulus		207°40.5	11°52.8
										Dubhe		193°48.1	61°39.4
										Denebola		182°30.8	14°28.5
										Gienah		175°49.4	-17°38.2
										Acrux		173°05.8	-63°11.5
										Gacrux		171°57.5	-57°12.4
										Alioth		166°18.2	55°51.8
										Spica		158°28.4	-11°15.0
										Alcaid		152°56.7	49°13.5
										Hadar		148°43.9	-60°27.0
										Menkent		148°04.4	-36°27.0
										Arcturus		145°53.2	19°05.8
										Rigel Kent.		139°48.0	-60°54.0
										Zubenelg.		137°02.5	-16°06.6
										Kochab		137°19.8	74°04.9
										Alphecca		126°08.9	26°39.4
										Antares		112°23.2	-26°27.9
										Atria		107°22.8	-69°03.0
										Sabik		102°09.7	-15°44.6
										Shaula		96°18.7	-37°06.7
										Rasalhague		96°04.3	12°32.9
										Etamin		90°45.2	51°29.1
										Kaus Aust.		83°40.7	-34°22.3
										Vega		80°37.5	38°47.9
										Nunki		75°55.5	-26°16.3
										Altair		62°06.1	8°54.8
										Peacock		53°15.9	-56°40.6
										Deneb		49°30.1	45°20.4
										Enif		33°45.0	9°57.2
										Alnair		27°41.1	-46°52.7
										Fomalhaut		15°21.7	-29°32.0
										Scheat		13°51.3	28°10.5
										Markab		13°36.2	15°17.8
										2017/2/2		SHA	Mer.pass
										Venus		351°20.5	14:17
										Mars		341°42.2	14:56
										Jupiter		158°29.4	03:09
										Saturn		93°51.7	07:27
										2017/2/2		SHA	Mer.pass
										Venus		351°08.3	14:13
										Mars		341°01.4	14:55
										Jupiter		158°32.5	03:05
										Saturn		93°47.5	07:24
										2017/2/2		SHA	Mer.pass
										Venus		350°58.0	14:10
										Mars		340°20.7	14:54
										Jupiter		158°35.8	03:01
										Saturn		93°43.5	07:20
										Horizontal parallax			
										Venus:		0.4	
										Mars:		0.1	
Mer.pass.:13:33		v2.1 d0.6 m-4.4		v0.8 d0.7 m1.3		v2.6 d0.1 m-2.2		v2.3 d-0.0 m0.5					

February 27, 28 ,01 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	157°01.1	147°50.6	10°31.8	136°41.0	8°33.8	315°40.3	-7°20.6	250°40.6	-22°05.3	Alpheratz	357°41.2	29°11.0	
1	172°03.6	162°52.8	10°32.4	151°41.7	8°34.5	330°42.9	-7°20.5	265°42.9	-22°05.3	Ankaa	353°13.6	-42°13.0	
2	187°06.0	177°54.9	10°33.0	166°42.5	8°35.2	345°45.5	-7°20.4	280°45.2	-22°05.3	Schedar	349°38.0	56°37.9	
3	202°08.5	192°57.1	10°33.6	181°43.3	8°35.9	0°48.1	-7°20.4	295°47.5	-22°05.3	Diphda	348°53.6	-17°53.8	
4	217°10.9	207°59.3	10°34.2	196°44.0	8°36.6	15°50.7	-7°20.3	310°49.8	-22°05.3	Achernar	335°25.4	-57°09.4	
5	232°13.4	223°01.4	10°34.8	211°44.8	8°37.3	30°53.3	-7°20.2	325°52.1	-22°05.3	Hamal	327°58.1	23°32.5	
6	247°15.9	238°03.6	10°35.4	226°45.6	8°38.1	45°55.9	-7°20.2	340°54.4	-22°05.3	Polaris	316°48.8	89°20.4	
7	262°18.3	253°05.8	10°36.0	241°46.3	8°38.8	60°58.6	-7°20.1	355°56.7	-22°05.3	Akamar	315°16.6	-40°14.6	
8	277°20.8	268°08.0	10°36.6	256°47.1	8°39.5	76°01.2	-7°20.0	10°59.0	-22°05.3	Menkar	314°12.5	4°09.2	
9	292°23.3	283°10.2	10°37.2	271°47.9	8°40.2	91°03.8	-7°20.0	26°01.3	-22°05.3	Mirfak	308°36.8	49°55.3	
10	307°25.7	298°12.3	10°37.8	286°48.6	8°40.9	106°06.4	-7°19.9	41°03.6	-22°05.3	Aldebaran	290°46.5	16°32.4	
11	322°28.2	313°14.5	10°38.3	301°49.4	8°41.6	121°09.0	-7°19.8	56°05.9	-22°05.3	Rigel	281°09.6	-8°11.3	
12	337°30.7	328°16.7	10°38.9	316°50.1	8°42.3	136°11.6	-7°19.8	71°08.2	-22°05.3	Capella	280°30.6	46°00.9	
13	352°33.1	343°18.9	10°39.5	331°50.9	8°43.0	151°14.2	-7°19.7	86°10.5	-22°05.3	Bellatrix	278°29.2	6°21.6	
14	7°35.6	358°21.1	10°40.1	346°51.7	8°43.7	166°16.8	-7°19.6	101°12.9	-22°05.3	Elnath	278°09.4	28°37.1	
15	22°38.0	13°23.3	10°40.7	1°52.4	8°44.4	181°19.5	-7°19.6	116°15.2	-22°05.3	Alnilam	275°43.7	-1°11.8	
16	37°40.5	28°25.5	10°41.3	16°53.2	8°45.1	196°22.1	-7°19.5	131°17.5	-22°05.3	Betelgeuse	270°58.5	7°24.3	
17	52°43.0	43°27.8	10°41.8	31°54.0	8°45.9	211°24.7	-7°19.4	146°19.8	-22°05.3	Canopus	263°54.8	-52°42.8	
18	67°45.4	58°30.0	10°42.4	46°54.7	8°46.6	226°27.3	-7°19.4	161°22.1	-22°05.3	Sirius	258°31.2	-16°44.6	
19	82°47.9	73°32.2	10°43.0	61°55.5	8°47.3	241°29.9	-7°19.3	176°24.4	-22°05.3	Adara	255°10.3	-29°00.1	
20	97°50.4	88°34.4	10°43.6	76°56.3	8°48.0	256°32.5	-7°19.2	191°26.7	-22°05.3	Procyon	244°56.8	5°10.7	
21	112°52.8	103°36.6	10°44.1	91°57.0	8°48.7	271°35.1	-7°19.1	206°29.0	-22°05.3	Pollux	243°24.3	27°58.9	
22	127°55.3	118°38.9	10°44.7	106°57.8	8°49.4	286°37.8	-7°19.1	221°31.3	-22°05.3	Avior	234°16.4	-59°34.2	
23	142°57.8	133°41.1	10°45.3	121°58.5	8°50.1	301°40.4	-7°19.0	236°33.6	-22°05.3	Suhail	222°50.1	-43°30.4	
Mer.pass.:13:29		v2.2 d0.6 m-4.4		v0.8 d0.7 m1.3		v2.6 d0.1 m-2.2		v2.3 d-0.0 m0.5		Miacplacidus		221°38.2	-69°47.5
										Alphard		217°53.3	-8°44.2
										Regulus		207°40.5	11°52.8
										Dubhe		193°48.1	61°39.4
										Denebola		182°30.7	14°28.5
										Gienah		175°49.4	-17°38.2
										Acrux		173°05.8	-63°11.5
										Gacrux		171°57.5	-57°12.4
										Alioth		166°18.2	55°51.9
										Spica		158°28.4	-11°15.0
										Alcaid		152°56.7	49°13.5
										Hadar		148°43.8	-60°27.0
										Menkent		148°04.4	-36°27.1
										Arcturus		145°53.1	19°05.8
										Rigel Kent.		139°47.9	-60°54.0
										Zubenelg.		137°02.5	-16°06.6
										Kochab		137°19.8	74°04.9
										Alphecca		126°08.8	26°39.4
										Antares		112°23.2	-26°28.0
										Atria		107°22.8	-69°03.0
										Sabik		102°09.7	-15°44.6
										Shaula		96°18.6	-37°06.7
										Rasalhague		96°04.2	12°32.9
										Etamin		90°45.2	51°29.1
										Kaus Aust.		83°40.7	-83°22.3
										Vega		80°37.5	38°47.8
										Nunki		75°55.4	-26°16.3
										Altair		62°06.1	8°54.8
										Peacock		53°15.9	-56°40.6
										Deneb		49°30.1	45°20.4
										Enif		33°45.0	9°57.2
										Alnair		27°41.1	-46°52.7
										Fomalhaut		15°21.7	-29°32.0
										Scheat		13°51.3	28°10.5
										Markab		13°36.2	15°17.8
										2017/2/2		SHA	Mer.pass
										Venus		350°49.5	14:07
										Mars		339°39.9	14:53
										Jupiter		158°39.2	02:57
										Saturn		93°39.5	07:16
										2017/2/2		SHA	Mer.pass
										Venus		350°43.1	14:03
										Mars		338°59.1	14:51
										Jupiter		158°42.8	02:53
										Saturn		93°35.7	07:12
										2017/3/1		SHA	Mer.pass
										Venus		350°38.7	13:59
										Mars		338°18.2	14:50
										Jupiter		158°46.5	02:48
										Saturn		93°31.9	07:09
										Horizontal paralax			
										Venus:		0.4	
										Mars:		0.1	
Mer.pass.:13:21		v2.3 d0.5 m-4.4		v0.8 d0.7 m1.3		v2.6 d0.1 m-2.2		v2.3 d-0.0 m0.5					

Table with multiple sections: Sun and Moon data for Monday, Tuesday, Wednesday; Twilight data; Moonrise/Moonset data; and Sun/Moon data for Day. Columns include GHA, Dec, ν, d, HP, Lat., Naut., Civil, Sunrise, Sunset, and Age.

March 02, 03, 04 (Thu., Fri., Sat.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Thu	GHA	Dec	GHA	Dec		GHA	Dec		GHA	Dec		GHA	Dec		SHA	Dec				
0	159°58.5	150°34.9	11°10.9	137°35.9	9°24.6	318°48.9	-7°15.5	253°26.7	-22°05.4	Alpheratz	357°41.2	29°11.0								
1	175°01.0	165°37.3	11°11.4	152°36.6	9°25.3	333°51.5	-7°15.4	268°29.0	-22°05.4	Ankaa	353°13.6	-42°13.0								
2	190°03.4	180°39.7	11°11.9	167°37.4	9°26.0	348°54.2	-7°15.3	283°31.3	-22°05.4	Schedar	349°38.1	56°37.9								
3	205°05.9	195°42.1	11°12.3	182°38.1	9°26.7	3°56.8	-7°15.3	298°33.7	-22°05.4	Diphda	348°53.6	-17°53.8								
4	220°08.4	210°44.6	11°12.8	197°38.9	9°27.4	18°59.4	-7°15.2	313°36.0	-22°05.4	Achernar	335°25.4	-57°09.3								
5	235°10.8	225°47.0	11°13.3	212°39.7	9°28.1	34°02.1	-7°15.1	328°38.3	-22°05.4	Hamal	327°58.1	23°32.5								
6	250°13.3	240°49.4	11°13.7	227°40.4	9°28.8	49°04.7	-7°15.0	343°40.6	-22°05.4	Polaris	316°50.1	89°20.4								
7	265°15.7	255°51.9	11°14.2	242°41.2	9°29.5	64°07.3	-7°15.0	358°42.9	-22°05.4	Akamar	315°16.6	-40°14.6								
8	280°18.2	270°54.3	11°14.7	257°41.9	9°30.2	79°10.0	-7°14.9	13°45.2	-22°05.4	Menkar	314°12.5	4°09.2								
9	295°20.7	285°56.7	11°15.1	272°42.7	9°30.9	94°12.6	-7°14.8	28°47.5	-22°05.4	Mirfak	308°36.9	49°55.3								
10	310°23.1	300°59.2	11°15.6	287°43.5	9°31.6	109°15.2	-7°14.7	43°49.9	-22°05.4	Aldebaran	290°46.5	16°32.4								
11	325°25.6	316°01.6	11°16.1	302°44.2	9°32.3	124°17.8	-7°14.7	58°52.2	-22°05.4	Rigel	281°09.6	-8°11.3								
12	340°28.1	331°04.1	11°16.5	317°45.0	9°32.9	139°20.5	-7°14.6	73°54.5	-22°05.4	Capella	280°30.7	46°00.9								
13	355°30.5	346°06.6	11°17.0	332°45.7	9°33.6	154°23.1	-7°14.5	88°56.8	-22°05.4	Bellatrix	278°29.2	6°21.6								
14	10°33.0	1°09.0	11°17.4	347°46.5	9°34.3	169°25.7	-7°14.4	103°59.1	-22°05.4	Elnath	278°09.4	28°37.1								
15	25°35.5	16°11.5	11°17.9	2°47.3	9°35.0	184°28.4	-7°14.3	119°01.4	-22°05.4	Alnilam	275°43.8	-1°11.8								
16	40°37.9	31°13.9	11°18.3	17°48.0	9°35.7	199°31.0	-7°14.3	134°03.7	-22°05.4	Betelgeuse	270°58.5	7°24.3								
17	55°40.4	46°16.4	11°18.8	32°48.8	9°36.4	214°33.6	-7°14.2	149°06.1	-22°05.4	Canopus	263°54.8	-52°42.8								
18	70°42.9	61°18.9	11°19.2	47°49.5	9°37.1	229°36.3	-7°14.1	164°08.4	-22°05.4	Sirius	258°31.2	-16°44.6								
19	85°45.3	76°21.4	11°19.7	62°50.3	9°37.8	244°38.9	-7°14.0	179°10.7	-22°05.4	Adara	255°10.3	-29°00.1								
20	100°47.8	91°23.9	11°20.1	77°51.1	9°38.5	259°41.6	-7°14.0	194°13.0	-22°05.4	Procyon	244°56.8	5°10.7								
21	115°50.2	106°26.3	11°20.5	92°51.8	9°39.2	274°44.2	-7°13.9	209°15.3	-22°05.4	Pollux	243°24.3	27°58.9								
22	130°52.7	121°28.8	11°21.0	107°52.6	9°39.9	289°46.8	-7°13.8	224°17.6	-22°05.4	Avior	234°16.4	-59°34.2								
23	145°55.2	136°31.3	11°21.4	122°53.3	9°40.6	304°49.5	-7°13.7	239°20.0	-22°05.4	Suhail	222°50.1	-43°30.4								
Mer.pass.:13:17			v2.4 d0.5 m-4.4			v0.8 d0.7 m1.3			v2.6 d0.1 m-2.2			v2.3 d-0.0 m0.5			Miaplacidus			221°38.2	-69°47.5	
															Alphard			217°53.3	-8°44.2	
															Regulus			207°40.5	11°52.8	
															Dubhe			193°48.1	61°39.4	
															Denebola			182°30.7	14°28.5	
															Gienah			175°49.4	-17°38.3	
															Acrux			173°05.8	-63°11.5	
															Gacrux			171°57.5	-57°12.4	
															Alioth			166°18.2	55°51.9	
															Spica			158°28.4	-11°15.0	
															Alcaid			152°56.6	49°13.5	
															Hadar			148°43.8	-60°27.0	
															Menkent			148°04.3	-36°27.1	
															Arcturus			145°53.1	19°05.8	
															Rigel Kent.			139°47.9	-60°54.0	
															Zubenelg.			137°02.5	-16°06.7	
															Kochab			137°19.7	74°04.9	
															Alphecca			126°08.8	26°39.4	
															Antares			112°23.1	-26°28.0	
															Atria			107°22.7	-69°03.0	
															Sabik			102°09.7	-15°44.6	
															Shaula			96°18.6	-37°06.7	
															Rasalhague			96°04.2	12°32.9	
															Etamin			90°45.1	51°29.1	
															Kaus Aust.			83°40.6	-34°22.3	
															Vega			80°37.5	38°47.8	
															Nunki			75°55.4	-26°16.3	
															Altair			62°06.1	8°54.8	
															Peacock			53°15.8	-56°40.6	
															Deneb			49°30.1	45°20.4	
															Enif			33°45.0	9°57.2	
															Alnair			27°41.1	-46°52.6	
															Fomalhaut			15°21.7	-29°32.0	
															Scheat			13°51.3	28°10.4	
															Markab			13°36.2	15°17.7	
															2017/3/2			SHA	Mer.pass	
															Venus			350°36.4	13:55	
															Mars			337°37.4	14:49	
															Jupiter			158°50.4	02:44	
															Saturn			93°28.2	07:05	
															2017/3/3			SHA	Mer.pass	
															Venus			350°36.2	13:51	
															Mars			336°56.5	14:48	
															Jupiter			158°54.5	02:40	
															Saturn			93°24.6	07:01	
															2017/3/4			SHA	Mer.pass	
															Venus			350°38.1	13:47	
															Mars			336°15.5	14:46	
															Jupiter			158°58.7	02:36	
															Saturn			93°21.1	06:58	
															Horizontal parallax					
															Venus:			0.4		
															Mars:			0.1		
Mer.pass.:13:10			v2.6 d0.4 m-4.4			v0.8 d0.7 m1.3			v2.6 d0.1 m-2.2			v2.3 d-0.0 m0.5								

h Sun								Moon							
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	176°57.2	-7°12.9	134°53.4	9.4	5°56.8	11.0	59.3	72	04:59	06:17	07:25	17:00	18:09	19:28	
1	191°57.4	-7°11.9	149°21.8	9.4	6°07.7	10.9	59.3	70	05:05	06:16	07:17	17:08	18:10	19:21	
2	206°57.5	-7°11.0	163°50.2	9.4	6°18.6	10.9	59.3	68	05:10	06:15	07:10	17:15	18:11	19:16	
3	221°57.6	-7°10.0	178°18.6	9.3	6°29.5	10.9	59.3	66	05:14	06:13	07:05	17:21	18:12	19:11	
4	236°57.8	-7°09.0	192°46.9	9.3	6°40.3	10.8	59.3	64	05:18	06:12	06:60	17:25	18:13	19:08	
5	251°57.9	-7°08.1	207°15.2	9.3	6°51.1	10.8	59.3	62	05:20	06:11	06:56	17:29	18:14	19:05	
6	266°58.0	-7°07.1	221°43.4	9.2	7°01.9	10.7	59.3	60	05:23	06:11	06:52	17:33	18:15	19:03	
7	281°58.1	-7°06.2	236°11.6	9.2	7°12.6	10.7	59.3	58	05:24	06:10	06:49	17:36	18:15	19:01	
8	296°58.3	-7°05.2	250°39.8	9.2	7°23.3	10.7	59.4	56	05:26	06:09	06:46	17:39	18:16	18:59	
9	311°58.4	-7°04.3	265°08.0	9.2	7°33.9	10.6	59.4	54	05:27	06:08	06:44	17:41	18:17	18:58	
10	326°58.5	-7°03.3	279°36.1	9.1	7°44.5	10.6	59.4	52	05:28	06:07	06:41	17:44	18:17	18:56	
11	341°58.6	-7°02.4	294°04.2	9.1	7°55.1	10.5	59.4	50	05:29	06:07	06:39	17:46	18:18	18:55	
12	356°58.8	-7°01.4	308°32.3	9.1	8°05.5	10.5	59.4	45	05:31	06:05	06:34	17:50	18:20	18:54	
13	11°58.9	-7°00.4	323°00.4	9.0	8°16.0	10.4	59.4	40	05:32	06:03	06:30	17:54	18:21	18:53	
14	26°59.0	-6°59.5	337°28.4	9.0	8°26.4	10.4	59.4	35	05:32	06:01	06:27	17:57	18:23	18:52	
15	41°59.1	-6°58.5	351°56.3	9.0	8°36.8	10.3	59.4	30	05:32	05:60	06:24	18:01	18:24	18:52	
16	56°59.3	-6°57.6	6°24.3	8.9	8°47.1	10.3	59.4	20	05:31	05:56	06:18	18:06	18:28	18:54	
17	71°59.4	-6°56.6	20°52.2	8.9	8°57.3	10.2	59.4	10	05:28	05:52	06:13	18:11	18:32	18:56	
18	86°59.5	-6°55.7	35°20.1	8.9	9°07.5	10.2	59.4	0	05:24	05:48	06:09	18:15	18:36	19:00	
19	101°59.7	-6°54.7	49°47.9	8.8	9°17.6	10.1	59.4	-10	05:18	05:43	06:04	18:20	18:41	19:06	
20	116°59.8	-6°53.7	64°15.7	8.8	9°27.7	10.1	59.4	-20	05:10	05:36	05:58	18:25	18:47	19:13	
21	131°59.9	-6°52.8	78°43.5	8.8	9°37.8	10.0	59.4	-30	04:60	05:28	05:52	18:31	18:55	19:23	
22	147°00.1	-6°51.8	93°11.2	8.7	9°47.7	9.9	59.4	-35	04:53	05:23	05:49	18:34	18:60	19:30	
23	162°00.2	-6°50.9	107°39.0	8.7	9°57.6	9.9	59.4	-40	04:44	05:17	05:45	18:38	19:06	19:38	
SD.=16.1 d=1.0 S.D.=16.2								-45	04:34	05:10	05:40	18:43	19:13	19:49	
								-50	04:21	05:01	05:34	18:48	19:22	20:02	
								-52	04:14	04:57	05:32	18:51	19:26	20:08	
								-54	04:07	04:52	05:29	18:54	19:30	20:15	
								-56	03:58	04:47	05:25	18:57	19:36	20:23	
								-58	03:49	04:41	05:22	19:00	19:41	20:33	
								-60	03:37	04:34	05:18	19:04	19:48	20:44	
								Moonrise			Moonset				
								Lat.	Thu	Fri	Sat	Thu	Fri	Sat	
								72	07:45	07:38	07:29	--	00:03	02:06	
								70	07:56	07:56	07:59	23:46	--	01:37	
								68	08:04	08:11	08:22	23:33	--	01:16	
								66	08:11	08:23	08:39	23:22	--	00:59	
								64	08:17	08:33	08:54	23:13	--	00:45	
								62	08:22	08:42	09:06	23:05	--	00:34	
								60	08:27	08:49	09:16	22:59	--	00:24	
								58	08:31	08:56	09:25	22:53	--	00:16	
								56	08:35	09:02	09:33	22:48	--	00:08	
								54	08:38	09:07	09:40	22:43	--	00:01	
								52	08:41	09:12	09:47	22:39	23:56	--	
								50	08:44	09:16	09:53	22:36	23:50	--	
								45	08:50	09:25	10:05	22:27	23:39	--	
								40	08:55	09:33	10:16	22:21	23:29	--	
								35	08:59	09:40	10:25	22:15	23:21	--	
								30	09:03	09:46	10:32	22:10	23:14	--	
								20	09:09	09:56	10:46	22:01	23:01	--	
								10	09:15	10:06	10:58	21:53	22:51	23:49	
								0	09:21	10:14	11:09	21:46	22:40	23:36	
								-10	09:26	10:23	11:21	21:39	22:30	23:24	
								-20	09:32	10:33	11:33	21:31	22:20	23:11	
								-30	09:39	10:43	11:47	21:23	22:07	22:56	
								-35	09:43	10:50	11:55	21:18	22:00	22:47	
								-40	09:48	10:57	12:05	21:12	21:52	22:37	
								-45	09:53	11:05	12:16	21:05	21:43	22:25	
								-50	09:56	11:15	12:29	20:57	21:32	22:11	
								-52	10:03	11:20	12:35	20:54	21:26	22:04	
								-54	10:06	11:25	12:42	20:50	21:21	21:57	
								-56	10:10	11:31	12:50	20:45	21:14	21:49	
								-58	10:14	11:37	12:58	20:41	21:07	21:40	
								-60	10:18	11:45	13:08	20:35	20:59	21:29	
								Day	Sun			Moon			
									Eqn.of Time	Mer.	Mer.	Mer.Pass.	Age		
									00 ^h	12 ^h	Pass	Upper	Lower		
								2	12:11	12:05	12:12	15:33	03:07	4(18%)	
								3	11:59	11:52	12:11	16:27	04:00	5(28%)	
								4	11:46	11:39	12:11	17:22	04:54	6(39%)	
SD.=16.1 d=1.0 S.D.=16.2															

March 08, 09 ,10 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	165°53.3	157°01.3	11°58.9	139°24.8	11°03.4	325°10.2	-7°03.8	259°01.5	-22°05.4	Alpheratz	357°41.2	29°11.0
1	180°55.8	172°04.2	11°59.1	154°25.5	11°04.1	340°12.9	-7°03.7	274°03.8	-22°05.4	Ankaa	353°13.6	-42°13.0
2	195°58.3	187°07.2	11°59.3	169°26.3	11°04.8	355°15.6	-7°03.6	289°06.1	-22°05.4	Schedar	349°38.1	56°37.9
3	211°00.7	202°10.2	11°59.4	184°27.0	11°05.5	10°18.2	-7°03.5	304°08.5	-22°05.4	Diphda	348°53.6	-17°53.8
4	226°03.2	217°13.2	11°59.6	199°27.8	11°06.1	25°20.9	-7°03.4	319°10.8	-22°05.4	Achernar	335°25.5	-57°09.3
5	241°05.7	232°16.1	11°59.8	214°28.6	11°06.8	40°23.6	-7°03.3	334°13.1	-22°05.4	Hamal	327°58.1	23°32.5
6	256°08.1	247°19.1	11°59.9	229°29.3	11°07.5	55°26.2	-7°03.2	349°15.5	-22°05.4	Polaris	316°52.3	89°20.3
7	271°10.6	262°22.1	12°00.1	244°30.1	11°08.1	70°28.9	-7°03.1	4°17.8	-22°05.4	Akamar	315°16.7	-40°14.6
8	286°13.0	277°25.1	12°00.3	259°30.8	11°08.8	85°31.6	-7°03.0	19°20.2	-22°05.4	Menkar	314°12.6	4°09.1
9	301°15.5	292°28.1	12°00.4	274°31.6	11°09.5	100°34.2	-7°03.0	34°22.5	-22°05.4	Mirfak	308°36.9	49°55.3
10	316°18.0	307°31.1	12°00.6	289°32.3	11°10.2	115°36.9	-7°02.9	49°24.8	-22°05.4	Aldebaran	290°46.5	16°32.4
11	331°20.4	322°34.1	12°00.7	304°33.1	11°10.8	130°39.6	-7°02.8	64°27.2	-22°05.4	Rigel	281°09.6	-8°11.3
12	346°22.9	337°37.1	12°00.9	319°33.8	11°11.5	145°42.3	-7°02.7	79°29.5	-22°05.4	Capella	280°30.7	46°00.9
13	1°25.4	352°40.1	12°01.0	334°34.6	11°12.2	160°44.9	-7°02.6	94°31.9	-22°05.4	Bellatrix	278°29.3	6°21.6
14	16°27.8	7°43.1	12°01.2	349°35.3	11°12.8	175°47.6	-7°02.5	109°34.2	-22°05.4	Elnath	278°09.4	28°37.1
15	31°30.3	22°46.1	12°01.3	4°36.1	11°13.5	190°50.3	-7°02.4	124°36.5	-22°05.4	Alnilam	275°43.8	-1°11.8
16	46°32.8	37°49.1	12°01.4	19°36.8	11°14.2	205°52.9	-7°02.3	139°38.9	-22°05.4	Betelgeuse	270°58.5	7°24.3
17	61°35.2	52°52.1	12°01.6	34°37.6	11°14.8	220°55.6	-7°02.2	154°41.2	-22°05.4	Canopus	263°54.8	-52°42.8
18	76°37.7	67°55.2	12°01.7	49°38.3	11°15.5	235°58.3	-7°02.2	169°43.5	-22°05.4	Sirius	258°31.3	-16°44.6
19	91°40.1	82°58.2	12°01.8	64°39.1	11°16.2	251°00.9	-7°02.1	184°45.9	-22°05.4	Adara	255°10.4	-29°00.2
20	106°42.6	98°01.2	12°02.0	79°39.8	11°16.9	266°03.6	-7°02.0	199°48.2	-22°05.4	Procyon	244°56.8	5°10.7
21	121°45.1	113°04.3	12°02.1	94°40.6	11°17.5	281°06.3	-7°01.9	214°50.6	-22°05.4	Pollux	243°24.3	27°58.9
22	136°47.5	128°07.3	12°02.2	109°41.3	11°18.2	296°08.9	-7°01.8	229°52.9	-22°05.4	Avior	234°16.5	-59°34.2
23	151°50.0	143°10.3	12°02.3	124°42.1	11°18.9	311°11.6	-7°01.7	244°55.2	-22°05.4	Suhail	222°50.2	-43°30.4
Mer.pass.:12:54		v3.0 d0.2 m-4.3		v0.8 d0.7 m1.4		v2.7 d0.1 m-2.2		v2.3 d0.0 m0.5		Miaplacidus	221°38.2	-69°47.5
										Alphard	217°53.3	-8°44.2
										Regulus	207°40.5	11°52.8
										Dubhe	193°48.1	61°39.4
										Denebola	182°30.7	14°28.5
										Genah	175°49.3	-17°38.3
										Acrux	173°05.7	-63°11.5
										Gacrux	171°57.4	-57°12.5
										Alioth	166°18.1	55°51.9
										Spica	158°28.3	-11°15.0
										Alcaid	152°56.6	49°13.5
										Hadar	148°43.7	-60°27.1
										Menkent	148°04.3	-36°27.1
										Arcturus	145°53.1	19°05.8
										Rigel Kent.	139°47.8	-60°54.0
										Zubenelg.	137°02.4	-16°06.7
										Kochab	137°19.6	74°04.9
										Alphecca	126°08.8	26°39.4
										Antares	112°23.1	-26°28.0
										Atria	107°22.6	-69°03.0
										Sabik	102°09.6	-15°44.6
										Shaula	96°18.5	-37°06.7
										Rasalhague	96°04.2	12°32.9
										Etamin	90°45.1	51°29.1
										Kaus Aust.	83°40.6	-83°22.3
										Vega	80°37.4	38°47.8
										Nunki	75°55.4	-26°16.3
										Altair	62°06.1	8°54.8
										Peacock	53°15.8	-56°40.5
										Deneb	49°30.1	45°20.4
										Enif	33°45.0	9°57.2
										Alnair	27°41.1	-46°52.6
										Fomalhaut	15°21.7	-29°32.0
										Scheat	13°51.3	28°10.4
										Markab	13°36.1	15°17.7
										2017/3/8	SHA	Mer.pass
										Venus	351°08.0	13:29
										Mars	333°31.5	14:42
										Jupiter	159°16.9	02:19
										Saturn	93°08.1	06:43
										2017/3/9	SHA	Mer.pass
										Venus	351°20.9	13:24
										Mars	332°50.4	14:40
										Jupiter	159°21.8	02:15
										Saturn	93°05.1	06:39
										2017/3/1	SHA	Mer.pass
										Venus	351°36.1	13:19
										Mars	332°09.2	14:39
										Jupiter	159°26.9	02:10
										Saturn	93°02.2	06:35
										Horizontal parallax		
										Venus:		0.5
										Mars:		0.1
Mer.pass.:12:46		v3.1 d0.1 m-4.2		v0.7 d0.7 m1.4		v2.7 d0.1 m-2.2		v2.3 d0.0 m0.5				

March 11, 12, 13 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass		
0	168°50.7	12°05.3	160°44.1	12°05.3	140°18.8	11°51.4	328°22.8	-6°57.2	261°50.1	-22°05.4	276°52.5	-22°05.4	Alpheratz	357°41.2	29°11.0		
1	183°53.2	12°05.3	175°47.3	12°05.3	155°19.5	11°52.0	343°25.5	-6°57.1	276°52.5	-22°05.4	321°59.5	-22°05.4	Ankaa	353°13.7	-42°13.0		
2	198°55.7	12°05.3	190°50.5	12°05.3	170°20.3	11°52.7	358°28.2	-6°57.0	291°54.8	-22°05.4	306°57.2	-22°05.4	Schedar	349°38.1	56°37.8		
3	213°58.1	12°05.3	205°53.8	12°05.3	185°21.0	11°53.4	13°30.8	-6°56.9	306°57.2	-22°05.4	337°01.9	-22°05.4	Diphda	348°53.6	-17°53.8		
4	229°00.6	12°05.3	220°57.0	12°05.3	200°21.8	11°54.0	28°33.5	-6°56.8	321°59.5	-22°05.4	7°06.6	-22°05.4	Achernar	335°25.5	-57°09.3		
5	244°03.1	12°05.2	236°00.2	12°05.2	215°22.5	11°54.7	43°36.2	-6°56.7	337°01.9	-22°05.4	22°08.9	-22°05.4	Hamal	327°58.2	23°32.5		
6	259°05.5	12°05.2	251°03.5	12°05.2	230°23.3	11°55.3	58°38.9	-6°56.6	352°04.2	-22°05.4	37°11.3	-22°05.4	Polaris	316°53.6	89°20.3		
7	274°08.0	12°05.2	266°06.7	12°05.2	245°24.0	11°56.0	73°41.6	-6°56.5	7°06.6	-22°05.4	52°13.6	-22°05.4	Akamar	315°16.7	-40°14.6		
8	289°10.5	12°05.2	281°10.0	12°05.2	260°24.8	11°56.7	88°44.3	-6°56.4	22°08.9	-22°05.4	103°46.9	-6°56.3	Menkar	314°12.6	4°09.2		
9	304°12.9	12°05.2	296°13.2	12°05.2	275°25.5	11°57.3	103°46.9	-6°56.3	37°11.3	-22°05.4	118°49.6	-6°56.2	Mirfak	308°36.9	49°55.3		
10	319°15.4	12°05.1	311°16.5	12°05.1	290°26.3	11°58.0	118°49.6	-6°56.2	52°13.6	-22°05.4	133°52.3	-6°56.1	Aldebaran	290°46.5	16°32.4		
11	334°17.8	12°05.1	326°19.8	12°05.1	305°27.0	11°58.6	133°52.3	-6°56.1	67°16.0	-22°05.4	148°55.0	-6°56.0	Rigel	281°09.6	-8°11.3		
12	349°20.3	12°05.1	341°23.0	12°05.1	320°27.8	11°59.3	148°55.0	-6°56.0	82°18.3	-22°05.4	163°57.7	-6°56.0	Capella	280°30.7	46°00.9		
13	4°22.8	12°05.1	356°26.3	12°05.1	335°28.5	11°59.9	163°57.7	-6°56.0	97°20.7	-22°05.4	179°00.4	-6°55.9	Bellatrix	278°29.3	6°21.6		
14	19°25.2	12°05.0	11°29.6	12°05.0	350°29.3	12°00.6	179°00.4	-6°55.9	112°23.0	-22°05.4	194°03.1	-6°55.8	Elnath	278°09.4	28°37.1		
15	34°27.7	12°05.0	26°32.9	12°05.0	5°30.0	12°01.2	239°11.1	-6°55.5	127°25.4	-22°05.4	209°05.7	-6°55.7	Alnilam	275°43.8	-1°11.8		
16	49°30.2	12°04.9	41°36.1	12°04.9	20°30.8	12°01.9	209°05.7	-6°55.7	142°27.8	-22°05.4	224°08.4	-6°55.6	Betelgeuse	270°58.5	7°24.3		
17	64°32.6	12°04.9	56°39.4	12°04.9	35°31.5	12°02.6	224°08.4	-6°55.6	157°30.1	-22°05.4	239°11.1	-6°55.5	Canopus	263°54.9	-52°42.8		
18	79°35.1	12°04.8	71°42.7	12°04.8	50°32.2	12°03.2	239°11.1	-6°55.5	172°32.5	-22°05.4	254°13.8	-6°55.4	Sirius	258°31.3	-16°44.6		
19	94°37.6	12°04.8	86°46.0	12°04.8	65°33.0	12°03.9	254°13.8	-6°55.4	187°34.8	-22°05.4	269°16.5	-6°55.3	Adara	255°10.4	-29°00.2		
20	109°40.0	12°04.7	101°49.3	12°04.7	80°33.7	12°04.5	269°16.5	-6°55.3	202°37.2	-22°05.4	284°19.2	-6°55.2	Procyon	244°56.8	5°10.7		
21	124°42.5	12°04.7	116°52.6	12°04.7	95°34.5	12°05.2	284°19.2	-6°55.2	217°39.5	-22°05.4	299°21.9	-6°55.1	Pollux	243°24.4	27°58.9		
22	139°45.0	12°04.6	131°55.9	12°04.6	110°35.2	12°05.8	299°21.9	-6°55.1	232°41.9	-22°05.4	314°24.5	-6°55.0	Avior	234°16.5	-59°34.2		
23	154°47.4	12°04.6	146°59.2	12°04.6	125°36.0	12°06.5	314°24.5	-6°55.0	247°44.2	-22°05.4			Suhail	222°50.2	-43°30.4		
Mer.pass.:12:42			v3.2 d-0.0 m-4.2			v0.7 d0.7 m1.4			v2.7 d0.1 m-2.2			v2.3 d0.0 m0.5			Miaplacidus 221°38.3 -69°47.5		
															Alphard 217°53.3 -8°44.2		
															Regulus 207°40.5 11°52.8		
															Dubhe 193°48.0 61°39.5		
															Denebola 182°30.7 14°28.5		
															Gienah 175°49.3 -17°38.3		
															Acrux 173°05.7 -63°11.6		
															Gacrux 171°57.4 -57°12.5		
															Alioth 166°18.1 55°51.9		
															Spica 158°28.3 -11°15.0		
															Alcaid 152°56.6 49°13.5		
															Hadar 148°43.7 -60°27.1		
															Menkent 148°04.3 -36°27.1		
															Arcturus 145°53.1 19°05.8		
															Rigel Kent. 139°47.8 -60°54.0		
															Zubenelg. 137°02.4 -16°06.7		
															Kochab 137°19.5 74°05.0		
															Alphecca 126°08.8 26°39.4		
															Antares 112°23.1 -26°28.0		
															Atria 107°22.5 -69°03.0		
															Sabik 102°09.6 -15°44.6		
															Shaula 96°18.5 -37°06.7		
															Rasalhague 96°04.2 12°32.9		
															Etamin 90°45.0 51°29.0		
															Kaus Aust. 83°40.6 -34°22.3		
															Vega 80°37.4 38°47.8		
															Nunki 75°55.4 -26°16.3		
															Altair 62°06.0 8°54.8		
															Peacock 53°15.7 -56°40.5		
															Deneb 49°30.1 45°20.4		
															Enif 33°44.9 9°57.1		
															Alnair 27°41.1 -46°52.6		
															Fomalhaut 15°21.7 -29°31.9		
															Scheat 13°51.3 28°10.4		
															Markab 13°36.1 15°17.7		
															2017/3/1 SHA Mer.pass		
															Venus 351°53.3 13:14		
															Mars 331°28.0 14:38		
															Jupiter 159°32.0 02:06		
															Saturn 92°59.4 06:32		
															2017/3/1 SHA Mer.pass		
															Venus 352°12.6 13:09		
															Mars 330°46.8 14:37		
															Jupiter 159°37.3 02:02		
															Saturn 92°56.7 06:28		
															2017/3/1 SHA Mer.pass		
															Venus 352°33.9 13:03		
															Mars 330°05.6 14:36		
															Jupiter 159°42.8 01:58		
															Saturn 92°54.1 06:24		
															Horizontal paralax		
															Venus: 0.5		
															Mars: 0.1		
Mer.pass.:12:34			v3.4 d-0.1 m-4.2			v0.7 d0.6 m1.4			v2.7 d0.1 m-2.2			v2.4 d0.0 m0.5					

h Sun								Moon							
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	177° 28.8	-3° 43.4	15° 50.6	10.8	10° 54.0	-8.9	57.2	72	04:10	05:32	06:39	17:43	18:50	20:13	
1	192° 29.0	-3° 42.4	30° 20.5	10.9	10° 45.1	-8.9	57.2	70	04:22	05:35	06:35	17:46	18:47	20:00	
2	207° 29.2	-3° 41.4	44° 50.4	10.9	10° 36.1	-9.0	57.2	68	04:32	05:38	06:33	17:48	18:44	19:50	
3	222° 29.3	-3° 40.5	59° 20.4	11.0	10° 27.1	-9.0	57.2	66	04:39	05:40	06:31	17:50	18:41	19:42	
4	237° 29.5	-3° 39.5	73° 50.4	11.0	10° 18.0	-9.1	57.2	64	04:46	05:42	06:29	17:52	18:40	19:36	
5	252° 29.6	-3° 38.5	88° 20.4	11.1	10° 08.9	-9.1	57.1	62	04:51	05:43	06:27	17:54	18:38	19:30	
6	267° 29.8	-3° 37.5	102° 50.5	11.1	9° 59.8	-9.2	57.1	60	04:56	05:44	06:25	17:55	18:37	19:25	
7	282° 30.0	-3° 36.5	117° 20.7	11.2	9° 50.6	-9.2	57.1	58	04:59	05:45	06:24	17:56	18:36	19:21	
8	297° 30.1	-3° 35.6	131° 50.9	11.3	9° 41.3	-9.3	57.1	56	05:03	05:46	06:23	17:58	18:35	19:18	
9	312° 30.3	-3° 34.6	146° 21.2	11.3	9° 32.0	-9.3	57.0	54	05:06	05:47	06:22	17:59	18:34	19:15	
10	327° 30.5	-3° 33.6	160° 51.5	11.4	9° 22.7	-9.4	57.0	52	05:08	05:47	06:21	17:59	18:33	19:12	
11	342° 30.6	-3° 32.6	175° 21.9	11.4	9° 13.3	-9.4	57.0	50	05:10	05:48	06:20	18:00	18:33	19:10	
12	357° 30.8	-3° 31.6	189° 52.4	11.5	9° 03.9	-9.4	57.0	45	05:15	05:49	06:18	18:02	18:31	19:06	
13	12° 31.0	-3° 30.6	204° 22.8	11.5	8° 54.5	-9.5	57.0	40	05:18	05:49	06:16	18:04	18:31	19:02	
14	27° 31.1	-3° 29.7	218° 53.4	11.6	8° 45.0	-9.5	56.9	35	05:20	05:50	06:15	18:05	18:30	18:60	
15	42° 31.3	-3° 28.7	233° 24.0	11.6	8° 35.4	-9.6	56.9	30	05:22	05:50	06:13	18:06	18:30	18:58	
16	57° 31.5	-3° 27.7	247° 54.6	11.7	8° 25.9	-9.6	56.9	20	05:23	05:49	06:11	18:09	18:31	18:56	
17	72° 31.6	-3° 26.7	262° 25.3	11.7	8° 16.3	-9.6	56.9	10	05:23	05:48	06:09	18:11	18:32	18:56	
18	87° 31.8	-3° 25.7	276° 56.0	11.8	8° 06.6	-9.7	56.9	0	05:22	05:46	06:06	18:13	18:34	18:58	
19	102° 32.0	-3° 24.7	291° 26.8	11.8	7° 56.9	-9.7	56.8	-10	05:19	05:43	06:04	18:15	18:36	19:01	
20	117° 32.1	-3° 23.8	305° 57.6	11.9	7° 47.2	-9.7	56.8	-20	05:14	05:39	06:01	18:18	18:40	19:05	
21	132° 32.3	-3° 22.8	320° 28.5	11.9	7° 37.5	-9.8	56.8	-30	05:06	05:34	05:58	18:20	18:44	19:12	
22	147° 32.5	-3° 21.8	334° 59.4	11.9	7° 27.7	-9.8	56.8	-35	05:01	05:31	05:57	18:22	18:48	19:17	
23	162° 32.6	-3° 20.8	349° 30.4	12.0	7° 17.9	-9.8	56.7	-40	04:55	05:27	05:55	18:24	18:51	19:23	
SD.=16.1 d=1.0 S.D.=15.6								-45	04:47	05:23	05:52	18:26	18:56	19:31	
								-50	04:38	05:16	05:49	18:29	19:02	19:41	
								-52	04:33	05:14	05:48	18:31	19:05	19:45	
								-54	04:27	05:10	05:46	18:32	19:08	19:51	
								-56	04:21	05:07	05:45	18:34	19:11	19:57	
								-58	04:14	05:03	05:43	18:35	19:15	20:03	
								-60	04:06	04:58	05:41	18:37	19:20	20:11	
								Moonrise			Moonset				
								Lat.	Sat	Sun	Mon	Sat	Sun	Mon	
								72	15:40	17:26	19:08	07:18	07:11	07:04	
								70	15:53	17:32	19:08	07:03	07:03	07:02	
								68	16:04	17:37	19:08	06:51	06:56	07:00	
								66	16:13	17:41	19:07	06:41	06:51	06:58	
								64	16:20	17:44	19:07	06:32	06:46	06:57	
								62	16:26	17:47	19:07	06:25	06:42	06:56	
								60	16:32	17:50	19:07	06:19	06:38	06:55	
								58	16:36	17:52	19:07	06:13	06:35	06:54	
								56	16:40	17:54	19:06	06:08	06:32	06:53	
								54	16:44	17:56	19:06	06:04	06:29	06:52	
								52	16:48	17:58	19:06	05:59	06:27	06:51	
								50	16:51	17:59	19:06	05:56	06:25	06:51	
								45	16:57	18:02	19:06	05:48	06:20	06:49	
								40	17:03	18:05	19:06	05:42	06:16	06:48	
								35	17:08	18:07	19:06	05:36	06:12	06:47	
								30	17:12	18:10	19:06	05:31	06:09	06:46	
								20	17:19	18:13	19:05	05:22	06:04	06:44	
								10	17:26	18:16	19:05	05:14	05:59	06:43	
								0	17:32	18:19	19:05	05:06	05:55	06:41	
								-10	17:38	18:22	19:05	04:59	05:50	06:40	
								-20	17:44	18:25	19:05	04:51	05:45	06:38	
								-30	17:51	18:29	19:05	04:42	05:40	06:37	
								-35	17:56	18:31	19:05	04:36	05:37	06:36	
								-40	18:00	18:33	19:05	04:30	05:33	06:34	
								-45	18:06	18:36	19:05	04:23	05:29	06:33	
								-50	18:12	18:39	19:05	04:14	05:24	06:31	
								-52	18:15	18:41	19:04	04:10	05:21	06:31	
								-54	18:19	18:42	19:04	04:06	05:19	06:30	
								-56	18:22	18:44	19:04	04:01	05:16	06:29	
								-58	18:26	18:46	19:04	03:56	05:12	06:28	
								-60	18:31	18:48	19:04	03:50	05:09	06:27	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age		
									00 ^h	12 ^h	Pass	Upper	Lower		
								11	10:05	09:57	12:09	23:43	11:19	13(99%)	
								12	09:49	09:41	12:09	00:30	12:07	14(100%)	
								13	09:32	09:24	12:09	00:30	12:53	15(99%)	
SD.=16.1 d=1.0 S.D.=15.3															

March 14, 15 ,16 (Tue., Wed., Thu.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Tue	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec				
0	171°48.2	11°58.5	164°45.3	11°58.5	141°12.5	12°38.3	331°36.5	-6°50.2	264°39.7	-22°05.4	264°39.7	-22°05.4	Alpheratz	357°41.2	29°11.0					
1	186°50.6	11°58.3	179°48.7	11°58.3	156°13.2	12°38.9	346°39.2	-6°50.1	279°42.1	-22°05.4	279°42.1	-22°05.4	Ankaa	353°13.7	-42°13.0					
2	201°53.1	11°58.1	194°52.2	11°58.1	171°13.9	12°39.6	1°41.9	-6°50.0	294°44.4	-22°05.4	294°44.4	-22°05.4	Schedar	349°38.1	56°37.8					
3	216°55.5	11°57.9	209°55.7	11°57.9	186°14.7	12°40.2	16°44.6	-6°49.9	309°46.8	-22°05.4	309°46.8	-22°05.4	Diphda	348°53.6	-17°53.8					
4	231°58.0	11°57.7	224°59.2	11°57.7	201°15.4	12°40.9	31°47.3	-6°49.8	324°49.2	-22°05.4	324°49.2	-22°05.4	Achernar	335°25.5	-57°09.3					
5	247°00.5	11°57.5	240°02.6	11°57.5	216°16.2	12°41.5	46°50.0	-6°49.7	339°51.5	-22°05.4	339°51.5	-22°05.4	Hamal	327°58.2	23°32.4					
6	262°02.9	11°57.3	255°06.1	11°57.3	231°16.9	12°42.1	61°52.7	-6°49.6	354°53.9	-22°05.4	354°53.9	-22°05.4	Polaris	316°54.8	89°20.3					
7	277°05.4	11°57.1	270°09.6	11°57.1	246°17.6	12°42.8	76°55.4	-6°49.5	9°56.3	-22°05.4	9°56.3	-22°05.4	Akamar	315°16.7	-40°14.6					
8	292°07.9	11°56.9	285°13.1	11°56.9	261°18.4	12°43.4	91°58.1	-6°49.4	24°58.6	-22°05.4	24°58.6	-22°05.4	Menkar	314°12.6	4°09.1					
9	307°10.3	11°56.7	300°16.6	11°56.7	276°19.1	12°44.1	107°00.8	-6°49.3	40°01.0	-22°05.4	40°01.0	-22°05.4	Mirfak	308°36.9	49°55.2					
10	322°12.8	11°56.5	315°20.1	11°56.5	291°19.9	12°44.7	122°03.5	-6°49.2	55°03.4	-22°05.4	55°03.4	-22°05.4	Aldebaran	290°46.6	16°32.4					
11	337°15.3	11°56.2	330°23.6	11°56.2	306°20.6	12°45.3	137°06.2	-6°49.1	70°05.7	-22°05.4	70°05.7	-22°05.4	Rigel	281°09.6	-8°11.3					
12	352°17.7	11°56.0	345°27.1	11°56.0	321°21.4	12°46.0	152°08.9	-6°49.0	85°08.1	-22°05.4	85°08.1	-22°05.4	Capella	280°30.7	46°00.9					
13	7°20.2	11°55.8	0°30.6	11°55.8	336°22.1	12°46.6	167°11.6	-6°48.9	100°10.4	-22°05.4	100°10.4	-22°05.4	Bellatrix	278°29.3	6°21.6					
14	22°22.7	11°55.6	15°34.1	11°55.6	351°22.8	12°47.3	182°14.3	-6°48.8	115°12.8	-22°05.4	115°12.8	-22°05.4	Elnath	278°09.4	28°37.1					
15	37°25.1	11°55.4	30°37.6	11°55.4	6°23.6	12°47.9	197°17.0	-6°48.7	130°15.2	-22°05.4	130°15.2	-22°05.4	Alnilam	275°43.8	-1°11.8					
16	52°27.6	11°55.1	45°41.1	11°55.1	21°24.3	12°48.5	212°19.7	-6°48.6	145°17.5	-22°05.3	145°17.5	-22°05.3	Betelgeuse	270°58.5	7°24.3					
17	67°30.0	11°54.9	60°44.6	11°54.9	36°25.1	12°49.2	227°22.4	-6°48.5	160°19.9	-22°05.3	160°19.9	-22°05.3	Canopus	263°54.9	-52°42.8					
18	82°32.5	11°54.7	75°48.2	11°54.7	51°25.8	12°49.8	242°25.1	-6°48.4	175°22.3	-22°05.3	175°22.3	-22°05.3	Sirius	258°31.3	-16°44.6					
19	97°35.0	11°54.4	90°51.7	11°54.4	66°26.5	12°50.5	257°27.8	-6°48.3	190°24.6	-22°05.3	190°24.6	-22°05.3	Adara	255°10.4	-29°00.2					
20	112°37.4	11°54.2	105°55.2	11°54.2	81°27.3	12°51.1	272°30.5	-6°48.2	205°27.0	-22°05.3	205°27.0	-22°05.3	Procyon	244°56.8	5°10.7					
21	127°39.9	11°53.9	120°58.7	11°53.9	96°28.0	12°51.7	287°33.2	-6°48.1	220°29.4	-22°05.3	220°29.4	-22°05.3	Pollux	243°24.4	27°58.9					
22	142°42.4	11°53.7	136°02.3	11°53.7	111°28.8	12°52.4	302°35.9	-6°48.0	235°31.7	-22°05.3	235°31.7	-22°05.3	Avior	234°16.5	-59°34.2					
23	157°44.8	11°53.4	151°05.8	11°53.4	126°29.5	12°53.0	317°38.6	-6°47.9	250°34.1	-22°05.3	250°34.1	-22°05.3	Suhail	222°50.2	-43°30.4					
Mer.pass.:12:30			v3.5 d-0.2 m-4.1			v0.7 d0.6 m1.4			v2.7 d0.1 m-2.2			v2.4 d0.0 m0.5			Miaplacidus			221°38.3	-69°47.5	
															Alphard			217°53.3	-8°44.2	
															Regulus			207°40.5	11°52.8	
															Dubhe			193°48.1	61°39.5	
															Denebola			182°30.7	14°28.5	
															Gienah			175°49.3	-17°38.3	
															Acrux			173°05.7	-63°11.6	
															Gacrux			171°57.4	-57°12.5	
															Alioth			166°18.1	55°51.9	
															Spica			158°28.3	-11°15.0	
															Alcaid			152°56.6	49°13.6	
															Hadar			148°43.7	-60°27.1	
															Menkent			148°04.3	-36°27.1	
															Arcturus			145°53.0	19°05.8	
															Rigel Kent.			139°47.8	-60°54.0	
															Zubenelg.			137°02.4	-16°06.7	
															Kochab			137°19.5	74°05.0	
															Alphecca			126°08.7	26°39.4	
															Antares			112°23.0	-26°28.0	
															Atria			107°22.5	-69°03.0	
															Sabik			102°09.6	-15°44.6	
															Shaula			96°18.5	-37°06.7	
															Rasalhague			96°04.1	12°32.9	
															Etamin			90°45.0	51°29.0	
															Kaus Aust.			83°40.5	-34°22.3	
															Vega			80°37.4	38°47.8	
															Nunki			75°55.3	-26°16.3	
															Altair			62°06.0	8°54.8	
															Peacock			53°15.7	-56°40.5	
															Deneb			49°30.1	45°20.4	
															Enif			33°44.9	9°57.1	
															Alnair			27°41.1	-46°52.6	
															Fomalhaut			15°21.7	-29°31.9	
															Scheat			13°51.3	28°10.4	
															Markab			13°36.1	15°17.7	
															2017/3/1			SHA	Mer.pass	
															Venus			352°57.1	12:58	
															Mars			329°24.3	14:34	
															Jupiter			159°48.3	01:53	
															Saturn			92°51.6	06:20	
															2017/3/1			SHA	Mer.pass	
															Venus			353°22.1	12:52	
															Mars			328°43.0	14:33	
															Jupiter			159°54.0	01:49	
															Saturn			92°49.2	06:17	
															2017/3/1			SHA	Mer.pass	
															Venus			353°48.6	12:47	
															Mars			328°01.6	14:32	
															Jupiter			159°59.8	01:45	
															Saturn			92°46.9	06:13	
															Horizontal parallax					
															Venus:			0.5		
															Mars:			0.1		
Mer.pass.:12:22			v3.6 d-0.3 m-4.1			v0.7 d0.6 m1.4			v2.7 d0.1 m-2.3			v2.4 d0.0 m0.5								

h		Sun				Moon										
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight				
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.			
0	177° 41.0	-2° 32.6	341° 35.8	13.7	-1° 00.0	-10.2	55.7	72	03:52	05:16	06:23	17:57	19:04	20:29		
1	192° 41.2	-2° 31.6	356° 08.5	13.7	-1° 10.2	-10.2	55.6	70	04:07	05:21	06:22	17:58	18:59	20:14		
2	207° 41.3	-2° 30.6	10° 41.3	13.7	-1° 20.3	-10.1	55.6	68	04:18	05:25	06:20	17:59	18:55	20:03		
3	222° 41.5	-2° 29.6	25° 14.0	13.8	-1° 30.5	-10.1	55.6	66	04:27	05:28	06:19	18:00	18:51	19:53		
4	237° 41.7	-2° 28.6	39° 46.8	13.8	-1° 40.6	-10.1	55.6	64	04:35	05:31	06:18	18:01	18:49	19:45		
5	252° 41.9	-2° 27.6	54° 19.6	13.8	-1° 50.7	-10.1	55.5	62	04:41	05:33	06:17	18:02	18:46	19:39		
6	267° 42.0	-2° 26.7	68° 52.4	13.8	-2° 00.8	-10.1	55.5	60	04:46	05:35	06:16	18:03	18:44	19:33		
7	282° 42.2	-2° 25.7	83° 25.2	13.8	-2° 10.9	-10.1	55.5	58	04:51	05:37	06:16	18:03	18:42	19:29		
8	297° 42.4	-2° 24.7	97° 58.0	13.8	-2° 20.9	-10.0	55.5	56	04:55	05:38	06:15	18:04	18:41	19:25		
9	312° 42.6	-2° 23.7	112° 30.9	13.9	-2° 31.0	-10.0	55.5	54	04:58	05:39	06:15	18:04	18:39	19:21		
10	327° 42.7	-2° 22.7	127° 03.7	13.9	-2° 41.0	-10.0	55.4	52	05:01	05:40	06:14	18:05	18:38	19:18		
11	342° 42.9	-2° 21.7	141° 36.6	13.9	-2° 51.0	-10.0	55.4	50	05:04	05:41	06:13	18:05	18:37	19:15		
12	357° 43.1	-2° 20.7	156° 09.5	13.9	-3° 00.9	-10.0	55.4	45	05:09	05:43	06:12	18:06	18:35	19:10		
13	12° 43.3	-2° 19.8	170° 42.4	13.9	-3° 10.9	-9.9	55.4	40	05:13	05:44	06:11	18:07	18:34	19:05		
14	27° 43.4	-2° 18.8	185° 15.4	13.9	-3° 20.8	-9.9	55.4	35	05:16	05:45	06:11	18:08	18:33	19:02		
15	42° 43.6	-2° 17.8	199° 48.3	13.9	-3° 30.7	-9.9	55.3	30	05:18	05:46	06:10	18:08	18:32	18:60		
16	57° 43.8	-2° 16.8	214° 21.3	14.0	-3° 40.6	-9.9	55.3	20	05:21	05:46	06:08	18:10	18:32	18:57		
17	72° 44.0	-2° 15.8	228° 54.2	14.0	-3° 50.5	-9.9	55.3	10	05:22	05:46	06:07	18:11	18:32	18:56		
18	87° 44.1	-2° 14.8	243° 27.2	14.0	-4° 00.3	-9.8	55.3	0	05:21	05:45	06:06	18:12	18:33	18:57		
19	102° 44.3	-2° 13.8	258° 00.2	14.0	-4° 10.1	-9.8	55.3	-10	05:19	05:43	06:04	18:13	18:34	18:59		
20	117° 44.5	-2° 12.8	272° 33.2	14.0	-4° 19.9	-9.8	55.2	-20	05:15	05:40	06:02	18:15	18:37	19:03		
21	132° 44.7	-2° 11.9	287° 06.2	14.0	-4° 29.7	-9.7	55.2	-30	05:08	05:36	06:00	18:17	18:41	19:09		
22	147° 44.8	-2° 10.9	301° 39.2	14.0	-4° 39.4	-9.7	55.2	-35	05:04	05:34	05:59	18:18	18:43	19:13		
23	162° 45.0	-2° 09.9	316° 12.3	14.0	-4° 49.1	-9.7	55.2	-40	04:59	05:31	05:58	18:19	18:46	19:18		
SD.=16.1 d=1.0 S.D.=15.2								-45	04:52	05:27	05:56	18:21	18:50	19:25		
								-50	04:43	05:21	05:54	18:23	18:55	19:34		
								-52	04:39	05:19	05:53	18:24	18:57	19:38		
								-54	04:34	05:16	05:52	18:25	19:00	19:42		
								-56	04:28	05:13	05:51	18:26	19:03	19:48		
								-58	04:22	05:10	05:49	18:27	19:06	19:54		
								-60	04:14	05:06	05:48	18:28	19:10	20:01		
								Moonrise			Moonset					
								Lat.	Tue	Wed	Thu	Tue	Wed	Thu		
								72	20:48	22:28	--	06:58	06:51	06:44		
								70	20:42	22:14	23:46	07:01	07:00	06:59		
								68	20:36	22:03	23:29	07:04	07:07	07:12		
								66	20:32	21:55	23:16	07:06	07:13	07:22		
								64	20:28	21:47	23:04	07:08	07:18	07:30		
								62	20:25	21:41	22:55	07:09	07:23	07:37		
								60	20:22	21:35	22:47	07:10	07:26	07:44		
								58	20:19	21:30	22:40	07:12	07:30	07:49		
								56	20:17	21:26	22:33	07:13	07:33	07:54		
								54	20:15	21:22	22:28	07:14	07:36	07:58		
								52	20:13	21:19	22:23	07:15	07:38	08:03		
								50	20:12	21:16	22:18	07:16	07:40	08:06		
								45	20:08	21:09	22:08	07:17	07:45	08:14		
								40	20:05	21:03	22:00	07:19	07:49	08:21		
								35	20:03	20:58	21:53	07:20	07:53	08:27		
								30	20:00	20:54	21:47	07:21	07:56	08:32		
								20	19:56	20:47	21:37	07:23	08:02	08:41		
								10	19:53	20:40	21:27	07:25	08:07	08:48		
								0	19:50	20:34	21:19	07:27	08:11	08:56		
								-10	19:47	20:28	21:10	07:28	08:16	09:03		
								-20	19:43	20:22	21:01	07:30	08:21	09:11		
								-30	19:40	20:15	20:51	07:32	08:26	09:20		
								-35	19:38	20:11	20:45	07:33	08:30	09:25		
								-40	19:35	20:06	20:38	07:34	08:33	09:31		
								-45	19:32	20:01	20:30	07:36	08:37	09:38		
								-50	19:29	19:54	20:21	07:38	08:43	09:46		
								-52	19:28	19:51	20:17	07:39	08:45	09:50		
								-54	19:26	19:48	20:12	07:39	08:47	09:54		
								-56	19:24	19:45	20:07	07:40	08:50	09:59		
								-58	19:22	19:41	20:01	07:42	08:53	10:04		
								-60	19:20	19:36	19:54	07:43	08:57	10:10		
								Sun			Moon					
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age			
									00 ^h	12 ^h	Pass	Upper	Lower			
								14	09:16	09:08	12:09	01:15	13:38	16(96%)		
								15	08:59	08:51	12:08	02:00	14:22	17(92%)		
								16	08:42	08:34	12:08	02:44	15:07	18(86%)		
SD.=16.1 d=1.0 S.D.=14.9																

March 17, 18 ,19 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	174°45.6	169°02.3	11°38.1	142°05.7	13°24.1	334°51.2	-6°42.8	267°30.2	-22°05.3	Alpheratz	357°41.2	29°11.0	
1	189°48.0	184°06.0	11°37.7	157°06.5	13°24.7	349°53.9	-6°42.7	282°32.6	-22°05.3	Ankaa	353°13.7	-42°13.0	
2	204°50.5	199°09.6	11°37.3	172°07.2	13°25.3	4°56.7	-6°42.6	297°35.0	-22°05.3	Schedar	349°38.1	56°37.8	
3	219°53.0	214°13.3	11°36.9	187°07.9	13°25.9	19°59.4	-6°42.5	312°37.3	-22°05.3	Diphda	348°53.6	-17°53.8	
4	234°55.4	229°17.0	11°36.6	202°08.7	13°26.6	35°02.1	-6°42.4	327°39.7	-22°05.3	Achernar	335°25.5	-57°09.3	
5	249°57.9	244°20.6	11°36.2	217°09.4	13°27.2	50°04.8	-6°42.3	342°42.1	-22°05.3	Hamal	327°58.2	23°32.4	
6	265°00.4	259°24.3	11°35.8	232°10.1	13°27.8	65°07.5	-6°42.2	357°44.5	-22°05.3	Polaris	316°55.8	89°20.3	
7	280°02.8	274°28.0	11°35.4	247°10.9	13°28.4	80°10.2	-6°42.1	12°46.8	-22°05.3	Akamar	315°16.7	-40°14.6	
8	295°05.3	289°31.7	11°35.0	262°11.6	13°29.1	95°12.9	-6°42.0	27°49.2	-22°05.3	Menkar	314°12.6	4°09.1	
9	310°07.7	304°35.3	11°34.6	277°12.4	13°29.7	110°15.6	-6°41.9	42°51.6	-22°05.3	Mirfak	308°36.9	49°55.2	
10	325°10.2	319°39.0	11°34.2	292°13.1	13°30.3	125°18.4	-6°41.8	57°54.0	-22°05.3	Aldebaran	290°46.6	16°32.4	
11	340°12.7	334°42.7	11°33.8	307°13.8	13°30.9	140°21.1	-6°41.7	72°56.3	-22°05.3	Rigel	281°09.7	-8°11.3	
12	355°15.1	349°46.4	11°33.4	322°14.6	13°31.6	155°23.8	-6°41.6	87°58.7	-22°05.3	Capella	280°30.8	46°00.9	
13	10°17.6	4°50.1	11°33.0	337°15.3	13°32.2	170°26.5	-6°41.4	103°01.1	-22°05.3	Bellatrix	278°29.3	6°21.6	
14	25°20.1	19°53.8	11°32.6	352°16.0	13°32.8	185°29.2	-6°41.3	118°03.5	-22°05.3	Elnath	278°09.5	28°37.1	
15	40°22.5	34°57.5	11°32.1	7°16.8	13°33.4	200°31.9	-6°41.2	133°05.9	-22°05.3	Alnilam	275°43.8	-1°11.8	
16	55°25.0	50°01.2	11°31.7	22°17.5	13°34.1	215°34.6	-6°41.1	148°08.2	-22°05.3	Betelgeuse	270°58.6	7°24.3	
17	70°27.5	65°04.9	11°31.3	37°18.2	13°34.7	230°37.4	-6°41.0	163°10.6	-22°05.3	Canopus	263°54.9	-52°42.8	
18	85°29.9	80°08.6	11°30.9	52°19.0	13°35.3	245°40.1	-6°40.9	178°13.0	-22°05.3	Sirius	258°31.3	-16°44.6	
19	100°32.4	95°12.3	11°30.5	67°19.7	13°35.9	260°42.8	-6°40.8	193°15.4	-22°05.3	Adara	255°10.4	-29°00.2	
20	115°34.8	110°16.0	11°30.0	82°20.4	13°36.6	275°45.5	-6°40.7	208°17.7	-22°05.3	Procyon	244°56.9	5°10.7	
21	130°37.3	125°19.7	11°29.6	97°21.2	13°37.2	290°48.2	-6°40.6	223°20.1	-22°05.3	Pollux	243°24.4	27°58.9	
22	145°39.8	140°23.4	11°29.2	112°21.9	13°37.8	305°50.9	-6°40.5	238°22.5	-22°05.3	Avior	234°16.5	-59°34.3	
23	160°42.2	155°27.1	11°28.7	127°22.7	13°38.4	320°53.6	-6°40.4	253°24.9	-22°05.3	Suhail	222°50.2	-43°30.4	
Mer.pass.:12:18		v3.7 d-0.4 m-4.0		v0.7 d0.6 m1.4		v2.7 d0.1 m-2.3		v2.4 d0.0 m0.5		Miacplacidus		221°38.3	-69°47.6
										Alphard		217°53.3	-8°44.2
										Regulus		207°40.5	11°52.8
										Dubhe		193°48.1	61°39.5
										Denebola		182°30.7	14°28.5
										Gienah		175°49.3	-17°38.3
										Acrux		173°05.2	-63°11.6
										Gacrux		171°57.4	-57°12.5
										Alioth		166°18.1	55°51.9
										Spica		158°28.3	-11°15.0
										Alcaid		152°56.5	49°13.6
										Hadar		148°43.7	-60°27.1
										Menkent		148°04.2	-36°27.1
										Arcturus		145°53.0	19°05.8
										Rigel Kent.		139°47.7	-60°54.1
										Zubenelg.		137°02.4	-16°06.7
										Kochab		137°19.4	74°05.0
										Alphecca		126°08.7	26°39.4
										Antares		112°23.0	-26°28.0
										Atria		107°22.4	-69°03.0
										Sabik		102°09.6	-15°44.6
										Shaula		96°18.5	-37°06.7
										Rasalhague		96°04.1	12°32.9
										Etamin		90°45.0	51°29.0
										Kaus Aust.		83°40.5	-34°22.3
										Vega		80°37.4	38°47.8
										Nunki		75°55.3	-26°16.3
										Altair		62°06.0	8°54.8
										Peacock		53°15.7	-56°40.5
										Deneb		49°30.0	45°20.4
										Enif		33°44.9	9°57.1
										Alnair		27°41.1	-46°52.6
										Fomalhaut		15°21.6	-29°31.9
										Scheat		13°51.3	28°10.4
										Markab		13°36.1	15°17.7
										2017/3/1		SHA	Mer.pass
										Venus		354°16.7	12:41
										Mars		327°20.2	14:31
										Jupiter		160°05.7	01:40
										Saturn		92°44.7	06:09
										2017/3/1		SHA	Mer.pass
										Venus		354°46.1	12:35
										Mars		326°38.7	14:30
										Jupiter		160°11.7	01:36
										Saturn		92°42.5	06:05
										2017/3/1		SHA	Mer.pass
										Venus		355°16.7	12:29
										Mars		325°57.2	14:29
										Jupiter		160°17.8	01:32
										Saturn		92°40.5	06:01
										Horizontal paralax			
										Venus:		0.5	
										Mars:		0.1	
Mer.pass.:12:11		v3.8 d-0.5 m-4.0		v0.7 d0.6 m1.4		v2.7 d0.1 m-2.3		v2.4 d0.0 m0.5					

h Sun

Moon

Table with 7 columns: Fri, GHA, Dec, GHA, nu, Dec, d, HP. Rows 0-23 with values for Sun position and S.D.=16.1 d=1.0 S.D.=14.8

Table with 6 columns: Lat., Twilight (Naut., Civil, Sunrise), Sunset, Twilight (Civil, Naut.). Rows 72-60 with values for twilight times and S.D.=14.8

Table with 7 columns: Sat, GHA, Dec, GHA, nu, Dec, d, HP. Rows 0-23 with values for Sun position and S.D.=16.1 d=1.0 S.D.=14.8

Table with 6 columns: Moonrise (Lat., Fri, Sat, Sun), Moonset (Fri, Sat, Sun). Rows 72-60 with values for moon phase times and S.D.=14.8

Table with 7 columns: Sun, GHA, Dec, GHA, nu, Dec, d, HP. Rows 0-23 with values for Sun position and S.D.=16.1 d=1.0 S.D.=14.8

Table with 5 columns: Day, Sun (Eqn. of Time, Mer. Pass), Moon (Mer. Pass, Age). Rows 17-19 with values for equation of time and moon age

March 20, 21 ,22 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	177°43.0	173°31.2	11°04.4	142°58.6	14°08.7	338°06.9	-6°35.1	270°21.6	-22°05.2	Alpheratz	357°41.2	29°11.0
1	192°45.4	188°35.0	11°03.9	157°59.3	14°09.3	353°09.7	-6°35.0	285°24.0	-22°05.2	Ankaa	353°13.7	-42°12.9
2	207°47.9	203°38.8	11°03.3	173°00.0	14°09.9	8°12.4	-6°34.9	300°26.4	-22°05.2	Schedar	349°38.1	56°37.8
3	222°50.4	218°42.6	11°02.7	188°00.8	14°10.5	23°15.1	-6°34.8	315°28.8	-22°05.2	Diphda	348°53.6	-17°53.8
4	237°52.8	233°46.4	11°02.2	203°01.5	14°11.1	38°17.8	-6°34.7	330°31.2	-22°05.2	Achernar	335°25.5	-57°09.3
5	252°55.3	248°50.2	11°01.6	218°02.2	14°11.7	53°20.6	-6°34.5	345°33.6	-22°05.2	Hamal	327°58.2	23°32.4
6	267°57.8	263°54.0	11°01.0	233°03.0	14°12.3	68°23.3	-6°34.4	0°36.0	-22°05.2	Polaris	316°56.7	89°20.3
7	283°00.2	278°57.8	11°00.5	248°03.7	14°12.9	83°26.0	-6°34.3	15°38.4	-22°05.2	Akamar	315°16.7	-40°14.6
8	298°02.7	294°01.6	10°59.9	263°04.4	14°13.5	98°28.7	-6°34.2	30°40.7	-22°05.2	Menkar	314°12.6	4°09.1
9	313°05.2	309°05.4	10°59.3	278°05.1	14°14.1	113°31.5	-6°34.1	45°43.1	-22°05.2	Mirfak	308°37.0	49°55.2
10	328°07.6	324°09.2	10°58.7	293°05.9	14°14.8	128°34.2	-6°34.0	60°45.5	-22°05.2	Aldebaran	290°46.6	16°32.4
11	343°10.1	339°13.0	10°58.2	308°03.3	14°16.8	143°36.9	-6°33.9	75°47.9	-22°05.2	Rigel	281°09.7	-8°11.3
12	358°12.6	354°16.8	10°57.6	323°06.0	14°16.6	158°39.6	-6°33.8	90°50.3	-22°05.2	Capella	280°30.8	46°00.9
13	13°15.0	9°20.6	10°57.0	338°07.2	14°16.9	173°42.4	-6°33.7	105°52.7	-22°05.2	Bellatrix	278°29.3	6°21.6
14	28°17.5	24°24.4	10°56.4	353°08.2	14°17.5	188°45.1	-6°33.6	120°55.1	-22°05.2	Elnath	278°09.5	28°37.1
15	43°19.9	39°28.2	10°55.8	8°09.0	14°18.0	203°47.8	-6°33.4	135°57.5	-22°05.2	Alnilam	275°43.8	-1°11.8
16	58°22.4	54°32.0	10°55.2	23°09.9	14°18.6	218°50.5	-6°33.3	150°59.9	-22°05.2	Betelgeuse	270°58.6	7°24.3
17	73°24.9	69°35.8	10°54.6	38°10.6	14°19.2	233°53.3	-6°33.2	166°02.2	-22°05.2	Canopus	263°55.0	-52°42.8
18	88°27.3	84°39.7	10°54.1	53°11.4	14°19.7	248°56.0	-6°33.1	181°04.6	-22°05.2	Sirius	258°31.3	-16°44.6
19	103°29.8	99°43.5	10°53.5	68°12.2	14°20.3	263°58.7	-6°33.0	196°07.0	-22°05.2	Adara	255°10.4	-29°00.2
20	118°32.3	114°47.3	10°52.9	83°12.9	14°20.9	278°01.4	-6°32.9	211°09.4	-22°05.2	Procyon	244°56.9	5°10.7
21	133°34.7	129°51.1	10°52.3	98°13.7	14°21.5	294°04.2	-6°32.8	226°11.8	-22°05.2	Pollux	243°24.4	27°58.9
22	148°37.2	144°54.9	10°51.6	113°14.4	14°22.1	309°06.9	-6°32.7	241°14.2	-22°05.2	Avior	234°16.6	-59°34.3
23	163°39.7	159°58.7	10°51.0	128°15.2	14°22.7	324°09.6	-6°32.6	256°16.6	-22°05.2	Suhail	222°50.2	-43°30.5
Mer.pass.:12:07		v3.8 d-0.6 m-3.9		v0.7 d0.6 m1.4		v2.7 d0.1 m-2.3		v2.4 d0.0 m0.5		Miaplacidus	221°38.4	-69°47.6
										Alphard	217°53.3	-8°44.2
										Regulus	207°40.5	11°52.8
										Dubhe	193°48.1	61°39.5
										Denebola	182°30.7	14°28.5
										Gienah	175°49.3	-17°38.3
										Acrux	173°05.7	-63°11.6
										Gacrux	171°57.4	-57°12.5
										Alioth	166°18.1	55°51.9
										Spica	158°28.3	-11°15.0
										Alcaid	152°56.5	49°13.6
										Hadar	148°43.6	-60°27.1
										Menkent	148°04.2	-36°27.1
										Arcturus	145°53.0	19°05.8
										Rigel Kent.	139°47.7	-60°54.1
										Zubenelg.	137°02.4	-16°06.7
										Kochab	137°19.4	74°05.0
										Alphecca	126°08.7	26°39.4
										Antares	112°23.0	-26°28.0
										Atria	107°22.4	-69°03.0
										Sabik	102°09.6	-15°44.6
										Shaula	96°18.4	-37°06.7
										Rasalhague	96°04.1	12°32.9
										Etamin	90°45.0	51°29.0
										Kaus Aust.	83°40.5	-34°22.3
										Vega	80°37.3	38°47.8
										Nunki	75°55.3	-26°16.3
										Altair	62°06.0	8°54.8
										Peacock	53°15.7	-56°40.5
										Deneb	49°30.0	45°20.3
										Enif	33°44.9	9°57.1
										Alnair	27°41.1	-46°52.6
										Fomalhaut	15°21.6	-29°31.9
										Scheat	13°51.3	28°10.4
										Markab	13°36.1	15°17.7
										2017/3/2	SHA	Mer.pass
										Venus	355°48.2	12:23
										Mars	325°15.6	14:27
										Jupiter	160°23.9	01:27
										Saturn	92°38.7	05:58
										2017/3/2	SHA	Mer.pass
										Venus	356°20.4	12:17
										Mars	324°33.8	14:26
										Jupiter	160°30.2	01:23
										Saturn	92°36.9	05:54
										2017/3/2	SHA	Mer.pass
										Venus	356°53.2	12:11
										Mars	323°52.2	14:25
										Jupiter	160°36.6	01:19
										Saturn	92°35.2	05:50
										Horizontal paralax		
										Venus:	0.5	
										Mars:	0.1	
Mer.pass.:11:59		v3.8 d-0.7 m-3.9		v0.7 d0.6 m1.4		v2.7 d0.1 m-2.3		v2.4 d0.0 m0.5				

March 26, 27 ,28 (Sun., Mon., Tue.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sun	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass		
0	183°37.8	182°43.1	9°23.3	144°42.9	15°34.2	344°40.8	-6°18.8	276°07.3	-22°04.9	Alpheratz	357°41.2	29°11.0					
1	198°40.3	197°46.9	9°22.5	159°43.6	15°34.7	359°43.5	-6°18.7	291°09.7	-22°04.9	Ankaa	353°13.7	-42°12.9					
2	213°42.7	212°50.8	9°21.6	174°44.3	15°35.3	14°46.2	-6°18.6	306°12.1	-22°04.9	Schedar	349°38.1	56°37.8					
3	228°45.2	227°54.6	9°20.8	189°45.0	15°35.9	29°49.0	-6°18.4	321°14.6	-22°04.9	Diphda	348°53.6	-17°53.8					
4	243°47.7	242°58.4	9°20.0	204°45.8	15°36.5	44°51.7	-6°18.3	336°17.0	-22°04.9	Achernar	335°25.5	-57°09.2					
5	258°50.1	258°02.2	9°19.2	219°46.5	15°37.0	59°54.5	-6°18.2	351°19.4	-22°04.9	Hamal	327°58.2	23°32.4					
6	273°52.6	273°06.0	9°18.3	234°47.2	15°37.6	74°57.2	-6°18.1	6°21.8	-22°04.9	Polaris	316°58.7	89°20.3					
7	288°55.1	288°09.8	9°17.5	249°47.9	15°38.2	89°60.0	-6°18.0	21°24.2	-22°04.9	Akamar	315°16.8	-40°14.5					
8	303°57.5	303°13.6	9°16.7	264°48.6	15°38.8	105°02.7	-6°17.9	36°26.6	-22°04.9	Menkar	314°12.6	4°09.2					
9	318°60.0	318°17.4	9°15.8	279°49.3	15°39.3	120°05.5	-6°17.7	51°29.0	-22°04.9	Mirfak	308°37.0	49°55.2					
10	334°02.5	333°21.2	9°15.0	294°50.1	15°39.9	135°08.2	-6°17.6	66°31.5	-22°04.9	Aldebaran	290°46.6	16°32.4					
11	349°04.9	348°25.0	9°14.1	309°50.8	15°40.5	150°11.0	-6°17.5	81°33.9	-22°04.9	Rigel	281°09.7	-8°11.3					
12	4°07.4	3°28.8	9°13.3	324°51.5	15°41.1	165°13.7	-6°17.4	96°36.3	-22°04.9	Capella	280°30.8	46°00.9					
13	19°09.8	18°32.7	9°12.5	339°52.2	15°41.6	180°16.4	-6°17.3	111°38.7	-22°04.9	Bellatrix	278°29.4	6°21.6					
14	34°12.3	33°36.5	9°11.6	354°52.9	15°42.2	195°19.2	-6°17.2	126°41.1	-22°04.9	Elnath	278°09.5	28°37.1					
15	49°14.8	48°40.3	9°10.8	9°53.6	15°42.8	210°21.9	-6°17.0	141°43.5	-22°04.9	Alnilam	275°43.9	-1°11.8					
16	64°17.2	63°44.1	9°09.9	24°54.4	15°43.3	225°24.7	-6°16.9	156°46.0	-22°04.9	Betelgeuse	270°58.6	7°24.3					
17	79°19.7	78°47.9	9°09.1	39°55.1	15°43.9	240°27.4	-6°16.8	171°48.4	-22°04.9	Canopus	263°55.0	-52°42.8					
18	94°22.2	93°51.6	9°08.2	54°55.8	15°44.5	255°30.2	-6°16.7	186°50.8	-22°04.9	Sirius	258°31.4	-16°44.6					
19	109°24.6	108°55.4	9°07.4	69°56.5	15°45.1	270°32.9	-6°16.6	201°53.2	-22°04.9	Adara	255°10.5	-29°00.2					
20	124°27.1	123°59.2	9°06.6	84°57.2	15°45.6	285°35.7	-6°16.5	216°55.6	-22°04.9	Procyon	244°56.9	5°10.7					
21	139°29.6	139°03.0	9°05.7	99°57.9	15°46.2	300°38.4	-6°16.3	231°58.0	-22°04.9	Pollux	243°24.4	27°58.9					
22	154°32.0	154°06.8	9°04.9	114°58.7	15°46.8	315°41.2	-6°16.2	247°00.5	-22°04.9	Avior	234°16.6	-59°34.3					
23	169°34.5	169°10.6	9°04.0	129°59.4	15°47.3	330°43.9	-6°16.1	262°02.9	-22°04.9	Suhail	222°50.2	-43°30.5					
Mer.pass.:11:43			v3.8 d-0.8 m-3.8			v0.7 d0.6 m1.4			v2.7 d0.1 m-2.3			v2.4 d0.0 m0.4			Miaplacidus	221°38.4	-69°47.6
															Alphard	217°53.3	-8°44.2
															Regulus	207°40.5	11°52.8
															Dubhe	193°48.1	61°39.5
															Denebola	182°30.7	14°28.5
															Genah	175°49.3	-17°38.3
															Acrux	173°05.7	-63°11.6
															Gacrux	171°57.4	-57°12.6
															Alioth	166°18.0	55°52.0
															Spica	158°28.3	-11°15.1
															Alcaid	152°56.5	49°13.6
															Hadar	148°43.6	-60°27.2
															Menkent	148°04.2	-36°27.1
															Arcturus	145°53.0	19°05.8
															Rigel Kent.	139°47.6	-60°54.1
															Zubenelg.	137°02.3	-16°06.7
															Kochab	137°19.3	74°05.0
															Alphecca	126°08.7	26°39.4
															Antares	112°23.0	-26°28.0
															Atria	107°22.3	-69°03.1
															Sabik	102°09.5	-15°44.6
															Shaula	96°18.4	-37°06.7
															Rasalhague	96°04.1	12°32.9
															Etamin	90°44.9	51°29.0
															Kaus Aust.	83°40.4	-34°22.3
															Vega	80°37.3	38°47.8
															Nunki	75°55.2	-26°16.3
															Altair	62°06.0	8°54.8
															Peacock	53°15.6	-56°40.5
															Deneb	49°30.0	45°20.3
															Enif	33°44.9	9°57.1
															Alnair	27°41.0	-46°52.5
															Fomalhaut	15°21.6	-29°31.9
															Scheat	13°51.3	28°10.4
															Markab	13°36.1	15°17.7
															2017/3/2	SHA	Mer.pass
															Venus	359°05.3	11:46
															Mars	321°05.1	14:20
															Jupiter	161°02.9	01:01
															Saturn	92°29.5	05:35
															2017/3/2	SHA	Mer.pass
															Venus	359°37.5	11:40
															Mars	320°23.1	14:19
															Jupiter	161°09.7	00:57
															Saturn	92°28.3	05:31
															2017/3/2	SHA	Mer.pass
															Venus	0°08.8	11:34
															Mars	319°41.1	14:18
															Jupiter	161°16.5	00:52
															Saturn	92°27.3	05:27
															Horizontal parallax		
															Venus:	0.5	
															Mars:	0.1	
Mer.pass.:11:35			v3.8 d-0.9 m-3.9			v0.7 d0.6 m1.4			v2.7 d0.1 m-2.3			v2.4 d0.0 m0.4					

March 29, 30, 31 (Wed., Thu., Fri.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Wed	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass		
0	186°35.2	8°21.1	187°14.4	8°21.1	145°34.3	16°15.0	347°58.6	-6°10.3	279°01.6	-22°04.8	294°04.0	-22°04.8	Alpheratz	357°41.2	29°11.0		
1	201°37.7	8°20.2	202°18.1	8°20.2	160°35.0	16°15.5	3°01.4	-6°10.2	294°04.0	-22°04.8	339°11.3	-22°04.8	Ankaa	353°13.7	-42°12.9		
2	216°40.2	8°19.3	217°21.8	8°19.3	175°35.7	16°16.1	18°04.1	-6°10.1	309°06.4	-22°04.8	324°08.9	-22°04.8	Schedar	349°38.1	56°37.8		
3	231°42.6	8°18.4	232°25.5	8°18.4	190°36.5	16°16.6	33°06.9	-6°09.9	324°08.9	-22°04.8	354°13.7	-22°04.8	Diphda	348°53.6	-17°53.7		
4	246°45.1	8°17.5	247°29.2	8°17.5	205°37.2	16°17.2	48°09.6	-6°09.8	339°11.3	-22°04.8	9°16.2	-22°04.8	Achernar	335°25.5	-57°09.2		
5	261°47.5	8°16.6	262°32.9	8°16.6	220°37.9	16°17.7	63°12.4	-6°09.7	354°13.7	-22°04.8	24°18.6	-22°04.8	Hamal	327°58.2	23°32.4		
6	276°50.0	8°15.7	277°36.6	8°15.7	235°38.6	16°18.3	78°15.1	-6°09.6	9°16.2	-22°04.8	39°21.0	-22°04.8	Polaris	316°59.6	89°20.3		
7	291°52.5	8°14.8	292°40.3	8°14.8	250°39.3	16°18.8	93°17.9	-6°09.5	24°18.6	-22°04.8	48°09.6	-22°04.8	Akamar	315°16.8	-40°14.5		
8	306°54.9	8°13.9	307°44.0	8°13.9	265°40.0	16°19.4	108°20.7	-6°09.4	39°21.0	-22°04.8	54°23.4	-22°04.8	Menkar	314°12.6	4°09.1		
9	321°57.4	8°13.0	322°47.7	8°13.0	280°40.7	16°20.0	123°23.4	-6°09.2	54°23.4	-22°04.8	69°25.9	-22°04.8	Mirfak	308°37.0	49°55.2		
10	336°59.9	8°12.1	337°51.4	8°12.1	295°41.4	16°20.5	138°26.2	-6°09.1	69°25.9	-22°04.8	84°28.3	-22°04.8	Aldebaran	290°46.6	16°32.4		
11	352°02.3	8°11.2	352°55.0	8°11.2	310°42.1	16°21.1	153°28.9	-6°09.0	84°28.3	-22°04.8	99°30.7	-22°04.8	Rigel	281°09.7	-8°11.3		
12	7°04.8	8°10.3	7°58.7	8°10.3	325°42.8	16°21.6	168°31.7	-6°08.9	99°30.7	-22°04.8	114°33.2	-22°04.8	Capella	280°30.8	46°00.9		
13	22°07.3	8°09.4	23°02.4	8°09.4	340°43.6	16°22.2	183°34.4	-6°08.8	114°33.2	-22°04.8	129°35.6	-22°04.8	Bellatrix	278°29.4	6°21.6		
14	37°09.7	8°08.5	38°06.1	8°08.5	355°44.3	16°22.7	198°37.2	-6°08.6	129°35.6	-22°04.8	144°38.0	-22°04.8	Elnath	278°09.5	28°37.1		
15	52°12.2	8°07.6	53°09.8	8°07.6	10°45.0	16°23.3	213°39.9	-6°08.5	144°38.0	-22°04.8	159°40.2	-22°04.8	Alnilam	275°43.9	-1°11.8		
16	67°14.6	8°06.7	68°13.4	8°06.7	25°45.7	16°23.8	228°42.7	-6°08.4	159°40.2	-22°04.8	174°42.9	-22°04.8	Betelgeuse	270°58.6	7°24.3		
17	82°17.1	8°05.8	83°17.1	8°05.8	40°46.4	16°24.4	243°45.4	-6°08.3	174°42.9	-22°04.8	189°45.3	-22°04.8	Canopus	263°55.0	-52°42.8		
18	97°19.6	8°04.9	98°20.8	8°04.9	55°47.1	16°24.9	258°48.2	-6°08.2	189°45.3	-22°04.8	204°47.7	-22°04.8	Sirius	258°31.4	-16°44.6		
19	112°22.0	8°04.0	113°24.4	8°04.0	70°47.8	16°25.5	273°50.9	-6°08.0	204°47.7	-22°04.8	219°50.2	-22°04.8	Adara	255°10.5	-29°00.2		
20	127°24.5	8°03.1	128°28.1	8°03.1	85°48.5	16°26.0	288°53.7	-6°07.9	219°50.2	-22°04.8	234°52.6	-22°04.8	Procyon	244°56.9	5°10.7		
21	142°27.0	8°02.2	143°31.8	8°02.2	100°49.2	16°26.6	303°56.4	-6°07.8	234°52.6	-22°04.8	249°55.0	-22°04.8	Pollux	243°24.4	27°58.9		
22	157°29.4	8°01.3	158°35.4	8°01.3	115°49.9	16°27.1	318°59.2	-6°07.7	249°55.0	-22°04.8	264°57.5	-22°04.7	Avior	234°16.7	-59°34.3		
23	172°31.9	8°00.3	173°39.1	8°00.3	130°50.7	16°27.7	334°02.0	-6°07.6	264°57.5	-22°04.7			Suhail	222°50.3	-43°30.5		
Mer.pass.:11:31			v3.7 d-0.9 m-3.9			v0.7 d0.6 m1.5			v2.8 d0.1 m-2.3			v2.4 d0.0 m0.4			Miaplacidus 221°38.5 -69°47.6		
															Alphard 217°53.4 -8°44.2		
															Regulus 207°40.5 11°52.8		
															Dubhe 193°48.1 61°39.5		
															Denebola 182°30.7 14°28.5		
															Gienah 175°49.3 -17°38.3		
															AcruX 173°05.7 -63°11.7		
															Gacrux 171°57.4 -57°12.6		
															Alioth 166°18.0 55°52.0		
															Spica 158°28.2 -11°15.1		
															Alcaid 152°56.5 49°13.6		
															Hadar 148°43.6 -60°27.2		
															Menkent 148°04.2 -36°27.2		
															Arcturus 145°53.0 19°05.8		
															Rigel Kent. 139°47.6 -60°54.1		
															Zubenelg. 137°02.3 -16°06.7		
															Kochab 137°19.3 74°05.0		
															Alphecca 126°08.6 26°39.4		
															Antares 112°22.9 -26°28.0		
															Atria 107°22.2 -69°03.1		
															Sabik 102°09.5 -15°44.6		
															Shaula 96°18.4 -37°06.7		
															Rasalhague 96°04.0 12°32.9		
															Etamin 90°44.9 51°29.0		
															Kaus Aust. 83°40.4 -34°22.3		
															Vega 80°37.3 38°47.8		
															Nunki 75°55.2 -26°16.3		
															Altair 62°05.9 8°54.8		
															Peacock 53°15.6 -56°40.5		
															Deneb 49°29.9 45°20.3		
															Enif 33°44.9 9°57.1		
															Alnair 27°41.0 -46°52.5		
															Fomalhaut 15°21.6 -29°31.9		
															Scheat 13°51.2 28°10.4		
															Markab 13°36.1 15°17.7		
															2017/3/2 SHA Mer.pass		
															Venus 0°39.2 11:28		
															Mars 318°59.1 14:17		
															Jupiter 161°23.4 00:48		
															Saturn 92°26.4 05:23		
															2017/3/3 SHA Mer.pass		
															Venus 1°08.4 11:22		
															Mars 318°17.0 14:16		
															Jupiter 161°30.3 00:44		
															Saturn 92°25.5 05:19		
															2017/3/3 SHA Mer.pass		
															Venus 1°36.2 11:17		
															Mars 317°34.8 14:15		
															Jupiter 161°37.3 00:39		
															Saturn 92°24.8 05:15		
															Horizontal parallax		
															Venus: 0.5		
															Mars: 0.1		
Mer.pass.:11:23			v3.6 d-0.9 m-4.0			v0.7 d0.5 m1.5			v2.8 d0.1 m-2.3			v2.4 d0.0 m0.4					

April 01, 02 ,03 (Sat., Sun., Mon.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	189°32.6	191°35.2	7°15.6	146°25.3	16°54.4	351°17.0	-6°01.7	281°56.8	-22°04.6	Alpheratz	357°41.2	29°11.0
1	204°35.1	206°38.7	7°14.6	161°26.0	16°54.9	6°19.7	-6°01.6	296°59.3	-22°04.6	Ankaa	353°13.7	-42°12.9
2	219°37.6	221°42.2	7°13.7	176°26.7	16°55.4	21°22.5	-6°01.4	312°01.7	-22°04.6	Schedar	349°38.1	56°37.8
3	234°40.0	236°45.7	7°12.8	191°27.4	16°56.0	36°25.3	-6°01.3	327°04.2	-22°04.6	Diphda	348°53.6	-17°53.7
4	249°42.5	251°49.3	7°11.9	206°28.1	16°56.5	51°28.0	-6°01.2	342°06.6	-22°04.6	Achernar	335°25.5	-57°09.2
5	264°45.0	266°52.8	7°11.0	221°28.8	16°57.1	66°30.8	-6°01.1	357°09.0	-22°04.6	Hamal	327°58.2	23°32.4
6	279°47.4	281°56.3	7°10.1	236°29.5	16°57.6	81°33.5	-6°00.9	12°11.5	-22°04.6	Polaris	317°00.2	89°20.3
7	294°49.9	296°59.8	7°09.1	251°30.2	16°58.1	96°36.3	-6°00.8	27°13.9	-22°04.6	Akamar	315°16.8	-40°14.5
8	309°52.3	312°03.3	7°08.2	266°30.9	16°58.7	111°39.0	-6°00.7	42°16.4	-22°04.6	Menkar	314°12.6	4°09.1
9	324°54.8	327°06.8	7°07.3	281°31.6	16°59.2	126°41.8	-6°00.6	57°18.8	-22°04.6	Mirfak	308°37.0	49°55.2
10	339°57.3	342°10.3	7°06.4	296°32.3	16°59.7	141°44.6	-6°00.5	72°21.3	-22°04.6	Aldebaran	290°46.6	16°32.4
11	354°59.7	357°13.8	7°05.5	311°33.0	17°00.3	156°47.3	-6°00.3	87°23.7	-22°04.6	Rigel	281°09.7	-8°11.3
12	10°02.2	12°17.3	7°04.6	326°33.7	17°00.8	171°50.1	-6°00.2	102°26.1	-22°04.6	Capella	280°30.9	46°00.9
13	25°04.7	27°20.8	7°03.6	341°34.4	17°01.3	186°52.8	-6°00.1	117°28.6	-22°04.6	Bellatrix	278°29.4	6°21.6
14	40°07.1	42°24.3	7°02.7	356°35.1	17°01.9	201°55.6	-5°60.0	132°31.0	-22°04.6	Elnath	278°09.5	28°37.1
15	55°09.6	57°27.8	7°01.8	11°35.8	17°02.4	216°58.4	-5°59.9	147°33.5	-22°04.6	Alnilam	275°43.9	-1°11.8
16	70°12.1	72°31.2	7°00.9	26°36.5	17°02.9	232°01.1	-5°59.7	162°35.9	-22°04.6	Betelgeuse	270°58.6	7°24.3
17	85°14.5	87°34.7	6°60.0	41°37.2	17°03.5	247°03.9	-5°59.6	177°38.4	-22°04.6	Canopus	263°55.1	-52°42.8
18	100°17.0	102°38.2	6°59.1	56°37.9	17°04.0	262°06.6	-5°59.5	192°40.8	-22°04.6	Sirius	258°31.4	-16°44.6
19	115°19.5	117°41.7	6°58.1	71°38.6	17°04.5	277°09.4	-5°59.4	207°43.3	-22°04.6	Adara	255°10.5	-29°00.2
20	130°21.9	132°45.1	6°57.2	86°39.3	17°05.1	292°12.1	-5°59.3	222°45.7	-22°04.6	Procyon	244°56.9	5°10.7
21	145°24.4	147°48.6	6°56.3	101°40.1	17°05.6	307°14.9	-5°59.1	237°48.1	-22°04.6	Pollux	243°24.5	27°58.9
22	160°26.8	162°52.1	6°55.4	116°40.8	17°06.1	322°17.7	-5°59.0	252°50.6	-22°04.6	Avior	234°16.7	-59°34.3
23	175°29.3	177°55.5	6°54.5	131°41.5	17°06.7	337°20.4	-5°58.9	267°53.0	-22°04.6	Suhail	222°50.3	-43°30.5
Mer.pass.:11:19		v3.5 d-0.9 m-4.0		v0.7 d0.5 m1.5		v2.8 d0.1 m-2.3		v2.4 d0.0 m0.4		Miaplacidus	221°38.5	-69°47.6
										Alphard	217°53.4	-8°44.2
										Regulus	207°40.5	11°52.8
										Dubhe	193°48.1	61°39.5
										Denebola	182°30.7	14°28.5
										Gienah	175°49.3	-17°38.3
										Acrux	173°05.6	-63°11.7
										Gacrux	171°57.4	-57°12.6
										Alioth	166°18.0	55°52.0
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.5	49°13.6
										Hadar	148°43.6	-60°27.2
										Menkent	148°04.2	-36°27.2
										Arcturus	145°53.0	19°05.8
										Rigel Kent.	139°47.6	-60°54.1
										Zubenelg.	137°02.3	-16°06.7
										Kochab	137°19.2	74°05.0
										Alphecca	126°08.6	26°39.4
										Antares	112°22.9	-26°28.0
										Atria	107°22.2	-69°03.1
										Sabik	102°09.5	-15°44.6
										Shaula	96°18.3	-37°06.7
										Rasalhague	96°04.0	12°32.9
										Etamin	90°44.8	51°29.1
										Kaus Aust.	83°40.4	-34°22.3
										Vega	80°37.2	38°47.8
										Nunki	75°55.2	-26°16.3
										Altair	62°05.9	8°54.8
										Peacock	53°15.5	-56°40.5
										Deneb	49°29.9	45°20.3
										Enif	33°44.9	9°57.1
										Alnair	27°41.0	-46°52.5
										Fomalhaut	15°21.6	-29°31.9
										Scheat	13°51.2	28°10.4
										Markab	13°36.1	15°17.7
										2017/4/1	SHA	Mer.pass
										Venus	2°02.5	11:11
										Mars	316°52.6	14:14
										Jupiter	161°44.3	00:35
										Saturn	92°24.2	05:11
										2017/4/2	SHA	Mer.pass
										Venus	2°27.2	11:06
										Mars	316°10.4	14:13
										Jupiter	161°51.4	00:30
										Saturn	92°23.7	05:07
										2017/4/3	SHA	Mer.pass
										Venus	2°50.1	11:00
										Mars	315°28.1	14:11
										Jupiter	161°58.5	00:26
										Saturn	92°23.3	05:04
										Horizontal parallax		
										Venus:		0.5
										Mars:		0.1
Mer.pass.:11:12		v3.4 d-0.9 m-4.1		v0.7 d0.5 m1.5		v2.8 d0.1 m-2.3		v2.4 d0.0 m0.4				

Sun								Moon							
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	179°00.7	4°31.8	126°03.3	6.2	15°56.9	6.6	60.0	72	01:23	03:34	04:50	19:20	20:37	22:58	
1	194°00.9	4°32.7	140°28.5	6.2	16°03.4	6.5	60.0	70	02:12	03:51	04:58	19:12	20:19	22:02	
2	209°01.1	4°33.7	154°53.7	6.2	16°09.8	6.4	60.0	68	02:42	04:05	05:04	19:05	20:05	21:30	
3	224°01.3	4°34.7	169°18.9	6.2	16°16.1	6.3	60.0	66	03:03	04:16	05:10	18:59	19:54	21:08	
4	239°01.5	4°35.6	183°44.0	6.1	16°22.3	6.1	60.0	64	03:20	04:25	05:15	18:54	19:45	20:50	
5	254°01.7	4°36.6	198°09.2	6.1	16°28.4	6.0	60.0	62	03:34	04:32	05:18	18:50	19:37	20:36	
6	269°01.8	4°37.6	212°34.3	6.1	16°34.4	5.9	60.0	60	03:45	04:39	05:22	18:47	19:30	20:24	
7	284°02.0	4°38.5	226°59.4	6.1	16°40.3	5.8	59.9	58	03:55	04:45	05:25	18:43	19:24	20:14	
8	299°02.2	4°39.5	241°24.4	6.1	16°46.0	5.7	59.9	56	04:03	04:50	05:28	18:41	19:19	20:06	
9	314°02.4	4°40.5	255°49.5	6.0	16°51.6	5.6	59.9	54	04:10	04:54	05:30	18:38	19:14	19:58	
10	329°02.6	4°41.4	270°14.5	6.0	16°57.2	5.5	59.9	52	04:16	04:58	05:32	18:36	19:10	19:52	
11	344°02.8	4°42.4	284°39.6	6.0	17°02.6	5.3	59.9	50	04:22	05:02	05:34	18:34	19:07	19:46	
12	359°02.9	4°43.4	299°04.6	6.0	17°07.8	5.2	59.9	45	04:34	05:09	05:39	18:29	18:59	19:34	
13	14°03.1	4°44.3	313°29.6	6.0	17°13.0	5.1	59.9	40	04:43	05:15	05:42	18:25	18:53	19:25	
14	29°03.3	4°45.3	327°54.6	6.0	17°18.1	5.0	59.8	35	04:50	05:20	05:45	18:22	18:48	19:18	
15	44°03.5	4°46.2	342°19.5	6.0	17°23.0	4.9	59.8	30	04:56	05:24	05:48	18:19	18:43	19:12	
16	59°03.7	4°47.2	356°44.5	6.0	17°27.8	4.7	59.8	20	05:05	05:31	05:53	18:15	18:37	19:03	
17	74°03.9	4°48.2	11°09.4	5.9	17°32.5	4.6	59.8	10	05:11	05:36	05:57	18:11	18:32	18:56	
18	89°04.1	4°49.1	25°34.4	5.9	17°37.0	4.5	59.8	0	05:15	05:40	06:00	18:07	18:28	18:52	
19	104°04.2	4°50.1	39°59.3	5.9	17°41.5	4.4	59.8	-10	05:18	05:43	06:04	18:03	18:24	18:49	
20	119°04.4	4°51.1	54°24.3	5.9	17°45.8	4.3	59.7	-20	05:20	05:45	06:07	17:59	18:21	18:47	
21	134°04.6	4°52.0	68°49.2	5.9	17°50.0	4.1	59.7	-30	05:20	05:47	06:11	17:55	18:19	18:47	
22	149°04.8	4°53.0	83°14.1	5.9	17°54.1	4.0	59.7	-35	05:19	05:48	06:14	17:53	18:18	18:47	
23	164°05.0	4°53.9	97°39.0	5.9	17°58.0	3.9	59.7	-40	05:18	05:49	06:16	17:50	18:17	18:49	
	SD.=16.0	d=1.0	S.D.=16.4												
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset			
0	179°05.2	4°54.9	112°03.9	5.9	18°01.9	3.8	59.7	72	05:30	--	--	01:47	--	--	
1	194°05.3	4°55.9	126°28.8	5.9	18°05.6	3.7	59.7	70	06:14	06:27	07:06	01:04	02:53	04:16	
2	209°05.5	4°56.8	140°53.7	5.9	18°09.2	3.5	59.6	68	06:43	07:09	07:56	00:36	02:11	03:26	
3	224°05.7	4°57.8	155°18.6	5.9	18°12.7	3.4	59.6	66	07:05	07:38	08:27	00:14	01:43	02:54	
4	239°05.9	4°58.7	169°43.5	5.9	18°16.0	3.3	59.6	64	07:23	07:60	08:51	--	01:21	02:31	
5	254°06.1	4°59.7	184°08.5	5.9	18°19.2	3.2	59.6	62	07:37	08:17	09:10	--	01:04	02:12	
6	269°06.3	5°00.7	198°33.4	5.9	18°22.3	3.0	59.6	60	07:50	08:32	09:25	--	00:50	01:57	
7	284°06.5	5°01.6	212°58.3	5.9	18°25.3	2.9	59.5	58	08:00	08:44	09:38	--	00:38	01:44	
8	299°06.6	5°02.6	227°23.2	5.9	18°28.1	2.8	59.5	56	08:10	08:55	09:49	--	00:27	01:33	
9	314°06.8	5°03.6	241°48.1	5.9	18°30.8	2.7	59.5	54	08:18	09:04	09:59	--	00:18	01:23	
10	329°07.0	5°04.5	256°13.1	5.9	18°33.4	2.5	59.5	52	08:26	09:13	10:08	--	00:10	01:14	
11	344°07.2	5°05.5	270°38.0	5.9	18°35.9	2.4	59.5	50	08:32	09:21	10:16	--	00:02	01:06	
12	359°07.4	5°06.4	285°02.9	6.0	18°38.2	2.3	59.4	45	08:47	09:37	10:33	23:46	--	00:49	
13	14°07.6	5°07.4	299°27.9	6.0	18°40.5	2.2	59.4	40	08:59	09:50	10:47	23:33	--	00:35	
14	29°07.7	5°08.3	313°52.9	6.0	18°42.5	2.0	59.4	35	09:09	10:02	10:58	23:22	--	00:24	
15	44°07.9	5°09.3	328°17.9	6.0	18°44.5	1.9	59.4	30	09:18	10:12	11:09	23:12	--	00:13	
16	59°08.1	5°10.3	342°42.9	6.0	18°46.4	1.8	59.4	20	09:33	10:29	11:26	22:56	23:56	--	
17	74°08.3	5°11.2	357°07.9	6.0	18°48.1	1.7	59.3	10	09:47	10:44	11:42	22:41	23:40	--	
18	89°08.5	5°12.2	11°32.9	6.0	18°49.7	1.5	59.3	0	09:60	10:58	11:56	22:27	23:26	--	
19	104°08.7	5°13.1	25°57.9	6.0	18°51.1	1.4	59.3	-10	10:13	11:12	12:10	22:14	23:11	--	
20	119°08.8	5°14.1	40°23.0	6.1	18°52.5	1.3	59.3	-20	10:26	11:27	12:26	21:59	22:56	23:54	
21	134°09.0	5°15.1	54°48.1	6.1	18°53.7	1.1	59.3	-30	10:42	11:45	12:44	21:43	22:38	23:36	
22	149°09.2	5°16.0	69°13.2	6.1	18°54.8	1.0	59.2	-35	10:51	11:55	12:54	21:33	22:28	23:26	
23	164°09.4	5°17.0	83°38.3	6.1	18°55.7	0.9	59.2	-40	11:02	12:07	13:06	21:22	22:16	23:14	
	SD.=16.0	d=1.0	S.D.=16.3												
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun			Moon			
0	179°09.6	5°17.9	98°03.4	6.1	18°56.6	0.8	59.2		Eqn.of Time	Mer.	Mer.Pass.	Age			
1	194°09.8	5°18.9	112°28.6	6.2	18°57.3	0.6	59.2	1	00 ^h	12 ^h	Pass	Upper	Lower		
2	209°09.9	5°19.8	126°53.8	6.2	18°57.9	0.5	59.2	2	03:57	03:48	12:03	16:13	03:44	4(25%)	
3	224°10.1	5°20.8	141°19.0	6.2	18°58.3	0.4	59.1	3	03:39	03:30	12:03	17:11	04:42	5(36%)	
4	239°10.3	5°21.8	155°44.2	6.2	18°58.7	0.3	59.1		03:22	03:13	12:03	18:09	05:40	6(47%)	
5	254°10.5	5°22.7	170°09.5	6.3	18°58.9	0.2	59.1								
6	269°10.7	5°23.7	184°34.7	6.3	18°59.0	0.0	59.1								
7	284°10.9	5°24.6	199°00.1	6.3	18°58.9	-0.1	59.0								
8	299°11.0	5°25.6	213°25.4	6.4	18°58.8	-0.2	59.0								
9	314°11.2	5°26.5	227°50.8	6.4	18°58.5	-0.3	59.0								
10	329°11.4	5°27.5	242°16.2	6.4	18°58.1	-0.5	59.0								
11	344°11.6	5°28.5	256°41.6	6.5	18°57.6	-0.6	59.0								
12	359°11.8	5°29.4	271°07.1	6.5	18°56.9	-0.7	58.9								
13	14°11.9	5°30.4	285°32.6	6.5	18°56.2	-0.8	58.9								
14	29°12.1	5°31.3	299°58.1	6.6	18°55.3	-0.9	58.9								
15	44°12.3	5°32.3	314°23.7	6.6	18°54.3	-1.1	58.9								
16	59°12.5	5°33.2	328°49.3	6.6	18°53.1	-1.2	58.8								
17	74°12.7	5°34.2	343°15.0	6.7	18°51.9	-1.3	58.8								
18	89°12.9	5°35.1	357°40.6	6.7	18°50.5	-1.4	58.8								
19	104°13.0	5°36.1	12°06.4	6.7	18°49.0	-1.5	58.8								
20	119°13.2	5°37.1	26°32.1	6.8	18°47.4	-1.7	58.7								
21	134°13.4	5°38.0	40°57.9	6.8	18°45.7	-1.8	58.7								
22	149°13.6	5°39.0	55°23.8	6.9	18°43.8	-1.9	58.7								
23	164°13.8	5°39.9	69°49.7	6.9	18°41.9	-2.0	58.7								
	SD.=16.0	d=1.0	S.D.=16.1												

April 04, 05 ,06 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	192°30.1	195°41.1	6°10.1	147°15.8	17°32.4	354°35.7	-5°53.0	284°53.1	-22°04.5	Alpheratz	357°41.2	29°11.0
1	207°32.5	210°44.4	6°09.3	162°16.5	17°32.9	9°38.4	-5°52.8	299°55.5	-22°04.5	Ankaa	353°13.6	-42°12.9
2	222°35.0	225°47.7	6°08.4	177°17.2	17°33.4	24°41.2	-5°52.7	314°58.0	-22°04.5	Schedar	349°38.1	56°37.7
3	237°37.4	240°50.9	6°07.5	192°17.9	17°33.9	39°43.9	-5°52.6	330°00.4	-22°04.5	Diphda	348°53.6	-17°53.7
4	252°39.9	255°54.2	6°06.6	207°18.5	17°34.4	54°46.7	-5°52.5	345°02.9	-22°04.4	Achernar	335°25.5	-57°09.2
5	267°42.4	270°57.5	6°05.7	222°19.2	17°35.0	69°49.5	-5°52.3	0°05.3	-22°04.4	Hamal	327°58.2	23°32.4
6	282°44.8	286°00.8	6°04.8	237°19.9	17°35.5	84°52.2	-5°52.2	15°07.8	-22°04.4	Polaris	317°00.8	89°20.2
7	297°47.3	301°04.1	6°03.9	252°20.6	17°36.0	99°55.0	-5°52.1	30°10.2	-22°04.4	Akamar	315°16.8	-40°14.5
8	312°49.8	316°07.3	6°03.0	267°21.3	17°36.5	114°57.7	-5°52.0	45°12.7	-22°04.4	Menkar	314°12.6	4°09.2
9	327°52.2	331°10.6	6°02.1	282°22.0	17°37.0	130°00.5	-5°51.9	60°15.2	-22°04.4	Mirfak	308°37.0	49°55.2
10	342°54.7	346°13.9	6°01.3	297°22.7	17°37.5	145°03.3	-5°51.7	75°17.6	-22°04.4	Aldebaran	290°46.6	16°32.4
11	357°57.2	1°17.1	6°00.4	312°23.4	17°38.0	160°06.0	-5°51.6	90°20.1	-22°04.4	Rigel	281°09.7	-8°11.3
12	12°59.6	16°20.4	5°59.5	327°24.1	17°38.6	175°08.8	-5°51.5	105°22.5	-22°04.4	Capella	280°30.9	46°00.9
13	28°02.1	31°23.6	5°58.6	342°24.8	17°39.1	190°11.6	-5°51.4	120°25.0	-22°04.4	Bellatrix	278°29.4	6°21.6
14	43°04.6	46°26.9	5°57.7	357°25.5	17°39.6	205°14.3	-5°51.3	135°27.4	-22°04.4	Elnath	278°09.5	28°37.1
15	58°07.0	61°30.1	5°56.8	12°26.2	17°40.1	220°17.1	-5°51.1	150°29.9	-22°04.4	Alnilam	275°43.9	-1°11.8
16	73°09.5	76°33.4	5°56.0	27°26.9	17°40.6	235°19.8	-5°51.0	165°32.4	-22°04.4	Betelgeuse	270°58.6	7°24.3
17	88°11.9	91°36.6	5°55.1	42°27.6	17°41.1	250°22.6	-5°50.9	180°34.8	-22°04.4	Canopus	263°55.1	-52°42.8
18	103°14.4	106°39.8	5°54.2	57°28.3	17°41.6	265°25.4	-5°50.8	195°37.3	-22°04.4	Sirius	258°31.4	-16°44.6
19	118°16.9	121°43.1	5°53.3	72°29.0	17°42.2	280°28.1	-5°50.6	210°39.7	-22°04.4	Adara	255°10.5	-29°00.2
20	133°19.3	136°46.3	5°52.4	87°29.7	17°42.7	295°30.9	-5°50.5	225°42.2	-22°04.4	Procyon	244°56.9	5°10.7
21	148°21.8	151°49.5	5°51.6	102°30.4	17°43.2	310°33.6	-5°50.4	240°44.6	-22°04.4	Pollux	243°24.5	27°58.9
22	163°24.3	166°52.7	5°50.7	117°31.1	17°43.7	325°36.4	-5°50.3	255°47.1	-22°04.4	Avior	234°16.7	-59°34.3
23	178°26.7	181°55.9	5°49.8	132°31.8	17°44.2	340°39.2	-5°50.2	270°49.6	-22°04.4	Suhail	222°50.3	-43°30.5
Mer.pass.:11:08		v3.3 d-0.9 m-4.1		v0.7 d0.5 m1.5		v2.8 d0.1 m-2.3		v2.5 d0.0 m0.4		Miaplacidus	221°38.5	-69°47.6
										Alphard	217°53.4	-8°44.3
										Regulus	207°40.5	11°52.8
										Dubhe	193°48.1	61°39.6
										Denebola	182°30.7	14°28.5
										Gienah	175°49.3	-17°38.3
										Acruz	173°05.6	-63°11.7
										Gacrux	171°57.4	-57°12.6
										Alioth	166°18.0	55°52.0
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.5	49°13.6
										Hadar	148°43.5	-60°27.2
										Menkent	148°04.2	-36°27.2
										Arcturus	145°53.0	19°05.8
										Rigel Kent.	139°47.6	-60°54.1
										Zubenelg.	137°02.3	-16°06.7
										Kochab	137°19.2	74°05.0
										Alphecca	126°08.6	26°39.4
										Antares	112°22.9	-26°28.0
										Atria	107°22.1	-69°03.1
										Sabik	102°09.5	-15°44.6
										Shaula	96°18.3	-37°06.7
										Rasalhague	96°04.0	12°32.9
										Etamin	90°44.8	51°29.1
										Kaus Aust.	83°40.4	-34°22.3
										Vega	80°37.2	38°47.8
										Nunki	75°55.2	-26°16.3
										Altair	62°05.9	8°54.8
										Peacock	53°15.5	-56°40.5
										Deneb	49°29.9	45°20.3
										Enif	33°44.8	9°57.1
										Alnair	27°41.0	-46°52.5
										Fomalhaut	15°21.6	-29°31.9
										Scheat	13°51.2	28°10.4
										Markab	13°36.1	15°17.7
										2017/4/4	SHA	Mer.pass
										Venus	3°11.0	10:55
										Mars	314°45.7	14:10
										Jupiter	162°05.6	00:22
										Saturn	92°23.0	04:60
										2017/4/5	SHA	Mer.pass
										Venus	3°30.0	10:50
										Mars	314°03.3	14:09
										Jupiter	162°12.7	00:17
										Saturn	92°22.8	04:56
										2017/4/6	SHA	Mer.pass
										Venus	3°46.8	10:45
										Mars	313°20.8	14:08
										Jupiter	162°19.9	00:13
										Saturn	92°22.7	04:52
										Horizontal parallax		
										Venus:		0.5
										Mars:		0.1
Mer.pass.:11:00		v3.1 d-0.9 m-4.2		v0.7 d0.5 m1.5		v2.8 d0.1 m-2.3		v2.5 d0.0 m0.4				

h Sun								Moon							
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	179°13.9	5°40.9	84°15.6	7.0	18°39.8	-2.1	58.7	72	--	03:15	04:34	19:35	20:55	--	
1	194°14.1	5°41.8	98°41.6	7.0	18°37.6	-2.2	58.6	70	01:44	03:35	04:44	19:24	20:34	22:31	
2	209°14.3	5°42.8	113°07.6	7.0	18°35.3	-2.4	58.6	68	02:21	03:50	04:52	19:16	20:18	21:50	
3	224°14.5	5°43.7	127°33.7	7.1	18°32.9	-2.5	58.6	66	02:47	04:03	04:58	19:09	20:05	21:23	
4	239°14.7	5°44.7	141°59.8	7.1	18°30.3	-2.6	58.6	64	03:06	04:13	05:04	19:03	19:54	21:02	
5	254°14.9	5°45.6	156°26.0	7.2	18°27.7	-2.7	58.5	62	03:22	04:22	05:09	18:58	19:45	20:47	
6	269°15.0	5°46.6	170°52.2	7.2	18°24.9	-2.8	58.5	60	03:34	04:29	05:13	18:54	19:38	20:34	
7	284°15.2	5°47.5	185°18.4	7.3	18°22.1	-2.9	58.5	58	03:45	04:36	05:17	18:50	19:31	20:23	
8	299°15.4	5°48.5	199°44.7	7.3	18°19.1	-3.0	58.5	56	03:54	04:41	05:20	18:47	19:25	20:13	
9	314°15.6	5°49.4	214°11.1	7.4	18°16.0	-3.2	58.4	54	04:02	04:46	05:23	18:44	19:20	20:05	
10	329°15.8	5°50.4	228°37.5	7.4	18°12.8	-3.3	58.4	52	04:09	04:51	05:26	18:41	19:16	19:58	
11	344°15.9	5°51.3	243°03.9	7.5	18°09.5	-3.4	58.4	50	04:15	04:55	05:28	18:38	19:12	19:52	
12	359°16.1	5°52.3	257°30.5	7.5	18°06.0	-3.5	58.4	45	04:28	05:03	05:33	18:33	19:03	19:39	
13	14°16.3	5°53.3	271°57.0	7.6	18°02.5	-3.6	58.3	40	04:38	05:10	05:38	18:28	18:56	19:29	
14	29°16.5	5°54.2	286°23.6	7.6	17°58.9	-3.7	58.3	35	04:46	05:16	05:41	18:25	18:50	19:20	
15	44°16.7	5°55.2	300°50.3	7.7	17°55.1	-3.8	58.3	30	04:52	05:20	05:45	18:21	18:45	19:14	
16	59°16.8	5°56.1	315°17.0	7.7	17°51.2	-3.9	58.3	20	05:02	05:28	05:50	18:15	18:38	19:04	
17	74°17.0	5°57.1	329°43.8	7.8	17°47.3	-4.0	58.3	10	05:09	05:34	05:55	18:10	18:32	18:56	
18	89°17.2	5°58.0	344°10.6	7.9	17°43.2	-4.1	58.2	0	05:14	05:39	05:59	18:06	18:27	18:51	
19	104°17.4	5°59.0	358°37.5	7.9	17°39.1	-4.2	58.2	-10	05:18	05:43	06:04	18:01	18:23	18:47	
20	119°17.6	5°59.9	13°04.4	8.0	17°34.8	-4.3	58.2	-20	05:20	05:46	06:08	17:57	18:19	18:45	
21	134°17.7	6°00.9	27°31.4	8.0	17°30.4	-4.4	58.2	-30	05:21	05:49	06:13	17:52	18:16	18:43	
22	149°17.9	6°01.8	41°58.5	8.1	17°25.9	-4.5	58.1	-35	05:21	05:51	06:16	17:49	18:14	18:43	
23	164°18.1	6°02.8	56°25.6	8.1	17°21.4	-4.6	58.1	-40	05:21	05:52	06:19	17:46	18:13	18:44	
SD.=16.0 d=1.0 S.D.=16.0								-45	05:19	05:53	06:23	17:42	18:11	18:45	
								-50	05:17	05:55	06:27	17:37	18:10	18:47	
								-52	05:16	05:55	06:29	17:35	18:09	18:48	
								-54	05:15	05:56	06:31	17:33	18:08	18:49	
								-56	05:13	05:56	06:34	17:31	18:08	18:51	
								-58	05:11	05:57	06:36	17:28	18:07	18:53	
								-60	05:09	05:57	06:39	17:25	18:07	18:55	
								Moonrise			Moonset				
								Lat.	Tue	Wed	Thu	Tue	Wed	Thu	
								72	--	09:19	11:22	--	05:57	05:43	
								70	08:25	10:05	11:49	04:56	05:10	05:15	
								68	09:07	10:35	12:09	04:13	04:39	04:54	
								66	09:36	10:58	12:25	03:44	04:16	04:37	
								64	09:57	11:15	12:38	03:22	03:58	04:23	
								62	10:15	11:30	12:49	03:05	03:43	04:11	
								60	10:29	11:42	12:59	02:50	03:31	04:01	
								58	10:42	11:52	13:07	02:38	03:20	03:53	
								56	10:52	12:01	13:14	02:27	03:10	03:45	
								54	11:02	12:10	13:20	02:17	03:02	03:38	
								52	11:10	12:17	13:26	02:09	02:54	03:32	
								50	11:17	12:23	13:31	02:01	02:47	03:26	
								45	11:33	12:37	13:42	01:45	02:33	03:14	
								40	11:47	12:49	13:52	01:31	02:21	03:04	
								35	11:58	12:59	13:59	01:20	02:10	02:55	
								30	12:07	13:07	14:06	01:10	02:01	02:48	
								20	12:24	13:22	14:18	00:52	01:45	02:34	
								10	12:39	13:35	14:29	00:37	01:32	02:23	
								0	12:53	13:47	14:39	00:23	01:19	02:12	
								-10	13:06	13:59	14:48	00:09	01:06	02:01	
								-20	13:21	14:12	14:59	--	00:52	01:49	
								-30	13:38	14:26	15:11	--	00:36	01:36	
								-35	13:47	14:35	15:17	--	00:27	01:28	
								-40	13:58	14:45	15:25	--	00:16	01:19	
								-45	14:11	14:56	15:34	--	00:03	01:08	
								-50	14:27	15:09	15:45	23:48	--	00:55	
								-52	14:35	15:16	15:50	23:41	--	00:49	
								-54	14:43	15:23	15:55	23:33	--	00:43	
								-56	14:52	15:31	16:02	23:24	--	00:35	
								-58	15:03	15:40	16:08	23:14	--	00:27	
								-60	15:15	15:50	16:16	23:02	--	00:17	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age			
									00 ^h	12 ^h	Pass	Upper	Lower		
								4	03:04	02:55	12:02	19:05	06:37	7(58%)	
								5	02:47	02:38	12:02	19:59	07:32	8(69%)	
								6	02:30	02:21	12:02	20:50	08:25	9(78%)	
SD.=16.0 d=0.9 S.D.=15.7															

April 07, 08 ,09 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	195°27.5	199°29.0	5°08.0	148°05.8	18°08.9	357°54.5	-5°44.2	287°50.2	-22°04.3	Alpheratz	357°41.2	29°10.9
1	210°29.9	214°32.0	5°07.2	163°06.5	18°09.4	12°57.3	-5°44.1	302°52.7	-22°04.3	Ankaa	353°13.6	-42°12.9
2	225°32.4	229°35.0	5°06.3	178°07.2	18°09.9	28°00.0	-5°44.0	317°55.2	-22°04.3	Schedar	349°38.1	56°37.7
3	240°34.9	244°38.0	5°05.5	193°07.8	18°10.4	43°02.8	-5°43.8	332°57.6	-22°04.3	Diphda	348°53.6	-17°53.7
4	255°37.3	259°41.0	5°04.7	208°08.5	18°10.9	58°05.6	-5°43.7	348°00.1	-22°04.3	Achernar	335°25.5	-57°09.2
5	270°39.8	274°44.1	5°03.9	223°09.2	18°11.4	73°08.3	-5°43.6	3°02.6	-22°04.3	Hamal	327°58.2	23°32.4
6	285°42.3	289°47.1	5°03.0	238°09.9	18°11.9	88°11.1	-5°43.5	18°05.1	-22°04.3	Polaris	317°01.5	89°20.2
7	300°44.7	304°50.1	5°02.2	253°10.6	18°12.4	103°13.9	-5°43.3	33°07.5	-22°04.3	Akamar	315°16.8	-40°14.5
8	315°47.2	319°53.1	5°01.4	268°11.3	18°12.9	118°16.6	-5°43.2	48°10.0	-22°04.3	Menkar	314°12.6	4°09.2
9	330°49.6	334°56.1	5°00.6	283°12.0	18°13.4	133°19.4	-5°43.1	63°12.5	-22°04.3	Mirfak	308°37.0	49°55.2
10	345°52.1	349°59.1	4°59.8	298°12.7	18°13.8	148°22.1	-5°43.0	78°14.9	-22°04.2	Aldebaran	290°46.7	16°32.4
11	0°54.6	5°02.1	4°59.0	313°13.4	18°14.3	163°24.9	-5°42.9	93°17.4	-22°04.2	Rigel	281°09.8	-8°11.3
12	15°57.0	20°05.0	4°58.1	328°14.1	18°14.8	178°27.7	-5°42.7	108°19.9	-22°04.2	Capella	280°30.9	46°00.9
13	30°59.5	35°08.0	4°57.3	343°14.8	18°15.3	193°30.4	-5°42.6	123°22.3	-22°04.2	Bellatrix	278°29.4	6°21.6
14	46°02.0	50°11.0	4°56.5	358°15.4	18°15.8	208°33.2	-5°42.5	138°24.8	-22°04.2	Elnath	278°09.5	28°37.1
15	61°04.4	65°14.0	4°55.7	13°16.1	18°16.3	223°36.0	-5°42.4	153°27.3	-22°04.2	Alnilam	275°43.9	-1°11.8
16	76°06.9	80°16.9	4°54.9	28°16.8	18°16.8	238°38.7	-5°42.3	168°29.7	-22°04.2	Betelgeuse	270°58.6	7°24.3
17	91°09.4	95°19.9	4°54.1	43°17.5	18°17.3	253°41.5	-5°42.1	183°32.2	-22°04.2	Canopus	263°55.1	-52°42.8
18	106°11.8	110°22.9	4°53.3	58°18.2	18°17.8	268°44.2	-5°42.0	198°34.7	-22°04.2	Sirius	258°31.4	-16°44.6
19	121°14.3	125°25.8	4°52.5	73°18.9	18°18.3	283°47.0	-5°41.9	213°37.2	-22°04.2	Adara	255°10.5	-29°00.2
20	136°16.8	140°28.8	4°51.7	88°19.6	18°18.8	298°49.8	-5°41.8	228°39.6	-22°04.2	Procyon	244°56.9	5°10.7
21	151°19.2	155°31.7	4°50.9	103°20.3	18°19.3	313°52.5	-5°41.6	243°42.1	-22°04.2	Pollux	243°24.5	27°58.9
22	166°21.7	170°34.7	4°50.1	118°21.0	18°19.8	328°55.3	-5°41.5	258°44.6	-22°04.2	Avior	234°16.7	-59°34.3
23	181°24.1	185°37.6	4°49.3	133°21.6	18°20.2	343°58.1	-5°41.4	273°47.0	-22°04.2	Suhail	222°50.3	-43°30.5
Mer.pass.:10:56		v3.0 d-0.8 m-4.2		v0.7 d0.5 m1.5		v2.8 d0.1 m-2.3		v2.5 d0.0 m0.4		Miaplacidus	221°38.6	-69°47.6
										Alphard	217°53.4	-8°44.3
										Regulus	207°40.5	11°52.8
										Dubhe	193°48.1	61°39.6
										Denebola	182°30.7	14°28.5
										Genah	175°49.3	-17°38.3
										Acrux	173°05.6	-63°11.7
										Gacrux	171°57.4	-57°12.6
										Alioth	166°18.0	55°52.0
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.5	49°13.6
										Hadar	148°43.5	-60°27.2
										Menkent	148°04.1	-36°27.2
										Arcturus	145°52.9	19°05.8
										Rigel Kent.	139°47.5	-60°54.1
										Zubenelg.	137°02.3	-16°06.7
										Kochab	137°19.2	74°05.1
										Alphecca	126°08.6	26°39.4
										Antares	112°22.9	-29°28.0
										Atria	107°22.1	-69°03.1
										Sabik	102°09.4	-15°44.6
										Shaula	96°18.3	-37°06.7
										Rasalhague	96°04.0	12°32.9
										Etamin	90°44.8	51°29.1
										Kaus Aust.	83°40.3	-34°22.3
										Vega	80°37.2	38°47.8
										Nunki	75°55.1	-26°16.3
										Altair	62°05.9	8°54.8
										Peacock	53°15.5	-56°40.4
										Deneb	49°29.9	45°20.3
										Enif	33°44.8	9°57.1
										Alnair	27°40.9	-46°52.5
										Fomalhaut	15°21.6	-29°31.9
										Scheat	13°51.2	28°10.4
										Markab	13°36.1	15°17.7
										2017/4/7	SHA	Mer.pass
										Venus	4°01.5	10:40
										Mars	312°38.3	14:07
										Jupiter	162°27.0	00:08
										Saturn	92°22.8	04:48
										2017/4/8	SHA	Mer.pass
										Venus	4°14.0	10:35
										Mars	311°55.7	14:06
										Jupiter	162°34.2	00:04
										Saturn	92°22.9	04:44
										2017/4/9	SHA	Mer.pass
										Venus	4°24.2	10:31
										Mars	311°13.1	14:05
										Jupiter	162°41.4	23:55
										Saturn	92°23.2	04:40
										Horizontal parallax		
										Venus:		0.5
										Mars:		0.1
Mer.pass.:10:48		v2.8 d-0.8 m-4.3		v0.7 d0.5 m1.5		v2.8 d0.1 m-2.3		v2.5 d0.0 m0.4				

April 10, 11, 12 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	198°24.9	202°57.0	4°11.6	148°55.3	18°43.9	1°13.4	-5°35.5	290°48.4	-22°04.1	Alpheratz	357°41.2	29°10.9	
1	213°27.3	217°59.7	4°10.9	163°56.0	18°44.4	16°16.2	-5°35.3	305°50.9	-22°04.1	Ankaa	353°13.6	-42°12.8	
2	228°29.8	233°02.5	4°10.2	178°56.7	18°44.8	31°19.0	-5°35.2	320°53.3	-22°04.1	Schedar	349°38.1	56°37.7	
3	243°32.3	248°05.2	4°09.4	193°57.4	18°45.3	46°21.7	-5°35.1	335°55.8	-22°04.1	Diphda	348°53.6	-17°53.7	
4	258°34.7	263°07.9	4°08.7	208°58.1	18°45.8	61°24.5	-5°35.0	350°58.3	-22°04.1	Achernar	335°25.6	-57°09.2	
5	273°37.2	278°10.7	4°08.0	223°58.7	18°46.3	76°27.2	-5°34.9	6°00.8	-22°04.1	Hamal	327°58.2	23°32.4	
6	288°39.7	293°13.4	4°07.2	238°59.4	18°46.7	91°30.0	-5°34.7	21°03.3	-22°04.1	Polaris	317°02.2	89°20.2	
7	303°42.1	308°16.1	4°06.5	254°00.1	18°47.2	106°32.8	-5°34.6	36°05.8	-22°04.1	Akamar	315°16.8	-40°14.5	
8	318°44.6	323°18.8	4°05.8	269°00.8	18°47.7	121°35.5	-5°34.5	51°08.2	-22°04.1	Menkar	314°12.7	4°09.2	
9	333°47.1	338°21.5	4°05.1	284°01.5	18°48.2	136°38.3	-5°34.4	66°10.7	-22°04.1	Mirfak	308°37.1	49°55.2	
10	348°49.5	353°24.2	4°04.4	299°02.2	18°48.6	151°41.1	-5°34.3	81°13.2	-22°04.1	Aldebaran	290°46.7	16°32.4	
11	3°52.0	8°27.0	4°03.6	314°02.8	18°49.1	166°43.8	-5°34.1	96°15.7	-22°04.0	Rigel	281°09.8	-8°11.3	
12	18°54.4	23°29.7	4°02.9	329°03.5	18°49.6	181°46.6	-5°34.0	111°18.2	-22°04.0	Capella	280°30.9	46°00.9	
13	33°56.9	38°32.4	4°02.2	344°04.2	18°50.1	196°49.3	-5°33.9	126°20.6	-22°04.0	Bellatrix	278°29.4	6°21.6	
14	48°59.4	53°35.0	4°01.5	359°04.9	18°50.5	211°52.1	-5°33.8	141°23.1	-22°04.0	Elnath	278°09.6	28°37.1	
15	64°01.8	68°37.7	4°00.8	14°05.6	18°51.0	226°54.9	-5°33.6	156°25.6	-22°04.0	Alnilam	275°43.9	-1°11.8	
16	79°04.3	83°40.4	4°00.1	29°06.3	18°51.5	241°57.6	-5°33.5	171°28.1	-22°04.0	Betelgeuse	270°58.7	7°24.3	
17	94°06.8	98°43.1	3°59.4	44°07.0	18°51.9	257°00.4	-5°33.4	186°30.6	-22°04.0	Canopus	263°55.1	-52°42.8	
18	109°09.2	113°45.8	3°58.7	59°07.6	18°52.4	272°03.1	-5°33.3	201°33.1	-22°04.0	Sirius	258°31.4	-16°44.6	
19	124°11.7	128°48.5	3°57.9	74°08.3	18°52.9	287°05.9	-5°33.2	216°35.6	-22°04.0	Adara	255°10.5	-29°00.2	
20	139°14.2	143°51.1	3°57.2	89°09.0	18°53.3	302°08.7	-5°33.0	231°38.0	-22°04.0	Procyon	244°57.0	5°10.7	
21	154°16.6	158°53.8	3°56.5	104°09.7	18°53.8	317°11.4	-5°32.9	246°40.5	-22°04.0	Pollux	243°24.5	27°58.9	
22	169°19.1	173°56.4	3°55.8	119°10.4	18°54.3	332°14.2	-5°32.8	261°43.0	-22°04.0	Avior	234°16.8	-59°34.3	
23	184°21.6	188°59.1	3°55.1	134°11.1	18°54.8	347°17.0	-5°32.7	276°45.5	-22°04.0	Suhail	222°50.3	-43°30.5	
Mer.pass.:10:44		v2.7 d-0.7 m-4.3		v0.7 d0.5 m1.5		v2.8 d0.1 m-2.3		v2.5 d0.0 m0.4		Miacplacidus		221°38.6	-69°47.7
										Alphard		217°53.4	-8°44.3
										Regulus		207°40.6	11°52.8
										Dubhe		193°48.1	61°39.6
										Denebola		182°30.7	14°28.5
										Gienah		175°49.3	-17°38.3
										Acruz		173°05.7	-63°11.7
										Gacrux		171°57.4	-57°12.6
										Alioth		166°18.0	55°52.0
										Spica		158°28.2	-11°15.1
										Alcaid		152°56.4	49°13.7
										Hadar		148°43.5	-60°27.2
										Menkent		148°04.1	-36°27.2
										Arcturus		145°52.9	19°05.9
										Rigel Kent.		139°47.5	-60°54.2
										Zubenelg.		137°02.3	-16°06.7
										Kochab		137°19.2	74°05.1
										Alphecca		126°08.6	26°39.4
										Antares		112°22.9	-26°28.0
										Atria		107°22.0	-69°03.1
										Sabik		102°09.4	-15°44.6
										Shaula		96°18.3	-37°06.7
										Rasalhague		96°03.9	12°32.9
										Etamin		90°44.8	51°29.1
										Kaus Aust.		83°40.3	-34°22.3
										Vega		80°37.2	38°47.8
										Nunki		75°55.1	-26°16.3
										Altair		62°05.9	8°54.8
										Peacock		53°15.4	-56°40.4
										Deneb		49°29.8	45°20.3
										Enif		33°44.8	9°57.1
										Alnair		27°40.9	-46°52.5
										Fomalhaut		15°21.6	-29°31.8
										Scheat		13°51.2	28°10.4
										Markab		13°36.1	15°17.7
										2017/4/1		SHA	Mer.pass
										Venus		4°32.1	10:26
										Mars		310°30.4	14:04
										Jupiter		162°48.5	23:51
										Saturn		92°23.5	04:36
										2017/4/1		SHA	Mer.pass
										Venus		4°37.7	10:22
										Mars		309°47.7	14:03
										Jupiter		162°55.7	23:46
										Saturn		92°24.0	04:32
										2017/4/1		SHA	Mer.pass
										Venus		4°41.1	10:18
										Mars		309°04.9	14:01
										Jupiter		163°02.8	23:42
										Saturn		92°24.5	04:28
										Horizontal parallax			
										Venus:		0.4	
										Mars:		0.1	
Mer.pass.:10:36		v2.6 d-0.7 m-4.3		v0.7 d0.5 m1.5		v2.8 d0.1 m-2.3		v2.5 d0.0 m0.4					

h		Sun				Moon										
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight				
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.			
0	179° 39.3	7° 56.2	11° 48.7	13.9	0° 13.5	-10.2	55.5	72	--	02:31	04:01	20:04	21:37	--		
1	194° 39.4	7° 57.1	26° 21.6	13.9	0° 03.3	-10.2	55.5	70	--	02:59	04:15	19:50	21:07	--		
2	209° 39.6	7° 58.0	40° 54.5	13.9	-0° 06.9	-10.2	55.5	68	01:32	03:20	04:26	19:39	20:45	22:40		
3	224° 39.8	7° 58.9	55° 27.4	13.9	-0° 17.1	-10.2	55.5	66	02:10	03:37	04:35	19:29	20:28	21:57		
4	239° 39.9	7° 59.9	70° 00.3	13.9	-0° 27.2	-10.2	55.4	64	02:36	03:50	04:43	19:21	20:15	21:30		
5	254° 40.1	8° 00.8	84° 33.3	14.0	-0° 37.4	-10.2	55.4	62	02:56	04:01	04:49	19:14	20:04	21:10		
6	269° 40.3	8° 01.7	99° 06.2	14.0	-0° 47.6	-10.2	55.4	60	03:11	04:10	04:55	19:09	19:54	20:53		
7	284° 40.4	8° 02.6	113° 39.2	14.0	-0° 57.7	-10.2	55.4	58	03:24	04:18	04:60	19:03	19:46	20:40		
8	299° 40.6	8° 03.6	128° 12.2	14.0	-1° 07.9	-10.1	55.4	56	03:35	04:25	05:04	18:59	19:39	20:29		
9	314° 40.8	8° 04.5	142° 45.2	14.0	-1° 18.0	-10.1	55.3	54	03:45	04:31	05:08	18:55	19:32	20:19		
10	329° 41.0	8° 05.4	157° 18.2	14.0	-1° 28.1	-10.1	55.3	52	03:53	04:37	05:12	18:51	19:27	20:10		
11	344° 41.1	8° 06.3	171° 51.3	14.0	-1° 38.3	-10.1	55.3	50	04:01	04:42	05:15	18:48	19:22	20:03		
12	359° 41.3	8° 07.2	186° 24.3	14.1	-1° 48.4	-10.1	55.3	45	04:16	04:52	05:22	18:40	19:11	19:48		
13	14° 41.5	8° 08.2	200° 57.4	14.1	-1° 58.4	-10.1	55.3	40	04:27	05:00	05:28	18:34	19:02	19:36		
14	29° 41.6	8° 09.1	215° 30.4	14.1	-2° 08.5	-10.1	55.3	35	04:37	05:07	05:33	18:29	18:55	19:26		
15	44° 41.8	8° 10.0	230° 03.5	14.1	-2° 18.6	-10.0	55.2	30	04:45	05:13	05:38	18:25	18:49	19:18		
16	59° 42.0	8° 10.9	244° 36.6	14.1	-2° 28.6	-10.0	55.2	20	04:57	05:23	05:45	18:17	18:39	19:06		
17	74° 42.1	8° 11.8	259° 09.7	14.1	-2° 38.6	-10.0	55.2	10	05:06	05:30	05:52	18:10	18:32	18:56		
18	89° 42.3	8° 12.8	273° 42.9	14.1	-2° 48.6	-10.0	55.2	0	05:13	05:37	05:58	18:04	18:25	18:49		
19	104° 42.5	8° 13.7	288° 16.0	14.1	-2° 58.6	-10.0	55.2	-10	05:18	05:42	06:04	17:58	18:19	18:44		
20	119° 42.6	8° 14.6	302° 49.1	14.1	-3° 08.6	-10.0	55.2	-20	05:22	05:48	06:10	17:52	18:14	18:40		
21	134° 42.8	8° 15.5	317° 22.3	14.1	-3° 18.5	-9.9	55.1	-30	05:25	05:53	06:17	17:45	18:09	18:37		
22	149° 43.0	8° 16.4	331° 55.4	14.2	-3° 28.5	-9.9	55.1	-35	05:26	05:55	06:21	17:41	18:06	18:36		
23	164° 43.1	8° 17.4	346° 28.6	14.2	-3° 38.4	-9.9	55.1	-40	05:26	05:58	06:25	17:36	18:04	18:35		
SD.=16.0 d=0.9 S.D.=15.1								-45	05:27	06:01	06:30	17:31	18:01	18:35		
								-50	05:26	06:04	06:36	17:25	17:57	18:35		
								-52	05:26	06:05	06:39	17:22	17:56	18:35		
								-54	05:25	06:06	06:42	17:19	17:55	18:35		
								-56	05:25	06:08	06:46	17:15	17:53	18:36		
								-58	05:24	06:10	06:49	17:12	17:51	18:37		
								-60	05:23	06:11	06:53	17:07	17:49	18:37		
								Moonrise			Moonset					
								Lat.	Mon	Tue	Wed	Mon	Tue	Wed		
								72	18:23	20:02	21:43	05:13	05:06	04:59		
								70	18:18	19:51	21:24	05:14	05:12	05:11		
								68	18:15	19:43	21:09	05:15	05:18	05:21		
								66	18:12	19:35	20:58	05:15	05:22	05:30		
								64	18:10	19:29	20:48	05:16	05:26	05:37		
								62	18:08	19:24	20:39	05:16	05:29	05:43		
								60	18:06	19:20	20:32	05:17	05:32	05:48		
								58	18:04	19:16	20:26	05:17	05:35	05:53		
								56	18:03	19:12	20:20	05:18	05:37	05:57		
								54	18:01	19:09	20:15	05:18	05:39	06:01		
								52	18:00	19:06	20:11	05:18	05:41	06:05		
								50	17:59	19:04	20:07	05:18	05:43	06:08		
								45	17:57	18:58	19:58	05:19	05:47	06:15		
								40	17:55	18:53	19:51	05:20	05:50	06:21		
								35	17:53	18:49	19:44	05:20	05:53	06:26		
								30	17:52	18:46	19:39	05:20	05:55	06:30		
								20	17:49	18:40	19:30	05:21	05:59	06:38		
								10	17:47	18:34	19:21	05:22	06:03	06:44		
								0	17:45	18:29	19:14	05:22	06:06	06:51		
								-10	17:43	18:24	19:06	05:23	06:10	06:57		
								-20	17:41	18:19	18:58	05:23	06:14	07:04		
								-30	17:39	18:13	18:49	05:24	06:18	07:11		
								-35	17:37	18:10	18:43	05:24	06:20	07:16		
								-40	17:36	18:06	18:37	05:24	06:23	07:21		
								-45	17:34	18:02	18:30	05:25	06:26	07:27		
								-50	17:32	17:56	18:22	05:25	06:30	07:34		
								-52	17:31	17:54	18:18	05:25	06:32	07:37		
								-54	17:30	17:51	18:14	05:26	06:34	07:41		
								-56	17:29	17:48	18:10	05:26	06:36	07:45		
								-58	17:27	17:45	18:04	05:26	06:38	07:49		
								-60	17:26	17:42	17:59	05:27	06:41	07:54		
								Sun			Moon					
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age			
									00 ^h	12 ^h	Pass	Upper	Lower			
								10	01:23	01:15	12:01	23:55	11:33	13(99%)		
								11	01:07	00:59	12:00	00:39	12:17	14(100%)		
								12	00:51	00:43	12:00	00:39	13:02	15(98%)		
SD.=16.0 d=0.9 S.D.=14.9																

April 13, 14 ,15 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	201°22.3	206°04.5	3°22.8	149°44.4	19°17.3	4°32.3	-5°26.8	293°47.5	-22°03.9	Alpheratz	357°41.2	29°10.9	
1	216°24.8	221°07.0	3°22.2	164°45.1	19°17.8	19°35.0	-5°26.7	308°50.0	-22°03.9	Ankaa	353°13.6	-42°12.8	
2	231°27.2	236°09.4	3°21.6	179°45.8	19°18.2	34°37.8	-5°26.6	323°52.5	-22°03.9	Schedar	349°38.1	56°37.7	
3	246°29.7	251°11.9	3°21.0	194°46.4	19°18.7	49°40.5	-5°26.4	338°55.0	-22°03.9	Diphda	348°53.6	-17°53.7	
4	261°32.1	266°14.3	3°20.4	209°47.1	19°19.1	64°43.3	-5°26.3	353°57.5	-22°03.9	Achernar	335°25.6	-57°09.1	
5	276°34.6	281°16.8	3°19.8	224°47.8	19°19.6	79°46.1	-5°26.2	8°59.9	-22°03.9	Hamal	327°58.2	23°32.4	
6	291°37.1	296°19.2	3°19.2	239°48.5	19°20.1	94°48.8	-5°26.1	24°02.4	-22°03.9	Polaris	317°02.6	89°20.2	
7	306°39.5	311°21.6	3°18.5	254°49.2	19°20.5	109°51.6	-5°26.0	39°04.9	-22°03.9	Akamar	315°16.8	-40°14.5	
8	321°42.0	326°24.1	3°17.9	269°49.8	19°21.0	124°54.3	-5°25.8	54°07.4	-22°03.9	Menkar	314°12.7	4°09.2	
9	336°44.5	341°26.5	3°17.3	284°50.5	19°21.4	139°57.1	-5°25.7	69°09.9	-22°03.8	Mirfak	308°37.1	49°55.2	
10	351°46.9	356°28.9	3°16.7	299°51.2	19°21.9	154°59.9	-5°25.6	84°12.4	-22°03.8	Aldebaran	290°46.7	16°32.4	
11	6°49.4	11°31.3	3°16.1	314°51.9	19°22.3	170°02.6	-5°25.5	99°14.9	-22°03.8	Rigel	281°09.8	-8°11.3	
12	21°51.9	26°33.8	3°15.5	329°52.5	19°22.8	185°05.4	-5°25.4	114°17.4	-22°03.8	Capella	280°30.9	46°00.9	
13	36°54.3	41°36.2	3°14.9	344°53.2	19°23.2	200°08.1	-5°25.2	129°19.9	-22°03.8	Bellatrix	278°29.4	6°21.6	
14	51°56.8	56°38.6	3°14.3	359°53.9	19°23.7	215°10.9	-5°25.1	144°22.4	-22°03.8	Elnath	278°09.6	28°37.1	
15	66°59.3	71°41.0	3°13.7	14°54.6	19°24.1	230°13.7	-5°25.0	159°24.9	-22°03.8	Alnilam	275°43.9	-1°11.8	
16	82°01.7	86°43.4	3°13.2	29°55.3	19°24.6	245°16.4	-5°24.9	174°27.4	-22°03.8	Betelgeuse	270°58.7	7°24.3	
17	97°04.2	101°45.8	3°12.6	44°55.9	19°25.0	260°19.2	-5°24.8	189°29.9	-22°03.8	Canopus	263°55.2	-52°42.8	
18	112°06.6	116°48.2	3°12.0	59°56.6	19°25.4	275°21.9	-5°24.7	204°32.4	-22°03.8	Sirius	258°31.4	-16°44.6	
19	127°09.1	131°50.6	3°11.4	74°57.3	19°25.9	290°24.7	-5°24.5	219°34.9	-22°03.8	Adara	255°10.6	-29°00.2	
20	142°11.6	146°53.0	3°10.8	89°58.0	19°26.3	305°27.5	-5°24.4	234°37.4	-22°03.8	Procyon	244°57.0	5°10.7	
21	157°14.0	161°55.4	3°10.2	104°58.6	19°26.8	320°30.2	-5°24.3	249°39.9	-22°03.8	Pollux	243°24.5	27°58.9	
22	172°16.5	176°57.7	3°09.6	119°59.3	19°27.2	335°33.0	-5°24.2	264°42.4	-22°03.8	Avior	234°16.8	-59°34.3	
23	187°19.0	192°00.1	3°09.1	134°60.0	19°27.7	350°35.7	-5°24.1	279°44.9	-22°03.8	Suhail	222°50.3	-43°30.5	
Mer.pass.:10:32		v2.5 d-0.6 m-4.4		v0.7 d0.5 m1.5		v2.8 d0.1 m-2.3		v2.5 d0.0 m0.4		Miacplacidus		221°38.7	-69°47.7
										Alphard		217°53.4	-8°44.3
										Regulus		207°40.6	11°52.9
										Dubhe		193°48.1	61°39.6
										Denebola		182°30.7	14°28.5
										Gienah		175°49.3	-17°38.3
										Acrux		173°05.7	-63°11.7
										Gacrux		171°57.4	-57°12.6
										Alioth		166°18.0	55°52.0
										Spica		158°28.2	-11°15.1
										Alcaid		152°56.4	49°13.7
										Hadar		148°43.5	-60°27.2
										Menkent		148°04.1	-36°27.2
										Arcturus		145°52.9	19°05.9
										Rigel Kent.		139°47.5	-60°54.2
										Zubenelg.		137°02.3	-16°06.7
										Kochab		137°19.1	74°05.1
										Alphecca		126°08.6	26°39.4
										Antares		112°22.8	-26°28.0
										Atria		107°22.0	-69°03.1
										Sabik		102°09.4	-15°44.6
										Shaula		96°18.2	-37°06.7
										Rasalhague		96°03.9	12°32.9
										Etamin		90°44.7	51°29.1
										Kaus Aust.		83°40.3	-34°22.3
										Vega		80°37.1	38°47.8
										Nunki		75°55.1	-26°16.3
										Altair		62°05.8	8°54.8
										Peacock		53°15.4	-56°40.4
										Deneb		49°29.8	45°20.3
										Enif		33°44.8	9°57.1
										Alnair		27°40.9	-46°52.5
										Fomalhaut		15°21.5	-29°31.8
										Scheat		13°51.2	28°10.4
										Markab		13°36.0	15°17.7
										2017/4/1		SHA	Mer.pass
										Venus		4°42.2	10:14
										Mars		308°22.1	14:00
										Jupiter		163°10.0	23:38
										Saturn		92°25.2	04:24
										2017/4/1		SHA	Mer.pass
										Venus		4°41.0	10:10
										Mars		307°39.2	13:59
										Jupiter		163°17.1	23:33
										Saturn		92°25.9	04:20
										2017/4/1		SHA	Mer.pass
										Venus		4°37.7	10:07
										Mars		306°56.3	13:58
										Jupiter		163°24.1	23:29
										Saturn		92°26.8	04:16
										Horizontal parallax			
										Venus:		0.4	
										Mars:		0.1	
Mer.pass.:10:24		v2.3 d-0.5 m-4.4		v0.7 d0.4 m1.5		v2.8 d0.1 m-2.3		v2.5 d0.0 m0.3					

h Sun								Moon							
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	179°51.1	9°02.1	339°32.5	14.0	-11°05.2	-8.1	54.4	72	--	02:06	03:44	20:20	22:02	--	
1	194°51.3	9°03.0	354°05.4	13.9	-11°13.2	-8.0	54.4	70	--	02:40	04:00	20:03	21:25	--	
2	209°51.4	9°03.9	8°38.3	13.9	-11°21.3	-8.0	54.4	68	00:54	03:04	04:13	19:50	20:60	23:25	
3	224°51.6	9°04.8	23°11.3	13.9	-11°29.2	-7.9	54.4	66	01:48	03:23	04:23	19:39	20:41	22:19	
4	239°51.7	9°05.7	37°44.2	13.9	-11°37.1	-7.9	54.4	64	02:19	03:38	04:32	19:30	20:25	21:45	
5	254°51.9	9°06.6	52°17.1	13.9	-11°45.0	-7.8	54.4	62	02:42	03:50	04:40	19:23	20:13	21:22	
6	269°52.1	9°07.5	66°49.9	13.9	-11°52.8	-7.8	54.4	60	02:60	04:00	04:46	19:16	20:02	21:04	
7	284°52.2	9°08.4	81°22.8	13.9	-12°00.5	-7.7	54.3	58	03:14	04:09	04:52	19:10	19:53	20:49	
8	299°52.4	9°09.3	95°55.6	13.8	-12°08.2	-7.7	54.3	56	03:26	04:17	04:57	19:05	19:45	20:37	
9	314°52.5	9°10.2	110°28.5	13.8	-12°15.9	-7.6	54.3	54	03:36	04:24	05:01	19:00	19:38	20:26	
10	329°52.7	9°11.1	125°01.3	13.8	-12°23.5	-7.6	54.3	52	03:45	04:30	05:05	18:56	19:32	20:17	
11	344°52.8	9°12.0	139°34.1	13.8	-12°31.0	-7.5	54.3	50	03:53	04:35	05:09	18:52	19:27	20:09	
12	359°53.0	9°12.9	154°06.8	13.8	-12°38.5	-7.4	54.3	45	04:10	04:46	05:17	18:44	19:15	19:52	
13	14°53.2	9°13.8	168°39.6	13.8	-12°45.9	-7.4	54.3	40	04:22	04:56	05:24	18:37	19:06	19:39	
14	29°53.3	9°14.7	183°12.3	13.7	-12°53.2	-7.3	54.3	35	04:32	05:03	05:29	18:32	18:58	19:29	
15	44°53.5	9°15.6	197°45.1	13.7	-13°00.5	-7.3	54.3	30	04:41	05:10	05:34	18:27	18:51	19:20	
16	59°53.6	9°16.6	212°17.8	13.7	-13°07.8	-7.2	54.3	20	04:54	05:20	05:43	18:18	18:40	19:07	
17	74°53.8	9°17.5	226°50.5	13.7	-13°14.9	-7.1	54.3	10	05:04	05:29	05:50	18:10	18:32	18:57	
18	89°53.9	9°18.4	241°23.1	13.7	-13°22.1	-7.1	54.2	0	05:12	05:36	05:57	18:04	18:24	18:49	
19	104°54.1	9°19.3	255°55.8	13.6	-13°29.1	-7.0	54.2	-10	05:18	05:42	06:04	17:57	18:18	18:43	
20	119°54.3	9°20.2	270°28.4	13.6	-13°36.1	-7.0	54.2	-20	05:23	05:48	06:11	17:50	18:12	18:38	
21	134°54.4	9°21.1	285°01.1	13.6	-13°43.0	-6.9	54.2	-30	05:26	05:54	06:19	17:42	18:06	18:34	
22	149°54.6	9°22.0	299°33.7	13.6	-13°49.9	-6.8	54.2	-35	05:28	05:57	06:23	17:37	18:02	18:32	
23	164°54.7	9°22.9	314°06.2	13.6	-13°56.7	-6.8	54.2	-40	05:29	06:01	06:28	17:32	17:59	18:31	
SD.=16.0 d=0.9 S.D.=14.8								-45	05:30	06:04	06:34	17:26	17:55	18:30	
								-50	05:31	06:08	06:41	17:19	17:51	18:29	
								-52	05:31	06:10	06:44	17:15	17:50	18:29	
								-54	05:31	06:12	06:48	17:12	17:48	18:29	
								-56	05:31	06:14	06:52	17:08	17:46	18:29	
								-58	05:30	06:16	06:56	17:04	17:44	18:29	
								-60	05:30	06:18	07:01	16:59	17:41	18:29	
								Moonrise			Moonset				
								Lat.	Thu	Fri	Sat	Thu	Fri	Sat	
								72	23:27	--	01:19	04:50	04:40	04:22	
								70	22:57	--	00:30	05:10	05:10	05:12	
								68	22:35	23:58	--	05:26	05:33	05:44	
								66	22:18	23:36	--	05:39	05:51	06:08	
								64	22:04	23:17	--	05:49	06:05	06:26	
								62	21:53	23:03	--	05:59	06:17	06:41	
								60	21:43	22:50	23:53	06:06	06:28	06:54	
								58	21:34	22:40	23:41	06:13	06:37	07:05	
								56	21:27	22:30	23:30	06:20	06:45	07:15	
								54	21:20	22:22	23:21	06:25	06:52	07:23	
								52	21:14	22:15	23:13	06:30	06:58	07:31	
								50	21:09	22:08	23:05	06:35	07:04	07:38	
								45	20:57	21:54	22:49	06:44	07:17	07:52	
								40	20:47	21:42	22:36	06:53	07:27	08:05	
								35	20:39	21:33	22:25	06:60	07:36	08:15	
								30	20:32	21:24	22:15	07:06	07:44	08:24	
								20	20:19	21:09	21:59	07:17	07:57	08:40	
								10	20:09	20:56	21:44	07:26	08:09	08:53	
								0	19:58	20:44	21:30	07:35	08:20	09:06	
								-10	19:48	20:32	21:17	07:44	08:31	09:19	
								-20	19:38	20:19	21:03	07:54	08:43	09:33	
								-30	19:26	20:05	20:46	08:05	08:57	09:49	
								-35	19:19	19:56	20:37	08:11	09:05	09:58	
								-40	19:11	19:46	20:26	08:18	09:14	10:08	
								-45	19:01	19:35	20:13	08:26	09:25	10:21	
								-50	18:50	19:22	19:57	08:37	09:37	10:36	
								-52	18:45	19:15	19:50	08:41	09:43	10:43	
								-54	18:39	19:08	19:42	08:47	09:50	10:51	
								-56	18:33	19:01	19:33	08:52	09:57	10:59	
								-58	18:26	18:52	19:23	08:59	10:06	11:09	
								-60	18:18	18:42	19:11	09:06	10:15	11:21	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age			
									00 ^h	12 ^h	Pass	Upper	Lower		
								13	00:36	00:28	12:00	01:24	13:46	16(95%)	
								14	00:20	00:13	12:00	02:09	14:32	17(90%)	
								15	00:06	00:02	11:59	02:55	15:18	18(84%)	
SD.=15.9 d=0.9 S.D.=14.8															

April 16, 17 ,18 (Sun., Mon., Tue.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sun	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass		
0	204°19.7	2°42.8	208°51.9	2°42.8	150°33.0	19°49.2	7°50.9	-5°18.3	296°47.5	-22°03.7	296°47.5	-22°03.7	Alpheratz	357°41.1	29°10.9		
1	210°22.2	2°42.3	223°54.0	2°42.3	165°33.7	19°49.6	22°53.6	-5°18.1	311°50.0	-22°03.7	311°50.0	-22°03.7	Ankaa	353°13.6	-42°12.8		
2	234°24.6	2°41.8	238°56.2	2°41.8	180°34.4	19°50.0	37°56.4	-5°18.0	326°52.5	-22°03.7	326°52.5	-22°03.7	Schedar	349°38.0	56°37.7		
3	249°27.1	2°41.3	253°58.4	2°41.3	195°35.1	19°50.5	52°59.2	-5°17.9	341°55.0	-22°03.7	341°55.0	-22°03.7	Diphda	348°53.5	-17°53.7		
4	264°29.6	2°40.8	269°00.6	2°40.8	210°35.7	19°50.9	68°01.9	-5°17.8	356°57.5	-22°03.7	356°57.5	-22°03.7	Achernar	335°25.6	-57°09.1		
5	279°32.0	2°40.3	284°02.8	2°40.3	225°36.4	19°51.3	83°04.7	-5°17.7	12°00.0	-22°03.6	12°00.0	-22°03.6	Hamal	327°58.2	23°32.4		
6	294°34.5	2°39.8	299°04.9	2°39.8	240°37.1	19°51.8	98°07.4	-5°17.6	27°02.5	-22°03.6	27°02.5	-22°03.6	Polaris	317°02.8	89°20.2		
7	309°37.0	2°39.4	314°07.1	2°39.4	255°37.7	19°52.2	113°10.2	-5°17.4	42°05.1	-22°03.6	42°05.1	-22°03.6	Akamar	315°16.8	-40°14.5		
8	324°39.4	2°38.9	329°09.2	2°38.9	270°38.4	19°52.6	128°12.9	-5°17.3	57°07.6	-22°03.6	57°07.6	-22°03.6	Menkar	314°12.7	4°09.2		
9	339°41.9	2°38.4	344°11.4	2°38.4	285°39.1	19°53.0	143°15.7	-5°17.2	72°10.1	-22°03.6	72°10.1	-22°03.6	Mirfak	308°37.1	49°55.2		
10	354°44.3	2°37.9	359°13.6	2°37.9	300°39.8	19°53.5	158°18.5	-5°17.1	87°12.6	-22°03.6	87°12.6	-22°03.6	Aldebaran	290°46.7	16°32.4		
11	0°46.8	2°37.5	14°15.7	2°37.5	315°40.4	19°53.9	173°21.2	-5°17.0	102°15.1	-22°03.6	102°15.1	-22°03.6	Rigel	281°09.8	-8°11.3		
12	24°49.3	2°37.0	29°17.9	2°37.0	330°41.1	19°54.3	188°24.0	-5°16.9	117°17.6	-22°03.6	117°17.6	-22°03.6	Capella	280°30.9	46°00.9		
13	39°51.7	2°36.5	44°20.0	2°36.5	345°41.8	19°54.8	203°26.7	-5°16.7	132°20.1	-22°03.6	132°20.1	-22°03.6	Bellatrix	278°29.4	6°21.6		
14	54°54.2	2°36.0	59°22.1	2°36.0	0°42.4	19°55.2	218°29.5	-5°16.6	147°22.6	-22°03.6	147°22.6	-22°03.6	Elnath	278°09.6	28°37.1		
15	69°56.7	2°35.6	74°24.3	2°35.6	15°43.1	19°55.6	233°32.2	-5°16.5	162°25.1	-22°03.6	162°25.1	-22°03.6	Alnilam	275°43.9	-1°11.8		
16	84°59.1	2°35.1	89°26.4	2°35.1	30°43.8	19°56.0	248°35.0	-5°16.4	177°27.6	-22°03.6	177°27.6	-22°03.6	Betelgeuse	270°58.7	7°24.3		
17	100°01.6	2°34.6	104°28.5	2°34.6	45°44.4	19°56.5	263°37.7	-5°16.3	192°30.1	-22°03.6	192°30.1	-22°03.6	Canopus	263°55.2	-52°42.8		
18	115°04.1	2°34.2	119°30.7	2°34.2	60°45.1	19°56.9	278°40.5	-5°16.2	207°32.7	-22°03.6	207°32.7	-22°03.6	Sirius	258°31.5	-16°44.6		
19	130°06.5	2°33.7	134°32.8	2°33.7	75°45.8	19°57.3	293°43.3	-5°16.0	222°35.2	-22°03.6	222°35.2	-22°03.6	Adara	255°10.6	-29°00.2		
20	145°09.0	2°33.3	149°34.9	2°33.3	90°46.5	19°57.7	308°46.0	-5°15.9	237°37.7	-22°03.6	237°37.7	-22°03.6	Procyon	244°57.0	5°10.7		
21	160°11.5	2°32.8	164°37.0	2°32.8	105°47.1	19°58.2	323°48.8	-5°15.8	252°40.2	-22°03.6	252°40.2	-22°03.6	Pollux	243°24.5	27°58.9		
22	175°13.9	2°32.4	179°39.1	2°32.4	120°47.8	19°58.6	338°51.5	-5°15.7	267°42.7	-22°03.6	267°42.7	-22°03.6	Avior	234°16.8	-59°34.3		
23	190°16.4	2°31.9	194°41.2	2°31.9	135°48.5	19°59.0	353°54.3	-5°15.6	282°45.2	-22°03.6	282°45.2	-22°03.6	Suhail	222°50.4	-43°30.5		
Mer.pass.:10:20			v2.2 d-0.5 m-4.4			v0.7 d0.4 m1.5			v2.8 d0.1 m-2.3			v2.5 d0.0 m0.3			Miaplacidus	221°38.7	-69°47.7
															Alphard	217°53.4	-8°44.3
															Regulus	207°40.6	11°52.9
															Dubhe	193°48.2	61°39.6
															Denebola	182°30.7	14°28.5
															Gienah	175°49.3	-17°38.4
															Acrux	173°05.7	-63°11.8
															Gacrux	171°57.4	-57°12.7
															Alioth	166°18.0	55°52.1
															Spica	158°28.2	-11°15.1
															Alcaid	152°56.4	49°13.7
															Hadar	148°43.5	-60°27.3
															Menkent	148°04.1	-36°27.2
															Arcturus	145°52.9	19°05.9
															Rigel Kent.	139°47.5	-60°54.2
															Zubenelg.	137°02.2	-16°06.7
															Kochab	137°19.1	74°05.1
															Alphecca	126°08.6	26°39.4
															Antares	112°22.8	-26°28.0
															Atria	107°21.9	-69°03.1
															Sabik	102°09.4	-15°44.6
															Shaula	96°18.2	-37°06.7
															Rasalhague	96°03.9	12°32.9
															Etamin	90°44.7	51°29.1
															Kaus Aust.	83°40.3	-34°22.3
															Vega	80°37.1	38°47.8
															Nunki	75°55.1	-26°16.3
															Altair	62°05.8	8°54.8
															Peacock	53°15.4	-56°40.4
															Deneb	49°29.8	45°20.3
															Enif	33°44.8	9°57.1
															Alnair	27°40.9	-46°52.5
															Fomalhaut	15°21.5	-29°31.8
															Scheat	13°51.2	28°10.4
															Markab	13°36.0	15°17.7
															2017/4/1	SHA	Mer.pass
															Venus	4°32.1	10:03
															Mars	306°13.3	13:57
															Jupiter	163°31.2	23:24
															Saturn	92°27.8	04:12
															2017/4/1	SHA	Mer.pass
															Venus	4°24.5	09:60
															Mars	305°30.3	13:56
															Jupiter	163°38.2	23:20
															Saturn	92°28.9	04:08
															2017/4/1	SHA	Mer.pass
															Venus	4°14.7	09:56
															Mars	304°47.2	13:55
															Jupiter	163°45.1	23:16
															Saturn	92°30.1	04:04
															Horizontal parallax		
															Venus:	0.4	
															Mars:	0.1	
Mer.pass.:10:13			v2.0 d-0.4 m-4.4			v0.7 d0.4 m1.5			v2.8 d0.1 m-2.3			v2.5 d0.0 m0.3					

Sun				Moon										
h	Sun			Moon										
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	180°02.2	10°06.6	306°17.8	12.6	-18°05.1	-3.2	54.1	72	--	01:36	03:27	20:36	22:34	--
1	195°02.3	10°07.5	320°49.3	12.5	-18°08.3	-3.1	54.1	70	--	02:19	03:45	20:17	21:46	--
2	210°02.5	10°08.4	335°20.9	12.5	-18°11.4	-3.0	54.1	68	--	02:48	03:60	20:02	21:15	--
3	225°02.6	10°09.3	349°52.4	12.5	-18°14.4	-3.0	54.1	66	01:22	03:09	04:12	19:50	20:54	22:46
4	240°02.8	10°10.2	4°23.9	12.5	-18°17.3	-2.9	54.1	64	02:01	03:25	04:22	19:40	20:36	22:03
5	255°02.9	10°11.1	18°55.4	12.5	-18°20.1	-2.8	54.1	62	02:27	03:39	04:30	19:31	20:22	21:35
6	270°03.1	10°12.0	33°26.8	12.4	-18°22.9	-2.7	54.1	60	02:47	03:50	04:37	19:23	20:11	21:15
7	285°03.2	10°12.8	47°58.3	12.4	-18°25.5	-2.6	54.1	58	03:03	04:00	04:44	19:17	20:01	20:58
8	300°03.4	10°13.7	62°29.7	12.4	-18°28.1	-2.5	54.1	56	03:16	04:09	04:49	19:11	19:52	20:45
9	315°03.5	10°14.6	77°01.1	12.4	-18°30.6	-2.5	54.1	54	03:28	04:16	04:54	19:06	19:44	20:33
10	330°03.7	10°15.5	91°32.4	12.4	-18°33.1	-2.4	54.1	52	03:37	04:23	04:59	19:01	19:38	20:23
11	345°03.8	10°16.4	106°03.8	12.4	-18°35.4	-2.3	54.2	50	03:46	04:29	05:03	18:57	19:32	20:14
12	0°04.0	10°17.3	120°35.2	12.3	-18°37.6	-2.2	54.2	45	04:04	04:41	05:12	18:48	19:19	19:57
13	15°04.1	10°18.1	135°06.5	12.3	-18°39.8	-2.1	54.2	40	04:17	04:51	05:19	18:41	19:09	19:43
14	30°04.3	10°19.0	149°37.8	12.3	-18°41.9	-2.0	54.2	35	04:28	04:59	05:25	18:34	19:00	19:32
15	45°04.4	10°19.9	164°09.1	12.3	-18°43.9	-2.0	54.2	30	04:37	05:06	05:31	18:29	18:53	19:22
16	60°04.5	10°20.8	178°40.3	12.3	-18°45.8	-1.9	54.2	20	04:51	05:18	05:40	18:19	18:41	19:08
17	75°04.7	10°21.7	193°11.6	12.2	-18°47.6	-1.8	54.2	10	05:02	05:27	05:49	18:11	18:32	18:57
18	90°04.8	10°22.6	207°42.8	12.2	-18°49.3	-1.7	54.2	0	05:11	05:35	05:56	18:03	18:24	18:48
19	105°05.0	10°23.4	222°14.0	12.2	-18°51.0	-1.6	54.2	-10	05:18	05:42	06:04	17:55	18:17	18:41
20	120°05.1	10°24.3	236°45.2	12.2	-18°52.6	-1.5	54.2	-20	05:23	05:49	06:12	17:47	18:10	18:35
21	135°05.3	10°25.2	251°16.4	12.2	-18°54.0	-1.4	54.2	-30	05:28	05:56	06:20	17:38	18:03	18:30
22	150°05.4	10°26.1	265°47.6	12.2	-18°55.4	-1.3	54.2	-35	05:30	05:60	06:25	17:33	17:59	18:28
23	165°05.6	10°27.0	280°18.7	12.1	-18°56.7	-1.3	54.2	-40	05:32	06:04	06:31	17:27	17:55	18:26
SD.=15.9			d=0.9			S.D.=14.8								
Mon	GHA	Dec	GHA	ν	Dec	d	HP							
0	180°05.7	10°27.8	294°49.9	12.1	-18°57.9	-1.2	54.3	-50	05:35	06:13	06:46	17:13	17:46	18:23
1	195°05.9	10°28.7	309°21.0	12.1	-18°59.1	-1.1	54.3	-52	05:35	06:15	06:49	17:09	17:43	18:23
2	210°06.0	10°29.6	323°52.1	12.1	-19°00.1	-1.0	54.3	-54	05:36	06:17	06:53	17:05	17:41	18:22
3	225°06.1	10°30.5	338°23.2	12.1	-19°01.1	-0.9	54.3	-56	05:36	06:19	06:58	17:01	17:39	18:22
4	240°06.3	10°31.4	352°54.2	12.1	-19°01.9	-0.8	54.3	-58	05:36	06:22	07:02	16:56	17:36	18:21
5	255°06.4	10°32.2	7°25.3	12.0	-19°02.7	-0.7	54.3	-60	05:37	06:25	07:08	16:50	17:33	18:21
6	270°06.6	10°33.1	21°56.3	12.0	-19°03.4	-0.6	54.3							
7	285°06.7	10°34.0	36°27.4	12.0	-19°04.0	-0.6	54.3							
8	300°06.9	10°34.9	50°58.4	12.0	-19°04.5	-0.5	54.3							
9	315°07.0	10°35.7	65°29.4	12.0	-19°04.9	-0.4	54.4							
10	330°07.1	10°36.6	80°00.3	12.0	-19°05.3	-0.3	54.4							
11	345°07.3	10°37.5	94°31.3	12.0	-19°05.5	-0.2	54.4							
12	0°07.4	10°38.4	109°02.2	11.9	-19°05.7	-0.1	54.4							
13	15°07.6	10°39.3	123°33.2	11.9	-19°05.8	-0.0	54.4							
14	30°07.7	10°40.1	138°04.1	11.9	-19°05.7	0.1	54.4							
15	45°07.9	10°41.0	152°35.0	11.9	-19°05.6	0.2	54.4							
16	60°08.0	10°41.9	167°05.9	11.9	-19°05.4	0.2	54.4							
17	75°08.1	10°42.8	181°36.8	11.9	-19°05.1	0.3	54.5							
18	90°08.3	10°43.6	196°07.7	11.9	-19°04.8	0.4	54.5							
19	105°08.4	10°44.5	210°38.5	11.9	-19°04.3	0.5	54.5							
20	120°08.6	10°45.4	225°09.4	11.8	-19°03.7	0.6	54.5							
21	135°08.7	10°46.2	239°40.2	11.8	-19°03.1	0.7	54.5							
22	150°08.8	10°47.1	254°11.0	11.8	-19°02.3	0.8	54.5							
23	165°09.0	10°48.0	268°41.8	11.8	-19°01.5	0.9	54.6							
SD.=15.9			d=0.9			S.D.=14.8								
								Moonrise			Moonset			
Lat.	Sun	Mon	Tue	Sun	Mon	Tue								
72	--	--	--	--	--	--								
70	01:59	03:16	04:00	05:20	05:42	06:37								
68	01:16	02:21	03:08	06:03	06:36	07:29								
66	00:47	01:48	02:36	06:32	07:09	08:01								
64	00:25	01:24	02:12	06:55	07:33	08:25								
62	00:08	01:05	01:53	07:12	07:53	08:44								
60	--	00:49	01:38	07:27	08:08	08:59								
58	--	00:36	01:24	07:39	08:22	09:12								
56	--	00:25	01:13	07:50	08:33	09:23								
54	--	00:15	01:03	07:60	08:43	09:33								
52	--	00:06	00:54	08:08	08:52	09:42								
50	23:58	--	00:46	08:16	09:00	09:50								
45	23:41	--	00:29	08:32	09:17	10:07								
40	23:27	--	00:15	08:46	09:31	10:21								
35	23:15	--	00:04	08:57	09:43	10:32								
30	23:05	23:53	--	09:07	09:53	10:42								
20	22:47	23:36	--	09:24	10:11	10:60								
10	22:32	23:20	--	09:39	10:26	11:15								
0	22:18	23:06	23:54	09:53	10:41	11:29								
-10	22:03	22:51	23:41	10:07	10:55	11:43								
-20	21:48	22:36	23:26	10:22	11:11	11:58								
-30	21:31	22:18	23:09	10:39	11:28	12:16								
-35	21:21	22:08	22:59	10:49	11:39	12:26								
-40	21:09	21:56	22:48	11:01	11:51	12:37								
-45	20:55	21:43	22:35	11:14	12:04	12:51								
-50	20:39	21:26	22:19	11:31	12:21	13:07								
-52	20:31	21:18	22:11	11:38	12:29	13:15								
-54	20:22	21:09	22:03	11:47	12:38	13:23								
-56	20:12	20:59	21:53	11:57	12:48	13:33								
-58	20:01	20:48	21:43	12:08	12:59	13:44								
-60	19:48	20:34	21:30	12:20	13:13	13:56								
								Sun			Moon			
Day	Eqn.of Time	Mer.	Mer.	Mer.Pass.	Age									
	00 ^h	12 ^h	Pass	Upper	Lower									
16	00:09	00:16	11:59	03:41	16:05	19(77%)								
17	00:23	00:30	11:59	04:29	16:53	20(68%)								
18	00:36	00:43	11:59	05:17	17:41	21(59%)								
SD.=15.9			d=0.9			S.D.=14.9								

April 19, 20, 21 (Wed., Thu., Fri.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Wed	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass					
0	207°17.1	211°20.1	2°11.9	151°21.2	20°19.4	11°09.2	-5°09.9	299°48.5	-22°03.4	299°48.5	-22°03.4	299°48.5	-22°03.4	Alpheratz	357°41.1	29°10.9				
1	222°19.6	226°22.0	2°11.6	166°21.9	20°19.8	26°11.9	-5°09.8	314°51.0	-22°03.4	314°51.0	-22°03.4	314°51.0	-22°03.4	Ankaa	353°13.6	-42°12.8				
2	237°22.1	241°24.0	2°11.2	181°22.5	20°20.2	41°14.7	-5°09.7	329°53.5	-22°03.4	329°53.5	-22°03.4	329°53.5	-22°03.4	Schedar	349°38.0	56°37.7				
3	252°24.5	256°25.9	2°10.8	196°23.2	20°20.6	56°17.4	-5°09.6	344°56.0	-22°03.4	344°56.0	-22°03.4	344°56.0	-22°03.4	Diphda	348°53.5	-17°53.7				
4	267°27.0	271°27.8	2°10.5	211°23.9	20°21.0	71°20.2	-5°09.5	359°58.5	-22°03.4	359°58.5	-22°03.4	359°58.5	-22°03.4	Achernar	335°25.5	-57°09.1				
5	282°29.4	286°29.7	2°10.1	226°24.5	20°21.4	86°22.9	-5°09.3	15°01.1	-22°03.4	15°01.1	-22°03.4	15°01.1	-22°03.4	Hamal	327°58.2	23°32.4				
6	297°31.9	301°31.6	2°09.8	241°25.2	20°21.8	101°25.7	-5°09.2	30°03.6	-22°03.4	30°03.6	-22°03.4	30°03.6	-22°03.4	Polaris	317°03.1	89°20.2				
7	312°34.4	316°33.5	2°09.4	256°25.9	20°22.2	116°28.4	-5°09.1	45°06.1	-22°03.4	45°06.1	-22°03.4	45°06.1	-22°03.4	Akamar	315°16.8	-40°14.4				
8	327°36.8	331°35.5	2°09.1	271°26.5	20°22.6	131°31.2	-5°09.0	60°08.6	-22°03.4	60°08.6	-22°03.4	60°08.6	-22°03.4	Menkar	314°12.7	4°09.2				
9	342°39.3	346°37.4	2°08.7	286°27.2	20°23.1	146°33.9	-5°08.9	75°11.2	-22°03.4	75°11.2	-22°03.4	75°11.2	-22°03.4	Mirfak	308°37.1	49°55.2				
10	357°41.8	1°39.3	2°08.4	301°27.9	20°23.5	161°36.7	-5°08.8	90°13.7	-22°03.4	90°13.7	-22°03.4	90°13.7	-22°03.4	Aldebaran	290°46.7	16°32.4				
11	12°44.2	16°41.2	2°08.0	316°28.5	20°23.9	176°39.4	-5°08.7	105°16.2	-22°03.4	105°16.2	-22°03.4	105°16.2	-22°03.4	Rigel	281°09.8	-8°11.3				
12	27°46.7	31°43.0	2°07.7	331°29.2	20°24.3	191°42.2	-5°08.5	120°18.7	-22°03.4	120°18.7	-22°03.4	120°18.7	-22°03.4	Capella	280°31.0	46°00.8				
13	42°49.2	46°44.9	2°07.4	346°29.9	20°24.7	206°44.9	-5°08.4	135°21.2	-22°03.4	135°21.2	-22°03.4	135°21.2	-22°03.4	Bellatrix	278°29.4	6°21.6				
14	57°51.6	61°46.8	2°07.0	1°30.5	20°25.1	221°47.7	-5°08.3	150°23.8	-22°03.4	150°23.8	-22°03.4	150°23.8	-22°03.4	Elnath	278°09.6	28°37.1				
15	72°54.1	76°48.7	2°06.7	16°31.2	20°25.5	236°50.4	-5°08.2	165°26.3	-22°03.4	165°26.3	-22°03.4	165°26.3	-22°03.4	Alnilam	275°44.0	-1°11.8				
16	87°56.6	91°50.6	2°06.3	31°31.9	20°25.9	251°53.2	-5°08.1	180°28.8	-22°03.4	180°28.8	-22°03.4	180°28.8	-22°03.4	Betelgeuse	270°58.7	7°24.3				
17	102°59.0	106°52.5	2°06.0	46°32.5	20°26.3	266°55.9	-5°08.0	195°31.3	-22°03.4	195°31.3	-22°03.4	195°31.3	-22°03.4	Canopus	263°55.2	-52°42.8				
18	118°01.5	121°54.3	2°05.7	61°33.2	20°26.7	281°58.7	-5°07.9	210°33.9	-22°03.4	210°33.9	-22°03.4	210°33.9	-22°03.4	Sirius	258°31.5	-16°44.6				
19	133°03.9	136°56.2	2°05.3	76°33.8	20°27.1	297°01.4	-5°07.7	225°36.4	-22°03.4	225°36.4	-22°03.4	225°36.4	-22°03.4	Adara	255°10.6	-29°00.2				
20	148°06.4	151°58.1	2°05.0	91°34.5	20°27.5	312°04.2	-5°07.6	240°38.9	-22°03.4	240°38.9	-22°03.4	240°38.9	-22°03.4	Procyon	244°57.0	5°10.7				
21	163°08.9	166°59.9	2°04.7	106°35.2	20°27.9	327°06.9	-5°07.5	255°41.4	-22°03.4	255°41.4	-22°03.4	255°41.4	-22°03.4	Pollux	243°24.5	27°59.0				
22	178°11.3	182°01.8	2°04.4	121°35.8	20°28.3	342°09.7	-5°07.4	270°43.9	-22°03.4	270°43.9	-22°03.4	270°43.9	-22°03.4	Avior	234°16.9	-59°34.3				
23	193°13.8	197°03.7	2°04.0	136°36.5	20°28.7	357°12.4	-5°07.3	285°46.5	-22°03.4	285°46.5	-22°03.4	285°46.5	-22°03.4	Suhail	222°50.4	-43°30.5				
Mer.pass.:10:09			v1.9 d-0.4 m-4.4			v0.7 d0.4 m1.6			v2.8 d0.1 m-2.3			v2.5 d0.0 m0.3			Miaplacidus			221°38.8	-69°47.7	
															Alphard			217°53.4	-8°44.3	
															Regulus			207°40.6	11°52.9	
															Dubhe			193°48.2	61°39.6	
															Denebola			182°30.7	14°28.5	
															Genah			175°49.3	-17°38.4	
															Acru			173°05.7	-63°11.8	
															Gacrux			171°57.4	-57°12.7	
															Alioth			166°18.0	55°52.1	
															Spica			158°28.2	-11°15.1	
															Alcaid			152°56.4	49°13.7	
															Hadar			148°43.5	-60°27.3	
															Menkent			148°04.1	-36°27.2	
															Arcturus			145°52.9	19°05.9	
															Rigel Kent.			139°47.5	-60°54.2	
															Zubenelg.			137°02.2	-16°06.7	
															Kochab			137°19.1	74°05.1	
															Alphecca			126°08.5	26°39.4	
															Antares			112°22.8	-26°28.0	
															Atria			107°21.9	-69°03.1	
															Sabik			102°09.4	-15°44.6	
															Shaula			96°18.2	-37°06.7	
															Rasalhague			96°03.9	12°32.9	
															Etamin			90°44.7	51°29.1	
															Kaus Aust.			83°40.2	-34°22.3	
															Vega			80°37.1	38°47.8	
															Nunki			75°55.0	-26°16.3	
															Altair			62°05.8	8°54.8	
															Peacock			53°15.3	-56°40.4	
															Deneb			49°29.8	45°20.3	
															Enif			33°44.7	9°57.2	
															Alnair			27°40.8	-46°52.4	
															Fomalhaut			15°21.5	-29°31.8	
															Scheat			13°51.1	28°10.4	
															Markab			13°36.0	15°17.7	
															2017/4/1			SHA	Mer.pass	
															Venus			4°03.0	09:53	
															Mars			304°04.1	13:54	
															Jupiter			163°52.1	23:11	
															Saturn			92°31.3	04:00	
															2017/4/2			SHA	Mer.pass	
															Venus			3°49.2	09:50	
															Mars			303°20.9	13:53	
															Jupiter			163°58.9	23:07	
															Saturn			92°32.7	03:56	
															2017/4/2			SHA	Mer.pass	
															Venus			3°33.6	09:48	
															Mars			302°37.7	13:52	
															Jupiter			164°05.7	23:02	
															Saturn			92°34.2	03:52	
															Horizontal parallax					
															Venus:			0.4		
															Mars:			0.1		
Mer.pass.:10:01			v1.8 d-0.3 m-4.5			v0.7 d0.4 m1.6			v2.7 d0.1 m-2.3			v2.5 d0.0 m0.3								

h		Sun		Moon				Twilight			Twilight				
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	180°12.4	11°09.7	271°28.7	11.6	-18°11.4	3.1	55.0	72	--	00:53	03:09	20:54	23:27	--	
1	195°12.6	11°10.6	285°59.3	11.6	-18°08.2	3.2	55.1	70	--	01:56	03:30	20:31	22:09	--	
2	210°12.7	11°11.4	300°29.9	11.6	-18°04.9	3.3	55.1	68	--	02:30	03:47	20:14	21:32	--	
3	225°12.8	11°12.3	315°00.4	11.5	-18°01.6	3.4	55.1	66	00:46	02:54	04:00	20:00	21:07	23:32	
4	240°13.0	11°13.2	329°31.0	11.5	-17°58.1	3.5	55.1	64	01:41	03:13	04:11	19:49	20:48	22:23	
5	255°13.1	11°14.0	344°01.5	11.5	-17°54.6	3.6	55.2	62	02:12	03:28	04:20	19:39	20:32	21:50	
6	270°13.2	11°14.9	358°32.0	11.5	-17°50.9	3.7	55.2	60	02:35	03:41	04:29	19:31	20:19	21:26	
7	285°13.4	11°15.8	13°02.5	11.5	-17°47.2	3.8	55.2	58	02:52	03:51	04:36	19:24	20:08	21:08	
8	300°13.5	11°16.6	27°33.1	11.5	-17°43.4	3.9	55.2	56	03:07	04:00	04:42	19:17	19:59	20:53	
9	315°13.6	11°17.5	42°03.6	11.5	-17°39.5	3.9	55.3	54	03:19	04:09	04:47	19:12	19:51	20:41	
10	330°13.8	11°18.3	56°34.1	11.5	-17°35.5	4.0	55.3	52	03:30	04:16	04:52	19:06	19:43	20:30	
11	345°13.9	11°19.2	71°04.6	11.5	-17°31.4	4.1	55.3	50	03:39	04:22	04:57	19:02	19:37	20:20	
12	0°14.0	11°20.1	85°35.1	11.5	-17°27.2	4.2	55.3	45	03:58	04:36	05:07	18:52	19:23	20:01	
13	15°14.2	11°20.9	100°05.6	11.5	-17°23.0	4.3	55.4	40	04:12	04:46	05:15	18:44	19:12	19:46	
14	30°14.3	11°21.8	114°36.0	11.5	-17°18.6	4.4	55.4	35	04:24	04:55	05:22	18:37	19:03	19:34	
15	45°14.4	11°22.6	129°06.5	11.5	-17°14.2	4.5	55.4	30	04:34	05:03	05:28	18:30	18:55	19:25	
16	60°14.6	11°23.5	143°37.0	11.5	-17°09.7	4.6	55.4	20	04:49	05:16	05:38	18:20	18:42	19:09	
17	75°14.7	11°24.4	158°07.5	11.5	-17°05.1	4.7	55.5	10	05:01	05:26	05:47	18:11	18:32	18:57	
18	90°14.8	11°25.2	172°37.9	11.5	-17°00.4	4.7	55.5	0	05:10	05:34	05:56	18:02	18:23	18:48	
19	105°15.0	11°26.1	187°08.4	11.5	-16°55.6	4.8	55.5	-10	05:18	05:42	06:04	17:54	18:15	18:40	
20	120°15.1	11°26.9	201°38.8	11.4	-16°50.7	4.9	55.6	-20	05:24	05:50	06:12	17:45	18:07	18:33	
21	135°15.2	11°27.8	216°09.3	11.4	-16°45.7	5.0	55.6	-30	05:30	05:58	06:22	17:35	17:59	18:27	
22	150°15.4	11°28.7	230°39.7	11.4	-16°40.7	5.1	55.6	-35	05:32	06:02	06:28	17:29	17:55	18:25	
23	165°15.5	11°29.5	245°10.1	11.4	-16°35.5	5.2	55.6	-40	05:35	06:06	06:34	17:23	17:51	18:22	
SD.=15.9			d=0.9		S.D.=15.0				-45	05:37	06:11	06:41	17:16	17:46	18:20
									-50	05:39	06:17	06:50	17:07	17:40	18:18
									-52	05:40	06:19	06:54	17:03	17:37	18:17
									-54	05:41	06:22	06:59	16:58	17:35	18:16
									-56	05:42	06:25	07:03	16:53	17:32	18:15
									-58	05:42	06:28	07:09	16:48	17:29	18:14
									-60	05:43	06:32	07:15	16:42	17:25	18:13
									Moonrise			Moonset			
									Lat.	Wed	Thu	Fri	Wed	Thu	Fri
									72	05:50	05:03	04:49	06:29	08:58	10:55
									70	04:17	04:22	04:23	08:02	09:38	11:19
									68	03:37	03:54	04:04	08:41	10:06	11:37
									66	03:10	03:32	03:48	09:08	10:26	11:52
									64	02:48	03:15	03:35	09:29	10:43	12:04
									62	02:31	03:01	03:25	09:46	10:56	12:14
									60	02:17	02:49	03:15	09:59	11:08	12:23
									58	02:05	02:39	03:07	10:11	11:18	12:30
									56	01:55	02:30	02:60	10:22	11:27	12:37
									54	01:45	02:22	02:53	10:31	11:34	12:43
									52	01:37	02:14	02:47	10:39	11:41	12:48
									50	01:29	02:08	02:42	10:46	11:47	12:53
									45	01:14	01:54	02:31	11:01	12:01	13:04
									40	01:00	01:42	02:21	11:14	12:12	13:12
									35	00:49	01:32	02:13	11:25	12:21	13:20
									30	00:40	01:24	02:06	11:34	12:29	13:26
									20	00:23	01:09	01:53	11:51	12:43	13:37
									10	00:08	00:55	01:43	12:05	12:55	13:47
									0	--	00:43	01:32	12:18	13:07	13:56
									-10	--	00:31	01:22	12:31	13:18	14:05
									-20	--	00:18	01:11	12:45	13:30	14:14
									-30	--	00:03	00:58	13:01	13:44	14:25
									-35	23:54	--	00:51	13:10	13:52	14:31
									-40	23:44	--	00:43	13:21	14:01	14:38
									-45	23:32	--	00:33	13:33	14:11	14:47
									-50	23:18	--	00:21	13:48	14:24	14:56
									-52	23:11	--	00:16	13:55	14:30	15:01
									-54	23:03	--	00:10	14:02	14:36	15:06
									-56	22:55	--	00:03	14:11	14:43	15:11
									-58	22:46	23:56	--	14:21	14:52	15:17
									-60	22:35	23:47	--	14:32	15:01	15:24
									Sun			Moon			
									Day	Eqn.of Time	Mer.	Mer.Pass.	Age		
										00 ^h	12 ^h	Pass	Upper	Lower	
									19	00:50	00:56	11:59	06:06	18:30	22(49%)
									20	01:03	01:09	11:58	06:54	19:19	23(39%)
									21	01:15	01:21	11:58	07:44	20:08	24(30%)
									SD.=15.9			d=0.8		S.D.=15.4	

April 22, 23 ,24 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec				
0	210°14.5	1°50.4	213°30.7	1°50.4	152°08.9	20°47.9	14°27.0	-5°01.8	302°50.3	-22°03.2	317°52.9	-22°03.2	Alpheratz	357°41.1	29°10.9					
1	225°17.0	1°50.1	228°32.4	1°49.9	167°09.6	20°48.3	29°29.8	-5°01.7	317°52.9	-22°03.2	332°55.4	-22°03.2	Ankaa	353°13.6	-42°12.8					
2	240°19.5	1°49.9	243°34.1	1°49.7	182°10.3	20°48.7	44°32.5	-5°01.6	332°55.4	-22°03.2	347°57.9	-22°03.2	Schedar	349°38.0	56°37.7					
3	255°21.9	1°49.7	258°35.8	1°49.4	197°10.9	20°49.1	59°35.3	-5°01.5	347°57.9	-22°03.2	3°00.5	-22°03.2	Diphda	348°53.5	-17°53.7					
4	270°24.4	1°49.4	273°37.5	1°49.2	212°11.6	20°49.5	74°38.0	-5°01.4	3°00.5	-22°03.2	18°03.0	-22°03.2	Achernar	335°25.5	-57°09.1					
5	285°26.9	1°49.2	288°39.1	1°48.8	227°12.2	20°49.9	89°40.7	-5°01.2	18°03.0	-22°03.2	33°05.5	-22°03.2	Hamal	327°58.2	23°32.4					
6	300°29.3	1°48.8	303°40.8	1°48.1	242°12.9	20°50.2	104°43.5	-5°01.1	33°05.5	-22°03.2	48°08.1	-22°03.2	Polaris	317°03.5	89°20.2					
7	315°31.8	1°48.1	318°42.5	1°47.9	257°13.6	20°50.6	119°46.2	-5°01.0	48°08.1	-22°03.2	63°10.6	-22°03.2	Akamar	315°16.8	-40°14.4					
8	330°34.3	1°48.5	333°44.2	1°48.3	272°14.2	20°51.0	134°49.0	-5°00.9	63°10.6	-22°03.2	78°13.1	-22°03.2	Menkar	314°12.7	4°09.2					
9	345°36.7	1°48.3	348°45.9	1°48.1	287°14.9	20°51.4	149°51.7	-5°00.8	78°13.1	-22°03.2	93°15.7	-22°03.2	Mirfak	308°37.1	49°55.1					
10	0°39.2	1°48.1	3°47.5	1°48.1	302°15.5	20°51.8	164°54.5	-5°00.7	93°15.7	-22°03.2	108°18.2	-22°03.2	Aldebaran	290°46.7	16°32.4					
11	15°41.6	1°47.9	18°49.2	1°47.7	317°16.2	20°52.1	179°57.2	-5°00.6	108°18.2	-22°03.2	123°20.7	-22°03.2	Rigel	281°09.8	-8°11.3					
12	30°44.1	1°47.7	33°50.9	1°47.5	332°16.8	20°52.5	194°59.9	-5°00.5	123°20.7	-22°03.2	138°23.3	-22°03.2	Capella	280°31.0	46°00.8					
13	45°46.6	1°47.5	48°52.5	1°47.2	347°17.5	20°52.9	210°02.7	-5°00.4	138°23.3	-22°03.2	153°25.8	-22°03.2	Bellatrix	278°29.5	6°21.6					
14	60°49.0	1°47.2	63°54.2	1°47.0	2°18.2	20°53.3	225°05.4	-5°00.3	153°25.8	-22°03.2	168°28.4	-22°03.2	Elnath	278°09.6	28°37.1					
15	75°51.5	1°47.0	78°55.8	1°46.8	17°18.8	20°53.7	240°08.2	-5°00.1	168°28.4	-22°03.2	182°30.9	-22°03.2	Alnilam	275°44.0	-1°11.8					
16	90°54.0	1°46.8	93°57.5	1°46.6	32°19.5	20°54.0	255°10.9	-5°00.0	182°30.9	-22°03.2	198°33.4	-22°03.2	Betelgeuse	270°58.7	7°24.3					
17	105°56.4	1°46.6	108°59.1	1°46.4	47°20.1	20°54.4	270°13.7	-4°59.9	198°33.4	-22°03.2	213°36.0	-22°03.2	Canopus	263°55.2	-52°42.8					
18	120°58.9	1°46.4	124°00.8	1°46.2	62°20.8	20°54.8	285°16.4	-4°59.8	213°36.0	-22°03.2	228°38.5	-22°03.2	Sirius	258°31.5	-16°44.6					
19	136°01.4	1°46.2	139°02.4	1°46.0	77°21.5	20°55.2	300°19.1	-4°59.7	228°38.5	-22°03.2	243°41.0	-22°03.2	Adara	255°10.6	-29°00.2					
20	151°03.8	1°46.0	154°04.1	1°45.8	92°22.1	20°55.6	315°21.9	-4°59.6	243°41.0	-22°03.2	258°43.6	-22°03.2	Procyon	244°57.0	5°10.7					
21	166°06.3	1°45.8	169°05.7	1°45.6	107°22.8	20°55.9	330°24.6	-4°59.5	258°43.6	-22°03.2	273°46.1	-22°03.2	Pollux	243°24.6	27°59.0					
22	181°08.8	1°45.6	184°07.3	1°45.4	122°23.4	20°56.3	345°27.4	-4°59.4	273°46.1	-22°03.2	288°48.6	-22°03.2	Avior	234°16.9	-59°34.3					
23	196°11.2	1°45.4	199°09.0	1°45.4	137°24.1	20°56.7	0°30.1	-4°59.3	288°48.6	-22°03.2			Suhail	222°50.4	-43°30.5					
Mer.pass.:9:57:			v1.7 d-0.2 m-4.5			v0.7 d0.4 m1.6			v2.7 d0.1 m-2.3			v2.5 d0.0 m0.3			Miaplacidus			221°38.8	-69°47.7	
															Alphard			217°53.4	-8°44.3	
															Regulus			207°40.6	11°52.9	
															Dubhe			193°48.2	61°39.6	
															Denebola			182°30.7	14°28.5	
															Gienah			175°49.3	-17°38.4	
															Acruz			173°05.7	-63°11.8	
															Gacrux			171°57.4	-57°12.7	
															Alioth			166°18.0	55°52.1	
															Spica			158°28.2	-11°15.1	
															Alcaid			152°56.4	49°13.7	
															Hadar			148°43.5	-60°27.3	
															Menkent			148°04.1	-36°27.2	
															Arcturus			145°52.9	19°05.9	
															Rigel Kent.			139°47.5	-60°54.2	
															Zubenelg.			137°02.2	-16°06.7	
															Kochab			137°19.1	74°05.1	
															Alphecca			126°08.5	26°39.4	
															Antares			112°22.8	-26°28.0	
															Atria			107°21.8	-69°03.1	
															Sabik			102°09.3	-15°44.6	
															Shaula			96°18.2	-37°06.7	
															Rasalhague			96°03.9	12°32.9	
															Etamin			90°44.6	51°29.1	
															Kaus Aust.			83°40.2	-34°22.3	
															Vega			80°37.1	38°47.8	
															Nunki			75°55.0	-26°16.3	
															Altair			62°05.8	8°54.8	
															Peacock			53°15.3	-56°40.4	
															Deneb			49°29.7	45°20.3	
															Enif			33°44.7	9°57.2	
															Alnair			27°40.8	-46°52.4	
															Fomalhaut			15°21.5	-29°31.8	
															Scheat			13°51.1	28°10.4	
															Markab			13°36.0	15°17.7	
															2017/4/2			SHA	Mer.pass	
															Venus			3°16.1	09:45	
															Mars			301°54.4	13:51	
															Jupiter			164°12.5	22:58	
															Saturn			92°35.8	03:48	
															2017/4/2			SHA	Mer.pass	
															Venus			2°56.9	09:42	
															Mars			301°11.1	13:50	
															Jupiter			164°19.2	22:54	
															Saturn			92°37.5	03:44	
															2017/4/2			SHA	Mer.pass	
															Venus			2°36.0	09:40	
															Mars			300°27.7	13:49	
															Jupiter			164°25.8	22:49	
															Saturn			92°39.3	03:40	
															Horizontal parallax					
															Venus:			0.4		
															Mars:			0.1		
Mer.pass.:9:49:			v1.6 d-0.2 m-4.5			v0.7 d0.4 m1.6			v2.7 d0.1 m-2.3			v2.5 d0.0 m0.3								

April 25, 26 ,27 (Tue., Wed., Thu.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Tue	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec				
0	213°12.0	1°37.8	215°25.3	1°37.8	152°56.2	21°14.8	17°44.3	-4°54.0	305°53.1	-22°03.0	305°53.1	-22°03.0	Alpheratz	357°41.1	29°10.9					
1	228°14.4	1°37.7	230°26.8	1°37.7	167°56.9	21°15.1	32°47.0	-4°53.9	320°55.7	-22°03.0	320°55.7	-22°03.0	Ankaa	353°13.6	-42°12.8					
2	243°16.9	1°37.6	245°28.3	1°37.6	182°57.5	21°15.5	47°49.7	-4°53.7	335°58.2	-22°03.0	335°58.2	-22°03.0	Schedar	349°38.0	56°37.7					
3	258°19.3	1°37.5	260°29.8	1°37.5	197°58.2	21°15.9	62°52.5	-4°53.6	351°00.8	-22°03.0	351°00.8	-22°03.0	Diphda	348°53.5	-17°53.7					
4	273°21.8	1°37.4	275°31.2	1°37.4	212°58.9	21°16.2	77°55.2	-4°53.5	6°03.3	-22°03.0	6°03.3	-22°03.0	Achernar	335°25.5	-57°09.1					
5	288°24.3	1°37.3	290°32.7	1°37.3	227°59.5	21°16.6	92°57.9	-4°53.4	21°05.9	-22°03.0	21°05.9	-22°03.0	Hamal	327°58.2	23°32.4					
6	303°26.7	1°37.2	305°34.2	1°37.2	243°00.2	21°16.9	108°00.7	-4°53.3	36°08.4	-22°03.0	36°08.4	-22°03.0	Polaris	317°03.7	89°20.1					
7	318°29.2	1°37.1	320°35.7	1°37.1	258°00.8	21°17.3	123°03.4	-4°53.2	51°10.9	-22°03.0	51°10.9	-22°03.0	Akamar	315°16.8	-40°14.4					
8	333°31.7	1°37.0	335°37.1	1°37.0	273°01.5	21°17.7	138°06.1	-4°53.1	66°13.5	-22°03.0	66°13.5	-22°03.0	Menkar	314°12.7	4°09.2					
9	348°34.1	1°36.9	350°38.6	1°36.9	288°02.1	21°18.0	153°08.9	-4°53.0	81°16.0	-22°03.0	81°16.0	-22°03.0	Mirfak	308°37.1	49°55.1					
10	3°36.6	1°36.8	5°40.1	1°36.8	303°02.8	21°18.4	168°11.6	-4°52.9	96°18.6	-22°03.0	96°18.6	-22°03.0	Aldebaran	290°46.7	16°32.4					
11	18°39.1	1°36.7	20°41.5	1°36.7	318°03.4	21°18.7	183°14.4	-4°52.8	111°21.1	-22°03.0	111°21.1	-22°03.0	Rigel	281°09.8	-8°11.3					
12	33°41.5	1°36.6	35°43.0	1°36.6	333°04.1	21°19.1	198°17.1	-4°52.7	126°23.7	-22°03.0	126°23.7	-22°03.0	Capella	280°31.0	46°00.8					
13	48°44.0	1°36.5	50°44.4	1°36.5	348°04.7	21°19.4	213°19.8	-4°52.6	141°26.2	-22°03.0	141°26.2	-22°03.0	Bellatrix	278°29.5	6°21.6					
14	63°46.4	1°36.4	65°45.9	1°36.4	3°05.4	21°19.8	228°22.6	-4°52.5	156°28.8	-22°03.0	156°28.8	-22°03.0	Elnath	278°09.6	28°37.1					
15	78°48.9	1°36.3	80°47.3	1°36.3	18°06.0	21°20.2	243°25.3	-4°52.4	171°31.3	-22°02.9	171°31.3	-22°02.9	Alnilam	275°44.0	-1°11.8					
16	93°51.4	1°36.2	95°48.8	1°36.2	33°06.7	21°20.5	258°28.0	-4°52.3	186°33.9	-22°02.9	186°33.9	-22°02.9	Betelgeuse	270°58.7	7°24.3					
17	108°53.8	1°36.1	110°50.2	1°36.1	48°07.3	21°20.9	273°30.7	-4°52.2	201°36.4	-22°02.9	201°36.4	-22°02.9	Canopus	263°55.3	-52°42.8					
18	123°56.3	1°36.1	125°51.7	1°36.1	63°08.0	21°21.2	288°33.5	-4°52.1	216°39.0	-22°02.9	216°39.0	-22°02.9	Sirius	258°31.5	-16°44.6					
19	138°58.8	1°36.0	140°53.1	1°36.0	78°08.7	21°21.6	303°36.2	-4°51.9	231°41.5	-22°02.9	231°41.5	-22°02.9	Adara	255°10.6	-29°00.2					
20	154°01.2	1°35.9	155°54.5	1°35.9	93°09.3	21°21.9	318°38.9	-4°51.8	246°44.1	-22°02.9	246°44.1	-22°02.9	Procyon	244°57.0	5°10.7					
21	169°03.7	1°35.8	170°56.0	1°35.8	108°10.0	21°22.3	333°41.7	-4°51.7	261°46.6	-22°02.9	261°46.6	-22°02.9	Pollux	243°24.6	27°59.0					
22	184°06.2	1°35.7	185°57.4	1°35.7	123°10.6	21°22.6	348°44.4	-4°51.6	276°49.2	-22°02.9	276°49.2	-22°02.9	Avior	234°16.9	-59°34.3					
23	199°08.6	1°35.7	200°58.8	1°35.7	138°11.3	21°23.0	3°47.1	-4°51.5	291°51.7	-22°02.9	291°51.7	-22°02.9	Suhail	222°50.4	-43°30.5					
Mer.pass.:9:45:			v1.5 d-0.1 m-4.5			v0.7 d0.4 m1.6			v2.7 d0.1 m-2.3			v2.5 d0.0 m0.3			Miaplacidus			221°38.8	-69°47.7	
															Alphard			217°53.5	-8°44.3	
															Regulus			207°40.6	11°52.9	
															Dubhe			193°48.2	61°39.6	
															Denebola			182°30.7	14°28.5	
															Genah			175°49.3	-17°38.4	
															Acruz			173°05.7	-63°11.8	
															Gacrux			171°57.4	-57°12.7	
															Alioth			166°18.0	55°52.1	
															Spica			158°28.2	-11°15.1	
															Alcaid			152°56.4	49°13.7	
															Hadar			148°43.5	-60°27.3	
															Menkent			148°04.1	-36°27.2	
															Arcturus			145°52.9	19°05.9	
															Rigel Kent.			139°47.5	-60°54.2	
															Zubenelg.			137°02.2	-16°06.7	
															Kochab			137°19.1	74°05.2	
															Alphecca			126°08.5	26°39.5	
															Antares			112°22.8	-26°28.0	
															Atria			107°21.8	-69°03.1	
															Sabik			102°09.3	-15°44.6	
															Shaula			96°18.1	-37°06.7	
															Rasalhague			96°03.9	12°32.9	
															Etamin			90°44.6	51°29.1	
															Kaus Aust.			83°40.2	-34°22.3	
															Vega			80°37.0	38°47.9	
															Nunki			75°55.0	-26°16.3	
															Altair			62°05.7	8°54.8	
															Peacock			53°15.2	-56°40.4	
															Deneb			49°29.7	45°20.3	
															Enif			33°44.7	9°57.2	
															Alnair			27°40.8	-46°52.4	
															Fomalhaut			15°21.5	-29°31.8	
															Scheat			13°51.1	28°10.4	
															Markab			13°36.0	15°17.7	
															2017/4/2			SHA	Mer.pass	
															Venus			2°13.4	09:37	
															Mars			299°44.3	13:48	
															Jupiter			164°32.3	22:45	
															Saturn			92°41.2	03:36	
															2017/4/2			SHA	Mer.pass	
															Venus			1°49.2	09:35	
															Mars			299°00.8	13:47	
															Jupiter			164°38.8	22:41	
															Saturn			92°43.2	03:32	
															2017/4/2			SHA	Mer.pass	
															Venus			1°23.5	09:33	
															Mars			298°17.3	13:46	
															Jupiter			164°45.2	22:36	
															Saturn			92°45.2	03:28	
															Horizontal parallax					
															Venus:			0.4		
															Mars:			0.1		
Mer.pass.:9:37:			v1.4 d-0.0 m-4.5			v0.7 d0.3 m1.6			v2.7 d0.1 m-2.3			v2.6 d0.0 m0.3								

h		Sun		Moon											
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight		
								Naut.	Civil			Civil	Naut.		
0	180°29.9	13°10.8	198°56.6	9.0	2°22.1	11.9	60.0	72	--	--	02:29	21:32	--	--	
1	195°30.1	13°11.6	213°24.5	8.9	2°34.0	11.9	60.0	70	--	00:50	02:58	21:01	23:26	--	
2	210°30.2	13°12.4	227°52.4	8.9	2°45.9	11.9	60.0	68	--	01:50	03:20	20:39	22:12	--	
3	225°30.3	13°13.2	242°20.3	8.8	2°57.7	11.9	60.1	66	--	02:23	03:37	20:22	21:36	--	
4	240°30.4	13°14.0	256°48.1	8.8	3°09.6	11.8	60.1	64	00:43	02:47	03:50	20:07	21:12	23:30	
5	255°30.5	13°14.8	271°15.8	8.7	3°21.4	11.8	60.1	62	01:37	03:06	04:02	19:56	20:52	22:24	
6	270°30.6	13°15.7	285°43.6	8.7	3°33.2	11.8	60.2	60	02:07	03:21	04:11	19:46	20:37	21:52	
7	285°30.7	13°16.5	300°11.2	8.6	3°45.1	11.8	60.2	58	02:30	03:34	04:20	19:37	20:24	21:29	
8	300°30.8	13°17.3	314°38.8	8.6	3°56.9	11.8	60.2	56	02:47	03:44	04:27	19:29	20:13	21:11	
9	315°30.9	13°18.1	329°06.4	8.5	4°08.7	11.8	60.3	54	03:02	03:54	04:34	19:23	20:03	20:56	
10	330°31.0	13°18.9	343°33.9	8.5	4°20.5	11.8	60.3	52	03:14	04:02	04:40	19:17	19:55	20:43	
11	345°31.1	13°19.7	358°01.4	8.4	4°32.2	11.8	60.3	50	03:25	04:10	04:45	19:11	19:47	20:32	
12	0°31.2	13°20.5	1°28.8	8.4	4°44.0	11.7	60.3	45	03:46	04:25	04:57	18:59	19:31	20:11	
13	15°31.3	13°21.3	26°56.2	8.3	4°55.7	11.7	60.3	40	04:03	04:38	05:06	18:50	19:19	19:54	
14	30°31.4	13°22.1	41°23.5	8.3	5°07.4	11.7	60.4	35	04:16	04:48	05:15	18:41	19:08	19:40	
15	45°31.5	13°22.9	55°50.8	8.2	5°19.1	11.7	60.4	30	04:27	04:57	05:22	18:34	18:59	19:29	
16	60°31.6	13°23.8	70°18.0	8.2	5°30.8	11.7	60.4	20	04:44	05:11	05:34	18:22	18:45	19:12	
17	75°31.7	13°24.6	84°45.2	8.1	5°42.4	11.6	60.4	10	04:58	05:23	05:45	18:11	18:33	18:58	
18	90°31.8	13°25.4	99°12.3	8.1	5°54.0	11.6	60.5	0	05:08	05:33	05:54	18:01	18:22	18:47	
19	105°31.9	13°26.2	113°39.3	8.0	6°05.6	11.6	60.5	-10	05:18	05:43	06:04	17:51	18:13	18:38	
20	120°32.0	13°27.0	128°06.3	8.0	6°17.2	11.5	60.5	-20	05:26	05:52	06:14	17:41	18:04	18:30	
21	135°32.1	13°27.8	142°33.3	7.9	6°28.7	11.5	60.5	-30	05:33	06:01	06:26	17:29	17:54	18:22	
22	150°32.2	13°28.6	157°00.2	7.9	6°40.2	11.5	60.6	-35	05:37	06:07	06:33	17:23	17:49	18:18	
23	165°32.3	13°29.4	171°27.0	7.8	6°51.7	11.4	60.6	-40	05:40	06:12	06:40	17:15	17:43	18:15	
							S.D.=16.4								
							-45	05:44	06:18	06:49	17:06	17:37	18:11		
							-50	05:48	06:26	06:59	16:56	17:29	18:07		
							-52	05:49	06:29	07:04	16:51	17:26	18:06		
							-54	05:51	06:32	07:09	16:45	17:22	18:04		
							-56	05:52	06:36	07:15	16:39	17:19	18:02		
							-58	05:54	06:40	07:22	16:33	17:14	18:01		
							-60	05:56	06:45	07:29	16:25	17:10	17:59		
Moonrise Moonset															
		Moonrise			Moonset										
		Tue Wed Thu			Tue Wed Thu										
Lat.															
72	04:16	04:08	03:59	18:38	20:45	22:60									
70	04:20	04:19	04:19	18:29	20:26	22:26									
68	04:23	04:28	04:35	18:22	20:12	22:02									
66	04:26	04:36	04:48	18:16	20:00	21:44									
64	04:29	04:42	04:59	18:11	19:50	21:29									
62	04:31	04:48	05:08	18:07	19:42	21:16									
60	04:33	04:52	05:16	18:03	19:35	21:06									
58	04:34	04:57	05:23	18:00	19:29	20:57									
56	04:36	05:01	05:29	17:57	19:23	20:49									
54	04:37	05:04	05:35	17:54	19:18	20:41									
52	04:38	05:07	05:40	17:52	19:14	20:35									
50	04:39	05:10	05:45	17:50	19:10	20:29									
45	04:42	05:17	05:55	17:45	19:01	20:17									
40	04:44	05:22	06:03	17:41	18:54	20:07									
35	04:46	05:27	06:10	17:38	18:48	19:58									
30	04:48	05:31	06:17	17:35	18:42	19:50									
20	04:50	05:38	06:28	17:30	18:33	19:37									
10	04:53	05:44	06:38	17:25	18:25	19:26									
0	04:55	05:50	06:47	17:21	18:17	19:15									
-10	04:58	05:56	06:56	17:17	18:09	19:04									
-20	05:01	06:03	07:06	17:12	18:01	18:53									
-30	05:04	06:10	07:18	17:07	17:52	18:40									
-35	05:05	06:14	07:25	17:04	17:46	18:32									
-40	05:07	06:19	07:32	17:01	17:40	18:23									
-45	05:10	06:25	07:41	16:57	17:33	18:13									
-50	05:13	06:32	07:52	16:52	17:25	18:01									
-52	05:14	06:35	07:57	16:50	17:21	17:56									
-54	05:15	06:39	08:03	16:48	17:17	17:50									
-56	05:17	06:43	08:09	16:45	17:12	17:43									
-58	05:19	06:47	08:16	16:43	17:07	17:35									
-60	05:21	06:52	08:24	16:40	17:01	17:27									
Sun Moon															
Day		Sun			Moon										
		Eqn.of Time			Mer. Pass.										
		00 ^h 12 ^h			Upper Lower										
25	02:00	02:05	11:57	11:08	23:35	28(2%)									
26	02:10	02:15	11:57	12:03	00:31	29(0%)									
27	02:19	02:24	11:57	13:00	00:31	1(2%)									
							S.D.=16.6								

April 28, 29 ,30 (Fri., Sat., Sun.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Fri	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec				
0	216°09.4	1°33.8	217°05.7	1°33.8	153°43.1	21°39.9	21°00.8	-4°46.5	308°56.8	-22°02.8	308°56.8	-22°02.8	Alpheratz	357°41.1	29°10.9					
1	231°11.8	1°33.8	232°07.0	1°33.8	168°43.8	21°40.2	36°03.5	-4°46.4	323°59.3	-22°02.8	323°59.3	-22°02.8	Ankaa	353°13.6	-42°12.8					
2	246°14.3	1°33.8	247°08.3	1°33.8	183°44.4	21°40.6	51°06.3	-4°46.3	339°01.9	-22°02.8	339°01.9	-22°02.8	Schedar	349°38.0	56°37.7					
3	261°16.8	1°33.8	262°09.6	1°33.8	198°45.1	21°40.9	66°09.0	-4°46.2	354°04.5	-22°02.8	354°04.5	-22°02.8	Diphda	348°53.5	-17°53.7					
4	276°19.2	1°33.9	277°10.9	1°33.9	213°45.7	21°41.2	81°11.7	-4°46.1	9°07.0	-22°02.7	9°07.0	-22°02.7	Achernar	335°25.5	-57°09.1					
5	291°21.7	1°33.9	292°12.2	1°33.9	228°46.4	21°41.6	96°14.4	-4°46.0	24°09.6	-22°02.7	24°09.6	-22°02.7	Hamal	327°58.2	23°32.4					
6	306°24.2	1°33.9	307°13.5	1°33.9	243°47.0	21°41.9	111°17.2	-4°45.9	39°12.1	-22°02.7	39°12.1	-22°02.7	Polaris	317°03.6	89°20.1					
7	321°26.6	1°33.9	322°14.8	1°33.9	258°47.7	21°42.2	126°19.9	-4°45.8	54°14.7	-22°02.7	54°14.7	-22°02.7	Akamar	315°16.8	-40°14.4					
8	336°29.1	1°33.9	337°16.0	1°33.9	273°48.3	21°42.6	141°22.6	-4°45.7	69°17.2	-22°02.7	69°17.2	-22°02.7	Menkar	314°12.7	4°09.2					
9	351°31.5	1°33.9	352°17.3	1°33.9	288°49.0	21°42.9	156°25.3	-4°45.6	84°19.8	-22°02.7	84°19.8	-22°02.7	Mirfak	308°37.1	49°55.1					
10	6°34.0	1°33.9	7°18.6	1°33.9	303°49.6	21°43.2	171°28.0	-4°45.4	99°22.4	-22°02.7	99°22.4	-22°02.7	Akamar	315°16.8	-40°14.4					
11	21°36.5	1°33.9	22°19.9	1°33.9	318°50.3	21°43.6	186°30.8	-4°45.3	114°24.9	-22°02.7	114°24.9	-22°02.7	Rigel	281°09.8	-8°11.2					
12	36°38.9	1°34.0	37°21.2	1°34.0	333°50.9	21°43.9	201°33.5	-4°45.2	129°27.5	-22°02.7	129°27.5	-22°02.7	Capella	280°31.0	46°00.8					
13	51°41.4	1°34.0	52°22.4	1°34.0	348°51.6	21°44.2	216°36.2	-4°45.1	144°30.0	-22°02.7	144°30.0	-22°02.7	Bellatrix	278°29.5	6°21.6					
14	66°43.9	1°34.0	67°23.7	1°34.0	3°52.2	21°44.6	231°38.9	-4°45.0	159°32.6	-22°02.7	159°32.6	-22°02.7	Elnath	278°09.6	28°37.1					
15	81°46.3	1°34.0	82°25.0	1°34.0	18°52.9	21°44.9	246°41.7	-4°44.9	174°35.2	-22°02.7	174°35.2	-22°02.7	Alnilam	275°44.0	-1°11.8					
16	96°48.8	1°34.1	97°26.2	1°34.1	33°53.5	21°45.2	261°44.4	-4°44.8	189°37.7	-22°02.7	189°37.7	-22°02.7	Betelgeuse	270°58.7	7°24.3					
17	111°51.3	1°34.1	112°27.5	1°34.1	48°54.2	21°45.6	276°47.1	-4°44.7	204°40.3	-22°02.7	204°40.3	-22°02.7	Canopus	263°55.3	-52°42.8					
18	126°53.7	1°34.1	127°28.8	1°34.1	63°54.8	21°45.9	291°49.8	-4°44.6	219°42.8	-22°02.7	219°42.8	-22°02.7	Sirius	258°31.5	-16°44.6					
19	141°56.2	1°34.1	142°30.0	1°34.1	78°55.5	21°46.2	306°52.5	-4°44.5	234°45.4	-22°02.7	234°45.4	-22°02.7	Adara	255°10.6	-29°00.2					
20	156°58.6	1°34.2	157°31.3	1°34.2	93°56.1	21°46.5	321°55.3	-4°44.4	249°48.0	-22°02.7	249°48.0	-22°02.7	Procyon	244°57.0	5°10.7					
21	172°01.1	1°34.2	172°32.5	1°34.2	108°56.8	21°46.9	336°58.0	-4°44.3	264°50.5	-22°02.7	264°50.5	-22°02.7	Pollux	243°24.6	27°59.0					
22	187°03.6	1°34.2	187°33.8	1°34.2	123°57.4	21°47.2	352°00.7	-4°44.2	279°53.1	-22°02.7	279°53.1	-22°02.7	Avior	234°17.0	-59°34.3					
23	202°06.0	1°34.3	202°35.0	1°34.3	138°58.1	21°47.5	7°03.4	-4°44.1	294°55.6	-22°02.7	294°55.6	-22°02.7	Suhail	222°50.4	-43°30.5					
Mer.pass.:9:33:			v1.3 d0.0 m-4.5			v0.6 d0.3 m1.6			v2.7 d0.1 m-2.3			v2.6 d0.0 m0.3			Miaplacidus			221°38.9	-69°47.7	
															Alphard			217°53.5	-8°44.3	
															Regulus			207°40.6	11°52.9	
															Dubhe			193°48.2	61°39.7	
															Denebola			182°30.7	14°28.5	
															Gienah			175°49.3	-17°38.4	
															Acrux			173°05.7	-63°11.8	
															Gacrux			171°57.4	-57°12.7	
															Alioth			166°18.0	55°52.1	
															Spica			158°28.2	-11°15.1	
															Alcaid			152°56.4	49°13.7	
															Hadar			148°43.5	-60°27.3	
															Menkent			148°04.1	-36°27.3	
															Arcturus			145°52.9	19°05.9	
															Rigel Kent.			139°47.4	-60°54.2	
															Zubenelg.			137°02.2	-16°06.7	
															Kochab			137°19.1	74°05.2	
															Alphecca			126°08.5	26°39.5	
															Antares			112°22.7	-26°28.0	
															Atria			107°21.7	-69°03.1	
															Sabik			102°09.3	-15°44.6	
															Shaula			96°18.1	-37°06.7	
															Rasalhague			96°03.8	12°32.9	
															Etamin			90°44.6	51°29.1	
															Kaus Aust.			83°40.2	-34°22.3	
															Vega			80°37.0	38°47.9	
															Nunki			75°55.0	-26°16.3	
															Altair			62°05.7	8°54.8	
															Peacock			53°15.2	-56°40.4	
															Deneb			49°29.7	45°20.3	
															Enif			33°44.7	9°57.2	
															Alnair			27°40.8	-46°52.4	
															Fomalhaut			15°21.4	-29°31.8	
															Scheat			13°51.1	28°10.4	
															Markab			13°36.0	15°17.7	
															2017/4/2			SHA	Mer.pass	
															Venus			0°56.3	09:31	
															Mars			297°33.8	13:45	
															Jupiter			164°51.4	22:32	
															Saturn			92°47.4	03:24	
															2017/4/2			SHA	Mer.pass	
															Venus			0°27.8	09:29	
															Mars			296°50.2	13:43	
															Jupiter			164°57.6	22:28	
															Saturn			92°49.7	03:20	
															2017/4/3			SHA	Mer.pass	
															Venus			359°57.9	09:27	
															Mars			296°06.6	13:42	
															Jupiter			165°03.7	22:23	
															Saturn			92°52.0	03:15	
															Horizontal parallax					
															Venus:			0.3		
															Mars:			0.1		
Mer.pass.:9:25:			v1.2 d0.1 m-4.5			v0.6 d0.3 m1.6			v2.7 d0.1 m-2.3			v2.6 d0.0 m0.3								

May 01, 02 ,03 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	219°06.8	218°33.5	1°37.8	154°29.7	22°03.2	24°16.5	-4°39.3	312°01.3	-22°02.5	Alpheratz	357°41.1	29°10.9
1	234°09.3	233°34.6	1°37.9	169°30.4	22°03.5	39°19.2	-4°39.3	327°03.9	-22°02.5	Ankaa	353°13.5	-42°12.7
2	249°11.7	248°35.7	1°38.0	184°31.0	22°03.9	54°21.9	-4°39.2	342°06.4	-22°02.5	Schedar	349°38.0	56°37.6
3	264°14.2	263°36.9	1°38.1	199°31.6	22°04.2	69°24.7	-4°39.1	357°09.0	-22°02.5	Diphda	348°53.5	-17°53.6
4	279°16.6	278°38.0	1°38.2	214°32.3	22°04.5	84°27.4	-4°39.0	12°11.6	-22°02.5	Achernar	335°25.5	-57°09.0
5	294°19.1	293°39.1	1°38.4	229°32.9	22°04.8	99°30.1	-4°38.9	27°14.1	-22°02.5	Hamal	327°58.2	23°32.4
6	309°21.6	308°40.3	1°38.5	244°33.6	22°05.1	114°32.8	-4°38.8	42°16.7	-22°02.5	Polaris	317°03.5	89°20.1
7	324°24.0	323°41.4	1°38.6	259°34.2	22°05.4	129°35.5	-4°38.7	57°19.3	-22°02.5	Akamar	315°16.8	-40°14.4
8	339°26.5	338°42.5	1°38.7	274°34.9	22°05.7	144°38.2	-4°38.6	72°21.8	-22°02.5	Menkar	314°12.7	4°09.2
9	354°29.0	353°43.6	1°38.8	289°35.5	22°06.0	159°40.9	-4°38.5	87°24.4	-22°02.5	Mirfak	308°37.1	49°55.1
10	9°31.4	8°44.8	1°39.0	304°36.2	22°06.3	174°43.6	-4°38.4	102°27.0	-22°02.5	Aldebaran	290°46.7	16°32.4
11	24°33.9	23°45.9	1°39.1	319°36.8	22°06.6	189°46.3	-4°38.3	117°29.5	-22°02.5	Rigel	281°09.8	-8°11.2
12	39°36.4	38°47.0	1°39.2	334°37.4	22°07.0	204°49.1	-4°38.2	132°32.1	-22°02.5	Capella	280°31.0	46°00.8
13	54°38.8	53°48.1	1°39.3	349°38.1	22°07.3	219°51.8	-4°38.1	147°34.7	-22°02.5	Bellatrix	278°29.5	6°21.6
14	69°41.3	68°49.2	1°39.4	4°38.7	22°07.6	234°54.5	-4°38.0	162°37.3	-22°02.5	Elnath	278°09.6	28°37.1
15	84°43.7	83°50.3	1°39.6	19°39.4	22°07.9	249°57.2	-4°37.9	177°39.8	-22°02.5	Alnilam	275°44.0	-1°11.8
16	99°46.2	98°51.4	1°39.7	34°40.0	22°08.2	264°59.9	-4°37.8	192°42.4	-22°02.5	Betelgeuse	270°58.7	7°24.3
17	114°48.7	113°52.5	1°39.8	49°40.7	22°08.5	280°02.6	-4°37.7	207°45.0	-22°02.5	Canopus	263°55.3	-52°42.7
18	129°51.1	128°53.6	1°40.0	64°41.3	22°08.8	295°05.3	-4°37.6	222°47.5	-22°02.5	Sirius	258°31.5	-16°44.6
19	144°53.6	143°54.7	1°40.1	79°41.9	22°09.1	310°08.0	-4°37.5	237°50.1	-22°02.5	Adara	255°10.6	-29°00.1
20	159°56.1	158°55.8	1°40.2	94°42.6	22°09.4	325°10.7	-4°37.4	252°52.7	-22°02.5	Procyon	244°57.0	5°10.7
21	174°58.5	173°56.9	1°40.4	109°43.2	22°09.7	340°13.4	-4°37.3	267°55.3	-22°02.4	Pollux	243°24.6	27°59.0
22	190°01.0	188°58.0	1°40.5	124°43.9	22°10.0	355°16.1	-4°37.3	282°57.8	-22°02.4	Avior	234°17.0	-59°34.3
23	205°03.5	203°59.1	1°40.6	139°44.5	22°10.3	10°18.8	-4°37.2	298°00.4	-22°02.4	Suhail	222°50.5	-43°30.5
Mer.pass.:9:22:		v1.1 d0.1 m-4.5		v0.6 d0.3 m1.6		v2.7 d0.1 m-2.3		v2.6 d0.0 m0.2		Miaplacidus	221°38.9	-69°47.7
										Alphard	217°53.5	-8°44.3
										Regulus	207°40.6	11°52.9
										Dubhe	193°48.3	61°39.7
										Denebola	182°30.7	14°28.5
										Gienah	175°49.3	-17°38.4
										Acrux	173°05.7	-63°11.8
										Gacrux	171°57.4	-57°12.7
										Alioth	166°18.0	55°52.1
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.4	49°13.8
										Hadar	148°43.4	-60°27.3
										Menkent	148°04.1	-36°27.3
										Arcturus	145°52.9	19°05.9
										Rigel Kent.	139°47.4	-60°54.3
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.1	74°05.2
										Alphecca	126°08.5	26°39.5
										Antares	112°22.7	-26°28.0
										Atria	107°21.7	-69°03.2
										Sabik	102°09.3	-15°44.6
										Shaula	96°18.1	-37°06.7
										Rasalhague	96°03.8	12°32.9
										Etamin	90°44.6	51°29.1
										Kaus Aust.	83°40.1	-34°22.3
										Vega	80°37.0	38°47.9
										Nunki	75°54.9	-26°16.3
										Altair	62°05.7	8°54.8
										Peacock	53°15.2	-56°40.4
										Deneb	49°29.7	45°20.3
										Enif	33°44.7	9°57.2
										Alnair	27°40.7	-46°52.4
										Fomalhaut	15°21.4	-29°31.8
										Scheat	13°51.1	28°10.4
										Markab	13°35.9	15°17.7
										2017/5/1	SHA	Mer.pass
										Venus	359°26.7	09:25
										Mars	295°22.9	13:41
										Jupiter	165°09.7	22:19
										Saturn	92°54.5	03:11
										2017/5/2	SHA	Mer.pass
										Venus	358°54.3	09:23
										Mars	294°39.2	13:40
										Jupiter	165°15.6	22:15
										Saturn	92°57.0	03:07
										2017/5/3	SHA	Mer.pass
										Venus	358°20.7	09:22
										Mars	293°55.5	13:39
										Jupiter	165°21.4	22:10
										Saturn	92°59.7	03:03
										Horizontal parallax		
										Venus:		0.3
										Mars:		0.1
Mer.pass.:9:14:		v1.0 d0.2 m-4.5		v0.6 d0.3 m1.6		v2.7 d0.1 m-2.3		v2.6 d0.0 m0.2				

May 04, 05 ,06 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	222°04.2	219°50.1	1°49.1	155°16.0	22°24.8	27°31.3	-4°32.7	315°06.6	-22°02.3	Alpheratz	357°41.1	29°10.9
1	237°06.7	234°51.1	1°49.3	170°16.6	22°25.1	42°34.0	-4°32.6	330°09.2	-22°02.3	Ankaa	353°13.5	-42°12.7
2	252°09.1	249°52.1	1°49.5	185°17.3	22°25.4	57°36.7	-4°32.5	345°11.8	-22°02.3	Schedar	349°37.9	56°37.6
3	267°11.6	264°53.1	1°49.7	200°17.9	22°25.7	72°39.4	-4°32.4	0°14.3	-22°02.3	Diphda	348°53.5	-17°53.6
4	282°14.1	279°54.1	1°49.9	215°18.5	22°25.9	87°42.1	-4°32.3	15°16.9	-22°02.3	Achernar	335°25.5	-57°09.0
5	297°16.5	294°55.1	1°50.1	230°19.2	22°26.2	102°44.8	-4°32.2	30°19.5	-22°02.3	Hamal	327°58.2	23°32.4
6	312°19.0	309°56.0	1°50.4	245°19.8	22°26.5	117°47.5	-4°32.1	45°22.1	-22°02.3	Polaris	317°03.5	89°20.1
7	327°21.5	324°57.0	1°50.6	260°20.5	22°26.8	132°50.2	-4°32.0	60°24.7	-22°02.2	Akamar	315°16.8	-40°14.4
8	342°23.9	339°58.0	1°50.8	275°21.1	22°27.1	147°52.9	-4°31.9	75°27.2	-22°02.2	Menkar	314°12.6	4°09.2
9	357°26.4	354°59.0	1°51.0	290°21.7	22°27.4	162°55.6	-4°31.9	90°29.8	-22°02.2	Mirfak	308°37.1	49°55.1
10	12°28.8	9°60.0	1°51.2	305°22.4	22°27.7	177°58.3	-4°31.8	105°32.4	-22°02.2	Aldebaran	290°46.7	16°32.4
11	27°31.3	25°00.9	1°51.4	320°23.0	22°27.9	193°01.0	-4°31.7	120°35.0	-22°02.2	Rigel	281°09.8	-8°11.2
12	42°33.8	40°01.9	1°51.7	335°23.7	22°28.2	208°03.7	-4°31.6	135°37.6	-22°02.2	Capella	280°31.0	46°00.8
13	57°36.2	55°02.9	1°51.9	350°24.3	22°28.5	223°06.4	-4°31.5	150°40.1	-22°02.2	Bellatrix	278°29.5	6°21.6
14	72°38.7	70°03.8	1°52.1	5°24.9	22°28.8	238°09.1	-4°31.4	165°42.7	-22°02.2	Elnath	278°09.6	28°37.1
15	87°41.2	85°04.8	1°52.3	20°25.6	22°29.1	253°11.7	-4°31.3	180°45.3	-22°02.2	Alnilam	275°44.0	-1°11.8
16	102°43.6	100°05.8	1°52.6	35°26.2	22°29.3	268°14.4	-4°31.2	195°47.9	-22°02.2	Betelgeuse	270°58.7	7°24.3
17	117°46.1	115°06.7	1°52.8	50°26.9	22°29.6	283°17.1	-4°31.1	210°50.5	-22°02.2	Canopus	263°55.3	-52°42.7
18	132°48.6	130°07.7	1°53.0	65°27.5	22°29.9	298°19.8	-4°31.1	225°53.1	-22°02.2	Sirius	258°31.5	-16°44.6
19	147°51.0	145°08.6	1°53.2	80°28.1	22°30.2	313°22.5	-4°31.0	240°55.6	-22°02.2	Adara	255°10.7	-29°00.1
20	162°53.5	160°09.6	1°53.5	95°28.8	22°30.5	328°25.2	-4°30.9	255°58.2	-22°02.2	Procyon	244°57.1	5°10.7
21	177°56.0	175°10.6	1°53.7	110°29.4	22°30.7	343°27.9	-4°30.8	271°00.8	-22°02.2	Pollux	243°24.6	27°59.0
22	192°58.4	190°11.5	1°53.9	125°30.1	22°31.0	358°30.6	-4°30.7	286°03.4	-22°02.2	Avior	234°17.0	-59°34.3
23	208°00.9	205°12.5	1°54.2	140°30.7	22°31.3	13°33.3	-4°30.6	301°06.0	-22°02.2	Suhail	222°50.5	-43°30.5
Mer.pass.:9:10:		v1.0 d0.2 m-4.5		v0.6 d0.3 m1.6		v2.7 d0.1 m-2.2		v2.6 d0.0 m0.2		Miaplacidus	221°39.0	-69°47.7
										Alphard	217°53.5	-8°44.2
										Regulus	207°40.6	11°52.9
										Dubhe	193°48.3	61°39.7
										Denebola	182°30.7	14°28.5
										Gienah	175°49.3	-17°38.4
										Acrux	173°05.7	-63°11.8
										Gacrux	171°57.4	-57°12.7
										Alioth	166°18.0	55°52.1
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.4	49°13.8
										Hadar	148°43.4	-60°27.3
										Menkent	148°04.1	-36°27.3
										Arcturus	145°52.9	19°05.9
										Rigel Kent.	139°47.4	-60°54.3
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.0	74°05.2
										Alphecca	126°08.5	26°39.5
										Antares	112°22.7	-26°28.0
										Atria	107°21.7	-69°03.2
										Sabik	102°09.3	-15°44.6
										Shaula	96°18.1	-37°06.7
										Rasalhague	96°03.8	12°32.9
										Etamin	90°44.5	51°29.1
										Kaus Aust.	83°40.1	-34°22.3
										Vega	80°37.0	38°47.9
										Nunki	75°54.9	-26°16.3
										Altair	62°05.7	8°54.8
										Peacock	53°15.1	-56°40.4
										Deneb	49°29.6	45°20.3
										Enif	33°44.6	9°57.2
										Alnair	27°40.7	-46°52.4
										Fomalhaut	15°21.4	-29°31.8
										Scheat	13°51.0	28°10.4
										Markab	13°35.9	15°17.7
										2017/5/4	SHA	Mer.pass
										Venus	357°45.9	09:20
										Mars	293°11.8	13:38
										Jupiter	165°27.1	22:06
										Saturn	93°02.4	02:59
										2017/5/5	SHA	Mer.pass
										Venus	357°10.1	09:19
										Mars	292°28.0	13:37
										Jupiter	165°32.7	22:02
										Saturn	93°05.2	02:55
										2017/5/6	SHA	Mer.pass
										Venus	356°33.2	09:17
										Mars	291°44.2	13:36
										Jupiter	165°38.1	21:57
										Saturn	93°08.1	02:51
										Horizontal paralax		
										Venus:		0.3
										Mars:		0.1
Mer.pass.:9:02:		v0.9 d0.3 m-4.4		v0.6 d0.3 m1.6		v2.7 d0.1 m-2.2		v2.6 d0.0 m0.2				

May 07, 08 ,09 (Sun., Mon., Tue.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sun	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	225°01.6	2°07.1	220°56.9	2°07.1	156°02.0	22°44.6	30°45.0	-4°26.4	318°12.7	-22°02.0			Alpheratz	357°41.0	29°10.9		
1	240°04.1	2°07.4	235°57.8	2°07.4	171°02.6	22°44.8	45°47.7	-4°26.3	333°15.3	-22°02.0			Ankaa	353°13.5	-42°12.7		
2	255°06.5	2°07.7	250°58.6	2°07.7	186°03.3	22°45.1	60°50.4	-4°26.3	348°17.9	-22°02.0			Schedar	349°37.9	56°37.6		
3	270°09.0	2°08.0	265°59.5	2°08.0	201°03.9	22°45.3	75°53.1	-4°26.2	3°20.5	-22°02.0			Diphda	348°53.5	-17°53.6		
4	285°11.5	2°08.3	281°00.3	2°08.3	216°04.5	22°45.6	90°55.8	-4°26.1	18°23.1	-22°02.0			Achernar	335°25.5	-57°09.0		
5	300°13.9	2°08.6	296°01.2	2°08.6	231°05.2	22°45.9	105°58.5	-4°26.0	33°25.6	-22°02.0			Hamal	327°58.2	23°32.4		
6	315°16.4	2°08.9	311°02.1	2°08.9	246°05.8	22°46.1	121°01.1	-4°25.9	48°28.2	-22°02.0			Polaris	317°03.4	89°20.1		
7	330°18.9	2°09.2	326°02.9	2°09.2	261°06.5	22°46.4	136°03.8	-4°25.8	63°30.8	-22°02.0			Akamar	315°16.8	-40°14.4		
8	345°21.3	2°09.5	341°03.8	2°09.5	276°07.1	22°46.6	151°06.5	-4°25.8	78°33.4	-22°02.0			Menkar	314°12.6	4°09.2		
9	0°23.8	2°09.8	356°04.6	2°09.8	291°07.7	22°46.9	166°09.2	-4°25.7	93°36.0	-22°02.0			Mirfak	308°37.1	49°55.1		
10	15°26.3	2°10.1	11°05.5	2°10.1	306°08.4	22°47.1	181°11.9	-4°25.6	108°38.6	-22°02.0			Aldebaran	290°46.7	16°32.4		
11	30°28.7	2°10.4	26°06.3	2°10.4	321°09.0	22°47.4	196°14.6	-4°25.5	123°41.2	-22°02.0			Rigel	281°09.8	-8°11.2		
12	45°31.2	2°10.7	41°07.1	2°10.7	336°09.6	22°47.7	211°17.2	-4°25.4	138°43.8	-22°02.0			Capella	280°31.0	46°00.8		
13	60°33.7	2°11.0	56°08.0	2°11.0	351°10.3	22°47.9	226°19.9	-4°25.4	153°46.4	-22°02.0			Bellatrix	278°29.5	6°21.6		
14	75°36.1	2°11.4	71°08.8	2°11.4	6°10.9	22°48.2	241°22.6	-4°25.3	168°49.0	-22°02.0			Elnath	278°09.6	28°37.1		
15	90°38.6	2°11.7	86°09.7	2°11.7	21°11.6	22°48.4	256°25.3	-4°25.2	183°51.6	-22°02.0			Alnilam	275°44.0	-1°11.8		
16	105°41.0	2°12.0	101°10.5	2°12.0	36°12.2	22°48.7	271°28.0	-4°25.1	198°54.1	-22°02.0			Betelgeuse	270°58.7	7°24.3		
17	120°43.5	2°12.3	116°11.3	2°12.3	51°12.8	22°48.9	286°30.6	-4°25.0	213°56.7	-22°02.0			Canopus	263°55.4	-52°42.7		
18	135°46.0	2°12.6	131°12.2	2°12.6	66°13.5	22°49.2	301°33.3	-4°24.9	228°59.3	-22°02.0			Sirius	258°31.5	-16°44.6		
19	150°48.4	2°12.9	146°13.0	2°12.9	81°14.1	22°49.5	316°36.0	-4°24.9	244°01.9	-22°02.0			Adara	255°10.7	-29°00.1		
20	165°50.9	2°13.2	161°13.8	2°13.2	96°14.7	22°49.7	331°38.7	-4°24.8	259°04.5	-22°01.9			Procyon	244°57.1	5°10.7		
21	180°53.4	2°13.6	176°14.7	2°13.6	111°15.4	22°50.0	346°41.4	-4°24.7	274°07.1	-22°01.9			Pollux	243°24.6	27°59.0		
22	195°55.8	2°13.9	191°15.5	2°13.9	126°16.0	22°50.2	1°44.0	-4°24.6	289°09.7	-22°01.9			Avior	234°17.1	-59°34.3		
23	210°58.3	2°14.2	206°16.3	2°14.2	141°16.6	22°50.5	16°46.7	-4°24.5	304°12.3	-22°01.9			Suhail	222°50.5	-43°30.5		
Mer.pass.:8:58:			v0.9 d0.3 m-4.4			v0.6 d0.3 m1.6			v2.7 d0.1 m-2.2			v2.6 d0.0 m0.2			Miaplacidus 221°39.0 -69°47.7		
															Alphard 217°53.5 -8°44.2		
															Regulus 207°40.6 11°52.9		
															Dubhe 193°48.3 61°39.7		
															Denebola 182°30.7 14°28.5		
															Gienah 175°49.3 -17°38.4		
															Acruz 173°05.7 -63°11.9		
															Gacrux 171°57.4 -57°12.8		
															Alioth 166°18.1 55°52.1		
															Spica 158°28.2 -11°15.1		
															Alcaid 152°56.4 49°13.8		
															Hadar 148°43.4 -60°27.4		
															Menkent 148°04.1 -36°27.3		
															Arcturus 145°52.9 19°05.9		
															Rigel Kent. 139°47.4 -60°54.3		
															Zubenelg. 137°02.2 -16°06.7		
															Kochab 137°19.0 74°05.2		
															Alphecca 126°08.5 26°39.5		
															Antares 112°22.7 -26°28.0		
															Atria 107°21.6 -69°03.2		
															Sabik 102°09.2 -15°44.6		
															Shaula 96°18.0 -37°06.7		
															Rasalhague 96°03.8 12°33.0		
															Etamin 90°44.5 51°29.2		
															Kaus Aust. 83°40.1 -34°22.3		
															Vega 80°37.0 38°47.9		
															Nunki 75°54.9 -26°16.3		
															Altair 62°05.7 8°54.8		
															Peacock 53°15.1 -56°40.4		
															Deneb 49°29.6 45°20.3		
															Enif 33°44.6 9°57.2		
															Alnair 27°40.7 -46°52.4		
															Fomalhaut 15°21.4 -29°31.7		
															Scheat 13°51.0 28°10.4		
															Markab 13°35.9 15°17.7		
															2017/5/7 SHA Mer.pass		
															Venus 355°55.3 09:16		
															Mars 291°00.4 13:35		
															Jupiter 165°43.4 21:53		
															Saturn 93°11.1 02:47		
															2017/5/8 SHA Mer.pass		
															Venus 355°16.4 09:14		
															Mars 290°16.5 13:34		
															Jupiter 165°48.6 21:49		
															Saturn 93°14.1 02:43		
															2017/5/9 SHA Mer.pass		
															Venus 354°36.6 09:13		
															Mars 289°32.7 13:33		
															Jupiter 165°53.7 21:45		
															Saturn 93°17.3 02:38		
															Horizontal parallax		
															Venus: 0.3		
															Mars: 0.1		
Mer.pass.:8:50:			v0.8 d0.3 m-4.4			v0.6 d0.2 m1.6			v2.7 d0.1 m-2.2			v2.6 d0.0 m0.2					

May 10, 11, 12 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	227°59.0	221°54.9	2°31.2	156°47.8	23°02.5	33°57.7	-4°20.7	321°19.5	-22°01.8	Alpheratz	357°41.0	29°10.9
1	243°01.5	236°55.7	2°31.6	171°48.4	23°02.7	49°00.4	-4°20.6	336°22.1	-22°01.8	Ankaa	353°13.5	-42°12.7
2	258°04.0	251°56.4	2°32.0	186°49.1	23°02.9	64°03.0	-4°20.5	351°24.7	-22°01.8	Schedar	349°37.9	56°37.6
3	273°06.4	266°57.2	2°32.4	201°49.7	23°03.2	79°05.7	-4°20.5	6°27.3	-22°01.8	Diphda	348°53.5	-17°53.6
4	288°08.9	281°57.9	2°32.7	216°50.3	23°03.4	94°08.4	-4°20.4	21°29.9	-22°01.7	Achernar	335°25.5	-57°09.0
5	303°11.4	296°58.6	2°33.1	231°51.0	23°03.6	109°11.0	-4°20.3	36°32.5	-22°01.7	Hamal	327°58.2	23°32.4
6	318°13.8	311°59.4	2°33.5	246°51.6	23°03.9	124°13.7	-4°20.2	51°35.1	-22°01.7	Polaris	317°03.2	89°20.1
7	333°16.3	327°00.1	2°33.9	261°52.2	23°04.1	139°16.4	-4°20.2	66°37.7	-22°01.7	Akamar	315°16.8	-40°14.3
8	348°18.7	342°00.9	2°34.3	276°52.9	23°04.3	154°19.0	-4°20.1	81°40.3	-22°01.7	Menkar	314°12.6	4°09.2
9	3°21.2	357°01.6	2°34.6	291°53.5	23°04.6	169°21.7	-4°20.0	96°42.9	-22°01.7	Mirfak	308°37.1	49°55.1
10	18°23.7	12°02.3	2°35.0	306°54.1	23°04.8	184°24.4	-4°19.9	111°45.5	-22°01.7	Aldebaran	290°46.7	16°32.4
11	33°26.1	27°03.1	2°35.4	321°54.8	23°05.0	199°27.0	-4°19.9	126°48.1	-22°01.7	Rigel	281°09.8	-8°11.2
12	48°28.6	42°03.8	2°35.8	336°55.4	23°05.3	214°29.7	-4°19.8	141°50.7	-22°01.7	Capella	280°31.0	46°00.8
13	63°31.1	57°04.5	2°36.2	351°56.1	23°05.5	229°32.3	-4°19.7	156°53.3	-22°01.7	Bellatrix	278°29.5	6°21.6
14	78°33.5	72°05.3	2°36.6	6°56.7	23°05.7	244°35.0	-4°19.6	171°55.9	-22°01.7	Elnath	278°09.7	28°37.1
15	93°36.0	87°06.0	2°37.0	21°57.3	23°06.0	259°37.7	-4°19.6	186°58.5	-22°01.7	Alnilam	275°44.0	-1°11.8
16	108°38.5	102°06.7	2°37.4	36°58.0	23°06.2	274°40.3	-4°19.5	202°01.1	-22°01.7	Betelgeuse	270°58.7	7°24.3
17	123°40.9	117°07.4	2°37.8	51°58.6	23°06.4	289°43.0	-4°19.4	217°03.7	-22°01.7	Canopus	263°55.4	-52°42.7
18	138°43.4	132°08.2	2°38.1	66°59.2	23°06.7	304°45.7	-4°19.3	232°06.3	-22°01.7	Sirius	258°31.6	-16°44.6
19	153°45.8	147°08.9	2°38.5	81°59.9	23°06.9	319°48.3	-4°19.3	247°08.9	-22°01.7	Adara	255°10.7	-29°00.1
20	168°48.3	162°09.6	2°38.9	97°00.5	23°07.1	334°51.0	-4°19.2	262°11.5	-22°01.7	Procyon	244°57.1	5°10.8
21	183°50.8	177°10.3	2°39.3	112°01.1	23°07.3	349°53.7	-4°19.1	277°14.1	-22°01.7	Pollux	243°24.6	27°59.0
22	198°53.2	192°11.1	2°39.7	127°01.8	23°07.6	4°56.3	-4°19.0	292°16.7	-22°01.7	Avior	234°17.1	-59°34.3
23	213°55.7	207°11.8	2°40.1	142°02.4	23°07.8	19°59.0	-4°19.0	307°19.4	-22°01.7	Suhail	222°50.5	-43°30.5
Mer.pass.:8:46:		v0.7 d0.4 m-4.4		v0.6 d0.2 m1.6		v2.7 d0.1 m-2.2		v2.6 d0.0 m0.2		Miaplacidus	221°39.1	-69°47.7
										Alphard	217°53.5	-8°44.2
										Regulus	207°40.7	11°52.9
										Dubhe	193°48.3	61°39.7
										Denebola	182°30.8	14°28.6
										Gienah	175°49.3	-17°38.4
										Acruz	173°05.7	-63°11.9
										Gacrux	171°57.4	-57°12.8
										Alioth	166°18.1	55°52.2
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.4	49°13.8
										Hadar	148°43.4	-60°27.4
										Menkent	148°04.1	-36°27.3
										Arcturus	145°52.9	19°05.9
										Rigel Kent.	139°47.4	-60°54.3
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.1	74°05.2
										Alphecca	126°08.5	26°39.5
										Antares	112°22.7	-26°28.0
										Atria	107°21.6	-69°03.2
										Sabik	102°09.2	-15°44.6
										Shaula	96°18.0	-37°06.7
										Rasalhague	96°03.8	12°33.0
										Etamin	90°44.5	51°29.2
										Kaus Aust.	83°40.1	-34°22.3
										Vega	80°36.9	38°47.9
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°54.8
										Peacock	53°15.1	-56°40.4
										Deneb	49°29.6	45°20.3
										Enif	33°44.6	9°57.2
										Alnair	27°40.6	-46°52.4
										Fomalhaut	15°21.4	-29°31.7
										Scheat	13°51.0	28°10.4
										Markab	13°35.9	15°17.7
										2017/5/1	SHA	Mer.pass
										Venus	353°55.9	09:12
										Mars	288°48.8	13:32
										Jupiter	165°58.7	21:40
										Saturn	93°20.5	02:34
										2017/5/1	SHA	Mer.pass
										Venus	353°14.3	09:11
										Mars	288°04.9	13:31
										Jupiter	166°03.5	21:36
										Saturn	93°23.8	02:30
										2017/5/1	SHA	Mer.pass
										Venus	352°31.9	09:10
										Mars	287°20.9	13:30
										Jupiter	166°08.2	21:32
										Saturn	93°27.2	02:26
										Horizontal parallax		
										Venus:		0.3
										Mars:		0.1
Mer.pass.:8:38:		v0.7 d0.4 m-4.4		v0.6 d0.2 m1.6		v2.7 d0.1 m-2.2		v2.6 d0.0 m0.2				

May 13, 14 ,15 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	230°56.4	3°00.8	222°45.2	3°00.8	157°33.4	23°18.5	37°09.2	-4°15.5	324°27.0	-22°01.5			Alpheratz	357°41.0	29°10.9		
1	245°58.9	3°01.3	237°45.8	3°01.3	172°34.1	23°18.7	52°11.8	-4°15.4	339°29.7	-22°01.5			Ankaa	353°13.5	-42°12.7		
2	261°01.4	3°01.7	252°46.5	3°01.7	187°34.7	23°19.0	67°14.5	-4°15.3	354°32.3	-22°01.5			Schedar	349°37.9	56°37.6		
3	276°03.8	3°02.2	267°47.1	3°02.2	202°35.3	23°19.2	82°17.1	-4°15.3	9°34.9	-22°01.5			Diphda	348°53.4	-17°53.6		
4	291°06.3	3°02.6	282°47.7	3°02.6	217°36.0	23°19.4	97°19.8	-4°15.2	24°37.5	-22°01.5			Achernar	335°25.5	-57°09.0		
5	306°08.8	3°03.1	297°48.4	3°03.1	232°36.6	23°19.6	112°22.4	-4°15.1	39°40.1	-22°01.5			Hamal	327°58.1	23°32.4		
6	321°11.2	3°03.5	312°49.0	3°03.5	247°37.2	23°19.8	127°25.1	-4°15.1	54°42.7	-22°01.5			Polaris	317°02.7	89°20.0		
7	336°13.7	3°04.0	327°49.7	3°04.0	262°37.9	23°20.0	142°27.7	-4°15.0	69°45.3	-22°01.5			Akamar	315°16.8	-40°14.3		
8	351°16.2	3°04.4	342°50.3	3°04.4	277°38.5	23°20.2	157°30.3	-4°14.9	84°47.9	-22°01.5			Menkar	314°12.6	4°09.2		
9	6°18.6	3°04.9	357°50.9	3°04.9	292°39.1	23°20.4	172°33.0	-4°14.9	99°50.5	-22°01.5			Mirfak	308°37.1	49°55.1		
10	21°21.1	3°05.4	12°51.6	3°05.4	307°39.8	23°20.6	187°35.6	-4°14.8	114°53.1	-22°01.5			Aldebaran	290°46.7	16°32.4		
11	36°23.6	3°05.8	27°52.2	3°05.8	322°40.4	23°20.8	202°38.3	-4°14.7	129°55.8	-22°01.5			Rigel	281°09.8	-8°11.2		
12	51°26.0	3°06.3	42°52.8	3°06.3	337°41.0	23°21.0	217°40.9	-4°14.7	144°58.4	-22°01.4			Capella	280°31.0	46°00.8		
13	66°28.5	3°06.7	57°53.5	3°06.7	352°41.7	23°21.2	232°43.6	-4°14.6	160°01.0	-22°01.4			Bellatrix	278°29.5	6°21.6		
14	81°30.9	3°07.2	72°54.1	3°07.2	7°42.3	23°21.4	247°46.2	-4°14.5	175°03.6	-22°01.4			Elnath	278°09.7	28°37.1		
15	96°33.4	3°07.6	87°54.7	3°07.6	22°42.9	23°21.6	262°48.9	-4°14.5	190°06.2	-22°01.4			Alnilam	275°44.0	-1°11.8		
16	111°35.9	3°08.1	102°55.4	3°08.1	37°43.6	23°21.9	277°51.5	-4°14.4	205°08.8	-22°01.4			Betelgeuse	270°58.8	7°24.3		
17	126°38.3	3°08.6	117°56.0	3°08.6	52°44.2	23°22.1	292°54.2	-4°14.3	220°11.4	-22°01.4			Canopus	263°55.4	-52°42.7		
18	141°40.8	3°09.0	132°56.6	3°09.0	67°44.8	23°22.3	307°56.8	-4°14.3	235°14.0	-22°01.4			Sirius	258°31.6	-16°44.6		
19	156°43.3	3°09.5	147°57.2	3°09.5	82°45.5	23°22.5	322°59.5	-4°14.2	250°16.6	-22°01.4			Adara	255°10.7	-29°00.1		
20	171°45.7	3°10.0	162°57.9	3°10.0	97°46.1	23°22.7	338°02.1	-4°14.1	265°19.3	-22°01.4			Procyon	244°57.1	5°10.8		
21	186°48.2	3°10.4	177°58.5	3°10.4	112°46.7	23°22.9	353°04.8	-4°14.1	280°21.9	-22°01.4			Pollux	243°24.6	27°59.0		
22	201°50.7	3°10.9	192°59.1	3°10.9	127°47.4	23°23.1	8°07.4	-4°14.0	295°24.5	-22°01.4			Avior	234°17.1	-59°34.3		
23	216°53.1	3°11.4	207°59.7	3°11.4	142°48.0	23°23.3	23°10.1	-4°13.9	310°27.1	-22°01.4			Suhail	222°50.5	-43°30.5		
Mer.pass.:8:34:			v0.6 d0.4 m-4.4			v0.6 d0.2 m1.6			v2.7 d0.1 m-2.2			v2.6 d0.0 m0.2			Miaplacidus 221°39.1 -69°47.7		
															Alphard 217°53.5 -8°44.2		
															Regulus 207°40.7 11°52.9		
															Dubhe 193°48.4 61°39.7		
															Denebola 182°30.8 14°28.6		
															Genah 175°49.3 -17°38.4		
															Acrux 173°05.8 -63°11.9		
															Gacrux 171°57.4 -57°12.8		
															Alioth 166°18.1 55°52.2		
															Spica 158°28.2 -11°15.1		
															Alcaid 152°56.4 49°13.8		
															Hadar 148°43.4 -60°27.4		
															Menkent 148°04.1 -36°27.3		
															Arcturus 145°52.9 19°05.9		
															Rigel Kent. 139°47.4 -60°54.3		
															Zubenelg. 137°02.2 -16°06.7		
															Kochab 137°19.1 74°05.3		
															Alphecca 126°08.5 26°39.5		
															Antares 112°22.7 -26°28.0		
															Atria 107°21.6 -69°03.2		
															Sabik 102°09.2 -15°44.6		
															Shaula 96°18.0 -37°06.7		
															Rasalhague 96°03.8 12°33.0		
															Etamin 90°44.5 51°29.2		
															Kaus Aust. 83°40.0 -34°22.3		
															Vega 80°36.9 38°47.9		
															Nunki 75°54.9 -26°16.3		
															Altair 62°05.6 8°54.8		
															Peacock 53°15.0 -56°40.4		
															Deneb 49°29.5 45°20.4		
															Enif 33°44.6 9°57.2		
															Alnair 27°40.6 -46°52.4		
															Fomalhaut 15°21.3 -29°31.7		
															Scheat 13°51.0 28°10.4		
															Markab 13°35.9 15°17.7		
															2017/5/1 SHA Mer.pass		
															Venus 351°48.7 09:09		
															Mars 286°37.0 13:29		
															Jupiter 166°12.7 21:28		
															Saturn 93°30.6 02:22		
															2017/5/1 SHA Mer.pass		
															Venus 351°04.7 09:08		
															Mars 285°53.0 13:28		
															Jupiter 166°17.1 21:23		
															Saturn 93°34.1 02:18		
															2017/5/1 SHA Mer.pass		
															Venus 350°20.0 09:07		
															Mars 285°09.1 13:27		
															Jupiter 166°21.4 21:19		
															Saturn 93°37.7 02:13		
															Horizontal parallax		
															Venus: 0.3		
															Mars: 0.1		
Mer.pass.:8:26:			v0.6 d0.5 m-4.4			v0.6 d0.2 m1.6			v2.6 d0.1 m-2.2			v2.6 d0.0 m0.2					

May 16, 17 ,18 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	233°53.9	223°28.5	3°35.3	158°18.9	23°32.7	40°19.4	-4°10.8	327°35.2	-22°01.2	Alpheratz	357°41.0	29°10.9
1	248°56.3	238°29.0	3°35.9	173°19.6	23°32.9	55°22.0	-4°10.8	342°37.8	-22°01.2	Ankaa	353°13.4	-42°12.7
2	263°58.8	253°29.6	3°36.4	188°20.2	23°33.1	70°24.6	-4°10.7	357°40.5	-22°01.2	Schedar	349°37.8	56°37.6
3	279°01.3	268°30.1	3°36.9	203°20.8	23°33.3	85°27.3	-4°10.6	12°43.1	-22°01.2	Diphda	348°53.4	-17°53.6
4	294°03.7	283°30.7	3°37.4	218°21.5	23°33.5	100°29.9	-4°10.6	27°45.7	-22°01.2	Achernar	335°25.5	-57°08.9
5	309°06.2	298°31.2	3°37.9	233°22.1	23°33.7	115°32.5	-4°10.5	42°48.3	-22°01.2	Hamal	327°58.1	23°32.4
6	324°08.7	313°31.8	3°38.4	248°22.7	23°33.8	130°35.2	-4°10.5	57°50.9	-22°01.2	Polaris	317°02.3	89°20.0
7	339°11.1	328°32.3	3°38.9	263°23.4	23°34.0	145°37.8	-4°10.4	72°53.6	-22°01.2	Akamar	315°16.8	-40°14.3
8	354°13.6	343°32.9	3°39.5	278°24.0	23°34.2	160°40.4	-4°10.3	87°56.2	-22°01.2	Menkar	314°12.6	4°09.2
9	9°16.0	358°33.4	3°40.0	293°24.6	23°34.4	175°43.1	-4°10.3	102°58.8	-22°01.2	Mirfak	308°37.0	49°55.1
10	24°18.5	13°34.0	3°40.5	308°25.2	23°34.6	190°45.7	-4°10.2	118°01.4	-22°01.2	Aldebaran	290°46.7	16°32.4
11	39°21.0	28°34.5	3°41.0	323°25.9	23°34.8	205°48.3	-4°10.2	133°04.0	-22°01.2	Rigel	281°09.8	-8°11.2
12	54°23.4	43°35.1	3°41.5	338°26.5	23°34.9	220°50.9	-4°10.1	148°06.6	-22°01.2	Capella	280°31.0	46°00.8
13	69°25.9	58°35.6	3°42.0	353°27.1	23°35.1	235°53.6	-4°10.0	163°09.3	-22°01.2	Bellatrix	278°29.5	6°21.6
14	84°28.4	73°36.2	3°42.6	8°27.8	23°35.3	250°56.2	-4°10.0	178°11.9	-22°01.2	Elnath	278°09.7	28°37.1
15	99°30.8	88°36.7	3°43.1	23°28.4	23°35.5	265°58.8	-4°09.9	193°14.5	-22°01.2	Alnilam	275°44.0	-1°11.8
16	114°33.3	103°37.2	3°43.6	38°29.0	23°35.7	281°01.5	-4°09.9	208°17.1	-22°01.2	Betelgeuse	270°58.8	7°24.3
17	129°35.8	118°37.8	3°44.1	53°29.7	23°35.8	296°04.1	-4°09.8	223°19.7	-22°01.2	Canopus	263°55.4	-52°42.7
18	144°38.2	133°38.3	3°44.7	68°30.3	23°36.0	311°06.7	-4°09.8	238°22.4	-22°01.2	Sirius	258°31.6	-16°44.5
19	159°40.7	148°38.8	3°45.2	83°30.9	23°36.2	326°09.4	-4°09.7	253°25.0	-22°01.1	Adara	255°10.7	-29°00.1
20	174°43.1	163°39.4	3°45.7	98°31.6	23°36.4	341°12.0	-4°09.6	268°27.6	-22°01.1	Procyon	244°57.1	5°10.8
21	189°45.6	178°39.9	3°46.2	113°32.2	23°36.5	356°14.6	-4°09.6	283°30.2	-22°01.1	Pollux	243°24.6	27°59.0
22	204°48.1	193°40.4	3°46.8	128°32.8	23°36.7	11°17.2	-4°09.5	298°32.8	-22°01.1	Avior	234°17.1	-59°34.3
23	219°50.5	208°41.0	3°47.3	143°33.5	23°36.9	26°19.9	-4°09.5	313°35.5	-22°01.1	Suhail	222°50.5	-43°30.5
Mer.pass.:8:23:		v0.6 d0.5 m-4.4		v0.6 d0.2 m1.6		v2.6 d0.1 m-2.2		v2.6 d0.0 m0.2		Miaplacidus	221°39.2	-69°47.7
										Alphard	217°53.5	-8°44.2
										Regulus	207°40.7	11°52.9
										Dubhe	193°48.4	61°39.7
										Denebola	182°30.8	14°28.6
										Genah	175°49.3	-17°38.4
										Acrux	173°05.8	-63°11.9
										Gacrux	171°57.5	-57°12.8
										Alioth	166°18.1	55°52.2
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.4	49°13.8
										Hadar	148°43.4	-60°27.4
										Menkent	148°04.1	-36°27.3
										Arcturus	145°52.9	19°05.9
										Rigel Kent.	139°47.4	-60°54.3
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.1	74°05.3
										Alphecca	126°08.5	26°39.5
										Antares	112°22.6	-26°28.0
										Atria	107°21.5	-69°03.2
										Sabik	102°09.2	-15°44.6
										Shaula	96°18.0	-37°06.7
										Rasalhague	96°03.7	12°33.0
										Etamin	90°44.5	51°29.2
										Kaus Aust.	83°40.0	-34°22.3
										Vega	80°36.9	38°47.9
										Nunki	75°54.8	-26°16.3
										Altair	62°05.6	8°54.8
										Peacock	53°15.0	-56°40.4
										Deneb	49°29.5	45°20.4
										Enif	33°44.5	9°57.2
										Alnair	27°40.6	-46°52.4
										Fomalhaut	15°21.3	-29°31.7
										Scheat	13°51.0	28°10.4
										Markab	13°35.8	15°17.8
										2017/5/1	SHA	Mer.pass
										Venus	349°34.6	09:06
										Mars	284°25.1	13:26
										Jupiter	166°25.5	21:15
										Saturn	93°41.4	02:09
										2017/5/1	SHA	Mer.pass
										Venus	348°48.5	09:05
										Mars	283°41.1	13:25
										Jupiter	166°29.5	21:11
										Saturn	93°45.1	02:05
										2017/5/1	SHA	Mer.pass
										Venus	348°01.7	09:04
										Mars	282°57.1	13:24
										Jupiter	166°33.3	21:07
										Saturn	93°48.9	02:01
										Horizontal parallax		
										Venus:		0.3
										Mars:		0.1
Mer.pass.:8:15:		v0.5 d0.5 m-4.4		v0.6 d0.2 m1.6		v2.6 d0.1 m-2.2		v2.6 d0.0 m0.1				

h		Sun				Moon								
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	180°54.9	19°05.4	301°38.8	11.9	-18°44.4	2.5	54.6	72	--	--	--	--	--	
1	195°54.8	19°06.0	316°09.7	11.9	-18°41.9	2.6	54.6	70	--	--	--	--	--	
2	210°54.8	19°06.6	330°40.5	11.9	-18°39.3	2.6	54.6	68	--	--	01:35	22:23	--	
3	225°54.8	19°07.2	345°11.4	11.9	-18°36.6	2.7	54.6	66	--	--	02:14	21:42	--	
4	240°54.8	19°07.7	359°42.2	11.9	-18°33.8	2.8	54.6	64	--	00:51	02:40	21:15	23:11	
5	255°54.8	19°08.3	14°13.1	11.9	-18°31.0	2.9	54.6	62	--	01:42	03:01	20:54	22:15	
6	270°54.8	19°08.9	28°44.0	11.9	-18°28.0	3.0	54.7	60	--	02:12	03:18	20:37	21:43	
7	285°54.8	19°09.5	43°14.8	11.9	-18°25.0	3.1	54.7	58	00:46	02:35	03:31	20:23	21:20	
8	300°54.7	19°10.0	57°45.7	11.9	-18°21.8	3.2	54.7	56	01:32	02:53	03:43	20:11	21:02	
9	315°54.7	19°10.6	72°16.6	11.9	-18°18.6	3.3	54.7	54	02:00	03:08	03:54	20:00	20:47	
10	330°54.7	19°11.2	86°47.4	11.9	-18°15.3	3.4	54.7	52	02:21	03:20	04:03	19:51	20:34	
11	345°54.7	19°11.8	101°18.3	11.9	-18°11.9	3.4	54.7	50	02:38	03:32	04:11	19:42	20:22	
12	0°54.7	19°12.3	115°49.2	11.9	-18°08.4	3.5	54.8	45	03:10	03:54	04:29	19:25	19:59	
13	15°54.7	19°12.9	130°20.0	11.9	-18°04.9	3.6	54.8	40	03:34	04:12	04:43	19:10	19:41	
14	30°54.7	19°13.5	144°50.9	11.9	-18°01.2	3.7	54.8	35	03:52	04:27	04:55	18:58	19:27	
15	45°54.6	19°14.0	159°21.8	11.9	-17°57.5	3.8	54.8	30	04:08	04:39	05:05	18:48	19:14	
16	60°54.6	19°14.6	173°52.7	11.9	-17°53.6	3.9	54.8	20	04:31	04:59	05:23	18:30	18:54	
17	75°54.6	19°15.2	188°23.5	11.9	-17°49.7	4.0	54.9	10	04:50	05:16	05:39	18:14	18:37	
18	90°54.6	19°15.7	202°54.4	11.9	-17°45.7	4.1	54.9	0	05:05	05:31	05:53	17:60	18:22	
19	105°54.6	19°16.3	217°25.3	11.9	-17°41.6	4.1	54.9	-10	05:19	05:45	06:07	17:46	18:08	
20	120°54.6	19°16.9	231°56.2	11.9	-17°37.4	4.2	54.9	-20	05:32	05:59	06:22	17:31	17:54	
21	135°54.5	19°17.4	246°27.1	11.9	-17°33.2	4.3	54.9	-30	05:45	06:14	06:39	17:13	17:39	
22	150°54.5	19°18.0	260°58.0	11.9	-17°28.8	4.4	55.0	-35	05:51	06:22	06:49	17:03	17:31	
23	165°54.5	19°18.6	275°28.9	11.9	-17°24.4	4.5	55.0	-40	05:58	06:31	07:00	16:52	17:21	
SD.=15.8 d=0.6 S.D.=14.9								-45	06:06	06:41	07:14	16:39	17:11	17:47
								-50	06:14	06:54	07:30	16:23	16:59	17:38
								-52	06:18	06:59	07:37	16:15	16:53	17:35
								-54	06:21	07:05	07:46	16:07	16:47	17:31
								-56	06:26	07:12	07:55	15:57	16:40	17:26
								-58	06:30	07:19	08:06	15:47	16:33	17:22
								-60	06:35	07:28	08:18	15:34	16:24	17:17
								Moonrise			Moonset			
								Lat.	Tue	Wed	Thu	Tue	Wed	Thu
								72	--	03:34	03:12	--	06:14	08:17
								70	02:33	02:39	02:40	05:34	07:09	08:47
								68	01:46	02:05	02:17	06:21	07:41	09:10
								66	01:15	01:41	01:58	06:52	08:05	09:27
								64	00:52	01:22	01:43	07:14	08:24	09:41
								62	00:34	01:06	01:31	07:32	08:39	09:53
								60	00:19	00:53	01:20	07:47	08:52	10:03
								58	00:06	00:42	01:11	07:60	09:03	10:12
								56	--	00:32	01:03	08:11	09:12	10:19
								54	--	00:23	00:56	08:20	09:21	10:26
								52	--	00:15	00:49	08:29	09:28	10:32
								50	--	00:08	00:43	08:36	09:35	10:38
								45	23:53	--	00:31	08:53	09:49	10:50
								40	23:41	--	00:20	09:06	10:01	10:60
								35	23:30	--	00:11	09:17	10:11	11:08
								30	23:21	--	00:03	09:27	10:20	11:15
								20	23:05	23:49	--	09:44	10:35	11:28
								10	22:51	23:37	--	09:59	10:49	11:39
								0	22:38	23:26	--	10:13	11:01	11:49
								-10	22:25	23:15	--	10:27	11:13	11:59
								-20	22:11	23:02	23:55	10:41	11:26	12:10
								-30	21:55	22:49	23:44	10:58	11:41	12:22
								-35	21:45	22:40	23:38	11:08	11:50	12:29
								-40	21:34	22:31	23:31	11:19	11:60	12:37
								-45	21:22	22:21	23:22	11:32	12:11	12:47
								-50	21:07	22:07	23:12	11:48	12:25	12:58
								-52	20:59	22:01	23:08	11:55	12:31	13:03
								-54	20:51	21:55	23:02	12:03	12:38	13:09
								-56	20:42	21:47	22:57	12:12	12:46	13:15
								-58	20:32	21:39	22:50	12:23	12:55	13:22
								-60	20:21	21:29	22:43	12:35	13:05	13:30
								Sun			Moon			
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age		
									00 ^h	12 ^h	Pass	Upper	Lower	
								16	03:39	03:39	11:56	04:01	16:25	20(74%)
								17	03:38	03:37	11:56	04:49	17:13	21(65%)
								18	03:36	03:35	11:56	05:37	18:01	22(55%)
SD.=15.8 d=0.5 S.D.=15.2														

May 19, 20, 21 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	236°51.3	224°05.6	4°14.2	159°04.3	23°45.1	43°28.3	-4°06.7	330°44.0	-22°00.9	Alpheratz	357°41.0	29°10.9
1	251°53.7	239°06.1	4°14.7	174°05.0	23°45.2	58°30.9	-4°06.7	345°46.6	-22°00.9	Ankaa	353°13.4	-42°12.7
2	266°56.2	254°06.6	4°15.3	189°05.6	23°45.4	73°33.5	-4°06.6	0°49.3	-22°00.9	Schedar	349°37.8	56°37.6
3	281°58.7	269°07.0	4°15.9	204°06.2	23°45.6	88°36.1	-4°06.6	15°51.9	-22°00.9	Diphda	348°53.4	-17°53.6
4	297°01.1	284°07.5	4°16.4	219°06.9	23°45.7	103°38.7	-4°06.5	30°54.5	-22°00.9	Achernar	335°25.4	-57°08.9
5	312°03.6	299°08.0	4°17.0	234°07.5	23°45.9	118°41.4	-4°06.5	45°57.1	-22°00.9	Hamal	327°58.1	23°32.4
6	327°06.1	314°08.4	4°17.6	249°08.1	23°46.0	133°44.0	-4°06.4	60°59.8	-22°00.9	Polaris	317°01.9	89°20.0
7	342°08.5	329°08.9	4°18.2	264°08.8	23°46.2	148°46.6	-4°06.4	76°02.4	-22°00.9	Akamar	315°16.8	-40°14.3
8	357°11.0	344°09.4	4°18.7	279°09.4	23°46.3	163°49.2	-4°06.3	91°05.0	-22°00.9	Menkar	314°12.6	4°09.2
9	12°13.5	359°09.8	4°19.3	294°10.0	23°46.5	178°51.8	-4°06.3	106°07.7	-22°00.9	Mirfak	308°37.0	49°55.1
10	27°15.9	14°10.3	4°19.9	309°10.6	23°46.7	193°54.4	-4°06.2	121°10.3	-22°00.9	Aldebaran	290°46.7	16°32.4
11	42°18.4	29°10.8	4°20.4	324°11.3	23°46.8	208°57.0	-4°06.2	136°12.9	-22°00.9	Rigel	281°09.8	-8°11.2
12	57°20.9	44°11.2	4°21.0	339°11.9	23°47.0	223°59.6	-4°06.1	151°15.5	-22°00.9	Capella	280°31.0	46°00.8
13	72°23.3	59°11.7	4°21.6	354°12.5	23°47.1	239°02.3	-4°06.1	166°18.2	-22°00.9	Bellatrix	278°29.5	6°21.6
14	87°25.8	74°12.2	4°22.2	9°13.2	23°47.3	254°04.9	-4°06.0	181°20.8	-22°00.9	Elnath	278°09.7	28°37.1
15	102°28.2	89°12.6	4°22.7	24°13.8	23°47.4	269°07.5	-4°06.0	196°23.4	-22°00.9	Alnilam	275°44.0	-1°11.7
16	117°30.7	104°13.1	4°23.3	39°14.4	23°47.6	284°10.1	-4°05.9	211°26.0	-22°00.9	Betelgeuse	270°58.8	7°24.3
17	132°33.2	119°13.5	4°23.9	54°15.1	23°47.7	299°12.7	-4°05.9	226°28.7	-22°00.9	Canopus	263°55.4	-52°42.7
18	147°35.6	134°14.0	4°24.5	69°15.7	23°47.9	314°15.3	-4°05.8	241°31.3	-22°00.9	Sirius	258°31.6	-16°44.5
19	162°38.1	149°14.4	4°25.1	84°16.3	23°48.0	329°17.9	-4°05.8	256°33.9	-22°00.9	Adara	255°10.7	-29°00.1
20	177°40.6	164°14.9	4°25.6	99°16.9	23°48.2	344°20.5	-4°05.7	271°36.6	-22°00.9	Procyon	244°57.1	5°10.8
21	192°43.0	179°15.4	4°26.2	114°17.6	23°48.3	359°23.1	-4°05.7	286°39.2	-22°00.9	Pollux	243°24.7	27°59.0
22	207°45.5	194°15.8	4°26.8	129°18.2	23°48.5	14°25.7	-4°05.6	301°41.8	-22°00.9	Avior	234°17.2	-59°34.3
23	222°48.0	209°16.3	4°27.4	144°18.8	23°48.6	29°28.4	-4°05.6	316°44.4	-22°00.9	Suhail	222°50.6	-43°30.5
Mer.pass.:8:11:		v0.5 d0.6 m-4.4		v0.6 d0.2 m1.6		v2.6 d0.1 m-2.2		v2.6 d0.0 m0.1		Miaplacidus	221°39.2	-69°47.7
										Alphard	217°53.5	-8°44.2
										Regulus	207°40.7	11°52.9
										Dubhe	193°48.4	61°39.7
										Denebola	182°30.8	14°28.6
										Gienah	175°49.3	-17°38.4
										Acrux	173°05.8	-63°11.9
										Gacrux	171°57.5	-57°12.8
										Alioth	166°18.1	55°52.2
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.5	49°13.8
										Hadar	148°43.4	-60°27.4
										Menkent	148°04.1	-36°27.3
										Arcturus	145°52.9	19°06.0
										Rigel Kent.	139°47.4	-60°54.3
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.1	74°05.3
										Alphecca	126°08.4	26°39.5
										Antares	112°22.6	-26°28.0
										Atria	107°21.5	-69°03.2
										Sabik	102°09.2	-15°44.6
										Shaula	96°18.0	-37°06.7
										Rasalhague	96°03.7	12°33.0
										Etamin	90°44.4	51°29.2
										Kaus Aust.	83°40.0	-34°22.3
										Vega	80°36.9	38°47.9
										Nunki	75°54.8	-26°16.3
										Altair	62°05.6	8°54.8
										Peacock	53°14.9	-56°40.4
										Deneb	49°29.5	45°20.4
										Enif	33°44.5	9°57.2
										Alnair	27°40.5	-46°52.3
										Fomalhaut	15°21.3	-29°31.7
										Scheat	13°50.9	28°10.4
										Markab	13°35.8	15°17.8
										2017/5/1	SHA	Mer.pass
										Venus	347°14.3	09:03
										Mars	282°13.1	13:23
										Jupiter	166°37.0	21:02
										Saturn	93°52.7	01:57
										2017/5/2	SHA	Mer.pass
										Venus	346°26.3	09:03
										Mars	281°29.0	13:22
										Jupiter	166°40.5	20:58
										Saturn	93°56.6	01:53
										2017/5/2	SHA	Mer.pass
										Venus	345°37.7	09:02
										Mars	280°45.6	13:21
										Jupiter	166°43.9	20:54
										Saturn	94°00.6	01:48
										Horizontal parallax		
										Venus:		0.2
										Mars:		0.1
Mer.pass.:8:03:		v0.4 d0.6 m-4.3		v0.6 d0.1 m1.6		v2.6 d0.0 m-2.2		v2.6 d0.0 m0.1				

May 22, 23 ,24 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	239°48.7	224°37.2	4°56.8	159°49.7	23°55.6	46°35.9	-4°03.3	333°53.4	-22°00.7	Alpheratz	357°40.9	29°10.9
1	254°51.2	239°37.6	4°57.4	174°50.3	23°55.7	61°38.5	-4°03.2	348°56.0	-22°00.7	Ankaa	353°13.4	-42°12.6
2	269°53.6	254°38.0	4°58.0	189°51.0	23°55.8	76°41.0	-4°03.2	3°58.6	-22°00.7	Schedar	349°37.8	56°37.6
3	284°56.1	269°38.4	4°58.6	204°51.6	23°56.0	91°43.6	-4°03.1	19°01.3	-22°00.6	Diphda	348°53.4	-17°53.6
4	299°58.6	284°38.8	4°59.2	219°52.2	23°56.1	106°46.2	-4°03.1	34°03.9	-22°00.6	Achernar	335°25.4	-57°08.9
5	315°01.0	299°39.2	4°59.8	234°52.9	23°56.2	121°48.8	-4°03.0	49°06.5	-22°00.6	Hamal	327°58.1	23°32.4
6	330°03.5	314°39.6	5°00.5	249°53.5	23°56.3	136°51.4	-4°03.0	64°09.2	-22°00.6	Polaris	317°01.4	89°20.0
7	345°05.9	329°40.0	5°01.1	264°54.1	23°56.5	151°54.0	-4°02.9	79°11.8	-22°00.6	Akamar	315°16.8	-40°14.3
8	0°08.4	344°40.4	5°01.7	279°54.7	23°56.6	166°56.6	-4°02.9	94°14.4	-22°00.6	Menkar	314°12.6	4°09.2
9	15°10.9	359°40.8	5°02.3	294°55.4	23°56.7	181°59.2	-4°02.9	109°17.1	-22°00.6	Mirfak	308°37.0	49°55.1
10	30°13.3	14°41.1	5°02.9	309°56.0	23°56.9	197°01.8	-4°02.8	124°19.7	-22°00.6	Aldebaran	290°46.7	16°32.4
11	45°15.8	29°41.5	5°03.6	324°56.6	23°57.0	212°04.4	-4°02.8	139°22.3	-22°00.6	Rigel	281°09.9	-8°11.2
12	60°18.3	44°41.9	5°04.2	339°57.3	23°57.1	227°07.0	-4°02.7	154°25.0	-22°00.6	Capella	280°31.0	46°00.8
13	75°20.7	59°42.3	5°04.8	354°57.9	23°57.2	242°09.6	-4°02.7	169°27.6	-22°00.6	Bellatrix	278°29.5	6°21.6
14	90°23.2	74°42.7	5°05.4	9°58.5	23°57.4	257°12.2	-4°02.6	184°30.2	-22°00.6	Elnath	278°09.7	28°37.1
15	105°25.7	89°43.1	5°06.1	24°59.2	23°57.5	272°14.8	-4°02.6	199°32.9	-22°00.6	Alnilam	275°44.0	-1°11.7
16	120°28.1	104°43.5	5°06.7	39°59.8	23°57.6	287°17.3	-4°02.6	214°35.5	-22°00.6	Betelgeuse	270°58.8	7°24.3
17	135°30.6	119°43.9	5°07.3	55°00.4	23°57.8	302°19.9	-4°02.5	229°38.2	-22°00.6	Canopus	263°55.4	-52°42.7
18	150°33.1	134°44.3	5°07.9	70°01.0	23°57.9	317°22.5	-4°02.5	244°40.8	-22°00.6	Sirius	258°31.6	-16°44.5
19	165°35.5	149°44.6	5°08.6	85°01.7	23°58.0	332°25.1	-4°02.4	259°43.4	-22°00.6	Adara	255°10.7	-29°00.1
20	180°38.0	164°45.0	5°09.2	100°02.3	23°58.1	347°27.7	-4°02.4	274°46.1	-22°00.6	Procyon	244°57.1	5°10.8
21	195°40.4	179°45.4	5°09.8	115°02.9	23°58.3	2°30.3	-4°02.3	289°48.7	-22°00.6	Pollux	243°24.7	27°59.0
22	210°42.9	194°45.8	5°10.4	130°03.6	23°58.4	17°32.9	-4°02.3	304°51.3	-22°00.6	Avior	234°17.2	-59°34.3
23	225°45.4	209°46.2	5°11.1	145°04.2	23°58.5	32°35.5	-4°02.3	319°54.0	-22°00.6	Suhail	222°50.6	-43°30.5
Mer.pass.:7:59:		v0.4 d0.6 m-4.3		v0.6 d0.1 m1.6		v2.6 d0.0 m-2.2		v2.6 d0.0 m0.1		Miaplacidus	221°39.3	-69°47.7
										Alphard	217°53.6	-8°44.2
										Regulus	207°40.7	11°52.9
										Dubhe	193°48.4	61°39.7
										Denebola	182°30.8	14°28.6
										Gienah	175°49.4	-17°38.4
										Acrux	173°05.8	-63°11.9
										Gacrux	171°57.5	-57°12.8
										Alioth	166°18.1	55°52.2
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.5	49°13.8
										Hadar	148°43.5	-60°27.4
										Menkent	148°04.1	-36°27.3
										Arcturus	145°52.9	19°06.0
										Rigel Kent.	139°47.4	-60°54.4
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.1	74°05.3
										Alphecca	126°08.4	26°39.6
										Antares	112°22.6	-26°28.0
										Atria	107°21.5	-69°03.2
										Sabik	102°09.2	-15°44.6
										Shaula	96°17.9	-37°06.7
										Rasalhague	96°03.7	12°33.0
										Etamin	90°44.4	51°29.2
										Kaus Aust.	83°40.0	-34°22.3
										Vega	80°36.9	38°48.0
										Nunki	75°54.8	-26°16.3
										Altair	62°05.5	8°54.9
										Peacock	53°14.9	-56°40.4
										Deneb	49°29.5	45°20.4
										Enif	33°44.5	9°57.2
										Alnair	27°40.5	-46°52.3
										Fomalhaut	15°21.3	-29°31.7
										Scheat	13°50.9	28°10.4
										Markab	13°35.8	15°17.8
										2017/5/2	SHA	Mer.pass
										Venus	344°48.5	09:01
										Mars	280°01.0	13:20
										Jupiter	166°47.2	20:50
										Saturn	94°04.7	01:44
										2017/5/2	SHA	Mer.pass
										Venus	343°58.7	09:01
										Mars	279°17.0	13:19
										Jupiter	166°50.2	20:46
										Saturn	94°08.8	01:40
										2017/5/2	SHA	Mer.pass
										Venus	343°08.4	09:00
										Mars	278°33.0	13:18
										Jupiter	166°53.1	20:42
										Saturn	94°12.9	01:36
										Horizontal parallax		
										Venus:		0.2
										Mars:		0.1
Mer.pass.:7:51:		v0.4 d0.6 m-4.3		v0.6 d0.1 m1.6		v2.6 d0.0 m-2.1		v2.6 d0.0 m0.1				

May 25, 26 ,27 (Thu., Fri., Sat.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Thu	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec				
0	242°46.1	5°42.6	225°03.7	5°42.6	160°35.1	24°04.1	49°42.0	-4°00.4	337°03.2	-22°00.4	352°05.9	-22°00.4	Alpheratz	357°40.9	29°10.9					
1	257°48.6	5°43.2	240°04.1	5°43.2	175°35.7	24°04.3	64°44.6	-4°00.3	352°05.9	-22°00.4	37°13.8	-22°00.3	Ankaa	353°13.4	-42°12.6					
2	272°51.0	5°43.9	255°04.4	5°43.9	190°36.3	24°04.4	79°47.2	-4°00.3	7°08.5	-22°00.4	22°11.2	-22°00.4	Schedar	349°37.7	56°37.6					
3	287°53.5	5°44.5	270°04.7	5°44.5	205°37.0	24°04.5	94°49.7	-4°00.3	109°52.3	-4°00.2	37°13.8	-22°00.3	Diphda	348°53.4	-17°53.5					
4	302°56.0	5°45.2	285°05.1	5°45.2	220°37.6	24°04.6	109°52.3	-4°00.2	124°54.9	-4°00.2	52°16.4	-22°00.3	Achernar	335°25.4	-57°08.9					
5	317°58.4	5°45.9	300°05.4	5°45.9	235°38.2	24°04.7	124°54.9	-4°00.2	139°57.5	-4°00.2	67°19.1	-22°00.3	Hamal	327°58.1	23°32.4					
6	333°00.9	5°46.5	315°05.7	5°46.5	250°38.9	24°04.8	139°57.5	-4°00.2	155°00.0	-4°00.1	82°21.7	-22°00.3	Polaris	317°00.7	89°20.0					
7	348°03.4	5°47.2	330°06.1	5°47.2	265°39.5	24°04.9	155°00.0	-4°00.1	170°02.6	-4°00.1	97°24.4	-22°00.3	Akamar	315°16.8	-40°14.3					
8	3°05.8	5°47.8	345°06.4	5°47.8	280°40.1	24°05.0	170°02.6	-4°00.1	185°05.2	-4°00.0	112°27.0	-22°00.3	Menkar	314°12.6	4°09.2					
9	18°08.3	5°48.5	0°06.7	5°48.5	295°40.7	24°05.1	185°05.2	-4°00.0	200°07.8	-4°00.0	127°29.6	-22°00.3	Mirfak	308°37.0	49°55.0					
10	33°10.8	5°49.2	15°07.0	5°49.2	310°41.4	24°05.2	200°07.8	-4°00.0	215°10.3	-3°60.0	142°32.3	-22°00.3	Aldebaran	290°46.7	16°32.4					
11	48°13.2	5°49.8	30°07.4	5°49.8	325°42.0	24°05.3	215°10.3	-3°60.0	230°12.9	-3°59.9	157°34.9	-22°00.3	Rigel	281°09.9	-8°11.2					
12	63°15.7	5°50.5	45°07.7	5°50.5	340°42.6	24°05.4	230°12.9	-3°59.9	245°15.5	-3°59.9	172°37.6	-22°00.3	Capella	280°31.0	46°00.8					
13	78°18.1	5°51.2	60°08.0	5°51.2	355°43.3	24°05.5	245°15.5	-3°59.9	260°18.1	-3°59.9	187°40.2	-22°00.3	Bellatrix	278°29.5	6°21.7					
14	93°20.6	5°51.8	75°08.4	5°51.8	10°43.9	24°05.6	260°18.1	-3°59.9	275°20.6	-3°59.8	202°42.8	-22°00.3	Elnath	278°09.7	28°37.1					
15	108°23.1	5°52.5	90°08.7	5°52.5	25°44.5	24°05.7	275°20.6	-3°59.8	290°23.2	-3°59.8	217°45.5	-22°00.3	Alnilam	275°44.0	-1°11.7					
16	123°25.5	5°53.1	105°09.0	5°53.1	40°45.2	24°05.8	290°23.2	-3°59.8	305°25.8	-3°59.8	232°48.1	-22°00.3	Betelgeuse	270°58.8	7°24.3					
17	138°28.0	5°53.8	120°09.3	5°53.8	55°45.8	24°05.9	305°25.8	-3°59.8	320°28.3	-3°59.7	247°50.8	-22°00.3	Canopus	263°55.5	-52°42.7					
18	153°30.5	5°54.5	135°09.6	5°54.5	70°46.4	24°06.0	320°28.3	-3°59.7	335°30.9	-3°59.7	262°53.4	-22°00.3	Sirius	258°31.6	-16°44.5					
19	168°32.9	5°55.1	150°10.0	5°55.1	85°47.1	24°06.1	335°30.9	-3°59.7	350°33.5	-3°59.7	277°56.1	-22°00.3	Adara	255°10.7	-29°00.1					
20	183°35.4	5°55.8	165°10.3	5°55.8	100°47.7	24°06.2	350°33.5	-3°59.7	5°36.0	-3°59.6	292°58.7	-22°00.3	Procyon	244°57.1	5°10.8					
21	198°37.9	5°56.5	180°10.6	5°56.5	115°48.3	24°06.3	5°36.0	-3°59.6	20°38.6	-3°59.6	308°01.3	-22°00.3	Pollux	243°24.7	27°59.0					
22	213°40.3	5°57.1	195°10.9	5°57.1	130°48.9	24°06.4	20°38.6	-3°59.6	35°41.2	-3°59.6	323°04.0	-22°00.3	Avior	234°17.2	-59°34.3					
23	228°42.8	5°57.8	210°11.2	5°57.8	145°49.6	24°06.5	35°41.2	-3°59.6					Suhail	222°50.6	-43°30.5					
Mer.pass.:7:47:			v0.3 d0.7 m-4.3			v0.6 d0.1 m1.6			v2.6 d0.0 m-2.1			v2.6 d0.0 m0.1			Miaplacidus			221°39.3	-69°47.7	
															Alphard			217°53.6	-8°44.2	
															Regulus			207°40.7	11°52.9	
															Dubhe			193°48.5	61°39.7	
															Denebola			182°30.8	14°28.6	
															Gienah			175°49.4	-17°38.4	
															Acrux			173°05.8	-63°11.9	
															Gacrux			171°57.5	-57°12.8	
															Alioth			166°18.1	55°52.2	
															Spica			158°28.2	-11°15.1	
															Alcaid			152°56.5	49°13.9	
															Hadar			148°43.5	-60°27.4	
															Menkent			148°04.1	-36°27.3	
															Arcturus			145°52.9	19°06.0	
															Rigel Kent.			139°47.4	-60°54.4	
															Zubenelg.			137°02.2	-16°06.7	
															Kochab			137°19.1	74°05.3	
															Alphecca			126°08.4	26°39.6	
															Antares			112°22.6	-26°28.0	
															Atria			107°21.5	-69°03.3	
															Sabik			102°09.2	-15°44.6	
															Shaula			96°17.9	-37°06.7	
															Rasalhague			96°03.7	12°33.0	
															Etamin			90°44.4	51°29.2	
															Kaus Aust.			83°39.9	-34°22.3	
															Vega			80°36.8	38°48.0	
															Nunki			75°54.8	-26°16.3	
															Altair			62°05.5	8°54.9	
															Peacock			53°14.9	-56°40.4	
															Deneb			49°29.4	45°20.4	
															Enif			33°44.5	9°57.2	
															Alnair			27°40.5	-46°52.3	
															Fomalhaut			15°21.2	-29°31.7	
															Scheat			13°50.9	28°10.4	
															Markab			13°35.8	15°17.8	
															2017/5/2			SHA	Mer.pass	
															Venus			342°17.6	08:60	
															Mars			277°49.0	13:17	
															Jupiter			166°55.9	20:38	
															Saturn			94°17.1	01:32	
															2017/5/2			SHA	Mer.pass	
															Venus			341°26.3	08:59	
															Mars			277°05.0	13:16	
															Jupiter			166°58.5	20:34	
															Saturn			94°21.4	01:27	
															2017/5/2			SHA	Mer.pass	
															Venus			340°34.5	08:59	
															Mars			276°21.0	13:15	
															Jupiter			167°00.9	20:29	
															Saturn			94°25.7	01:23	
															Horizontal paralax					
															Venus:			0.2		
															Mars:			0.1		
Mer.pass.:7:39:			v0.3 d0.7 m-4.3			v0.6 d0.1 m1.6			v2.6 d0.0 m-2.1			v2.6 d0.0 m0.1								

h		Sun			Moon									
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
									Naut.	Civil	Sunrise	Sunset	Civil	Naut.
0	180°46.6	20°56.5	191°39.8	5.6	13°29.9	9.2	61.2	72	--	--	--	--	--	--
1	195°46.6	20°56.9	206°04.4	5.5	13°39.0	9.1	61.2	70	--	--	--	--	--	--
2	210°46.5	20°57.4	220°28.9	5.5	13°48.0	9.0	61.2	68	--	--	00:14	--	--	--
3	225°46.4	20°57.8	234°53.4	5.4	13°57.0	8.9	61.2	66	--	--	01:37	22:21	--	--
4	240°46.4	20°58.3	249°17.7	5.3	14°05.8	8.8	61.3	64	--	--	02:13	21:43	--	--
5	255°46.3	20°58.7	263°42.1	5.3	14°14.6	8.7	61.3	62	--	00:58	02:39	21:17	23:02	--
6	270°46.2	20°59.1	278°06.3	5.2	14°23.2	8.6	61.3	60	--	01:44	02:59	20:56	22:13	--
7	285°46.2	20°59.6	292°30.5	5.2	14°31.8	8.5	61.3	58	--	02:13	03:15	20:40	21:43	--
8	300°46.1	21°00.0	306°54.6	5.1	14°40.3	8.4	61.3	56	00:52	02:34	03:29	20:26	21:21	23:07
9	315°46.0	21°00.5	321°18.7	5.0	14°48.6	8.3	61.3	54	01:34	02:52	03:41	20:14	21:03	22:22
10	330°46.0	21°00.9	335°42.7	5.0	14°56.9	8.2	61.3	52	02:01	03:07	03:52	20:03	20:49	21:55
11	345°45.9	21°01.4	350°06.6	4.9	15°05.0	8.1	61.3	50	02:22	03:19	04:01	19:54	20:36	21:34
12	0°45.8	21°01.8	4°30.5	4.8	15°13.0	8.0	61.3	45	02:59	03:45	04:21	19:34	20:10	20:56
13	15°45.8	21°02.2	18°54.3	4.8	15°21.0	7.9	61.3	40	03:25	04:05	04:36	19:18	19:50	20:30
14	30°45.7	21°02.7	33°18.1	4.7	15°28.8	7.8	61.3	35	03:45	04:21	04:50	19:05	19:34	20:09
15	45°45.6	21°03.1	47°41.8	4.7	15°36.5	7.7	61.4	30	04:02	04:34	05:01	18:53	19:20	19:52
16	60°45.6	21°03.6	62°05.4	4.6	15°44.1	7.5	61.4	20	04:28	04:57	05:21	18:33	18:58	19:26
17	75°45.5	21°04.0	76°29.0	4.6	15°51.6	7.4	61.4	10	04:48	05:15	05:38	18:16	18:39	19:06
18	90°45.4	21°04.4	90°52.5	4.5	15°59.0	7.3	61.4	0	05:06	05:31	05:53	18:01	18:23	18:49
19	105°45.4	21°04.9	105°16.0	4.5	16°06.2	7.2	61.4	-10	05:21	05:47	06:09	17:45	18:07	18:33
20	120°45.3	21°05.3	119°39.5	4.4	16°13.4	7.1	61.4	-20	05:35	06:02	06:26	17:28	17:52	18:19
21	135°45.2	21°05.8	134°02.8	4.4	16°20.4	7.0	61.4	-30	05:49	06:19	06:45	17:09	17:35	18:05
22	150°45.2	21°06.2	148°26.2	4.3	16°27.3	6.8	61.4	-35	05:57	06:28	06:55	16:58	17:26	17:57
23	165°45.1	21°06.6	162°49.5	4.3	16°34.1	6.7	61.4	-40	06:05	06:38	07:08	16:46	17:16	17:49
SD.=15.8 d=0.4 S.D.=16.7								-45	06:14	06:50	07:23	16:31	17:04	17:40
								-50	06:23	07:04	07:41	16:13	16:50	17:30
								-52	06:28	07:10	07:49	16:04	16:44	17:26
								-54	06:32	07:17	07:59	15:55	16:37	17:21
								-56	06:37	07:25	08:10	15:44	16:29	17:16
								-58	06:43	07:33	08:22	15:32	16:20	17:11
								-60	06:49	07:43	08:36	15:17	16:10	17:05
								Moonrise			Moonset			
								Lat.	Thu	Fri	Sat	Thu	Fri	Sat
								72	02:05	01:46	--	22:25	--	--
								70	02:31	02:34	02:45	21:38	23:37	--
								68	02:51	03:05	03:32	21:08	22:50	--
								66	03:07	03:28	04:02	20:45	22:20	23:35
								64	03:20	03:46	04:25	20:28	21:57	23:11
								62	03:31	04:01	04:44	20:13	21:39	22:51
								60	03:41	04:14	04:59	20:01	21:24	22:35
								58	03:49	04:25	05:12	19:50	21:12	22:22
								56	03:57	04:35	05:23	19:41	21:01	22:10
								54	04:03	04:43	05:33	19:33	20:51	21:60
								52	04:09	04:51	05:42	19:26	20:43	21:51
								50	04:15	04:58	05:50	19:19	20:35	21:43
								45	04:26	05:13	06:06	19:05	20:18	21:25
								40	04:36	05:25	06:20	18:54	20:05	21:11
								35	04:45	05:36	06:32	18:44	19:54	20:59
								30	04:52	05:45	06:42	18:35	19:44	20:49
								20	05:05	06:01	07:00	18:21	19:26	20:30
								10	05:16	06:15	07:16	18:08	19:11	20:15
								0	05:27	06:28	07:30	17:56	18:57	19:60
								-10	05:38	06:41	07:45	17:44	18:43	19:45
								-20	05:49	06:55	08:00	17:31	18:28	19:29
								-30	06:03	07:11	08:18	17:16	18:11	19:11
								-35	06:10	07:21	08:29	17:08	18:01	19:00
								-40	06:19	07:32	08:41	16:58	17:50	18:48
								-45	06:30	07:45	08:55	16:47	17:36	18:34
								-50	06:42	08:00	09:12	16:33	17:20	18:16
								-52	06:48	08:08	09:21	16:27	17:13	18:08
								-54	06:55	08:16	09:30	16:20	17:04	17:59
								-56	07:02	08:25	09:40	16:12	16:55	17:48
								-58	07:10	08:36	09:52	16:03	16:44	17:36
								-60	07:19	08:48	10:06	15:53	16:31	17:23
								Sun			Moon			
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age		
									00 ^h	12 ^h	Pass	Upper	Lower	
								25	03:06	03:03	11:56	11:41	00:11	29(0%)
								26	03:00	02:57	11:57	12:42	00:11	1(1%)
								27	02:53	02:50	11:57	13:45	01:13	2(4%)
SD.=15.8 d=0.4 S.D.=16.7														

May 28, 29 ,30 (Sun., Mon., Tue.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sun	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	245°43.5	225°25.7	6°31.1	161°20.5	24°10.9	52°46.7	-3°58.1	340°13.5	-22°00.1	Alpheratz	357°40.9	29°10.9					
1	260°46.0	240°26.0	6°31.8	176°21.1	24°10.9	67°49.3	-3°58.1	355°16.2	-22°00.1	Ankaa	353°13.4	-42°12.6					
2	275°48.5	255°26.3	6°32.5	191°21.8	24°11.0	82°51.8	-3°58.1	10°18.8	-22°00.1	Schedar	349°37.7	56°37.6					
3	290°50.9	270°26.6	6°33.2	206°22.4	24°11.1	97°54.4	-3°58.0	25°21.5	-22°00.1	Diphda	348°53.3	-17°53.5					
4	305°53.4	285°26.8	6°33.9	221°23.0	24°11.2	112°57.0	-3°58.0	40°24.1	-22°00.0	Achernar	335°25.4	-57°08.9					
5	320°55.9	300°27.1	6°34.6	236°23.7	24°11.3	127°59.5	-3°58.0	55°26.8	-22°00.0	Hamal	327°58.1	23°32.4					
6	335°58.3	315°27.4	6°35.3	251°24.3	24°11.3	143°02.1	-3°57.9	70°29.4	-22°00.0	Polaris	316°59.8	89°20.0					
7	351°00.8	330°27.7	6°35.9	266°24.9	24°11.4	158°04.6	-3°57.9	85°32.1	-22°00.0	Akamar	315°16.8	-40°14.2					
8	6°03.2	345°27.9	6°36.6	281°25.6	24°11.5	173°07.2	-3°57.9	100°34.7	-22°00.0	Menkar	314°12.6	4°09.2					
9	21°05.7	0°28.2	6°37.3	296°26.2	24°11.6	188°09.7	-3°57.9	115°37.4	-22°00.0	Mirfak	308°37.0	49°55.0					
10	36°08.2	15°28.5	6°38.0	311°26.8	24°11.6	203°12.3	-3°57.8	130°40.0	-22°00.0	Aldebaran	290°46.7	16°32.4					
11	51°10.6	30°28.7	6°38.7	326°27.5	24°11.7	218°14.8	-3°57.8	145°42.7	-22°00.0	Rigel	281°09.8	-8°11.2					
12	66°13.1	45°29.0	6°39.4	341°28.1	24°11.8	233°17.4	-3°57.8	160°45.3	-22°00.0	Capella	280°31.0	46°00.8					
13	81°15.6	60°29.3	6°40.1	356°28.7	24°11.9	248°19.9	-3°57.8	175°48.0	-22°00.0	Bellatrix	278°29.5	6°21.7					
14	96°18.0	75°29.5	6°40.8	11°29.4	24°11.9	263°22.5	-3°57.7	190°50.6	-22°00.0	Elnath	278°09.6	28°37.1					
15	111°20.5	90°29.8	6°41.5	26°30.0	24°12.0	278°25.0	-3°57.7	205°53.2	-21°60.0	Alnilam	275°44.0	-1°11.7					
16	126°23.0	105°30.1	6°42.2	41°30.6	24°12.1	293°27.6	-3°57.7	220°55.9	-21°60.0	Betelgeuse	270°58.8	7°24.4					
17	141°25.4	120°30.3	6°42.9	56°31.3	24°12.2	308°30.1	-3°57.7	235°58.5	-21°60.0	Canopus	263°55.5	-52°42.6					
18	156°27.9	135°30.6	6°43.6	71°31.9	24°12.2	323°32.7	-3°57.6	251°01.2	-21°60.0	Sirius	258°31.6	-16°44.5					
19	171°30.4	150°30.8	6°44.3	86°32.5	24°12.3	338°35.2	-3°57.6	266°03.8	-21°60.0	Adara	255°10.7	-29°00.1					
20	186°32.8	165°31.1	6°45.0	101°33.2	24°12.4	353°37.8	-3°57.6	281°06.5	-21°60.0	Procyon	244°57.1	5°10.8					
21	201°35.3	180°31.4	6°45.7	116°33.8	24°12.5	8°40.3	-3°57.6	296°09.1	-21°60.0	Pollux	243°24.7	27°59.0					
22	216°37.7	195°31.6	6°46.4	131°34.4	24°12.5	23°42.9	-3°57.5	311°11.8	-21°60.0	Avior	234°17.2	-59°34.3					
23	231°40.2	210°31.9	6°47.1	146°35.0	24°12.6	38°45.4	-3°57.5	326°14.4	-21°60.0	Suhail	222°50.6	-43°30.5					
Mer.pass.:7:35:			v0.3 d0.7 m-4.3	v0.6 d0.1 m1.6	v2.6 d0.0 m-2.1	v2.6 d0.0 m0.1					Miaplacidus	221°39.3	-69°47.7				
											Alphard	217°53.6	-8°44.2				
											Regulus	207°40.7	11°52.9				
											Dubhe	193°48.5	61°39.7				
											Denebola	182°30.8	14°28.6				
											Gienah	175°49.4	-17°38.4				
											Acruz	173°05.8	-63°11.9				
											Gacrux	171°57.5	-57°12.8				
											Alioth	166°18.2	55°52.2				
											Spica	158°28.2	-11°15.1				
											Alcaid	152°56.5	49°13.9				
											Hadar	148°43.5	-60°27.4				
											Menkent	148°04.1	-36°27.3				
											Arcturus	145°52.9	19°06.0				
											Rigel Kent.	139°47.4	-60°54.4				
											Zubenelg.	137°02.2	-16°06.7				
											Kochab	137°19.2	74°05.3				
											Alphecca	126°08.4	26°39.6				
											Antares	112°22.6	-26°28.0				
											Atria	107°21.4	-69°03.3				
											Sabik	102°09.1	-15°44.6				
											Shaula	96°17.9	-37°06.7				
											Rasalhague	96°03.7	12°33.0				
											Etamin	90°44.4	51°29.3				
											Kaus Aust.	83°39.9	-34°22.3				
											Vega	80°36.8	38°48.0				
											Nunki	75°54.7	-26°16.3				
											Altair	62°05.5	8°54.9				
											Peacock	53°14.8	-56°40.4				
											Deneb	49°29.4	45°20.4				
											Enif	33°44.5	9°57.2				
											Alnair	27°40.5	-46°52.3				
											Fomalhaut	15°21.2	-29°31.7				
											Scheat	13°50.9	28°10.4				
											Markab	13°35.7	15°17.8				
											2017/5/2	SHA	Mer.pass				
											Venus	339°42.2	08:58				
											Mars	275°37.0	13:14				
											Jupiter	167°03.2	20:25				
											Saturn	94°30.0	01:19				
											2017/5/2	SHA	Mer.pass				
											Venus	338°49.5	08:58				
											Mars	274°53.0	13:13				
											Jupiter	167°05.3	20:21				
											Saturn	94°34.4	01:15				
											2017/5/3	SHA	Mer.pass				
											Venus	337°56.3	08:57				
											Mars	274°09.1	13:12				
											Jupiter	167°07.3	20:17				
											Saturn	94°38.8	01:10				
											Horizontal parallax						
											Venus:	0.2					
											Mars:	0.1					
Mer.pass.:7:27:			v0.2 d0.7 m-4.3	v0.6 d0.1 m1.6	v2.5 d0.0 m-2.1	v2.6 d0.0 m0.1											

May 31, 01 ,02 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	248°41.0	225°43.6	7°21.9	162°06.1	24°15.7	55°50.0	-3°56.5	343°24.3	-21°59.8	Alpheratz	357°40.9	29°11.0
1	263°43.4	240°43.8	7°22.6	177°06.7	24°15.8	70°52.5	-3°56.5	358°26.9	-21°59.8	Ankaa	353°13.3	-42°12.6
2	278°45.9	255°44.0	7°23.3	192°07.4	24°15.8	85°55.1	-3°56.4	13°29.6	-21°59.7	Schedar	349°37.7	56°37.6
3	293°48.3	270°44.2	7°24.0	207°08.0	24°15.9	100°57.6	-3°56.4	28°32.2	-21°59.7	Diphda	348°53.3	-17°53.5
4	308°50.8	285°44.4	7°24.7	222°08.6	24°15.9	116°00.1	-3°56.4	43°34.9	-21°59.7	Achernar	335°25.3	-57°08.9
5	323°53.3	300°44.7	7°25.4	237°09.3	24°16.0	131°02.7	-3°56.4	58°37.5	-21°59.7	Hamal	327°58.0	23°32.4
6	338°55.7	315°44.9	7°26.2	252°09.9	24°16.0	146°05.2	-3°56.4	73°40.2	-21°59.7	Polaris	316°59.1	89°20.0
7	353°58.2	330°45.1	7°26.9	267°10.5	24°16.1	161°07.7	-3°56.4	88°42.8	-21°59.7	Akamar	315°16.8	-40°14.2
8	9°00.7	345°45.3	7°27.6	282°11.2	24°16.1	176°10.3	-3°56.3	103°45.5	-21°59.7	Menkar	314°12.6	4°09.2
9	24°03.1	0°45.5	7°28.3	297°11.8	24°16.2	191°12.8	-3°56.3	118°48.1	-21°59.7	Mirfak	308°37.0	49°55.0
10	39°05.6	15°45.7	7°29.0	312°12.4	24°16.2	206°15.3	-3°56.3	133°50.8	-21°59.7	Aldebaran	290°46.7	16°32.4
11	54°08.1	30°45.9	7°29.8	327°13.1	24°16.3	221°17.8	-3°56.3	148°53.4	-21°59.7	Rigel	281°09.8	-8°11.2
12	69°10.5	45°46.1	7°30.5	342°13.7	24°16.3	236°20.4	-3°56.3	163°56.1	-21°59.7	Capella	280°31.0	46°00.8
13	84°13.0	60°46.4	7°31.2	357°14.3	24°16.4	251°22.9	-3°56.3	178°58.7	-21°59.7	Bellatrix	278°29.5	6°21.7
14	99°15.5	75°46.6	7°31.9	12°15.0	24°16.4	266°25.4	-3°56.2	194°01.4	-21°59.7	Elnath	278°09.6	28°37.1
15	114°17.9	90°46.8	7°32.7	27°15.6	24°16.5	281°28.0	-3°56.2	209°04.0	-21°59.7	Alnilam	275°44.0	-1°11.7
16	129°20.4	105°47.0	7°33.4	42°16.2	24°16.5	296°30.5	-3°56.2	224°06.7	-21°59.7	Betelgeuse	270°58.8	7°24.4
17	144°22.8	120°47.2	7°34.1	57°16.9	24°16.6	311°33.0	-3°56.2	239°09.3	-21°59.7	Canopus	263°55.5	-52°42.6
18	159°25.3	135°47.4	7°34.8	72°17.5	24°16.6	326°35.6	-3°56.2	254°12.0	-21°59.7	Sirius	258°31.6	-16°44.5
19	174°27.8	150°47.6	7°35.6	87°18.1	24°16.7	341°38.1	-3°56.2	269°14.6	-21°59.7	Adara	255°10.7	-29°00.1
20	189°30.2	165°47.8	7°36.3	102°18.8	24°16.7	356°40.6	-3°56.1	284°17.3	-21°59.7	Procyon	244°57.1	5°10.8
21	204°32.7	180°48.0	7°37.0	117°19.4	24°16.8	11°43.1	-3°56.1	299°19.9	-21°59.7	Pollux	243°24.7	27°59.0
22	219°35.2	195°48.2	7°37.7	132°20.1	24°16.8	26°45.7	-3°56.1	314°22.6	-21°59.7	Avior	234°17.3	-59°34.3
23	234°37.6	210°48.4	7°38.5	147°20.7	24°16.9	41°48.2	-3°56.1	329°25.2	-21°59.7	Suhail	222°50.6	-43°30.5
Mer.pass.:7:24:		v0.2 d0.7 m-4.3		v0.6 d0.1 m1.6		v2.5 d0.0 m-2.1		v2.7 d0.0 m0.1		Miaplacidus	221°39.4	-69°47.7
										Alphard	217°53.6	-8°44.2
										Regulus	207°40.7	11°52.9
										Dubhe	193°48.5	61°39.7
										Denebola	182°30.8	14°28.6
										Genah	175°49.4	-17°38.4
										Acruz	173°05.9	-63°11.9
										Gacrux	171°57.5	-57°12.8
										Alioth	166°18.2	55°52.2
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.5	49°13.9
										Hadar	148°43.5	-60°27.5
										Menkent	148°04.1	-36°27.3
										Arcturus	145°52.9	19°06.0
										Rigel Kent.	139°47.4	-60°54.4
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.2	74°05.3
										Alphecca	126°08.4	26°39.6
										Antares	112°22.6	-26°28.1
										Atria	107°21.4	-69°03.3
										Sabik	102°09.1	-15°44.6
										Shaula	96°17.9	-37°06.7
										Rasalhague	96°03.7	12°33.0
										Etamin	90°44.4	51°29.3
										Kaus Aust.	83°39.9	-34°22.3
										Vega	80°36.8	38°48.0
										Nunki	75°54.7	-26°16.3
										Altair	62°05.5	8°54.9
										Peacock	53°14.8	-56°40.4
										Deneb	49°29.4	45°20.4
										Enif	33°44.4	9°57.3
										Alnair	27°40.4	-46°52.3
										Fomalhaut	15°21.2	-29°31.7
										Scheat	13°50.8	28°10.4
										Markab	13°35.7	15°17.8
										2017/5/3	SHA	Mer.pass
										Venus	337°02.6	08:57
										Mars	273°25.1	13:11
										Jupiter	167°09.0	20:13
										Saturn	94°43.3	01:06
										2017/6/1	SHA	Mer.pass
										Venus	336°08.5	08:57
										Mars	272°41.2	13:10
										Jupiter	167°10.6	20:09
										Saturn	94°47.8	01:02
										2017/6/2	SHA	Mer.pass
										Venus	335°14.0	08:56
										Mars	271°57.4	13:09
										Jupiter	167°12.1	20:05
										Saturn	94°52.3	00:58
										Horizontal parallax		
										Venus:	0.2	
										Mars:	0.1	
Mer.pass.:7:16:		v0.2 d0.7 m-4.2		v0.6 d0.0 m1.7		v2.5 d0.0 m-2.1		v2.7 d0.0 m0.1				

June 03, 04 ,05 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec				
0	251°38.4	8°14.4	225°57.4	8°14.4	162°51.9	24°18.7	58°51.7	-3°55.5	346°35.3	-21°59.4	1°37.9	-21°59.4	Alpheratz	357°40.8	29°11.0					
1	266°40.8	8°15.1	240°57.6	8°15.1	177°52.5	24°18.7	73°54.3	-3°55.5	1°37.9	-21°59.4	1°37.9	-21°59.4	Ankaa	353°13.3	-42°12.6					
2	281°43.3	8°15.8	255°57.8	8°15.8	192°53.1	24°18.7	88°56.8	-3°55.5	16°40.6	-21°59.4	16°40.6	-21°59.4	Schedar	349°37.6	56°37.6					
3	296°45.8	8°16.6	270°57.9	8°16.6	207°53.8	24°18.8	103°59.3	-3°55.5	31°43.2	-21°59.4	31°43.2	-21°59.4	Diphda	348°53.3	-17°53.5					
4	311°48.2	8°17.3	285°58.1	8°17.3	222°54.4	24°18.8	119°01.8	-3°55.5	46°45.9	-21°59.4	46°45.9	-21°59.4	Achernar	335°25.3	-57°08.8					
5	326°50.7	8°18.1	300°58.3	8°18.1	237°55.1	24°18.8	134°04.3	-3°55.5	61°48.6	-21°59.4	61°48.6	-21°59.4	Hamal	327°58.0	23°32.4					
6	341°53.2	8°18.8	315°58.4	8°18.8	252°55.7	24°18.8	149°06.8	-3°55.4	76°51.2	-21°59.4	76°51.2	-21°59.4	Polaris	316°58.4	89°19.9					
7	356°55.6	8°19.5	330°58.6	8°19.5	267°56.3	24°18.9	164°09.3	-3°55.4	91°53.9	-21°59.4	91°53.9	-21°59.4	Akamar	315°16.7	-40°14.2					
8	11°58.1	8°20.3	345°58.8	8°20.3	282°57.0	24°18.9	179°11.8	-3°55.4	106°56.5	-21°59.4	106°56.5	-21°59.4	Menkar	314°12.6	4°09.2					
9	27°00.5	8°21.0	0°58.9	8°21.0	297°57.6	24°18.9	194°14.4	-3°55.4	121°59.2	-21°59.4	121°59.2	-21°59.4	Mirfak	308°37.0	49°55.0					
10	42°03.0	8°21.8	15°59.1	8°21.8	312°58.3	24°18.9	209°16.9	-3°55.4	137°01.8	-21°59.4	137°01.8	-21°59.4	Aldebaran	290°46.7	16°32.4					
11	57°05.5	8°22.5	30°59.2	8°22.5	327°58.9	24°19.0	224°19.4	-3°55.4	152°04.5	-21°59.4	152°04.5	-21°59.4	Rigel	281°09.8	-8°11.2					
12	72°07.9	8°23.3	45°59.4	8°23.3	342°59.5	24°19.0	239°21.9	-3°55.4	167°07.1	-21°59.4	167°07.1	-21°59.4	Capella	280°31.0	46°00.8					
13	87°10.4	8°24.0	60°59.5	8°24.0	358°00.2	24°19.0	254°24.4	-3°55.4	182°09.8	-21°59.4	182°09.8	-21°59.4	Bellatrix	278°29.5	6°21.7					
14	102°12.9	8°24.7	75°59.7	8°24.7	13°00.8	24°19.0	269°26.9	-3°55.4	197°12.5	-21°59.4	197°12.5	-21°59.4	Elnath	278°09.6	28°37.1					
15	117°15.3	8°25.5	90°59.9	8°25.5	28°01.4	24°19.1	284°29.4	-3°55.4	212°15.1	-21°59.4	212°15.1	-21°59.4	Alnilam	275°44.0	-1°11.7					
16	132°17.8	8°26.2	106°00.0	8°26.2	43°02.1	24°19.1	299°31.9	-3°55.4	227°17.8	-21°59.4	227°17.8	-21°59.4	Betelgeuse	270°58.8	7°24.4					
17	147°20.3	8°27.0	121°00.2	8°27.0	58°02.7	24°19.1	314°34.4	-3°55.4	242°20.4	-21°59.4	242°20.4	-21°59.4	Canopus	263°55.5	-52°42.6					
18	162°22.7	8°27.7	136°00.3	8°27.7	73°03.4	24°19.1	329°36.9	-3°55.4	257°23.1	-21°59.4	257°23.1	-21°59.4	Sirius	258°31.6	-16°44.5					
19	177°25.2	8°28.5	151°00.5	8°28.5	88°04.0	24°19.1	344°39.5	-3°55.3	272°25.7	-21°59.4	272°25.7	-21°59.4	Adara	255°10.8	-29°00.0					
20	192°27.7	8°29.2	166°00.6	8°29.2	103°04.6	24°19.2	359°42.0	-3°55.3	287°28.4	-21°59.4	287°28.4	-21°59.4	Procyon	244°57.1	5°10.8					
21	207°30.1	8°29.9	181°00.8	8°29.9	118°05.3	24°19.2	14°44.5	-3°55.3	302°31.1	-21°59.4	302°31.1	-21°59.4	Pollux	243°24.7	27°59.0					
22	222°32.6	8°30.7	196°00.9	8°30.7	133°05.9	24°19.2	29°47.0	-3°55.3	317°33.7	-21°59.3	317°33.7	-21°59.3	Avior	234°17.3	-59°34.3					
23	237°35.0	8°31.4	211°01.1	8°31.4	148°06.6	24°19.2	44°49.5	-3°55.3	332°36.4	-21°59.3	332°36.4	-21°59.3	Suhail	222°50.6	-43°30.5					
Mer.pass.:7:12:			v0.2 d0.7 m-4.2			v0.6 d0.0 m1.7			v2.5 d0.0 m-2.1			v2.7 d0.0 m0.0			Miaplacidus			221°39.4	-69°47.7	
															Alphard			217°53.6	-8°44.2	
															Regulus			207°40.7	11°52.9	
															Dubhe			193°48.5	61°39.7	
															Denebola			182°30.8	14°28.6	
															Gienah			175°49.4	-17°38.4	
															AcruX			173°05.9	-63°11.9	
															Gacrux			171°57.6	-57°12.8	
															Alioth			166°18.2	55°52.2	
															Spica			158°28.2	-11°15.1	
															Alcaid			152°56.5	49°13.9	
															Hadar			148°43.5	-60°27.5	
															Menkent			148°04.1	-36°27.3	
															Arcturus			145°52.9	19°06.0	
															Rigel Kent.			139°47.4	-60°54.4	
															Zubenelg.			137°02.2	-16°06.7	
															Kochab			137°19.2	74°05.4	
															Alphecca			126°08.4	26°39.6	
															Antares			112°22.6	-26°28.1	
															Atria			107°21.4	-69°03.3	
															Sabik			102°09.1	-15°44.6	
															Shaula			96°17.9	-37°06.7	
															Rasalhague			96°03.7	12°33.0	
															Etamin			90°44.4	51°29.3	
															Kaus Aust.			83°39.9	-34°22.3	
															Vega			80°36.8	38°48.0	
															Nunki			75°54.7	-26°16.3	
															Altair			62°05.5	8°54.9	
															Peacock			53°14.7	-56°40.4	
															Deneb			49°29.4	45°20.4	
															Enif			33°44.4	9°57.3	
															Alnair			27°40.4	-46°52.3	
															Fomalhaut			15°21.2	-29°31.7	
															Scheat			13°50.8	28°10.4	
															Markab			13°35.7	15°17.8	
															2017/6/3			SHA	Mer.pass	
															Venus			334°19.1	08:56	
															Mars			271°13.5	13:08	
															Jupiter			167°13.4	20:01	
															Saturn			94°56.9	00:53	
															2017/6/4			SHA	Mer.pass	
															Venus			333°23.7	08:56	
															Mars			270°29.7	13:07	
															Jupiter			167°14.5	19:57	
															Saturn			95°01.5	00:49	
															2017/6/5			SHA	Mer.pass	
															Venus			332°27.9	08:56	
															Mars			269°45.9	13:06	
															Jupiter			167°15.4	19:53	
															Saturn			95°06.1	00:45	
															Horizontal paralax					
															Venus:			0.2		
															Mars:			0.1		
Mer.pass.:7:04:			v0.1 d0.8 m-4.2			v0.6 d0.0 m1.7			v2.5 d0.0 m-2.1			v2.7 d0.0 m0.0								

h Sun								Moon							
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	180°28.4	22°18.3	70°35.4	13.8	2°29.9	-10.3	55.8	72	--	--	--	--	--		
1	195°28.3	22°18.7	85°08.2	13.8	2°19.6	-10.3	55.8	70	--	--	--	--	--		
2	210°28.2	22°19.0	99°41.1	13.9	2°09.3	-10.3	55.8	68	--	--	--	--	--		
3	225°28.1	22°19.3	114°14.0	13.9	1°59.0	-10.3	55.7	66	--	--	00:59	23:02	--		
4	240°28.0	22°19.6	128°46.9	13.9	1°48.6	-10.3	55.7	64	--	--	01:51	22:08	--		
5	255°27.9	22°19.9	143°19.9	14.0	1°38.3	-10.3	55.7	62	--	--	02:22	21:36	--		
6	270°27.8	22°20.2	157°52.9	14.0	1°28.0	-10.3	55.7	60	--	01:17	02:45	21:13	22:42		
7	285°27.7	22°20.5	172°25.9	14.0	1°17.7	-10.3	55.6	58	--	01:55	03:04	20:54	22:04		
8	300°27.6	22°20.8	186°59.0	14.1	1°07.4	-10.3	55.6	56	--	02:20	03:19	20:38	21:38		
9	315°27.5	22°21.1	201°32.0	14.1	0°57.1	-10.3	55.6	54	01:10	02:40	03:32	20:25	21:17		
10	330°27.4	22°21.4	216°05.2	14.1	0°46.8	-10.3	55.6	52	01:45	02:57	03:44	20:14	21:01		
11	345°27.3	22°21.7	230°38.3	14.2	0°36.5	-10.3	55.5	50	02:09	03:11	03:54	20:03	20:47		
12	0°27.2	22°22.0	245°11.5	14.2	0°26.2	-10.3	55.5	45	02:50	03:38	04:15	19:42	20:19		
13	15°27.1	22°22.3	259°44.7	14.2	0°15.9	-10.3	55.5	40	03:19	03:60	04:32	19:25	19:57		
14	30°27.0	22°22.6	274°17.9	14.2	0°05.7	-10.3	55.4	35	03:41	04:17	04:46	19:10	19:40		
15	45°26.9	22°22.9	288°51.1	14.3	-0°04.6	-10.3	55.4	30	03:59	04:32	04:59	18:58	19:25		
16	60°26.8	22°23.2	303°24.4	14.3	-0°14.9	-10.3	55.4	20	04:27	04:55	05:20	18:37	19:01		
17	75°26.7	22°23.5	317°57.7	14.3	-0°25.1	-10.2	55.4	10	04:48	05:15	05:38	18:19	18:42		
18	90°26.6	22°23.8	332°31.0	14.3	-0°35.3	-10.2	55.4	0	05:06	05:32	05:55	18:02	18:24		
19	105°26.4	22°24.1	347°04.4	14.3	-0°45.6	-10.2	55.3	-10	05:23	05:49	06:11	17:45	18:08		
20	120°26.3	22°24.4	1°37.7	14.4	-0°55.8	-10.2	55.3	-20	05:38	06:05	06:29	17:28	17:51		
21	135°26.2	22°24.7	16°11.1	14.4	-1°06.0	-10.2	55.3	-30	05:53	06:23	06:49	17:07	17:33		
22	150°26.1	22°25.0	30°44.5	14.4	-1°16.2	-10.2	55.3	-35	06:02	06:33	07:01	16:55	17:23		
23	165°26.0	22°25.2	45°17.9	14.4	-1°26.4	-10.2	55.2	-40	06:11	06:44	07:15	16:42	17:12		
SD.=15.8 d=0.3 S.D.=15.2								-45	06:20	06:57	07:30	16:26	16:59	17:36	
								-50	06:31	07:12	07:50	16:06	16:44	17:25	
								-52	06:36	07:19	07:59	15:57	16:37	17:20	
								-54	06:41	07:27	08:10	15:47	16:30	17:15	
								-56	06:47	07:35	08:22	15:35	16:21	17:09	
								-58	06:53	07:45	08:35	15:21	16:12	17:03	
								-60	07:00	07:56	08:51	15:05	16:01	16:56	
								Moonrise			Moonset				
								Lat.	Sat	Sun	Mon	Sat	Sun	Mon	
								72	13:42	15:21	16:60	01:47	01:39	01:31	
								70	13:42	15:15	16:47	01:44	01:42	01:39	
								68	13:42	15:10	16:36	01:41	01:44	01:46	
								66	13:42	15:05	16:28	01:40	01:46	01:52	
								64	13:42	15:02	16:21	01:38	01:47	01:57	
								62	13:42	14:59	16:14	01:36	01:49	02:01	
								60	13:42	14:56	16:09	01:35	01:50	02:04	
								58	13:42	14:54	16:04	01:34	01:51	02:08	
								56	13:42	14:52	16:00	01:33	01:52	02:11	
								54	13:42	14:50	15:57	01:32	01:53	02:13	
								52	13:42	14:48	15:53	01:31	01:53	02:16	
								50	13:42	14:47	15:50	01:30	01:54	02:18	
								45	13:42	14:43	15:44	01:29	01:56	02:23	
								40	13:42	14:41	15:38	01:27	01:57	02:26	
								35	13:42	14:38	15:33	01:26	01:58	02:30	
								30	13:42	14:36	15:29	01:25	01:59	02:33	
								20	13:43	14:33	15:22	01:23	02:01	02:38	
								10	13:43	14:29	15:16	01:21	02:02	02:43	
								0	13:43	14:26	15:10	01:20	02:04	02:47	
								-10	13:43	14:24	15:04	01:18	02:05	02:52	
								-20	13:43	14:20	14:58	01:16	02:07	02:56	
								-30	13:43	14:17	14:51	01:14	02:08	03:02	
								-35	13:43	14:15	14:47	01:13	02:09	03:05	
								-40	13:43	14:13	14:42	01:12	02:11	03:08	
								-45	13:43	14:10	14:37	01:10	02:12	03:12	
								-50	13:44	14:07	14:31	01:08	02:13	03:17	
								-52	13:44	14:06	14:28	01:07	02:14	03:20	
								-54	13:44	14:04	14:25	01:06	02:15	03:22	
								-56	13:44	14:02	14:22	01:05	02:16	03:25	
								-58	13:44	14:01	14:18	01:04	02:17	03:28	
								-60	13:44	13:59	14:14	01:03	02:18	03:31	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age		
									00 ^h	12 ^h	Pass	Upper	Lower		
								3	01:54	01:49	11:58	19:53	07:31	9(70%)	
								4	01:44	01:39	11:58	20:36	08:15	10(78%)	
								5	01:33	01:28	11:58	21:20	08:58	11(86%)	
SD.=15.8 d=0.3 S.D.=14.9															

June 06, 07 ,08 (Tue., Wed., Thu.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Tue	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	254°35.8	9°08.2	226°07.6	9°08.2	163°37.9	24°19.8	61°52.0	-3°55.1	349°46.6	-21°59.1	4°49.2	-21°59.1	Alpheratz	357°40.8	29°11.0		
1	269°38.2	9°08.9	241°07.7	9°08.9	178°38.6	24°19.8	76°54.5	-3°55.1	4°49.2	-21°59.1	19°51.9	-21°59.1	Ankaa	353°13.3	-42°12.6		
2	284°40.7	9°09.7	256°07.8	9°09.7	193°39.2	24°19.8	91°57.0	-3°55.1	19°51.9	-21°59.1	34°54.6	-21°59.1	Schedar	349°37.6	56°37.6		
3	299°43.2	9°10.5	271°07.9	9°10.5	208°39.9	24°19.8	106°59.5	-3°55.1	34°54.6	-21°59.1	49°57.2	-21°59.1	Diphda	348°53.3	-17°53.5		
4	314°45.6	9°11.2	286°08.0	9°11.2	223°40.5	24°19.8	122°02.0	-3°55.1	49°57.2	-21°59.1	64°59.9	-21°59.1	Achernar	335°25.3	-57°08.8		
5	329°48.1	9°12.0	301°08.1	9°12.0	238°41.1	24°19.8	137°04.5	-3°55.1	64°59.9	-21°59.1	80°02.5	-21°59.1	Hamal	327°58.0	23°32.4		
6	344°50.6	9°12.7	316°08.2	9°12.7	253°41.8	24°19.8	152°07.0	-3°55.1	80°02.5	-21°59.1	95°05.2	-21°59.1	Polaris	316°57.5	89°19.9		
7	359°53.0	9°13.5	331°08.3	9°13.5	268°42.4	24°19.8	167°09.4	-3°55.1	95°05.2	-21°59.1	110°07.8	-21°59.1	Akamar	315°16.7	-40°14.2		
8	14°55.5	9°14.2	346°08.4	9°14.2	283°43.1	24°19.8	182°11.9	-3°55.1	110°07.8	-21°59.1	125°10.5	-21°59.1	Menkar	314°12.5	4°09.3		
9	29°58.0	9°15.0	1°08.6	9°15.0	298°43.7	24°19.8	197°14.4	-3°55.2	125°10.5	-21°59.1	140°13.2	-21°59.1	Mirfak	308°36.9	49°55.0		
10	45°00.4	9°15.8	16°08.7	9°15.8	313°44.4	24°19.8	212°16.9	-3°55.2	140°13.2	-21°59.1	155°15.8	-21°59.1	Aldebaran	290°46.7	16°32.4		
11	60°02.9	9°16.5	31°08.8	9°16.5	328°45.0	24°19.8	227°19.4	-3°55.2	155°15.8	-21°59.1	170°18.5	-21°59.1	Rigel	281°09.8	-8°11.1		
12	75°05.4	9°17.3	46°08.9	9°17.3	343°45.6	24°19.8	242°21.9	-3°55.2	170°18.5	-21°59.1	185°21.1	-21°59.1	Capella	280°31.0	46°00.7		
13	90°07.8	9°18.0	61°09.0	9°18.0	358°46.3	24°19.8	257°24.4	-3°55.2	185°21.1	-21°59.1	200°23.8	-21°59.1	Bellatrix	278°29.5	6°21.7		
14	105°10.3	9°18.8	76°09.1	9°18.8	13°46.9	24°19.8	272°26.9	-3°55.2	200°23.8	-21°59.1	215°26.5	-21°59.1	Elnath	278°09.6	28°37.1		
15	120°12.7	9°19.5	91°09.2	9°19.5	28°47.6	24°19.8	287°29.4	-3°55.2	215°26.5	-21°59.1	230°29.1	-21°59.1	Alnilam	275°44.0	-1°11.7		
16	135°15.2	9°20.3	106°09.3	9°20.3	43°48.2	24°19.8	302°31.9	-3°55.2	230°29.1	-21°59.1	245°31.8	-21°59.1	Betelgeuse	270°58.8	7°24.4		
17	150°17.7	9°21.1	121°09.4	9°21.1	58°48.8	24°19.8	317°34.3	-3°55.2	245°31.8	-21°59.1	260°34.4	-21°59.0	Canopus	263°55.5	-52°42.6		
18	165°20.1	9°21.8	136°09.5	9°21.8	73°49.5	24°19.8	332°36.8	-3°55.2	260°34.4	-21°59.0	275°37.1	-21°59.0	Sirius	258°31.6	-16°44.5		
19	180°22.6	9°22.6	151°09.6	9°22.6	88°50.1	24°19.8	347°39.3	-3°55.2	275°37.1	-21°59.0	290°39.8	-21°59.0	Adara	255°10.8	-29°00.0		
20	195°25.1	9°23.3	166°09.7	9°23.3	103°50.8	24°19.8	2°41.8	-3°55.2	290°39.8	-21°59.0	305°42.4	-21°59.0	Procyon	244°57.1	5°10.8		
21	210°27.5	9°24.1	181°09.8	9°24.1	118°51.4	24°19.8	17°44.3	-3°55.2	305°42.4	-21°59.0	320°45.1	-21°59.0	Pollux	243°24.7	27°59.0		
22	225°30.0	9°24.8	196°09.9	9°24.8	133°52.1	24°19.8	32°46.8	-3°55.2	320°45.1	-21°59.0	335°47.7	-21°59.0	Avior	234°17.3	-59°34.3		
23	240°32.5	9°25.6	211°10.0	9°25.6	148°52.7	24°19.7	47°49.3	-3°55.2	335°47.7	-21°59.0			Suhail	222°50.7	-43°30.5		
Mer.pass.:7:00:			v0.1 d0.8 m-4.2			v0.6 d0.0 m1.7			v2.5 d0.0 m-2.1			v2.7 d0.0 m0.0			Miaplacidus 221°39.5 -69°47.7		
															Alphard 217°53.6 -8°44.2		
															Regulus 207°40.7 11°52.9		
															Dubhe 193°48.6 61°39.7		
															Denebola 182°30.8 14°28.6		
															Gienah 175°49.4 -17°38.4		
															Acrux 173°05.9 -63°11.9		
															Gacrux 171°57.6 -57°12.8		
															Alioth 166°18.2 55°52.3		
															Spica 158°28.2 -11°15.1		
															Alcaid 152°56.5 49°13.9		
															Hadar 148°43.5 -60°27.5		
															Menkent 148°04.1 -36°27.3		
															Arcturus 145°52.9 19°06.0		
															Rigel Kent. 139°47.4 -60°54.4		
															Zubenelg. 137°02.2 -16°06.7		
															Kochab 137°19.2 74°05.4		
															Alphecca 126°08.4 26°39.6		
															Antares 112°22.6 -26°28.1		
															Atria 107°21.4 -69°03.3		
															Sabik 102°09.1 -15°44.6		
															Shaula 96°17.9 -37°06.7		
															Rasalhague 96°03.7 12°33.0		
															Etamin 90°44.4 51°29.3		
															Kaus Aust. 83°39.9 -34°22.3		
															Vega 80°36.8 38°48.0		
															Nunki 75°54.7 -26°16.3		
															Altair 62°05.4 8°54.9		
															Peacock 53°14.7 -56°40.4		
															Deneb 49°29.3 45°20.4		
															Enif 33°44.4 9°57.3		
															Alnair 27°40.4 -46°52.3		
															Fomalhaut 15°21.1 -29°31.6		
															Scheat 13°50.8 28°10.4		
															Markab 13°35.7 15°17.8		
															2017/6/6 SHA Mer.pass		
															Venus 331°31.8 08:55		
															Mars 269°02.1 13:05		
															Jupiter 167°16.2 19:49		
															Saturn 95°10.8 00:41		
															2017/6/7 SHA Mer.pass		
															Venus 330°35.2 08:55		
															Mars 268°18.4 13:04		
															Jupiter 167°16.8 19:45		
															Saturn 95°15.5 00:37		
															2017/6/8 SHA Mer.pass		
															Venus 329°38.2 08:55		
															Mars 267°34.7 13:03		
															Jupiter 167°17.3 19:41		
															Saturn 95°20.2 00:32		
															Horizontal paralax		
															Venus: 0.2		
															Mars: 0.1		
Mer.pass.:6:52:			v0.1 d0.8 m-4.2			v0.6 d-0.0 m1.7			v2.5 d-0.0 m-2.0			v2.7 d0.0 m0.0					

June 09, 10 ,11 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	257°33.2	226°14.0	10°02.9	164°24.3	24°19.0	64°50.8	-3°55.4	352°58.1	-21°58.8	Alpheratz	357°40.8	29°11.0
1	272°35.7	241°14.1	10°03.7	179°24.9	24°19.0	79°53.2	-3°55.4	8°00.7	-21°58.8	Ankaa	353°13.2	-42°12.6
2	287°38.1	256°14.1	10°04.5	194°25.6	24°19.0	94°55.7	-3°55.5	23°03.4	-21°58.8	Schedar	349°37.6	56°37.6
3	302°40.6	271°14.2	10°05.2	209°26.2	24°19.0	109°58.2	-3°55.5	38°06.1	-21°58.8	Diphda	348°53.3	-17°53.5
4	317°43.1	286°14.3	10°06.0	224°26.9	24°18.9	125°00.7	-3°55.5	53°08.7	-21°58.8	Achernar	335°25.3	-57°08.8
5	332°45.5	301°14.3	10°06.8	239°27.5	24°18.9	140°03.1	-3°55.5	68°11.4	-21°58.8	Hamal	327°58.0	23°32.4
6	347°48.0	316°14.4	10°07.5	254°28.2	24°18.9	155°05.6	-3°55.5	83°14.0	-21°58.8	Polaris	316°56.4	89°19.9
7	2°50.5	331°14.4	10°08.3	269°28.8	24°18.9	170°08.1	-3°55.5	98°16.7	-21°58.8	Akamar	315°16.7	-40°14.2
8	17°52.9	346°14.5	10°09.1	284°29.5	24°18.8	185°10.5	-3°55.5	113°19.4	-21°58.8	Menkar	314°12.5	4°09.3
9	32°55.4	1°14.6	10°09.8	299°30.1	24°18.8	200°13.0	-3°55.5	128°22.0	-21°58.8	Mirfak	308°36.9	49°55.0
10	47°57.8	16°14.6	10°10.6	314°30.8	24°18.8	215°15.5	-3°55.5	143°24.7	-21°58.8	Aldebaran	290°46.7	16°32.4
11	63°00.3	31°14.7	10°11.4	329°31.4	24°18.8	230°17.9	-3°55.5	158°27.3	-21°58.8	Rigel	281°09.8	-8°11.1
12	78°02.8	46°14.7	10°12.1	344°32.1	24°18.7	245°20.4	-3°55.5	173°30.0	-21°58.8	Capella	280°31.0	46°00.7
13	93°05.2	61°14.8	10°12.9	359°32.7	24°18.7	260°22.9	-3°55.6	188°32.7	-21°58.8	Bellatrix	278°29.5	6°21.7
14	108°07.7	76°14.8	10°13.7	14°33.4	24°18.7	275°25.4	-3°55.6	203°35.3	-21°58.7	Elnath	278°09.6	28°37.1
15	123°10.2	91°14.9	10°14.4	29°34.0	24°18.7	290°27.8	-3°55.6	218°38.0	-21°58.7	Alnilam	275°44.0	-1°11.7
16	138°12.6	106°15.0	10°15.2	44°34.7	24°18.6	305°30.3	-3°55.6	233°40.6	-21°58.7	Betelgeuse	270°58.8	7°24.4
17	153°15.1	121°15.0	10°15.9	59°35.3	24°18.6	320°32.8	-3°55.6	248°43.3	-21°58.7	Canopus	263°55.5	-52°42.6
18	168°17.6	136°15.1	10°16.7	74°36.0	24°18.6	335°35.2	-3°55.6	263°46.0	-21°58.7	Sirius	258°31.6	-16°44.5
19	183°20.0	151°15.1	10°17.5	89°36.6	24°18.5	350°37.7	-3°55.6	278°48.6	-21°58.7	Adara	255°10.8	-29°00.0
20	198°22.5	166°15.2	10°18.2	104°37.2	24°18.5	5°40.2	-3°55.6	293°51.3	-21°58.7	Procyon	244°57.1	5°10.8
21	213°24.9	181°15.2	10°19.0	119°37.9	24°18.5	20°42.6	-3°55.6	308°54.0	-21°58.7	Pollux	243°24.7	27°59.0
22	228°27.4	196°15.3	10°19.8	134°38.5	24°18.5	35°45.1	-3°55.7	323°56.6	-21°58.7	Avior	234°17.3	-59°34.3
23	243°29.9	211°15.3	10°20.5	149°39.2	24°18.4	50°47.6	-3°55.7	338°59.3	-21°58.7	Suhail	222°50.7	-43°30.5
Mer.pass.:6:48:		v0.1 d0.8 m-4.2		v0.6 d-0.0 m1.7		v2.5 d-0.0 m-2.0		v2.7 d0.0 m0.0		Miaplacidus	221°39.5	-69°47.7
										Alphard	217°53.6	-8°44.2
										Regulus	207°40.8	11°52.9
										Dubhe	193°48.6	61°39.7
										Denebola	182°30.8	14°28.6
										Genah	175°49.4	-17°38.4
										Acrux	173°05.9	-63°12.0
										Gacrux	171°57.6	-57°12.8
										Alioth	166°18.2	55°52.3
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.5	49°13.9
										Hadar	148°43.5	-60°27.5
										Menkent	148°04.1	-36°27.3
										Arcturus	145°52.9	19°06.0
										Rigel Kent.	139°47.4	-60°54.4
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.3	74°05.4
										Alphecca	126°08.4	26°39.6
										Antares	112°22.6	-26°28.1
										Atria	107°21.4	-69°03.3
										Sabik	102°09.1	-15°44.6
										Shaula	96°17.9	-37°06.7
										Rasalhague	96°03.6	12°33.1
										Etamin	90°44.3	51°29.3
										Kaus Aust.	83°39.9	-34°22.3
										Vega	80°36.8	38°48.0
										Nunki	75°54.7	-26°16.3
										Altair	62°05.4	8°54.9
										Peacock	53°14.7	-56°40.4
										Deneb	49°29.3	45°20.5
										Enif	33°44.4	9°57.3
										Alnair	27°40.3	-46°52.3
										Fomalhaut	15°21.1	-29°31.6
										Scheat	13°50.8	28°10.4
										Markab	13°35.6	15°17.8
										2017/6/9	SHA	Mer.pass
										Venus	328°40.8	08:55
										Mars	266°51.1	13:02
										Jupiter	167°17.6	19:37
										Saturn	95°24.9	00:28
										2017/6/1	SHA	Mer.pass
										Venus	327°43.0	08:55
										Mars	266°07.5	13:01
										Jupiter	167°17.7	19:33
										Saturn	95°29.6	00:24
										2017/6/1	SHA	Mer.pass
										Venus	326°44.8	08:55
										Mars	265°23.9	12:60
										Jupiter	167°17.6	19:30
										Saturn	95°34.3	00:20
										Horizontal parallax		
										Venus:		0.2
										Mars:		0.1
Mer.pass.:6:40:		v0.0 d0.8 m-4.2		v0.7 d-0.0 m1.7		v2.5 d-0.0 m-2.0		v2.7 d0.0 m0.0				

June 12, 13, 14 (Mon., Tue., Wed.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Mon	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	260°30.6	10°58.2	226°16.9	11°00.5	165°11.0	24°16.5	67°48.0	-3°56.4	356°09.7	-21°58.5	11°12.4	-21°58.5	Alpheratz	357°40.8	29°11.0		
1	275°33.1	10°58.9	241°16.9	11°01.3	180°11.7	24°16.4	82°50.5	-3°56.4	11°12.4	-21°58.5	26°15.0	-21°58.5	Ankaa	353°13.2	-42°12.5		
2	290°35.5	10°59.7	256°16.9	11°00.5	195°12.3	24°16.4	97°52.9	-3°56.4	26°15.0	-21°58.5	41°17.7	-21°58.5	Schedar	349°37.5	56°37.6		
3	305°38.0	11°00.5	271°16.9	11°01.3	210°13.0	24°16.3	112°55.4	-3°56.4	41°17.7	-21°58.5	56°20.4	-21°58.5	Diphda	348°53.2	-17°53.5		
4	320°40.5	11°02.0	286°17.0	11°02.8	225°13.7	24°16.3	127°57.8	-3°56.4	56°20.4	-21°58.5	71°23.0	-21°58.5	Achernar	335°25.2	-57°08.8		
5	335°42.9	11°03.6	301°17.0	11°03.6	240°14.3	24°16.2	143°00.3	-3°56.4	71°23.0	-21°58.5	86°25.7	-21°58.5	Hamal	327°58.0	23°32.4		
6	350°45.4	11°04.3	316°17.0	11°05.1	255°15.0	24°16.2	158°02.7	-3°56.5	86°25.7	-21°58.5	101°28.3	-21°58.5	Polaris	316°55.4	89°19.9		
7	5°47.9	11°05.1	331°17.0	11°05.9	270°15.6	24°16.1	173°05.2	-3°56.5	101°28.3	-21°58.5	116°31.0	-21°58.5	Akamar	315°16.7	-40°14.2		
8	20°50.3	11°06.6	346°17.0	11°06.6	285°16.3	24°16.1	188°07.6	-3°56.5	116°31.0	-21°58.5	131°33.7	-21°58.4	Menkar	314°12.5	4°09.3		
9	35°52.8	11°07.4	1°17.0	11°07.4	300°16.9	24°16.0	203°10.1	-3°56.5	131°33.7	-21°58.4	146°36.3	-21°58.4	Mirfak	308°36.9	49°55.0		
10	50°55.3	11°08.2	16°17.0	11°08.2	315°17.6	24°16.0	218°12.5	-3°56.5	146°36.3	-21°58.4	161°39.0	-21°58.4	Aldebaran	290°46.6	16°32.4		
11	65°57.7	11°08.9	31°17.0	11°08.9	330°18.2	24°15.9	233°15.0	-3°56.6	161°39.0	-21°58.4	176°41.7	-21°58.4	Rigel	281°09.8	-8°11.1		
12	81°00.2	11°09.7	46°17.0	11°09.7	345°18.9	24°15.9	248°17.4	-3°56.6	176°41.7	-21°58.4	191°44.3	-21°58.4	Capella	280°31.0	46°00.7		
13	96°02.7	11°09.7	61°17.1	11°09.7	0°19.5	24°15.8	263°19.9	-3°56.6	191°44.3	-21°58.4	206°47.0	-21°58.4	Bellatrix	278°29.5	6°21.7		
14	111°05.1	11°09.7	76°17.1	11°09.7	15°20.2	24°15.8	278°22.3	-3°56.6	206°47.0	-21°58.4	221°49.6	-21°58.4	Elnath	278°09.6	28°37.1		
15	126°07.6	11°10.5	91°17.1	11°10.5	30°20.8	24°15.7	293°24.8	-3°56.6	221°49.6	-21°58.4	236°52.3	-21°58.4	Alnilam	275°44.0	-1°11.7		
16	141°10.0	11°11.3	106°17.1	11°11.3	45°21.5	24°15.7	308°27.2	-3°56.7	236°52.3	-21°58.4	251°55.0	-21°58.4	Betelgeuse	270°58.7	7°24.4		
17	156°12.5	11°12.0	121°17.1	11°12.0	60°22.1	24°15.6	323°29.7	-3°56.7	251°55.0	-21°58.4	266°57.6	-21°58.4	Canopus	263°55.5	-52°42.6		
18	171°15.0	11°12.8	136°17.1	11°12.8	75°22.8	24°15.5	338°32.1	-3°56.7	266°57.6	-21°58.4	282°00.3	-21°58.4	Sirius	258°31.6	-16°44.5		
19	186°17.4	11°13.6	151°17.1	11°13.6	90°23.4	24°15.5	353°34.6	-3°56.7	282°00.3	-21°58.4	297°03.0	-21°58.4	Adara	255°10.8	-29°00.0		
20	201°19.9	11°14.3	166°17.1	11°14.3	105°24.1	24°15.4	8°37.0	-3°56.7	297°03.0	-21°58.4	312°05.6	-21°58.4	Procyon	244°57.1	5°10.8		
21	216°22.4	11°15.1	181°17.1	11°15.1	120°24.7	24°15.4	23°39.5	-3°56.7	312°05.6	-21°58.4	327°08.3	-21°58.4	Pollux	243°24.7	27°58.9		
22	231°24.8	11°15.9	196°17.1	11°15.9	135°25.4	24°15.3	38°41.9	-3°56.8	327°08.3	-21°58.4	342°10.9	-21°58.4	Avior	234°17.4	-59°34.2		
23	246°27.3	11°15.9	211°17.1	11°15.9	150°26.1	24°15.3	53°44.4	-3°56.8	342°10.9	-21°58.4			Suhail	222°50.7	-43°30.5		
Mer.pass.:6:36:			v0.0 d0.8 m-4.2			v0.7 d-0.0 m1.7			v2.5 d-0.0 m-2.0			v2.7 d0.0 m0.0			Miaplacidus 221°39.5 -69°47.7		
															Alphard 217°53.6 -8°44.2		
															Regulus 207°40.8 11°52.9		
															Dubhe 193°48.6 61°39.7		
															Denebola 182°30.8 14°28.6		
															Gienah 175°49.4 -17°38.4		
															AcruX 173°06.0 -63°12.0		
															Gacrux 171°57.6 -57°12.8		
															Alioth 166°18.3 55°52.3		
															Spica 158°28.2 -11°15.1		
															Alcaid 152°56.5 49°13.9		
															Hadar 148°43.5 -60°27.5		
															Menkent 148°04.1 -36°27.3		
															Arcturus 145°52.9 19°06.0		
															Rigel Kent. 139°47.4 -60°54.4		
															Zubenelg. 137°02.2 -16°06.7		
															Kochab 137°19.3 74°05.4		
															Alphecca 126°08.4 26°39.6		
															Antares 112°22.6 -26°28.1		
															Atria 107°21.3 -69°03.3		
															Sabik 102°09.1 -15°44.6		
															Shaula 96°17.8 -37°06.7		
															Rasalhague 96°03.6 12°33.1		
															Etamin 90°44.3 51°29.3		
															Kaus Aust. 83°39.8 -34°22.3		
															Vega 80°36.7 38°48.1		
															Nunki 75°54.7 -26°16.3		
															Altair 62°05.4 8°54.9		
															Peacock 53°14.6 -56°40.4		
															Deneb 49°29.3 45°20.5		
															Enif 33°44.3 9°57.3		
															Alnair 27°40.3 -46°52.3		
															Fomalhaut 15°21.1 -29°31.6		
															Scheat 13°50.7 28°10.4		
															Markab 13°35.6 15°17.8		
															2017/6/1 SHA Mer.pass		
															Venus 325°46.3 08:55		
															Mars 264°40.4 12:59		
															Jupiter 167°17.4 19:26		
															Saturn 95°39.1 00:15		
															2017/6/1 SHA Mer.pass		
															Venus 324°47.3 08:55		
															Mars 263°56.9 12:58		
															Jupiter 167°17.0 19:22		
															Saturn 95°43.8 00:11		
															2017/6/1 SHA Mer.pass		
															Venus 323°48.0 08:55		
															Mars 263°13.5 12:57		
															Jupiter 167°16.5 19:18		
															Saturn 95°48.6 00:07		
															Horizontal paralax		
															Venus: 0.2		
															Mars: 0.1		
Mer.pass.:6:29:			v-0.0 d0.8 m-4.2			v0.7 d-0.1 m1.7			v2.4 d-0.0 m-2.0			v2.7 d0.0 m0.0					

h		Sun				Moon								
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	180°03.3	23°08.7	331°20.8	11.8	-19°06.9	1.8	54.4	72	--	--	--	--	--	--
1	195°03.1	23°08.8	345°51.6	11.8	-19°05.0	1.9	54.4	70	--	--	--	--	--	--
2	210°03.0	23°09.0	0°22.4	11.8	-19°03.0	2.0	54.4	68	--	--	--	--	--	--
3	225°02.9	23°09.1	14°53.2	11.8	-19°00.9	2.1	54.4	66	--	--	--	--	--	--
4	240°02.7	23°09.3	29°24.0	11.8	-18°58.8	2.2	54.4	64	--	--	01:35	22:26	--	--
5	255°02.6	23°09.5	43°54.8	11.8	-18°56.5	2.3	54.4	62	--	--	02:11	21:49	--	--
6	270°02.5	23°09.6	58°25.6	11.8	-18°54.2	2.4	54.4	60	--	00:56	02:37	21:24	23:06	--
7	285°02.4	23°09.8	72°56.4	11.8	-18°51.7	2.5	54.5	58	--	01:43	02:57	21:03	22:18	--
8	300°02.2	23°09.9	87°27.2	11.8	-18°49.2	2.6	54.5	56	--	02:12	03:14	20:47	21:49	--
9	315°02.1	23°10.1	101°58.0	11.8	-18°46.6	2.7	54.5	54	00:51	02:34	03:28	20:33	21:27	23:10
10	330°02.0	23°10.2	116°28.8	11.8	-18°43.9	2.7	54.5	52	01:35	02:51	03:40	20:21	21:09	22:26
11	345°01.8	23°10.4	130°59.6	11.8	-18°41.1	2.8	54.5	50	02:01	03:06	03:51	20:10	20:54	21:59
12	0°01.7	23°10.5	145°30.4	11.8	-18°38.2	2.9	54.5	45	02:46	03:35	04:13	19:48	20:25	21:14
13	15°01.6	23°10.7	160°01.2	11.8	-18°35.2	3.0	54.5	40	03:16	03:58	04:31	19:30	20:03	20:44
14	30°01.5	23°10.8	174°32.1	11.8	-18°32.2	3.1	54.6	35	03:39	04:16	04:46	19:15	19:44	20:21
15	45°01.3	23°11.0	189°02.9	11.8	-18°29.0	3.2	54.6	30	03:58	04:31	04:58	19:02	19:29	20:03
16	60°01.2	23°11.1	203°33.7	11.8	-18°25.8	3.3	54.6	20	04:27	04:56	05:20	18:40	19:05	19:34
17	75°01.1	23°11.3	218°04.6	11.8	-18°22.5	3.4	54.6	10	04:49	05:16	05:39	18:21	18:44	19:11
18	90°00.9	23°11.4	232°35.4	11.9	-18°19.1	3.5	54.6	0	05:08	05:34	05:56	18:04	18:26	18:52
19	105°00.8	23°11.5	247°06.3	11.9	-18°15.6	3.5	54.6	-10	05:25	05:51	06:14	17:46	18:09	18:36
20	120°00.7	23°11.7	261°37.2	11.9	-18°12.0	3.6	54.6	-20	05:41	06:08	06:32	17:28	17:52	18:20
21	135°00.6	23°11.8	276°08.0	11.9	-18°08.3	3.7	54.7	-30	05:57	06:27	06:53	17:07	17:33	18:03
22	150°00.4	23°12.0	290°38.9	11.9	-18°04.5	3.8	54.7	-35	06:06	06:37	07:05	16:55	17:23	17:55
23	165°00.3	23°12.1	305°09.8	11.9	-18°00.7	3.9	54.7	-40	06:15	06:49	07:19	16:41	17:11	17:45
SD.=15.8 d=0.2 S.D.=14.8								-45	06:25	07:02	07:36	16:24	16:58	17:35
								-50	06:37	07:18	07:57	16:03	16:42	17:23
								-52	06:42	07:26	08:06	15:54	16:35	17:18
								-54	06:48	07:34	08:17	15:43	16:26	17:13
								-56	06:54	07:43	08:30	15:30	16:17	17:06
								-58	07:00	07:53	08:44	15:16	16:07	16:60
								-60	07:08	08:04	09:02	14:58	15:56	16:52
								Moonrise			Moonset			
								Lat.	Mon	Tue	Wed	Mon	Tue	Wed
								72	--	02:19	01:35	--	03:23	05:46
								70	00:48	00:55	00:57	03:13	04:45	06:23
								68	--	00:16	00:29	04:07	05:24	06:50
								66	23:49	--	00:09	04:40	05:50	07:10
								64	23:28	23:52	--	05:04	06:11	07:26
								62	23:11	23:38	23:59	05:23	06:27	07:39
								60	22:57	23:27	23:50	05:39	06:41	07:50
								58	22:45	23:17	23:42	05:52	06:53	07:60
								56	22:35	23:08	23:35	06:04	07:03	08:08
								54	22:26	22:60	23:29	06:14	07:12	08:16
								52	22:17	22:53	23:24	06:22	07:20	08:22
								50	22:10	22:46	23:18	06:30	07:27	08:28
								45	21:54	22:33	23:07	06:47	07:43	08:41
								40	21:41	22:21	22:58	07:01	07:55	08:52
								35	21:30	22:11	22:50	07:13	08:06	09:01
								30	21:20	22:03	22:43	07:23	08:15	09:09
								20	21:03	21:48	22:31	07:41	08:31	09:23
								10	20:49	21:35	22:21	07:56	08:45	09:35
								0	20:35	21:23	22:11	08:10	08:58	09:46
								-10	20:21	21:11	22:01	08:24	09:11	09:57
								-20	20:07	20:58	21:50	08:40	09:25	10:09
								-30	19:50	20:43	21:38	08:57	09:41	10:22
								-35	19:40	20:34	21:31	09:07	09:50	10:30
								-40	19:29	20:25	21:23	09:18	10:00	10:39
								-45	19:16	20:13	21:13	09:32	10:13	10:49
								-50	18:60	19:59	21:02	09:48	10:27	11:01
								-52	18:52	19:52	20:57	09:56	10:34	11:07
								-54	18:44	19:45	20:51	10:05	10:42	11:13
								-56	18:34	19:37	20:44	10:14	10:50	11:20
								-58	18:23	19:28	20:37	10:25	10:60	11:28
								-60	18:11	19:17	20:28	10:38	11:11	11:37
								Sun			Moon			
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age	
									00 ^h	12 ^h	Pass	Upper	Lower	
								12	00:13	00:07	11:59	01:58	14:22	18(92%)
								13	00:01	00:06	12:00	02:46	15:10	19(86%)
								14	00:12	00:18	12:00	03:34	15:58	20(79%)
SD.=15.7 d=0.1 S.D.=15.0														

June 15, 16 ,17 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	263°28.0	226°16.3	11°53.5	165°58.2	24°12.1	70°43.8	-3°57.9	359°21.4	-21°58.2	Alpheratz	357°40.7	29°11.0
1	278°30.5	241°16.3	11°54.3	180°58.8	24°12.0	85°46.3	-3°57.9	14°24.1	-21°58.2	Ankaa	353°13.2	-42°12.5
2	293°33.0	256°16.2	11°55.1	195°59.5	24°11.9	100°48.7	-3°58.0	29°26.7	-21°58.2	Schedar	349°37.5	56°37.6
3	308°35.4	271°16.2	11°55.8	211°00.2	24°11.9	115°51.1	-3°58.0	44°29.4	-21°58.2	Diphda	348°53.2	-17°53.5
4	323°37.9	286°16.2	11°56.6	226°00.8	24°11.8	130°53.6	-3°58.0	59°32.1	-21°58.2	Achernar	335°25.2	-57°08.8
5	338°40.4	301°16.1	11°57.4	241°01.5	24°11.7	145°56.0	-3°58.0	74°34.7	-21°58.1	Hamal	327°57.9	23°32.4
6	353°42.8	316°16.1	11°58.1	256°02.1	24°11.6	160°58.4	-3°58.1	89°37.4	-21°58.1	Polaris	316°54.4	89°19.9
7	8°45.3	331°16.1	11°58.9	271°02.8	24°11.6	176°00.8	-3°58.1	104°40.1	-21°58.1	Akamar	315°16.7	-40°14.1
8	23°47.8	346°16.0	11°59.7	286°03.5	24°11.5	191°03.3	-3°58.1	119°42.7	-21°58.1	Menkar	314°12.5	4°09.3
9	38°50.2	1°16.0	12°00.4	301°04.1	24°11.4	206°05.7	-3°58.1	134°45.4	-21°58.1	Mirfak	308°36.9	49°55.0
10	53°52.7	16°16.0	12°01.2	316°04.8	24°11.3	221°08.1	-3°58.2	149°48.0	-21°58.1	Aldebaran	290°46.6	16°32.4
11	68°55.1	31°15.9	12°02.0	331°05.4	24°11.3	236°10.6	-3°58.2	164°50.7	-21°58.1	Rigel	281°09.8	-8°11.1
12	83°57.6	46°15.9	12°02.7	346°06.1	24°11.2	251°13.0	-3°58.2	179°53.4	-21°58.1	Capella	280°31.0	46°00.7
13	99°00.1	61°15.8	12°03.5	1°06.7	24°11.1	266°15.4	-3°58.3	194°56.0	-21°58.1	Bellatrix	278°29.5	6°21.7
14	114°02.5	76°15.8	12°04.3	16°07.4	24°11.0	281°17.8	-3°58.3	209°58.7	-21°58.1	Elnath	278°09.6	28°37.1
15	129°05.0	91°15.8	12°05.0	31°08.1	24°10.9	296°20.3	-3°58.3	225°01.4	-21°58.1	Alnilam	275°44.0	-1°11.7
16	144°07.5	106°15.7	12°05.8	46°08.7	24°10.9	311°22.7	-3°58.3	240°04.0	-21°58.1	Betelgeuse	270°58.7	7°24.4
17	159°09.9	121°15.7	12°06.6	61°09.4	24°10.8	326°25.1	-3°58.4	255°06.7	-21°58.1	Canopus	263°55.5	-52°42.5
18	174°12.4	136°15.6	12°07.3	76°10.0	24°10.7	341°27.6	-3°58.4	270°09.4	-21°58.1	Sirius	258°31.6	-16°44.5
19	189°14.9	151°15.6	12°08.1	91°10.7	24°10.6	356°30.0	-3°58.4	285°12.0	-21°58.1	Adara	255°10.8	-29°00.0
20	204°17.3	166°15.5	12°08.9	106°11.4	24°10.6	11°32.4	-3°58.5	300°14.7	-21°58.1	Procyon	244°57.1	5°10.8
21	219°19.8	181°15.5	12°09.6	121°12.0	24°10.5	26°34.8	-3°58.5	315°17.3	-21°58.1	Pollux	243°24.7	27°58.9
22	234°22.3	196°15.4	12°10.4	136°12.7	24°10.4	41°37.3	-3°58.5	330°20.0	-21°58.1	Avior	234°17.4	-59°34.2
23	249°24.7	211°15.4	12°11.2	151°13.3	24°10.3	56°39.7	-3°58.5	345°22.7	-21°58.1	Suhail	222°50.7	-43°30.5
Mer.pass.:6:25:		v-0.0 d0.8 m-4.2		v0.7 d-0.1 m1.7		v2.4 d-0.0 m-2.0		v2.7 d0.0 m0.0		Miaplacidus	221°39.6	-69°47.7
										Alphard	217°53.6	-8°44.2
										Regulus	207°40.8	11°52.9
										Dubhe	193°48.6	61°39.7
										Denebola	182°30.9	14°28.6
										Genah	175°49.4	-17°38.4
										Acrux	173°06.0	-63°12.0
										Gacrux	171°57.6	-57°12.8
										Alioth	166°18.3	55°52.3
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.6	49°13.9
										Hadar	148°43.5	-60°27.5
										Menkent	148°04.1	-36°27.3
										Arcturus	145°52.9	19°06.0
										Rigel Kent.	139°47.5	-60°54.4
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.3	74°05.4
										Alphecca	126°08.4	26°39.6
										Antares	112°22.6	-26°28.1
										Atria	107°21.3	-69°03.4
										Sabik	102°09.1	-15°44.6
										Shaula	96°17.8	-37°06.8
										Rasalhague	96°03.6	12°33.1
										Etamin	90°44.3	51°29.4
										Kaus Aust.	83°39.8	-34°22.3
										Vega	80°36.7	38°48.1
										Nunki	75°54.6	-26°16.3
										Altair	62°05.4	8°54.9
										Peacock	53°14.6	-56°40.4
										Deneb	49°29.3	45°20.3
										Enif	33°44.3	9°57.3
										Alnair	27°40.3	-46°52.3
										Fomalhaut	15°21.0	-29°31.6
										Scheat	13°50.7	28°10.4
										Markab	13°35.6	15°17.8
										2017/6/1	SHA	Mer.pass
										Venus	322°48.3	08:55
										Mars	262°30.1	12:56
										Jupiter	167°15.8	19:14
										Saturn	95°53.4	00:03
										2017/6/1	SHA	Mer.pass
										Venus	321°48.2	08:55
										Mars	261°46.8	12:54
										Jupiter	167°14.9	19:10
										Saturn	95°58.2	23:54
										2017/6/1	SHA	Mer.pass
										Venus	320°47.7	08:55
										Mars	261°03.6	12:53
										Jupiter	167°13.9	19:06
										Saturn	96°02.9	23:50
										Horizontal parallax		
										Venus:		0.2
										Mars:		0.1
Mer.pass.:6:17:		v-0.1 d0.8 m-4.1		v0.7 d-0.1 m1.7		v2.4 d-0.0 m-2.0		v2.7 d0.0 m0.0				

h Sun Moon

Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	179°53.9	23°18.2	296°34.9	12.4	-13°11.5	7.8	55.7	72	--	--	--	--	--	--
1	194°53.7	23°18.3	311°06.2	12.4	-13°03.7	7.8	55.7	70	--	--	--	--	--	--
2	209°53.6	23°18.4	325°37.6	12.4	-12°55.8	7.9	55.7	68	--	--	--	--	--	--
3	224°53.5	23°18.5	340°09.0	12.4	-12°47.9	8.0	55.8	66	--	--	--	--	--	--
4	239°53.3	23°18.6	354°40.3	12.4	-12°39.9	8.0	55.8	64	--	--	--	--	--	--
5	254°53.2	23°18.7	9°11.7	12.4	-12°31.8	8.1	55.8	62	--	01:33	22:30	--	--	--
6	269°53.1	23°18.8	23°43.1	12.4	-12°23.7	8.2	55.8	60	--	--	02:10	21:52	--	--
7	284°52.9	23°18.9	38°14.5	12.4	-12°15.5	8.2	55.9	58	--	00:52	02:36	21:26	23:11	--
8	299°52.8	23°19.0	52°45.9	12.4	-12°07.3	8.3	55.9	56	--	01:41	02:56	21:05	22:21	--
9	314°52.7	23°19.1	67°17.3	12.4	-11°58.9	8.4	55.9	54	--	02:11	03:13	20:49	21:51	--
10	329°52.5	23°19.2	81°48.7	12.4	-11°50.5	8.4	55.9	52	00:47	02:33	03:27	20:35	21:29	23:15
11	344°52.4	23°19.3	96°20.2	12.4	-11°42.1	8.5	56.0	50	01:33	02:51	03:39	20:22	21:11	22:29
12	359°52.3	23°19.4	110°51.6	12.4	-11°33.6	8.5	56.0	50	02:00	03:06	03:50	20:11	20:56	22:01
13	14°52.1	23°19.5	125°23.0	12.4	-11°25.0	8.6	56.0	45	02:46	03:35	04:13	19:49	20:26	21:16
14	29°52.0	23°19.6	139°54.4	12.4	-11°16.4	8.7	56.0	40	03:16	03:58	04:31	19:31	20:04	20:45
15	44°51.9	23°19.7	154°25.9	12.4	-11°07.7	8.7	56.1	35	03:39	04:16	04:46	19:16	19:46	20:22
16	59°51.7	23°19.8	168°57.3	12.4	-10°58.9	8.8	56.1	30	03:58	04:31	04:59	19:03	19:30	20:04
17	74°51.6	23°19.9	183°28.7	12.4	-10°50.1	8.9	56.1	20	04:27	04:56	05:21	18:41	19:05	19:35
18	89°51.5	23°20.0	198°00.2	12.4	-10°41.2	8.9	56.2	10	04:49	05:16	05:40	18:22	18:45	19:12
19	104°51.3	23°20.1	212°31.6	12.4	-10°32.3	9.0	56.2	0	05:08	05:35	05:57	18:04	18:27	18:53
20	119°51.2	23°20.2	227°03.0	12.4	-10°23.2	9.0	56.2	-10	05:25	05:52	06:14	17:47	18:10	18:36
21	134°51.1	23°20.2	241°34.5	12.4	-10°14.2	9.1	56.2	-20	05:41	06:09	06:33	17:28	17:53	18:20
22	149°50.9	23°20.3	256°05.9	12.4	-10°05.1	9.1	56.3	-30	05:58	06:28	06:54	17:07	17:34	18:04
23	164°50.8	23°20.4	270°37.3	12.4	-9°55.9	9.2	56.3	-35	06:07	06:38	07:06	16:55	17:23	17:55
SD.=15.7 d=0.1 S.D.=15.2								-40	06:16	06:50	07:21	16:41	17:11	17:45
								-45	06:26	07:04	07:37	16:24	16:58	17:35
								-50	06:38	07:20	07:58	16:03	16:42	17:23
								-52	06:43	07:27	08:08	15:53	16:34	17:18
								-54	06:49	07:35	08:19	15:42	16:26	17:12
								-56	06:55	07:44	08:32	15:30	16:17	17:06
								-58	07:02	07:54	08:46	15:15	16:07	16:60
								-60	07:09	08:06	09:04	14:58	15:55	16:52
								Moonrise			Moonset			
								Lat.	Thu	Fri	Sat	Thu	Fri	Sat
								72	01:20	01:09	00:60	07:40	09:29	11:18
								70	00:56	00:54	00:52	08:03	09:43	11:24
								68	00:37	00:42	00:45	08:20	09:53	11:28
								66	00:22	00:32	00:40	08:34	10:02	11:32
								64	00:10	00:24	00:35	08:46	10:09	11:35
								62	--	00:16	00:31	08:55	10:15	11:38
								60	--	00:10	00:27	09:04	10:21	11:41
								58	--	00:04	00:24	09:11	10:26	11:43
								56	23:59	--	00:21	09:17	10:30	11:45
								54	23:55	--	00:19	09:23	10:34	11:46
								52	23:51	--	00:16	09:28	10:37	11:48
								50	23:47	--	00:14	09:33	10:40	11:49
								45	23:39	--	00:10	09:43	10:47	11:52
								40	23:33	--	00:06	09:51	10:52	11:55
								35	23:27	--	00:02	09:58	10:57	11:57
								30	23:22	23:59	--	10:05	11:01	11:59
								20	23:13	23:54	--	10:15	11:08	12:03
								10	23:05	23:50	--	10:25	11:15	12:05
								0	22:58	23:45	--	10:33	11:21	12:08
								-10	22:51	23:41	--	10:42	11:26	12:11
								-20	22:43	23:36	--	10:51	11:33	12:14
								-30	22:34	23:31	--	11:02	11:40	12:17
								-35	22:29	23:28	--	11:08	11:44	12:19
								-40	22:23	23:25	--	11:14	11:48	12:21
								-45	22:16	23:21	--	11:22	11:53	12:23
								-50	22:08	23:16	--	11:32	11:59	12:26
								-52	22:04	23:14	--	11:36	12:02	12:27
								-54	21:60	23:11	--	11:41	12:05	12:28
								-56	21:55	23:09	--	11:46	12:09	12:30
								-58	21:50	23:06	--	11:52	12:13	12:32
								-60	21:44	23:02	--	11:59	12:17	12:33
								Sun			Moon			
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age	
									00 ^h	12 ^h	Pass	Upper	Lower	
								15	00:25	00:31	12:00	04:22	16:45	21(70%)
								16	00:37	00:44	12:00	05:09	17:32	22(60%)
								17	00:50	00:57	12:00	05:56	18:20	23(50%)
SD.=15.7 d=0.1 S.D.=15.6														

June 21, 22 ,23 (Wed., Thu., Fri.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Wed	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	269°22.9	13°42.9	226°04.9	13°42.9	167°33.9	23°58.0	76°31.0	-4°02.9	5°44.8	-21°57.5	Alpheratz	357°40.7	29°11.0	Alpheratz	357°40.7	29°11.0	
1	284°25.3	13°43.7	241°04.8	13°43.7	182°34.6	23°57.8	91°33.4	-4°02.9	20°47.5	-21°57.5	Ankaa	353°13.1	-42°12.5	Ankaa	353°13.1	-42°12.5	
2	299°27.8	13°44.4	256°04.7	13°44.4	197°35.2	23°57.7	106°35.8	-4°02.9	35°50.2	-21°57.5	Schedar	349°37.4	56°37.6	Schedar	349°37.4	56°37.6	
3	314°30.3	13°45.1	271°04.5	13°45.1	212°35.9	23°57.6	121°38.2	-4°03.0	50°52.8	-21°57.5	Diphda	348°53.2	-17°53.4	Diphda	348°53.2	-17°53.4	
4	329°32.7	13°45.9	286°04.4	13°45.9	227°36.6	23°57.5	136°40.6	-4°03.0	65°55.5	-21°57.5	Achernar	335°25.1	-57°08.8	Achernar	335°25.1	-57°08.8	
5	344°35.2	13°46.6	301°04.3	13°46.6	242°37.2	23°57.4	151°43.0	-4°03.1	80°58.1	-21°57.5	Hamal	327°57.9	23°32.4	Hamal	327°57.9	23°32.4	
6	359°37.7	13°47.4	316°04.1	13°47.4	257°37.9	23°57.2	166°45.3	-4°03.1	96°00.8	-21°57.5	Polaris	316°52.1	89°19.9	Polaris	316°52.1	89°19.9	
7	14°40.1	13°48.1	331°04.0	13°48.1	272°38.6	23°57.1	181°47.7	-4°03.2	111°03.5	-21°57.5	Akamar	315°16.6	-40°14.1	Akamar	315°16.6	-40°14.1	
8	29°42.6	13°48.9	346°03.9	13°48.9	287°39.3	23°57.0	196°50.1	-4°03.2	126°06.1	-21°57.5	Menkar	314°12.5	4°09.3	Menkar	314°12.5	4°09.3	
9	44°45.0	13°49.6	1°03.7	13°49.6	302°39.9	23°56.9	211°52.5	-4°03.2	141°08.8	-21°57.5	Mirfak	308°36.8	49°55.0	Mirfak	308°36.8	49°55.0	
10	59°47.5	13°50.4	16°03.6	13°50.4	317°40.6	23°56.7	226°54.9	-4°03.3	156°11.4	-21°57.5	Aldebaran	290°46.6	16°32.4	Aldebaran	290°46.6	16°32.4	
11	74°50.0	13°51.1	31°03.5	13°51.1	332°41.3	23°56.6	241°57.3	-4°03.3	171°14.1	-21°57.5	Rigel	281°09.8	-8°11.1	Rigel	281°09.8	-8°11.1	
12	89°52.4	13°51.9	46°03.3	13°51.9	347°41.9	23°56.5	256°59.7	-4°03.4	186°16.8	-21°57.5	Capella	280°30.9	46°00.7	Capella	280°30.9	46°00.7	
13	104°54.9	13°52.6	61°03.2	13°52.6	2°42.6	23°56.3	272°02.1	-4°03.4	201°19.4	-21°57.5	Bellatrix	278°29.4	6°21.7	Bellatrix	278°29.4	6°21.7	
14	119°57.4	13°53.4	76°03.1	13°53.4	17°43.3	23°56.2	287°04.4	-4°03.5	216°22.1	-21°57.5	Elnath	278°09.6	28°37.1	Elnath	278°09.6	28°37.1	
15	134°59.8	13°54.1	91°02.9	13°54.1	32°44.0	23°56.1	302°06.8	-4°03.5	231°24.7	-21°57.5	Alnilam	275°44.0	-1°11.7	Alnilam	275°44.0	-1°11.7	
16	150°02.3	13°54.8	106°02.8	13°54.8	47°44.6	23°56.0	317°09.2	-4°03.6	246°27.4	-21°57.5	Betelgeuse	270°58.7	7°24.4	Betelgeuse	270°58.7	7°24.4	
17	165°04.8	13°55.6	121°02.7	13°55.6	62°45.3	23°55.8	332°11.6	-4°03.6	261°30.1	-21°57.5	Canopus	263°55.5	-52°42.5	Canopus	263°55.5	-52°42.5	
18	180°07.2	13°56.3	136°02.5	13°56.3	77°46.0	23°55.7	347°14.0	-4°03.6	276°32.7	-21°57.5	Sirius	258°31.6	-16°44.4	Sirius	258°31.6	-16°44.4	
19	195°09.7	13°57.1	151°02.4	13°57.1	92°46.7	23°55.6	2°16.4	-4°03.7	291°35.4	-21°57.5	Adara	255°10.8	-28°60.0	Adara	255°10.8	-28°60.0	
20	210°12.2	13°57.8	166°02.3	13°57.8	107°47.3	23°55.5	17°18.8	-4°03.7	306°38.1	-21°57.4	Procyon	244°57.1	5°10.8	Procyon	244°57.1	5°10.8	
21	225°14.6	13°58.6	181°02.1	13°58.6	122°48.0	23°55.3	32°21.1	-4°03.8	321°40.7	-21°57.4	Pollux	243°24.7	27°58.9	Pollux	243°24.7	27°58.9	
22	240°17.1	13°59.3	196°02.0	13°59.3	137°48.7	23°55.2	47°23.5	-4°03.8	336°43.4	-21°57.4	Avior	234°17.4	-59°34.2	Avior	234°17.4	-59°34.2	
23	255°19.5	14°00.1	211°01.8	14°00.1	152°49.4	23°55.1	62°25.9	-4°03.9	351°46.0	-21°57.4	Suhail	222°50.7	-43°30.4	Suhail	222°50.7	-43°30.4	
Mer.pass.:6:01:			v-0.1 d0.7 m-4.1			v0.7 d-0.1 m1.7			v2.4 d-0.0 m-2.0			v2.7 d0.0 m0.0			Miaplacidus		
															Alphard		
															Regulus		
															Dubhe		
															Denebola		
															Gienah		
															AcruX		
															Gacrux		
															Alioth		
															Spica		
															Alcaid		
															Hadar		
															Menkent		
															Arcturus		
															Rigel Kent.		
															Zubenelg.		
															Kochab		
															Alphecca		
															Antares		
															Atria		
															Sabik		
															Shaula		
															Rasalhague		
															Etamin		
															Kaus Aust.		
															Vega		
															Nunki		
															Altair		
															Peacock		
															Deneb		
															Enif		
															Alnair		
															Fomalhaut		
															Scheat		
															Markab		
															2017/6/2		
															SHA		
															Mer.pass		
															Venus		
															Mars		
															Jupiter		
															Saturn		
															2017/6/2		
															SHA		
															Mer.pass		
															Venus		
															Mars		
															Jupiter		
															Saturn		
															2017/6/2		
															SHA		
															Mer.pass		
															Venus		
															Mars		
															Jupiter		
															Saturn		
															Horizontal paralax		
															Venus:		
															Mars:		
															0.2		
															0.1		
Mer.pass.:5:53:			v-0.2 d0.7 m-4.1			v0.7 d-0.1 m1.7			v2.4 d-0.0 m-1.9			v2.7 d0.0 m0.0					

June 24, 25 ,26 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec						
0	272°20.3	14°36.2	225°54.2	14°36.2	168°22.5	23°48.3	79°22.4	-4°06.2	8°56.4	-21°57.2			Alpheratz	357°40.7	29°11.0					
1	287°22.8	14°36.9	240°54.0	14°36.9	183°23.2	23°48.1	94°24.8	-4°06.3	23°59.0	-21°57.2			Ankaa	353°13.1	-42°12.5					
2	302°25.2	14°37.6	255°53.9	14°37.6	198°23.9	23°48.0	109°27.1	-4°06.3	39°01.7	-21°57.2			Schedar	349°37.4	56°37.6					
3	317°27.7	14°38.4	270°53.7	14°38.4	213°24.6	23°47.8	124°29.5	-4°06.4	54°04.4	-21°57.2			Diphda	348°53.1	-17°53.4					
4	332°30.1	14°39.1	285°53.5	14°39.1	228°25.2	23°47.7	139°31.9	-4°06.4	69°07.0	-21°57.2			Achernar	335°25.1	-57°08.7					
5	347°32.6	14°39.8	300°53.3	14°39.8	243°25.9	23°47.5	154°34.3	-4°06.5	84°09.7	-21°57.2			Hamal	327°57.9	23°32.4					
6	2°35.1	14°40.5	315°53.2	14°40.5	258°26.6	23°47.4	169°36.6	-4°06.5	99°12.3	-21°57.2			Polaris	316°50.7	89°19.9					
7	17°37.5	14°41.3	330°53.0	14°41.3	273°27.3	23°47.3	184°39.0	-4°06.6	114°15.0	-21°57.2			Akamar	315°16.6	-40°14.1					
8	32°40.0	14°42.0	345°52.8	14°42.0	288°28.0	23°47.1	199°41.4	-4°06.7	129°17.7	-21°57.2			Menkar	314°12.4	4°09.3					
9	47°42.5	14°42.7	0°52.6	14°42.7	303°28.6	23°47.0	214°43.7	-4°06.7	144°20.3	-21°57.2			Mirfak	308°36.8	49°55.0					
10	62°44.9	14°43.5	15°52.5	14°43.5	318°29.3	23°46.8	229°46.1	-4°06.8	159°23.0	-21°57.2			Aldebaran	290°46.6	16°32.4					
11	77°47.4	14°44.2	30°52.3	14°44.2	333°30.0	23°46.7	244°48.5	-4°06.8	174°25.6	-21°57.2			Rigel	281°09.8	-8°11.1					
12	92°49.9	14°44.9	45°52.1	14°44.9	348°30.7	23°46.5	259°50.8	-4°06.9	189°28.3	-21°57.2			Capella	280°30.9	46°00.7					
13	107°52.3	14°45.6	60°51.9	14°45.6	3°31.4	23°46.4	274°53.2	-4°06.9	204°31.0	-21°57.2			Bellatrix	278°29.4	6°21.7					
14	122°54.8	14°46.4	75°51.8	14°46.4	18°32.0	23°46.2	289°55.6	-4°07.0	219°33.6	-21°57.2			Elnath	278°09.6	28°37.1					
15	137°57.3	14°47.1	90°51.6	14°47.1	33°32.7	23°46.1	304°57.9	-4°07.0	234°36.3	-21°57.2			Alnilam	275°44.0	-1°11.7					
16	152°59.7	14°47.8	105°51.4	14°47.8	48°33.4	23°45.9	320°00.3	-4°07.1	249°38.9	-21°57.2			Betelgeuse	270°58.7	7°24.4					
17	168°02.2	14°48.5	120°51.2	14°48.5	63°34.1	23°45.7	335°02.7	-4°07.1	264°41.6	-21°57.2			Canopus	263°55.5	-52°42.5					
18	183°04.6	14°49.3	135°51.0	14°49.3	78°34.8	23°45.6	350°05.0	-4°07.2	279°44.3	-21°57.2			Sirius	258°31.6	-16°44.4					
19	198°07.1	14°50.0	150°50.8	14°50.0	93°35.4	23°45.4	5°07.4	-4°07.2	294°46.9	-21°57.2			Adara	255°10.8	-28°60.0					
20	213°09.6	14°50.7	165°50.7	14°50.7	108°36.1	23°45.3	20°09.8	-4°07.3	309°49.6	-21°57.1			Procyon	244°57.1	5°10.8					
21	228°12.0	14°51.4	180°50.5	14°51.4	123°36.8	23°45.1	35°12.1	-4°07.3	324°52.2	-21°57.1			Pollux	243°24.7	27°58.9					
22	243°14.5	14°52.2	195°50.3	14°52.2	138°37.5	23°45.0	50°14.5	-4°07.4	339°54.9	-21°57.1			Avior	234°17.4	-59°34.2					
23	258°17.0	14°52.9	210°50.1	14°52.9	153°38.2	23°44.8	65°16.9	-4°07.4	354°57.5	-21°57.1			Suhail	222°50.7	-43°30.4					
Mer.pass.:5:49:			v-0.2 d0.7 m-4.1			v0.7 d-0.1 m1.7			v2.4 d-0.1 m-1.9			v2.7 d0.0 m0.0			Miaplacidus 221°39.7 -69°47.6					
Alphard 217°53.6 -8°44.2			Regulus 207°40.8 11°52.9			Dubhe 193°48.7 61°39.7			Denebola 182°30.9 14°28.6			Gienah 175°49.4 -17°38.4			Acrux 173°06.1 -63°12.0					
Gacrux 171°57.7 -57°12.9			Alioth 166°18.3 55°52.3			Spica 158°28.3 -11°15.1			Alcaid 152°56.6 49°14.0			Hadar 148°43.6 -60°27.5			Menkent 148°04.1 -36°27.4					
Arcturus 145°52.9 19°06.0			Rigel Kent. 139°47.5 -60°54.5			Zubenelg. 137°02.2 -16°06.7			Kochab 137°19.5 74°05.4			Alphecca 126°08.5 26°39.7			Antares 112°22.6 -26°28.1					
Atria 107°21.3 -69°03.4			Sabik 102°09.1 -15°44.6			Shaula 96°17.8 -37°06.8			Rasalhague 96°03.6 12°33.1			Etamin 90°44.3 51°29.4			Kaus Aust. 83°39.8 -34°22.3					
Vega 80°36.7 38°48.1			Nunki 75°54.6 -26°16.3			Altair 62°05.3 8°55.0			Peacock 53°14.5 -56°40.4			Deneb 49°29.2 45°20.5			Enif 33°44.3 9°57.3					
Alnair 27°40.2 -46°52.3			Fomalhaut 15°21.0 -29°31.6			Scheat 13°50.6 28°10.5			Markab 13°35.5 15°17.9			2017/6/2 SHA Mer.pass			Venus 313°33.9 08:56					
Mars 256°02.2 12:46			Jupiter 167°02.1 18:40			Saturn 96°36.1 23:20			2017/6/2 SHA Mer.pass			Venus 312°30.5 08:57			Mars 255°19.4 12:45					
Jupiter 166°59.8 18:36			Saturn 96°40.8 23:16			2017/6/2 SHA Mer.pass			Venus 311°26.7 08:57			Mars 254°36.7 12:44			Jupiter 166°57.3 18:32					
Saturn 96°45.4 23:12			Horizontal parallax			Venus: 0.2			Mars: 0.1											
Mer.pass.:5:41:			v-0.2 d0.7 m-4.1			v0.7 d-0.2 m1.6			v2.4 d-0.1 m-1.9			v2.7 d0.0 m0.0								

h		Sun				Moon										
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight				
									Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	179°24.5	23°24.4	181°04.4	3.3	19°17.0	1.6	61.2	72	--	--	--	--	--	--		
1	194°24.4	23°24.4	195°26.6	3.3	19°18.6	1.5	61.2	70	--	--	--	--	--	--		
2	209°24.2	23°24.3	209°48.9	3.3	19°20.0	1.3	61.2	68	--	--	--	--	--	--		
3	224°24.1	23°24.3	224°11.2	3.3	19°21.3	1.2	61.2	66	--	--	--	--	--	--		
4	239°24.0	23°24.2	238°33.5	3.3	19°22.4	1.1	61.2	64	--	--	--	--	--	--		
5	254°23.8	23°24.2	252°55.8	3.3	19°23.4	0.9	61.2	62	--	--	01:34	22:31	--	--		
6	269°23.7	23°24.1	267°18.0	3.3	19°24.2	0.8	61.2	60	--	--	02:11	21:54	--	--		
7	284°23.6	23°24.1	281°40.3	3.3	19°24.9	0.6	61.1	58	--	00:52	02:37	21:28	23:12	--		
8	299°23.4	23°24.0	296°02.7	3.3	19°25.4	0.5	61.1	56	--	01:42	02:58	21:07	22:23	--		
9	314°23.3	23°24.0	310°25.0	3.3	19°25.8	0.3	61.1	54	--	02:12	03:15	20:51	21:53	--		
10	329°23.2	23°23.9	324°47.3	3.3	19°26.0	0.2	61.1	52	00:48	02:34	03:29	20:36	21:31	23:16		
11	344°23.0	23°23.9	339°09.7	3.4	19°26.1	0.0	61.1	50	01:34	02:52	03:41	20:24	21:13	22:31		
12	359°22.9	23°23.8	353°32.0	3.4	19°26.1	-0.1	61.1	45	02:02	03:07	03:52	20:13	20:58	22:03		
13	14°22.8	23°23.7	7°54.4	3.4	19°25.9	-0.3	61.1	40	02:47	03:37	04:14	19:51	20:28	21:18		
14	29°22.6	23°23.7	22°16.8	3.4	19°25.5	-0.4	61.1	35	03:18	03:60	04:32	19:33	20:06	20:47		
15	44°22.5	23°23.6	36°39.3	3.4	19°25.1	-0.6	61.0	30	03:41	04:18	04:48	19:18	19:48	20:24		
16	59°22.4	23°23.6	51°01.7	3.5	19°24.4	-0.7	61.0	20	03:60	04:33	05:01	19:05	19:32	20:06		
17	74°22.2	23°23.5	65°24.2	3.5	19°23.6	-0.9	61.0	10	04:29	04:58	05:23	18:43	19:07	19:37		
18	89°22.1	23°23.4	79°46.7	3.5	19°22.7	-1.0	61.0	0	04:51	05:18	05:41	18:24	18:47	19:14		
19	104°22.0	23°23.4	94°09.3	3.6	19°21.7	-1.1	61.0	-10	05:10	05:36	05:59	18:06	18:29	18:55		
20	119°21.8	23°23.3	108°31.8	3.6	19°20.4	-1.3	61.0	-20	05:27	05:54	06:16	17:49	18:12	18:38		
21	134°21.7	23°23.3	122°54.5	3.6	19°19.1	-1.4	60.9	-30	05:43	06:11	06:35	17:30	17:54	18:22		
22	149°21.6	23°23.2	137°17.1	3.7	19°17.6	-1.6	60.9	-40	05:60	06:30	06:56	17:09	17:36	18:06		
23	164°21.4	23°23.1	151°39.8	3.7	19°16.0	-1.7	60.9	-50	06:09	06:40	07:09	16:57	17:25	17:57		
		SD.=15.7	d=-0.0					S.D.=16.7	-58	06:18	06:52	07:23	16:43	17:13	17:47	
									-45	06:28	07:06	07:39	16:26	16:60	17:37	
									-50	06:40	07:22	08:00	16:05	16:44	17:25	
									-52	06:45	07:29	08:10	15:55	16:36	17:20	
									-54	06:51	07:37	08:21	15:44	16:28	17:14	
									-56	06:57	07:46	08:34	15:32	16:19	17:08	
									-58	07:04	07:57	08:48	15:17	16:09	17:01	
									-60	07:11	08:08	09:06	14:60	15:57	16:54	
									Moonrise			Moonset				
									Lat.	Sat	Sun	Mon	Sat	Sun	Mon	
									72	--	--	03:01	--	--	01:07	
									70	01:09	02:18	04:08	23:42	23:59	--	
									68	02:04	03:11	04:44	22:49	23:22	23:39	
									66	02:37	03:44	05:10	22:16	22:56	23:20	
									64	03:01	04:08	05:30	21:52	22:36	23:04	
									62	03:21	04:27	05:46	21:33	22:19	22:51	
									60	03:37	04:42	05:59	21:17	22:05	22:40	
									58	03:50	04:55	06:11	21:03	21:53	22:31	
									56	04:02	05:07	06:21	20:52	21:43	22:22	
									54	04:12	05:17	06:30	20:42	21:34	22:15	
									52	04:21	05:26	06:38	20:33	21:26	22:08	
									50	04:29	05:34	06:45	20:25	21:18	22:02	
									45	04:46	05:51	06:60	20:07	21:03	21:49	
									40	05:01	06:05	07:12	19:53	20:50	21:38	
									35	05:13	06:16	07:23	19:41	20:38	21:29	
									30	05:23	06:27	07:32	19:31	20:29	21:21	
									20	05:41	06:45	07:48	19:13	20:12	21:06	
									10	05:57	06:60	08:02	18:57	19:57	20:54	
									0	06:12	07:14	08:15	18:42	19:43	20:42	
									-10	06:27	07:29	08:27	18:27	19:30	20:30	
									-20	06:43	07:44	08:41	18:11	19:15	20:17	
									-30	07:01	08:02	08:57	17:53	18:58	20:03	
									-35	07:12	08:12	09:06	17:42	18:48	19:54	
									-40	07:24	08:24	09:17	17:30	18:36	19:44	
									-45	07:39	08:38	09:29	17:16	18:23	19:33	
									-50	07:56	08:55	09:44	16:58	18:06	19:19	
									-52	08:05	09:03	09:51	16:49	17:58	19:12	
									-54	08:14	09:12	09:58	16:40	17:50	19:05	
									-56	08:24	09:22	10:07	16:30	17:40	18:57	
									-58	08:36	09:33	10:16	16:18	17:29	18:48	
									-60	08:50	09:46	10:27	16:04	17:16	18:37	
									Sun			Moon				
									Day	Eqn.of Time	Mer.	Mer.Pass.	Age			
										00 ^h	12 ^h	Pass	Upper	Lower		
									24	02:22	02:28	12:02	12:27	00:58	0(0%)	
									25	02:35	02:41	12:02	13:29	00:58	1(3%)	
									26	02:48	02:54	12:02	14:28	01:59	2(8%)	
									SD.=15.7		d=-0.1		S.D.=16.4			

June 27, 28 ,29 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	275°17.7	225°40.3	15°28.0	169°11.7	23°36.9	82°12.4	-4°10.2	12°07.8	-21°56.9	Alpheratz	357°40.6	29°11.0
1	290°20.2	240°40.1	15°28.7	184°12.4	23°36.7	97°14.7	-4°10.3	27°10.4	-21°56.9	Ankaa	353°13.1	-42°12.5
2	305°22.6	255°39.8	15°29.4	199°13.1	23°36.6	112°17.1	-4°10.3	42°13.1	-21°56.9	Schedar	349°37.4	56°37.6
3	320°25.1	270°39.6	15°30.1	214°13.8	23°36.4	127°19.4	-4°10.4	57°15.7	-21°56.9	Diphda	348°53.1	-17°53.4
4	335°27.6	285°39.4	15°30.8	229°14.5	23°36.2	142°21.8	-4°10.5	72°18.4	-21°56.9	Achernar	335°25.1	-57°08.7
5	350°30.0	300°39.2	15°31.5	244°15.2	23°36.0	157°24.1	-4°10.5	87°21.1	-21°56.9	Hamal	327°57.8	23°32.5
6	5°32.5	315°39.0	15°32.2	259°15.9	23°35.9	172°26.5	-4°10.6	102°23.7	-21°56.9	Polaris	316°49.5	89°19.9
7	20°35.0	330°38.8	15°32.9	274°16.6	23°35.7	187°28.8	-4°10.6	117°26.4	-21°56.9	Akamar	315°16.6	-40°14.1
8	35°37.4	345°38.5	15°33.6	289°17.3	23°35.5	202°31.2	-4°10.7	132°29.0	-21°56.9	Menkar	314°12.4	4°09.3
9	50°39.9	0°38.3	15°34.3	304°17.9	23°35.3	217°33.5	-4°10.8	147°31.7	-21°56.9	Mirfak	308°36.8	49°55.0
10	65°42.4	15°38.1	15°35.0	319°18.6	23°35.2	232°35.9	-4°10.8	162°34.3	-21°56.9	Aldebaran	290°46.6	16°32.4
11	80°44.8	30°37.9	15°35.7	334°19.3	23°35.0	247°38.2	-4°10.9	177°37.0	-21°56.9	Rigel	281°09.8	-8°11.1
12	95°47.3	45°37.6	15°36.4	349°20.0	23°34.8	262°40.6	-4°10.9	192°39.6	-21°56.9	Capella	280°30.9	46°00.7
13	110°49.7	60°37.4	15°37.1	4°20.7	23°34.7	277°42.9	-4°11.0	207°42.3	-21°56.9	Bellatrix	278°29.4	6°21.7
14	125°52.2	75°37.2	15°37.8	19°21.4	23°34.5	292°45.3	-4°11.1	222°45.0	-21°56.9	Elnath	278°09.6	28°37.1
15	140°54.7	90°37.0	15°38.5	34°22.1	23°34.3	307°47.6	-4°11.1	237°47.6	-21°56.9	Alnilam	275°43.9	-1°11.6
16	155°57.1	105°36.7	15°39.2	49°22.8	23°34.1	322°49.9	-4°11.2	252°50.3	-21°56.9	Betelgeuse	270°58.7	7°24.4
17	170°59.6	120°36.5	15°39.9	64°23.5	23°34.0	337°52.3	-4°11.2	267°52.9	-21°56.9	Canopus	263°55.5	-52°42.5
18	186°02.1	135°36.3	15°40.6	79°24.2	23°33.8	352°54.6	-4°11.3	282°55.6	-21°56.9	Sirius	258°31.6	-16°44.4
19	201°04.5	150°36.1	15°41.3	94°24.8	23°33.6	7°57.0	-4°11.4	297°58.2	-21°56.9	Adara	255°10.8	-28°60.0
20	216°07.0	165°35.8	15°42.0	109°25.5	23°33.4	22°59.3	-4°11.4	313°00.9	-21°56.8	Procyon	244°57.1	5°10.8
21	231°09.5	180°35.6	15°42.7	124°26.2	23°33.3	38°01.7	-4°11.5	328°03.5	-21°56.8	Pollux	243°24.7	27°58.9
22	246°11.9	195°35.4	15°43.4	139°26.9	23°33.1	53°04.0	-4°11.5	343°06.2	-21°56.8	Avior	234°17.4	-59°34.2
23	261°14.4	210°35.2	15°44.1	154°27.6	23°32.9	68°06.4	-4°11.6	358°08.9	-21°56.8	Suhail	222°50.7	-43°30.4
Mer.pass.:5:37:		v-0.2 d0.7 m-4.1		v0.7 d-0.2 m1.6		v2.4 d-0.1 m-1.9		v2.7 d0.0 m0.0		Miaplacidus	221°39.7	-69°47.6
										Alphard	217°53.6	-8°44.2
										Regulus	207°40.8	11°52.9
										Dubhe	193°48.7	61°39.7
										Denebola	182°30.9	14°28.6
										Gienah	175°49.5	-17°38.4
										Acrux	173°06.1	-63°12.0
										Gacrux	171°57.7	-57°12.9
										Alioth	166°18.4	55°52.3
										Spica	158°28.3	-11°15.1
										Alcaid	152°56.6	49°14.0
										Hadar	148°43.6	-60°27.5
										Menkent	148°04.1	-36°27.4
										Arcturus	145°52.9	19°06.0
										Rigel Kent.	139°47.5	-60°54.5
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.5	74°05.4
										Alphecca	126°08.5	26°39.7
										Antares	112°22.6	-26°28.1
										Atria	107°21.3	-69°03.4
										Sabik	102°09.1	-15°44.6
										Shaula	96°17.8	-37°06.8
										Rasalhague	96°03.6	12°33.1
										Etamin	90°44.3	51°29.4
										Kaus Aust.	83°39.8	-34°22.3
										Vega	80°36.7	38°48.1
										Nunki	75°54.6	-26°16.3
										Altair	62°05.3	8°55.0
										Peacock	53°14.5	-56°40.4
										Deneb	49°29.2	45°20.3
										Enif	33°44.2	9°57.5
										Alnair	27°40.1	-46°52.3
										Fomalhaut	15°20.9	-29°31.6
										Scheat	13°50.6	28°10.5
										Markab	13°35.5	15°17.9
										2017/6/2	SHA	Mer.pass
										Venus	310°22.6	08:57
										Mars	253°54.0	12:43
										Jupiter	166°54.7	18:28
										Saturn	96°50.1	23:07
										2017/6/2	SHA	Mer.pass
										Venus	309°18.1	08:58
										Mars	253°11.4	12:42
										Jupiter	166°51.9	18:25
										Saturn	96°54.7	23:03
										2017/6/2	SHA	Mer.pass
										Venus	308°13.2	08:58
										Mars	252°28.9	12:40
										Jupiter	166°48.9	18:21
										Saturn	96°59.2	22:59
										Horizontal parallax		
										Venus:		0.2
										Mars:		0.1
Mer.pass.:5:30:		v-0.2 d0.7 m-4.1		v0.7 d-0.2 m1.6		v2.3 d-0.1 m-1.9		v2.7 d0.0 m0.0				

June 30, 01 ,02 (Fri., Sat., Sun.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Fri	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	278°15.1	16°17.9	225°23.1	16°17.9	170°01.6	23°23.8	85°00.9	-4°14.8	15°18.9	-21°56.6			Alpheratz	357°40.6	29°11.0		
1	293°17.6	16°18.6	240°22.9	16°18.6	185°02.3	23°23.6	100°03.3	-4°14.8	30°21.6	-21°56.6			Ankaa	353°13.0	-42°12.5		
2	308°20.1	16°19.3	255°22.6	16°19.3	200°03.0	23°23.4	115°05.6	-4°14.9	45°24.2	-21°56.6			Schedar	349°37.3	56°37.6		
3	323°22.5	16°20.0	270°22.4	16°20.0	215°03.7	23°23.2	130°07.9	-4°15.0	60°26.9	-21°56.6			Diphda	348°53.1	-17°53.4		
4	338°25.0	16°20.7	285°22.1	16°20.7	230°04.4	23°23.0	145°10.3	-4°15.0	75°29.5	-21°56.6			Achernar	335°25.0	-57°08.7		
5	353°27.4	16°21.3	300°21.8	16°21.3	245°05.1	23°22.9	160°12.6	-4°15.1	90°32.2	-21°56.6			Hamal	327°57.8	23°32.5		
6	8°29.9	16°22.0	315°21.6	16°22.0	260°05.8	23°22.7	175°14.9	-4°15.2	105°34.8	-21°56.6			Polaris	316°48.3	89°19.9		
7	23°32.4	16°22.7	330°21.3	16°22.7	275°06.5	23°22.5	190°17.2	-4°15.2	120°37.5	-21°56.6			Akamar	315°16.6	-40°14.1		
8	38°34.8	16°23.4	345°21.0	16°23.4	290°07.2	23°22.3	205°19.6	-4°15.3	135°40.1	-21°56.6			Menkar	314°12.4	4°09.3		
9	53°37.3	16°24.0	0°20.8	16°24.0	305°07.9	23°22.1	220°21.9	-4°15.4	150°42.8	-21°56.6			Mirfak	308°36.7	49°55.0		
10	68°39.8	16°24.7	15°20.5	16°24.7	320°08.6	23°21.9	235°24.2	-4°15.4	165°45.4	-21°56.6			Aldebaran	290°46.6	16°32.4		
11	83°42.2	16°25.4	30°20.2	16°25.4	335°09.3	23°21.7	250°26.6	-4°15.5	180°48.1	-21°56.6			Rigel	281°09.8	-8°11.1		
12	98°44.7	16°26.1	45°20.0	16°26.1	350°10.0	23°21.5	265°28.9	-4°15.6	195°50.7	-21°56.6			Capella	280°30.9	46°00.7		
13	113°47.2	16°26.7	60°19.7	16°26.7	5°10.7	23°21.3	280°31.2	-4°15.6	210°53.4	-21°56.6			Bellatrix	278°29.4	6°21.7		
14	128°49.6	16°27.4	75°19.4	16°27.4	20°11.4	23°21.1	295°33.5	-4°15.7	225°56.0	-21°56.6			Elnath	278°09.5	28°37.1		
15	143°52.1	16°28.1	90°19.2	16°28.1	35°12.1	23°20.9	310°35.9	-4°15.8	240°58.7	-21°56.6			Alnilam	275°43.9	-1°11.6		
16	158°54.6	16°28.8	105°18.9	16°28.8	50°12.8	23°20.7	325°38.2	-4°15.9	256°01.3	-21°56.6			Betelgeuse	270°58.7	7°24.4		
17	173°57.0	16°29.4	120°18.6	16°29.4	65°13.5	23°20.5	340°40.5	-4°15.9	271°04.0	-21°56.6			Canopus	263°55.5	-52°42.5		
18	188°59.5	16°30.1	135°18.4	16°30.1	80°14.2	23°20.3	355°42.9	-4°16.0	286°06.6	-21°56.6			Sirius	258°31.6	-16°44.4		
19	204°01.9	16°30.8	150°18.1	16°30.8	95°14.9	23°20.1	10°45.2	-4°16.1	301°09.3	-21°56.6			Adara	255°10.8	-28°59.9		
20	219°04.4	16°31.4	165°17.8	16°31.4	110°15.6	23°19.9	25°47.5	-4°16.1	316°11.9	-21°56.6			Procyon	244°57.1	5°10.8		
21	234°06.9	16°32.1	180°17.5	16°32.1	125°16.3	23°19.7	40°49.8	-4°16.2	331°14.6	-21°56.6			Pollux	243°24.7	27°58.9		
22	249°09.3	16°32.8	195°17.3	16°32.8	140°17.0	23°19.5	55°52.2	-4°16.3	346°17.2	-21°56.6			Avior	234°17.5	-59°34.2		
23	264°11.8	16°33.5	210°17.0	16°33.5	155°17.7	23°19.3	70°54.5	-4°16.3	1°19.9	-21°56.6			Suhail	222°50.8	-43°30.4		
Mer.pass.:5:26:			v-0.3 d0.7 m-4.1			v0.7 d-0.2 m1.6			v2.3 d-0.1 m-1.9			v2.7 d0.0 m0.1			Miaplacidus 221°39.8 -69°47.6		
															Alphard 217°53.6 -8°44.2		
															Regulus 207°40.8 11°52.9		
															Dubhe 193°48.8 61°39.7		
															Denebola 182°30.9 14°28.6		
															Gienah 175°49.5 -17°38.4		
															Acrux 173°06.1 -63°12.0		
															Gacrux 171°57.7 -57°12.9		
															Alioth 166°18.4 55°52.3		
															Spica 158°28.3 -11°15.1		
															Alcaid 152°56.6 49°14.0		
															Hadar 148°43.6 -60°27.5		
															Menkent 148°04.2 -36°27.4		
															Arcturus 145°53.0 19°06.1		
															Rigel Kent. 139°47.5 -60°54.5		
															Zubenelg. 137°02.2 -16°06.7		
															Kochab 137°19.6 74°05.5		
															Alphecca 126°08.5 26°39.7		
															Antares 112°22.6 -26°28.1		
															Atria 107°21.3 -69°03.4		
															Sabik 102°09.1 -15°44.6		
															Shaula 96°17.8 -37°06.8		
															Rasalhague 96°03.6 12°33.1		
															Etamin 90°44.3 51°29.4		
															Kaus Aust. 83°39.8 -34°22.3		
															Vega 80°36.7 38°48.2		
															Nunki 75°54.6 -26°16.3		
															Altair 62°05.3 8°55.0		
															Peacock 53°14.5 -56°40.4		
															Deneb 49°29.2 45°20.6		
															Enif 33°44.2 9°57.4		
															Alnair 27°40.1 -46°52.3		
															Fomalhaut 15°20.9 -29°31.6		
															Scheat 13°50.6 28°10.5		
															Markab 13°35.5 15°17.9		
															2017/6/3 SHA Mer.pass		
															Venus 307°08.0 08:59		
															Mars 251°46.5 12:39		
															Jupiter 166°45.8 18:17		
															Saturn 97°03.8 22:55		
															2017/7/1 SHA Mer.pass		
															Venus 306°02.5 08:59		
															Mars 251°04.1 12:38		
															Jupiter 166°42.5 18:13		
															Saturn 97°08.3 22:50		
															2017/7/2 SHA Mer.pass		
															Venus 304°56.6 08:60		
															Mars 250°21.9 12:37		
															Jupiter 166°39.1 18:10		
															Saturn 97°12.7 22:46		
															Horizontal paralax		
															Venus: 0.2		
															Mars: 0.1		
Mer.pass.:5:18:			v-0.3 d0.7 m-4.0			v0.7 d-0.2 m1.6			v2.3 d-0.1 m-1.9			v2.6 d0.0 m0.1					

h Sun								Moon							
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	179°05.7	23°10.1	100°39.0	12.9	3°55.9	-10.5	56.7	72	--	--	--	--	--		
1	194°05.6	23°09.9	115°10.9	12.9	3°45.4	-10.5	56.6	70	--	--	--	--	--		
2	209°05.5	23°09.8	129°42.8	13.0	3°34.9	-10.5	56.6	68	--	--	--	--	--		
3	224°05.4	23°09.6	144°14.8	13.0	3°24.3	-10.5	56.6	66	--	--	00:22	23:38	--		
4	239°05.2	23°09.5	158°46.8	13.1	3°13.8	-10.5	56.5	64	--	--	01:42	22:25	--		
5	254°05.1	23°09.3	173°18.9	13.1	3°03.2	-10.5	56.5	62	--	--	02:17	21:50	--		
6	269°05.0	23°09.1	187°51.0	13.2	2°52.7	-10.5	56.5	60	--	01:04	02:42	21:25	23:02		
7	284°04.9	23°09.0	202°23.2	13.2	2°42.1	-10.5	56.4	58	--	01:49	03:02	21:05	22:18		
8	299°04.8	23°08.8	216°55.4	13.2	2°31.6	-10.5	56.4	56	--	02:17	03:19	20:49	21:50		
9	314°04.6	23°08.7	231°27.7	13.3	2°21.1	-10.5	56.3	54	00:59	02:39	03:32	20:35	21:29		
10	329°04.5	23°08.5	246°00.0	13.3	2°10.5	-10.5	56.3	52	01:40	02:56	03:44	20:23	21:11		
11	344°04.4	23°08.4	260°32.4	13.4	1°60.0	-10.5	56.3	50	02:07	03:11	03:55	20:12	20:56		
12	359°04.3	23°08.2	275°04.8	13.4	1°49.4	-10.5	56.2	45	02:51	03:40	04:17	19:50	20:27		
13	14°04.1	23°08.0	289°37.2	13.5	1°38.9	-10.5	56.2	40	03:21	04:02	04:35	19:33	20:05		
14	29°04.0	23°07.9	304°09.7	13.5	1°28.4	-10.5	56.2	35	03:44	04:20	04:50	19:18	19:47		
15	44°03.9	23°07.7	318°42.2	13.5	1°17.9	-10.5	56.1	30	04:02	04:35	05:03	19:05	19:32		
16	59°03.8	23°07.6	333°14.8	13.6	1°07.4	-10.5	56.1	20	04:31	04:60	05:24	18:43	19:08		
17	74°03.7	23°07.4	347°47.4	13.6	0°56.9	-10.5	56.1	10	04:53	05:20	05:43	18:25	18:48		
18	89°03.5	23°07.2	2°20.0	13.7	0°46.4	-10.5	56.1	0	05:12	05:38	06:00	18:08	18:30		
19	104°03.4	23°07.1	16°52.7	13.7	0°35.9	-10.5	56.0	-10	05:28	05:55	06:17	17:50	18:13		
20	119°03.3	23°06.9	31°25.4	13.7	0°25.4	-10.5	56.0	-20	05:44	06:12	06:36	17:32	17:56		
21	134°03.2	23°06.7	45°58.1	13.8	0°14.9	-10.5	56.0	-30	06:00	06:30	06:57	17:11	17:38		
22	149°03.0	23°06.6	60°30.9	13.8	0°04.5	-10.5	55.9	-35	06:09	06:41	07:09	16:59	17:27		
23	164°02.9	23°06.4	75°03.7	13.8	-0°06.0	-10.4	55.9	-40	06:18	06:52	07:23	16:45	17:16		
SD.=15.7 d=-0.2 S.D.=15.5								-45	06:28	07:05	07:39	16:29	17:02	17:40	
								-50	06:40	07:21	07:60	16:08	16:47	17:28	
								-52	06:45	07:29	08:09	15:59	16:39	17:23	
								-54	06:51	07:37	08:20	15:48	16:31	17:17	
								-56	06:57	07:45	08:32	15:36	16:23	17:11	
								-58	07:03	07:55	08:47	15:21	16:13	17:05	
								-60	07:10	08:07	09:04	15:04	16:01	16:58	
								Moonrise			Moonset				
								Lat.	Fri	Sat	Sun	Fri	Sat	Sun	
								72	11:16	12:57	14:37	00:05	23:49	23:41	
								70	11:18	12:53	14:27	23:57	23:55	23:53	
								68	11:20	12:50	14:18	23:58	23:60	--	
								66	11:22	12:48	14:11	23:58	--	00:04	
								64	11:24	12:46	14:06	23:58	--	00:08	
								62	11:25	12:44	14:01	23:59	--	00:11	
								60	11:26	12:42	13:56	23:59	--	00:13	
								58	11:27	12:41	13:53	23:59	--	00:16	
								56	11:28	12:40	13:49	23:59	--	00:18	
								54	11:29	12:38	13:46	23:59	--	00:20	
								52	11:30	12:37	13:43	23:59	--	00:22	
								50	11:30	12:37	13:41	23:60	--	00:23	
								45	11:32	12:35	13:36	23:60	--	00:27	
								40	11:33	12:33	13:31	--	00:00	00:30	
								35	11:34	12:31	13:27	--	00:00	00:32	
								30	11:35	12:30	13:24	--	00:00	00:35	
								20	11:37	12:28	13:18	--	00:01	00:39	
								10	11:38	12:26	13:13	--	00:01	00:42	
								0	11:40	12:24	13:08	--	00:01	00:45	
								-10	11:41	12:23	13:03	--	00:01	00:49	
								-20	11:42	12:21	12:58	--	00:02	00:52	
								-30	11:44	12:19	12:53	--	00:02	00:56	
								-35	11:45	12:17	12:50	--	00:02	00:58	
								-40	11:46	12:16	12:46	--	00:02	01:01	
								-45	11:47	12:15	12:42	--	00:02	01:04	
								-50	11:49	12:13	12:37	--	00:02	01:08	
								-52	11:50	12:12	12:34	--	00:02	01:09	
								-54	11:50	12:11	12:32	--	00:02	01:11	
								-56	11:51	12:10	12:29	--	00:03	01:13	
								-58	11:52	12:09	12:26	--	00:03	01:15	
								-60	11:53	12:08	12:23	--	00:03	01:18	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age			
									00 ^h	12 ^h	Pass	Upper	Lower		
								30	03:37	03:43	12:03	17:50	05:27	6(45%)	
								1	03:49	03:55	12:03	18:34	06:12	7(55%)	
								2	04:00	04:06	12:04	19:18	06:56	8(64%)	
SD.=15.7 d=-0.2 S.D.=15.1															

July 03, 04 ,05 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	281°12.5	225°02.8	17°05.7	170°52.2	23°09.1	87°48.1	-4°19.9	18°29.7	-21°56.4	Alpheratz	357°40.6	29°11.0
1	296°15.0	240°02.5	17°06.4	185°52.9	23°08.9	102°50.4	-4°20.0	33°32.4	-21°56.4	Ankaa	353°13.0	-42°12.5
2	311°17.5	255°02.2	17°07.0	200°53.6	23°08.7	117°52.7	-4°20.0	48°35.0	-21°56.4	Schedar	349°37.3	56°37.6
3	326°19.9	270°01.9	17°07.7	215°54.3	23°08.5	132°55.1	-4°20.1	63°37.7	-21°56.4	Diphda	348°53.1	-17°53.4
4	341°22.4	285°01.6	17°08.3	230°55.0	23°08.2	147°57.4	-4°20.2	78°40.3	-21°56.4	Achernar	335°25.0	-57°08.7
5	356°24.9	300°01.3	17°09.0	245°55.8	23°08.0	162°59.7	-4°20.3	93°43.0	-21°56.4	Hamal	327°57.8	23°32.5
6	11°27.3	315°01.0	17°09.6	260°56.5	23°07.8	178°02.0	-4°20.3	108°45.6	-21°56.4	Polaris	316°47.0	89°19.9
7	26°29.8	330°00.7	17°10.2	275°57.2	23°07.6	193°03.3	-4°20.4	123°48.2	-21°56.4	Akamar	315°16.6	-40°14.1
8	41°32.3	345°00.4	17°10.9	290°57.9	23°07.4	208°06.6	-4°20.5	138°50.9	-21°56.3	Menkar	314°12.4	4°09.3
9	56°34.7	0°00.1	17°11.5	305°58.6	23°07.2	223°08.9	-4°20.6	153°53.5	-21°56.3	Mirfak	308°36.7	49°55.0
10	71°37.2	14°59.8	17°12.2	320°59.3	23°06.9	320°59.3	-4°20.6	168°56.2	-21°56.3	Aldebaran	290°46.5	16°32.4
11	86°39.6	29°59.5	17°12.8	336°00.0	23°06.7	253°13.5	-4°20.7	183°58.8	-21°56.3	Rigel	281°09.7	-8°11.1
12	101°42.1	44°59.1	17°13.5	351°00.7	23°06.5	268°15.8	-4°20.8	199°01.5	-21°56.3	Capella	280°30.9	46°00.7
13	116°44.6	59°58.8	17°14.1	6°01.4	23°06.3	283°18.2	-4°20.9	214°04.1	-21°56.3	Bellatrix	278°29.4	6°21.7
14	131°47.0	74°58.5	17°14.7	21°02.1	23°06.1	298°20.5	-4°20.9	229°06.8	-21°56.3	Elnath	278°09.5	28°37.1
15	146°49.5	89°58.2	17°15.4	36°02.8	23°05.8	313°22.8	-4°21.0	244°09.4	-21°56.3	Alnilam	275°43.9	-1°11.6
16	161°52.0	104°57.9	17°16.0	51°03.6	23°05.6	328°25.1	-4°21.1	259°12.1	-21°56.3	Betelgeuse	270°58.7	7°24.4
17	176°54.4	119°57.6	17°16.7	66°04.3	23°05.4	343°27.4	-4°21.2	274°14.7	-21°56.3	Canopus	263°55.5	-52°42.4
18	191°56.9	134°57.3	17°17.3	81°05.0	23°05.2	358°29.7	-4°21.2	289°17.4	-21°56.3	Sirius	258°31.6	-16°44.4
19	206°59.4	149°56.9	17°17.9	96°05.7	23°05.0	13°32.0	-4°21.3	304°20.0	-21°56.3	Adara	255°10.8	-28°59.9
20	222°01.8	164°56.6	17°18.6	111°06.4	23°04.7	28°34.3	-4°21.4	319°22.7	-21°56.3	Procyon	244°57.1	5°10.8
21	237°04.3	179°56.3	17°19.2	126°07.1	23°04.5	43°36.6	-4°21.5	334°25.3	-21°56.3	Pollux	243°24.7	27°58.9
22	252°06.8	194°56.0	17°19.8	141°07.8	23°04.3	58°38.9	-4°21.6	349°27.9	-21°56.3	Avior	234°17.5	-59°34.2
23	267°09.2	209°55.7	17°20.5	156°08.5	23°04.1	73°41.2	-4°21.6	4°30.6	-21°56.3	Suhail	222°50.8	-43°30.4
Mer.pass.:5:14:		v-0.3 d0.6 m-4.0		v0.7 d-0.2 m1.6		v2.3 d-0.1 m-1.9		v2.6 d0.0 m0.1		Miaplacidus	221°39.8	-69°47.6
										Alphard	217°53.7	-8°44.2
										Regulus	207°40.8	11°52.9
										Dubhe	193°48.8	61°39.7
										Denebola	182°30.9	14°28.6
										Gienah	175°49.5	-17°38.3
										Acrux	173°06.2	-63°12.0
										Gacrus	171°57.8	-57°12.9
										Alioth	166°18.4	55°52.3
										Spica	158°28.3	-11°15.0
										Alcaid	152°56.7	49°14.0
										Hadar	148°43.6	-60°27.5
										Menkent	148°04.2	-36°27.4
										Arcturus	145°53.0	19°06.1
										Rigel Kent.	139°47.6	-60°54.5
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.6	74°05.5
										Alphecca	126°08.5	26°39.7
										Antares	112°22.6	-26°28.1
										Atria	107°21.4	-69°03.4
										Sabik	102°09.1	-15°44.6
										Shaula	96°17.8	-37°06.8
										Rasalhague	96°03.6	12°33.1
										Etamin	90°44.3	51°29.5
										Kaus Aust.	83°39.8	-34°22.3
										Vega	80°36.7	38°48.2
										Nunki	75°54.6	-26°16.3
										Altair	62°05.3	8°55.0
										Peacock	53°14.4	-56°40.4
										Deneb	49°29.1	45°20.6
										Enif	33°44.2	9°57.4
										Alnair	27°40.1	-46°52.3
										Fomalhaut	15°20.9	-29°31.6
										Scheat	13°50.6	28°10.5
										Markab	13°35.5	15°17.9
										2017/7/3	SHA	Mer.pass
										Venus	303°50.3	08:60
										Mars	249°39.7	12:36
										Jupiter	166°35.6	18:06
										Saturn	97°17.2	22:42
										2017/7/4	SHA	Mer.pass
										Venus	302°43.7	09:01
										Mars	248°57.6	12:35
										Jupiter	166°31.9	18:02
										Saturn	97°21.6	22:38
										2017/7/5	SHA	Mer.pass
										Venus	301°36.7	09:01
										Mars	248°15.5	12:34
										Jupiter	166°28.0	17:59
										Saturn	97°25.9	22:34
										Horizontal paralax		
										Venus:		0.2
										Mars:		0.1
Mer.pass.:5:06:		v-0.3 d0.6 m-4.0		v0.7 d-0.2 m1.6		v2.3 d-0.1 m-1.9		v2.6 d0.0 m0.1				

July 06, 07, 08 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	284°10.0	224°39.4	17°51.0	171°43.5	22°52.8	90°34.0	-4°25.5	21°40.2	-21°56.1	Alpheratz	357°40.6	29°11.1
1	299°12.4	239°39.0	17°51.6	186°44.2	22°52.5	105°36.3	-4°25.6	36°42.8	-21°56.1	Ankaa	353°13.0	-42°12.5
2	314°14.9	254°38.7	17°52.2	201°45.0	22°52.3	120°38.5	-4°25.7	51°45.4	-21°56.1	Schedar	349°37.2	56°37.6
3	329°17.4	269°38.3	17°52.8	216°45.7	22°52.1	135°40.8	-4°25.8	66°48.1	-21°56.1	Diphda	348°53.0	-17°53.4
4	344°19.8	284°38.0	17°53.4	231°46.4	22°51.8	150°43.1	-4°25.9	81°50.7	-21°56.1	Achernar	335°25.0	-57°08.7
5	359°22.3	299°37.6	17°54.0	246°47.1	22°51.6	165°45.4	-4°26.0	96°53.4	-21°56.1	Hamal	327°57.8	23°32.5
6	14°24.7	314°37.3	17°54.6	261°47.8	22°51.3	180°47.7	-4°26.0	111°56.0	-21°56.1	Polaris	316°45.5	89°19.9
7	29°27.2	329°36.9	17°55.2	276°48.6	22°51.1	195°50.0	-4°26.1	126°58.6	-21°56.1	Akamar	315°16.5	-40°14.0
8	44°29.7	344°36.6	17°55.8	291°49.3	22°50.9	210°52.3	-4°26.2	142°01.3	-21°56.1	Menkar	314°12.4	4°09.3
9	59°32.1	359°36.2	17°56.5	306°50.0	22°50.6	225°54.6	-4°26.3	157°03.9	-21°56.1	Mirfak	308°36.7	49°55.0
10	74°34.6	14°35.9	17°57.1	321°50.7	22°50.4	240°56.9	-4°26.4	172°06.6	-21°56.1	Aldebaran	290°46.5	16°32.4
11	89°37.1	29°35.5	17°57.7	336°51.4	22°50.1	255°59.2	-4°26.5	187°09.2	-21°56.1	Rigel	281°09.7	-8°11.0
12	104°39.5	44°35.2	17°58.3	351°52.2	22°49.9	271°01.5	-4°26.5	202°11.9	-21°56.1	Capella	280°30.8	46°00.7
13	119°42.0	59°34.8	17°58.9	6°52.9	22°49.7	286°03.8	-4°26.6	217°14.5	-21°56.1	Bellatrix	278°29.4	6°21.7
14	134°44.5	74°34.4	17°59.5	21°53.6	22°49.4	301°06.1	-4°26.7	232°17.1	-21°56.1	Elnath	278°09.5	28°37.1
15	149°46.9	89°34.1	18°00.1	36°54.3	22°49.2	316°08.3	-4°26.8	247°19.8	-21°56.1	Alnilam	275°43.9	-1°11.6
16	164°49.4	104°33.7	18°00.7	51°55.0	22°48.9	331°10.6	-4°26.9	262°22.4	-21°56.1	Betelgeuse	270°58.7	7°24.4
17	179°51.9	119°33.4	18°01.3	66°55.8	22°48.7	346°12.9	-4°27.0	277°25.1	-21°56.1	Canopus	263°55.5	-52°42.4
18	194°54.3	134°33.0	18°01.9	81°56.5	22°48.4	1°15.2	-4°27.0	292°27.7	-21°56.1	Sirius	258°31.6	-16°44.4
19	209°56.8	149°32.7	18°02.5	96°57.2	22°48.2	16°17.5	-4°27.1	307°30.3	-21°56.1	Adara	255°10.7	-28°59.9
20	224°59.2	164°32.3	18°03.1	111°57.9	22°48.0	31°19.8	-4°27.2	322°33.0	-21°56.1	Procyon	244°57.1	5°10.8
21	240°01.7	179°31.9	18°03.7	126°58.6	22°47.7	46°22.1	-4°27.3	337°35.6	-21°56.1	Pollux	243°24.7	27°58.9
22	255°04.2	194°31.6	18°04.3	141°59.4	22°47.5	61°24.4	-4°27.4	352°38.3	-21°56.1	Avior	234°17.5	-59°34.1
23	270°06.6	209°31.2	18°04.9	157°00.1	22°47.2	76°26.7	-4°27.5	7°40.9	-21°56.1	Suhail	222°50.8	-43°30.4
Mer.pass.:5:02:		v-0.3 d0.6 m-4.0		v0.7 d-0.2 m1.6		v2.3 d-0.1 m-1.9		v2.6 d0.0 m0.1		Miaplacidus	221°39.8	-69°47.6
										Alphard	217°53.7	-8°44.2
										Regulus	207°40.8	11°52.9
										Dubhe	193°48.8	61°39.7
										Denebola	182°30.9	14°28.6
										Gienah	175°49.5	-17°38.3
										Acrux	173°06.2	-63°12.0
										Gacrux	171°57.8	-57°12.8
										Alioth	166°18.4	55°52.3
										Spica	158°28.3	-11°15.0
										Alcaid	152°56.7	49°14.0
										Hadar	148°43.7	-60°27.5
										Menkent	148°04.2	-36°27.4
										Arcturus	145°53.0	19°06.1
										Rigel Kent.	139°47.6	-60°54.5
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.7	74°05.5
										Alphecca	126°08.5	26°39.7
										Antares	112°22.6	-26°28.1
										Atria	107°21.4	-69°03.4
										Sabik	102°09.1	-15°44.6
										Shaula	96°17.8	-37°06.8
										Rasalhague	96°03.6	12°33.1
										Etamin	90°44.3	51°29.5
										Kaus Aust.	83°39.8	-34°22.3
										Vega	80°36.7	38°48.2
										Nunki	75°54.6	-26°16.3
										Altair	62°05.3	8°55.0
										Peacock	53°14.4	-56°40.4
										Deneb	49°29.1	45°20.6
										Enif	33°44.2	9°57.4
										Alnair	27°40.1	-46°52.3
										Fomalhaut	15°20.9	-29°31.6
										Scheat	13°50.5	28°10.5
										Markab	13°35.4	15°17.9
										2017/7/6		SHA Mer.pass
										Venus	300°29.4	09:02
										Mars	247°33.6	12:32
										Jupiter	166°24.0	17:55
										Saturn	97°30.2	22:29
										2017/7/7		SHA Mer.pass
										Venus	299°21.8	09:02
										Mars	246°51.7	12:31
										Jupiter	166°19.8	17:51
										Saturn	97°34.4	22:25
										2017/7/8		SHA Mer.pass
										Venus	298°13.8	09:03
										Mars	246°09.9	12:30
										Jupiter	166°15.6	17:48
										Saturn	97°38.6	22:21
										Horizontal paralax		
										Venus:	0.2	
										Mars:	0.1	
										Mer.pass.:4:54:		
										v-0.4 d0.6 m-4.0		
										v0.7 d-0.3 m1.6		
										v2.3 d-0.1 m-1.9		
										v2.6 d0.0 m0.1		

h Sun								Moon							
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	178°49.2	22°41.1	35°43.9	13.0	-16°54.7	-5.0	54.0	72	--	--	--	--	--		
1	193°49.1	22°40.9	50°15.9	13.0	-16°59.6	-4.9	54.0	70	--	--	--	--	--		
2	208°49.0	22°40.6	64°47.9	13.0	-17°04.5	-4.8	54.0	68	--	--	--	--	--		
3	223°48.9	22°40.4	79°19.8	12.9	-17°09.3	-4.8	54.0	66	--	--	00:59	23:07	--		
4	238°48.8	22°40.1	93°51.7	12.9	-17°14.0	-4.7	54.0	64	--	--	01:54	22:14	--		
5	253°48.7	22°39.9	108°23.6	12.9	-17°18.7	-4.6	54.0	62	--	--	02:27	21:42	--		
6	268°48.6	22°39.6	122°55.5	12.9	-17°23.2	-4.5	54.0	60	--	01:20	02:50	21:19	22:47		
7	283°48.5	22°39.3	137°27.3	12.8	-17°27.7	-4.5	54.0	58	--	01:59	03:09	21:00	22:10		
8	298°48.4	22°39.1	151°59.1	12.8	-17°32.2	-4.4	54.0	56	--	02:25	03:25	20:45	21:44		
9	313°48.3	22°38.8	166°30.9	12.8	-17°36.5	-4.3	54.0	54	01:14	02:45	03:38	20:31	21:24		
10	328°48.2	22°38.6	181°02.7	12.7	-17°40.7	-4.2	54.0	52	01:49	03:02	03:49	20:20	21:07		
11	343°48.1	22°38.3	195°34.4	12.7	-17°44.9	-4.1	54.0	50	02:14	03:16	03:60	20:10	20:53		
12	358°48.0	22°38.1	210°06.1	12.7	-17°49.0	-4.1	54.0	45	02:56	03:44	04:21	19:48	20:25		
13	13°47.9	22°37.8	224°37.8	12.7	-17°53.1	-4.0	54.0	40	03:25	04:06	04:38	19:31	20:04		
14	28°47.8	22°37.5	239°09.4	12.6	-17°57.0	-3.9	54.0	35	03:47	04:23	04:53	19:17	19:46		
15	43°47.7	22°37.3	253°41.0	12.6	-18°00.9	-3.8	54.0	30	04:05	04:38	05:05	19:05	19:32		
16	58°47.6	22°37.0	268°12.6	12.6	-18°04.6	-3.7	54.0	20	04:33	05:02	05:26	18:44	19:08		
17	73°47.5	22°36.8	282°44.2	12.6	-18°08.3	-3.7	54.0	10	04:55	05:22	05:44	18:25	18:48		
18	88°47.4	22°36.5	297°15.7	12.5	-18°12.0	-3.6	54.0	0	05:13	05:39	06:01	18:09	18:31		
19	103°47.3	22°36.2	311°47.2	12.5	-18°15.5	-3.5	54.0	-10	05:29	05:55	06:18	17:52	18:15		
20	118°47.2	22°36.0	326°18.7	12.5	-18°18.9	-3.4	54.0	-20	05:45	06:12	06:36	17:34	17:58		
21	133°47.1	22°35.7	340°50.2	12.4	-18°22.3	-3.3	54.0	-30	06:00	06:30	06:56	17:14	17:40		
22	148°47.0	22°35.4	355°21.6	12.4	-18°25.6	-3.2	54.0	-35	06:09	06:40	07:08	17:02	17:30		
23	163°46.9	22°35.2	9°53.0	12.4	-18°28.8	-3.2	54.0	-40	06:17	06:51	07:22	16:49	17:19		
SD.=15.7 d=-0.3 S.D.=14.7								-45	06:27	07:04	07:38	16:33	17:06	17:43	
								-50	06:38	07:19	07:57	16:13	16:51	17:32	
								-52	06:43	07:26	08:07	16:04	16:44	17:27	
								-54	06:48	07:34	08:17	15:53	16:36	17:22	
								-56	06:54	07:43	08:29	15:41	16:28	17:16	
								-58	07:00	07:52	08:43	15:28	16:18	17:10	
								-60	07:07	08:03	08:59	15:12	16:07	17:03	
								Moonrise			Moonset				
								Lat.	Thu	Fri	Sat	Thu	Fri	Sat	
								72	--	--	--	--	--	--	
								70	20:42	22:07	22:56	23:51	--	00:05	
								68	19:56	21:05	21:55	00:21	00:37	01:07	
								66	19:27	20:31	21:20	00:44	01:07	01:42	
								64	19:04	20:05	20:55	01:03	01:29	02:07	
								62	18:47	19:46	20:35	01:18	01:47	02:27	
								60	18:32	19:30	20:19	01:31	02:02	02:43	
								58	18:20	19:16	20:06	01:42	02:15	02:56	
								56	18:09	19:05	19:54	01:52	02:26	03:08	
								54	17:59	18:54	19:44	02:00	02:36	03:18	
								52	17:51	18:45	19:35	02:08	02:44	03:27	
								50	17:43	18:37	19:26	02:15	02:52	03:36	
								45	17:27	18:20	19:09	02:29	03:09	03:53	
								40	17:14	18:06	18:55	02:42	03:22	04:07	
								35	17:03	17:54	18:43	02:52	03:34	04:19	
								30	16:53	17:43	18:32	03:01	03:44	04:30	
								20	16:36	17:25	18:14	03:17	04:01	04:48	
								10	16:21	17:10	17:58	03:31	04:16	05:04	
								0	16:08	16:55	17:44	03:44	04:31	05:19	
								-10	15:54	16:41	17:29	03:57	04:45	05:33	
								-20	15:40	16:25	17:13	04:10	04:60	05:49	
								-30	15:23	16:07	16:55	04:26	05:17	06:07	
								-35	15:13	15:57	16:45	04:36	05:27	06:18	
								-40	15:02	15:45	16:33	04:46	05:39	06:30	
								-45	14:50	15:31	16:18	04:58	05:53	06:44	
								-50	14:34	15:14	16:01	05:14	06:09	07:01	
								-52	14:27	15:07	15:53	05:21	06:17	07:09	
								-54	14:19	14:58	15:44	05:28	06:26	07:18	
								-56	14:10	14:48	15:34	05:37	06:36	07:28	
								-58	13:59	14:36	15:22	05:47	06:47	07:40	
								-60	13:47	14:23	15:08	05:59	06:60	07:54	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age		
									00 ^h	12 ^h	Pass	Upper	Lower		
								6	04:43	04:48	12:04	22:19	09:55	12(93%)	
								7	04:53	04:58	12:04	23:06	10:42	13(97%)	
								8	05:02	05:07	12:05	23:55	11:31	14(99%)	
SD.=15.7 d=-0.3 S.D.=14.8															

July 09, 10, 11 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	287°07.4	224°12.8	18°33.4	172°35.6	22°34.9	93°18.5	-4°31.7	24°50.2	-21°55.9	Alpheratz	357°40.5	29°11.1
1	302°09.8	230°12.4	18°34.0	187°36.3	22°34.6	108°20.8	-4°31.8	39°52.8	-21°55.9	Ankaa	353°13.0	-42°12.5
2	317°12.3	254°12.0	18°34.5	202°37.1	22°34.4	123°23.1	-4°31.9	54°55.4	-21°55.9	Schedar	349°37.2	56°37.7
3	332°14.8	269°11.6	18°35.1	217°37.8	22°34.1	138°25.3	-4°32.0	69°58.1	-21°55.9	Diphda	348°53.0	-17°53.4
4	347°17.2	284°11.2	18°35.7	232°38.5	22°33.8	153°27.6	-4°32.1	85°00.7	-21°55.9	Achernar	335°24.9	-57°08.7
5	2°19.7	299°10.8	18°36.2	247°39.2	22°33.6	168°29.9	-4°32.2	100°03.3	-21°55.9	Hamal	327°57.7	23°32.5
6	17°22.2	314°10.4	18°36.8	262°40.0	22°33.3	183°32.2	-4°32.3	115°06.0	-21°55.9	Polaris	316°44.0	89°19.9
7	32°24.6	329°10.0	18°37.4	277°40.7	22°33.1	198°34.4	-4°32.4	130°08.6	-21°55.9	Akamar	315°16.5	-40°14.0
8	47°27.1	344°09.6	18°37.9	292°41.4	22°32.8	213°36.7	-4°32.4	145°11.3	-21°55.9	Menkar	314°12.3	4°09.3
9	62°29.6	359°09.3	18°38.5	307°42.2	22°32.5	228°39.0	-4°32.5	160°13.9	-21°55.9	Mirfak	308°36.6	49°55.0
10	77°32.0	14°08.9	18°39.0	322°42.9	22°32.3	243°41.3	-4°32.6	175°16.5	-21°55.9	Aldebaran	290°46.5	16°32.4
11	92°34.5	29°08.5	18°39.6	337°43.6	22°32.0	258°43.5	-4°32.7	190°19.2	-21°55.9	Rigel	281°09.7	-8°11.0
12	107°37.0	44°08.1	18°40.2	352°44.4	22°31.7	273°45.8	-4°32.8	205°21.8	-21°55.9	Capella	280°30.8	46°00.7
13	122°39.4	59°07.7	18°40.7	7°45.1	22°31.5	288°48.1	-4°32.9	220°24.4	-21°55.9	Bellatrix	278°29.4	6°21.7
14	137°41.9	74°07.3	18°41.3	22°45.8	22°31.2	303°50.3	-4°33.0	235°27.1	-21°55.9	Elnath	278°09.5	28°37.1
15	152°44.3	89°06.9	18°41.8	37°46.5	22°31.0	318°52.6	-4°33.1	250°29.7	-21°55.9	Alnilam	275°43.9	-1°11.6
16	167°46.8	104°06.5	18°42.4	52°47.3	22°30.7	333°54.9	-4°33.2	265°32.3	-21°55.9	Betelgeuse	270°58.7	7°24.4
17	182°49.3	119°06.1	18°43.0	67°48.0	22°30.4	348°57.2	-4°33.3	280°35.0	-21°55.9	Canopus	263°55.5	-52°42.4
18	197°51.7	134°05.7	18°43.5	82°48.7	22°30.2	3°59.4	-4°33.4	295°37.6	-21°55.9	Sirius	258°31.6	-16°44.4
19	212°54.2	149°05.3	18°44.1	97°49.5	22°29.9	19°01.7	-4°33.4	310°40.2	-21°55.9	Adara	255°10.7	-28°59.9
20	227°56.7	164°04.9	18°44.6	112°50.2	22°29.6	34°04.0	-4°33.5	325°42.9	-21°55.8	Procyon	244°57.1	5°10.8
21	242°59.1	179°04.5	18°45.2	127°50.9	22°29.4	49°06.2	-4°33.6	340°45.5	-21°55.8	Pollux	243°24.7	27°58.9
22	258°01.6	194°04.1	18°45.7	142°51.7	22°29.1	64°08.5	-4°33.7	355°48.1	-21°55.8	Avior	234°17.5	-59°34.1
23	273°04.1	209°03.7	18°46.3	157°52.4	22°28.8	79°10.8	-4°33.8	10°50.8	-21°55.8	Suhail	222°50.8	-43°30.4
Mer.pass.:4:50:		v-0.4 d0.6 m-4.0		v0.7 d-0.3 m1.6		v2.3 d-0.1 m-1.9		v2.6 d0.0 m0.1		Miaplacidus	221°39.8	-69°47.6
										Alphard	217°53.7	-8°44.1
										Regulus	207°40.8	11°52.9
										Dubhe	193°48.8	61°39.7
										Denebola	182°30.9	14°28.6
										Genah	175°49.5	-17°38.3
										Acrux	173°06.2	-63°12.0
										Gacrux	171°57.8	-57°12.8
										Alioth	166°18.4	55°52.3
										Spica	158°28.3	-11°15.0
										Alcaid	152°56.7	49°14.0
										Hadar	148°43.7	-60°27.5
										Menkent	148°04.2	-36°27.4
										Arcturus	145°53.0	19°06.1
										Rigel Kent.	139°47.6	-60°54.5
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.7	74°05.5
										Alphecca	126°08.5	26°39.7
										Antares	112°22.6	-26°28.1
										Atria	107°21.4	-69°03.5
										Sabik	102°09.1	-15°44.6
										Shaula	96°17.8	-37°06.8
										Rasalhague	96°03.6	12°33.2
										Etamin	90°44.3	51°29.5
										Kaus Aust.	83°39.7	-34°22.3
										Vega	80°36.7	38°48.2
										Nunki	75°54.5	-26°16.3
										Altair	62°05.3	8°55.0
										Peacock	53°14.4	-56°40.4
										Deneb	49°29.1	45°20.6
										Enif	33°44.2	9°57.4
										Alnair	27°40.0	-46°52.3
										Fomalhaut	15°20.8	-29°31.6
										Scheat	13°50.5	28°10.5
										Markab	13°35.4	15°17.9
										2017/7/9 SHA Mer.pass		
										Venus	297°05.4	09:03
										Mars	245°28.2	12:29
										Jupiter	166°11.1	17:44
										Saturn	97°42.8	22:17
										2017/7/1 SHA Mer.pass		
										Venus	295°56.7	09:04
										Mars	244°46.6	12:28
										Jupiter	166°06.5	17:40
										Saturn	97°46.9	22:13
										2017/7/1 SHA Mer.pass		
										Venus	294°47.7	09:05
										Mars	244°05.1	12:27
										Jupiter	166°01.8	17:37
										Saturn	97°50.9	22:08
										Horizontal paralax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:4:42:		v-0.4 d0.5 m-4.0		v0.7 d-0.3 m1.6		v2.3 d-0.1 m-1.8		v2.6 d0.0 m0.1				

Sun		Moon					
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°42.2	22°21.3	1°08.0	11.6	-19°18.3	1.2	54.4
1	193°42.1	22°21.0	15°38.6	11.6	-19°17.1	1.3	54.4
2	208°42.0	22°20.7	30°09.2	11.6	-19°15.7	1.4	54.4
3	223°41.9	22°20.4	44°39.8	11.6	-19°14.3	1.5	54.4
4	238°41.8	22°20.1	59°10.4	11.6	-19°12.7	1.6	54.5
5	253°41.7	22°19.8	73°41.0	11.6	-19°11.1	1.7	54.5
6	268°41.6	22°19.5	88°11.6	11.6	-19°09.4	1.8	54.5
7	283°41.5	22°19.2	102°42.1	11.6	-19°07.6	1.9	54.5
8	298°41.4	22°18.9	117°12.7	11.6	-19°05.7	2.0	54.5
9	313°41.4	22°18.6	131°43.3	11.6	-19°03.7	2.0	54.5
10	328°41.3	22°18.3	146°13.9	11.6	-19°01.6	2.1	54.5
11	343°41.2	22°18.0	160°44.5	11.6	-18°59.4	2.2	54.5
12	358°41.1	22°17.7	175°15.0	11.6	-18°57.1	2.3	54.6
13	13°41.0	22°17.3	189°45.6	11.6	-18°54.8	2.4	54.6
14	28°40.9	22°17.0	204°16.2	11.6	-18°52.3	2.5	54.6
15	43°40.8	22°16.7	218°46.8	11.6	-18°49.7	2.6	54.6
16	58°40.7	22°16.4	233°17.4	11.6	-18°47.1	2.7	54.6
17	73°40.6	22°16.1	247°47.9	11.6	-18°44.4	2.8	54.6
18	88°40.6	22°15.8	262°18.5	11.6	-18°41.6	2.9	54.6
19	103°40.5	22°15.5	276°49.1	11.6	-18°38.6	3.0	54.6
20	118°40.4	22°15.2	291°19.7	11.6	-18°35.6	3.0	54.7
21	133°40.3	22°14.9	305°50.3	11.6	-18°32.5	3.1	54.7
22	148°40.2	22°14.5	320°20.9	11.6	-18°29.4	3.2	54.7
23	163°40.1	22°14.2	334°51.5	11.6	-18°26.1	3.3	54.7
SD.=15.7		d=-0.3	S.D.=14.8				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°40.0	22°13.9	349°22.1	11.6	-18°22.7	3.4	54.7
1	193°39.9	22°13.6	3°52.7	11.6	-18°19.3	3.5	54.7
2	208°39.8	22°13.3	18°23.4	11.6	-18°15.7	3.6	54.7
3	223°39.8	22°13.0	32°54.0	11.6	-18°12.1	3.7	54.8
4	238°39.7	22°12.6	47°24.6	11.6	-18°08.4	3.8	54.8
5	253°39.6	22°12.3	61°55.3	11.6	-18°04.6	3.9	54.8
6	268°39.5	22°12.0	76°25.9	11.7	-18°00.7	3.9	54.8
7	283°39.4	22°11.7	90°56.6	11.7	-17°56.7	4.0	54.8
8	298°39.3	22°11.4	105°27.2	11.7	-17°52.6	4.1	54.8
9	313°39.2	22°11.1	119°57.9	11.7	-17°48.4	4.2	54.8
10	328°39.2	22°10.7	134°28.6	11.7	-17°44.2	4.3	54.9
11	343°39.1	22°10.4	148°59.3	11.7	-17°39.8	4.4	54.9
12	358°39.0	22°10.1	163°30.0	11.7	-17°35.4	4.5	54.9
13	13°38.9	22°09.8	178°00.7	11.7	-17°30.9	4.6	54.9
14	28°38.8	22°09.4	192°31.4	11.7	-17°26.3	4.6	54.9
15	43°38.7	22°09.1	207°02.2	11.7	-17°21.6	4.7	54.9
16	58°38.6	22°08.8	221°32.9	11.7	-17°16.9	4.8	55.0
17	73°38.6	22°08.5	236°03.7	11.8	-17°12.0	4.9	55.0
18	88°38.5	22°08.1	250°34.4	11.8	-17°07.1	5.0	55.0
19	103°38.4	22°07.8	265°05.2	11.8	-17°02.0	5.1	55.0
20	118°38.3	22°07.5	279°36.0	11.8	-16°56.9	5.2	55.0
21	133°38.2	22°07.1	294°06.8	11.8	-16°51.7	5.2	55.0
22	148°38.1	22°06.8	308°37.6	11.8	-16°46.5	5.3	55.0
23	163°38.1	22°06.5	323°08.4	11.8	-16°41.1	5.4	55.1
SD.=15.7		d=-0.3	S.D.=14.9				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°38.0	22°06.2	337°39.2	11.8	-16°35.7	5.5	55.1
1	193°37.9	22°05.8	352°10.1	11.9	-16°30.1	5.6	55.1
2	208°37.8	22°05.5	6°40.9	11.9	-16°24.5	5.6	55.1
3	223°37.7	22°05.2	21°11.8	11.9	-16°18.8	5.7	55.1
4	238°37.6	22°04.8	35°42.7	11.9	-16°13.1	5.8	55.1
5	253°37.6	22°04.5	50°13.6	11.9	-16°07.2	5.9	55.2
6	268°37.5	22°04.2	64°44.5	11.9	-16°01.3	6.0	55.2
7	283°37.4	22°03.8	79°15.4	11.9	-15°55.3	6.1	55.2
8	298°37.3	22°03.5	93°46.4	11.9	-15°49.2	6.1	55.2
9	313°37.2	22°03.1	108°17.3	12.0	-15°43.0	6.2	55.2
10	328°37.2	22°02.8	122°48.3	12.0	-15°36.8	6.3	55.3
11	343°37.1	22°02.5	137°19.3	12.0	-15°30.4	6.4	55.3
12	358°37.0	22°02.1	151°50.3	12.0	-15°24.0	6.4	55.3
13	13°36.9	22°01.8	166°21.3	12.0	-15°17.6	6.5	55.3
14	28°36.8	22°01.5	180°52.3	12.0	-15°11.0	6.6	55.3
15	43°36.8	22°01.1	195°23.3	12.0	-15°04.4	6.7	55.3
16	58°36.7	22°00.8	209°54.4	12.1	-14°57.7	6.7	55.4
17	73°36.6	22°00.4	224°25.4	12.1	-14°50.9	6.8	55.4
18	88°36.5	22°00.1	238°56.5	12.1	-14°44.0	6.9	55.4
19	103°36.4	21°59.7	253°27.6	12.1	-14°37.1	7.0	55.4
20	118°36.4	21°59.4	267°58.7	12.1	-14°30.1	7.0	55.4
21	133°36.3	21°59.1	282°29.8	12.1	-14°23.0	7.1	55.5
22	148°36.2	21°58.7	297°01.0	12.1	-14°15.8	7.2	55.5
23	163°36.1	21°58.4	311°32.1	12.2	-14°08.6	7.3	55.5
SD.=15.7		d=-0.3	S.D.=15.0				

Lat.	Twilight			Twilight		
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	--	--	--	--	--	--
70	--	--	--	--	--	--
68	--	--	--	--	--	--
66	--	--	01:14	22:53	--	--
64	--	--	02:02	22:07	--	--
62	--	--	02:32	21:37	--	--
60	--	01:29	02:55	21:15	22:39	--
58	--	02:05	03:13	20:57	22:04	--
56	--	02:30	03:28	20:42	21:40	--
54	01:22	02:50	03:41	20:29	21:20	22:46
52	01:55	03:06	03:52	20:18	21:04	22:14
50	02:18	03:19	04:02	20:08	20:51	21:51
45	02:59	03:47	04:23	19:47	20:23	21:11
40	03:27	04:08	04:40	19:30	20:02	20:43
35	03:49	04:25	04:54	19:16	19:45	20:21
30	04:07	04:39	05:07	19:04	19:31	20:04
20	04:34	05:03	05:27	18:43	19:08	19:36
10	04:56	05:22	05:45	18:26	18:48	19:15
0	05:13	05:39	06:02	18:09	18:31	18:57
-10	05:29	05:56	06:18	17:53	18:15	18:41
-20	05:45	06:12	06:36	17:35	17:59	18:26
-30	05:60	06:30	06:56	17:15	17:41	18:11
-35	06:08	06:39	07:07	17:04	17:32	18:03
-40	06:17	06:50	07:21	16:51	17:21	17:54
-45	06:26	07:03	07:36	16:35	17:08	17:45
-50	06:37	07:18	07:55	16:16	16:53	17:34
-52	06:42	07:25	08:05	16:07	16:47	17:29
-54	06:47	07:32	08:15	15:56	16:39	17:24
-56	06:52	07:40	08:26	15:45	16:31	17:19
-58	06:58	07:50	08:40	15:32	16:21	17:13
-60	07:05	08:00	08:55	15:16	16:11	17:06

Lat.	Moonrise			Moonset		
	Sun	Mon	Tue	Sun	Mon	Tue
72	--	--	23:39	--	--	03:16
70	23:09	23:11	23:11	00:57	02:25	04:03
68	22:24	22:40	22:50	01:58	03:09	04:33
66	21:55	22:18	22:33	02:32	03:38	04:56
64	21:32	21:59	22:19	02:57	04:00	05:13
62	21:15	21:44	22:07	03:17	04:18	05:28
60	20:60	21:32	21:57	03:33	04:32	05:40
58	20:47	21:21	21:49	03:46	04:45	05:50
56	20:36	21:11	21:41	03:58	04:56	05:59
54	20:26	21:03	21:34	04:08	05:05	06:07
52	20:18	20:55	21:28	04:17	05:13	06:15
50	20:10	20:49	21:22	04:25	05:21	06:21
45	19:54	20:34	21:10	04:43	05:37	06:35
40	19:40	20:22	21:00	04:57	05:50	06:46
35	19:29	20:12	20:52	05:09	06:01	06:56
30	19:19	20:03	20:44	05:19	06:11	07:05
20	19:01	19:47	20:31	05:37	06:28	07:19
10	18:46	19:34	20:20	05:53	06:42	07:32
0	18:32	19:21	20:09	06:07	06:56	07:44
-10	18:18	19:08	19:58	06:22	07:09	07:56
-20	18:03	18:54	19:46	06:37	07:24	08:08
-30	17:46	18:39	19:33	06:55	07:40	08:23
-35	17:36	18:29	19:26	07:05	07:50	08:31
-40	17:24	18:19	19:17	07:17	08:00	08:40
-45	17:10	18:07	19:07	07:31	08:13	08:51
-50	16:54	17:52	18:54	07:48	08:29	09:05
-52	16:46	17:45	18:48	07:56	08:36	09:11
-54	16:37	17:37	18:42	08:04	08:44	09:18
-56	16:28	17:29	18:35	08:14	08:53	09:25
-58	16:16	17:19	18:27	08:26	09:03	09:34
-60	16:04	17:07	18:18	08:39	09:15	09:43

Day	Sun			Moon		
	Eqn.of Time 00 ^h	12 ^h	Mer. Pass	Mer.Pass.		Age
9	05:11	05:16	12:05	00:43	12:19	15(100%)
10	05:20	05:24	12:05	00:43	13:08	16(98%)
11	05:28	05:32	12:05	01:32	13:56	17(95%)

July 12, 13, 14 (Wed., Thu., Fri.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Wed	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass		
0	290°04.8	223°43.2	19°12.6	173°28.4	22°15.4	96°01.8	-4°38.4	27°59.7	-21°55.7	43°02.3	-21°55.7	357°40.5	29°11.1				
1	305°07.3	238°42.7	19°13.1	188°29.2	22°15.2	111°04.0	-4°38.5	43°02.3	-21°55.7	58°05.0	-21°55.7	353°12.9	-42°12.5				
2	320°09.7	253°42.3	19°13.7	203°29.9	22°14.9	126°06.3	-4°38.6	58°05.0	-21°55.7	73°07.6	-21°55.7	349°37.2	56°37.7				
3	335°12.2	268°41.9	19°14.2	218°30.7	22°14.6	141°08.5	-4°38.7	73°07.6	-21°55.7	88°10.2	-21°55.7	348°53.0	-17°53.4				
4	350°14.7	283°41.4	19°14.7	233°31.4	22°14.3	156°10.8	-4°38.8	88°10.2	-21°55.7	103°12.9	-21°55.7	335°24.9	-57°08.7				
5	5°17.1	298°41.0	19°15.2	248°32.1	22°14.0	171°13.1	-4°38.9	103°12.9	-21°55.7	118°15.5	-21°55.7	327°57.7	23°32.5				
6	20°19.6	313°40.6	19°15.7	263°32.9	22°13.8	186°15.3	-4°39.0	118°15.5	-21°55.7	133°18.1	-21°55.7	316°42.7	89°19.8				
7	35°22.0	328°40.1	19°16.3	278°33.6	22°13.5	201°17.6	-4°39.1	133°18.1	-21°55.7	148°20.7	-21°55.7	315°16.5	-40°14.0				
8	50°24.5	343°39.7	19°16.8	293°34.4	22°13.2	216°19.8	-4°39.2	148°20.7	-21°55.7	163°23.4	-21°55.7	314°12.3	4°09.4				
9	65°27.0	358°39.3	19°17.3	308°35.1	22°12.9	231°22.1	-4°39.3	163°23.4	-21°55.7	178°26.0	-21°55.7	308°36.6	49°55.0				
10	80°29.4	13°38.8	19°17.8	323°35.8	22°12.6	323°35.8	-4°39.4	178°26.0	-21°55.7	193°28.6	-21°55.7	290°46.5	16°32.5				
11	95°31.9	28°38.4	19°18.3	338°36.6	22°12.3	261°26.6	-4°39.5	193°28.6	-21°55.7	208°31.2	-21°55.7	281°09.7	-8°11.0				
12	110°34.4	43°37.9	19°18.8	353°37.3	22°12.1	276°28.9	-4°39.6	208°31.2	-21°55.7	223°33.9	-21°55.7	280°30.8	46°00.7				
13	125°36.8	58°37.5	19°19.3	8°38.1	22°11.8	291°31.1	-4°39.7	223°33.9	-21°55.7	238°36.5	-21°55.7	278°29.3	6°21.7				
14	140°39.3	73°37.1	19°19.9	23°38.8	22°11.5	306°33.4	-4°39.8	238°36.5	-21°55.7	253°39.1	-21°55.7	278°09.5	28°37.1				
15	155°41.8	88°36.6	19°20.4	38°39.5	22°11.2	321°35.6	-4°39.9	253°39.1	-21°55.7	268°41.8	-21°55.7	275°43.9	-1°11.6				
16	170°44.2	103°36.2	19°20.9	53°40.3	22°10.9	336°37.9	-4°40.0	268°41.8	-21°55.7	283°44.4	-21°55.7	270°58.6	7°24.4				
17	185°46.7	118°35.7	19°21.4	68°41.0	22°10.6	351°40.1	-4°40.1	283°44.4	-21°55.7	298°47.0	-21°55.7	263°55.5	-52°42.4				
18	200°49.2	133°35.3	19°21.9	83°41.8	22°10.3	6°42.4	-4°40.2	298°47.0	-21°55.7	313°49.6	-21°55.7	258°31.6	-16°44.4				
19	215°51.6	148°34.9	19°22.4	98°42.5	22°10.1	21°44.6	-4°40.3	313°49.6	-21°55.7	328°52.3	-21°55.7	255°10.7	-28°59.9				
20	230°54.1	163°34.4	19°22.9	113°43.3	22°09.8	36°46.9	-4°40.4	328°52.3	-21°55.7	343°54.9	-21°55.7	244°57.1	5°10.8				
21	245°56.5	178°34.0	19°23.4	128°44.0	22°09.5	51°49.2	-4°40.5	343°54.9	-21°55.7	358°57.5	-21°55.7	243°24.7	27°58.9				
22	260°59.0	193°33.5	19°23.9	143°44.7	22°09.2	66°51.4	-4°40.6	358°57.5	-21°55.7	14°00.1	-21°55.7	234°17.5	-59°34.1				
23	276°01.5	208°33.1	19°24.4	158°45.5	22°08.9	81°53.7	-4°40.7	14°00.1	-21°55.7			222°50.8	-43°30.4				
Mer.pass.:4:38:			v-0.4 d0.5 m-4.0			v0.7 d-0.3 m1.6			v2.3 d-0.1 m-1.8			v2.6 d0.0 m0.1			Miaplacidus 221°39.9 -69°47.6		
															Alphard 217°53.7 -8°44.1		
															Regulus 207°40.8 11°52.9		
															Dubhe 193°48.8 61°39.7		
															Denebola 182°30.9 14°28.6		
															Gienah 175°49.5 -17°38.3		
															Acrux 173°06.3 -63°12.0		
															Gacrux 171°57.8 -57°12.8		
															Alioth 166°18.5 55°52.3		
															Spica 158°28.3 -11°15.0		
															Alcaid 152°56.7 49°14.0		
															Hadar 148°43.7 -60°27.5		
															Menkent 148°04.2 -36°27.4		
															Arcturus 145°53.0 19°06.1		
															Rigel Kent. 139°47.6 -60°54.5		
															Zubenelg. 137°02.2 -16°06.7		
															Kochab 137°19.8 74°05.5		
															Alphecca 126°08.5 26°39.7		
															Antares 112°22.6 -26°28.1		
															Atria 107°21.4 -69°03.5		
															Sabik 102°09.1 -15°44.6		
															Shaula 96°17.8 -37°06.8		
															Rasalhague 96°03.6 12°33.2		
															Etamin 90°44.3 51°29.5		
															Kaus Aust. 83°39.7 -34°22.3		
															Vega 80°36.7 38°48.2		
															Nunki 75°54.5 -26°16.3		
															Altair 62°05.3 8°55.0		
															Peacock 53°14.4 -56°40.5		
															Deneb 49°29.1 45°20.6		
															Enif 33°44.1 9°57.4		
															Alnair 27°40.0 -46°52.3		
															Fomalhaut 15°20.8 -29°31.6		
															Scheat 13°50.5 28°10.6		
															Markab 13°35.4 15°17.9		
															2017/7/1 SHA Mer.pass		
															Venus 293°38.4 09:05		
															Mars 243°23.6 12:25		
															Jupiter 165°57.0 17:33		
															Saturn 97°54.9 22:04		
															2017/7/1 SHA Mer.pass		
															Venus 292°28.7 09:06		
															Mars 242°42.3 12:24		
															Jupiter 165°52.0 17:30		
															Saturn 97°58.8 21:60		
															2017/7/1 SHA Mer.pass		
															Venus 291°18.7 09:07		
															Mars 242°01.0 12:23		
															Jupiter 165°46.8 17:26		
															Saturn 98°02.7 21:56		
															Horizontal parallax		
															Venus: 0.1		
															Mars: 0.1		
Mer.pass.:4:31:			v-0.5 d0.5 m-4.0			v0.7 d-0.3 m1.6			v2.2 d-0.1 m-1.8			v2.6 d0.0 m0.1					

July 15, 16, 17 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec				
0	293°02.2	19°48.4	223°10.6	19°48.4	174°22.1	21°54.5	98°43.8	-4°45.6	31°08.7	-21°55.5	46°11.3	-21°55.5	Alpheratz	357°40.5	29°11.1					
1	308°04.7	19°48.8	238°10.1	19°48.8	189°22.8	21°54.2	113°46.0	-4°45.7	46°11.3	-21°55.5	61°14.0	-21°55.5	Ankaa	353°12.9	-42°12.5					
2	323°07.1	19°49.3	253°09.7	19°49.3	204°23.6	21°53.9	128°48.3	-4°45.8	61°14.0	-21°55.5	76°16.6	-21°55.5	Schedar	349°37.1	56°37.7					
3	338°09.6	19°49.8	268°09.2	19°49.8	219°24.3	21°53.6	143°50.5	-4°45.9	76°16.6	-21°55.5	91°19.2	-21°55.5	Diphda	348°53.0	-17°53.4					
4	353°12.1	19°50.2	283°08.7	19°50.2	234°25.1	21°53.3	158°52.8	-4°46.0	91°19.2	-21°55.5	106°21.8	-21°55.5	Achernar	335°24.9	-57°08.7					
5	8°14.5	19°50.7	298°08.2	19°50.7	249°25.8	21°53.0	173°55.0	-4°46.1	106°21.8	-21°55.5	121°24.4	-21°55.5	Hamal	327°57.7	23°32.5					
6	23°17.0	19°51.2	313°07.8	19°51.2	264°26.6	21°52.7	188°57.2	-4°46.2	121°24.4	-21°55.5	136°27.1	-21°55.5	Polaris	316°41.4	89°19.8					
7	38°19.5	19°51.6	328°07.3	19°51.6	279°27.3	21°52.4	203°59.5	-4°46.3	136°27.1	-21°55.5	151°29.7	-21°55.5	Akamar	315°16.4	-40°14.0					
8	53°21.9	19°52.1	343°06.8	19°52.1	294°28.1	21°52.1	219°01.7	-4°46.4	151°29.7	-21°55.5	166°32.3	-21°55.5	Menkar	314°12.3	4°09.4					
9	68°24.4	19°52.6	358°06.3	19°52.6	309°28.8	21°51.8	234°04.0	-4°46.5	166°32.3	-21°55.5	181°34.9	-21°55.5	Mirfak	308°36.6	49°55.0					
10	83°26.9	19°53.0	373°05.9	19°53.0	324°29.6	21°51.5	249°06.2	-4°46.7	181°34.9	-21°55.5	196°37.5	-21°55.5	Aldebaran	290°46.5	16°32.5					
11	98°29.3	19°53.5	388°05.4	19°53.5	339°30.3	21°51.2	264°08.4	-4°46.8	196°37.5	-21°55.5	211°40.2	-21°55.5	Rigel	281°09.7	-8°11.0					
12	113°31.8	19°54.0	403°04.9	19°54.0	354°31.1	21°50.9	279°10.7	-4°46.9	211°40.2	-21°55.5	226°42.8	-21°55.5	Capella	280°30.8	46°00.7					
13	128°34.2	19°54.4	418°04.4	19°54.4	9°31.8	21°50.6	294°12.9	-4°47.0	226°42.8	-21°55.5	241°45.4	-21°55.5	Bellatrix	278°29.3	6°21.8					
14	143°36.7	19°54.9	433°03.9	19°54.9	24°32.6	21°50.3	309°15.2	-4°47.1	241°45.4	-21°55.5	256°48.0	-21°55.5	Elnath	278°09.5	28°37.1					
15	158°39.2	19°55.3	448°03.5	19°55.3	39°33.3	21°50.0	324°17.4	-4°47.2	256°48.0	-21°55.5	271°50.6	-21°55.5	Alnilam	275°43.9	-1°11.6					
16	173°41.6	19°55.8	463°03.0	19°55.8	54°34.1	21°49.7	339°19.6	-4°47.3	271°50.6	-21°55.5	301°55.9	-21°55.5	Betelgeuse	270°58.6	7°24.4					
17	188°44.1	19°56.3	478°02.5	19°56.3	69°34.8	21°49.4	354°21.9	-4°47.4	301°55.9	-21°55.5	316°58.5	-21°55.5	Canopus	263°55.5	-52°42.4					
18	203°46.6	19°56.7	493°02.0	19°56.7	84°35.6	21°49.0	9°24.1	-4°47.5	316°58.5	-21°55.5	332°01.1	-21°55.5	Sirius	258°31.5	-16°44.3					
19	218°49.0	19°57.2	508°01.5	19°57.2	99°36.3	21°48.7	24°26.4	-4°47.6	332°01.1	-21°55.5	347°03.7	-21°55.5	Adara	255°10.7	-28°59.9					
20	233°51.5	19°57.6	523°01.1	19°57.6	114°37.1	21°48.4	39°28.6	-4°47.7	347°03.7	-21°55.5	2°06.4	-21°55.5	Procyon	244°57.1	5°10.8					
21	248°54.0	19°58.1	538°00.6	19°58.1	129°37.9	21°48.1	54°30.8	-4°47.8	2°06.4	-21°55.5	17°09.0	-21°55.5	Pollux	243°24.7	27°58.9					
22	263°56.4	19°58.5	553°00.1	19°58.5	144°38.6	21°47.8	69°33.1	-4°47.9	17°09.0	-21°55.5			Avior	234°17.5	-59°34.1					
23	278°58.9	19°59.0	568°59.6	19°59.0	159°39.4	21°47.5	84°35.3	-4°48.0					Suhail	222°50.8	-43°30.3					
Mer.pass.:4:27:			v-0.5 d0.5 m-4.0			v0.8 d-0.3 m1.6			v2.2 d-0.1 m-1.8			v2.6 d0.0 m0.1			Miaplacidus			221°39.9	-69°47.5	
															Alphard			217°53.7	-8°44.1	
															Regulus			207°40.8	11°52.9	
															Dubhe			193°48.9	61°39.7	
															Denebola			182°30.9	14°28.6	
															Gienah			175°49.5	-17°38.3	
															Acrux			173°06.3	-63°12.0	
															Gacrux			171°57.9	-57°12.8	
															Alioth			166°18.5	55°52.3	
															Spica			158°28.3	-11°15.0	
															Alcaid			152°56.7	49°14.0	
															Hadar			148°43.7	-60°27.5	
															Menkent			148°04.2	-36°27.4	
															Arcturus			145°53.0	19°06.1	
															Rigel Kent.			139°47.6	-60°54.5	
															Zubenelg.			137°02.2	-16°06.7	
															Kochab			137°19.8	74°05.5	
															Alphecca			126°08.5	26°39.7	
															Antares			112°22.6	-28°28.1	
															Atria			107°21.4	-69°03.5	
															Sabik			102°09.1	-15°44.6	
															Shaula			96°17.8	-37°06.8	
															Rasalhague			96°03.6	12°33.2	
															Etamin			90°44.3	51°29.5	
															Kaus Aust.			83°39.7	-34°22.4	
															Vega			80°36.7	38°48.2	
															Nunki			75°54.5	-26°16.3	
															Altair			62°05.3	8°55.0	
															Peacock			53°14.4	-56°40.5	
															Deneb			49°29.1	45°20.6	
															Enif			33°44.1	9°57.4	
															Alnair			27°40.0	-46°52.3	
															Fomalhaut			15°20.8	-29°31.6	
															Scheat			13°50.5	28°10.6	
															Markab			13°35.4	15°17.9	
															2017/7/1			SHA	Mer.pass	
															Venus			290°08.4	09:08	
															Mars			241°19.9	12:22	
															Jupiter			165°41.6	17:22	
															Saturn			98°06.5	21:52	
															2017/7/1			SHA	Mer.pass	
															Venus			288°57.8	09:08	
															Mars			240°38.8	12:21	
															Jupiter			165°36.2	17:19	
															Saturn			98°10.2	21:47	
															2017/7/1			SHA	Mer.pass	
															Venus			287°46.8	09:09	
															Mars			239°57.8	12:19	
															Jupiter			165°30.7	17:15	
															Saturn			98°13.9	21:43	
															Horizontal paralax					
															Venus:			0.1		
															Mars:			0.1		
Mer.pass.:4:19:			v-0.5 d0.4 m-4.0			v0.8 d-0.3 m1.7			v2.2 d-0.1 m-1.8			v2.6 d0.0 m0.2								

Sun								Moon							
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
									Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	178°30.9	21°31.3	291°45.7	12.3	-2°45.6	10.9	57.2	72	--	--	--	--	--	--	
1	193°30.9	21°30.9	306°16.9	12.3	-2°34.8	10.9	57.2	70	--	--	--	--	--	--	
2	208°30.8	21°30.5	320°48.2	12.3	-2°23.9	10.9	57.2	68	--	--	--	--	--	--	
3	223°30.7	21°30.2	335°19.4	12.2	-2°13.0	10.9	57.3	66	--	--	01:41	22:28	--	--	
4	238°30.7	21°29.8	349°50.7	12.2	-2°02.0	10.9	57.3	64	--	--	02:19	21:51	--	--	
5	253°30.6	21°29.4	4°21.9	12.2	-1°51.1	11.0	57.3	62	--	00:58	02:45	21:25	23:08	--	
6	268°30.5	21°29.0	18°53.0	12.2	-1°40.1	11.0	57.4	60	--	01:49	03:06	21:05	22:21	--	
7	283°30.5	21°28.6	33°24.2	12.1	-1°29.1	11.0	57.4	58	--	02:19	03:23	20:48	21:52	--	
8	298°30.4	21°28.2	47°55.3	12.1	-1°18.1	11.0	57.4	56	00:53	02:41	03:37	20:35	21:30	23:14	
9	313°30.4	21°27.8	62°26.4	12.1	-1°07.1	11.0	57.4	54	01:40	02:59	03:49	20:23	21:12	22:30	
10	328°30.3	21°27.4	76°57.5	12.1	-0°56.1	11.0	57.5	52	02:08	03:14	03:59	20:12	20:57	22:03	
11	343°30.2	21°27.0	91°28.6	12.0	-0°45.0	11.1	57.5	50	02:29	03:27	04:09	20:03	20:44	21:42	
12	358°30.2	21°26.6	105°59.6	12.0	-0°33.9	11.1	57.5	45	03:06	03:53	04:29	19:43	20:19	21:05	
13	13°30.1	21°26.2	120°30.6	12.0	-0°22.9	11.1	57.5	40	03:33	04:13	04:45	19:27	19:59	20:38	
14	28°30.0	21°25.8	135°01.6	12.0	-0°11.8	11.1	57.6	35	03:54	04:29	04:58	19:14	19:43	20:18	
15	43°30.0	21°25.4	149°32.5	11.9	-0°00.7	11.1	57.6	30	04:10	04:43	05:10	19:02	19:29	20:01	
16	58°29.9	21°25.0	164°03.4	11.9	0°10.4	11.1	57.6	20	04:37	05:05	05:30	18:42	19:07	19:35	
17	73°29.9	21°24.6	178°34.3	11.9	0°21.6	11.1	57.7	10	04:57	05:24	05:47	18:25	18:48	19:15	
18	88°29.8	21°24.2	193°05.2	11.8	0°32.7	11.1	57.7	0	05:14	05:40	06:03	18:10	18:32	18:58	
19	103°29.7	21°23.7	207°36.0	11.8	0°43.8	11.1	57.7	-10	05:30	05:56	06:18	17:54	18:16	18:42	
20	118°29.7	21°23.3	222°06.8	11.8	0°55.0	11.1	57.7	-20	05:44	06:11	06:35	17:37	18:01	18:28	
21	133°29.6	21°22.9	236°37.6	11.7	1°06.1	11.2	57.8	-30	05:59	06:28	06:54	17:18	17:44	18:14	
22	148°29.6	21°22.5	251°08.3	11.7	1°17.3	11.2	57.8	-35	06:06	06:37	07:05	17:07	17:35	18:06	
23	163°29.5	21°22.1	265°39.0	11.7	1°28.4	11.2	57.8	-40	06:14	06:48	07:18	16:55	17:25	17:58	
	SD.=15.7	d=-0.4			S.D.=15.6			-45	06:23	06:60	07:32	16:40	17:13	17:49	
								-50	06:33	07:14	07:51	16:22	16:59	17:39	
								-52	06:38	07:20	07:59	16:13	16:53	17:35	
								-54	06:42	07:27	08:09	16:04	16:46	17:30	
								-56	06:47	07:35	08:20	15:53	16:38	17:25	
								-58	06:53	07:44	08:32	15:41	16:29	17:20	
								-60	06:59	07:53	08:47	15:26	16:19	17:14	

Sun	GHA	Dec	GHA	ν	Dec	d	HP	Moonrise			Moonset			
								Lat.	Sat	Sun	Mon	Sat	Sun	Mon
0	178°29.4	21°21.7	280°09.6	11.6	1°39.6	11.2	57.9	72	23:01	22:53	22:44	10:42	12:32	14:27
1	193°29.4	21°21.3	294°40.3	11.6	1°50.8	11.2	57.9	70	23:03	23:01	22:59	10:43	12:26	14:13
2	208°29.3	21°20.9	309°10.8	11.6	2°01.9	11.2	57.9	68	23:04	23:07	23:12	10:44	12:22	14:02
3	223°29.3	21°20.5	323°41.4	11.5	2°13.1	11.2	57.9	66	23:05	23:13	23:22	10:45	12:18	13:53
4	238°29.2	21°20.1	338°11.9	11.5	2°24.3	11.2	58.0	64	23:07	23:18	23:31	10:46	12:15	13:46
5	253°29.2	21°19.7	352°42.4	11.4	2°35.4	11.2	58.0	62	23:07	23:22	23:38	10:47	12:12	13:40
6	268°29.1	21°19.2	7°12.8	11.4	2°46.6	11.2	58.0	60	23:08	23:25	23:45	10:47	12:10	13:34
7	283°29.0	21°18.8	21°43.2	11.4	2°57.8	11.2	58.1	58	23:09	23:28	23:50	10:48	12:07	13:29
8	298°29.0	21°18.4	36°13.5	11.3	3°08.9	11.1	58.1	56	23:10	23:31	23:55	10:48	12:05	13:25
9	313°28.9	21°18.0	50°43.8	11.3	3°20.1	11.1	58.1	54	23:10	23:34	--	10:49	12:04	13:21
10	328°28.9	21°17.6	65°14.0	11.2	3°31.2	11.1	58.1	52	23:11	23:36	--	10:49	12:02	13:18
11	343°28.8	21°17.2	79°44.3	11.2	3°42.3	11.1	58.2	50	23:11	23:38	--	10:49	12:01	13:14
12	358°28.8	21°16.8	94°14.4	11.1	3°53.4	11.1	58.2	45	23:13	23:43	--	10:50	11:58	13:07
13	13°28.7	21°16.3	108°44.5	11.1	4°04.6	11.1	58.2	40	23:13	23:47	--	10:51	11:55	13:02
14	28°28.6	21°15.9	123°14.6	11.0	4°15.7	11.1	58.3	35	23:14	23:50	--	10:51	11:53	12:57
15	43°28.6	21°15.5	137°44.6	11.0	4°26.8	11.1	58.3	30	23:15	23:54	--	10:51	11:51	12:53
16	58°28.5	21°15.1	152°14.6	11.0	4°37.8	11.1	58.3	20	23:16	23:59	--	10:52	11:48	12:45
17	73°28.5	21°14.7	166°44.5	10.9	4°48.9	11.1	58.3	10	23:17	--	00:04	10:53	11:45	12:38
18	88°28.4	21°14.2	181°14.4	10.9	4°60.0	11.0	58.4	0	23:19	--	00:08	10:53	11:42	12:32
19	103°28.4	21°13.8	195°44.2	10.8	5°11.0	11.0	58.4	-10	23:20	--	00:13	10:54	11:39	12:26
20	118°28.3	21°13.4	210°14.0	10.7	5°22.0	11.0	58.4	-20	23:21	--	00:17	10:54	11:36	12:20
21	133°28.3	21°13.0	224°43.7	10.7	5°33.0	11.0	58.5	-30	23:22	--	00:23	10:55	11:33	12:12
22	148°28.2	21°12.6	239°13.4	10.6	5°44.0	11.0	58.5	-35	23:23	--	00:26	10:55	11:31	12:08
23	163°28.2	21°12.1	253°43.0	10.6	5°54.9	10.9	58.5	-40	23:24	--	00:30	10:56	11:29	12:03
	SD.=15.7	d=-0.4			S.D.=15.8			-45	23:25	--	00:34	10:56	11:26	11:58
								-50	23:27	--	00:39	10:57	11:23	11:51
								-52	23:27	--	00:42	10:57	11:22	11:48
								-54	23:28	--	00:44	10:57	11:20	11:44
								-56	23:29	--	00:47	10:58	11:18	11:41
								-58	23:29	--	00:50	10:58	11:16	11:37
								-60	23:30	--	00:54	10:58	11:14	11:32

Day	Sun			Moon		
	Eqn. of Time	Mer.	Mer. Pass.	Age		
	00 ^h	12 ^h	Pass	Upper	Lower	
15	05:56	05:59	12:05	04:41	17:05	21(64%)
16	06:02	06:05	12:06	05:30	17:54	22(54%)
17	06:08	06:10	12:06	06:20	18:45	23(42%)

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°28.1	21°11.7	268°12.6	10.5	6°05.9	10.9	58.5
1	193°28.0	21°11.3	282°42.1	10.5	6°16.8	10.9	58.6
2	208°28.0	21°10.9	297°11.6	10.4	6°27.7	10.9	58.6
3	223°27.9	21°10.4	311°40.9	10.4	6°38.6	10.9	58.6
4	238°27.9	21°10.0	326°10.3	10.3	6°49.4	10.8	58.7
5	253°27.8	21°09.6	340°39.6	10.3	7°00.2	10.8	58.7
6	268°27.8	21°09.2	355°08.8	10.2	7°11.0	10.8	58.7
7	283°27.7	21°08.7	9°38.0	10.1	7°21.8	10.7	58.7
8	298°27.7	21°08.3	24°07.1	10.1	7°32.5	10.7	58.8
9	313°27.6	21°07.9	38°36.1	10.0	7°43.2	10.7	58.8
10	328°27.6	21°07.4	53°05.1	9.9	7°53.8	10.6	58.8
11	343°27.5	21°07.0	67°34.0	9.9	8°04.5	10.6	58.9
12	358°27.5	21°06.6	82°02.9	9.8	8°15.1	10.6	58.9
13	13°27.4	21°06.2	96°31.6	9.8	8°25.6	10.5	58.9
14	28°27.4	21°05.7	111°00.4	9.7	8°36.2	10.5	58.9
15	43°27.3	21°05.3	125°29.0	9.6	8°46.6	10.5	59.0
16	58°27.3	21°04.9	139°57.6	9.6	8°57.1	10.4	59.0
17	73°27.2	21°04.4	154°26.2	9.5	9°07.5	10.4	59.0
18	88°27.2	21°04.0	168°54.6	9.4	9°17.8	10.3	59.1
19	103°27.1	21°03.5	183°23.0	9.4	9°28.1	10.3	59.1
20	118°27.1	21°03.1	197°51.4	9.3	9°38.4	10.2	59.1
21	133°27.0	21°02.7	212°19.6	9.2	9°48.6	10.2	59.1
22	148°27.0	21°02.2	226°47.8	9.2	9°58.8	10.2	59.2
23	163°26.9	21°01.8	241°16.0	9.1	10°08.9	10.1	59.2
	SD.=15.7	d=-0.4			S.D.=16.0		

July 18, 19 ,20 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	295°59.6	222°35.2	20°20.3	175°16.5	21°32.1	101°24.6	-4°53.3	34°17.1	-21°55.4	Alpheratz	357°40.5	29°11.1
1	311°02.1	237°34.7	20°20.7	190°17.2	21°31.8	116°26.9	-4°53.4	49°19.8	-21°55.4	Ankaa	353°12.9	-42°12.5
2	326°04.6	252°34.2	20°21.1	205°18.0	21°31.5	131°29.1	-4°53.5	64°22.4	-21°55.4	Schedar	349°37.1	56°37.7
3	341°07.0	267°33.7	20°21.6	220°18.8	21°31.2	146°31.3	-4°53.6	79°25.0	-21°55.4	Diphda	348°52.9	-17°53.4
4	356°09.5	282°33.2	20°22.0	235°19.5	21°30.8	161°33.5	-4°53.7	94°27.6	-21°55.4	Achernar	335°24.8	-57°08.7
5	11°11.9	297°32.7	20°22.4	250°20.3	21°30.5	176°35.7	-4°53.8	109°30.2	-21°55.4	Hamal	327°57.7	23°32.5
6	26°14.4	312°32.2	20°22.8	265°21.1	21°30.2	191°38.0	-4°53.9	124°32.8	-21°55.4	Polaris	316°39.8	89°19.8
7	41°16.9	327°31.7	20°23.2	280°21.8	21°29.9	206°40.2	-4°54.1	139°35.4	-21°55.4	Akamar	315°16.4	-40°14.0
8	56°19.3	342°31.1	20°23.6	295°22.6	21°29.5	221°42.4	-4°54.2	154°38.0	-21°55.4	Menkar	314°12.3	4°09.4
9	71°21.8	357°30.6	20°24.0	310°23.3	21°29.2	236°44.6	-4°54.3	169°40.7	-21°55.4	Mirfak	308°36.6	49°55.0
10	86°24.3	12°30.1	20°24.4	325°24.1	21°28.9	251°46.9	-4°54.4	184°43.3	-21°55.4	Aldebaran	290°46.5	16°32.5
11	101°26.7	27°29.6	20°24.8	340°24.9	21°28.6	266°49.1	-4°54.5	199°45.9	-21°55.4	Rigel	281°09.7	-8°11.0
12	116°29.2	42°29.1	20°25.2	355°25.6	21°28.3	281°51.3	-4°54.6	214°48.5	-21°55.4	Capella	280°30.8	46°00.7
13	131°31.7	57°28.6	20°25.7	10°26.4	21°27.9	296°53.5	-4°54.7	229°51.1	-21°55.4	Bellatrix	278°29.3	6°21.8
14	146°34.1	72°28.0	20°26.1	25°27.2	21°27.6	311°55.8	-4°54.8	244°53.7	-21°55.4	Elnath	278°09.4	28°37.1
15	161°36.6	87°27.5	20°26.5	40°27.9	21°27.3	326°58.0	-4°54.9	259°56.3	-21°55.4	Alnilam	275°43.9	-1°11.6
16	176°39.1	102°27.0	20°26.9	55°28.7	21°27.0	342°00.2	-4°55.0	274°58.9	-21°55.4	Betelgeuse	270°58.6	7°24.4
17	191°41.5	117°26.5	20°27.3	70°29.5	21°26.6	357°02.4	-4°55.2	290°01.6	-21°55.4	Canopus	263°55.4	-52°42.4
18	206°44.0	132°26.0	20°27.7	85°30.2	21°26.3	12°04.6	-4°55.3	305°04.2	-21°55.4	Sirius	258°31.5	-16°44.3
19	221°46.4	147°25.5	20°28.1	100°31.0	21°26.0	27°06.9	-4°55.4	320°06.8	-21°55.4	Adara	255°10.7	-28°59.9
20	236°48.9	162°24.9	20°28.5	115°31.7	21°25.7	42°09.1	-4°55.5	335°09.4	-21°55.4	Procyon	244°57.1	5°10.8
21	251°51.4	177°24.4	20°28.9	130°32.5	21°25.3	57°11.3	-4°55.6	350°12.0	-21°55.4	Pollux	243°24.7	27°58.9
22	266°53.8	192°23.9	20°29.3	145°33.3	21°25.0	72°13.5	-4°55.7	5°14.6	-21°55.4	Avior	234°17.5	-59°34.1
23	281°56.3	207°23.4	20°29.7	160°34.0	21°24.7	87°15.8	-4°55.8	20°17.2	-21°55.4	Suhail	222°50.8	-43°30.3
Mer.pass.:4:15:		v-0.5 d0.4 m-4.0		v0.8 d-0.3 m1.7		v2.2 d-0.1 m-1.8		v2.6 d0.0 m0.2		Miaplacidus	221°39.9	-69°47.5
										Alphard	217°53.7	-8°44.1
										Regulus	207°40.8	11°52.9
										Dubhe	193°48.9	61°39.7
										Denebola	182°31.0	14°28.6
										Gienah	175°49.5	-17°38.3
										Acrux	173°06.3	-63°11.9
										Gacrux	171°57.9	-57°12.8
										Alioth	166°18.5	55°52.3
										Spica	158°28.3	-11°15.0
										Alcaid	152°56.8	49°14.0
										Hadar	148°43.8	-60°27.5
										Menkent	148°04.2	-36°27.4
										Arcturus	145°53.0	19°06.1
										Rigel Kent.	139°47.7	-60°54.5
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.9	74°05.5
										Alphecca	126°08.5	26°39.7
										Antares	112°22.6	-26°28.1
										Atria	107°21.4	-69°03.5
										Sabik	102°09.1	-15°44.6
										Shaula	96°17.8	-37°06.8
										Rasalhague	96°03.6	12°33.2
										Etamin	90°44.4	51°29.5
										Kaus Aust.	83°39.7	-34°22.4
										Vega	80°36.7	38°48.2
										Nunki	75°54.5	-26°16.3
										Altair	62°05.3	8°55.0
										Peacock	53°14.4	-56°40.5
										Deneb	49°29.1	45°20.7
										Enif	33°44.1	9°57.4
										Alnair	27°40.0	-46°52.3
										Fomalhaut	15°20.8	-29°31.6
										Scheat	13°50.5	28°10.6
										Markab	13°35.4	15°18.0
										2017/7/1	SHA	Mer.pass
										Venus	286°35.6	09:10
										Mars	239°16.9	12:18
										Jupiter	165°25.0	17:12
										Saturn	98°17.5	21:39
										2017/7/1	SHA	Mer.pass
										Venus	285°24.1	09:11
										Mars	238°36.0	12:17
										Jupiter	165°19.2	17:08
										Saturn	98°21.1	21:35
										2017/7/2	SHA	Mer.pass
										Venus	284°12.3	09:12
										Mars	237°55.3	12:16
										Jupiter	165°13.3	17:05
										Saturn	98°24.5	21:31
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:4:07:		v-0.5 d0.4 m-4.0		v0.8 d-0.3 m1.7		v2.2 d-0.1 m-1.8		v2.6 d0.0 m0.2				

h Sun

Moon

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°26.9	21°01.4	255°44.0	9.0	10°19.0	10.1	59.2
1	193°26.8	21°00.9	270°12.0	9.0	10°29.1	10.0	59.3
2	208°26.8	21°00.5	284°39.9	8.9	10°39.0	9.9	59.3
3	223°26.7	21°00.0	299°07.8	8.8	10°48.9	9.9	59.3
4	238°26.7	20°59.6	313°35.6	8.7	10°58.8	9.8	59.3
5	253°26.6	20°59.2	328°03.3	8.7	11°08.6	9.8	59.4
6	268°26.6	20°58.7	342°30.9	8.6	11°18.4	9.7	59.4
7	283°26.6	20°58.3	356°58.5	8.5	11°28.1	9.7	59.4
8	298°26.5	20°57.8	11°26.0	8.5	11°37.7	9.6	59.4
9	313°26.5	20°57.4	25°53.4	8.4	11°47.3	9.5	59.5
10	328°26.4	20°56.9	40°20.7	8.3	11°56.8	9.5	59.5
11	343°26.4	20°56.5	54°48.0	8.2	12°06.2	9.4	59.5
12	358°26.3	20°56.1	69°15.2	8.2	12°15.6	9.3	59.5
13	13°26.3	20°55.6	83°42.3	8.1	12°24.9	9.3	59.6
14	28°26.2	20°55.2	98°09.4	8.0	12°34.2	9.2	59.6
15	43°26.2	20°54.7	112°36.3	7.9	12°43.4	9.1	59.6
16	58°26.1	20°54.3	127°03.2	7.9	12°52.5	9.1	59.6
17	73°26.1	20°53.8	141°30.0	7.8	13°01.5	9.0	59.7
18	88°26.1	20°53.4	155°56.8	7.7	13°10.5	8.9	59.7
19	103°26.0	20°52.9	170°23.5	7.6	13°19.3	8.8	59.7
20	118°26.0	20°52.5	184°50.1	7.6	13°28.1	8.8	59.7
21	133°25.9	20°52.0	199°16.6	7.5	13°36.9	8.7	59.8
22	148°25.9	20°51.6	213°43.0	7.4	13°45.5	8.6	59.8
23	163°25.8	20°51.1	228°09.4	7.3	13°54.1	8.5	59.8
	SD.=15.7	d=-0.4			S.D.=16.2		

Lat.	Twilight			Twilight		
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	---	---	---	---	---	---
70	---	---	---	---	---	---
68	---	---	00:48	23:15	---	---
66	---	---	01:54	22:16	---	---
64	---	---	02:28	21:42	---	---
62	---	01:16	02:53	21:18	22:52	---
60	---	01:58	03:12	20:59	22:11	---
58	---	02:26	03:28	20:44	21:45	---
56	01:10	02:47	03:41	20:30	21:24	22:59
54	01:49	03:04	03:53	20:19	21:07	22:22
52	02:14	03:19	04:03	20:09	20:53	21:57
50	02:34	03:31	04:12	19:60	20:41	21:37
45	03:10	03:56	04:32	19:41	20:16	21:01
40	03:36	04:15	04:47	19:25	19:57	20:36
35	03:56	04:31	05:00	19:12	19:41	20:16
30	04:13	04:45	05:11	19:01	19:28	19:60
20	04:38	05:07	05:31	18:42	19:06	19:34
10	04:58	05:25	05:47	18:25	18:48	19:14
0	05:15	05:41	06:03	18:10	18:32	18:58
-10	05:30	05:56	06:18	17:55	18:17	18:43
-20	05:44	06:11	06:34	17:38	18:02	18:29
-30	05:58	06:27	06:53	17:20	17:46	18:15
-35	06:05	06:36	07:04	17:09	17:37	18:08
-40	06:13	06:46	07:16	16:57	17:27	18:00
-45	06:21	06:58	07:30	16:43	17:15	17:52
-50	06:31	07:11	07:48	16:25	17:02	17:42
-52	06:35	07:17	07:56	16:17	16:56	17:38
-54	06:40	07:24	08:05	16:08	16:49	17:34
-56	06:44	07:31	08:16	15:57	16:42	17:29
-58	06:50	07:40	08:28	15:46	16:33	17:24
-60	06:55	07:49	08:41	15:32	16:24	17:18

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°25.8	20°50.7	242°35.7	7.3	14°02.6	8.5	59.8
1	193°25.8	20°50.2	257°01.9	7.2	14°11.0	8.4	59.9
2	208°25.7	20°49.7	271°28.1	7.1	14°19.3	8.3	59.9
3	223°25.7	20°49.3	285°54.2	7.0	14°27.6	8.2	59.9
4	238°25.6	20°48.8	300°20.2	7.0	14°35.7	8.1	59.9
5	253°25.6	20°48.4	314°46.1	6.9	14°43.8	8.0	60.0
6	268°25.5	20°47.9	329°11.9	6.8	14°51.8	7.9	60.0
7	283°25.5	20°47.5	343°37.7	6.7	14°59.7	7.8	60.0
8	298°25.5	20°47.0	358°03.4	6.7	15°07.5	7.8	60.0
9	313°25.4	20°46.5	12°29.0	6.6	15°15.2	7.7	60.0
10	328°25.4	20°46.1	26°54.6	6.5	15°22.8	7.6	60.1
11	343°25.3	20°45.6	41°20.1	6.4	15°30.3	7.5	60.1
12	358°25.3	20°45.2	55°45.5	6.4	15°37.7	7.4	60.1
13	13°25.3	20°44.7	70°10.8	6.3	15°45.0	7.3	60.1
14	28°25.2	20°44.2	84°36.1	6.2	15°52.3	7.2	60.1
15	43°25.2	20°43.8	99°01.3	6.2	15°59.4	7.1	60.2
16	58°25.1	20°43.3	113°26.4	6.1	16°06.4	7.0	60.2
17	73°25.1	20°42.9	127°51.5	6.0	16°13.3	6.9	60.2
18	88°25.1	20°42.4	142°16.4	5.9	16°20.1	6.8	60.2
19	103°25.0	20°41.9	156°41.4	5.9	16°26.8	6.7	60.2
20	118°25.0	20°41.5	171°06.2	5.8	16°33.4	6.6	60.3
21	133°24.9	20°41.0	185°31.0	5.7	16°39.9	6.4	60.3
22	148°24.9	20°40.5	199°55.7	5.7	16°46.3	6.3	60.3
23	163°24.9	20°40.1	214°20.3	5.6	16°52.6	6.2	60.3
	SD.=15.7	d=-0.5			S.D.=16.3		

Lat.	Moonrise			Moonset		
	Tue	Wed	Thu	Tue	Wed	Thu
72	22:32	22:13	---	16:30	18:48	---
70	22:59	23:00	23:09	16:05	18:02	19:59
68	23:19	23:31	23:56	15:47	17:32	19:13
66	23:35	23:54	---	15:32	17:10	18:43
64	23:48	---	00:12	15:19	16:53	18:20
62	23:59	---	00:27	15:09	16:38	18:02
60	---	00:09	00:40	15:00	16:26	17:47
58	---	00:17	00:51	14:53	16:16	17:35
56	---	00:24	01:00	14:46	16:07	17:24
54	00:00	00:31	01:09	14:40	15:59	17:14
52	00:04	00:37	01:16	14:34	15:51	17:06
50	00:08	00:42	01:23	14:29	15:45	16:58
45	00:16	00:54	01:38	14:19	15:31	16:42
40	00:23	01:04	01:50	14:10	15:20	16:28
35	00:29	01:12	02:01	14:03	15:10	16:17
30	00:35	01:20	02:10	13:56	15:01	16:07
20	00:44	01:33	02:26	13:45	14:47	15:50
10	00:52	01:44	02:39	13:35	14:34	15:35
0	00:60	01:55	02:53	13:25	14:22	15:21
-10	01:08	02:05	03:06	13:16	14:10	15:07
-20	01:16	02:17	03:20	13:06	13:57	14:52
-30	01:26	02:30	03:36	12:55	13:42	14:35
-35	01:31	02:38	03:45	12:49	13:34	14:25
-40	01:37	02:47	03:56	12:41	13:24	14:14
-45	01:45	02:57	04:09	12:33	13:13	14:01
-50	01:54	03:10	04:24	12:22	12:60	13:44
-52	01:58	03:15	04:32	12:18	12:53	13:37
-54	02:03	03:22	04:40	12:13	12:46	13:28
-56	02:08	03:29	04:49	12:07	12:39	13:19
-58	02:13	03:37	04:59	12:00	12:30	13:08
-60	02:20	03:47	05:11	11:53	12:20	12:56

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°24.8	20°39.6	228°44.9	5.5	16°58.7	6.1	60.3
1	193°24.8	20°39.1	243°09.4	5.5	17°04.8	6.0	60.3
2	208°24.8	20°38.7	257°33.9	5.4	17°10.7	5.9	60.4
3	223°24.7	20°38.2	271°58.3	5.4	17°16.5	5.8	60.4
4	238°24.7	20°37.7	286°22.6	5.3	17°22.2	5.6	60.4
5	253°24.7	20°37.2	300°46.8	5.2	17°27.8	5.5	60.4
6	268°24.6	20°36.8	315°11.0	5.2	17°33.2	5.4	60.4
7	283°24.6	20°36.3	329°35.2	5.1	17°38.6	5.3	60.4
8	298°24.5	20°35.8	343°59.3	5.1	17°43.8	5.2	60.5
9	313°24.5	20°35.4	358°23.3	5.0	17°48.9	5.0	60.5
10	328°24.5	20°34.9	12°47.3	4.9	17°53.9	4.9	60.5
11	343°24.4	20°34.4	27°11.2	4.9	17°58.7	4.8	60.5
12	358°24.4	20°33.9	41°35.0	4.8	18°03.5	4.7	60.5
13	13°24.4	20°33.5	55°58.8	4.8	18°08.1	4.5	60.5
14	28°24.3	20°33.0	70°22.6	4.7	18°12.6	4.4	60.5
15	43°24.3	20°32.5	84°46.3	4.7	18°16.9	4.3	60.5
16	58°24.3	20°32.0	99°10.0	4.6	18°21.1	4.2	60.6
17	73°24.2	20°31.5	113°33.6	4.6	18°25.2	4.0	60.6
18	88°24.2	20°31.1	127°57.1	4.5	18°29.2	3.9	60.6
19	103°24.2	20°30.6	142°20.7	4.5	18°33.0	3.8	60.6
20	118°24.1	20°30.1	156°44.1	4.5	18°36.7	3.6	60.6
21	133°24.1	20°29.6	171°07.6	4.4	18°40.3	3.5	60.6
22	148°24.1	20°29.1	185°31.0	4.4	18°43.7	3.4	60.6
23	163°24.0	20°28.7	199°54.3	4.3	18°47.0	3.2	60.6
	SD.=15.7	d=-0.5			S.D.=16.5		

Day	Sun			Moon		
	Eqn.of Time	Mer. Pass	Mer. Pass.	Upper	Lower	Age
18	00 ^h 06:12	06:15	12:06	07:12	19:39	24(31%)
19	06:17	06:19	12:06	08:08	20:37	25(21%)
20	06:21	06:22	12:06	09:06	21:37	26(12%)

July 21, 22 ,23 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	298°57.0	221°57.2	20°48.2	176°11.7	21°08.3	104°04.3	-5°01.4	37°25.0	-21°55.3	Alpheratz	357°40.4	29°11.1
1	313°59.5	236°56.7	20°48.5	191°12.5	21°08.0	119°06.5	-5°01.5	52°27.6	-21°55.3	Ankaa	353°12.8	-42°12.5
2	329°02.0	251°56.1	20°48.9	206°13.3	21°07.6	134°08.7	-5°01.6	67°30.2	-21°55.3	Schedar	349°37.1	56°37.7
3	344°04.4	266°55.6	20°49.3	221°14.0	21°07.3	149°10.9	-5°01.8	82°32.8	-21°55.3	Diphda	348°52.9	-17°53.4
4	359°06.9	281°55.0	20°49.6	236°14.8	21°07.0	164°13.1	-5°01.9	97°35.4	-21°55.3	Achernar	335°24.8	-57°08.7
5	14°09.4	296°54.5	20°50.0	251°15.6	21°06.6	179°15.3	-5°02.0	112°38.0	-21°55.3	Hamal	327°57.6	23°32.5
6	29°11.8	311°54.0	20°50.3	266°16.4	21°06.3	194°17.5	-5°02.1	127°40.6	-21°55.3	Polaris	316°38.2	89°19.8
7	44°14.3	326°53.4	20°50.7	281°17.1	21°05.9	209°19.7	-5°02.2	142°43.2	-21°55.3	Akamar	315°16.4	-40°14.0
8	59°16.8	341°52.9	20°51.0	296°17.9	21°05.6	224°21.9	-5°02.3	157°45.8	-21°55.3	Menkar	314°12.2	4°09.4
9	74°19.2	356°52.3	20°51.4	311°18.7	21°05.2	239°24.1	-5°02.5	172°48.4	-21°55.3	Mirfak	308°36.5	49°55.0
10	89°21.7	11°51.8	20°51.7	326°19.5	21°04.9	254°26.4	-5°02.6	187°51.0	-21°55.3	Aldebaran	290°46.4	16°32.5
11	104°24.2	26°51.2	20°52.1	341°20.2	21°04.6	269°28.6	-5°02.7	202°53.6	-21°55.3	Rigel	281°09.7	-8°11.0
12	119°26.6	41°50.7	20°52.4	356°21.0	21°04.2	284°30.8	-5°02.8	217°56.2	-21°55.3	Capella	280°30.7	46°00.7
13	134°29.1	56°50.1	20°52.8	11°21.8	21°03.9	299°33.0	-5°02.9	232°58.8	-21°55.3	Bellatrix	278°29.3	6°21.8
14	149°31.5	71°49.6	20°53.1	26°22.5	21°03.5	314°35.2	-5°03.0	248°01.4	-21°55.3	Elnath	278°09.4	28°37.1
15	164°34.0	86°49.0	20°53.5	41°23.3	21°03.2	329°37.4	-5°03.2	263°04.0	-21°55.3	Alnilam	275°43.8	-1°11.6
16	179°36.5	101°48.5	20°53.8	56°24.1	21°02.8	344°39.6	-5°03.3	278°06.6	-21°55.3	Betelgeuse	270°58.6	7°24.4
17	194°38.9	116°47.9	20°54.1	71°24.9	21°02.5	359°41.8	-5°03.4	293°09.2	-21°55.3	Canopus	263°55.4	-52°42.3
18	209°41.4	131°47.3	20°54.5	86°25.6	21°02.2	14°44.0	-5°03.5	308°11.8	-21°55.3	Sirius	258°31.5	-16°44.3
19	224°43.9	146°46.8	20°54.8	101°26.4	21°01.8	29°46.2	-5°03.6	323°14.4	-21°55.3	Adara	255°10.7	-28°59.8
20	239°46.3	161°46.2	20°55.2	116°27.2	21°01.5	44°48.4	-5°03.7	338°17.0	-21°55.3	Procyon	244°57.1	5°10.8
21	254°48.8	176°45.7	20°55.5	131°28.0	21°01.1	59°50.6	-5°03.9	353°19.6	-21°55.3	Pollux	243°24.6	27°58.9
22	269°51.3	191°45.1	20°55.9	146°28.8	21°00.8	74°52.8	-5°04.0	8°22.2	-21°55.3	Avior	234°17.5	-59°34.1
23	284°53.7	206°44.6	20°56.2	161°29.5	21°00.4	89°55.0	-5°04.1	23°24.8	-21°55.3	Suhail	222°50.8	-43°30.3
Mer.pass.:4:03:		v-0.5 d0.4 m-4.0		v0.8 d-0.3 m1.7		v2.2 d-0.1 m-1.8		v2.6 d0.0 m0.2		Miaplacidus	221°39.9	-69°47.5
										Alphard	217°53.7	-8°44.1
										Regulus	207°40.8	11°52.9
										Dubhe	193°48.9	61°39.6
										Denebola	182°31.0	14°28.6
										Gienah	175°49.5	-17°38.3
										Acrux	173°06.3	-63°11.9
										Gacrux	171°57.9	-57°12.8
										Alioth	166°18.5	55°52.3
										Spica	158°28.3	-11°15.0
										Alcaid	152°56.8	49°14.0
										Hadar	148°43.8	-60°27.5
										Menkent	148°04.2	-36°27.4
										Arcturus	145°53.0	19°06.1
										Rigel Kent.	139°47.7	-60°54.5
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°19.9	74°05.5
										Alphecca	126°08.5	26°39.7
										Antares	112°22.6	-26°28.1
										Atria	107°21.4	-69°03.5
										Sabik	102°09.1	-15°44.6
										Shaula	96°17.8	-37°06.8
										Rasalhague	96°03.6	12°33.2
										Etamin	90°44.4	51°29.5
										Kaus Aust.	83°39.7	-34°22.4
										Vega	80°36.7	38°48.3
										Nunki	75°54.5	-26°16.3
										Altair	62°05.3	8°55.1
										Peacock	53°14.3	-56°40.5
										Deneb	49°29.1	45°20.7
										Enif	33°44.1	9°57.4
										Alnair	27°39.9	-46°52.3
										Fomalhaut	15°20.8	-29°31.6
										Scheat	13°50.4	28°10.6
										Markab	13°35.3	15°18.0
										2017/7/2	SHA	Mer.pass
										Venus	283°00.2	09:13
										Mars	237°14.7	12:15
										Jupiter	165°07.2	17:01
										Saturn	98°27.9	21:27
										2017/7/2	SHA	Mer.pass
										Venus	281°47.8	09:13
										Mars	236°34.1	12:13
										Jupiter	165°01.0	16:58
										Saturn	98°31.2	21:22
										2017/7/2	SHA	Mer.pass
										Venus	280°35.2	09:14
										Mars	235°53.7	12:12
										Jupiter	164°54.7	16:54
										Saturn	98°34.5	21:18
										Horizontal paralax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:3:55:		v-0.6 d0.3 m-4.0		v0.8 d-0.4 m1.7		v2.2 d-0.1 m-1.8		v2.6 d0.0 m0.2				

Sun			Moon				Twilight							
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
0	178°24.0	20°28.2	214°17.6	4.3	18°50.2	3.1	60.6	72	--	--	--	--	--	--
1	193°24.0	20°27.7	228°40.9	4.3	18°53.2	3.0	60.6	70	--	--	--	--	--	--
2	208°24.0	20°27.2	243°04.1	4.2	18°56.1	2.8	60.6	68	--	--	01:16	22:51	--	--
3	223°23.9	20°26.7	257°27.3	4.2	18°58.9	2.7	60.7	66	--	--	02:06	22:03	--	--
4	238°23.9	20°26.2	271°50.5	4.2	19°01.5	2.6	60.7	64	--	--	02:37	21:33	--	--
5	253°23.9	20°25.8	286°13.7	4.1	19°04.0	2.4	60.7	62	--	01:32	03:00	21:11	22:37	--
6	268°23.8	20°25.3	300°36.8	4.1	19°06.3	2.3	60.7	60	--	02:08	03:18	20:53	22:02	--
7	283°23.8	20°24.8	314°59.9	4.1	19°08.6	2.1	60.7	58	--	02:34	03:33	20:38	21:37	--
8	298°23.8	20°24.3	329°22.9	4.1	19°10.6	2.0	60.7	56	01:24	02:53	03:46	20:26	21:18	22:45
9	313°23.7	20°23.8	343°46.0	4.0	19°12.6	1.9	60.7	54	01:57	03:10	03:57	20:14	21:02	22:13
10	328°23.7	20°23.3	358°09.0	4.0	19°14.3	1.7	60.7	52	02:21	03:23	04:07	20:05	20:48	21:50
11	343°23.7	20°22.8	12°32.0	4.0	19°16.0	1.6	60.7	50	02:40	03:35	04:16	19:56	20:37	21:32
12	358°23.7	20°22.4	26°55.0	4.0	19°17.5	1.4	60.7	45	03:14	03:59	04:35	19:38	20:13	20:58
13	13°23.6	20°21.9	41°17.9	4.0	19°18.9	1.3	60.7	40	03:39	04:18	04:50	19:23	19:54	20:33
14	28°23.6	20°21.4	55°40.9	3.9	19°20.1	1.2	60.7	35	03:59	04:34	05:02	19:10	19:39	20:14
15	43°23.6	20°20.9	70°03.8	3.9	19°21.2	1.0	60.7	30	04:15	04:47	05:13	18:59	19:26	19:58
16	58°23.5	20°20.4	84°26.7	3.9	19°22.1	0.9	60.7	20	04:40	05:08	05:32	18:41	19:05	19:33
17	73°23.5	20°19.9	98°49.7	3.9	19°22.9	0.7	60.7	10	04:59	05:25	05:48	18:25	18:47	19:14
18	88°23.5	20°19.4	113°12.6	3.9	19°23.6	0.6	60.7	0	05:15	05:41	06:03	18:10	18:32	18:58
19	103°23.5	20°18.9	127°35.5	3.9	19°24.1	0.4	60.7	-10	05:30	05:55	06:18	17:55	18:18	18:43
20	118°23.4	20°18.4	141°58.4	3.9	19°24.5	0.3	60.7	-20	05:43	06:10	06:33	17:40	18:03	18:30
21	133°23.4	20°17.9	156°21.3	3.9	19°24.7	0.2	60.7	-30	05:57	06:26	06:51	17:22	17:47	18:17
22	148°23.4	20°17.4	170°44.1	3.9	19°24.8	0.0	60.7	-35	06:04	06:34	07:02	17:11	17:39	18:10
23	163°23.4	20°16.9	185°07.0	3.9	19°24.7	-0.1	60.7	-40	06:11	06:44	07:14	16:60	17:29	18:02
SD.=15.7 d=-0.5							S.D.=16.5							
Sat														
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Fri	Sat	Sun	Fri	Sat	Sun
0	178°23.3	20°16.4	199°29.9	3.9	19°24.5	-0.3	60.7	-52	06:28	07:08	07:44	16:29	17:05	17:45
1	193°23.3	20°15.9	213°52.8	3.9	19°24.2	-0.4	60.7	-54	06:36	07:20	08:01	16:12	16:53	17:37
2	208°23.3	20°15.4	228°15.7	3.9	19°23.7	-0.6	60.7	-56	06:41	07:28	08:11	16:02	16:46	17:33
3	223°23.3	20°14.9	242°38.7	3.9	19°23.1	-0.7	60.7	-58	06:46	07:36	08:23	15:51	16:38	17:28
4	238°23.2	20°14.4	257°01.6	3.9	19°22.3	-0.8	60.7	-60	06:51	07:45	08:36	15:38	16:29	17:22
5	253°23.2	20°13.9	271°24.5	3.9	19°21.4	-1.0	60.7							
6	268°23.2	20°13.4	285°47.5	4.0	19°20.4	-1.1	60.7							
7	283°23.2	20°12.9	300°10.4	4.0	19°19.2	-1.3	60.7							
8	298°23.1	20°12.4	314°33.4	4.0	19°17.8	-1.4	60.6							
9	313°23.1	20°11.9	328°56.4	4.0	19°16.4	-1.5	60.6							
10	328°23.1	20°11.4	343°19.4	4.0	19°14.7	-1.7	60.6							
11	343°23.1	20°10.9	357°42.5	4.1	19°13.0	-1.8	60.6							
12	358°23.0	20°10.4	12°05.6	4.1	19°11.1	-2.0	60.6							
13	13°23.0	20°09.9	26°28.7	4.1	19°09.1	-2.1	60.6							
14	28°23.0	20°09.4	40°51.8	4.1	19°06.9	-2.2	60.6							
15	43°23.0	20°08.9	55°14.9	4.2	19°04.6	-2.4	60.6							
16	58°23.0	20°08.4	69°38.1	4.2	19°02.1	-2.5	60.6							
17	73°22.9	20°07.9	84°01.3	4.2	18°59.5	-2.7	60.6							
18	88°22.9	20°07.4	98°24.6	4.3	18°56.8	-2.8	60.6							
19	103°22.9	20°06.9	112°47.9	4.3	18°54.0	-2.9	60.5							
20	118°22.9	20°06.4	127°11.2	4.3	18°51.0	-3.1	60.5							
21	133°22.8	20°05.9	141°34.6	4.4	18°47.8	-3.2	60.5							
22	148°22.8	20°05.4	155°58.0	4.4	18°44.6	-3.3	60.5							
23	163°22.8	20°04.9	170°21.4	4.5	18°41.2	-3.5	60.5							
SD.=15.7 d=-0.5							S.D.=16.6							
Sun														
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun Eqn. of Time 00 ^h	Mer. Pass	Mer. Pass. Upper	Mer. Pass. Lower	Age	
0	178°22.8	20°04.3	184°44.9	4.5	18°37.6	-3.6	60.5	-10	04:08	05:10	06:10	16:08	17:10	18:11
1	193°22.8	20°03.8	199°08.4	4.6	18°34.0	-3.7	60.5	-20	04:23	05:26	06:25	15:52	16:54	17:57
2	208°22.7	20°03.3	213°32.0	4.6	18°30.2	-3.9	60.4	-30	04:41	05:44	06:42	15:33	16:36	17:41
3	223°22.7	20°02.8	227°55.7	4.7	18°26.3	-4.0	60.4	-35	04:52	05:54	06:52	15:23	16:26	17:32
4	238°22.7	20°02.3	242°19.3	4.7	18°22.2	-4.1	60.4	-40	05:04	06:07	07:03	15:11	16:14	17:21
5	253°22.7	20°01.8	256°43.1	4.8	18°18.0	-4.2	60.4	-45	05:18	06:21	07:16	14:56	15:60	17:09
6	268°22.7	20°01.3	271°06.9	4.8	18°13.7	-4.4	60.4	-50	05:35	06:38	07:32	14:39	15:42	16:53
7	283°22.7	20°00.8	285°30.7	4.9	18°09.3	-4.5	60.4	-52	05:43	06:47	07:40	14:30	15:34	16:46
8	298°22.6	20°00.2	299°54.6	4.9	18°04.7	-4.6	60.3	-54	05:52	06:56	07:48	14:21	15:25	16:38
9	313°22.6	19°59.7	314°18.5	5.0	18°00.1	-4.7	60.3	-56	06:03	07:06	07:57	14:11	15:15	16:29
10	328°22.6	19°59.2	328°42.6	5.0	17°55.3	-4.9	60.3	-58	06:14	07:18	08:08	13:59	15:03	16:19
11	343°22.6	19°58.7	343°06.6	5.1	17°50.3	-5.0	60.3	-60	06:28	07:32	08:20	13:45	14:50	16:07
12	358°22.6	19°58.2	357°30.8	5.2	17°45.3	-5.1	60.3							
13	13°22.6	19°57.7	11°54.9	5.2	17°40.1	-5.2	60.3							
14	28°22.5	19°57.1	26°19.2	5.3	17°34.8	-5.3	60.2							
15	43°22.5	19°56.6	40°43.5	5.4	17°29.4	-5.5	60.2							
16	58°22.5	19°56.1	55°07.9	5.4	17°23.9	-5.6	60.2							
17	73°22.5	19°55.6	69°32.4	5.5	17°18.2	-5.7	60.2							
18	88°22.5	19°55.1	83°56.9	5.5	17°12.5	-5.8	60.1							
19	103°22.5	19°54.5	98°21.5	5.6	17°06.6	-5.9	60.1							
20	118°22.4	19°54.0	112°46.1	5.7	17°00.6	-6.0	60.1							
21	133°22.4	19°53.5	127°10.8	5.8	16°54.5	-6.1	60.1							
22	148°22.4	19°53.0	141°35.6	5.8	16°48.3	-6.3	60.1							
23	163°22.4	19°52.4	156°00.5	5.9	16°42.0	-6.4	60.0							
SD.=15.7 d=-0.5							S.D.=16.5							

July 24, 25 ,26 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	301°54.5	221°16.8	21°11.7	177°07.8	20°43.2	106°42.8	-5°10.0	40°32.1	-21°55.3	Alpheratz	357°40.4	29°11.1
1	316°56.9	236°16.3	21°12.0	192°08.6	20°42.8	121°45.0	-5°10.1	55°34.7	-21°55.3	Ankaa	353°12.8	-42°12.4
2	331°59.4	251°15.7	21°12.3	207°09.3	20°42.4	136°47.2	-5°10.2	70°37.3	-21°55.3	Schedar	349°37.0	56°37.7
3	347°01.9	266°15.1	21°12.6	222°10.1	20°42.1	151°49.3	-5°10.3	85°39.9	-21°55.3	Diphda	348°52.9	-17°53.3
4	2°04.3	281°14.5	21°12.9	237°10.9	20°41.7	166°51.5	-5°10.5	100°42.5	-21°55.3	Achernar	335°24.7	-57°08.7
5	17°06.8	296°13.9	21°13.2	252°11.7	20°41.4	181°53.7	-5°10.6	115°45.1	-21°55.3	Hamal	327°57.6	23°32.5
6	32°09.3	311°13.4	21°13.5	267°12.5	20°41.0	196°55.9	-5°10.7	130°47.6	-21°55.3	Polaris	316°36.7	89°19.8
7	47°11.7	326°12.8	21°13.8	282°13.3	20°40.6	211°58.1	-5°10.8	145°50.2	-21°55.3	Akamar	315°16.4	-40°14.0
8	62°14.2	341°12.2	21°14.1	297°14.0	20°40.3	227°00.3	-5°11.0	160°52.8	-21°55.3	Menkar	314°12.2	4°09.4
9	77°16.6	356°11.6	21°14.4	312°14.8	20°39.9	242°02.5	-5°11.1	175°55.4	-21°55.3	Mirfak	308°36.5	49°55.0
10	92°19.1	11°11.0	21°14.6	327°15.6	20°39.5	327°04.7	-5°11.2	190°58.0	-21°55.3	Aldebaran	290°46.4	16°32.5
11	107°21.6	26°10.5	21°14.9	342°16.4	20°39.2	272°06.9	-5°11.3	206°00.6	-21°55.3	Rigel	281°09.6	-8°11.0
12	122°24.0	41°09.9	21°15.2	357°17.2	20°38.8	287°09.1	-5°11.4	221°03.2	-21°55.3	Capella	280°30.7	46°00.7
13	137°26.5	56°09.3	21°15.5	12°18.0	20°38.5	302°11.3	-5°11.6	236°05.8	-21°55.3	Bellatrix	278°29.3	6°21.8
14	152°29.0	71°08.7	21°15.8	27°18.8	20°38.1	317°13.5	-5°11.7	251°08.4	-21°55.3	Elnath	278°09.4	28°37.1
15	167°31.4	86°08.1	21°16.1	42°19.6	20°37.7	332°15.6	-5°11.8	266°11.0	-21°55.3	Alnilam	275°43.8	-1°11.6
16	182°33.9	101°07.6	21°16.3	57°20.3	20°37.4	347°17.8	-5°11.9	281°13.6	-21°55.3	Betelgeuse	270°58.6	7°24.5
17	197°36.4	116°07.0	21°16.6	72°21.1	20°37.0	2°20.0	-5°12.1	296°16.2	-21°55.3	Canopus	263°55.4	-52°42.3
18	212°38.8	131°06.4	21°16.9	87°21.9	20°36.7	17°22.2	-5°12.2	311°18.8	-21°55.3	Sirius	258°31.5	-16°44.3
19	227°41.3	146°05.8	21°17.2	102°22.7	20°36.3	32°24.4	-5°12.3	326°21.3	-21°55.3	Adara	255°10.7	-28°59.8
20	242°43.8	161°05.2	21°17.5	117°23.5	20°35.9	47°26.6	-5°12.4	341°23.9	-21°55.3	Procyon	244°57.1	5°10.8
21	257°46.2	176°04.6	21°17.7	132°24.3	20°35.6	62°28.8	-5°12.6	356°26.5	-21°55.3	Pollux	243°24.6	27°58.9
22	272°48.7	191°04.0	21°18.0	147°25.1	20°35.2	77°31.0	-5°12.7	11°29.1	-21°55.3	Avior	234°17.5	-59°34.0
23	287°51.1	206°03.5	21°18.3	162°25.9	20°34.8	92°33.2	-5°12.8	26°31.7	-21°55.3	Suhail	222°50.8	-43°30.3
Mer.pass.:3:51:		v-0.6 d0.3 m-4.0		v0.8 d-0.4 m1.7		v2.2 d-0.1 m-1.8		v2.6 d0.0 m0.2		Miaplacidus	221°39.9	-69°47.5
										Alphard	217°53.7	-8°44.1
										Regulus	207°40.8	11°52.9
										Dubhe	193°48.9	61°39.6
										Denebola	182°31.0	14°28.6
										Gienah	175°49.5	-17°38.3
										Acrux	173°06.4	-63°11.9
										Gacrux	171°57.9	-57°12.8
										Alioth	166°18.6	55°52.3
										Spica	158°28.4	-11°15.0
										Alcaid	152°56.8	49°14.0
										Hadar	148°43.8	-60°27.6
										Menkent	148°04.2	-36°27.4
										Arcturus	145°53.0	19°06.1
										Rigel Kent.	139°47.7	-60°54.5
										Zubenelg.	137°02.2	-16°06.7
										Kochab	137°20.0	74°05.5
										Alphecca	126°08.5	26°39.7
										Antares	112°22.6	-26°28.1
										Atria	107°21.5	-69°03.5
										Sabik	102°09.1	-15°44.6
										Shaula	96°17.8	-37°06.8
										Rasalhague	96°03.6	12°33.2
										Etamin	90°44.4	51°29.6
										Kaus Aust.	83°39.7	-34°22.4
										Vega	80°36.7	38°48.3
										Nunki	75°54.5	-26°16.3
										Altair	62°05.3	8°55.1
										Peacock	53°14.3	-56°40.5
										Deneb	49°29.1	45°20.7
										Enif	33°44.1	9°57.4
										Alnair	27°39.9	-46°52.3
										Fomalhaut	15°20.7	-29°31.6
										Scheat	13°50.4	28°10.6
										Markab	13°35.3	15°18.0
										2017/7/2	SHA	Mer.pass
										Venus	279°22.4	09:15
										Mars	235°13.3	12:11
										Jupiter	164°48.3	16:51
										Saturn	98°37.6	21:14
										2017/7/2	SHA	Mer.pass
										Venus	278°09.3	09:16
										Mars	234°33.0	12:10
										Jupiter	164°41.7	16:47
										Saturn	98°40.7	21:10
										2017/7/2	SHA	Mer.pass
										Venus	276°55.9	09:17
										Mars	233°52.9	12:08
										Jupiter	164°35.1	16:44
										Saturn	98°43.7	21:06
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:3:43:		v-0.6 d0.3 m-4.0		v0.8 d-0.4 m1.7		v2.2 d-0.1 m-1.8		v2.6 d0.0 m0.2				

Sun				Moon													
h	Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight				
										Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	178°22.4	19°51.9	170°25.4	6.0	16°35.6	-6.5	60.0	72	--	--	--	--	--	--	--		
1	193°22.4	19°51.4	184°50.4	6.0	16°29.1	-6.6	60.0	70	--	--	--	--	--	--	--		
2	208°22.4	19°50.9	199°15.5	6.1	16°22.4	-6.7	60.0	68	--	--	01:36	22:31	--	--	--		
3	223°22.3	19°50.3	213°40.7	6.2	16°15.7	-6.8	59.9	66	--	--	02:18	21:51	--	--	--		
4	238°22.3	19°49.8	228°05.9	6.3	16°08.9	-6.9	59.9	64	--	00:46	02:46	21:24	23:17	--	--		
5	253°22.3	19°49.3	242°31.2	6.3	16°01.9	-7.0	59.9	62	--	01:46	03:08	21:03	22:23	--	--		
6	268°22.3	19°48.8	256°56.6	6.4	15°54.9	-7.1	59.9	60	--	02:18	03:25	20:47	21:52	--	--		
7	283°22.3	19°48.2	271°22.1	6.5	15°47.8	-7.2	59.8	58	00:42	02:41	03:39	20:32	21:30	23:22	--		
8	298°22.3	19°47.7	285°47.6	6.6	15°40.5	-7.3	59.8	56	01:37	02:60	03:51	20:20	21:11	22:33	--		
9	313°22.3	19°47.2	300°13.2	6.7	15°33.2	-7.4	59.8	54	02:06	03:15	04:02	20:10	20:56	22:04	--		
10	328°22.3	19°46.6	314°38.9	6.7	15°25.8	-7.5	59.7	52	02:28	03:28	04:12	20:01	20:43	21:43	--		
11	343°22.3	19°46.1	329°04.7	6.8	15°18.3	-7.6	59.7	50	02:46	03:40	04:20	19:52	20:32	21:26	--		
12	358°22.2	19°45.6	343°30.6	6.9	15°10.6	-7.7	59.7	45	03:19	04:03	04:38	19:35	20:09	20:53	--		
13	13°22.2	19°45.0	357°56.5	7.0	15°02.9	-7.7	59.7	40	03:43	04:21	04:52	19:20	19:51	20:30	--		
14	28°22.2	19°44.5	12°22.6	7.1	14°55.2	-7.8	59.6	35	04:01	04:36	05:04	19:08	19:37	20:11	--		
15	43°22.2	19°44.0	26°48.7	7.1	14°47.3	-7.9	59.6	30	04:17	04:49	05:15	18:58	19:24	19:56	--		
16	58°22.2	19°43.4	41°14.8	7.2	14°39.3	-8.0	59.6	20	04:41	05:09	05:33	18:40	19:04	19:32	--		
17	73°22.2	19°42.9	55°41.1	7.3	14°31.3	-8.1	59.5	10	04:60	05:26	05:49	18:24	18:47	19:13	--		
18	88°22.2	19°42.4	70°07.5	7.4	14°23.1	-8.2	59.5	0	05:16	05:41	06:03	18:10	18:32	18:57	--		
19	103°22.2	19°41.8	84°33.9	7.5	14°14.9	-8.3	59.5	-10	05:29	05:55	06:17	17:56	18:18	18:44	--		
20	118°22.2	19°41.3	99°00.4	7.6	14°06.6	-8.3	59.4	-20	05:42	06:09	06:33	17:41	18:04	18:31	--		
21	133°22.2	19°40.8	113°27.0	7.6	13°58.2	-8.4	59.4	-30	05:55	06:24	06:50	17:23	17:49	18:18	--		
22	148°22.2	19°40.2	127°53.7	7.7	13°49.8	-8.5	59.4	-35	06:02	06:33	06:60	17:14	17:41	18:11	--		
23	163°22.1	19°39.7	142°20.4	7.8	13°41.3	-8.6	59.4	-40	06:09	06:42	07:11	17:02	17:31	18:04	--		
SD.=15.7 d=-0.5 S.D.=16.4								-45	06:17	06:52	07:25	16:49	17:21	17:57	--	--	--
								-50	06:25	07:05	07:41	16:33	17:09	17:48	--	--	--
								-52	06:29	07:10	07:49	16:25	17:03	17:45	--	--	--
								-54	06:33	07:17	07:57	16:17	16:57	17:41	--	--	--
								-56	06:37	07:23	08:07	16:07	16:50	17:37	--	--	--
								-58	06:42	07:31	08:17	15:56	16:43	17:32	--	--	--
								-60	06:47	07:39	08:30	15:44	16:34	17:27	--	--	--
								Moonrise			Moonset						
								Lat.	Mon	Tue	Wed	Mon	Tue	Wed			
								72	02:32	04:48	06:49	22:42	22:31	22:22			
								70	03:17	05:12	07:02	22:16	22:16	22:14			
								68	03:46	05:31	07:13	21:56	22:03	22:07			
								66	04:08	05:46	07:22	21:41	21:53	22:02			
								64	04:25	05:58	07:29	21:28	21:44	21:57			
								62	04:40	06:08	07:36	21:17	21:37	21:53			
								60	04:52	06:17	07:41	21:07	21:30	21:49			
								58	05:02	06:24	07:46	20:59	21:25	21:46			
								56	05:11	06:31	07:50	20:51	21:20	21:43			
								54	05:19	06:37	07:54	20:45	21:15	21:41			
								52	05:26	06:42	07:58	20:39	21:11	21:38			
								50	05:32	06:47	08:01	20:34	21:07	21:36			
								45	05:46	06:58	08:08	20:22	20:59	21:31			
								40	05:58	07:06	08:13	20:12	20:52	21:27			
								35	06:07	07:14	08:18	20:04	20:46	21:24			
								30	06:16	07:20	08:23	19:57	20:41	21:21			
								20	06:30	07:32	08:30	19:44	20:32	21:16			
								10	06:43	07:41	08:37	19:33	20:24	21:11			
								0	06:55	07:51	08:43	19:22	20:16	21:06			
								-10	07:07	07:60	08:49	19:11	20:08	21:02			
								-20	07:20	08:10	08:55	18:60	19:60	20:57			
								-30	07:34	08:21	09:03	18:47	19:50	20:52			
								-35	07:42	08:27	09:07	18:39	19:45	20:48			
								-40	07:52	08:34	09:12	18:30	19:39	20:45			
								-45	08:03	08:43	09:17	18:20	19:31	20:40			
								-50	08:16	08:53	09:24	18:08	19:22	20:35			
								-52	08:23	08:58	09:27	18:02	19:18	20:33			
								-54	08:30	09:03	09:30	17:55	19:14	20:30			
								-56	08:37	09:09	09:34	17:48	19:09	20:27			
								-58	08:46	09:15	09:38	17:40	19:03	20:24			
								-60	08:56	09:22	09:43	17:31	18:57	20:21			
								Sun			Moon						
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age					
									00 ^h	12 ^h	Pass	Upper	Lower				
								24	06:30	06:31	12:06	13:08	00:39	1(2%)			
								25	06:31	06:32	12:06	14:03	01:36	2(6%)			
								26	06:32	06:32	12:06	14:54	02:29	3(12%)			
SD.=15.7 d=-0.6 S.D.=16.0																	

July 27, 28 ,29 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	304°51.9	220°34.3	21°30.7	178°04.7	20°16.7	109°20.2	-5°19.0	43°38.5	-21°55.3	Alpheratz	357°40.4	29°11.1
1	319°54.3	235°33.7	21°30.9	193°05.5	20°16.3	124°22.3	-5°19.1	58°41.1	-21°55.3	Ankaa	353°12.8	-42°12.4
2	334°56.8	250°33.1	21°31.2	208°06.3	20°15.9	139°24.5	-5°19.2	73°43.7	-21°55.3	Schedar	349°37.0	56°37.7
3	349°59.3	265°32.5	21°31.4	223°07.1	20°15.5	154°26.7	-5°19.4	88°46.2	-21°55.3	Diphda	348°52.9	-17°53.3
4	5°01.7	280°31.9	21°31.6	238°07.9	20°15.2	169°28.9	-5°19.5	103°48.8	-21°55.3	Achernar	335°24.7	-57°08.7
5	20°04.2	295°31.3	21°31.8	253°08.7	20°14.8	184°31.0	-5°19.6	118°51.4	-21°55.3	Hamal	327°57.6	23°32.5
6	35°06.7	310°30.6	21°32.1	268°09.4	20°14.4	199°33.2	-5°19.7	133°54.0	-21°55.3	Polaris	316°35.3	89°19.8
7	50°09.1	325°30.0	21°32.3	283°10.2	20°14.0	214°35.4	-5°19.9	148°56.6	-21°55.3	Akamar	315°16.3	-40°14.0
8	65°11.6	340°29.4	21°32.5	298°11.0	20°13.6	229°37.6	-5°20.0	163°59.2	-21°55.3	Menkar	314°12.2	4°09.4
9	80°14.1	355°28.8	21°32.7	313°11.8	20°13.3	244°39.8	-5°20.1	179°01.7	-21°55.3	Mirfak	308°36.5	49°55.0
10	95°16.5	10°28.2	21°33.0	328°12.6	20°12.9	259°41.9	-5°20.3	194°04.3	-21°55.3	Aldebaran	290°46.4	16°32.5
11	110°19.0	25°27.6	21°33.2	343°13.4	20°12.5	274°44.1	-5°20.4	209°06.9	-21°55.3	Rigel	281°09.6	-8°11.0
12	125°21.5	40°27.0	21°33.4	358°14.2	20°12.1	289°46.3	-5°20.5	224°09.5	-21°55.3	Capella	280°30.7	46°00.7
13	140°23.9	55°26.4	21°33.6	13°15.0	20°11.7	304°48.5	-5°20.6	239°12.1	-21°55.3	Bellatrix	278°29.3	6°21.8
14	155°26.4	70°25.8	21°33.8	28°15.8	20°11.4	319°50.6	-5°20.8	254°14.7	-21°55.3	Elnath	278°09.4	28°37.1
15	170°28.8	85°25.2	21°34.0	43°16.6	20°11.0	334°52.8	-5°20.9	269°17.2	-21°55.3	Alnilam	275°43.8	-1°11.6
16	185°31.3	100°24.6	21°34.3	58°17.4	20°10.6	349°55.0	-5°21.0	284°19.8	-21°55.3	Betelgeuse	270°58.6	7°24.5
17	200°33.8	115°24.0	21°34.5	73°18.2	20°10.2	4°57.2	-5°21.2	299°22.4	-21°55.3	Canopus	263°55.4	-52°42.3
18	215°36.2	130°23.3	21°34.7	88°19.0	20°09.8	19°59.3	-5°21.3	314°25.0	-21°55.3	Sirius	258°31.5	-16°44.3
19	230°38.7	145°22.7	21°34.9	103°19.8	20°09.5	35°01.5	-5°21.4	329°27.6	-21°55.3	Adara	255°10.7	-28°59.8
20	245°41.2	160°22.1	21°35.1	118°20.6	20°09.1	50°03.7	-5°21.5	344°30.1	-21°55.3	Procyon	244°57.1	5°10.9
21	260°43.6	175°21.5	21°35.3	133°21.4	20°08.7	65°05.9	-5°21.7	359°32.7	-21°55.3	Pollux	243°24.6	27°58.9
22	275°46.1	190°20.9	21°35.5	148°22.2	20°08.3	80°08.0	-5°21.8	14°35.3	-21°55.3	Avior	234°17.5	-59°34.0
23	290°48.6	205°20.3	21°35.8	163°23.0	20°07.9	95°10.2	-5°21.9	29°37.9	-21°55.3	Suhail	222°50.8	-43°30.3
Mer.pass.:3:39:		v-0.6 d0.2 m-3.9		v0.8 d-0.4 m1.7		v2.2 d-0.1 m-1.8		v2.6 d-0.0 m0.2		Miaplacidus	221°39.9	-69°47.5
										Alphard	217°53.7	-8°44.1
										Regulus	207°40.8	11°52.9
										Dubhe	193°48.9	61°39.6
										Denebola	182°31.0	14°28.6
										Gienah	175°49.6	-17°38.3
										Acrux	173°06.4	-63°11.9
										Gacrux	171°58.0	-57°12.8
										Alioth	166°18.6	55°52.3
										Spica	158°28.4	-11°15.0
										Alcaid	152°56.8	49°14.0
										Hadar	148°43.8	-60°27.5
										Menkent	148°04.3	-36°27.4
										Arcturus	145°53.1	19°06.1
										Rigel Kent.	139°47.7	-60°54.5
										Zubenelg.	137°02.3	-16°06.7
										Kochab	137°20.0	74°05.5
										Alphecca	126°08.6	26°39.8
										Antares	112°22.6	-26°28.1
										Atria	107°21.5	-69°03.5
										Sabik	102°09.1	-15°44.6
										Shaula	96°17.8	-37°06.8
										Rasalhague	96°03.6	12°33.2
										Etamin	90°44.4	51°29.6
										Kaus Aust.	83°39.7	-34°22.4
										Vega	80°36.7	38°48.3
										Nunki	75°54.5	-26°16.3
										Altair	62°05.3	8°55.1
										Peacock	53°14.3	-56°40.5
										Deneb	49°29.1	45°20.7
										Enif	33°44.1	9°57.5
										Alnair	27°39.9	-46°52.3
										Fomalhaut	15°20.7	-29°31.6
										Scheat	13°50.4	28°10.6
										Markab	13°35.3	15°18.0
										2017/7/2	SHA	Mer.pass
										Venus	275°42.4	09:18
										Mars	233°12.8	12:07
										Jupiter	164°28.3	16:40
										Saturn	98°46.6	21:02
										2017/7/2	SHA	Mer.pass
										Venus	274°28.6	09:19
										Mars	232°32.8	12:06
										Jupiter	164°21.4	16:37
										Saturn	98°49.4	20:58
										2017/7/2	SHA	Mer.pass
										Venus	273°14.7	09:20
										Mars	231°52.9	12:04
										Jupiter	164°14.3	16:33
										Saturn	98°52.2	20:54
										Horizontal parallax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:3:32:		v-0.6 d0.2 m-3.9		v0.8 d-0.4 m1.7		v2.2 d-0.1 m-1.7		v2.6 d-0.0 m0.2				

h Sun							Moon							
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	178°22.1	19°12.7	131°49.6	11.5	5°37.2	-10.7	57.6	72	--	--	--	--	--	--
1	193°22.1	19°12.1	146°20.2	11.6	5°26.5	-10.7	57.6	70	--	--	00:40	23:18	--	--
2	208°22.1	19°11.5	160°50.9	11.7	5°15.8	-10.7	57.5	68	--	--	01:54	22:14	--	--
3	223°22.1	19°11.0	175°21.6	11.7	5°05.1	-10.7	57.5	66	--	--	02:30	21:39	--	--
4	238°22.1	19°10.4	189°52.3	11.8	4°54.4	-10.7	57.5	64	--	01:14	02:56	21:15	22:52	--
5	253°22.1	19°09.8	204°23.1	11.9	4°43.6	-10.7	57.4	62	--	01:59	03:16	20:55	22:10	--
6	268°22.1	19°09.3	218°54.0	11.9	4°32.9	-10.8	57.4	60	--	02:28	03:32	20:40	21:43	--
7	283°22.1	19°08.7	233°25.0	12.0	4°22.1	-10.8	57.3	58	01:07	02:49	03:45	20:26	21:22	22:60
8	298°22.1	19°08.1	247°56.0	12.0	4°11.4	-10.8	57.3	56	01:49	03:07	03:57	20:15	21:05	22:21
9	313°22.2	19°07.6	262°27.0	12.1	4°00.6	-10.8	57.3	54	02:15	03:21	04:07	20:05	20:50	21:56
10	328°22.2	19°07.0	276°58.1	12.1	3°49.8	-10.8	57.2	52	02:35	03:34	04:16	19:56	20:38	21:36
11	343°22.2	19°06.4	291°29.3	12.2	3°39.0	-10.8	57.2	50	02:52	03:44	04:24	19:48	20:27	21:20
12	358°22.2	19°05.9	306°00.5	12.2	3°28.3	-10.8	57.2	45	03:23	04:07	04:41	19:31	20:06	20:49
13	13°22.2	19°05.3	320°31.8	12.3	3°17.5	-10.8	57.1	40	03:46	04:24	04:55	19:18	19:48	20:26
14	28°22.2	19°04.7	335°03.1	12.4	3°06.7	-10.8	57.1	35	04:04	04:38	05:07	19:06	19:34	20:08
15	43°22.2	19°04.1	349°34.5	12.4	2°55.9	-10.8	57.1	30	04:19	04:50	05:17	18:56	19:22	19:53
16	58°22.2	19°03.6	4°05.9	12.5	2°45.1	-10.8	57.0	20	04:42	05:10	05:34	18:39	19:02	19:30
17	73°22.2	19°03.0	18°37.4	12.5	2°34.3	-10.8	57.0	10	05:01	05:27	05:49	18:24	18:46	19:12
18	88°22.2	19°02.4	33°09.0	12.6	2°23.5	-10.8	56.9	0	05:16	05:41	06:03	18:10	18:32	18:57
19	103°22.2	19°01.8	47°40.5	12.6	2°12.8	-10.8	56.9	-10	05:29	05:55	06:17	17:56	18:18	18:44
20	118°22.3	19°01.3	62°12.2	12.7	2°02.0	-10.8	56.9	-20	05:41	06:08	06:31	17:42	18:05	18:32
21	133°22.3	19°00.7	76°43.9	12.7	1°51.2	-10.8	56.8	-30	05:54	06:23	06:48	17:25	17:51	18:20
22	148°22.3	19°00.1	91°15.6	12.7	1°40.4	-10.8	56.8	-35	06:00	06:31	06:58	17:16	17:43	18:13
23	163°22.3	18°59.5	105°47.4	12.8	1°29.7	-10.8	56.8	-40	06:07	06:39	07:09	17:05	17:34	18:07
SD.=15.7 d=-0.6 S.D.=15.7							-45	06:14	06:50	07:21	16:52	17:24	17:60	
							-50	06:22	07:01	07:37	16:37	17:12	17:52	
							-52	06:25	07:07	07:44	16:29	17:07	17:48	
							-54	06:29	07:12	07:52	16:21	17:01	17:45	
							-56	06:33	07:19	08:01	16:12	16:55	17:41	
							-58	06:37	07:26	08:12	16:02	16:48	17:36	
							-60	06:42	07:34	08:23	15:50	16:40	17:32	
							Moonrise			Moonset				
							Lat.	Thu	Fri	Sat	Thu	Fri	Sat	
							72	08:41	10:26	12:09	22:14	22:06	21:58	
							70	08:46	10:25	12:01	22:12	22:10	22:07	
							68	08:51	10:25	11:55	22:10	22:13	22:15	
							66	08:55	10:24	11:50	22:09	22:15	22:22	
							64	08:58	10:24	11:46	22:08	22:17	22:27	
							62	09:01	10:23	11:42	22:07	22:19	22:32	
							60	09:03	10:23	11:39	22:06	22:21	22:36	
							58	09:06	10:22	11:36	22:05	22:22	22:40	
							56	09:08	10:22	11:34	22:04	22:24	22:43	
							54	09:09	10:22	11:32	22:03	22:25	22:46	
							52	09:11	10:21	11:30	22:03	22:26	22:49	
							50	09:12	10:21	11:28	22:02	22:27	22:51	
							45	09:16	10:21	11:24	22:01	22:29	22:57	
							40	09:18	10:20	11:20	21:60	22:31	23:01	
							35	09:20	10:20	11:18	21:59	22:32	23:05	
							30	09:22	10:20	11:15	21:58	22:34	23:09	
							20	09:26	10:19	11:11	21:57	22:36	23:15	
							10	09:29	10:19	11:07	21:56	22:38	23:20	
							0	09:32	10:18	11:04	21:54	22:40	23:25	
							-10	09:35	10:18	11:00	21:53	22:42	23:30	
							-20	09:38	10:18	10:56	21:52	22:44	23:35	
							-30	09:41	10:17	10:52	21:50	22:47	23:41	
							-35	09:43	10:17	10:50	21:49	22:48	23:45	
							-40	09:45	10:17	10:47	21:48	22:49	23:49	
							-45	09:48	10:16	10:44	21:47	22:51	23:53	
							-50	09:51	10:16	10:40	21:46	22:53	23:59	
							-52	09:52	10:16	10:39	21:45	22:54	--	
							-54	09:54	10:16	10:37	21:44	22:55	--	
							-56	09:56	10:16	10:35	21:43	22:57	--	
							-58	09:58	10:15	10:33	21:42	22:58	--	
							-60	09:60	10:15	10:30	21:41	22:59	--	
							Sun			Moon				
							Day	Eqn.of Time	Mer.	Mer.Pass.		Age		
								00 ^h	12 ^h	Upper	Lower			
							27	06:32	06:31	12:06	15:43	03:19	4(20%)	
							28	06:31	06:30	12:06	16:29	04:06	5(29%)	
							29	06:29	06:28	12:06	17:14	04:51	6(39%)	
SD.=15.8 d=-0.6 S.D.=15.3														

July 30, 31 .01 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	307°49.3	219°49.8	21°44.9	179°02.4	19°48.9	111°56.5	-5°28.4	46°44.2	-21°55.3	Alpheratz	357°40.4	29°11.1
1	322°51.8	234°49.2	21°45.0	194°03.2	19°48.5	126°58.6	-5°28.5	61°46.7	-21°55.3	Ankaa	353°12.8	-42°12.4
2	337°54.2	249°48.6	21°45.2	209°04.0	19°48.1	142°00.8	-5°28.6	76°49.3	-21°55.3	Schedar	349°37.0	56°37.7
3	352°56.7	264°48.0	21°45.4	224°04.9	19°47.7	157°03.0	-5°28.8	91°51.9	-21°55.3	Diphda	348°52.9	-17°53.3
4	7°59.2	279°47.3	21°45.5	239°05.7	19°47.3	172°05.1	-5°28.9	106°54.4	-21°55.3	Achernar	335°24.7	-57°08.7
5	23°01.6	294°46.7	21°45.7	254°06.5	19°46.9	187°07.3	-5°29.0	121°57.0	-21°55.3	Hamal	327°57.6	23°32.5
6	38°04.1	309°46.1	21°45.8	269°07.3	19°46.5	202°09.5	-5°29.2	136°59.6	-21°55.3	Polaris	316°33.8	89°19.8
7	53°06.5	324°45.4	21°46.0	284°08.1	19°46.1	217°11.6	-5°29.3	152°02.2	-21°55.3	Akamar	315°16.3	-40°14.0
8	68°09.0	339°44.8	21°46.1	299°08.9	19°45.7	232°13.8	-5°29.4	167°04.7	-21°55.3	Menkar	314°12.2	4°09.4
9	83°11.5	354°44.2	21°46.3	314°09.7	19°45.3	247°15.9	-5°29.6	182°07.3	-21°55.3	Mirfak	308°36.4	49°55.0
10	98°13.9	9°43.5	21°46.5	329°10.5	19°44.9	262°18.1	-5°29.7	197°09.9	-21°55.3	Aldebaran	290°46.4	16°32.5
11	113°16.4	24°42.9	21°46.6	344°11.3	19°44.5	277°20.3	-5°29.8	212°12.4	-21°55.3	Rigel	281°09.6	-8°11.0
12	128°18.9	39°42.3	21°46.8	359°12.1	19°44.1	292°22.4	-5°30.0	227°15.0	-21°55.3	Capella	280°30.7	46°00.7
13	143°21.3	54°41.6	21°46.9	14°13.0	19°43.7	307°24.6	-5°30.1	242°17.6	-21°55.3	Bellatrix	278°29.2	6°21.8
14	158°23.8	69°41.0	21°47.1	29°13.8	19°43.3	322°26.8	-5°30.2	257°20.2	-21°55.3	Elnath	278°09.4	28°37.1
15	173°26.3	84°40.4	21°47.2	44°14.6	19°42.9	337°28.9	-5°30.4	272°22.7	-21°55.3	Alnilam	275°43.8	-1°11.6
16	188°28.7	99°39.7	21°47.4	59°15.4	19°42.6	352°31.1	-5°30.5	287°25.3	-21°55.3	Betelgeuse	270°58.5	7°24.5
17	203°31.2	114°39.1	21°47.5	74°16.2	19°42.2	7°33.2	-5°30.6	302°27.9	-21°55.3	Canopus	263°55.4	-52°42.3
18	218°33.7	129°38.5	21°47.6	89°17.0	19°41.8	22°35.4	-5°30.8	317°30.4	-21°55.3	Sirius	258°31.5	-16°44.3
19	233°36.1	144°37.8	21°47.8	104°17.8	19°41.4	37°37.6	-5°30.9	332°33.0	-21°55.3	Adara	255°10.7	-28°59.8
20	248°38.6	159°37.2	21°47.9	119°18.6	19°41.0	52°39.7	-5°31.0	347°35.6	-21°55.3	Procyon	244°57.1	5°10.9
21	263°41.0	174°36.6	21°48.1	134°19.4	19°40.6	67°41.9	-5°31.2	2°38.2	-21°55.3	Pollux	243°24.6	27°58.9
22	278°43.5	189°35.9	21°48.2	149°20.3	19°40.2	82°44.0	-5°31.3	17°40.7	-21°55.3	Avior	234°17.5	-59°34.0
23	293°46.0	204°35.3	21°48.4	164°21.1	19°39.8	97°46.2	-5°31.5	32°43.3	-21°55.3	Suhail	222°50.8	-43°30.3
Mer.pass.:3:28:		v-0.6 d0.2 m-3.9		v0.8 d-0.4 m1.7		v2.2 d-0.1 m-1.7		v2.6 d-0.0 m0.2		Miaplacidus	221°39.9	-69°47.5
										Alphard	217°53.7	-8°44.1
										Regulus	207°40.8	11°52.9
										Dubhe	193°48.9	61°39.6
										Denebola	182°31.0	14°28.6
										Gienah	175°49.6	-17°38.3
										Acrux	173°06.4	-63°11.9
										Gacrux	171°58.0	-57°12.8
										Alioth	166°18.6	55°52.3
										Spica	158°28.4	-11°15.0
										Alcaid	152°56.8	49°14.0
										Hadar	148°43.9	-60°27.5
										Menkent	148°04.3	-36°27.3
										Arcturus	145°53.1	19°06.1
										Rigel Kent.	139°47.8	-60°54.5
										Zubenelg.	137°02.3	-16°06.7
										Kochab	137°20.1	74°05.5
										Alphecca	126°08.6	26°39.8
										Antares	112°22.6	-26°28.1
										Atria	107°21.5	-69°03.5
										Sabik	102°09.1	-15°44.6
										Shaula	96°17.8	-37°06.8
										Rasalhague	96°03.6	12°33.2
										Etamin	90°44.4	51°29.6
										Kaus Aust.	83°39.7	-34°22.4
										Vega	80°36.7	38°48.3
										Nunki	75°54.5	-26°16.3
										Altair	62°05.3	8°55.1
										Peacock	53°14.3	-56°40.5
										Deneb	49°29.1	45°20.7
										Enif	33°44.1	9°57.5
										Alnair	27°39.9	-46°52.3
										Fomalhaut	15°20.7	-29°31.6
										Scheat	13°50.4	28°10.6
										Markab	13°35.3	15°18.0
										2017/7/3	SHA	Mer.pass
										Venus	272°00.5	09:21
										Mars	231°13.1	12:03
										Jupiter	164°07.2	16:30
										Saturn	98°54.9	20:49
										2017/7/3	SHA	Mer.pass
										Venus	270°46.2	09:22
										Mars	230°33.4	12:02
										Jupiter	163°59.9	16:26
										Saturn	98°57.4	20:45
										2017/8/1	SHA	Mer.pass
										Venus	269°31.7	09:23
										Mars	229°53.8	12:01
										Jupiter	163°52.5	16:23
										Saturn	98°59.9	20:41
										Horizontal parallax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:3:20:		v-0.6 d0.1 m-3.9		v0.8 d-0.4 m1.7		v2.2 d-0.1 m-1.7		v2.6 d-0.0 m0.2				

Sun								Moon							
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
									Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	178°23.2	18°30.6	98°24.0	14.1	-6°54.8	-9.6	55.3	72	--	--	--	--	--	--	
1	193°23.2	18°30.0	112°57.1	14.1	-7°04.3	-9.5	55.2	70	--	--	01:19	22:46	--	--	
2	208°23.2	18°29.4	127°30.2	14.1	-7°13.8	-9.5	55.2	68	--	--	02:11	21:58	--	--	
3	223°23.3	18°28.8	142°03.3	14.1	-7°23.3	-9.5	55.2	66	--	--	02:42	21:27	--	--	
4	238°23.3	18°28.2	156°36.4	14.1	-7°32.7	-9.4	55.2	64	--	01:34	03:05	21:05	22:33	--	
5	253°23.3	18°27.6	171°09.4	14.1	-7°42.1	-9.4	55.1	62	--	02:12	03:24	20:47	21:58	--	
6	268°23.3	18°26.9	185°42.5	14.1	-7°51.5	-9.3	55.1	60	--	02:37	03:39	20:32	21:33	--	
7	283°23.4	18°26.3	200°15.6	14.1	-8°00.8	-9.3	55.1	58	01:26	02:57	03:51	20:20	21:13	22:42	
8	298°23.4	18°25.7	214°48.7	14.1	-8°10.1	-9.2	55.1	56	01:60	03:13	04:02	20:09	20:58	22:10	
9	313°23.4	18°25.1	229°21.9	14.1	-8°19.3	-9.2	55.0	54	02:24	03:27	04:12	19:60	20:44	21:47	
10	328°23.4	18°24.5	243°55.0	14.1	-8°28.5	-9.2	55.0	52	02:42	03:39	04:20	19:51	20:33	21:29	
11	343°23.5	18°23.9	258°28.1	14.1	-8°37.6	-9.1	55.0	50	02:58	03:49	04:28	19:44	20:22	21:13	
12	358°23.5	18°23.3	273°01.2	14.1	-8°46.7	-9.1	55.0	45	03:28	04:10	04:44	19:28	20:01	20:44	
13	13°23.5	18°22.7	287°34.3	14.1	-8°55.7	-9.0	55.0	40	03:50	04:27	04:58	19:15	19:45	20:22	
14	28°23.6	18°22.1	302°07.4	14.1	-9°04.7	-8.9	54.9	35	04:07	04:41	05:09	19:04	19:31	20:05	
15	43°23.6	18°21.5	316°40.5	14.1	-9°13.7	-8.9	54.9	30	04:21	04:52	05:18	18:54	19:20	19:51	
16	58°23.6	18°20.8	331°13.6	14.1	-9°22.6	-8.9	54.9	20	04:44	05:12	05:35	18:37	19:01	19:29	
17	73°23.6	18°20.2	345°46.7	14.1	-9°31.5	-8.8	54.9	10	05:01	05:27	05:50	18:23	18:45	19:11	
18	88°23.7	18°19.6	0°19.8	14.1	-9°40.3	-8.8	54.9	0	05:16	05:41	06:03	18:10	18:32	18:57	
19	103°23.7	18°19.0	14°52.9	14.1	-9°49.0	-8.7	54.8	-10	05:29	05:54	06:16	17:57	18:19	18:44	
20	118°23.7	18°18.4	29°26.0	14.1	-9°57.7	-8.7	54.8	-20	05:40	06:07	06:30	17:43	18:06	18:33	
21	133°23.8	18°17.8	43°59.0	14.1	-10°06.4	-8.6	54.8	-30	05:52	06:21	06:46	17:27	17:52	18:21	
22	148°23.8	18°17.2	58°32.1	14.1	-10°15.0	-8.6	54.8	-35	05:58	06:28	06:55	17:18	17:45	18:15	
23	163°23.8	18°16.6	73°05.2	14.1	-10°23.6	-8.5	54.8	-40	06:04	06:37	07:06	17:07	17:36	18:09	
	SD.=15.8	d=-0.6			S.D.=15.1			-45	06:11	06:46	07:18	16:55	17:27	18:02	
								-50	06:18	06:57	07:33	16:41	17:16	17:55	
								-52	06:21	07:02	07:40	16:34	17:11	17:52	
								-54	06:25	07:08	07:47	16:26	17:05	17:49	
								-56	06:28	07:14	07:56	16:18	16:59	17:45	
								-58	06:32	07:21	08:06	16:08	16:53	17:41	
								-60	06:37	07:28	08:17	15:57	16:45	17:37	
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Moonrise			Moonset				
								Lat.	Sun	Mon	Tue	Sun	Mon	Tue	
0	178°23.9	18°15.9	87°38.3	14.1	-10°32.1	-8.5	54.7	72	13:50	15:34	17:23	21:49	21:38	21:23	
1	193°23.9	18°15.3	102°11.3	14.1	-10°40.6	-8.4	54.7	70	13:35	15:09	16:44	22:05	22:04	22:03	
2	208°23.9	18°14.7	116°44.4	14.0	-10°49.0	-8.4	54.7	68	13:24	14:51	16:17	22:18	22:23	22:31	
3	223°23.9	18°14.1	131°17.4	14.0	-10°57.4	-8.3	54.7	66	13:14	14:36	15:56	22:29	22:39	22:52	
4	238°24.0	18°13.5	145°50.4	14.0	-11°05.7	-8.3	54.7	64	13:06	14:24	15:40	22:38	22:51	23:09	
5	253°24.0	18°12.8	160°23.4	14.0	-11°13.9	-8.2	54.6	62	12:59	14:14	15:27	22:46	23:02	23:23	
6	268°24.0	18°12.2	174°56.5	14.0	-11°22.1	-8.2	54.6	60	12:53	14:06	15:15	22:53	23:12	23:35	
7	283°24.1	18°11.6	189°29.5	14.0	-11°30.3	-8.1	54.6	58	12:48	13:58	15:05	22:59	23:20	23:45	
8	298°24.1	18°11.0	204°02.4	14.0	-11°38.4	-8.1	54.6	56	12:44	13:51	14:57	23:04	23:27	23:54	
9	313°24.1	18°10.4	218°35.4	14.0	-11°46.4	-8.0	54.6	54	12:39	13:45	14:49	23:09	23:33	--	
10	328°24.2	18°09.7	233°08.4	14.0	-11°54.4	-8.0	54.6	52	12:32	13:35	14:36	23:17	23:44	--	
11	343°24.2	18°09.1	247°41.3	13.9	-12°02.3	-7.9	54.5	45	12:25	13:25	14:23	23:25	23:56	--	
12	358°24.2	18°08.5	262°14.3	13.9	-12°10.2	-7.8	54.5	40	12:19	13:16	14:12	23:32	--	00:05	
13	13°24.3	18°07.9	276°47.2	13.9	-12°18.0	-7.8	54.5	35	12:14	13:09	14:03	23:39	--	00:13	
14	28°24.3	18°07.3	291°20.1	13.9	-12°25.8	-7.7	54.5	30	12:09	13:02	13:55	23:44	--	00:21	
15	43°24.4	18°06.6	305°53.0	13.9	-12°33.5	-7.7	54.5	20	12:01	12:51	13:41	23:53	--	00:33	
16	58°24.4	18°06.0	320°25.9	13.9	-12°41.2	-7.6	54.5	10	11:54	12:41	13:29	--	00:02	00:44	
17	73°24.4	18°05.4	334°58.8	13.9	-12°48.7	-7.6	54.5	0	11:48	12:32	13:17	--	00:09	00:54	
18	88°24.5	18°04.8	349°31.6	13.8	-12°56.3	-7.5	54.4	-10	11:42	12:23	13:06	--	00:17	01:04	
19	103°24.5	18°04.1	4°04.4	13.8	-13°03.7	-7.4	54.4	-20	11:35	12:14	12:54	--	00:25	01:15	
20	118°24.5	18°03.5	18°37.3	13.8	-13°11.2	-7.4	54.4	-30	11:27	12:03	12:41	--	00:35	01:28	
21	133°24.6	18°02.9	33°10.1	13.8	-13°18.5	-7.3	54.4	-35	11:23	11:57	12:33	--	00:40	01:35	
22	148°24.6	18°02.2	47°42.8	13.8	-13°25.8	-7.3	54.4	-40	11:18	11:50	12:24	--	00:47	01:43	
23	163°24.6	18°01.6	62°15.6	13.8	-13°33.0	-7.2	54.4	-45	11:12	11:41	12:13	--	00:54	01:53	
	SD.=15.8	d=-0.6			S.D.=14.9			-50	11:05	11:32	12:01	--	01:03	02:05	
								-52	11:02	11:27	11:55	00:02	01:07	02:10	
								-54	10:59	11:22	11:48	00:04	01:11	02:16	
								-56	10:55	11:16	11:41	00:07	01:16	02:23	
								-58	10:51	11:10	11:33	00:11	01:22	02:30	
								-60	10:46	11:03	11:24	00:15	01:28	02:39	
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Moon		Age		
									Eqn.of Time	Mer.	Mer.Pass.				
									00 ^h	12 ^h	Pass	Upper	Lower		
0	178°24.7	18°01.0	76°48.4	13.7	-13°40.2	-7.1	54.4	30	06:27	06:26	12:06	17:58	05:36	7(49%)	
1	193°24.7	18°00.4	91°21.1	13.7	-13°47.3	-7.1	54.4	31	06:25	06:23	12:06	18:43	06:20	8(58%)	
2	208°24.8	17°59.7	105°53.8	13.7	-13°54.4	-7.0	54.4	1	06:21	06:19	12:06	19:28	07:05	9(68%)	
3	223°24.8	17°59.1	120°26.5	13.7	-14°01.3	-7.0	54.3								
4	238°24.8	17°58.5	134°59.2	13.7	-14°08.3	-6.9	54.3								
5	253°24.9	17°57.8	149°31.8	13.6	-14°15.1	-6.8	54.3								
6	268°24.9	17°57.2	164°04.4	13.6	-14°21.9	-6.8	54.3								
7	283°25.0	17°56.6	178°37.0	13.6	-14°28.6	-6.7	54.3								
8	298°25.0	17°55.9	193°09.6	13.6	-14°35.3	-6.6	54.3								
9	313°25.0	17°55.3	207°42.2	13.6	-14°41.9	-6.6	54.3								
10	328°25.1	17°54.7	222°14.7	13.5	-14°48.4	-6.5	54.3								
11	343°25.1	17°54.0	236°47.3	13.5	-14°54.9	-6.4	54.3								
12	358°25.2	17°53.4	251°19.8	13.5	-15°01.3	-6.4	54.3								
13	13°25.2	17°52.8	265°52.2	13.5	-15°07.6	-6.3	54.2								
14	28°25.2	17°52.1	280°24.7	13.4	-15°13.9	-6.2	54.2								
15	43°25.3	17°51.5	294°57.1	13.4	-15°20.1	-6.2	54.2								
16	58°25.3	17°50.9	309°29.5	13.4	-15°26.2	-6.1	54.2								
17	73°25.4	17°50.2	324°01.9	13.4	-15°32.3	-6.0	54.2								
18	88°25.4	17°49.6	338°34.3	13.4	-15°38.3	-6.0	54.2								
19	103°25.5	17°49.0	353°06.6	13.3	-15°44.2	-5.9	54.2								
20	118°25.5	17°48.3	7°38.9	13.3	-15°50.1	-5.8	54.2								
21	133°25.5	17°47.7	22°11.2	13.3	-15°55.8	-5.7	54.2								
22	148°25.6	17°47.0	36°43.5	13.3	-16°01.6	-5.7	54.2								
23	163°25.6	17°46.4	51°15.7	13.2	-16°07.2	-5.6	54.2								
	SD.=15.8	d=-0.6		</											

August 02, 03 ,04 (Wed., Thu., Fri.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Wed	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec				
0	310°46.7	21°54.1	219°03.8	21°54.1	180°01.1	19°19.9	114°31.8	-5°38.1	49°49.0	-21°55.4	64°51.6	-21°55.4	Alpheratz	357°40.3	29°11.2					
1	325°49.2	21°54.2	234°03.1	21°54.2	195°01.9	19°19.5	129°33.9	-5°38.3	64°51.6	-21°55.4	79°54.1	-21°55.4	Ankaa	353°12.7	-42°12.4					
2	340°51.6	21°54.3	249°02.5	21°54.3	210°02.7	19°19.1	144°36.1	-5°38.4	79°54.1	-21°55.4	94°56.7	-21°55.4	Schedar	349°36.9	56°37.7					
3	355°54.1	21°54.4	264°01.8	21°54.4	225°03.5	19°18.7	159°38.2	-5°38.6	94°56.7	-21°55.4	109°59.3	-21°55.4	Diphda	348°52.8	-17°53.3					
4	10°56.6	21°54.4	279°01.2	21°54.4	240°04.3	19°18.2	174°40.4	-5°38.7	109°59.3	-21°55.4	125°01.8	-21°55.4	Achernar	335°24.6	-57°08.7					
5	25°59.0	21°54.5	294°00.5	21°54.5	255°05.2	19°17.8	189°42.5	-5°38.8	125°01.8	-21°55.4	140°04.4	-21°55.4	Hamal	327°57.6	23°32.5					
6	41°01.5	21°54.6	308°59.9	21°54.6	270°06.0	19°17.4	204°44.7	-5°39.0	140°04.4	-21°55.4	155°06.9	-21°55.4	Polaris	316°32.2	89°19.8					
7	56°04.0	21°54.7	323°59.2	21°54.7	285°06.8	19°17.0	219°46.8	-5°39.1	155°06.9	-21°55.4	170°09.5	-21°55.4	Akamar	315°16.3	-40°13.9					
8	71°06.4	21°54.8	338°58.6	21°54.8	300°07.6	19°16.6	234°49.0	-5°39.3	170°09.5	-21°55.4	185°12.1	-21°55.4	Menkar	314°12.2	4°09.4					
9	86°08.9	21°54.9	353°57.9	21°54.9	315°08.4	19°16.2	249°51.1	-5°39.4	185°12.1	-21°55.4	200°14.6	-21°55.4	Mirfak	308°36.4	49°55.0					
10	101°11.4	21°55.0	8°57.3	21°55.0	330°09.3	19°15.8	264°53.3	-5°39.5	200°14.6	-21°55.4	215°17.2	-21°55.4	Aldebaran	290°46.3	16°32.5					
11	116°13.8	21°55.0	23°56.6	21°55.0	345°10.1	19°15.4	279°55.4	-5°39.7	215°17.2	-21°55.4	230°19.7	-21°55.4	Rigel	281°09.6	-8°11.0					
12	131°16.3	21°55.1	38°56.0	21°55.1	0°10.9	19°14.9	294°57.5	-5°39.8	230°19.7	-21°55.4	245°22.3	-21°55.4	Capella	280°30.6	46°00.7					
13	146°18.7	21°55.2	53°55.3	21°55.2	15°11.7	19°14.5	309°59.7	-5°40.0	245°22.3	-21°55.4	260°24.9	-21°55.4	Bellatrix	278°29.2	6°21.8					
14	161°21.2	21°55.3	68°54.7	21°55.3	30°12.6	19°14.1	325°01.8	-5°40.1	260°24.9	-21°55.4	275°27.4	-21°55.4	Elnath	278°09.3	28°37.1					
15	176°23.7	21°55.4	83°54.0	21°55.4	45°13.4	19°13.7	340°04.0	-5°40.2	275°27.4	-21°55.4	290°30.0	-21°55.4	Alnilam	275°43.8	-1°11.6					
16	191°26.1	21°55.4	98°53.4	21°55.4	60°14.2	19°13.3	355°06.1	-5°40.4	290°30.0	-21°55.4	305°32.5	-21°55.4	Betelgeuse	270°58.5	7°24.5					
17	206°28.6	21°55.5	113°52.7	21°55.5	75°15.0	19°12.9	10°08.3	-5°40.5	305°32.5	-21°55.4	320°35.1	-21°55.4	Canopus	263°55.4	-52°42.3					
18	221°31.1	21°55.6	128°52.0	21°55.6	90°15.8	19°12.5	25°10.4	-5°40.7	320°35.1	-21°55.4	335°37.7	-21°55.4	Sirius	258°31.5	-16°44.3					
19	236°33.5	21°55.7	143°51.4	21°55.7	105°16.7	19°12.0	40°12.6	-5°40.8	335°37.7	-21°55.4	35°42.8	-21°55.4	Adara	255°10.7	-28°59.8					
20	251°36.0	21°55.7	158°50.7	21°55.7	120°17.5	19°11.6	55°14.7	-5°40.9	350°40.2	-21°55.4	5°42.8	-21°55.4	Procyon	244°57.0	5°10.9					
21	266°38.5	21°55.8	173°50.1	21°55.8	135°18.3	19°11.2	70°16.9	-5°41.1	5°42.8	-21°55.4	20°45.3	-21°55.4	Pollux	243°24.6	27°58.9					
22	281°40.9	21°55.9	188°49.4	21°55.9	150°19.1	19°10.8	85°19.0	-5°41.2	20°45.3	-21°55.4	35°47.9	-21°55.4	Avior	234°17.5	-59°34.0					
23	296°43.4	21°56.0	203°48.8	21°56.0	165°20.0	19°10.4	100°21.2	-5°41.4	35°47.9	-21°55.4			Suhail	222°50.8	-43°30.3					
Mer.pass.:3:16:			v-0.6 d0.1 m-3.9			v0.8 d-0.4 m1.7			v2.1 d-0.1 m-1.7			v2.6 d-0.0 m0.3			Miaplacidus			221°39.9	-69°47.4	
															Alphard			217°53.7	-8°44.1	
															Regulus			207°40.8	11°52.9	
															Dubhe			193°48.9	61°39.6	
															Denebola			182°31.0	14°28.6	
															Gienah			175°49.6	-17°38.3	
															Acruz			173°06.4	-63°11.9	
															Gacrux			171°58.0	-57°12.8	
															Alioth			166°18.6	55°52.3	
															Spica			158°28.4	-11°15.0	
															Alcaid			152°56.8	49°14.0	
															Hadar			148°43.9	-60°27.5	
															Menkent			148°04.3	-36°27.3	
															Arcturus			145°53.1	19°06.1	
															Rigel Kent.			139°47.8	-60°54.5	
															Zubenelg.			137°02.3	-16°06.7	
															Kochab			137°20.2	74°05.5	
															Alphecca			126°08.6	26°39.8	
															Antares			112°22.6	-26°28.1	
															Atria			107°21.5	-69°03.5	
															Sabik			102°09.1	-15°44.6	
															Shaula			96°17.8	-37°06.8	
															Rasalhague			96°03.6	12°33.2	
															Etamin			90°44.4	51°29.6	
															Kaus Aust.			83°39.8	-34°22.4	
															Vega			80°36.7	38°48.3	
															Nunki			75°54.5	-26°16.3	
															Altair			62°05.3	8°55.1	
															Peacock			53°14.3	-56°40.5	
															Deneb			49°29.1	45°20.7	
															Enif			33°44.1	9°57.5	
															Alnair			27°39.9	-46°52.3	
															Fomalhaut			15°20.7	-29°31.6	
															Scheat			13°50.4	28°10.7	
															Markab			13°35.3	15°18.0	
															2017/8/2			SHA	Mer.pass	
															Venus			268°17.1	09:24	
															Mars			229°14.3	11:59	
															Jupiter			163°45.1	16:20	
															Saturn			99°02.3	20:37	
															2017/8/3			SHA	Mer.pass	
															Venus			267°02.3	09:25	
															Mars			228°34.9	11:58	
															Jupiter			163°37.5	16:16	
															Saturn			99°04.6	20:33	
															2017/8/4			SHA	Mer.pass	
															Venus			265°47.3	09:26	
															Mars			227°55.6	11:57	
															Jupiter			163°29.7	16:13	
															Saturn			99°06.8	20:29	
															Horizontal paralax					
															Venus:			0.1		
															Mars:			0.1		
Mer.pass.:3:08:			v-0.7 d0.0 m-3.9			v0.8 d-0.4 m1.7			v2.1 d-0.1 m-1.7			v2.6 d-0.0 m0.3								

h		Sun				Moon										
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight				
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.			
0	178°25.7	17°45.8	65°47.9	13.2	-16°12.8	-5.5	54.2	72	--	--	--	--	--			
1	193°25.7	17°45.1	80°20.1	13.2	-16°18.3	-5.5	54.2	70	--	--	01:44	22:22	--			
2	208°25.8	17°44.5	94°52.3	13.2	-16°23.7	-5.4	54.2	68	--	--	02:26	21:42	--			
3	223°25.8	17°43.8	109°24.4	13.1	-16°29.0	-5.3	54.2	66	--	00:55	02:54	21:16	23:07			
4	238°25.9	17°43.2	123°56.6	13.1	-16°34.3	-5.2	54.2	64	--	01:52	03:15	20:55	22:16			
5	253°25.9	17°42.5	138°28.6	13.1	-16°39.5	-5.2	54.2	62	--	02:24	03:32	20:39	21:46			
6	268°25.9	17°41.9	153°00.7	13.1	-16°44.7	-5.1	54.2	60	00:50	02:47	03:46	20:25	21:23			
7	283°26.0	17°41.3	167°32.7	13.0	-16°49.7	-5.0	54.2	58	01:41	03:05	03:58	20:13	21:05			
8	298°26.0	17°40.6	182°04.8	13.0	-16°54.7	-4.9	54.1	56	02:10	03:20	04:08	20:03	20:50			
9	313°26.1	17°40.0	196°36.7	13.0	-16°59.6	-4.9	54.1	54	02:32	03:33	04:17	19:54	20:38			
10	328°26.1	17°39.3	211°08.7	12.9	-17°04.4	-4.8	54.1	52	02:49	03:44	04:25	19:46	20:27			
11	343°26.2	17°38.7	225°40.6	12.9	-17°09.2	-4.7	54.1	50	03:04	03:54	04:32	19:39	20:17			
12	358°26.2	17°38.0	240°12.5	12.9	-17°13.9	-4.6	54.1	45	03:32	04:14	04:48	19:24	19:57			
13	13°26.3	17°37.4	254°44.4	12.9	-17°18.5	-4.6	54.1	40	03:53	04:30	05:00	19:11	19:41			
14	28°26.3	17°36.7	269°16.3	12.8	-17°23.0	-4.5	54.1	35	04:10	04:43	05:11	19:01	19:28			
15	43°26.4	17°36.1	283°48.1	12.8	-17°27.4	-4.4	54.1	30	04:24	04:54	05:20	18:52	19:17			
16	58°26.4	17°35.4	298°19.9	12.8	-17°31.8	-4.3	54.1	20	04:45	05:13	05:36	18:36	18:59			
17	73°26.5	17°34.8	312°51.7	12.8	-17°36.1	-4.3	54.1	10	05:02	05:28	05:50	18:22	18:44			
18	88°26.5	17°34.1	327°23.4	12.7	-17°40.3	-4.2	54.1	0	05:16	05:41	06:03	18:10	18:31			
19	103°26.6	17°33.5	341°55.2	12.7	-17°44.5	-4.1	54.1	-10	05:28	05:53	06:15	17:57	18:19			
20	118°26.6	17°32.8	356°26.9	12.7	-17°48.5	-4.0	54.1	-20	05:39	06:06	06:29	17:44	18:07			
21	133°26.7	17°32.2	10°58.5	12.7	-17°52.5	-3.9	54.1	-30	05:50	06:19	06:44	17:29	17:54			
22	148°26.7	17°31.5	25°30.2	12.6	-17°56.4	-3.9	54.1	-35	05:56	06:26	06:53	17:20	17:47			
23	163°26.8	17°30.9	40°01.8	12.6	-18°00.2	-3.8	54.1	-40	06:01	06:34	07:03	17:10	17:39			
	SD.=15.8	d=-0.6	S.D.=14.8						-45	06:08	06:43	07:14	16:59	17:30		
									-50	06:14	06:53	07:28	16:45	17:20		
									-52	06:17	06:58	07:35	16:38	17:15		
									-54	06:20	07:03	07:42	16:31	17:10		
									-56	06:24	07:09	07:50	16:23	17:04		
									-58	06:27	07:15	07:59	16:14	16:58		
									-60	06:31	07:22	08:10	16:03	16:51		
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Moonrise			Moonset					
0	178°26.8	17°30.2	54°33.4	12.6	-18°03.9	-3.7	54.1	Lat.	Wed	Thu	Fri	Wed	Thu	Fri		
1	193°26.9	17°29.6	69°05.0	12.6	-18°07.6	-3.6	54.1	72	19:46	--	--	20:36	--	--		
2	208°26.9	17°28.9	83°36.5	12.5	-18°11.2	-3.5	54.1	70	18:18	19:48	20:54	22:04	22:13	22:47		
3	223°27.0	17°28.3	98°08.0	12.5	-18°14.6	-3.4	54.1	68	17:39	18:53	19:51	22:44	23:08	23:50		
4	238°27.0	17°27.6	112°39.5	12.5	-18°18.0	-3.4	54.1	66	17:12	18:20	19:16	23:11	23:41	--		
5	253°27.1	17°27.0	127°11.0	12.5	-18°21.4	-3.3	54.2	64	16:52	17:56	18:50	23:32	--	00:05		
6	268°27.1	17°26.3	141°42.4	12.4	-18°24.6	-3.2	54.2	62	16:35	17:37	18:31	23:49	--	00:24		
7	283°27.2	17°25.7	156°13.8	12.4	-18°27.8	-3.1	54.2	60	16:21	17:22	18:14	--	00:03	00:40		
8	298°27.2	17°25.0	170°45.2	12.4	-18°30.8	-3.0	54.2	58	16:09	17:08	18:01	--	00:15	00:53		
9	313°27.3	17°24.3	185°16.6	12.4	-18°33.8	-2.9	54.2	56	15:59	16:57	17:49	--	00:26	01:05		
10	328°27.3	17°23.7	199°47.9	12.3	-18°36.7	-2.9	54.2	54	15:50	16:47	17:39	00:02	00:35	01:15		
11	343°27.4	17°23.0	214°19.2	12.3	-18°39.6	-2.8	54.2	52	15:42	16:38	17:30	00:09	00:44	01:24		
12	358°27.4	17°22.4	228°50.5	12.3	-18°42.3	-2.7	54.2	50	15:35	16:30	17:21	00:15	00:51	01:32		
13	13°27.5	17°21.7	243°21.8	12.3	-18°44.9	-2.6	54.2	45	15:19	16:13	17:04	00:29	01:07	01:49		
14	28°27.6	17°21.0	257°53.0	12.2	-18°47.5	-2.5	54.2	40	15:07	15:59	16:50	00:41	01:20	02:03		
15	43°27.6	17°20.4	272°24.2	12.2	-18°50.0	-2.4	54.2	35	14:56	15:48	16:38	00:51	01:31	02:15		
16	58°27.7	17°19.7	286°55.4	12.2	-18°52.4	-2.4	54.2	30	14:47	15:38	16:27	00:59	01:41	02:26		
17	73°27.7	17°19.1	301°26.6	12.2	-18°54.7	-2.3	54.2	20	14:31	15:20	16:09	01:14	01:58	02:43		
18	88°27.8	17°18.4	315°57.8	12.1	-18°56.9	-2.2	54.2	10	14:16	15:05	15:53	01:27	02:12	02:59		
19	103°27.8	17°17.7	330°28.9	12.1	-18°59.0	-2.1	54.2	0	14:03	14:50	15:39	01:40	02:26	03:14		
20	118°27.9	17°17.1	344°60.0	12.1	-19°01.1	-2.0	54.2	-10	13:50	14:36	15:24	01:52	02:40	03:28		
21	133°27.9	17°16.4	359°31.1	12.1	-19°03.0	-1.9	54.2	-20	13:36	14:21	15:08	02:05	02:54	03:44		
22	148°28.0	17°15.8	14°02.1	12.0	-19°04.9	-1.8	54.2	-30	13:21	14:04	14:50	02:20	03:11	04:02		
23	163°28.1	17°15.1	28°33.2	12.0	-19°06.7	-1.7	54.2	-35	13:11	13:54	14:40	02:29	03:21	04:12		
	SD.=15.8	d=-0.7	S.D.=14.8						-40	13:01	13:42	14:28	02:39	03:32	04:24	
									-45	12:49	13:29	14:14	02:50	03:46	04:38	
									-50	12:34	13:12	13:56	03:05	04:02	04:55	
									-52	12:27	13:04	13:48	03:11	04:09	05:03	
									-54	12:19	12:56	13:39	03:19	04:18	05:12	
									-56	12:11	12:46	13:29	03:27	04:27	05:22	
									-58	12:01	12:35	13:17	03:36	04:38	05:34	
									-60	11:50	12:22	13:04	03:47	04:50	05:47	
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Sun			Moon					
0	178°28.1	17°14.4	43°04.2	12.0	-19°08.4	-1.7	54.2	Day	Eqn. of Time		Mer.	Mer. Pass.		Age		
1	193°28.2	17°13.8	57°35.2	12.0	-19°10.0	-1.6	54.3	2	06:17	06:15	12:06	Upper	Lower	10(76%)		
2	208°28.2	17°13.1	72°06.1	12.0	-19°11.5	-1.5	54.3	3	06:13	06:10	12:06	21:02	08:38	11(84%)		
3	223°28.3	17°12.4	86°37.1	11.9	-19°12.9	-1.4	54.3	4	06:08	06:05	12:06	21:50	09:26	12(90%)		
4	238°28.3	17°11.8	101°08.0	11.9	-19°14.3	-1.3	54.3									
5	253°28.4	17°11.1	115°38.9	11.9	-19°15.5	-1.2	54.3									
6	268°28.5	17°10.4	130°09.8	11.9	-19°16.7	-1.1	54.3									
7	283°28.5	17°09.8	144°40.7	11.9	-19°17.8	-1.0	54.3									
8	298°28.6	17°09.1	159°11.5	11.8	-19°18.7	-0.9	54.3									
9	313°28.6	17°08.4	173°42.4	11.8	-19°19.6	-0.8	54.3									
10	328°28.7	17°07.8	188°13.2	11.8	-19°20.4	-0.8	54.3									
11	343°28.8	17°07.1	202°44.0	11.8	-19°21.1	-0.7	54.3									
12	358°28.8	17°06.4	217°14.8	11.8	-19°21.8	-0.6	54.3									
13	13°28.9	17°05.7	231°45.5	11.8	-19°22.3	-0.5	54.4									
14	28°28.9	17°05.1	246°16.3	11.7	-19°22.7	-0.4	54.4									
15	43°29.0	17°04.4	260°47.0	11.7	-19°23.1	-0.3	54.4									
16	58°29.1	17°03.7	275°17.7	11.7	-19°23.3	-0.2	54.4									
17	73°29.1	17°03.1	289°48.4	11.7	-19°23.5	-0.1	54.4									
18	88°29.2	17°02.4	304°19.1	11.7	-											

August 05, 06, 07 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	313°44.1	21°58.2	218°16.4	21°58.2	181°00.5	18°49.7	117°06.1	-5°48.3	52°53.1	-21°55.5			Alpheratz	357°40.3	29°11.2		
1	329°46.6	21°58.2	233°15.7	21°58.2	196°01.4	18°49.3	132°08.2	-5°48.4	67°55.6	-21°55.5			Ankaa	353°12.7	-42°12.4		
2	343°49.1	21°58.2	248°15.0	21°58.2	211°02.2	18°48.8	147°10.3	-5°48.6	82°58.2	-21°55.5			Schedar	349°36.9	56°37.8		
3	358°51.5	21°58.2	263°14.4	21°58.2	226°03.0	18°48.4	162°12.5	-5°48.7	98°00.7	-21°55.5			Diphda	348°52.8	-17°53.3		
4	13°54.0	21°58.3	278°13.7	21°58.3	241°03.9	18°48.0	177°14.6	-5°48.9	113°03.3	-21°55.5			Achernar	335°24.6	-57°08.7		
5	28°56.5	21°58.3	293°13.0	21°58.3	256°04.7	18°47.6	192°16.7	-5°49.0	128°05.8	-21°55.5			Hamal	327°57.5	23°32.6		
6	43°58.9	21°58.3	308°12.4	21°58.3	271°05.5	18°47.1	207°18.9	-5°49.2	143°08.4	-21°55.5			Polaris	316°30.6	89°19.9		
7	59°01.4	21°58.3	323°11.7	21°58.3	286°06.4	18°46.7	222°21.0	-5°49.3	158°10.9	-21°55.5			Akamar	315°16.3	-40°13.9		
8	74°03.8	21°58.3	338°11.0	21°58.3	301°07.2	18°46.3	237°23.2	-5°49.4	173°13.5	-21°55.5			Menkar	314°12.1	4°09.4		
9	89°06.3	21°58.3	353°10.4	21°58.3	316°08.0	18°45.8	252°25.3	-5°49.6	188°16.0	-21°55.5			Mirfak	308°36.4	49°55.0		
10	104°08.8	21°58.3	8°09.7	21°58.3	331°08.9	18°45.4	267°27.4	-5°49.7	203°18.6	-21°55.5			Aldebaran	290°46.3	16°32.5		
11	119°11.2	21°58.3	23°09.0	21°58.3	346°09.7	18°45.0	282°29.6	-5°49.9	218°21.1	-21°55.5			Rigel	281°09.6	-8°11.0		
12	134°13.7	21°58.4	38°08.4	21°58.4	1°10.5	18°44.6	297°31.7	-5°50.0	233°23.7	-21°55.5			Capella	280°30.6	46°00.7		
13	149°16.2	21°58.4	53°07.7	21°58.4	16°11.4	18°44.1	312°33.8	-5°50.2	248°26.2	-21°55.5			Bellatrix	278°29.2	6°21.8		
14	164°18.6	21°58.4	68°07.0	21°58.4	31°12.2	18°43.7	327°36.0	-5°50.3	263°28.8	-21°55.5			Elnath	278°09.3	28°37.1		
15	179°21.1	21°58.4	83°06.3	21°58.4	46°13.0	18°43.3	342°38.1	-5°50.5	278°31.3	-21°55.5			Alnilam	275°43.7	-1°11.6		
16	194°23.6	21°58.4	98°05.7	21°58.4	61°13.9	18°42.8	357°40.2	-5°50.6	293°33.8	-21°55.6			Betelgeuse	270°58.5	7°24.5		
17	209°26.0	21°58.4	113°05.0	21°58.4	76°14.7	18°42.4	12°42.4	-5°50.7	308°36.4	-21°55.6			Canopus	263°55.3	-52°42.3		
18	224°28.5	21°58.4	128°04.3	21°58.4	91°15.5	18°42.0	27°44.5	-5°50.9	323°38.9	-21°55.6			Sirius	258°31.5	-16°44.3		
19	239°31.0	21°58.4	143°03.7	21°58.4	106°16.4	18°41.5	42°46.6	-5°51.0	338°41.5	-21°55.6			Adara	255°10.6	-28°59.8		
20	254°33.4	21°58.4	158°03.0	21°58.4	121°17.2	18°41.1	57°48.8	-5°51.2	353°44.0	-21°55.6			Procyon	244°57.0	5°10.9		
21	269°35.9	21°58.4	173°02.3	21°58.4	136°18.1	18°40.7	72°50.9	-5°51.3	8°46.6	-21°55.6			Pollux	243°24.6	27°58.9		
22	284°38.3	21°58.4	188°01.7	21°58.4	151°18.9	18°40.2	87°53.0	-5°51.5	23°49.1	-21°55.6			Avior	234°17.5	-59°34.0		
23	299°40.8	21°58.4	203°01.0	21°58.4	166°19.7	18°39.8	102°55.2	-5°51.6	38°51.7	-21°55.6			Suhail	222°50.8	-43°30.2		
Mer.pass.:3:04:			v-0.7 d0.0 m-3.9			v0.8 d-0.4 m1.7			v2.1 d-0.1 m-1.7			v2.6 d-0.0 m0.3			Miacplacidus 221°39.9 -69°47.4		
															Alphard 217°53.6 -8°44.1		
															Regulus 207°40.8 11°52.9		
															Dubhe 193°48.9 61°39.6		
															Denebola 182°31.0 14°28.6		
															Gienah 175°49.6 -17°38.3		
															Acrux 173°06.5 -63°11.9		
															Gacrux 171°58.0 -57°12.8		
															Alioth 166°18.6 55°52.2		
															Spica 158°28.4 -11°15.0		
															Alcaid 152°56.9 49°14.0		
															Hadar 148°43.9 -60°27.5		
															Menkent 148°04.3 -36°27.3		
															Arcturus 145°53.1 19°06.1		
															Rigel Kent. 139°47.8 -60°54.5		
															Zubenelg. 137°02.3 -16°06.7		
															Kochab 137°20.2 74°05.5		
															Alphecca 126°08.6 26°39.8		
															Antares 112°22.6 -26°28.1		
															Atria 107°21.6 -69°03.5		
															Sabik 102°09.1 -15°44.6		
															Shaula 96°17.8 -37°06.8		
															Rasalhague 96°03.6 12°33.2		
															Etamin 90°44.4 51°29.6		
															Kaus Aust. 83°39.8 -34°22.4		
															Vega 80°36.7 38°48.3		
															Nunki 75°54.5 -26°16.3		
															Altair 62°05.2 8°55.1		
															Peacock 53°14.3 -56°40.5		
															Deneb 49°29.1 45°20.8		
															Enif 33°44.0 9°57.5		
															Alnair 27°39.8 -46°52.3		
															Fomalhaut 15°20.7 -29°31.6		
															Scheat 13°50.3 28°10.7		
															Markab 13°35.3 15°18.0		
															2017/8/5 SHA Mer.pass		
															Venus 264°32.2 09:27		
															Mars 227°16.4 11:55		
															Jupiter 163°21.9 16:09		
															Saturn 99°08.9 20:25		
															2017/8/6 SHA Mer.pass		
															Venus 263°17.0 09:28		
															Mars 226°37.3 11:54		
															Jupiter 163°14.0 16:06		
															Saturn 99°11.0 20:21		
															2017/8/7 SHA Mer.pass		
															Venus 262°01.7 09:29		
															Mars 225°58.3 11:53		
															Jupiter 163°06.0 16:02		
															Saturn 99°12.9 20:17		
															Horizontal paralax		
															Venus: 0.1		
															Mars: 0.1		
Mer.pass.:2:56:			v-0.7 d-0.0 m-3.9			v0.8 d-0.4 m1.7			v2.1 d-0.1 m-1.7			v2.5 d-0.0 m0.3					

h		Sun					Moon					Twilight						
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.				
0	178°29.6	16°58.3	31°22.9	11.6	-19°22.0	0.5	54.5	72	--	--	01:01	22:58	--	--				
1	193°29.6	16°57.7	45°53.4	11.6	-19°21.4	0.6	54.5	70	--	--	02:05	22:01	--	--				
2	208°29.7	16°57.0	60°24.0	11.6	-19°20.8	0.7	54.5	68	--	--	02:40	21:28	--	--				
3	223°29.8	16°56.3	74°54.6	11.6	-19°20.0	0.8	54.5	66	--	01:25	03:05	21:04	22:40	--				
4	238°29.8	16°55.6	89°25.1	11.5	-19°19.1	0.9	54.5	64	--	02:07	03:24	20:45	22:00	--				
5	253°29.9	16°55.0	103°55.6	11.5	-19°18.2	1.0	54.5	62	--	02:35	03:40	20:30	21:34	--				
6	268°30.0	16°54.3	118°26.2	11.5	-19°17.2	1.1	54.5	60	01:16	02:56	03:53	20:17	21:13	22:49				
7	283°30.0	16°53.6	132°56.7	11.5	-19°16.0	1.2	54.6	58	01:55	03:13	04:04	20:06	20:57	22:13				
8	298°30.1	16°52.9	147°27.2	11.5	-19°14.8	1.3	54.6	56	02:21	03:27	04:14	19:57	20:43	21:48				
9	313°30.1	16°52.2	161°57.7	11.5	-19°13.5	1.4	54.6	54	02:40	03:39	04:22	19:48	20:31	21:29				
10	328°30.2	16°51.6	176°28.2	11.5	-19°12.1	1.5	54.6	52	02:56	03:50	04:30	19:41	20:21	21:13				
11	343°30.3	16°50.9	190°58.7	11.5	-19°10.5	1.6	54.6	50	03:10	03:59	04:37	19:34	20:12	21:00				
12	358°30.3	16°50.2	205°29.1	11.5	-19°08.9	1.6	54.6	45	03:37	04:18	04:51	19:20	19:53	20:34				
13	13°30.4	16°49.5	219°59.6	11.5	-19°07.3	1.7	54.6	40	03:57	04:33	05:03	19:08	19:38	20:14				
14	28°30.5	16°48.8	234°30.1	11.5	-19°05.5	1.8	54.7	35	04:13	04:46	05:13	18:58	19:25	19:58				
15	43°30.5	16°48.1	249°00.5	11.4	-19°03.6	1.9	54.7	30	04:26	04:56	05:22	18:49	19:15	19:45				
16	58°30.6	16°47.5	263°31.0	11.4	-19°01.6	2.0	54.7	20	04:46	05:14	05:37	18:34	18:58	19:25				
17	73°30.7	16°46.8	278°01.4	11.4	-18°59.5	2.1	54.7	10	05:03	05:28	05:50	18:21	18:43	19:09				
18	88°30.8	16°46.1	292°31.8	11.4	-18°57.4	2.2	54.7	0	05:16	05:41	06:02	18:09	18:31	18:56				
19	103°30.8	16°45.4	307°02.3	11.4	-18°55.1	2.3	54.7	-10	05:27	05:53	06:14	17:57	18:19	18:45				
20	118°30.9	16°44.7	321°32.7	11.4	-18°52.8	2.4	54.7	-20	05:38	06:04	06:27	17:45	18:08	18:34				
21	133°31.0	16°44.0	336°03.1	11.4	-18°50.4	2.5	54.8	-30	05:48	06:17	06:42	17:30	17:55	18:24				
22	148°31.0	16°43.4	350°33.5	11.4	-18°47.8	2.6	54.8	-35	05:53	06:23	06:50	17:22	17:49	18:19				
23	163°31.1	16°42.7	5°03.9	11.4	-18°45.2	2.7	54.8	-40	05:58	06:31	06:59	17:13	17:41	18:14				
SD.=15.8		d=-0.7	S.D.=14.9					-45	06:04	06:39	07:10	17:02	17:33	18:08	-			
								-50	06:10	06:49	07:23	16:49	17:24	18:02				
								-52	06:13	06:53	07:30	16:43	17:19	17:60				
								-54	06:16	06:58	07:36	16:36	17:14	17:57				
								-56	06:18	07:03	07:44	16:28	17:09	17:54				
								-58	06:22	07:09	07:53	16:20	17:04	17:51				
								-60	06:25	07:15	08:02	16:10	16:57	17:48				
												Moonrise			Moonset			
Lat.	Sat	Sun	Mon	Sat	Sun	Mon												
72	--	22:24	21:57	--	--	00:41												
70	21:18	21:23	21:24	--	--	00:05												
68	20:28	20:48	20:60	--	--	00:55												
66	19:56	20:23	20:41	00:25	01:26	02:40												
64	19:33	20:03	20:26	00:51	01:49	02:59												
62	19:14	19:47	20:13	01:10	02:08	03:15												
60	18:58	19:34	20:02	01:26	02:23	03:28												
58	18:45	19:22	19:52	01:40	02:36	03:39												
56	18:34	19:12	19:44	01:52	02:47	03:49												
54	18:24	19:03	19:37	02:02	02:57	03:58												
52	18:15	18:55	19:30	02:11	03:05	04:05												
50	18:07	18:48	19:24	02:19	03:13	04:12												
45	17:51	18:33	19:11	02:37	03:30	04:27												
40	17:37	18:20	19:00	02:51	03:43	04:39												
35	17:25	18:09	18:51	03:03	03:55	04:49												
30	17:15	18:00	18:43	03:14	04:05	04:58												
20	16:57	17:44	18:29	03:32	04:22	05:14												
10	16:42	17:30	18:17	03:47	04:37	05:27												
0	16:27	17:16	18:05	04:02	04:51	05:40												
-10	16:13	17:03	17:53	04:17	05:05	05:52												
-20	15:57	16:49	17:41	04:32	05:20	06:06												
-30	15:40	16:32	17:27	04:50	05:37	06:21												
-35	15:29	16:23	17:19	05:01	05:47	06:29												
-40	15:18	16:12	17:09	05:13	05:58	06:39												
-45	15:04	15:59	16:58	05:27	06:11	06:51												
-50	14:47	15:43	16:45	05:44	06:27	07:05												
-52	14:39	15:36	16:39	05:52	06:35	07:12												
-54	14:30	15:28	16:32	06:01	06:43	07:19												
-56	14:20	15:19	16:24	06:11	06:52	07:27												
-58	14:09	15:09	16:15	06:22	07:03	07:36												
-60	13:55	14:57	16:05	06:36	07:15	07:47												
												Sun		Moon				
Day	Eqn.of Time		Mer.	Mer.Pass.		Age												
	00 ^h	12 ^h	Pass	Upper	Lower													
5	06:02	05:59	12:05	22:39	10:14	13(95%)												
6	05:55	05:52	12:05	23:27	11:03	14(98%)												
7	05:48	05:45	12:05	00:16	11:52	15(100%)												
SD.=15.8		d=-0.7	S.D.=15.1															

August 08, 09 ,10 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec
0	316°41.5	217°27.9	21°57.0	182°00.9	18°18.4	119°39.4	-5°58.8	55°56.3	-21°55.7	Alpheratz	357°40.3 29°11.2
1	331°44.0	232°27.2	21°57.0	197°01.7	18°17.9	134°41.5	-5°58.9	70°58.8	-21°55.7	Ankaa	353°12.7 -42°12.4
2	346°46.5	247°26.5	21°56.9	212°02.6	18°17.5	149°43.7	-5°59.1	86°01.3	-21°55.7	Schedar	349°36.9 56°37.8
3	1°48.9	262°25.9	21°56.9	227°03.4	18°17.0	164°45.8	-5°59.2	101°03.9	-21°55.7	Diphda	348°52.8 -17°53.3
4	16°51.4	277°25.2	21°56.8	242°04.3	18°16.6	179°47.9	-5°59.4	116°06.4	-21°55.7	Achernar	335°24.6 -57°08.7
5	31°53.9	292°24.5	21°56.8	257°05.1	18°16.2	194°50.0	-5°59.5	131°09.0	-21°55.7	Hamal	327°57.5 23°32.6
6	46°56.3	307°23.8	21°56.7	272°05.9	18°15.7	209°52.2	-5°59.7	146°11.5	-21°55.7	Polaris	316°29.1 89°19.9
7	61°58.8	322°23.1	21°56.6	287°06.8	18°15.3	224°54.3	-5°59.8	161°14.0	-21°55.7	Akamar	315°16.2 -40°13.9
8	77°01.3	337°22.5	21°56.6	302°07.6	18°14.8	239°56.4	-5°60.0	176°16.6	-21°55.7	Menkar	314°12.1 4°09.4
9	92°03.7	352°21.8	21°56.5	317°08.5	18°14.4	254°58.5	-6°00.1	191°19.1	-21°55.7	Mirfak	308°36.3 49°55.0
10	107°06.2	7°21.1	21°56.5	332°09.3	18°13.9	270°00.6	-6°00.3	206°21.6	-21°55.7	Aldebaran	290°46.3 16°32.5
11	122°08.7	22°20.4	21°56.4	347°10.2	18°13.5	285°02.8	-6°00.4	221°24.2	-21°55.7	Rigel	281°09.5 -8°10.9
12	137°11.1	37°19.7	21°56.3	2°11.0	18°13.0	300°04.9	-6°00.6	236°26.7	-21°55.7	Capella	280°30.6 46°00.7
13	152°13.6	52°19.1	21°56.3	17°11.9	18°12.6	315°07.0	-6°00.7	251°29.3	-21°55.7	Bellatrix	278°29.2 6°21.8
14	167°16.0	67°18.4	21°56.2	32°12.7	18°12.1	330°09.1	-6°00.9	266°31.8	-21°55.8	Elnath	278°09.3 28°37.1
15	182°18.5	82°17.7	21°56.1	47°13.6	18°11.7	345°11.2	-6°01.0	281°34.3	-21°55.8	Alnilam	275°43.7 -1°11.5
16	197°21.0	97°17.0	21°56.1	62°14.4	18°11.3	0°13.4	-6°01.2	296°36.9	-21°55.8	Betelgeuse	270°58.5 7°24.5
17	212°23.4	112°16.3	21°56.0	77°15.2	18°10.8	15°15.5	-6°01.3	311°39.4	-21°55.8	Canopus	263°55.3 -52°42.3
18	227°25.9	127°15.7	21°55.9	92°16.1	18°10.4	30°17.6	-6°01.5	326°41.9	-21°55.8	Sirius	258°31.4 -16°44.3
19	242°28.4	142°15.0	21°55.9	107°16.9	18°09.9	45°19.7	-6°01.6	341°44.5	-21°55.8	Adara	255°10.6 -28°59.8
20	257°30.8	157°14.3	21°55.8	122°17.8	18°09.5	60°21.8	-6°01.8	356°47.0	-21°55.8	Procyon	244°57.0 5°10.9
21	272°33.3	172°13.6	21°55.7	137°18.6	18°09.0	75°24.0	-6°01.9	11°49.5	-21°55.8	Pollux	243°24.6 27°58.9
22	287°35.8	187°12.9	21°55.6	152°19.5	18°08.6	90°26.1	-6°02.1	26°52.1	-21°55.8	Avior	234°17.5 -59°34.0
23	302°38.2	202°12.2	21°55.6	167°20.3	18°08.1	105°28.2	-6°02.2	41°54.6	-21°55.8	Suhail	222°50.8 -43°30.2
Mer.pass.:2:52:		v-0.7 d-0.1 m-3.9		v0.8 d-0.4 m1.7		v2.1 d-0.1 m-1.7		v2.5 d-0.0 m0.3		Miaplacidus	221°39.9 -69°47.4
										Alphard	217°53.6 -8°44.1
										Regulus	207°40.8 11°52.9
										Dubhe	193°48.9 61°39.6
										Denebola	182°31.0 14°28.6
										Gienah	175°49.6 -17°38.3
										Acru	173°06.5 -63°11.9
										Gacrux	171°58.0 -57°12.8
										Alioth	166°18.6 55°52.2
										Spica	158°28.4 -11°15.0
										Alcaid	152°56.9 49°14.0
										Hadar	148°43.9 -60°27.5
										Menkent	148°04.3 -36°27.3
										Arcturus	145°53.1 19°06.1
										Rigel Kent.	139°47.9 -60°54.5
										Zubenelg.	137°02.3 -16°06.7
										Kochab	137°20.3 74°05.5
										Alphecca	126°08.6 26°39.8
										Antares	112°22.6 -26°28.1
										Atria	107°21.6 -69°03.5
										Sabik	102°09.1 -15°44.6
										Shaula	96°17.8 -37°06.8
										Rasalhague	96°03.7 12°33.2
										Etamin	90°44.5 51°29.6
										Kaus Aust.	83°39.8 -34°22.4
										Vega	80°36.7 38°48.3
										Nunki	75°54.5 -26°16.3
										Altair	62°05.2 8°55.1
										Peacock	53°14.3 -56°40.5
										Deneb	49°29.1 45°20.8
										Enif	33°44.0 9°57.5
										Alnair	27°39.8 -46°52.3
										Fomalhaut	15°20.7 -29°31.6
										Scheat	13°50.3 28°10.7
										Markab	13°35.2 15°18.0
										2017/8/8 SHA Mer.pass	
										Venus	260°46.4 09:31
										Mars	225°19.3 11:51
										Jupiter	162°57.9 15:59
										Saturn	99°14.7 20:13
										2017/8/9 SHA Mer.pass	
										Venus	259°30.9 09:32
										Mars	224°40.5 11:50
										Jupiter	162°49.6 15:56
										Saturn	99°16.5 20:09
										2017/8/1 SHA Mer.pass	
										Venus	258°15.3 09:33
										Mars	224°01.7 11:49
										Jupiter	162°41.3 15:52
										Saturn	99°18.1 20:05
										Horizontal paralax	
										Venus:	0.1
										Mars:	0.1
Mer.pass.:2:44:		v-0.7 d-0.1 m-3.9		v0.9 d-0.5 m1.7		v2.1 d-0.2 m-1.7		v2.5 d-0.0 m0.3			

h Sun				Moon			
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°34.8	16°08.5	355°58.4	11.7	-14°47.4	6.9	55.7
1	193°34.9	16°07.8	10°29.1	11.7	-14°40.5	7.0	55.7
2	208°35.0	16°07.0	24°59.8	11.7	-14°33.5	7.1	55.7
3	223°35.1	16°06.3	39°30.5	11.7	-14°26.4	7.1	55.7
4	238°35.2	16°05.6	54°01.3	11.7	-14°19.2	7.2	55.7
5	253°35.2	16°04.9	68°32.0	11.8	-14°11.9	7.3	55.8
6	268°35.3	16°04.2	83°02.8	11.8	-14°04.6	7.4	55.8
7	283°35.4	16°03.5	97°33.6	11.8	-13°57.2	7.4	55.8
8	298°35.5	16°02.8	112°04.4	11.8	-13°49.7	7.5	55.8
9	313°35.6	16°02.1	126°35.2	11.8	-13°42.2	7.6	55.8
10	328°35.7	16°01.3	141°06.0	11.8	-13°34.6	7.7	55.9
11	343°35.7	16°00.6	155°36.8	11.8	-13°26.9	7.7	55.9
12	358°35.8	15°59.9	170°07.6	11.8	-13°19.1	7.8	55.9
13	13°35.9	15°59.2	184°38.5	11.9	-13°11.3	7.9	55.9
14	28°36.0	15°58.5	199°09.4	11.9	-13°03.4	7.9	55.9
15	43°36.1	15°57.8	213°40.2	11.9	-12°55.4	8.0	56.0
16	58°36.2	15°57.1	228°11.1	11.9	-12°47.4	8.1	56.0
17	73°36.3	15°56.3	242°42.0	11.9	-12°39.3	8.1	56.0
18	88°36.3	15°55.6	257°12.9	11.9	-12°31.1	8.2	56.0
19	103°36.4	15°54.9	271°43.8	11.9	-12°22.9	8.3	56.0
20	118°36.5	15°54.2	286°14.8	11.9	-12°14.6	8.3	56.1
21	133°36.6	15°53.5	300°45.7	11.9	-12°06.2	8.4	56.1
22	148°36.7	15°52.8	315°16.7	12.0	-11°57.7	8.5	56.1
23	163°36.8	15°52.0	329°47.6	12.0	-11°49.2	8.5	56.1
SD.=15.8 d=-0.7 S.D.=15.2							
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°36.9	15°51.3	344°18.6	12.0	-11°40.7	8.6	56.1
1	193°37.0	15°50.6	358°49.6	12.0	-11°32.0	8.7	56.2
2	208°37.0	15°49.9	13°20.6	12.0	-11°23.3	8.7	56.2
3	223°37.1	15°49.2	27°51.6	12.0	-11°14.6	8.8	56.2
4	238°37.2	15°48.4	42°22.6	12.0	-11°05.8	8.8	56.2
5	253°37.3	15°47.7	56°53.7	12.0	-10°56.9	8.9	56.2
6	268°37.4	15°47.0	71°24.7	12.0	-10°48.0	9.0	56.3
7	283°37.5	15°46.3	85°55.8	12.1	-10°39.0	9.0	56.3
8	298°37.6	15°45.5	100°26.8	12.1	-10°29.9	9.1	56.3
9	313°37.7	15°44.8	114°57.9	12.1	-10°20.8	9.1	56.3
10	328°37.8	15°44.1	129°29.0	12.1	-10°11.6	9.2	56.3
11	343°37.9	15°43.4	144°00.0	12.1	-10°02.4	9.3	56.4
12	358°38.0	15°42.6	158°31.1	12.1	-9°53.1	9.3	56.4
13	13°38.0	15°41.9	173°02.2	12.1	-9°43.8	9.4	56.4
14	28°38.1	15°41.2	187°33.3	12.1	-9°34.4	9.4	56.4
15	43°38.2	15°40.5	202°04.5	12.1	-9°25.0	9.5	56.4
16	58°38.3	15°39.7	216°35.6	12.1	-9°15.5	9.5	56.5
17	73°38.4	15°39.0	231°06.7	12.1	-9°05.9	9.6	56.5
18	88°38.5	15°38.3	245°37.9	12.1	-8°56.4	9.6	56.5
19	103°38.6	15°37.6	260°09.0	12.1	-8°46.7	9.7	56.5
20	118°38.7	15°36.8	274°40.2	12.2	-8°37.0	9.7	56.5
21	133°38.8	15°36.1	289°11.3	12.2	-8°27.3	9.8	56.6
22	148°38.9	15°35.4	303°42.5	12.2	-8°17.5	9.8	56.6
23	163°39.0	15°34.6	318°13.6	12.2	-8°07.6	9.9	56.6
SD.=15.8 d=-0.7 S.D.=15.3							
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°39.1	15°33.9	332°44.8	12.2	-7°57.7	9.9	56.6
1	193°39.2	15°33.2	347°16.0	12.2	-7°47.8	10.0	56.7
2	208°39.3	15°32.4	1°47.2	12.2	-7°37.8	10.0	56.7
3	223°39.3	15°31.7	16°18.3	12.2	-7°27.8	10.0	56.7
4	238°39.4	15°31.0	30°49.5	12.2	-7°17.8	10.1	56.7
5	253°39.5	15°30.3	45°20.7	12.2	-7°07.6	10.1	56.7
6	268°39.6	15°29.5	59°51.9	12.2	-6°57.5	10.2	56.8
7	283°39.7	15°28.8	74°23.1	12.2	-6°47.3	10.2	56.8
8	298°39.8	15°28.1	88°54.3	12.2	-6°37.1	10.2	56.8
9	313°39.9	15°27.3	103°25.5	12.2	-6°26.8	10.3	56.8
10	328°40.0	15°26.6	117°56.7	12.2	-6°16.5	10.3	56.8
11	343°40.1	15°25.8	132°27.9	12.2	-6°06.2	10.4	56.9
12	358°40.2	15°25.1	146°59.1	12.2	-5°55.8	10.4	56.9
13	13°40.3	15°24.4	161°30.3	12.2	-5°45.4	10.4	56.9
14	28°40.4	15°23.6	176°01.4	12.2	-5°34.9	10.5	56.9
15	43°40.5	15°22.9	190°32.6	12.2	-5°24.4	10.5	56.9
16	58°40.6	15°22.2	205°03.8	12.2	-5°13.9	10.5	57.0
17	73°40.7	15°21.4	219°35.0	12.2	-5°03.3	10.6	57.0
18	88°40.8	15°20.7	234°06.2	12.2	-4°52.8	10.6	57.0
19	103°40.9	15°20.0	248°37.4	12.2	-4°42.1	10.6	57.0
20	118°41.0	15°19.2	263°08.5	12.2	-4°31.5	10.7	57.0
21	133°41.1	15°18.5	277°39.7	12.2	-4°20.8	10.7	57.1
22	148°41.2	15°17.7	292°10.8	12.2	-4°10.1	10.7	57.1
23	163°41.3	15°17.0	306°42.0	12.1	-3°59.4	10.7	57.1
SD.=15.8 d=-0.7 S.D.=15.4							

Twilight		Twilight	
Naut.	Civil	Sunrise	Sunset
72	--	--	01:37
70	--	--	02:24
68	--	00:33	02:54
66	--	01:47	03:16
64	--	02:22	03:34
62	00:30	02:46	03:48
60	01:36	03:05	04:00
58	02:08	03:21	04:10
56	02:30	03:34	04:19
54	02:49	03:45	04:27
52	03:03	03:55	04:35
50	03:16	04:04	04:41
45	03:41	04:22	04:55
40	04:00	04:36	05:06
35	04:15	04:48	05:16
30	04:28	04:58	05:24
20	04:48	05:15	05:38
10	05:03	05:29	05:51
0	05:16	05:41	06:02
-10	05:26	05:52	06:13
-20	05:36	06:03	06:25
-30	05:46	06:14	06:39
-35	05:50	06:20	06:47
-40	05:55	06:27	06:56
-45	06:00	06:35	07:06
-50	06:06	06:44	07:18
-52	06:08	06:48	07:24
-54	06:10	06:53	07:31
-56	06:13	06:57	07:38
-58	06:16	07:03	07:46
-60	06:19	07:09	07:55

Moonrise			Moonset			
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	21:44	21:34	21:25	02:49	04:43	06:33
70	21:23	21:21	21:19	03:21	05:03	06:44
68	21:07	21:11	21:14	03:45	05:18	06:52
66	20:53	21:02	21:10	04:03	05:30	06:59
64	20:42	20:55	21:06	04:17	05:40	07:05
62	20:33	20:49	21:03	04:30	05:49	07:10
60	20:25	20:44	21:01	04:40	05:56	07:15
58	20:17	20:39	20:58	04:49	06:02	07:19
56	20:11	20:35	20:56	04:57	06:08	07:22
54	20:05	20:31	20:54	05:04	06:13	07:25
52	20:00	20:27	20:52	05:10	06:18	07:28
50	19:56	20:24	20:51	05:16	06:22	07:30
45	19:45	20:17	20:47	05:28	06:31	07:36
40	19:37	20:11	20:44	05:38	06:38	07:41
35	19:30	20:06	20:42	05:46	06:45	07:45
30	19:23	20:02	20:39	05:54	06:50	07:48
20	19:12	19:54	20:36	06:07	07:00	07:54
10	19:02	19:48	20:32	06:18	07:08	07:59
0	18:53	19:41	20:29	06:28	07:16	08:04
-10	18:44	19:35	20:26	06:39	07:24	08:09
-20	18:34	19:28	20:22	06:50	07:32	08:14
-30	18:23	19:20	20:18	07:02	07:42	08:20
-35	18:17	19:16	20:16	07:10	07:47	08:23
-40	18:09	19:11	20:13	07:18	07:53	08:27
-45	18:01	19:05	20:10	07:27	08:00	08:31
-50	17:50	18:58	20:07	07:39	08:09	08:36
-52	17:45	18:54	20:05	07:44	08:13	08:38
-54	17:40	18:51	20:03	07:50	08:17	08:41
-56	17:34	18:47	20:01	07:56	08:21	08:44
-58	17:27	18:42	19:59	08:04	08:27	08:47
-60	17:20	18:37	19:57	08:12	08:33	08:50

Day	Sun			Moon		
	Eqn.of Time	Mer.	Mer.	Mer.Pass.	Age	
8	05:41	05:37	12:05	Upper	Lower	16(99%)
9	05:32	05:28	12:05	01:04	13:28	17(97%)
10	05:24	05:19	12:05	01:52	14:16	18(92%)

August 11, 12, 13 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	319°39.0	216°38.7	21°50.6	183°02.0	17°45.9	122°11.8	-6°09.6	58°58.6	-21°56.0	Alpheratz	357°40.3	29°11.2
1	334°41.4	231°38.0	21°50.5	198°02.9	17°45.5	137°14.0	-6°09.8	74°01.1	-21°56.0	Ankaa	353°12.7	-42°12.5
2	349°43.9	246°37.3	21°50.3	213°03.7	17°45.0	152°16.1	-6°09.9	89°03.7	-21°56.0	Schedar	349°36.9	56°37.8
3	4°46.4	261°36.6	21°50.2	228°04.6	17°44.6	167°18.2	-6°10.1	104°06.2	-21°56.0	Diphda	348°52.8	-17°53.3
4	19°48.8	276°35.9	21°50.1	243°05.5	17°44.1	182°20.3	-6°10.2	119°08.7	-21°56.0	Achernar	335°24.5	-57°08.7
5	34°51.3	291°35.2	21°49.9	258°06.3	17°43.7	197°22.4	-6°10.4	134°11.2	-21°56.0	Hamal	327°57.5	23°32.6
6	49°53.7	306°34.6	21°49.8	273°07.2	17°43.2	212°24.5	-6°10.5	149°13.8	-21°56.0	Polaris	316°27.8	89°19.9
7	64°56.2	321°33.9	21°49.7	288°08.0	17°42.7	227°26.6	-6°10.7	164°16.3	-21°56.0	Akamar	315°16.2	-40°13.9
8	79°58.7	336°33.2	21°49.5	303°08.9	17°42.3	242°28.7	-6°10.8	179°18.8	-21°56.0	Menkar	314°12.1	4°09.4
9	95°01.1	351°32.5	21°49.4	318°09.7	17°41.8	257°30.8	-6°11.0	194°21.3	-21°56.0	Mirfak	308°36.3	49°55.0
10	110°03.6	6°31.8	21°49.3	333°10.6	17°41.4	272°32.9	-6°11.1	209°23.9	-21°56.0	Aldebaran	290°46.3	16°32.5
11	125°06.1	21°31.1	21°49.1	348°11.5	17°40.9	287°35.1	-6°11.3	224°26.4	-21°56.0	Rigel	281°09.5	-8°10.9
12	140°08.5	36°30.4	21°49.0	3°12.3	17°40.4	302°37.2	-6°11.4	239°28.9	-21°56.0	Capella	280°30.5	46°00.7
13	155°11.0	51°29.7	21°48.8	18°13.2	17°40.0	317°39.3	-6°11.6	254°31.4	-21°56.0	Bellatrix	278°29.2	6°21.8
14	170°13.5	66°29.0	21°48.7	33°14.0	17°39.5	332°41.4	-6°11.7	269°34.0	-21°56.0	Elnath	278°09.3	28°37.1
15	185°15.9	81°28.4	21°48.6	48°14.9	17°39.1	347°43.5	-6°11.9	284°36.5	-21°56.0	Alnilam	275°43.7	-1°11.5
16	200°18.4	96°27.7	21°48.4	63°15.7	17°38.6	2°45.6	-6°12.1	299°39.0	-21°56.0	Betelgeuse	270°58.5	7°24.5
17	215°20.9	111°27.0	21°48.3	78°16.6	17°38.1	17°47.7	-6°12.2	314°41.5	-21°56.0	Canopus	263°55.3	-52°42.2
18	230°23.3	126°26.3	21°48.1	93°17.5	17°37.7	32°49.8	-6°12.4	329°44.1	-21°56.0	Sirius	258°31.4	-16°44.3
19	245°25.8	141°25.6	21°48.0	108°18.3	17°37.2	47°51.9	-6°12.5	344°46.6	-21°56.0	Adara	255°10.6	-28°59.8
20	260°28.2	156°24.9	21°47.8	123°19.2	17°36.7	62°54.0	-6°12.7	359°49.1	-21°56.0	Procyon	244°57.0	5°10.9
21	275°30.7	171°24.2	21°47.7	138°20.0	17°36.3	77°56.1	-6°12.8	14°51.6	-21°56.0	Pollux	243°24.6	27°58.9
22	290°33.2	186°23.5	21°47.5	153°20.9	17°35.8	92°58.2	-6°13.0	29°54.2	-21°56.0	Avior	234°17.5	-59°33.9
23	305°35.6	201°22.8	21°47.4	168°21.7	17°35.4	108°00.4	-6°13.1	44°56.7	-21°56.0	Suhail	222°50.8	-43°30.2
Mer.pass.:2:40:		v-0.7 d-0.1 m-3.9		v0.9 d-0.5 m1.7		v2.1 d-0.2 m-1.7		v2.5 d-0.0 m0.3		Miaplacidus	221°39.9	-69°47.4
										Alphard	217°53.6	-8°44.1
										Regulus	207°40.8	11°52.9
										Dubhe	193°49.0	61°39.6
										Denebola	182°31.0	14°28.6
										Gienah	175°49.6	-17°38.3
										Acrux	173°06.5	-63°11.9
										Gacrux	171°58.1	-57°12.8
										Alioth	166°18.7	55°52.2
										Spica	158°28.4	-11°15.0
										Alcaid	152°56.9	49°14.0
										Hadar	148°44.0	-60°27.5
										Menkent	148°04.3	-36°27.3
										Arcturus	145°53.1	19°06.1
										Rigel Kent.	139°47.9	-60°54.5
										Zubenelg.	137°02.3	-16°06.7
										Kochab	137°20.3	74°05.5
										Alphecca	126°08.6	26°39.8
										Antares	112°22.7	-28°28.1
										Atria	107°21.6	-69°03.6
										Sabik	102°09.1	-15°44.6
										Shaula	96°17.9	-37°06.8
										Rasalhague	96°03.7	12°33.2
										Etamin	90°44.5	51°29.6
										Kaus Aust.	83°39.8	-34°22.4
										Vega	80°36.8	38°48.3
										Nunki	75°54.5	-26°16.3
										Altair	62°05.3	8°55.1
										Peacock	53°14.3	-56°40.6
										Deneb	49°29.1	45°20.8
										Enif	33°44.0	9°57.5
										Alnair	27°39.8	-46°52.3
										Fomalhaut	15°20.6	-29°31.6
										Scheat	13°50.3	28°10.7
										Markab	13°35.2	15°18.1
										2017/8/1	SHA	Mer.pass
										Venus	256°59.7	09:34
										Mars	223°23.1	11:47
										Jupiter	162°32.9	15:49
										Saturn	99°19.6	20:01
										2017/8/1	SHA	Mer.pass
										Venus	255°44.1	09:35
										Mars	222°44.5	11:46
										Jupiter	162°24.4	15:46
										Saturn	99°21.1	19:57
										2017/8/1	SHA	Mer.pass
										Venus	254°28.4	09:36
										Mars	222°06.0	11:44
										Jupiter	162°15.7	15:42
										Saturn	99°22.4	19:53
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:2:33:		v-0.7 d-0.2 m-3.9		v0.9 d-0.5 m1.7		v2.1 d-0.2 m-1.7		v2.5 d-0.0 m0.3				

h Sun								Moon							
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	178°41.4	15°16.3	321°13.1	12.1	-3°48.6	10.8	57.1	72	--	--	02:03	22:00	--	--	
1	193°41.5	15°15.5	335°44.3	12.1	-3°37.8	10.8	57.2	70	--	--	02:41	21:24	--	--	
2	208°41.6	15°14.8	350°15.4	12.1	-3°27.0	10.8	57.2	68	--	01:18	03:07	20:59	22:43	--	
3	223°41.7	15°14.0	4°46.5	12.1	-3°16.2	10.8	57.2	66	--	02:05	03:27	20:40	21:60	--	
4	238°41.8	15°13.3	19°17.6	12.1	-3°05.3	10.9	57.2	64	--	02:35	03:43	20:25	21:32	--	
5	253°41.9	15°12.5	33°48.8	12.1	-2°54.4	10.9	57.2	62	01:09	02:57	03:56	20:12	21:10	22:53	
6	268°42.0	15°11.8	48°19.8	12.1	-2°43.5	10.9	57.3	60	01:52	03:14	04:07	20:01	20:53	22:13	
7	283°42.1	15°11.1	62°50.9	12.1	-2°32.6	10.9	57.3	58	02:19	03:29	04:17	19:52	20:39	21:47	
8	298°42.2	15°10.3	77°22.0	12.1	-2°21.7	11.0	57.3	56	02:40	03:41	04:25	19:43	20:27	21:28	
9	313°42.3	15°09.6	91°53.1	12.1	-2°10.7	11.0	57.3	54	02:56	03:51	04:33	19:36	20:17	21:11	
10	328°42.4	15°08.8	106°24.1	12.0	-1°59.7	11.0	57.3	52	03:10	04:01	04:39	19:30	20:08	20:58	
11	343°42.5	15°08.1	120°55.1	12.0	-1°48.7	11.0	57.4	50	03:22	04:09	04:45	19:24	19:60	20:46	
12	358°42.6	15°07.3	135°26.2	12.0	-1°37.7	11.0	57.4	45	03:46	04:26	04:58	19:11	19:43	20:23	
13	13°42.7	15°06.6	149°57.2	12.0	-1°26.7	11.0	57.4	40	04:04	04:39	05:09	19:01	19:30	20:05	
14	28°42.8	15°05.8	164°28.1	12.0	-1°15.7	11.0	57.4	35	04:18	04:51	05:18	18:52	19:19	19:51	
15	43°42.9	15°05.1	178°59.1	12.0	-1°04.6	11.1	57.4	30	04:30	05:00	05:26	18:44	19:09	19:39	
16	58°43.0	15°04.3	193°30.1	11.9	-0°53.5	11.1	57.5	20	04:49	05:16	05:39	18:31	18:54	19:21	
17	73°43.1	15°03.6	208°01.0	11.9	-0°42.5	11.1	57.5	10	05:03	05:29	05:51	18:19	18:41	19:06	
18	88°43.2	15°02.9	222°31.9	11.9	-0°31.4	11.1	57.5	0	05:15	05:40	06:02	18:08	18:30	18:55	
19	103°43.3	15°02.1	237°02.8	11.9	-0°20.3	11.1	57.5	-10	05:26	05:51	06:12	17:58	18:19	18:45	
20	118°43.4	15°01.4	251°33.7	11.9	-0°09.2	11.1	57.5	-20	05:35	06:01	06:24	17:47	18:09	18:36	
21	133°43.6	15°00.6	266°04.6	11.9	0°02.0	11.1	57.6	-30	05:43	06:12	06:36	17:34	17:59	18:27	
22	148°43.7	14°59.9	280°35.4	11.8	0°13.1	11.1	57.6	-35	05:48	06:17	06:44	17:27	17:53	18:23	
23	163°43.8	14°59.1	295°06.2	11.8	0°24.2	11.1	57.6	-40	05:52	06:24	06:52	17:18	17:47	18:19	
SD.=15.8 d=-0.7 S.D.=15.6								-45	05:56	06:31	07:02	17:09	17:40	18:14	
								-50	06:01	06:39	07:13	16:57	17:31	18:10	
								-52	06:03	06:43	07:19	16:52	17:28	18:08	
								-54	06:05	06:47	07:25	16:46	17:24	18:06	
								-56	06:07	06:51	07:31	16:40	17:19	18:04	
								-58	06:10	06:56	07:39	16:32	17:15	18:01	
								-60	06:12	07:02	07:47	16:24	17:09	17:59	
								Moonrise			Moonset				
								Lat.	Fri	Sat	Sun	Fri	Sat	Sun	
								72	21:17	21:09	21:00	08:21	10:10	12:03	
								70	21:17	21:15	21:13	08:25	10:07	11:52	
								68	21:17	21:20	21:23	08:27	10:04	11:43	
								66	21:17	21:24	21:32	08:30	10:02	11:36	
								64	21:17	21:27	21:39	08:32	09:60	11:30	
								62	21:17	21:30	21:46	08:34	09:58	11:25	
								60	21:17	21:33	21:51	08:35	09:57	11:20	
								58	21:17	21:36	21:56	08:36	09:56	11:16	
								56	21:17	21:38	22:01	08:37	09:54	11:13	
								54	21:17	21:40	22:05	08:39	09:53	11:09	
								52	21:17	21:41	22:08	08:39	09:52	11:07	
								50	21:17	21:43	22:11	08:40	09:52	11:04	
								45	21:17	21:47	22:18	08:42	09:50	10:58	
								40	21:17	21:50	22:24	08:44	09:48	10:54	
								35	21:17	21:52	22:30	08:45	09:47	10:50	
								30	21:17	21:55	22:34	08:46	09:46	10:46	
								20	21:17	21:59	22:42	08:48	09:43	10:40	
								10	21:17	22:02	22:49	08:50	09:42	10:34	
								0	21:17	22:06	22:56	08:52	09:40	10:29	
								-10	21:17	22:09	23:03	08:53	09:38	10:24	
								-20	21:17	22:13	23:10	08:55	09:36	10:19	
								-30	21:17	22:17	23:18	08:57	09:34	10:13	
								-35	21:17	22:19	23:23	08:58	09:33	10:09	
								-40	21:17	22:22	23:28	08:59	09:32	10:05	
								-45	21:17	22:25	23:35	09:00	09:30	10:01	
								-50	21:17	22:29	23:42	09:02	09:28	09:55	
								-52	21:18	22:31	23:46	09:03	09:27	09:53	
								-54	21:18	22:33	23:50	09:04	09:26	09:50	
								-56	21:18	22:35	23:54	09:05	09:25	09:47	
								-58	21:18	22:38	23:59	09:06	09:24	09:43	
								-60	21:18	22:41	--	09:07	09:23	09:40	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age			
									00 ^h	12 ^h	Pass	Upper	Lower		
								11	05:14	05:09	12:05	02:40	15:04	19(86%)	
								12	05:04	04:59	12:04	03:28	15:52	20(77%)	
								13	04:54	04:49	12:04	04:17	16:42	21(67%)	
								Sun			Moon				
								0	178°46.5	14°40.2	297°48.0	11.1	5°01.6	11.0	58.1
								1	193°46.6	14°39.5	312°18.1	11.0	5°12.5	10.9	58.1
								2	208°46.7	14°38.7	326°48.1	11.0	5°23.4	10.9	58.2
								3	223°46.8	14°37.9	341°18.0	10.9	5°34.3	10.9	58.2
								4	238°46.9	14°37.2	355°47.9	10.9	5°45.2	10.9	58.2
								5	253°47.0	14°36.4	10°17.8	10.9	5°56.1	10.8	58.2
								6	268°47.2	14°35.6	24°47.7	10.8	6°06.9	10.8	58.2
								7	283°47.3	14°34.9	39°17.5	10.8	6°17.7	10.8	58.3
								8	298°47.4	14°34.1	53°47.2	10.7	6°28.5	10.8	58.3
								9	313°47.5	14°33.4	68°16.9	10.7	6°39.2	10.7	58.3
								10	328°47.6	14°32.6	82°46.6	10.6	6°49.9	10.7	58.3
								11	343°47.7	14°31.8	97°16.2	10.6	7°00.6	10.7	58.3
								12	358°47.8	14°31.1	111°45.8	10.6	7°11.3	10.6	58.4
								13	13°47.9	14°30.3	126°15.3	10.5	7°21.9	10.6	58.4
								14	28°48.1	14°29.5	140°44.8	10.5	7°32.5	10.6	58.4
								15	43°48.2	14°28.8	155°14.2	10.4	7°43.1	10.5	58.4
								16	58°48.3	14°28.0	169°43.6	10.4	7°53.6	10.5	58.4
								17	73°48.4	14°27.2	184°12.9	10.3	8°04.1	10.5	58.4
								18	88°48.5	14°26.5	198°42.2	10.3	8°14.5	10.4	58.5
								19	103°48.6	14°25.7	213°11.5	10.2	8°24.9	10.4	58.5
								20	118°48.8	14°24.9	227°40.6	10.2	8°35.3	10.3	58.5
								21	133°48.9	14°24.2	242°09.8	10.1	8°45.6	10.3	58.5
								22	148°49.0	14°23.4	256°38.9	10.1	8°55.9	10.3	58.5
								23	163°49.1	14°22.6	271°07.9	10.0	9°06.1	10.2	58.6
SD.=15.8 d=-0.8 S.D.=15.9															

August 14, 15, 16 (Mon., Tue., Wed.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Mon	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	322°36.4	215°49.0	21°38.7	184°04.0	17°12.5	124°43.4	-6°20.7	62°00.1	-21°56.3	Alpheratz	357°40.3	29°11.2					
1	337°38.8	230°48.3	21°38.5	199°04.9	17°12.0	139°45.5	-6°20.9	77°02.6	-21°56.3	Ankaa	353°12.6	-42°12.5					
2	352°41.3	245°47.6	21°38.3	214°05.7	17°11.5	154°47.6	-6°21.0	92°05.1	-21°56.3	Schedar	349°36.8	56°37.8					
3	7°43.8	260°46.9	21°38.1	229°06.6	17°11.0	169°49.7	-6°21.2	107°07.6	-21°56.3	Diphda	348°52.8	-17°53.3					
4	22°46.2	275°46.3	21°37.9	244°07.5	17°10.6	184°51.8	-6°21.4	122°10.1	-21°56.3	Achernar	335°24.5	-57°08.7					
5	37°48.7	290°45.6	21°37.7	259°08.3	17°10.1	199°53.9	-6°21.5	137°12.6	-21°56.3	Hamal	327°57.5	23°32.6					
6	52°51.2	305°44.9	21°37.5	274°09.2	17°09.6	214°56.0	-6°21.7	152°15.2	-21°56.3	Polaris	316°26.2	89°19.9					
7	67°53.6	320°44.2	21°37.3	289°10.1	17°09.2	229°58.1	-6°21.8	167°17.7	-21°56.3	Akamar	315°16.2	-40°13.9					
8	82°56.1	335°43.5	21°37.1	304°10.9	17°08.7	245°00.2	-6°22.0	182°20.2	-21°56.3	Menkar	314°12.1	4°09.4					
9	97°58.6	350°42.8	21°36.9	319°11.8	17°08.2	260°02.3	-6°22.1	197°22.7	-21°56.3	Mirfak	308°36.3	49°55.0					
10	113°01.0	5°42.1	21°36.7	334°12.7	17°07.7	275°04.4	-6°22.3	212°25.2	-21°56.3	Aldebaran	290°46.3	16°32.5					
11	128°03.5	20°41.4	21°36.5	349°13.5	17°07.3	290°06.5	-6°22.5	227°27.7	-21°56.3	Rigel	281°09.5	-8°10.9					
12	143°05.9	35°40.7	21°36.3	4°14.4	17°06.8	305°08.6	-6°22.6	242°30.2	-21°56.3	Capella	280°30.5	46°00.7					
13	158°08.4	50°40.0	21°36.0	19°15.3	17°06.3	320°10.7	-6°22.8	257°32.7	-21°56.3	Bellatrix	278°29.1	6°21.8					
14	173°10.9	65°39.3	21°35.8	34°16.1	17°05.8	335°12.8	-6°22.9	272°35.3	-21°56.3	Elnath	278°09.2	28°37.1					
15	188°13.3	80°38.6	21°35.6	49°17.0	17°05.4	350°14.9	-6°23.1	287°37.8	-21°56.3	Alnilam	275°43.7	-1°11.5					
16	203°15.8	95°38.0	21°35.4	64°17.9	17°04.9	5°17.0	-6°23.2	302°40.3	-21°56.3	Betelgeuse	270°58.5	7°24.5					
17	218°18.3	110°37.3	21°35.2	79°18.7	17°04.4	20°19.0	-6°23.4	317°42.8	-21°56.3	Canopus	263°55.3	-52°42.2					
18	233°20.7	125°36.6	21°34.9	94°19.6	17°03.9	35°21.1	-6°23.6	332°45.3	-21°56.3	Sirius	258°31.4	-16°44.2					
19	248°23.2	140°35.9	21°34.7	109°20.5	17°03.5	50°23.2	-6°23.7	347°47.8	-21°56.4	Adara	255°10.6	-28°59.7					
20	263°25.7	155°35.2	21°34.5	124°21.4	17°03.0	65°25.3	-6°23.9	2°50.3	-21°56.4	Procyon	244°57.0	5°10.9					
21	278°28.1	170°34.5	21°34.3	139°22.2	17°02.5	80°27.4	-6°24.0	17°52.8	-21°56.4	Pollux	243°24.5	27°58.9					
22	293°30.6	185°33.8	21°34.1	154°23.1	17°02.0	95°29.5	-6°24.2	32°55.3	-21°56.4	Avior	234°17.4	-59°33.9					
23	308°33.0	200°33.1	21°33.8	169°24.0	17°01.6	110°31.6	-6°24.4	47°57.9	-21°56.4	Suhail	222°50.8	-43°30.2					
Mer.pass.:2:29:			v-0.7 d-0.2 m-3.9	v0.9 d-0.5 m1.7	v2.1 d-0.2 m-1.7	v2.5 d-0.0 m0.3							Miaplacidus	221°39.9	-69°47.4		
													Alphard	217°53.6	-8°44.1		
													Regulus	207°40.8	11°52.9		
													Dubhe	193°49.0	61°39.5		
													Denebola	182°31.0	14°28.6		
													Gienah	175°49.6	-17°38.3		
													Acrux	173°06.5	-63°11.9		
													Gacrux	171°58.1	-57°12.8		
													Alioth	166°18.7	55°52.2		
													Spica	158°28.4	-11°15.0		
													Alcaid	152°56.9	49°14.0		
													Hadar	148°44.0	-60°27.5		
													Menkent	148°04.4	-36°27.3		
													Arcturus	145°53.1	19°06.1		
													Rigel Kent.	139°47.9	-60°54.5		
													Zubenelg.	137°02.3	-16°06.7		
													Kochab	137°20.4	74°05.5		
													Alphecca	126°08.6	26°39.8		
													Antares	112°22.7	-26°28.1		
													Atria	107°21.7	-69°03.6		
													Sabik	102°09.1	-15°44.6		
													Shaula	96°17.9	-37°06.8		
													Rasalhague	96°03.7	12°33.2		
													Etamin	90°44.5	51°29.6		
													Kaus Aust.	83°39.8	-34°22.4		
													Vega	80°36.8	38°48.4		
													Nunki	75°54.6	-26°16.3		
													Altair	62°05.3	8°55.1		
													Peacock	53°14.3	-56°40.6		
													Deneb	49°29.1	45°20.8		
													Enif	33°44.0	9°57.5		
													Alnair	27°39.8	-46°52.3		
													Fomalhaut	15°20.6	-29°31.6		
													Scheat	13°50.3	28°10.7		
													Markab	13°35.2	15°18.1		
													2017/8/1	SHA	Mer.pass		
													Venus	253°12.6	09:37		
													Mars	221°27.6	11:43		
													Jupiter	162°07.0	15:39		
													Saturn	99°23.7	19:49		
													2017/8/1	SHA	Mer.pass		
													Venus	251°56.9	09:38		
													Mars	220°49.3	11:42		
													Jupiter	161°58.2	15:36		
													Saturn	99°24.8	19:45		
													2017/8/1	SHA	Mer.pass		
													Venus	250°41.2	09:39		
													Mars	220°11.1	11:40		
													Jupiter	161°49.3	15:32		
													Saturn	99°25.9	19:41		
													Horizontal paralax				
													Venus:	0.1			
													Mars:	0.1			
Mer.pass.:2:21:			v-0.7 d-0.3 m-3.9	v0.9 d-0.5 m1.7	v2.1 d-0.2 m-1.6	v2.5 d-0.0 m0.3											

h	Sun			Moon				Twilight							
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	178°49.2	14°21.8	285°36.9	10.0	9°16.3	10.2	58.6	72	--	--	02:25	21:38	--	--	
1	193°49.3	14°21.1	300°05.8	9.9	9°26.5	10.1	58.6	70	--	--	02:57	21:08	--	--	
2	208°49.5	14°20.3	314°34.7	9.8	9°36.6	10.1	58.6	68	--	01:45	03:20	20:46	22:18	--	
3	223°49.6	14°19.5	329°03.5	9.8	9°46.6	10.0	58.6	66	--	02:22	03:38	20:28	21:43	--	
4	238°49.7	14°18.8	343°32.3	9.7	9°56.6	10.0	58.7	64	--	02:48	03:52	20:14	21:18	--	
5	253°49.8	14°18.0	358°01.0	9.7	10°06.6	9.9	58.7	62	01:33	03:07	04:04	20:03	20:59	22:30	
6	268°49.9	14°17.2	12°29.6	9.6	10°16.5	9.9	58.7	60	02:07	03:23	04:15	19:53	20:44	21:58	
7	283°50.0	14°16.4	26°58.2	9.6	10°26.3	9.8	58.7	58	02:30	03:36	04:23	19:44	20:31	21:35	
8	298°50.2	14°15.7	41°26.8	9.5	10°36.1	9.8	58.7	56	02:49	03:48	04:31	19:36	20:20	21:17	
9	313°50.3	14°14.9	55°55.3	9.5	10°45.9	9.7	58.8	54	03:04	03:57	04:38	19:30	20:10	21:03	
10	328°50.4	14°14.1	70°23.7	9.4	10°55.5	9.7	58.8	52	03:17	04:06	04:44	19:24	20:01	20:50	
11	343°50.5	14°13.3	84°52.1	9.3	11°05.2	9.6	58.8	50	03:28	04:14	04:50	19:18	19:54	20:39	
12	358°50.6	14°12.6	99°20.4	9.3	11°14.7	9.5	58.8	45	03:50	04:30	05:02	19:06	19:38	20:17	
13	13°50.8	14°11.8	113°48.6	9.2	11°24.3	9.5	58.8	40	04:07	04:43	05:12	18:57	19:25	20:01	
14	28°50.9	14°11.0	128°16.8	9.2	11°33.7	9.4	58.8	35	04:21	04:53	05:20	18:48	19:15	19:47	
15	43°51.0	14°10.2	142°45.0	9.1	11°43.1	9.4	58.9	30	04:32	05:02	05:27	18:41	19:06	19:36	
16	58°51.1	14°09.5	157°13.1	9.0	11°52.4	9.3	58.9	20	04:50	05:17	05:40	18:29	18:51	19:18	
17	73°51.2	14°08.7	171°41.1	9.0	12°01.7	9.2	58.9	10	05:04	05:29	05:51	18:18	18:39	19:05	
18	88°51.4	14°07.9	186°09.0	8.9	12°10.9	9.2	58.9	0	05:15	05:40	06:01	18:08	18:29	18:54	
19	103°51.5	14°07.1	200°36.9	8.9	12°20.0	9.1	58.9	-10	05:24	05:49	06:11	17:58	18:19	18:44	
20	118°51.6	14°06.4	215°04.8	8.8	12°29.1	9.0	59.0	-20	05:33	05:59	06:22	17:47	18:10	18:36	
21	133°51.7	14°05.6	229°32.5	8.7	12°38.1	9.0	59.0	-30	05:41	06:09	06:34	17:36	18:00	18:29	
22	148°51.8	14°04.8	244°00.3	8.7	12°47.0	8.9	59.0	-35	05:44	06:14	06:40	17:29	17:55	18:25	
23	163°52.0	14°04.0	258°27.9	8.6	12°55.9	8.8	59.0	-40	05:48	06:20	06:48	17:21	17:49	18:21	
SD.=15.8			d=-0.8	S.D.=16.0				-45	05:52	06:27	06:57	17:12	17:43	18:17	
SD.=15.8			d=-0.8	S.D.=16.1				-50	05:56	06:34	07:08	17:02	17:35	18:14	
SD.=15.8			d=-0.8	S.D.=16.1				-52	05:58	06:37	07:13	16:57	17:32	18:12	
SD.=15.8			d=-0.8	S.D.=16.1				-54	05:59	06:41	07:18	16:51	17:29	18:10	
SD.=15.8			d=-0.8	S.D.=16.1				-56	06:01	06:45	07:24	16:45	17:25	18:09	
SD.=15.8			d=-0.8	S.D.=16.1				-58	06:03	06:49	07:31	16:38	17:20	18:07	
SD.=15.8			d=-0.8	S.D.=16.1				-60	06:05	06:54	07:39	16:31	17:16	18:05	

Tue	GHA	Dec	GHA	ν	Dec	d	HP	Moonrise			Moonset				
0	178°52.1	14°03.2	272°55.5	8.6	13°04.6	8.7	59.0	Lat.	Mon	Tue	Wed	Mon	Tue	Wed	
0	178°52.1	14°03.2	272°55.5	8.6	13°04.6	8.7	59.0	72	20:50	20:36	19:53	14:01	16:09	18:50	
1	193°52.2	14°02.5	287°23.0	8.5	13°13.4	8.7	59.0	70	21:12	21:13	21:18	13:40	15:33	17:26	
2	208°52.3	14°01.7	301°50.5	8.4	13°22.0	8.6	59.1	68	21:29	21:39	21:57	13:24	15:07	16:48	
3	223°52.5	14°00.9	316°17.9	8.4	13°30.6	8.5	59.1	66	21:43	21:59	22:25	13:12	14:48	16:21	
4	238°52.6	14°00.1	330°45.3	8.3	13°39.0	8.4	59.1	64	21:55	22:15	22:46	13:01	14:32	16:00	
5	253°52.7	13°59.3	345°12.6	8.3	13°47.4	8.4	59.1	62	22:04	22:29	23:03	12:52	14:20	15:43	
6	268°52.8	13°58.6	359°39.8	8.2	13°55.8	8.3	59.1	60	22:13	22:40	23:17	12:44	14:09	15:30	
7	283°53.0	13°57.8	14°06.9	8.1	14°04.0	8.2	59.1	58	22:20	22:50	23:29	12:38	13:59	15:18	
8	298°53.1	13°57.0	28°34.0	8.1	14°12.2	8.1	59.2	56	22:27	22:59	23:40	12:32	13:51	15:07	
9	313°53.2	13°56.2	43°01.1	8.0	14°20.3	8.0	59.2	54	22:33	23:07	23:49	12:26	13:44	14:58	
10	328°53.3	13°55.4	57°28.1	7.9	14°28.3	8.0	59.2	52	22:38	23:14	23:57	12:22	13:37	14:50	
11	343°53.5	13°54.6	71°55.0	7.9	14°36.2	7.9	59.2	50	22:43	23:20	--	12:17	13:31	14:43	
12	358°53.6	13°53.9	86°21.8	7.8	14°44.0	7.8	59.2	45	22:54	23:34	--	12:08	13:18	14:28	
13	13°53.7	13°53.1	100°48.6	7.8	14°51.8	7.7	59.2	40	23:03	23:45	--	12:00	13:08	14:15	
14	28°53.8	13°52.3	115°15.3	7.7	14°59.4	7.6	59.3	35	23:10	23:55	--	11:54	12:59	14:04	
15	43°54.0	13°51.5	129°42.0	7.6	15°07.0	7.5	59.3	30	23:17	--	00:04	11:48	12:51	13:55	
16	58°54.1	13°50.7	144°08.6	7.6	15°14.5	7.4	59.3	20	23:29	--	00:18	11:38	12:37	13:38	
17	73°54.2	13°49.9	158°35.1	7.5	15°21.9	7.3	59.3	10	23:39	--	00:31	11:29	12:26	13:24	
18	88°54.3	13°49.1	173°01.6	7.4	15°29.2	7.3	59.3	0	23:48	--	00:44	11:21	12:14	13:11	
19	103°54.5	13°48.4	187°28.0	7.4	15°36.4	7.2	59.3	-10	23:58	--	00:56	11:12	12:03	12:58	
20	118°54.6	13°47.6	201°54.4	7.3	15°43.5	7.1	59.3	-20	--	00:09	01:09	11:04	11:52	12:43	
21	133°54.7	13°46.8	216°20.7	7.3	15°50.5	7.0	59.4	-30	--	00:21	01:24	10:54	11:38	12:27	
22	148°54.8	13°46.0	230°46.9	7.2	15°57.4	6.9	59.4	-35	--	00:28	01:33	10:48	11:30	12:18	
23	163°55.0	13°45.2	245°13.1	7.1	16°04.2	6.8	59.4	-40	--	00:36	01:43	10:41	11:22	12:07	
SD.=15.8			d=-0.8	S.D.=16.1				-45	--	00:45	01:55	10:34	11:11	11:55	
SD.=15.8			d=-0.8	S.D.=16.1				-50	--	00:56	02:10	10:25	10:59	11:39	
SD.=15.8			d=-0.8	S.D.=16.1				-52	--	01:02	02:16	10:21	10:53	11:32	
SD.=15.8			d=-0.8	S.D.=16.1				-54	--	01:07	02:24	10:16	10:47	11:24	
SD.=15.8			d=-0.8	S.D.=16.1				-56	--	01:14	02:32	10:11	10:40	11:16	
SD.=15.8			d=-0.8	S.D.=16.1				-58	--	01:21	02:42	10:05	10:32	11:06	
SD.=15.8			d=-0.8	S.D.=16.1				-60	00:05	01:29	02:53	09:59	10:23	10:54	

Day	Sun		Moon			
	Eqn.of Time	Mer.	Mer.Pass.	Age		
	00 ^h	Pass	Upper	Lower		
14	04:43	04:37	12:04	05:08	17:34	22(56%)
15	04:32	04:26	12:04	06:01	18:28	23(45%)
16	04:20	04:13	12:04	06:57	19:26	24(34%)

August 17, 18 ,19 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	325°33.8	214°59.2	21°21.5	185°06.8	16°38.0	127°14.1	-6°32.2	65°00.6	-21°56.6	Alpheratz	357°40.3	29°11.2
1	340°36.3	229°58.5	21°21.3	200°07.6	16°37.5	142°16.2	-6°32.3	80°03.1	-21°56.6	Ankaa	353°12.6	-42°12.5
2	355°38.7	244°57.8	21°21.0	215°08.5	16°37.0	157°18.3	-6°32.5	95°05.6	-21°56.6	Schedar	349°36.8	56°37.8
3	10°41.2	259°57.2	21°20.7	230°09.4	16°36.5	172°20.3	-6°32.6	110°08.1	-21°56.6	Diphda	348°52.7	-17°53.3
4	25°43.6	274°56.5	21°20.4	245°10.3	16°36.0	187°22.4	-6°32.8	125°10.6	-21°56.6	Achernar	335°24.5	-57°08.7
5	40°46.1	289°55.8	21°20.1	260°11.1	16°35.5	202°24.5	-6°33.0	140°13.1	-21°56.7	Hamal	327°57.4	23°32.6
6	55°48.6	304°55.1	21°19.9	275°12.0	16°35.1	217°26.6	-6°33.1	155°15.6	-21°56.7	Polaris	316°24.6	89°19.9
7	70°51.0	319°54.4	21°19.6	290°12.9	16°34.6	232°28.7	-6°33.3	170°18.1	-21°56.7	Akamar	315°16.2	-40°13.9
8	85°53.5	334°53.7	21°19.3	305°13.8	16°34.1	247°30.8	-6°33.4	185°20.6	-21°56.7	Menkar	314°12.0	4°09.4
9	100°56.0	349°53.0	21°19.0	320°14.6	16°33.6	262°32.9	-6°33.6	200°23.1	-21°56.7	Mirfak	308°36.2	49°55.0
10	115°58.4	4°52.3	21°18.7	335°15.5	16°33.1	277°34.9	-6°33.8	215°25.6	-21°56.7	Aldebaran	290°46.2	16°32.5
11	131°00.9	19°51.6	21°18.4	350°16.4	16°32.6	292°37.0	-6°33.9	230°28.1	-21°56.7	Rigel	281°09.5	-8°10.9
12	146°03.4	34°50.9	21°18.1	5°17.3	16°32.1	307°39.1	-6°34.1	245°30.6	-21°56.7	Capella	280°30.5	46°00.7
13	161°05.8	49°50.3	21°17.8	20°18.2	16°31.6	322°41.2	-6°34.2	260°33.1	-21°56.7	Bellatrix	278°29.1	6°21.8
14	176°08.3	64°49.6	21°17.6	35°19.0	16°31.2	337°43.3	-6°34.4	275°35.6	-21°56.7	Elnath	278°09.2	28°37.1
15	191°10.8	79°48.9	21°17.3	50°19.9	16°30.7	352°45.4	-6°34.6	290°38.1	-21°56.7	Alnilam	275°43.7	-1°11.5
16	206°13.2	94°48.2	21°17.0	65°20.8	16°30.2	7°47.5	-6°34.7	305°40.6	-21°56.7	Betelgeuse	270°58.4	7°24.5
17	221°15.7	109°47.5	21°16.7	80°21.7	16°29.7	22°49.5	-6°34.9	320°43.1	-21°56.7	Canopus	263°55.2	-52°42.2
18	236°18.1	124°46.8	21°16.4	95°22.6	16°29.2	37°51.6	-6°35.1	335°45.6	-21°56.7	Sirius	258°31.4	-16°44.2
19	251°20.6	139°46.1	21°16.1	110°23.4	16°28.7	52°53.7	-6°35.2	350°48.1	-21°56.7	Adara	255°10.6	-28°59.7
20	266°23.1	154°45.4	21°15.8	125°24.3	16°28.2	67°55.8	-6°35.4	5°50.6	-21°56.7	Procyon	244°57.0	5°10.9
21	281°25.5	169°44.7	21°15.5	140°25.2	16°27.7	82°57.9	-6°35.5	20°53.1	-21°56.7	Pollux	243°24.5	27°58.9
22	296°28.0	184°44.0	21°15.2	155°26.1	16°27.2	97°60.0	-6°35.7	35°55.6	-21°56.7	Avior	234°17.4	-59°33.9
23	311°30.5	199°43.4	21°14.9	170°27.0	16°26.7	113°02.0	-6°35.9	50°58.1	-21°56.8	Suhail	222°50.8	-43°30.2
Mer.pass.:2:17:		v-0.7 d-0.3 m-3.9		v0.9 d-0.5 m1.7		v2.1 d-0.2 m-1.6		v2.5 d-0.0 m0.3		Miaplacidus	221°39.9	-69°47.4
										Alphard	217°53.6	-8°44.1
										Regulus	207°40.8	11°52.9
										Dubhe	193°49.0	61°39.5
										Denebola	182°31.0	14°28.6
										Gienah	175°49.6	-17°38.3
										Acrux	173°06.6	-63°11.9
										Gacrux	171°58.1	-57°12.8
										Alioth	166°18.7	55°52.2
										Spica	158°28.4	-11°15.0
										Alcaid	152°56.9	49°13.9
										Hadar	148°44.0	-60°27.5
										Menkent	148°04.4	-36°27.3
										Arcturus	145°53.1	19°06.1
										Rigel Kent.	139°47.9	-60°54.5
										Zubenelg.	137°02.3	-16°06.7
										Kochab	137°20.5	74°05.5
										Alphecca	126°08.7	26°39.8
										Antares	112°22.7	-26°28.1
										Atria	107°21.7	-69°03.6
										Sabik	102°09.2	-15°44.6
										Shaula	96°17.9	-37°06.8
										Rasalhague	96°03.7	12°33.2
										Etamin	90°44.5	51°29.6
										Kaus Aust.	83°39.8	-34°22.4
										Vega	80°36.8	38°48.4
										Nunki	75°54.6	-26°16.3
										Altair	62°05.3	8°55.1
										Peacock	53°14.3	-56°40.6
										Deneb	49°29.1	45°20.8
										Enif	33°44.0	9°57.5
										Alnair	27°39.8	-46°52.4
										Fomalhaut	15°20.6	-29°31.6
										Scheat	13°50.3	28°10.7
										Markab	13°35.2	15°18.1
										2017/8/1	SHA	Mer.pass
										Venus	249°25.4	09:40
										Mars	219°33.0	11:39
										Jupiter	161°40.3	15:29
										Saturn	99°26.8	19:37
										2017/8/1	SHA	Mer.pass
										Venus	248°09.7	09:42
										Mars	218°54.9	11:37
										Jupiter	161°31.2	15:26
										Saturn	99°27.7	19:33
										2017/8/1	SHA	Mer.pass
										Venus	246°54.1	09:43
										Mars	218°16.9	11:36
										Jupiter	161°22.0	15:22
										Saturn	99°28.4	19:29
										Horizontal parallax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:2:09:		v-0.7 d-0.3 m-3.9		v0.9 d-0.5 m1.7		v2.1 d-0.2 m-1.6		v2.5 d-0.0 m0.3				

Sun								Moon							
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	178°58.2	13°25.4	245°49.3	5.8	18°20.1	4.0	59.7	72	---	---	02:45	21:17	---	---	
1	193°58.3	13°24.6	260°14.1	5.8	18°24.1	3.9	59.7	70	---	01:15	03:12	20:52	22:42	---	
2	208°58.5	13°23.8	274°38.8	5.7	18°27.9	3.8	59.7	68	---	02:06	03:33	20:32	21:56	---	
3	223°58.6	13°23.0	289°03.5	5.7	18°31.6	3.6	59.7	66	---	02:37	03:48	20:17	21:27	---	
4	238°58.7	13°22.2	303°28.2	5.7	18°35.1	3.5	59.7	64	01:06	02:60	04:01	20:04	21:05	22:52	
5	253°58.9	13°21.4	317°52.8	5.6	18°38.6	3.4	59.7	62	01:52	03:17	04:12	19:53	20:48	22:11	
6	268°59.0	13°20.6	332°17.4	5.6	18°41.9	3.3	59.7	60	02:20	03:32	04:22	19:44	20:34	21:44	
7	283°59.2	13°19.8	346°42.0	5.5	18°45.1	3.1	59.8	58	02:41	03:44	04:30	19:36	20:22	21:24	
8	298°59.3	13°19.0	1°06.5	5.5	18°48.2	3.0	59.8	56	02:58	03:54	04:37	19:29	20:12	21:07	
9	313°59.4	13°18.2	15°31.0	5.5	18°51.1	2.9	59.8	54	03:12	04:03	04:43	19:23	20:03	20:54	
10	328°59.6	13°17.4	29°55.4	5.4	18°53.9	2.8	59.8	52	03:24	04:12	04:49	19:17	19:55	20:42	
11	343°59.7	13°16.6	44°19.8	5.4	18°56.6	2.6	59.8	50	03:34	04:19	04:54	19:12	19:48	20:32	
12	358°59.8	13°15.8	58°44.2	5.4	18°59.2	2.5	59.8	45	03:55	04:34	05:05	19:01	19:33	20:12	
13	13°60.0	13°15.0	73°08.6	5.3	19°01.6	2.4	59.8	40	04:11	04:46	05:15	18:52	19:21	19:56	
14	29°00.1	13°14.2	87°32.9	5.3	19°03.9	2.2	59.8	35	04:24	04:56	05:22	18:45	19:11	19:43	
15	44°00.2	13°13.4	101°57.2	5.3	19°06.1	2.1	59.8	30	04:35	05:04	05:29	18:38	19:03	19:32	
16	59°00.4	13°12.6	116°21.5	5.3	19°08.1	2.0	59.8	20	04:51	05:18	05:41	18:26	18:49	19:16	
17	74°00.5	13°11.7	130°45.7	5.2	19°10.0	1.8	59.8	10	05:04	05:29	05:51	18:16	18:38	19:03	
18	89°00.6	13°10.9	145°09.9	5.2	19°11.8	1.7	59.8	0	05:15	05:39	06:00	18:07	18:28	18:53	
19	104°00.8	13°10.1	159°34.1	5.2	19°13.5	1.6	59.8	-10	05:23	05:48	06:10	17:58	18:19	18:44	
20	119°00.9	13°09.3	173°58.3	5.2	19°15.0	1.4	59.8	-20	05:31	05:57	06:20	17:48	18:11	18:37	
21	134°01.1	13°08.5	188°22.5	5.1	19°16.4	1.3	59.8	-30	05:38	06:06	06:31	17:37	18:02	18:30	
22	149°01.2	13°07.7	202°46.6	5.1	19°17.6	1.2	59.9	-35	05:41	06:11	06:37	17:31	17:57	18:27	
23	164°01.3	13°06.9	217°10.7	5.1	19°18.7	1.0	59.9	-40	05:44	06:16	06:44	17:24	17:52	18:24	
	SD.=15.8	d=-0.8			S.D.=16.3			-45	05:48	06:22	06:52	17:16	17:46	18:21	
								-50	05:51	06:29	07:02	17:06	17:40	18:17	
								-52	05:52	06:32	07:07	17:01	17:37	18:16	
								-54	05:54	06:35	07:12	16:56	17:33	18:15	
								-56	05:55	06:39	07:17	16:51	17:30	18:14	
								-58	05:56	06:42	07:24	16:45	17:26	18:12	
								-60	05:58	06:47	07:31	16:38	17:22	18:11	
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Moonrise			Moonset				
								Lat.	Thu	Fri	Sat	Thu	Fri	Sat	
0	179°01.5	13°06.1	231°34.8	5.1	19°19.7	0.9	59.9	72	---	---	23:27	---	---	21:31	
1	194°01.6	13°05.3	245°58.9	5.1	19°20.6	0.8	59.9	70	21:39	22:46	---	19:09	20:07	20:24	
2	209°01.7	13°04.5	260°23.0	5.1	19°21.3	0.6	59.9	68	22:33	23:38	---	18:15	19:15	19:47	
3	224°01.9	13°03.7	274°47.0	5.1	19°21.9	0.5	59.9	66	23:06	---	00:11	17:42	18:42	19:21	
4	239°02.0	13°02.9	289°11.1	5.0	19°22.3	0.4	59.9	64	23:31	---	00:35	17:17	18:18	19:01	
5	254°02.2	13°02.1	303°35.1	5.0	19°22.6	0.2	59.9	62	23:50	---	00:54	16:58	17:59	18:44	
6	269°02.3	13°01.3	317°59.2	5.0	19°22.8	0.1	59.9	60	---	00:06	01:09	16:43	17:43	18:30	
7	284°02.4	13°00.5	332°23.2	5.0	19°22.9	-0.0	59.9	58	---	00:19	01:22	16:29	17:30	18:18	
8	299°02.6	12°59.6	346°47.2	5.0	19°22.8	-0.2	59.9	56	---	00:31	01:34	16:18	17:19	18:08	
9	314°02.7	12°58.8	1°11.2	5.0	19°22.5	-0.3	59.9	54	---	00:41	01:44	16:08	17:08	17:59	
10	329°02.9	12°58.0	15°35.3	5.0	19°22.2	-0.4	59.9	52	---	00:50	01:52	15:59	16:60	17:51	
11	344°03.0	12°57.2	29°59.3	5.0	19°21.7	-0.6	59.9	50	00:05	00:58	02:00	15:51	16:51	17:43	
12	359°03.1	12°56.4	44°23.3	5.0	19°21.1	-0.7	59.9	45	00:21	01:15	02:17	15:34	16:34	17:28	
13	14°03.3	12°55.6	58°47.3	5.0	19°20.3	-0.8	59.9	40	00:34	01:30	02:31	15:20	16:20	17:15	
14	29°03.4	12°54.8	73°11.3	5.0	19°19.4	-1.0	59.9	35	00:45	01:42	02:43	15:08	16:08	17:04	
15	44°03.6	12°54.0	87°35.4	5.0	19°18.4	-1.1	59.9	30	00:55	01:52	02:53	14:57	15:58	16:54	
16	59°03.7	12°53.2	101°59.4	5.0	19°17.2	-1.2	59.9	20	01:12	02:10	03:11	14:40	15:40	16:37	
17	74°03.8	12°52.3	116°23.5	5.0	19°15.9	-1.4	59.9	10	01:27	02:26	03:26	14:24	15:24	16:23	
18	89°04.0	12°51.5	130°47.5	5.1	19°14.5	-1.5	59.9	0	01:41	02:41	03:41	14:10	15:09	16:09	
19	104°04.1	12°50.7	145°11.6	5.1	19°12.9	-1.6	59.9	-10	01:55	02:56	03:55	13:55	14:55	15:55	
20	119°04.3	12°49.9	159°35.6	5.1	19°11.2	-1.8	59.9	-20	02:10	03:11	04:10	13:39	14:39	15:40	
21	134°04.4	12°49.1	173°59.7	5.1	19°09.4	-1.9	59.9	-30	02:28	03:30	04:28	13:22	14:21	15:23	
22	149°04.5	12°48.3	188°23.8	5.1	19°07.4	-2.0	59.9	-35	02:38	03:40	04:38	13:11	14:10	15:13	
23	164°04.7	12°47.5	202°48.0	5.1	19°05.3	-2.2	59.9	-40	02:50	03:53	04:50	12:59	13:58	15:02	
	SD.=15.8	d=-0.8			S.D.=16.3			-45	03:03	04:07	05:04	12:45	13:43	14:48	
								-50	03:20	04:24	05:21	12:28	13:26	14:32	
								-52	03:28	04:33	05:29	12:20	13:18	14:24	
								-54	03:37	04:42	05:38	12:11	13:08	14:16	
								-56	03:46	04:52	05:48	12:01	12:58	14:06	
								-58	03:58	05:04	05:59	11:50	12:46	13:55	
								-60	04:11	05:18	06:12	11:36	12:32	13:42	
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Sun			Moon				
								Day	Eqn. of Time 00 ^h 12 ^h	Mer. Pass	Mer. Pass. Upper Lower	Age			
0	179°04.8	12°46.6	217°12.1	5.1	19°03.1	-2.3	59.9	17	04:07	04:01	12:04	07:55	20:25	25(23%)	
1	194°05.0	12°45.8	231°36.3	5.2	19°00.7	-2.4	59.9	18	03:54	03:47	12:03	08:55	21:25	26(14%)	
2	209°05.1	12°45.0	246°00.4	5.2	18°58.2	-2.6	59.9	19	03:41	03:34	12:03	09:54	22:24	27(7%)	
3	224°05.3	12°44.2	260°24.6	5.2	18°55.6	-2.7	59.9								
4	239°05.4	12°43.4	274°48.9	5.2	18°52.8	-2.8	59.9								
5	254°05.5	12°42.6	289°13.1	5.3	18°50.0	-2.9	59.8								
6	269°05.7	12°41.7	303°37.4	5.3	18°46.9	-3.1	59.8								
7	284°05.8	12°40.9	318°01.7	5.3	18°43.8	-3.2	59.8								
8	299°06.0	12°40.1	332°26.0	5.3	18°40.5	-3.3	59.8								
9	314°06.1	12°39.3	346°50.4	5.4	18°37.1	-3.5	59.8								
10	329°06.3	12°38.5	1°14.8	5.4	18°33.6	-3.6	59.8								
11	344°06.4	12°37.6	15°39.2	5.4	18°29.9	-3.7	59.8								
12	359°06.6	12°36.8	30°03.7	5.5	18°26.2	-3.8	59.8								
13	14°06.7	12°36.0	44°28.2	5.5	18°22.3	-4.0	59.8								
14	29°06.9	12°35.2	58°52.7	5.6	18°18.2	-4.1	59.8								
15	44°07.0	12°34.4	73°17.3	5.6	18°14.1	-4.2	59.8								
16	59°07.1	12°33.5	87°41.9	5.6	18°09.8	-4.3	59.8								
17	74°07.3	12°32.7	102°06.5	5.7	18°05.4	-4.5	59.8								
18	89°07.4	12°31.9	116°31.2	5.7	18°00.9	-4.6	59.8								
19	104°07.6	12°31.1	130°56.0	5.8	17°56.3	-4.7	59.7								
20	119°07.7	12°30.3	145°20.7	5.8	17°51.5	-4.8	59.7								
21	134°07.9	12°29.4	159°45.6	5.8	17°46.6	-4.9	59.7								
22	149°08.0	12°28.6	174°10.4	5.9	17°41.6	-5.1	59.7								
23	164°08.2	12°27.8	188°35.3	5.9	17°36.5	-5.2	59.7								
	SD.=15.8	d=-0.8			S.D.=16.3										

August 20, 21 ,22 (Sun., Mon., Tue.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sun	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	328°31.2	214°09.6	20°58.9	186°10.3	16°02.5	129°43.9	-6°43.9	68°00.3	-21°57.0				Alpheratz	357°40.2	29°11.2		
1	343°33.7	229°09.0	20°58.6	201°11.2	16°02.0	144°46.0	-6°44.0	83°02.8	-21°57.1				Ankaa	353°12.6	-42°12.5		
2	358°36.1	244°08.3	20°58.2	216°12.0	16°01.5	159°48.1	-6°44.2	98°05.3	-21°57.1				Schedar	349°36.8	56°37.8		
3	13°38.6	259°07.6	20°57.9	231°12.9	16°01.0	174°50.2	-6°44.3	113°07.7	-21°57.1				Diphda	348°52.7	-17°53.3		
4	28°41.1	274°06.9	20°57.5	246°13.8	16°00.5	189°52.2	-6°44.5	128°10.2	-21°57.1				Achernar	335°24.4	-57°08.7		
5	43°43.5	289°06.2	20°57.2	261°14.7	16°00.0	204°54.3	-6°44.7	143°12.7	-21°57.1				Hamal	327°57.4	23°32.6		
6	58°46.0	304°05.5	20°56.8	276°15.6	15°59.5	219°56.4	-6°44.8	158°15.2	-21°57.1				Polaris	316°23.1	89°19.9		
7	73°48.5	319°04.8	20°56.5	291°16.5	15°59.0	234°58.5	-6°45.0	173°17.7	-21°57.1				Akamar	315°16.1	-40°13.9		
8	88°50.9	334°04.2	20°56.1	306°17.4	15°58.5	250°00.5	-6°45.2	188°20.2	-21°57.1				Menkar	314°12.0	4°09.5		
9	103°53.4	349°03.5	20°55.7	321°18.3	15°58.0	265°02.6	-6°45.3	203°22.7	-21°57.1				Mirfak	308°36.2	49°55.1		
10	118°55.9	4°02.8	20°55.4	336°19.2	15°57.5	280°04.7	-6°45.5	218°25.2	-21°57.1				Aldebaran	290°46.2	16°32.5		
11	133°58.3	19°02.1	20°55.0	351°20.0	15°57.0	295°06.8	-6°45.7	233°27.6	-21°57.1				Rigel	281°09.4	-8°10.9		
12	149°00.8	34°01.4	20°54.7	6°20.9	15°56.5	310°08.8	-6°45.8	248°30.1	-21°57.1				Capella	280°30.4	46°00.7		
13	164°03.2	49°00.7	20°54.3	21°21.8	15°56.0	325°10.9	-6°46.0	263°32.6	-21°57.1				Bellatrix	278°29.1	6°21.8		
14	179°05.7	64°00.0	20°53.9	36°22.7	15°55.5	340°13.0	-6°46.2	278°35.1	-21°57.1				Elnath	278°09.2	28°37.1		
15	194°08.2	79°59.4	20°53.6	51°23.6	15°55.0	355°15.1	-6°46.3	293°37.6	-21°57.1				Alnilam	275°43.6	-1°11.5		
16	209°10.6	95°58.7	20°53.2	66°24.5	15°54.5	10°17.1	-6°46.5	308°40.1	-21°57.2				Betelgeuse	270°58.4	7°24.5		
17	224°13.1	111°58.0	20°52.8	81°25.4	15°54.0	25°19.2	-6°46.7	323°42.6	-21°57.2				Canopus	263°55.2	-52°42.2		
18	239°15.6	127°57.3	20°52.5	96°26.3	15°53.5	40°21.3	-6°46.8	338°45.0	-21°57.2				Sirius	258°31.4	-16°44.2		
19	254°18.0	143°56.6	20°52.1	111°27.2	15°53.0	55°23.4	-6°47.0	353°47.5	-21°57.2				Adara	255°10.6	-28°59.7		
20	269°20.5	159°55.9	20°51.7	126°28.0	15°52.5	70°25.4	-6°47.2	8°50.0	-21°57.2				Procyon	244°57.0	5°10.9		
21	284°23.0	175°55.3	20°51.4	141°28.9	15°52.0	85°27.5	-6°47.3	23°52.5	-21°57.2				Pollux	243°24.5	27°58.9		
22	299°25.4	191°54.6	20°51.0	156°29.8	15°51.5	100°29.6	-6°47.5	38°55.0	-21°57.2				Avior	234°17.4	-59°33.9		
23	314°27.9	198°53.9	20°50.6	171°30.7	15°51.0	115°31.6	-6°47.6	53°57.5	-21°57.2				Suhail	222°50.8	-43°30.2		
Mer.pass.:2:05:			v-0.7 d-0.4 m-3.9			v0.9 d-0.5 m1.7			v2.1 d-0.2 m-1.6			v2.5 d-0.0 m0.4			Miaplacidus 221°39.9 -69°47.3		
Alphard 217°53.6 -8°44.1			Regulus 207°40.8 11°52.9			Dubhe 193°49.0 61°39.5			Denebola 182°31.0 14°28.6			Gienah 175°49.6 -17°38.3			AcruX 173°06.6 -63°11.9		
Gacrux 171°58.1 -57°12.7			Alioth 166°18.7 55°52.2			Spica 158°28.4 -11°15.0			Alcaid 152°57.0 49°13.9			Hadar 148°44.0 -60°27.5			Menkent 148°04.4 -36°27.3		
Arcturus 145°53.1 19°06.1			Rigel Kent. 139°48.0 -60°54.5			Zubenelg. 137°02.4 -16°06.7			Kochab 137°20.5 74°05.5			Alphecca 126°08.7 26°39.8			Antares 112°22.7 -26°28.1		
Atria 107°21.7 -69°03.6			Sabik 102°09.2 -15°44.6			Shaula 96°17.9 -37°06.8			Rasalhague 96°03.7 12°33.2			Etamin 90°44.5 51°29.7			Kaus Aust. 83°39.8 -34°22.4		
Vega 80°36.8 38°48.4			Nunki 75°54.6 -26°16.3			Altair 62°05.3 8°55.1			Peacock 53°14.3 -56°40.6			Deneb 49°29.1 45°20.8			Enif 33°44.0 9°57.5		
Alnair 27°39.8 -46°52.4			Fomalhaut 15°20.6 -29°31.6			Scheat 13°50.3 28°10.7			Markab 13°35.2 15°18.1			2017/8/2 SHA Mer.pass			Venus 245°38.4 09:44		
Mars 217°39.1 11:35			Jupiter 161°12.7 15:19			Saturn 99°29.1 19:25			2017/8/2 SHA Mer.pass			Venus 244°22.9 09:45			Mars 217°01.3 11:33		
Jupiter 161°03.4 15:16			Saturn 99°29.6 19:21			2017/8/2 SHA Mer.pass			Venus 243°07.4 09:46			Mars 216°23.5 11:32			Jupiter 160°53.9 15:12		
Saturn 99°30.0 19:17			Horizontal paralax			Venus: 0.1			Mars: 0.1			Mer.pass.:1:57:			v-0.7 d-0.4 m-3.9		
v0.9 d-0.5 m1.7			v2.1 d-0.2 m-1.6			v2.5 d-0.0 m0.4											

Sun			Moon				Twilight								
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	179°08.3	12°27.0	203°00.3	6.0	17°31.3	-5.3	59.7	72	--	--	03:03	20:58	--	--	
1	194°08.5	12°26.1	217°25.3	6.0	17°25.9	-5.4	59.7	70	--	01:46	03:27	20:36	22:13	--	
2	209°08.6	12°25.3	231°50.4	6.1	17°20.5	-5.5	59.7	68	--	02:25	03:45	20:19	21:37	--	
3	224°08.8	12°24.5	246°15.5	6.1	17°14.9	-5.6	59.7	66	--	02:51	03:59	20:05	21:11	--	
4	239°08.9	12°23.7	260°40.7	6.2	17°09.2	-5.7	59.6	64	01:33	03:11	04:11	19:53	20:52	22:27	
5	254°09.1	12°22.8	275°05.9	6.2	17°03.4	-5.9	59.6	62	02:08	03:27	04:20	19:44	20:37	21:54	
6	269°09.2	12°22.0	289°31.1	6.3	16°57.5	-6.0	59.6	60	02:32	03:40	04:29	19:36	20:24	21:31	
7	284°09.4	12°21.2	303°56.5	6.4	16°51.5	-6.1	59.6	58	02:51	03:51	04:36	19:28	20:13	21:12	
8	299°09.5	12°20.4	318°21.8	6.4	16°45.3	-6.2	59.6	56	03:06	04:01	04:43	19:22	20:03	20:58	
9	314°09.7	12°19.5	332°47.3	6.5	16°39.1	-6.3	59.6	54	03:19	04:10	04:49	19:16	19:55	20:45	
10	329°09.8	12°18.7	347°12.8	6.5	16°32.8	-6.4	59.6	52	03:30	04:17	04:54	19:11	19:48	20:34	
11	344°10.0	12°17.9	1°38.3	6.6	16°26.3	-6.5	59.5	50	03:40	04:24	04:59	19:06	19:41	20:25	
12	359°10.1	12°17.1	16°03.9	6.6	16°19.8	-6.6	59.5	45	03:59	04:38	05:09	18:56	19:28	20:06	
13	14°10.3	12°16.2	30°29.6	6.7	16°13.1	-6.7	59.5	40	04:14	04:49	05:17	18:48	19:17	19:51	
14	29°10.4	12°15.4	44°55.3	6.8	16°06.3	-6.8	59.5	35	04:27	04:58	05:25	18:41	19:07	19:39	
15	44°10.6	12°14.6	59°21.1	6.8	15°59.5	-6.9	59.5	30	04:37	05:06	05:31	18:35	18:60	19:29	
16	59°10.7	12°13.7	73°46.9	6.9	15°52.5	-7.0	59.5	20	04:52	05:19	05:42	18:24	18:47	19:13	
17	74°10.9	12°12.9	88°12.8	6.9	15°45.5	-7.1	59.5	10	05:04	05:30	05:51	18:15	18:36	19:02	
18	89°11.0	12°12.1	102°38.8	7.0	15°38.3	-7.2	59.4	0	05:14	05:39	05:60	18:06	18:28	18:52	
19	104°11.2	12°11.3	117°04.9	7.1	15°31.1	-7.3	59.4	-10	05:22	05:47	06:08	17:58	18:19	18:44	
20	119°11.3	12°10.4	131°30.9	7.1	15°23.7	-7.4	59.4	-20	05:29	05:55	06:17	17:49	18:12	18:37	
21	134°11.5	12°09.6	145°57.1	7.2	15°16.3	-7.5	59.4	-30	05:35	06:03	06:27	17:39	18:03	18:32	
22	149°11.6	12°08.8	160°23.3	7.3	15°08.7	-7.6	59.4	-35	05:38	06:07	06:33	17:33	17:59	18:29	
23	164°11.8	12°07.9	174°49.6	7.3	15°01.1	-7.7	59.3	-40	05:41	06:12	06:40	17:27	17:55	18:26	
SD.=15.8			d=-0.8		S.D.=16.3				-45	05:43	06:17	06:47	17:19	17:49	18:24
							-50	05:46	06:23	06:57	17:10	17:44	18:21		
							-52	05:47	06:26	07:01	17:06	17:41	18:20		
							-54	05:48	06:29	07:05	17:02	17:38	18:20		
							-56	05:48	06:32	07:10	16:57	17:35	18:19		
							-58	05:49	06:35	07:16	16:51	17:32	18:18		
							-60	05:50	06:39	07:22	16:45	17:28	18:17		
							Moonrise			Moonset					
							Lat.	Sun	Mon	Tue	Sun	Mon	Tue		
							72	--	01:57	04:03	21:01	20:48	20:38		
							70	00:34	02:29	04:21	20:28	20:28	20:27		
							68	01:10	02:52	04:36	20:04	20:12	20:18		
							66	01:35	03:10	04:47	19:45	19:60	20:10		
							64	01:55	03:25	04:57	19:29	19:49	20:03		
							62	02:11	03:37	05:05	19:16	19:40	19:58		
							60	02:24	03:47	05:12	19:05	19:32	19:53		
							58	02:36	03:56	05:18	18:56	19:25	19:48		
							56	02:46	04:04	05:24	18:47	19:19	19:44		
							54	02:55	04:11	05:29	18:40	19:13	19:41		
							52	03:03	04:17	05:33	18:33	19:08	19:38		
							50	03:10	04:23	05:37	18:27	19:03	19:35		
							45	03:25	04:35	05:46	18:14	18:54	19:28		
							40	03:37	04:45	05:53	18:03	18:45	19:23		
							35	03:48	04:54	05:59	17:54	18:38	19:18		
							30	03:57	05:01	06:05	17:45	18:32	19:14		
							20	04:13	05:14	06:14	17:31	18:21	19:07		
							10	04:27	05:25	06:22	17:19	18:11	19:00		
							0	04:39	05:36	06:30	17:07	18:02	18:54		
							-10	04:52	05:47	06:37	16:55	17:53	18:48		
							-20	05:06	05:58	06:46	16:42	17:43	18:42		
							-30	05:22	06:11	06:55	16:28	17:32	18:34		
							-35	05:31	06:18	07:00	16:19	17:25	18:30		
							-40	05:42	06:27	07:06	16:09	17:18	18:25		
							-45	05:54	06:36	07:13	15:58	17:09	18:19		
							-50	06:08	06:48	07:21	15:44	16:58	18:12		
							-52	06:15	06:54	07:25	15:37	16:53	18:09		
							-54	06:23	06:60	07:30	15:30	16:48	18:05		
							-56	06:32	07:06	07:34	15:22	16:42	18:01		
							-58	06:41	07:14	07:39	15:13	16:35	17:57		
							-60	06:52	07:22	07:45	15:02	16:27	17:52		
							Sun			Moon					
							Day	Eqn.of Time	Mer.	Mer.Pass.	Age				
								00 ^h	12 ^h	Pass	Upper	Lower			
							20	03:27	03:20	12:03	10:53	23:21	28(2%)		
							21	03:12	03:05	12:03	11:49	00:15	29(0%)		
							22	02:57	02:50	12:02	12:42	00:15	1(1%)		
SD.=15.8			d=-0.8		S.D.=16.0										

August 23, 24 ,25 (Wed., Thu., Fri.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Wed	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	331°28.6	213°20.6	20°31.1	187°14.5	15°26.2	132°13.0	-6°55.8	70°59.0	-21°57.5	70°59.0	-21°57.5	70°59.0	-21°57.5	Alpheratz	357°40.2	29°11.2	
1	346°31.1	228°19.9	20°30.6	202°15.4	15°25.6	147°15.1	-6°56.0	86°01.5	-21°57.5	86°01.5	-21°57.5	86°01.5	-21°57.5	Ankaa	353°12.6	-42°12.5	
2	1°33.6	243°19.2	20°30.2	217°16.3	15°25.1	162°17.1	-6°56.1	101°03.9	-21°57.5	101°03.9	-21°57.5	101°03.9	-21°57.5	Schedar	349°36.8	56°37.9	
3	16°36.0	258°18.5	20°29.8	232°17.2	15°24.6	177°19.2	-6°56.3	116°06.4	-21°57.6	116°06.4	-21°57.6	116°06.4	-21°57.6	Diphda	348°52.7	-17°53.3	
4	31°38.5	273°17.9	20°29.4	247°18.1	15°24.1	192°21.3	-6°56.5	131°08.9	-21°57.6	131°08.9	-21°57.6	131°08.9	-21°57.6	Achernar	335°24.4	-57°08.7	
5	46°40.9	288°17.2	20°28.9	262°19.0	15°23.6	207°23.3	-6°56.6	146°11.4	-21°57.6	146°11.4	-21°57.6	146°11.4	-21°57.6	Hamal	327°57.4	23°32.6	
6	61°43.4	303°16.5	20°28.5	277°19.9	15°23.1	222°25.4	-6°56.8	161°13.8	-21°57.6	161°13.8	-21°57.6	161°13.8	-21°57.6	Polaris	316°21.8	89°19.9	
7	76°45.9	318°15.8	20°28.1	292°20.8	15°22.6	237°27.5	-6°57.0	176°16.3	-21°57.6	176°16.3	-21°57.6	176°16.3	-21°57.6	Akamar	315°16.1	-40°13.9	
8	91°48.3	333°15.2	20°27.6	307°21.7	15°22.1	252°29.5	-6°57.2	191°18.8	-21°57.6	191°18.8	-21°57.6	191°18.8	-21°57.6	Menkar	314°12.0	4°09.5	
9	106°50.8	348°14.5	20°27.2	322°22.6	15°21.5	267°31.6	-6°57.3	206°21.3	-21°57.6	206°21.3	-21°57.6	206°21.3	-21°57.6	Mirfak	308°36.2	49°55.1	
10	121°53.3	3°13.8	20°26.8	337°23.5	15°21.0	282°33.7	-6°57.5	221°23.7	-21°57.6	221°23.7	-21°57.6	221°23.7	-21°57.6	Aldebaran	290°46.2	16°32.5	
11	136°55.7	18°13.1	20°26.3	352°24.4	15°20.5	297°35.7	-6°57.7	236°26.2	-21°57.6	236°26.2	-21°57.6	236°26.2	-21°57.6	Rigel	281°09.4	-8°10.9	
12	151°58.2	33°12.5	20°25.9	7°25.3	15°20.0	312°37.8	-6°57.8	251°28.7	-21°57.6	251°28.7	-21°57.6	251°28.7	-21°57.6	Capella	280°30.4	46°00.7	
13	167°00.7	48°11.8	20°25.5	22°26.2	15°19.5	327°39.8	-6°58.0	266°31.2	-21°57.6	266°31.2	-21°57.6	266°31.2	-21°57.6	Bellatrix	278°29.1	6°21.8	
14	182°03.1	63°11.1	20°25.0	37°27.1	15°19.0	342°41.9	-6°58.2	281°33.6	-21°57.6	281°33.6	-21°57.6	281°33.6	-21°57.6	Elnath	278°09.2	28°37.1	
15	197°05.6	78°10.4	20°24.6	52°28.0	15°18.5	357°44.0	-6°58.3	296°36.1	-21°57.6	296°36.1	-21°57.6	296°36.1	-21°57.6	Alnilam	275°43.6	-1°11.5	
16	212°08.1	93°09.8	20°24.1	67°28.9	15°18.0	12°46.0	-6°58.5	311°38.6	-21°57.6	311°38.6	-21°57.6	311°38.6	-21°57.6	Betelgeuse	270°58.4	7°24.5	
17	227°10.5	108°09.1	20°23.7	82°29.8	15°17.4	27°48.1	-6°58.7	326°41.0	-21°57.7	326°41.0	-21°57.7	326°41.0	-21°57.7	Canopus	263°55.2	-52°42.2	
18	242°13.0	123°08.4	20°23.3	97°30.7	15°16.9	42°50.2	-6°58.8	341°43.5	-21°57.7	341°43.5	-21°57.7	341°43.5	-21°57.7	Sirius	258°31.4	-16°44.2	
19	257°15.4	138°07.7	20°22.8	112°31.6	15°16.4	57°52.2	-6°59.0	356°46.0	-21°57.7	356°46.0	-21°57.7	356°46.0	-21°57.7	Adara	255°10.5	-28°59.7	
20	272°17.9	153°07.1	20°22.4	127°32.5	15°15.9	72°54.3	-6°59.2	11°48.5	-21°57.7	11°48.5	-21°57.7	11°48.5	-21°57.7	Procyon	244°56.9	5°10.9	
21	287°20.4	168°06.4	20°21.9	142°33.4	15°15.4	87°56.3	-6°59.3	26°50.9	-21°57.7	26°50.9	-21°57.7	26°50.9	-21°57.7	Pollux	243°24.5	27°58.9	
22	302°22.8	183°05.7	20°21.5	157°34.3	15°14.9	102°58.4	-6°59.5	41°53.4	-21°57.7	41°53.4	-21°57.7	41°53.4	-21°57.7	Avior	234°17.4	-59°33.9	
23	317°25.3	198°05.0	20°21.0	172°35.2	15°14.4	118°00.5	-6°59.7	56°55.9	-21°57.7	56°55.9	-21°57.7	56°55.9	-21°57.7	Suhail	222°50.7	-43°30.2	
Mer.pass.:1:53:			v-0.7 d-0.4 m-3.9			v0.9 d-0.5 m1.7			v2.1 d-0.2 m-1.6			v2.5 d-0.0 m0.4			Miaplacidus		
															Alphard		
															Regulus		
															Dubhe		
															Denebola		
															Gienah		
															Acrux		
															Gacrux		
															Alioth		
															Spica		
															Alcaid		
															Hadar		
															Menkent		
															Arcturus		
															Rigel Kent.		
															Zubenelg.		
															Kochab		
															Alphecca		
															Antares		
															Atria		
															Sabik		
															Shaula		
															Rasalhague		
															Etamin		
															Kaus Aust.		
															Vega		
															Nunki		
															Altair		
															Peacock		
															Deneb		
															Enif		
															Alnair		
															Fomalhaut		
															Scheat		
															Markab		
															2017/8/2		
															SHA		
															Mer.pass		
															Venus		
															Mars		
															Jupiter		
															Saturn		
															2017/8/2		
															SHA		
															Mer.pass		
															Venus		
															Mars		
															Jupiter		
															Saturn		
															2017/8/2		
															SHA		
															Mer.pass		
															Venus		
															Mars		
															Jupiter		
															Saturn		
															Horizontal paralax		
															Venus:		
															Mars:		
															0.1		
															0.1		
Mer.pass.:1:45:			v-0.7 d-0.5 m-3.9			v0.9 d-0.5 m1.8			v2.1 d-0.2 m-1.6			v2.5 d-0.0 m0.4					

h		Sun				Moon										
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight				
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.			
0	179°19.5	11°26.8	163°40.7	10.6	7°21.5	-10.6	58.1	72	--	01:17	03:20	20:40	22:36	--		
1	194°19.6	11°25.9	178°10.4	10.7	7°10.9	-10.6	58.1	70	--	02:10	03:41	20:21	21:49	--		
2	209°19.8	11°25.1	192°40.1	10.7	7°00.3	-10.6	58.1	68	--	02:42	03:56	20:05	21:19	--		
3	224°20.0	11°24.3	207°09.8	10.8	6°49.6	-10.7	58.0	67	01:07	03:04	04:09	19:53	20:57	22:48		
4	239°20.1	11°23.4	221°39.7	10.8	6°39.0	-10.7	58.0	66	01:54	03:22	04:20	19:43	20:40	22:06		
5	254°20.3	11°22.6	236°09.5	10.9	6°28.3	-10.7	58.0	64	02:22	03:37	04:28	19:34	20:26	21:38		
6	269°20.5	11°21.7	250°39.5	11.0	6°17.6	-10.7	57.9	62	02:44	03:49	04:36	19:27	20:14	21:18		
7	284°20.6	11°20.9	265°09.5	11.0	6°06.8	-10.7	57.9	60	03:01	03:59	04:43	19:20	20:04	21:01		
8	299°20.8	11°20.0	279°39.5	11.1	5°56.1	-10.8	57.9	58	03:15	04:08	04:49	19:14	19:55	20:48		
9	314°20.9	11°19.2	294°09.6	11.1	5°45.3	-10.8	57.8	56	03:26	04:15	04:54	19:09	19:48	20:36		
10	329°21.1	11°18.3	308°39.8	11.2	5°34.5	-10.8	57.8	54	03:37	04:22	04:59	19:05	19:41	20:26		
11	344°21.3	11°17.5	323°10.0	11.3	5°23.7	-10.8	57.8	52	03:46	04:29	05:03	19:00	19:35	20:18		
12	359°21.4	11°16.6	337°40.3	11.3	5°12.8	-10.8	57.7	50	04:04	04:42	05:13	18:51	19:22	19:60		
13	14°21.6	11°15.8	352°10.6	11.4	5°02.0	-10.9	57.7	45	04:18	04:52	05:20	18:44	19:12	19:46		
14	29°21.8	11°14.9	6°41.0	11.4	4°51.1	-10.9	57.7	40	04:29	05:01	05:27	18:37	19:03	19:35		
15	44°21.9	11°14.0	21°11.5	11.5	4°40.3	-10.9	57.7	35	04:39	05:08	05:33	18:32	18:56	19:25		
16	59°22.1	11°13.2	35°42.0	11.5	4°29.4	-10.9	57.6	30	04:53	05:20	05:43	18:22	18:44	19:11		
17	74°22.3	11°12.3	50°12.5	11.6	4°18.5	-10.9	57.6	20	05:05	05:30	05:51	18:13	18:35	18:60		
18	89°22.4	11°11.5	64°43.1	11.6	4°07.6	-10.9	57.6	10	05:13	05:38	05:59	18:06	18:27	18:51		
19	104°22.6	11°10.6	79°13.8	11.7	3°56.7	-10.9	57.5	0	05:21	05:45	06:07	17:58	18:19	18:44		
20	119°22.8	11°09.8	93°44.5	11.7	3°45.7	-10.9	57.5	-10	05:27	05:53	06:15	17:50	18:12	18:38		
21	134°22.9	11°08.9	108°15.2	11.8	3°34.8	-10.9	57.5	-20	05:32	05:60	06:24	17:41	18:05	18:33		
22	149°23.1	11°08.1	122°46.0	11.8	3°23.9	-10.9	57.4	-30	05:34	06:04	06:30	17:36	18:01	18:31		
23	164°23.3	11°07.2	137°16.9	11.9	3°13.0	-10.9	57.4	-35	05:36	06:08	06:35	17:30	17:57	18:29		
SD.=15.8 d=-0.8								S.D.=15.9								
Thu	GHA	Dec	GHA	ν	Dec	d	HP									
0	179°23.4	11°06.4	151°47.8	11.9	3°02.0	-10.9	57.4	-40	05:38	06:12	06:42	17:23	17:53	18:27		
1	194°23.6	11°05.5	166°18.7	12.0	2°51.1	-10.9	57.3	-50	05:40	06:18	06:51	17:15	17:48	18:25		
2	209°23.8	11°04.7	180°49.7	12.0	2°40.1	-10.9	57.3	-52	05:41	06:20	06:54	17:11	17:46	18:25		
3	224°23.9	11°03.8	195°20.8	12.1	2°29.2	-10.9	57.3	-54	05:41	06:22	06:59	17:07	17:43	18:24		
4	239°24.1	11°02.9	209°51.8	12.1	2°18.2	-10.9	57.2	-56	05:42	06:25	07:03	17:02	17:41	18:24		
5	254°24.3	11°02.1	224°23.0	12.2	2°07.3	-10.9	57.2	-58	05:42	06:28	07:08	16:57	17:38	18:24		
6	269°24.4	11°01.2	238°54.2	12.2	1°56.4	-10.9	57.2	-60	05:43	06:31	07:14	16:52	17:35	18:23		
7	284°24.6	11°00.4	253°25.4	12.2	1°45.4	-10.9	57.1									
8	299°24.8	10°59.5	267°56.6	12.3	1°34.5	-10.9	57.1	Moonrise			Moonset					
9	314°24.9	10°58.7	282°28.0	12.3	1°23.6	-10.9	57.1	Lat.	Wed	Thu	Fri	Wed	Thu	Fri		
10	329°25.1	10°57.8	296°59.3	12.4	1°12.6	-10.9	57.0	72	05:60	07:50	09:35	20:30	20:22	20:14		
11	344°25.3	10°56.9	311°30.7	12.4	1°01.7	-10.9	57.0	70	06:09	07:52	09:31	20:25	20:23	20:21		
12	359°25.4	10°56.1	326°02.1	12.5	0°50.8	-10.9	57.0	68	06:17	07:54	09:27	20:21	20:24	20:26		
13	14°25.6	10°55.2	340°33.6	12.5	0°39.9	-10.9	56.9	66	06:23	07:55	09:24	20:18	20:25	20:31		
14	29°25.8	10°54.4	355°05.1	12.5	0°29.0	-10.9	56.9	64	06:28	07:56	09:21	20:15	20:25	20:35		
15	44°25.9	10°53.5	9°36.7	12.6	0°18.2	-10.9	56.9	62	06:32	07:57	09:19	20:12	20:26	20:39		
16	59°26.1	10°52.7	24°08.3	12.6	0°07.3	-10.9	56.9	60	06:36	07:58	09:17	20:10	20:26	20:42		
17	74°26.3	10°51.8	38°39.9	12.6	-0°03.5	-10.8	56.8	58	06:40	07:59	09:16	20:08	20:27	20:44		
18	89°26.5	10°50.9	53°11.5	12.7	-0°14.4	-10.8	56.8	56	06:43	07:60	09:14	20:07	20:27	20:47		
19	104°26.6	10°50.1	67°43.2	12.7	-0°25.2	-10.8	56.8	54	06:46	08:00	09:13	20:05	20:27	20:49		
20	119°26.8	10°49.2	82°15.0	12.8	-0°36.0	-10.8	56.7	52	06:48	08:01	09:12	20:04	20:28	20:51		
21	134°27.0	10°48.3	96°46.7	12.8	-0°46.8	-10.8	56.7	50	06:50	08:02	09:10	20:02	20:28	20:53		
22	149°27.1	10°47.5	111°18.5	12.8	-0°57.6	-10.8	56.7	45	06:55	08:03	09:08	19:59	20:28	20:57		
23	164°27.3	10°46.6	125°50.4	12.9	-1°08.4	-10.8	56.6	40	06:59	08:04	09:06	19:57	20:29	21:00		
SD.=15.8 d=-0.9								S.D.=15.6								
Fri	GHA	Dec	GHA	ν	Dec	d	HP									
0	179°27.5	10°45.8	140°22.2	12.9	-1°19.1	-10.7	56.6	30	07:11	08:07	09:00	19:50	20:30	21:10		
1	194°27.6	10°44.9	154°54.1	12.9	-1°29.8	-10.7	56.6	10	07:16	08:08	08:58	19:47	20:31	21:14		
2	209°27.8	10°44.0	169°26.1	12.9	-1°40.5	-10.7	56.5	0	07:21	08:09	08:56	19:44	20:32	21:18		
3	224°28.0	10°43.2	183°58.0	13.0	-1°51.2	-10.7	56.5	-10	07:25	08:10	08:54	19:41	20:32	21:21		
4	239°28.2	10°42.3	198°30.0	13.0	-2°01.9	-10.7	56.5	-20	07:30	08:11	08:51	19:38	20:33	21:25		
5	254°28.3	10°41.4	213°02.1	13.0	-2°12.5	-10.6	56.4	-30	07:35	08:13	08:49	19:35	20:33	21:30		
6	269°28.5	10°40.6	227°34.1	13.1	-2°23.1	-10.6	56.4	-35	07:38	08:14	08:47	19:33	20:33	21:32		
7	284°28.7	10°39.7	242°06.2	13.1	-2°33.7	-10.6	56.4	-40	07:42	08:14	08:46	19:30	20:34	21:35		
8	299°28.8	10°38.9	256°38.3	13.1	-2°44.3	-10.6	56.4	-45	07:46	08:16	08:44	19:28	20:34	21:38		
9	314°29.0	10°38.0	271°10.4	13.1	-2°54.8	-10.5	56.3	-50	07:50	08:17	08:42	19:25	20:35	21:43		
10	329°29.2	10°37.1	285°42.6	13.2	-3°05.4	-10.5	56.3	-52	07:53	08:17	08:41	19:23	20:35	21:44		
11	344°29.4	10°36.3	300°14.7	13.2	-3°15.8	-10.5	56.3	-54	07:55	08:18	08:40	19:21	20:35	21:46		
12	359°29.5	10°35.4	314°47.0	13.2	-3°26.3	-10.5	56.2	-56	07:58	08:19	08:39	19:20	20:35	21:49		
13	14°29.7	10°34.5	329°19.2	13.2	-3°36.7	-10.4	56.2	-58	08:01	08:19	08:37	19:18	20:36	21:51		
14	29°29.9	10°33.7	343°51.4	13.3	-3°47.2	-10.4	56.2	-60	08:04	08:20	08:36	19:15	20:36	21:54		
15	44°30.1	10°32.8	358°23.7	13.3	-3°57.5	-10.4	56.1									
16	59°30.2	10°31.9	12°56.0	13.3	-4°07.9	-10.3	56.1	Day	Sun		Moon					
17	74°30.4	10°31.1	27°28.3	13.3	-4°18.2	-10.3	56.1	Eqn.of Time	Mer.	Mer.Pass.		Age				
18	89°30.6	10°30.2	42°00.7	13.3	-4°28.5	-10.3	56.1	00 ^h	Pass	Upper	Lower					
19	104°30.8	10°29.3	56°33.0	13.4	-4°38.7	-10.2	56.0	23	02:42	02:34	12:02	13:32	01:07	2(4%)		
20	119°30.9	10°28.5	71°05.4	13.4	-4°49.0	-10.2	56.0	24	02:26	02:18	12:02	14:20	01:56	3(9%)		
21	134°31.1	10°27.6	85°37.8	13.4	-4°59.2	-10.2	56.0	25	02:10	02:02	12:02	15:06	02:43	4(16%)		
22	149°31.3	10°26.7	100°10.2	13.4	-5°09.3	-10.1	55.9									
23	164°31.5	10°25.9	114°42.6	13.4	-5°19.4	-10.1	55.9									
SD.=15.8 d=-0.9								S.D.=15.4								

August 26, 27 ,28 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	334°26.0	212°32.3	19°57.9	188°19.6	14°48.9	134°41.3	-7°08.0	73°56.8	-21°58.1	73°56.8	-21°58.1	73°56.8	-21°58.1	Alpheratz	357°40.2	29°11.3	
1	349°28.5	227°31.6	19°57.5	203°20.5	14°48.4	149°43.4	-7°08.2	88°59.2	-21°58.1	88°59.2	-21°58.1	88°59.2	-21°58.1	Ankaa	353°12.6	-42°12.5	
2	4°31.0	242°31.0	19°57.0	218°21.4	14°47.9	164°45.4	-7°08.3	104°01.7	-21°58.1	104°01.7	-21°58.1	104°01.7	-21°58.1	Schedar	349°36.7	56°37.9	
3	19°33.4	257°30.3	19°56.5	233°22.3	14°47.4	179°47.5	-7°08.5	119°04.1	-21°58.1	119°04.1	-21°58.1	119°04.1	-21°58.1	Diphda	348°52.7	-17°53.3	
4	34°35.9	272°29.6	19°56.0	248°23.2	14°46.8	194°49.5	-7°08.7	134°06.6	-21°58.1	134°06.6	-21°58.1	134°06.6	-21°58.1	Achernar	335°24.4	-57°08.7	
5	49°38.4	287°29.0	19°55.5	263°24.1	14°46.3	209°51.6	-7°08.9	149°09.1	-21°58.1	149°09.1	-21°58.1	149°09.1	-21°58.1	Hamal	327°57.4	23°32.6	
6	64°40.8	302°28.3	19°55.0	278°25.0	14°45.8	224°53.6	-7°09.0	164°11.5	-21°58.1	164°11.5	-21°58.1	164°11.5	-21°58.1	Polaris	316°20.4	89°19.9	
7	79°43.3	317°27.6	19°54.5	293°25.9	14°45.3	239°55.7	-7°09.2	179°14.0	-21°58.1	179°14.0	-21°58.1	179°14.0	-21°58.1	Akamar	315°16.1	-40°13.9	
8	94°45.7	332°27.0	19°54.0	308°26.8	14°44.7	254°57.8	-7°09.4	194°16.4	-21°58.1	194°16.4	-21°58.1	194°16.4	-21°58.1	Menkar	314°12.0	4°09.5	
9	109°48.2	347°26.3	19°53.4	323°27.8	14°44.2	269°59.8	-7°09.5	209°18.9	-21°58.1	209°18.9	-21°58.1	209°18.9	-21°58.1	Mirfak	308°36.1	49°55.1	
10	124°50.7	2°25.7	19°52.9	338°28.7	14°43.7	285°01.9	-7°09.7	224°21.4	-21°58.2	224°21.4	-21°58.2	224°21.4	-21°58.2	Aldebaran	290°46.2	16°32.5	
11	139°53.1	17°25.0	19°52.4	353°29.6	14°43.2	300°03.9	-7°09.9	239°23.8	-21°58.2	239°23.8	-21°58.2	239°23.8	-21°58.2	Rigel	281°09.4	-8°10.9	
12	154°55.6	32°24.3	19°51.9	8°30.5	14°42.6	315°06.0	-7°10.1	254°26.3	-21°58.2	254°26.3	-21°58.2	254°26.3	-21°58.2	Capella	280°30.4	46°00.7	
13	169°58.1	47°23.7	19°51.4	23°31.4	14°42.1	330°08.0	-7°10.2	269°28.8	-21°58.2	269°28.8	-21°58.2	269°28.8	-21°58.2	Bellatrix	278°29.1	6°21.8	
14	185°00.5	62°23.0	19°50.9	38°32.3	14°41.6	345°10.1	-7°10.4	284°31.2	-21°58.2	284°31.2	-21°58.2	284°31.2	-21°58.2	Elnath	278°09.1	28°37.1	
15	200°03.0	77°22.4	19°50.4	53°33.2	14°41.1	0°12.1	-7°10.6	299°33.7	-21°58.2	299°33.7	-21°58.2	299°33.7	-21°58.2	Alnilam	275°43.6	-1°11.5	
16	215°05.5	92°21.7	19°49.9	68°34.1	14°40.5	15°14.2	-7°10.7	314°36.1	-21°58.2	314°36.1	-21°58.2	314°36.1	-21°58.2	Betelgeuse	270°58.4	7°24.5	
17	230°07.9	107°21.0	19°49.4	83°35.0	14°40.0	30°16.2	-7°10.9	329°38.6	-21°58.2	329°38.6	-21°58.2	329°38.6	-21°58.2	Canopus	263°55.2	-52°42.2	
18	245°10.4	122°20.4	19°48.9	98°35.9	14°39.5	45°18.3	-7°11.1	344°41.0	-21°58.2	344°41.0	-21°58.2	344°41.0	-21°58.2	Sirius	258°31.3	-16°44.2	
19	260°12.9	137°19.7	19°48.4	113°36.9	14°39.0	60°20.3	-7°11.3	359°43.5	-21°58.2	359°43.5	-21°58.2	359°43.5	-21°58.2	Adara	255°10.5	-28°59.7	
20	275°15.3	152°19.1	19°47.8	128°37.8	14°38.4	75°22.4	-7°11.4	14°46.0	-21°58.2	14°46.0	-21°58.2	14°46.0	-21°58.2	Procyon	244°56.9	5°10.9	
21	290°17.8	167°18.4	19°47.3	143°38.7	14°37.9	90°24.4	-7°11.6	29°48.4	-21°58.2	29°48.4	-21°58.2	29°48.4	-21°58.2	Pollux	243°24.5	27°58.9	
22	305°20.2	182°17.7	19°46.8	158°39.6	14°37.4	105°26.5	-7°11.8	44°50.9	-21°58.2	44°50.9	-21°58.2	44°50.9	-21°58.2	Avior	234°17.4	-59°33.9	
23	320°22.7	197°17.1	19°46.3	173°40.5	14°36.9	120°28.5	-7°11.9	59°53.3	-21°58.3	59°53.3	-21°58.3	59°53.3	-21°58.3	Suhail	222°50.7	-43°30.2	
Mer.pass.:1:41:			v-0.7 d-0.5 m-3.9			v0.9 d-0.5 m1.8			v2.1 d-0.2 m-1.6			v2.5 d-0.0 m0.4			Miacplacidus		
															Alphard		
															Regulus		
															Dubhe		
															Denebola		
															Gienah		
															Acruh		
															Gacrux		
															Alioth		
															Spica		
															Alcaid		
															Hadar		
															Menkent		
															Arcturus		
															Rigel Kent.		
															Zubenelg.		
															Kochab		
															Alphecca		
															Antares		
															Atria		
															Sabik		
															Shaula		
															Rasalhague		
															Etamin		
															Kaus Aust.		
															Vega		
															Nunki		
															Altair		
															Peacock		
															Deneb		
															Enif		
															Alnair		
															Fomalhaut		
															Scheat		
															Markab		
															2017/8/2		
															SHA		
															Mer.pass		
															Venus		
															Mars		
															Jupiter		
															Saturn		
															2017/8/2		
															SHA		
															Mer.pass		
															Venus		
															Mars		
															Jupiter		
															Saturn		
															2017/8/2		
															SHA		
															Mer.pass		
															Venus		
															Mars		
															Jupiter		
															Saturn		
															Horizontal parallax		
															Venus:		
															Mars:		
															0.1		
															0.1		
Mer.pass.:1:34:			v-0.7 d-0.5 m-3.9			v0.9 d-0.5 m1.8			v2.0 d-0.2 m-1.6			v2.5 d-0.0 m0.4					

h Sun								Moon							
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	179°31.6	10°25.0	129°15.1	13.5	-5°29.5	-10.1	55.9	72	--	01:51	03:37	20:22	22:04	--	
1	194°31.8	10°24.1	143°47.6	13.5	-5°39.6	-10.0	55.9	70	--	02:30	03:54	20:06	21:27	--	
2	209°32.0	10°23.3	158°20.0	13.5	-5°49.6	-10.0	55.8	68	--	02:57	04:08	19:52	21:02	--	
3	224°32.2	10°22.4	172°52.5	13.5	-5°59.5	-10.0	55.8	66	01:36	03:17	04:19	19:42	20:43	22:20	
4	239°32.3	10°21.5	187°25.0	13.5	-6°09.5	-9.9	55.8	64	02:11	03:33	04:28	19:32	20:27	21:47	
5	254°32.5	10°20.6	201°57.6	13.5	-6°19.4	-9.9	55.7	62	02:36	03:46	04:36	19:25	20:15	21:24	
6	269°32.7	10°19.8	216°30.1	13.5	-6°29.2	-9.8	55.7	60	02:55	03:57	04:43	19:18	20:04	21:05	
7	284°32.9	10°18.9	231°02.6	13.6	-6°39.1	-9.8	55.7	58	03:10	04:06	04:49	19:12	19:55	20:51	
8	299°33.0	10°18.0	245°35.2	13.6	-6°48.8	-9.8	55.7	56	03:23	04:14	04:55	19:07	19:47	20:38	
9	314°33.2	10°17.2	260°07.8	13.6	-6°58.6	-9.7	55.6	54	03:33	04:21	04:59	19:02	19:40	20:28	
10	329°33.4	10°16.3	274°40.3	13.6	-7°08.3	-9.7	55.6	52	03:43	04:28	05:04	18:58	19:34	20:18	
11	344°33.6	10°15.4	289°12.9	13.6	-7°17.9	-9.6	55.6	50	03:51	04:33	05:08	18:54	19:28	20:10	
12	359°33.7	10°14.5	303°45.5	13.6	-7°27.6	-9.6	55.6	45	04:08	04:45	05:16	18:46	19:17	19:54	
13	14°33.9	10°13.7	318°18.1	13.6	-7°37.1	-9.5	55.5	40	04:21	04:55	05:23	18:39	19:07	19:41	
14	29°34.1	10°12.8	332°50.7	13.6	-7°46.7	-9.5	55.5	35	04:32	05:03	05:29	18:33	18:59	19:30	
15	44°34.3	10°11.9	347°23.4	13.6	-7°56.1	-9.5	55.5	30	04:41	05:10	05:34	18:28	18:53	19:22	
16	59°34.5	10°11.1	1°56.0	13.6	-8°05.6	-9.4	55.4	20	04:54	05:21	05:43	18:19	18:42	19:08	
17	74°34.6	10°10.2	16°28.6	13.6	-8°15.0	-9.4	55.4	10	05:05	05:30	05:51	18:12	18:33	18:58	
18	89°34.8	10°09.3	31°01.3	13.6	-8°24.3	-9.3	55.4	0	05:13	05:37	05:58	18:05	18:26	18:50	
19	104°35.0	10°08.4	45°33.9	13.6	-8°33.6	-9.3	55.4	-10	05:19	05:44	06:05	17:58	18:19	18:44	
20	119°35.2	10°07.6	60°06.6	13.7	-8°42.9	-9.2	55.3	-20	05:25	05:50	06:13	17:51	18:13	18:39	
21	134°35.4	10°06.7	74°39.2	13.7	-8°52.1	-9.2	55.3	-30	05:29	05:57	06:21	17:42	18:07	18:34	
22	149°35.5	10°05.8	89°11.9	13.7	-9°01.2	-9.1	55.3	-35	05:31	06:00	06:26	17:38	18:03	18:33	
23	164°35.7	10°04.9	103°44.5	13.7	-9°10.3	-9.1	55.3	-40	05:32	06:04	06:31	17:32	17:60	18:31	
SD.=15.8 d=-0.9 S.D.=15.2								-45	05:33	06:07	06:37	17:26	17:56	18:30	
								-50	05:34	06:12	06:45	17:19	17:52	18:30	
								-52	05:35	06:14	06:48	17:16	17:50	18:29	
								-54	05:35	06:16	06:52	17:12	17:48	18:29	
								-56	05:35	06:18	06:56	17:08	17:46	18:29	
								-58	05:35	06:20	07:00	17:04	17:44	18:29	
								-60	05:35	06:23	07:05	16:59	17:41	18:30	
								Moonrise			Moonset				
								Lat.	Sat	Sun	Mon	Sat	Sun	Mon	
								72	11:19	13:03	14:50	20:05	19:56	19:42	
								70	11:07	12:43	14:18	20:19	20:17	20:15	
								68	10:58	12:27	13:55	20:29	20:33	20:40	
								66	10:51	12:15	13:37	20:38	20:47	20:58	
								64	10:44	12:05	13:22	20:46	20:58	21:14	
								62	10:39	11:56	13:10	20:52	21:08	21:26	
								60	10:34	11:48	12:60	20:58	21:16	21:37	
								58	10:30	11:42	12:51	21:03	21:23	21:47	
								56	10:26	11:36	12:43	21:07	21:30	21:55	
								54	10:23	11:31	12:36	21:11	21:35	22:02	
								52	10:20	11:26	12:30	21:15	21:40	22:09	
								50	10:17	11:22	12:24	21:18	21:45	22:15	
								45	10:11	11:13	12:12	21:25	21:55	22:28	
								40	10:06	11:05	12:02	21:31	22:04	22:39	
								35	10:02	10:58	11:54	21:37	22:11	22:48	
								30	09:58	10:53	11:46	21:41	22:18	22:56	
								20	09:52	10:43	11:33	21:49	22:29	23:10	
								10	09:46	10:34	11:22	21:56	22:39	23:22	
								0	09:41	10:26	11:12	22:03	22:48	23:34	
								-10	09:36	10:18	11:01	22:10	22:57	23:45	
								-20	09:31	10:10	10:50	22:17	23:07	23:57	
								-30	09:24	10:00	10:37	22:25	23:19	--	
								-35	09:21	09:55	10:30	22:29	23:25	--	
								-40	09:17	09:49	10:22	22:35	23:33	--	
								-45	09:12	09:41	10:12	22:41	23:41	--	
								-50	09:07	09:33	10:01	22:48	23:52	--	
								-52	09:04	09:29	09:56	22:52	23:57	--	
								-54	09:01	09:24	09:50	22:55	--	00:02	
								-56	08:58	09:20	09:43	22:60	--	00:08	
								-58	08:55	09:14	09:36	23:04	--	00:15	
								-60	08:51	09:08	09:28	23:10	--	00:23	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age		
									00 ^h	12 ^h	Upper	Lower			
								26	01:53	01:45	12:01	15:52	03:29	5(24%)	
								27	01:36	01:28	12:01	16:37	04:14	6(33%)	
								28	01:19	01:10	12:01	17:22	04:59	7(42%)	
SD.=15.8 d=-0.9 S.D.=14.9															

August 29, 30, 31 (Tue., Wed., Thu.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Tue	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec				
0	337°23.5	19°19.7	211°45.0	19°17.7	189°25.3	14°10.9	137°08.9	-7°20.4	76°53.6	-21°58.7	76°53.6	-21°58.7	Alpheratz	357°40.2	29°11.3	29°11.3				
1	352°25.9	19°19.2	226°44.4	19°19.2	204°26.2	14°10.3	152°11.0	-7°20.6	91°56.0	-21°58.7	91°56.0	-21°58.7	Ankaa	353°12.6	-42°12.5	-42°12.5				
2	7°28.4	19°18.6	241°43.7	19°18.6	219°27.2	14°09.8	167°13.0	-7°20.8	106°58.5	-21°58.7	106°58.5	-21°58.7	Schedar	349°36.7	56°37.9	56°37.9				
3	22°30.8	19°18.0	256°43.1	19°18.0	234°28.1	14°09.3	182°15.0	-7°20.9	122°00.9	-21°58.7	122°00.9	-21°58.7	Diphda	348°52.7	-17°53.3	-17°53.3				
4	37°33.3	19°17.5	271°42.5	19°17.5	249°29.0	14°08.7	197°17.1	-7°21.1	137°03.4	-21°58.7	137°03.4	-21°58.7	Achernar	335°24.4	-57°08.7	-57°08.7				
5	52°35.8	19°16.9	286°41.8	19°16.9	264°29.9	14°08.2	212°19.1	-7°21.3	152°05.8	-21°58.7	152°05.8	-21°58.7	Hamal	327°57.4	23°32.6	23°32.6				
6	67°38.2	19°16.3	301°41.2	19°16.3	279°30.8	14°07.7	227°21.2	-7°21.5	167°08.3	-21°58.7	167°08.3	-21°58.7	Polaris	316°18.9	89°19.9	89°19.9				
7	82°40.7	19°15.8	316°40.5	19°15.8	294°31.8	14°07.1	242°23.2	-7°21.6	182°10.7	-21°58.7	182°10.7	-21°58.7	Akamar	315°16.1	-40°13.9	-40°13.9				
8	97°43.2	19°15.2	331°39.9	19°15.2	309°32.7	14°06.6	257°25.3	-7°21.8	197°13.2	-21°58.7	197°13.2	-21°58.7	Menkar	314°12.0	4°09.5	4°09.5				
9	112°45.6	19°14.6	346°39.2	19°14.6	324°33.6	14°06.1	272°27.3	-7°22.0	212°15.6	-21°58.7	212°15.6	-21°58.7	Mirfak	308°36.1	49°55.1	49°55.1				
10	127°48.1	19°14.0	1°38.6	19°14.0	339°34.5	14°05.5	287°29.4	-7°22.2	227°18.1	-21°58.8	227°18.1	-21°58.8	Aldebaran	290°46.1	16°32.5	16°32.5				
11	142°50.6	19°13.5	16°37.9	19°13.5	354°35.4	14°05.0	302°31.4	-7°22.3	242°20.5	-21°58.8	242°20.5	-21°58.8	Rigel	281°09.4	-8°10.9	-8°10.9				
12	157°53.0	19°12.9	31°37.3	19°12.9	9°36.4	14°04.4	317°33.4	-7°22.5	257°23.0	-21°58.8	257°23.0	-21°58.8	Capella	280°30.4	46°00.7	46°00.7				
13	172°55.5	19°12.3	46°36.6	19°12.3	24°37.3	14°03.9	332°35.5	-7°22.7	272°25.4	-21°58.8	272°25.4	-21°58.8	Bellatrix	278°29.0	6°21.8	6°21.8				
14	187°57.9	19°11.7	61°36.0	19°11.7	39°38.2	14°03.4	347°37.5	-7°22.9	287°27.8	-21°58.8	287°27.8	-21°58.8	Elnath	278°09.1	28°37.1	28°37.1				
15	203°00.4	19°11.2	76°35.4	19°11.2	54°39.1	14°02.8	2°39.6	-7°23.0	302°30.3	-21°58.8	302°30.3	-21°58.8	Alnilam	275°43.6	-1°11.5	-1°11.5				
16	218°02.9	19°10.6	91°34.7	19°10.6	69°40.0	14°02.3	17°41.6	-7°23.2	317°32.7	-21°58.8	317°32.7	-21°58.8	Betelgeuse	270°58.4	7°24.5	7°24.5				
17	233°05.3	19°10.0	106°34.1	19°10.0	84°41.0	14°01.8	32°43.7	-7°23.4	332°35.2	-21°58.8	332°35.2	-21°58.8	Canopus	263°55.1	-52°42.2	-52°42.2				
18	248°07.8	19°09.4	121°33.4	19°09.4	99°41.9	14°01.2	47°45.7	-7°23.6	347°37.6	-21°58.8	347°37.6	-21°58.8	Sirius	258°31.3	-16°44.2	-16°44.2				
19	263°10.3	19°08.8	136°32.8	19°08.8	114°42.8	14°00.7	62°47.7	-7°23.7	2°40.1	-21°58.8	2°40.1	-21°58.8	Adara	255°10.5	-28°59.7	-28°59.7				
20	278°12.7	19°08.2	151°32.1	19°08.2	129°43.7	14°00.2	77°49.8	-7°23.9	17°42.5	-21°58.8	17°42.5	-21°58.8	Procyon	244°56.9	5°10.9	5°10.9				
21	293°15.2	19°07.7	166°31.5	19°07.7	144°44.6	13°59.6	92°51.8	-7°24.1	32°45.0	-21°58.9	32°45.0	-21°58.9	Pollux	243°24.5	27°58.9	27°58.9				
22	308°17.7	19°07.1	181°30.8	19°07.1	159°45.6	13°59.1	107°53.9	-7°24.3	47°47.4	-21°58.9	47°47.4	-21°58.9	Avior	234°17.4	-59°33.9	-59°33.9				
23	323°20.1	19°06.5	196°30.2	19°06.5	174°46.5	13°58.5	122°55.9	-7°24.4	62°49.9	-21°58.9	62°49.9	-21°58.9	Suhail	222°50.7	-43°30.1	-43°30.1				
Mer.pass.:1:30:			v-0.6 d-0.6 m-3.9			v0.9 d-0.5 m1.8			v2.0 d-0.2 m-1.6			v2.4 d-0.0 m0.4			Miaplacidus			221°39.9	-69°47.3	-69°47.3
															Alphard			217°53.6	-8°44.0	-8°44.0
															Regulus			207°40.8	11°52.9	11°52.9
															Dubhe			193°49.0	61°39.5	61°39.5
															Denebola			182°31.0	14°28.6	14°28.6
															Gienah			175°49.6	-17°38.2	-17°38.2
															AcruX			173°06.6	-63°11.8	-63°11.8
															Gacrux			171°58.1	-57°12.7	-57°12.7
															Alioth			166°18.8	55°52.2	55°52.2
															Spica			158°28.5	-11°15.0	-11°15.0
															Alcaid			152°57.0	49°13.9	49°13.9
															Hadar			148°44.1	-60°27.5	-60°27.5
															Menkent			148°04.4	-36°27.3	-36°27.3
															Arcturus			145°53.2	19°06.1	19°06.1
															Rigel Kent.			139°48.1	-60°54.5	-60°54.5
															Zubenelg.			137°02.4	-16°06.7	-16°06.7
															Kochab			137°20.7	74°05.4	74°05.4
															Alphecca			126°08.7	26°39.8	26°39.8
															Antares			112°22.7	-26°28.1	-26°28.1
															Atria			107°21.9	-69°03.6	-69°03.6
															Sabik			102°09.2	-15°44.6	-15°44.6
															Shaula			96°17.9	-37°06.8	-37°06.8
															Rasalhague			96°03.7	12°33.2	12°33.2
															Etamin			90°44.6	51°29.7	51°29.7
															Kaus Aust.			83°39.8	-34°22.4	-34°22.4
															Vega			80°36.8	38°48.4	38°48.4
															Nunki			75°54.6	-26°16.3	-26°16.3
															Altair			62°05.3	8°55.1	8°55.1
															Peacock			53°14.3	-56°40.6	-56°40.6
															Deneb			49°29.1	45°20.9	45°20.9
															Enif			33°44.0	9°57.5	9°57.5
															Alnair			27°39.8	-46°52.4	-46°52.4
															Fomalhaut			15°20.6	-29°31.6	-29°31.6
															Scheat			13°50.3	28°10.8	28°10.8
															Markab			13°35.2	15°18.1	15°18.1
															2017/8/2			SHA	Mer.pass	
															Venus			234°21.6	09:53	09:53
															Mars			212°01.9	11:22	11:22
															Jupiter			159°45.5	14:49	14:49
															Saturn			99°30.1	18:49	18:49
															2017/8/3			SHA	Mer.pass	
															Venus			233°07.0	09:54	09:54
															Mars			211°24.8	11:20	11:20
															Jupiter			159°35.4	14:46	14:46
															Saturn			99°29.7	18:45	18:45
															2017/8/3			SHA	Mer.pass	
															Venus			231°52.5	09:55	09:55
															Mars			210°47.8	11:19	11:19
															Jupiter			159°25.2	14:43	14:43
															Saturn			99°29.2	18:42	18:42
															Horizontal parallax					
															Venus:			0.1		
															Mars:			0.1		
Mer.pass.:1:22:			v-0.6 d-0.6 m-3.9			v0.9 d-0.5 m1.8			v2.0 d-0.2 m-1.6			v2.4 d-0.0 m0.4								

h Sun Moon							
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°44.7	9°21.7	96°18.2	13.2	-15°27.2	-6.1	54.4
1	194°44.9	9°20.8	110°50.4	13.2	-15°33.3	-6.1	54.4
2	209°45.1	9°19.9	125°22.6	13.2	-15°39.3	-6.0	54.4
3	224°45.3	9°19.0	139°54.8	13.2	-15°45.3	-5.9	54.4
4	239°45.5	9°18.2	154°26.9	13.1	-15°51.2	-5.8	54.4
5	254°45.6	9°17.3	168°59.1	13.1	-15°57.0	-5.8	54.4
6	269°45.8	9°16.4	183°31.2	13.1	-16°02.7	-5.7	54.4
7	284°46.0	9°15.5	198°03.3	13.1	-16°08.3	-5.6	54.4
8	299°46.2	9°14.6	212°35.4	13.1	-16°13.9	-5.5	54.3
9	314°46.4	9°13.7	227°07.4	13.1	-16°19.4	-5.5	54.3
10	329°46.6	9°12.8	241°39.5	13.0	-16°24.9	-5.4	54.3
11	344°46.8	9°11.9	256°11.5	13.0	-16°30.2	-5.3	54.3
12	359°47.0	9°11.0	270°43.5	13.0	-16°35.5	-5.2	54.3
13	14°47.2	9°10.1	285°15.5	13.0	-16°40.7	-5.2	54.3
14	29°47.3	9°09.2	299°47.5	13.0	-16°45.8	-5.1	54.3
15	44°47.5	9°08.4	314°19.4	12.9	-16°50.9	-5.0	54.3
16	59°47.7	9°07.5	328°51.3	12.9	-16°55.9	-4.9	54.3
17	74°47.9	9°06.6	343°23.2	12.9	-17°00.8	-4.9	54.3
18	89°48.1	9°05.7	357°55.1	12.9	-17°05.6	-4.8	54.3
19	104°48.3	9°04.8	12°27.0	12.9	-17°10.4	-4.7	54.3
20	119°48.5	9°03.9	26°58.8	12.8	-17°15.0	-4.6	54.3
21	134°48.7	9°03.0	41°30.6	12.8	-17°19.6	-4.6	54.3
22	149°48.9	9°02.1	56°02.4	12.8	-17°24.1	-4.5	54.3
23	164°49.1	9°01.2	70°34.2	12.8	-17°28.6	-4.4	54.3
SD.=15.8 d=-0.9 S.D.=14.8							
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°49.3	9°00.3	85°06.0	12.7	-17°32.9	-4.3	54.3
1	194°49.4	8°59.4	99°37.7	12.7	-17°37.2	-4.2	54.2
2	209°49.6	8°58.5	114°09.4	12.7	-17°41.4	-4.2	54.2
3	224°49.8	8°57.6	128°41.1	12.7	-17°45.5	-4.1	54.2
4	239°50.0	8°56.7	143°12.8	12.7	-17°49.6	-4.0	54.2
5	254°50.2	8°55.8	157°44.4	12.6	-17°53.5	-3.9	54.2
6	269°50.4	8°54.9	172°16.1	12.6	-17°57.4	-3.8	54.2
7	284°50.6	8°54.0	186°47.7	12.6	-18°01.2	-3.8	54.2
8	299°50.8	8°53.1	201°19.3	12.6	-18°04.9	-3.7	54.2
9	314°51.0	8°52.2	215°50.8	12.6	-18°08.6	-3.6	54.2
10	329°51.2	8°51.4	230°22.4	12.5	-18°12.1	-3.5	54.2
11	344°51.4	8°50.5	244°53.9	12.5	-18°15.6	-3.4	54.2
12	359°51.6	8°49.6	259°25.4	12.5	-18°19.0	-3.3	54.2
13	14°51.8	8°48.7	273°56.9	12.5	-18°22.3	-3.3	54.2
14	29°51.9	8°47.8	288°28.3	12.4	-18°25.5	-3.2	54.2
15	44°52.1	8°46.9	302°59.8	12.4	-18°28.6	-3.1	54.2
16	59°52.3	8°46.0	317°31.2	12.4	-18°31.7	-3.0	54.2
17	74°52.5	8°45.1	332°02.6	12.4	-18°34.6	-2.9	54.2
18	89°52.7	8°44.2	346°34.0	12.4	-18°37.5	-2.8	54.2
19	104°52.9	8°43.3	1°05.3	12.3	-18°40.3	-2.8	54.2
20	119°53.1	8°42.4	15°36.6	12.3	-18°43.0	-2.7	54.2
21	134°53.3	8°41.5	30°08.0	12.3	-18°45.6	-2.6	54.2
22	149°53.5	8°40.6	44°39.2	12.3	-18°48.2	-2.5	54.2
23	164°53.7	8°39.7	59°10.5	12.3	-18°50.6	-2.4	54.3
SD.=15.8 d=-0.9 S.D.=14.8							
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°53.9	8°38.8	73°41.8	12.2	-18°53.0	-2.3	54.3
1	194°54.1	8°37.9	88°13.0	12.2	-18°55.3	-2.2	54.3
2	209°54.3	8°37.0	102°44.2	12.2	-18°57.5	-2.2	54.3
3	224°54.5	8°36.1	117°15.4	12.2	-18°59.6	-2.1	54.3
4	239°54.7	8°35.2	131°46.6	12.2	-19°01.6	-2.0	54.3
5	254°54.9	8°34.3	146°17.7	12.1	-19°03.5	-1.9	54.3
6	269°55.1	8°33.4	160°48.8	12.1	-19°05.4	-1.8	54.3
7	284°55.3	8°32.5	175°20.0	12.1	-19°07.1	-1.7	54.3
8	299°55.4	8°31.6	189°51.0	12.1	-19°08.8	-1.6	54.3
9	314°55.6	8°30.7	204°22.1	12.1	-19°10.4	-1.5	54.3
10	329°55.8	8°29.8	218°53.2	12.0	-19°11.9	-1.4	54.3
11	344°56.0	8°28.9	233°24.2	12.0	-19°13.3	-1.4	54.3
12	359°56.2	8°27.9	247°55.2	12.0	-19°14.6	-1.3	54.3
13	14°56.4	8°27.0	262°26.2	12.0	-19°15.8	-1.2	54.3
14	29°56.6	8°26.1	276°57.2	12.0	-19°17.0	-1.1	54.3
15	44°56.8	8°25.2	291°28.2	12.0	-19°18.0	-1.0	54.3
16	59°57.0	8°24.3	305°59.1	11.9	-19°19.0	-0.9	54.4
17	74°57.2	8°23.4	320°30.0	11.9	-19°19.8	-0.8	54.4
18	89°57.4	8°22.5	335°01.0	11.9	-19°20.6	-0.7	54.4
19	104°57.6	8°21.6	349°31.8	11.9	-19°21.3	-0.6	54.4
20	119°57.8	8°20.7	4°02.7	11.9	-19°21.9	-0.6	54.4
21	134°58.0	8°19.8	18°33.6	11.9	-19°22.4	-0.5	54.4
22	149°58.2	8°18.9	33°04.4	11.8	-19°22.8	-0.4	54.4
23	164°58.4	8°18.0	47°35.3	11.8	-19°23.1	-0.3	54.4
SD.=15.8 d=-0.9 S.D.=14.8							

Lat.	Twilight			Sunset	Twilight	
	Naut.	Civil	Sunrise		Civil	Naut.
72	--	02:17	03:52	20:05	21:38	--
70	--	02:49	04:07	19:51	21:08	--
68	01:11	03:12	04:19	19:39	20:46	22:40
66	01:58	03:29	04:29	19:30	20:29	21:58
64	02:27	03:43	04:37	19:22	20:15	21:30
62	02:48	03:55	04:44	19:15	20:04	21:10
60	03:05	04:05	04:50	19:09	19:54	20:54
58	03:19	04:13	04:56	19:04	19:46	20:40
56	03:30	04:21	05:01	18:59	19:39	20:29
54	03:40	04:27	05:05	18:55	19:32	20:19
52	03:49	04:33	05:09	18:51	19:27	20:11
50	03:57	04:38	05:12	18:48	19:22	20:03
45	04:12	04:49	05:20	18:41	19:11	19:48
40	04:25	04:58	05:26	18:35	19:02	19:36
35	04:35	05:05	05:31	18:29	18:55	19:26
30	04:43	05:11	05:36	18:25	18:49	19:18
20	04:55	05:22	05:44	18:17	18:39	19:05
10	05:05	05:30	05:51	18:10	18:31	18:56
0	05:12	05:36	05:57	18:04	18:25	18:49
-10	05:18	05:42	06:04	17:58	18:19	18:43
-20	05:22	05:48	06:10	17:51	18:13	18:39
-30	05:26	05:53	06:18	17:44	18:08	18:36
-35	05:27	05:56	06:22	17:40	18:05	18:35
-40	05:28	05:59	06:26	17:35	18:03	18:34
-45	05:28	06:02	06:32	17:30	17:60	18:34
-50	05:28	06:06	06:38	17:24	17:56	18:34
-52	05:28	06:07	06:41	17:21	17:55	18:34
-54	05:28	06:09	06:45	17:17	17:53	18:34
-56	05:28	06:11	06:48	17:14	17:52	18:35
-58	05:27	06:12	06:52	17:10	17:50	18:35
-60	05:26	06:14	06:57	17:06	17:48	18:36

Lat.	Moonrise			Moonset		
	Tue	Wed	Thu	Tue	Wed	Thu
72	16:51	--	--	19:18	--	--
70	15:53	17:26	18:45	20:16	20:20	20:41
68	15:19	16:38	17:43	20:50	21:09	21:43
66	14:55	16:07	17:08	21:15	21:40	22:18
64	14:36	15:44	16:43	21:34	22:03	22:43
62	14:21	15:26	16:23	21:50	22:22	23:03
60	14:08	15:11	16:07	22:04	22:37	23:19
58	13:57	14:58	15:53	22:15	22:50	23:33
56	13:47	14:47	15:41	22:25	23:01	23:44
54	13:39	14:37	15:31	22:34	23:11	23:55
52	13:31	14:29	15:22	22:42	23:20	--
50	13:24	14:21	15:14	22:49	23:27	--
45	13:10	14:05	14:57	23:04	23:44	--
40	12:58	13:51	14:42	23:16	23:58	--
35	12:47	13:40	14:30	23:27	--	00:10
30	12:39	13:30	14:20	23:36	--	00:20
20	12:23	13:13	14:02	23:53	--	00:37
10	12:10	12:58	13:46	--	00:07	00:53
0	11:57	12:44	13:32	--	00:20	01:07
-10	11:45	12:30	13:17	--	00:33	01:21
-20	11:32	12:16	13:01	--	00:47	01:37
-30	11:17	11:59	12:44	00:11	01:03	01:54
-35	11:08	11:49	12:33	00:20	01:13	02:04
-40	10:58	11:38	12:21	00:29	01:24	02:16
-45	10:47	11:25	12:07	00:40	01:36	02:30
-50	10:33	11:09	11:50	00:53	01:52	02:47
-52	10:26	11:01	11:42	00:59	01:59	02:55
-54	10:19	10:53	11:33	01:06	02:07	03:03
-56	10:11	10:44	11:23	01:14	02:16	03:13
-58	10:02	10:33	11:12	01:23	02:26	03:25
-60	09:51	10:21	10:59	01:33	02:38	03:38

Day	Sun			Moon		
	Eqn.of Time	Mer.	Mer.	Mer.Pass.	Age	
29	01:01	00:52	12:00	18:08	05:45	8(52%)
30	00:43	00:34	12:00	18:55	06:31	9(61%)
31	00:24	00:15	12:00	19:43	07:19	10(70%)

September 01, 02 ,03 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	340°20.9	210°59.0	18°36.6	190°31.8	13°32.0	139°35.8	-7°33.0	79°49.5	-21°59.3	Alpheratz	357°40.2	29°11.3
1	355°23.3	225°58.4	18°36.0	205°32.7	13°31.5	154°37.9	-7°33.2	94°51.9	-21°59.3	Ankaa	353°12.5	-42°12.5
2	10°25.8	240°57.8	18°35.3	220°33.7	13°31.0	169°39.9	-7°33.4	109°54.3	-21°59.3	Schedar	349°36.7	56°37.9
3	25°28.3	255°57.1	18°34.7	235°34.6	13°30.4	184°41.9	-7°33.6	124°56.8	-21°59.4	Diphda	348°52.7	-17°53.3
4	40°30.7	270°56.5	18°34.1	250°35.5	13°29.9	199°44.0	-7°33.7	139°59.2	-21°59.4	Achernar	335°24.3	-57°08.7
5	55°33.2	285°55.9	18°33.4	265°36.4	13°29.3	214°46.0	-7°33.9	155°01.6	-21°59.4	Hamal	327°57.3	23°32.6
6	70°35.7	300°55.3	18°32.8	280°37.4	13°28.8	229°48.0	-7°34.1	170°04.1	-21°59.4	Polaris	316°17.4	89°19.9
7	85°38.1	315°54.6	18°32.1	295°38.3	13°28.2	244°50.1	-7°34.3	185°06.5	-21°59.4	Akamar	315°16.0	-40°13.9
8	100°40.6	330°54.0	18°31.5	310°39.2	13°27.7	259°52.1	-7°34.5	200°08.9	-21°59.4	Menkar	314°11.9	4°09.5
9	115°43.0	345°53.4	18°30.9	325°40.2	13°27.1	274°54.1	-7°34.6	215°11.4	-21°59.4	Mirfak	308°36.1	49°55.1
10	130°45.5	0°52.8	18°30.2	340°41.1	13°26.6	289°56.2	-7°34.8	230°13.8	-21°59.4	Aldebaran	290°46.1	16°32.5
11	145°48.0	15°52.1	18°29.6	355°42.0	13°26.0	304°58.2	-7°35.0	245°16.2	-21°59.4	Rigel	281°09.4	-8°10.9
12	160°50.4	30°51.5	18°28.9	10°42.9	13°25.5	320°00.2	-7°35.2	260°18.7	-21°59.4	Capella	280°30.3	46°00.7
13	175°52.9	45°50.9	18°28.3	25°43.9	13°24.9	335°02.3	-7°35.3	275°21.1	-21°59.4	Bellatrix	278°29.0	6°21.8
14	190°55.4	60°50.2	18°27.6	40°44.8	13°24.4	350°04.3	-7°35.5	290°23.5	-21°59.5	Elnath	278°09.1	28°37.1
15	205°57.8	75°49.6	18°27.0	55°45.7	13°23.9	5°06.3	-7°35.7	305°26.0	-21°59.5	Alnilam	275°43.6	-1°11.5
16	221°00.3	90°49.0	18°26.4	70°46.7	13°23.3	20°08.4	-7°35.9	320°28.4	-21°59.5	Betelgeuse	270°58.3	7°24.5
17	236°02.8	105°48.4	18°25.7	85°47.6	13°22.8	35°10.4	-7°36.0	335°30.8	-21°59.5	Canopus	263°55.1	-52°42.2
18	251°05.2	120°47.7	18°25.1	100°48.5	13°22.2	50°12.4	-7°36.2	350°33.3	-21°59.5	Sirius	258°31.3	-16°44.2
19	266°07.7	135°47.1	18°24.4	115°49.4	13°21.7	65°14.5	-7°36.4	5°35.7	-21°59.5	Adara	255°10.5	-28°59.7
20	281°10.2	150°46.5	18°23.8	130°50.4	13°21.1	80°16.5	-7°36.6	20°38.1	-21°59.5	Procyon	244°56.9	5°10.9
21	296°12.6	165°45.9	18°23.1	145°51.3	13°20.6	95°18.5	-7°36.8	35°40.6	-21°59.5	Pollux	243°24.4	27°58.9
22	311°15.1	180°45.2	18°22.4	160°52.2	13°20.0	110°20.6	-7°36.9	50°43.0	-21°59.5	Avior	234°17.3	-59°33.8
23	326°17.5	195°44.6	18°21.8	175°53.2	13°19.5	125°22.6	-7°37.1	65°45.4	-21°59.5	Suhail	222°50.7	-43°30.1
Mer.pass.:1:18:		v-0.6 d-0.6 m-3.9		v0.9 d-0.5 m1.8		v2.0 d-0.2 m-1.6		v2.4 d-0.0 m0.4		Miaplacidus	221°39.9	-69°47.3
										Alphard	217°53.6	-8°44.0
										Regulus	207°40.8	11°52.9
										Dubhe	193°49.0	61°39.5
										Denebola	182°31.0	14°28.6
										Genah	175°49.6	-17°38.2
										Acrux	173°06.6	-63°11.8
										Gacrux	171°58.2	-57°12.7
										Alioth	166°18.8	55°52.2
										Spica	158°28.5	-11°15.0
										Alcaid	152°57.0	49°13.9
										Hadar	148°44.1	-60°27.5
										Menkent	148°04.4	-36°27.3
										Arcturus	145°53.2	19°06.1
										Rigel Kent.	139°48.1	-60°54.5
										Zubenelg.	137°02.4	-16°06.7
										Kochab	137°20.7	74°05.4
										Alphecca	126°08.7	26°39.8
										Antares	112°22.8	-28°28.1
										Atria	107°21.9	-69°03.6
										Sabik	102°09.2	-15°44.6
										Shaula	96°17.9	-37°06.8
										Rasalhague	96°03.7	12°33.2
										Etamin	90°44.6	51°29.7
										Kaus Aust.	83°39.8	-34°22.4
										Vega	80°36.9	38°48.4
										Nunki	75°54.6	-26°16.3
										Altair	62°05.3	8°55.1
										Peacock	53°14.3	-56°40.6
										Deneb	49°29.1	45°20.9
										Enif	33°44.0	9°57.6
										Alnair	27°39.8	-46°52.4
										Fomalhaut	15°20.6	-29°31.6
										Scheat	13°50.3	28°10.8
										Markab	13°35.2	15°18.1
										2017/9/1	SHA	Mer.pass
										Venus	230°38.2	09:56
										Mars	210°10.9	11:17
										Jupiter	159°15.0	14:40
										Saturn	99°28.6	18:38
										2017/9/2	SHA	Mer.pass
										Venus	229°24.0	09:57
										Mars	209°34.1	11:16
										Jupiter	159°04.6	14:36
										Saturn	99°27.9	18:34
										2017/9/3	SHA	Mer.pass
										Venus	228°10.0	09:58
										Mars	208°57.3	11:14
										Jupiter	158°54.2	14:33
										Saturn	99°27.0	18:30
										Horizontal parallax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:1:10:		v-0.6 d-0.7 m-3.9		v0.9 d-0.6 m1.8		v2.0 d-0.2 m-1.6		v2.4 d-0.0 m0.4				

h Sun								Moon							
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
									Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	179°58.6	8°17.1	62°06.1	11.8	-19°23.4	-0.2	54.4	72	--	02:39	04:07	19:49	21:14	--	
1	194°58.8	8°16.2	76°36.9	11.8	-19°23.5	-0.1	54.4	70	00:21	03:06	04:20	19:36	20:49	23:11	
2	209°59.0	8°15.3	91°07.6	11.8	-19°23.6	-0.0	54.4	68	01:41	03:25	04:30	19:26	20:30	22:11	
3	224°59.2	8°14.4	105°38.4	11.8	-19°23.5	0.1	54.5	66	02:17	03:41	04:39	19:18	20:16	21:38	
4	239°59.4	8°13.5	120°09.2	11.7	-19°23.4	0.2	54.5	64	02:41	03:53	04:46	19:11	20:03	21:15	
5	254°59.6	8°12.6	134°39.9	11.7	-19°23.2	0.3	54.5	62	02:60	04:04	04:52	19:05	19:53	20:56	
6	269°59.8	8°11.7	149°10.6	11.7	-19°22.8	0.4	54.5	60	03:15	04:13	04:58	19:00	19:45	20:42	
7	284°60.0	8°10.7	163°41.3	11.7	-19°22.4	0.5	54.5	58	03:27	04:20	05:02	18:56	19:37	20:30	
8	300°00.2	8°09.8	178°12.0	11.7	-19°21.9	0.5	54.5	56	03:38	04:27	05:06	18:51	19:31	20:19	
9	315°00.4	8°08.9	192°42.7	11.7	-19°21.3	0.6	54.5	54	03:47	04:33	05:10	18:48	19:25	20:10	
10	330°00.6	8°08.0	207°13.4	11.7	-19°20.7	0.7	54.5	52	03:55	04:38	05:14	18:45	19:20	20:03	
11	345°00.8	8°07.1	221°44.1	11.7	-19°19.9	0.8	54.6	50	04:02	04:43	05:17	18:42	19:15	19:56	
12	0°01.0	8°06.2	236°14.7	11.6	-19°19.0	0.9	54.6	45	04:17	04:53	05:23	18:35	19:05	19:41	
13	15°01.2	8°05.3	250°45.3	11.6	-19°18.0	1.0	54.6	40	04:28	05:01	05:29	18:30	18:57	19:30	
14	30°01.4	8°04.4	265°16.0	11.6	-19°17.0	1.1	54.6	35	04:37	05:08	05:33	18:25	18:51	19:21	
15	45°01.6	8°03.5	279°46.6	11.6	-19°15.8	1.2	54.6	30	04:45	05:13	05:38	18:21	18:45	19:14	
16	60°01.8	8°02.6	294°17.2	11.6	-19°14.6	1.3	54.6	20	04:56	05:22	05:45	18:14	18:37	19:03	
17	75°02.0	8°01.7	308°47.8	11.6	-19°13.3	1.4	54.6	10	05:05	05:30	05:51	18:08	18:30	18:54	
18	90°02.2	8°00.7	323°18.3	11.6	-19°11.8	1.5	54.6	0	05:11	05:35	05:56	18:03	18:24	18:48	
19	105°02.4	7°59.8	337°48.9	11.6	-19°10.3	1.6	54.7	-10	05:16	05:41	06:02	17:58	18:19	18:43	
20	120°02.6	7°58.9	352°19.5	11.6	-19°08.7	1.7	54.7	-20	05:20	05:45	06:08	17:52	18:14	18:40	
21	135°02.8	7°58.0	6°50.0	11.5	-19°07.0	1.8	54.7	-30	05:22	05:50	06:14	17:46	18:10	18:37	
22	150°03.0	7°57.1	21°20.6	11.5	-19°05.2	1.8	54.7	-35	05:23	05:52	06:18	17:42	18:07	18:37	
23	165°03.2	7°56.2	35°51.1	11.5	-19°03.3	1.9	54.7	-40	05:23	05:55	06:22	17:38	18:05	18:37	
SD.=15.8 d=-0.9 S.D.=14.8															
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset			
									Fri	Sat	Sun	Fri	Sat	Sun	
0	180°03.4	7°55.3	50°21.6	11.5	-19°01.3	2.0	54.7	72	--	--	20:17	--	--	--	
1	195°03.6	7°54.4	64°52.1	11.5	-18°59.2	2.1	54.8	70	19:24	19:34	19:36	21:42	23:14	--	
2	210°03.8	7°53.5	79°22.6	11.5	-18°57.1	2.2	54.8	68	18:28	18:54	19:08	22:39	23:54	--	
3	225°04.0	7°52.5	93°53.1	11.5	-18°54.8	2.3	54.8	66	17:54	18:26	18:47	23:12	--	00:21	
4	240°04.2	7°51.6	108°23.6	11.5	-18°52.5	2.4	54.8	64	17:29	18:04	18:30	23:36	--	00:42	
5	255°04.4	7°50.7	122°54.1	11.5	-18°50.0	2.5	54.8	62	17:10	17:47	18:16	23:56	--	00:59	
6	270°04.6	7°49.8	137°24.6	11.5	-18°47.5	2.6	54.8	60	16:54	17:33	18:04	--	00:11	01:13	
7	285°04.8	7°48.9	151°55.1	11.5	-18°44.8	2.7	54.9	58	16:41	17:21	17:53	--	00:25	01:25	
8	300°05.0	7°48.0	166°25.5	11.5	-18°42.1	2.8	54.9	56	16:29	17:10	17:44	--	00:36	01:36	
9	315°05.2	7°47.1	180°56.0	11.5	-18°39.3	2.9	54.9	54	16:19	17:01	17:36	--	00:46	01:45	
10	330°05.4	7°46.2	195°26.4	11.5	-18°36.4	3.0	54.9	52	16:10	16:52	17:29	00:04	00:55	01:53	
11	345°05.6	7°45.2	209°56.9	11.4	-18°33.4	3.1	54.9	50	16:02	16:45	17:22	00:12	01:03	02:00	
12	0°05.8	7°44.3	224°27.3	11.4	-18°30.3	3.1	54.9	45	15:45	16:29	17:08	00:30	01:20	02:16	
13	15°06.0	7°43.4	238°57.8	11.4	-18°27.1	3.2	55.0	40	15:31	16:15	16:57	00:44	01:34	02:28	
14	30°06.2	7°42.5	253°28.2	11.4	-18°23.8	3.3	55.0	35	15:19	16:04	16:47	00:56	01:46	02:39	
15	45°06.4	7°41.6	267°58.7	11.4	-18°20.4	3.4	55.0	30	15:08	15:54	16:38	01:06	01:56	02:49	
16	60°06.6	7°40.7	282°29.1	11.4	-18°17.0	3.5	55.0	20	14:50	15:37	16:23	01:24	02:14	03:05	
17	75°06.8	7°39.8	296°59.5	11.4	-18°13.4	3.6	55.0	10	14:35	15:23	16:10	01:40	02:29	03:19	
18	90°07.0	7°38.8	311°29.9	11.4	-18°09.8	3.7	55.1	0	14:20	15:09	15:58	01:55	02:44	03:32	
19	105°07.2	7°37.9	326°00.4	11.4	-18°06.0	3.8	55.1	-10	14:05	14:55	15:45	02:10	02:58	03:46	
20	120°07.4	7°37.0	340°30.8	11.4	-18°02.2	3.9	55.1	-20	13:50	14:40	15:32	02:25	03:13	03:60	
21	135°07.6	7°36.1	355°01.2	11.4	-17°58.3	4.0	55.1	-30	13:32	14:23	15:17	02:43	03:31	04:16	
22	150°07.9	7°35.2	9°31.6	11.4	-17°54.3	4.1	55.1	-35	13:21	14:13	15:08	02:54	03:41	04:25	
23	165°08.1	7°34.3	24°02.0	11.4	-17°50.2	4.1	55.2	-40	13:09	14:02	14:58	03:06	03:52	04:35	
SD.=15.9 d=-0.9 S.D.=14.9															
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun			Moon			
									Eqn.of Time	Mer.		Mer.Pass.		Age	
									00 ^h	Pass		Upper	Lower		
0	180°08.3	7°33.3	38°32.4	11.4	-17°46.0	4.2	55.2	1	00:06	00:04	11:59	20:31	08:07	11(78%)	
1	195°08.5	7°32.4	53°02.9	11.4	-17°41.7	4.3	55.2	2	00:14	00:23	11:59	21:20	08:56	12(86%)	
2	210°08.7	7°31.5	67°33.3	11.4	-17°37.3	4.4	55.2	3	00:33	00:43	11:59	22:09	09:45	13(92%)	
3	225°08.9	7°30.6	82°03.7	11.4	-17°32.8	4.5	55.2								
4	240°09.1	7°29.7	96°34.1	11.4	-17°28.3	4.6	55.3								
5	255°09.3	7°28.8	111°04.5	11.4	-17°23.6	4.7	55.3								
6	270°09.5	7°27.8	125°34.9	11.4	-17°18.9	4.8	55.3								
7	285°09.7	7°26.9	140°05.3	11.4	-17°14.1	4.9	55.3								
8	300°09.9	7°26.0	154°35.7	11.4	-17°09.2	5.0	55.3								
9	315°10.1	7°25.1	169°06.2	11.4	-17°04.2	5.0	55.4								
10	330°10.3	7°24.2	183°36.6	11.4	-16°59.1	5.1	55.4								
11	345°10.5	7°23.3	198°07.0	11.4	-16°53.9	5.2	55.4								
12	0°10.7	7°22.3	212°37.4	11.4	-16°48.6	5.3	55.4								
13	15°10.9	7°21.4	227°07.8	11.4	-16°43.3	5.4	55.5								
14	30°11.1	7°20.5	241°38.3	11.4	-16°37.9	5.5	55.5								
15	45°11.3	7°19.6	256°08.7	11.4	-16°32.3	5.6	55.5								
16	60°11.5	7°18.7	270°39.1	11.4	-16°26.7	5.7	55.5								
17	75°11.8	7°17.7	285°09.5	11.4	-16°21.0	5.7	55.5								
18	90°12.0	7°16.8	299°40.0	11.4	-16°15.2	5.8	55.6								
19	105°12.2	7°15.9	314°10.4	11.4	-16°09.4	5.9	55.6								
20	120°12.4	7°15.0	328°40.9	11.4	-16°03.4	6.0	55.6								
21	135°12.6	7°14.1	343°11.3	11.4	-15°57.4	6.1	55.6								
22	150°12.8	7°13.1	357°41.8	11.5	-15°51.2	6.2	55.7								
23	165°13.0	7°12.2	12°12.2	11.5	-15°45.0	6.2	55.7								
SD.=15.9 d=-0.9 S.D.=15.1															

September 04, 05 ,06 (Mon., Tue., Wed.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Mon	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	343°18.3	210°14.4	17°48.7	191°38.9	12°52.5	142°02.1	-7°45.8	82°44.4	-22°00.0	Alpheratz	357°40.2	29°11.3					
1	358°20.7	225°13.8	17°48.0	206°39.9	12°51.9	157°04.1	-7°46.0	97°46.8	-22°00.0	Ankaa	353°12.5	-42°12.5					
2	13°23.2	240°13.2	17°47.3	221°40.8	12°51.4	172°06.1	-7°46.2	112°49.2	-22°00.1	Schedar	349°36.7	56°37.9					
3	28°25.7	255°12.6	17°46.6	236°41.7	12°50.8	187°08.2	-7°46.4	127°51.7	-22°00.1	Diphda	348°52.6	-17°53.3					
4	43°28.1	270°12.0	17°45.9	251°42.7	12°50.3	202°10.2	-7°46.6	142°54.1	-22°00.1	Achernar	335°24.3	-57°08.7					
5	58°30.6	285°11.4	17°45.2	266°43.6	12°49.7	217°12.2	-7°46.7	157°56.5	-22°00.1	Hamal	327°57.3	23°32.6					
6	73°33.1	300°10.8	17°44.5	281°44.6	12°49.2	232°14.2	-7°46.9	172°58.9	-22°00.1	Polaris	316°16.1	89°19.9					
7	88°35.5	315°10.2	17°43.8	296°45.5	12°48.6	247°16.3	-7°47.1	188°01.3	-22°00.1	Akamar	315°16.0	-40°13.9					
8	103°38.0	330°09.5	17°43.1	311°46.4	12°48.0	262°18.3	-7°47.3	203°03.8	-22°00.1	Menkar	314°11.9	4°09.5					
9	118°40.5	345°08.9	17°42.4	326°47.4	12°47.5	277°20.3	-7°47.5	218°06.2	-22°00.1	Mirfak	308°36.0	49°55.1					
10	133°42.9	0°08.3	17°41.7	341°48.3	12°46.9	292°22.3	-7°47.6	233°08.6	-22°00.1	Aldebaran	290°46.1	16°32.5					
11	148°45.4	15°07.7	17°40.9	356°49.2	12°46.4	307°24.4	-7°47.8	248°11.0	-22°00.1	Rigel	281°09.3	-8°10.9					
12	163°47.9	30°07.1	17°40.2	11°50.2	12°45.8	322°26.4	-7°48.0	263°13.5	-22°00.2	Capella	280°30.3	46°00.7					
13	178°50.3	45°06.5	17°39.5	26°51.1	12°45.3	337°28.4	-7°48.2	278°15.9	-22°00.2	Bellatrix	278°29.0	6°21.8					
14	193°52.8	60°05.9	17°38.8	41°52.1	12°44.7	352°30.4	-7°48.4	293°18.3	-22°00.2	Elnath	278°09.1	28°37.1					
15	208°55.2	75°05.3	17°38.1	56°53.0	12°44.2	7°32.5	-7°48.5	308°20.7	-22°00.2	Alnilam	275°43.5	-1°11.5					
16	223°57.7	90°04.7	17°37.4	71°53.9	12°43.6	22°34.5	-7°48.7	323°23.1	-22°00.2	Betelgeuse	270°58.3	7°24.5					
17	239°00.2	105°04.1	17°36.7	86°54.9	12°43.0	37°36.5	-7°48.9	338°25.6	-22°00.2	Canopus	263°55.1	-52°42.2					
18	254°02.6	120°03.5	17°36.0	101°55.8	12°42.5	52°38.5	-7°49.1	353°28.0	-22°00.2	Sirius	258°31.3	-16°44.2					
19	269°05.1	135°02.9	17°35.3	116°56.8	12°41.9	67°40.6	-7°49.2	8°30.4	-22°00.2	Adara	255°10.5	-28°59.7					
20	284°07.6	150°02.3	17°34.5	131°57.7	12°41.4	82°42.6	-7°49.4	23°32.8	-22°00.2	Procyon	244°56.9	5°10.9					
21	299°10.0	165°01.7	17°33.8	146°58.6	12°40.8	97°44.6	-7°49.6	38°35.2	-22°00.3	Pollux	243°24.4	27°58.9					
22	314°12.5	180°01.1	17°33.1	161°59.6	12°40.3	112°46.0	-7°49.8	53°37.7	-22°00.3	Avior	234°17.3	-59°33.8					
23	329°15.0	195°00.5	17°32.4	177°00.5	12°39.7	127°48.7	-7°50.0	68°40.1	-22°00.3	Suhail	222°50.7	-43°30.1					
Mer.pass.:1:06:			v-0.6 d-0.7 m-3.9	v0.9 d-0.6 m1.8	v2.0 d-0.2 m-1.6	v2.4 d-0.0 m0.4											
Tue	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	344°17.4	209°59.9	17°31.7	192°01.5	12°39.1	142°50.7	-7°50.1	83°42.5	-22°00.3	Dubhe	193°49.0	61°39.4					
1	359°19.9	224°59.3	17°31.0	207°02.4	12°38.6	157°52.7	-7°50.3	98°44.9	-22°00.3	Denebola	182°31.0	14°28.6					
2	14°22.3	239°58.7	17°30.2	222°03.3	12°38.0	172°54.7	-7°50.5	113°47.3	-22°00.3	Genah	175°49.6	-17°38.2					
3	29°24.8	254°58.1	17°29.5	237°04.3	12°37.5	187°56.8	-7°50.7	128°49.7	-22°00.3	Acrux	173°06.7	-63°11.8					
4	44°27.3	269°57.5	17°28.8	252°05.2	12°36.9	202°58.8	-7°50.9	143°52.2	-22°00.3	Gacrux	171°58.2	-57°12.7					
5	59°29.7	284°56.9	17°28.1	267°06.2	12°36.4	218°00.8	-7°51.0	158°54.6	-22°00.3	Alioth	166°18.8	55°52.1					
6	74°32.2	299°56.3	17°27.3	282°07.1	12°35.8	233°02.8	-7°51.2	173°57.0	-22°00.3	Spica	158°28.5	-11°15.0					
7	89°34.7	314°55.7	17°26.6	297°08.0	12°35.2	248°04.9	-7°51.4	188°59.4	-22°00.4	Alcaid	152°57.0	49°13.9					
8	104°37.1	329°55.1	17°25.9	312°09.0	12°34.7	263°06.9	-7°51.6	204°01.8	-22°00.4	Hadar	148°44.2	-60°27.5					
9	119°39.6	344°54.5	17°25.2	327°09.9	12°34.1	278°08.9	-7°51.8	219°04.3	-22°00.4	Menkent	148°04.4	-36°27.3					
10	134°42.1	359°53.9	17°24.4	342°10.9	12°33.6	293°10.9	-7°51.9	234°06.7	-22°00.4	Arcturus	145°53.2	19°06.1					
11	149°44.5	14°53.3	17°23.7	357°11.8	12°33.0	308°13.0	-7°52.1	249°09.1	-22°00.4	Rigel Kent.	139°48.1	-60°54.5					
12	164°47.0	29°52.7	17°23.0	12°12.7	12°32.4	323°15.0	-7°52.3	264°11.5	-22°00.4	Zubenelg.	137°02.4	-16°06.7					
13	179°49.5	44°52.1	17°22.3	27°13.7	12°31.9	338°17.0	-7°52.5	279°13.9	-22°00.4	Kochab	137°20.8	74°05.4					
14	194°51.9	59°51.5	17°21.5	42°14.6	12°31.3	353°19.0	-7°52.7	294°16.3	-22°00.4	Alphecca	126°08.7	26°39.8					
15	209°54.4	74°50.9	17°20.8	57°15.6	12°30.8	8°21.0	-7°52.8	309°18.8	-22°00.4	Antares	112°22.8	-26°28.1					
16	224°56.8	89°50.3	17°20.1	72°16.5	12°30.2	23°23.0	-7°53.0	324°21.2	-22°00.5	Atria	107°22.0	-69°03.6					
17	239°59.3	104°49.7	17°19.3	87°17.5	12°29.6	38°25.1	-7°53.2	339°23.6	-22°00.5	Sabik	102°09.2	-15°44.6					
18	255°01.8	119°49.1	17°18.6	102°18.4	12°29.1	53°27.1	-7°53.4	354°26.0	-22°00.5	Shaula	96°18.0	-37°06.9					
19	270°04.2	134°48.5	17°17.9	117°19.3	12°28.5	68°29.1	-7°53.6	9°28.4	-22°00.5	Rasalhague	96°03.8	12°33.2					
20	285°06.7	149°47.9	17°17.1	132°20.3	12°28.0	83°31.2	-7°53.7	24°30.8	-22°00.5	Etamin	90°44.7	51°29.7					
21	300°09.2	164°47.3	17°16.4	147°21.2	12°27.4	98°33.2	-7°53.9	39°33.2	-22°00.5	Kaus Aust.	83°39.9	-34°22.4					
22	315°11.6	179°46.7	17°15.7	162°22.2	12°26.8	113°35.2	-7°54.1	54°35.7	-22°00.5	Vega	80°36.9	38°48.4					
23	330°14.1	194°46.1	17°14.9	177°23.1	12°26.3	128°37.2	-7°54.3	69°38.1	-22°00.5	Nunki	75°54.6	-26°16.3					
Mer.pass.:1:02:			v-0.6 d-0.7 m-3.9	v0.9 d-0.6 m1.8	v2.0 d-0.2 m-1.6	v2.4 d-0.0 m0.4											
Wed	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	345°16.6	209°45.5	17°14.2	192°24.1	12°25.7	143°39.2	-7°54.5	84°40.5	-22°00.5	Alnair	27°39.8	-46°52.4					
1	0°19.0	224°44.9	17°13.4	207°25.0	12°25.2	158°41.3	-7°54.6	99°42.9	-22°00.6	Fomalhaut	15°20.6	-29°31.6					
2	15°21.5	239°44.3	17°12.7	222°25.9	12°24.6	173°43.3	-7°54.8	114°45.3	-22°00.6	Scheat	13°50.3	28°10.8					
3	30°24.0	254°43.7	17°12.0	237°26.9	12°24.0	188°45.3	-7°55.0	129°47.7	-22°00.6	Markab	13°35.2	15°18.1					
4	45°26.4	269°43.1	17°11.2	252°27.8	12°23.5	203°47.3	-7°55.2	144°50.1	-22°00.6	2017/9/4							
5	60°28.9	284°42.5	17°10.5	267°28.8	12°22.9	218°49.3	-7°55.4	159°52.6	-22°00.6	Venus	226°56.1	09:59					
6	75°31.3	299°41.9	17°09.7	282°29.7	12°22.4	233°51.4	-7°55.6	174°55.0	-22°00.6	Mars	208°20.7	11:13					
7	90°33.8	314°41.3	17°09.0	297°30.7	12°21.8	248°53.4	-7°55.7	189°57.4	-22°00.6	Jupiter	158°43.8	14:30					
8	105°36.3	329°40.7	17°08.2	312°31.6	12°21.2	263°55.4	-7°55.9	204°59.8	-22°00.6	Saturn	99°26.1	18:26					
9	120°38.7	344°40.1	17°07.5	327°32.5	12°20.7	278°57.4	-7°56.1	220°02.2	-22°00.6	2017/9/5							
10	135°41.2	359°39.6	17°06.7	342°33.5	12°20.1	293°59.4	-7°56.3	235°04.6	-22°00.6	Venus	225°42.4	10:00					
11	150°43.7	14°39.0	17°06.0	357°34.4	12°19.6	309°01.5	-7°56.5	250°07.0	-22°00.7	Mars	207°44.0	11:11					
12	165°46.1	29°38.4	17°05.2	12°35.4	12°19.0	324°03.5	-7°56.6	265°09.5	-22°00.7	Jupiter	158°33.3	14:27					
13	180°48.6	44°37.8	17°04.5	27°36.3	12°18.4	339°05.5	-7°56.8	280°11.9	-22°00.7	Saturn	99°25.1	18:22					
14	195°51.1	59°37.2	17°03.7	42°37.3	12°17.9	354°07.5	-7°57.0	295°14.3	-22°00.7	2017/9/6							
15	210°53.5	74°36.6	17°03.0	57°38.2	12°17.3	9°09.5	-7°57.2	310°16.7	-22°00.7	Venus	224°28.9	10:01					
16	225°56.0	89°36.0	17°02.2	72°39.2	12°16.7	24°11.6	-7°57.4	325°19.1	-22°00.7	Mars	207°07.5	11:10					
17	240°58.4	104°35.4	17°01.5	87°40.1	12°16.2	39°13.6	-7°57.5	340°21.5	-22°00.7	Jupiter	158°22.7	14:23					
18	256°00.9	119°34.8	17°00.7	102°41.0	12°15.6	54°15.6	-7°57.7	355°23.9	-22°00.7	Saturn	99°23.9	18:18					
19	271°03.4	134°34.2	16°60.0	117°42.0	12°15.1	69°17.6	-7°57.9	10°26.3	-22°00.7	Horizontal paralax							
20	286°05.8	149°33.6	16°59.2	132°42.9	12°14.5	84°19.6	-7°58.1	25°28.7	-22°00.8	Venus:	0.1						
21	301°08.3	164°33.1	16°58.5	147°43.9	12°13.9	99°21.7	-7°58.3	40°31.2	-22°00.8	Mars:	0.1						
22	316°10.8	179°32.5	16°57.7	162°44.8	12°13.4	114°23.7	-7°58.4	55°33.6	-22°00.8								
23	331°13.2	194°31.9	16°56.9	177°45.8	12°12.8	129°25.7	-7°58.6	70°36.0	-22°00.8								
Mer.pass.:0:58:			v-0.6 d-0.7 m-3.9	v0.9 d-0.6 m1.8	v2.0 d-0.2 m-1.6	v2.4 d-0.0 m0.4											

h		Sun		Moon				Twilight			Twilight					
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	180° 13.2	7° 11.3	26° 42.7	11.5	-15° 38.7	6.3	55.7	72	--	02:59	04:22	19:32	20:53	--		
1	195° 13.4	7° 10.4	41° 13.1	11.5	-15° 32.4	6.4	55.7	70	01:19	03:21	04:32	19:22	20:32	22:28		
2	210° 13.6	7° 09.4	55° 43.6	11.5	-15° 25.9	6.5	55.7	68	02:04	03:39	04:41	19:14	20:16	21:47		
3	225° 13.8	7° 08.5	70° 14.1	11.5	-15° 19.4	6.6	55.8	66	02:33	03:52	04:49	19:07	20:02	21:20		
4	240° 14.0	7° 07.6	84° 44.5	11.5	-15° 12.8	6.7	55.8	64	02:54	04:03	04:55	19:01	19:52	20:60		
5	255° 14.2	7° 06.7	99° 15.0	11.5	-15° 06.1	6.7	55.8	62	03:11	04:13	05:00	18:56	19:43	20:44		
6	270° 14.4	7° 05.8	113° 45.5	11.5	-14° 59.3	6.8	55.8	60	03:24	04:21	05:05	18:51	19:35	20:31		
7	285° 14.6	7° 04.8	128° 16.0	11.5	-14° 52.4	6.9	55.9	58	03:36	04:27	05:09	18:47	19:28	20:20		
8	300° 14.9	7° 03.9	142° 46.5	11.5	-14° 45.5	7.0	55.9	56	03:45	04:33	05:12	18:44	19:22	20:10		
9	315° 15.1	7° 03.0	157° 17.0	11.5	-14° 38.4	7.1	55.9	54	03:54	04:39	05:16	18:41	19:17	20:02		
10	330° 15.3	7° 02.1	171° 47.5	11.5	-14° 31.3	7.1	55.9	52	04:01	04:44	05:18	18:38	19:12	19:55		
11	345° 15.5	7° 01.1	186° 18.0	11.5	-14° 24.1	7.2	56.0	50	04:07	04:48	05:21	18:35	19:08	19:48		
12	0° 15.7	7° 00.2	200° 48.5	11.5	-14° 16.9	7.3	56.0	45	04:21	04:57	05:27	18:30	18:60	19:35		
13	15° 15.9	6° 59.3	215° 19.0	11.5	-14° 09.5	7.4	56.0	40	04:31	05:04	05:32	18:25	18:52	19:25		
14	30° 16.1	6° 58.4	229° 49.5	11.5	-14° 02.1	7.5	56.0	35	04:40	05:10	05:36	18:21	18:47	19:17		
15	45° 16.3	6° 57.4	244° 20.1	11.5	-13° 54.6	7.5	56.1	30	04:46	05:15	05:39	18:18	18:42	19:10		
16	60° 16.5	6° 56.5	258° 50.6	11.5	-13° 47.1	7.6	56.1	20	04:57	05:23	05:45	18:12	18:34	18:60		
17	75° 16.7	6° 55.6	273° 21.1	11.5	-13° 39.4	7.7	56.1	10	05:05	05:29	05:51	18:07	18:28	18:52		
18	90° 16.9	6° 54.7	287° 51.7	11.5	-13° 31.7	7.8	56.1	0	05:10	05:35	05:55	18:02	18:23	18:47		
19	105° 17.2	6° 53.7	302° 22.2	11.6	-13° 23.9	7.8	56.2	-10	05:15	05:39	06:00	17:57	18:18	18:43		
20	120° 17.4	6° 52.8	316° 52.8	11.6	-13° 16.0	7.9	56.2	-20	05:17	05:43	06:05	17:53	18:15	18:40		
21	135° 17.6	6° 51.9	331° 23.4	11.6	-13° 08.1	8.0	56.2	-30	05:19	05:46	06:10	17:47	18:11	18:39		
22	150° 17.8	6° 51.0	345° 53.9	11.6	-13° 00.1	8.1	56.2	-35	05:19	05:48	06:14	17:44	18:10	18:39		
23	165° 18.0	6° 50.0	0° 24.5	11.6	-12° 52.0	8.1	56.3	-40	05:19	05:50	06:17	17:41	18:08	18:39		
SD.=15.9		d=-0.9	S.D.=15.2													
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Mon	Tue	Wed	Mon	Tue	Wed		
0	180° 18.2	6° 49.1	14° 55.1	11.6	-12° 43.8	8.2	56.3	-50	05:16	05:53	06:26	17:32	18:05	18:42		
1	195° 18.4	6° 48.2	29° 25.6	11.6	-12° 35.6	8.3	56.3	-52	05:15	05:54	06:28	17:30	18:04	18:43		
2	210° 18.6	6° 47.3	43° 56.2	11.6	-12° 27.3	8.3	56.3	-54	05:14	05:55	06:30	17:28	18:03	18:44		
3	225° 18.8	6° 46.3	58° 26.8	11.6	-12° 18.9	8.4	56.4	-56	05:13	05:56	06:33	17:25	18:03	18:46		
4	240° 19.0	6° 45.4	72° 57.4	11.6	-12° 10.5	8.5	56.4	-58	05:11	05:56	06:36	17:23	18:02	18:47		
5	255° 19.2	6° 44.5	87° 28.0	11.6	-12° 02.0	8.5	56.4	-60	05:09	05:57	06:39	17:19	18:01	18:49		
6	270° 19.5	6° 43.6	101° 58.6	11.6	-11° 53.4	8.6	56.4	Moonrise						Moonset		
7	285° 19.7	6° 42.6	116° 29.2	11.6	-11° 44.8	8.7	56.5	72	20:01	19:50	19:40	00:13	02:12	04:04		
8	300° 19.9	6° 41.7	130° 59.9	11.6	-11° 36.0	8.7	56.5	70	19:36	19:34	19:32	00:53	02:35	04:18		
9	315° 20.1	6° 40.8	145° 30.5	11.6	-11° 27.3	8.8	56.5	68	19:17	19:22	19:25	01:21	02:54	04:29		
10	330° 20.3	6° 39.8	160° 01.1	11.6	-11° 18.4	8.9	56.5	66	19:01	19:12	19:20	01:41	03:08	04:38		
11	345° 20.5	6° 38.9	174° 31.7	11.6	-11° 09.5	8.9	56.6	64	18:49	19:03	19:15	01:58	03:20	04:45		
12	0° 20.7	6° 38.0	189° 02.4	11.6	-11° 00.5	9.0	56.6	62	18:38	18:55	19:11	02:11	03:30	04:52		
13	15° 20.9	6° 37.1	203° 33.0	11.6	-10° 51.5	9.1	56.6	60	18:29	18:49	19:07	02:23	03:38	04:57		
14	30° 21.1	6° 36.1	218° 03.6	11.6	-10° 42.4	9.1	56.6	58	18:20	18:43	19:04	02:33	03:46	05:02		
15	45° 21.4	6° 35.2	232° 34.3	11.6	-10° 33.2	9.2	56.7	56	18:13	18:38	19:01	02:41	03:52	05:06		
16	60° 21.6	6° 34.3	247° 04.9	11.6	-10° 24.0	9.3	56.7	54	18:07	18:34	18:58	02:49	03:58	05:10		
17	75° 21.8	6° 33.3	261° 35.6	11.7	-10° 14.7	9.3	56.7	52	18:01	18:30	18:56	02:56	04:03	05:14		
18	90° 22.0	6° 32.4	276° 06.2	11.7	-10° 05.4	9.4	56.7	50	17:56	18:26	18:54	03:02	04:08	05:17		
19	105° 22.2	6° 31.5	290° 36.9	11.7	-9° 56.0	9.4	56.8	45	17:45	18:18	18:49	03:15	04:18	05:24		
20	120° 22.4	6° 30.6	305° 07.5	11.7	-9° 46.5	9.5	56.8	40	17:35	18:11	18:45	03:26	04:27	05:30		
21	135° 22.6	6° 29.6	319° 38.2	11.7	-9° 37.0	9.5	56.8	35	17:27	18:05	18:41	03:36	04:34	05:34		
22	150° 22.8	6° 28.7	334° 08.9	11.7	-9° 27.4	9.6	56.8	30	17:20	17:60	18:38	03:44	04:41	05:39		
23	165° 23.0	6° 27.8	348° 39.5	11.7	-9° 17.8	9.7	56.8	20	17:08	17:51	18:33	03:58	04:52	05:46		
SD.=15.9		d=-0.9	S.D.=15.4													
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun	Mer.	Moon	Age				
0	180° 23.3	6° 26.8	3° 10.2	11.7	-9° 08.1	9.7	56.9	4	00:53	01:03	11:58	22:58	10:33	14(97%)		
1	195° 23.5	6° 25.9	17° 40.9	11.7	-8° 58.4	9.8	56.9	5	01:13	01:23	11:58	23:46	11:22	15(99%)		
2	210° 23.7	6° 25.0	32° 11.5	11.7	-8° 48.6	9.8	56.9	6	01:33	01:43	11:58	00:35	12:11	16(100%)		
3	225° 23.9	6° 24.0	46° 42.2	11.7	-8° 38.7	9.9	56.9	Eqn.of Time		Mer.	Mer.Pass.		Age			
4	240° 24.1	6° 23.1	61° 12.9	11.7	-8° 28.8	9.9	57.0	00 ^h	12 ^h	Pass	Upper	Lower				
5	255° 24.3	6° 22.2	75° 43.5	11.7	-8° 18.9	10.0	57.0									
6	270° 24.5	6° 21.3	90° 14.2	11.7	-8° 08.9	10.0	57.0									
7	285° 24.7	6° 20.3	104° 44.9	11.7	-7° 58.8	10.1	57.0									
8	300° 25.0	6° 19.4	119° 15.5	11.7	-7° 48.7	10.1	57.1									
9	315° 25.2	6° 18.5	133° 46.2	11.7	-7° 38.6	10.2	57.1									
10	330° 25.4	6° 17.5	148° 16.9	11.7	-7° 28.4	10.2	57.1									
11	345° 25.6	6° 16.6	162° 47.5	11.7	-7° 18.1	10.3	57.1									
12	0° 25.8	6° 15.7	177° 18.2	11.7	-7° 07.8	10.3	57.2									
13	15° 26.0	6° 14.7	191° 48.9	11.7	-6° 57.5	10.4	57.2									
14	30° 26.2	6° 13.8	206° 19.5	11.7	-6° 47.1	10.4	57.2									
15	45° 26.4	6° 12.9	220° 50.2	11.7	-6° 36.7	10.4	57.2									
16	60° 26.7	6° 11.9	235° 20.8	11.7	-6° 26.2	10.5	57.3									
17	75° 26.9	6° 11.0	249° 51.5	11.6	-6° 15.7	10.5	57.3									
18	90° 27.1	6° 10.1	264° 22.1	11.6	-6° 05.2	10.6	57.3									
19	105° 27.3	6° 09.1	278° 52.8	11.6	-5° 54.6	10.6	57.3									
20	120° 27.5	6° 08.2	293° 23.4	11.6	-5° 44.0	10.6	57.3									
21	135° 27.7	6° 07.3	307° 54.0	11.6	-5° 33.3	10.7	57.4									
22	150° 27.9	6° 06.3	322° 24.6	11.6	-5° 22.6	10.7	57.4									
23	165° 28.2	6° 05.4	336° 55.3	11.6	-5° 11.9	10.8	57.4									
SD.=15.9		d=-0.9	S.D.=15.5													

September 07, 08 ,09 (Thu., Fri., Sat.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Thu	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec				
0	346°15.7	209°31.3	16°56.2	192°46.7	12°12.2	144°27.7	-7°58.8	85°38.4	-22°00.8	85°38.4	-22°00.8	85°38.4	-22°00.8	Alpheratz	357°40.2	29°11.3				
1	1°18.2	224°30.7	16°55.4	207°47.7	12°11.7	159°29.7	-7°59.0	100°40.8	-22°00.8	100°40.8	-22°00.8	100°40.8	-22°00.8	Ankaa	353°12.5	-42°12.5				
2	16°20.6	239°30.1	16°54.7	222°48.6	12°11.1	174°31.8	-7°59.2	115°43.2	-22°00.8	115°43.2	-22°00.8	115°43.2	-22°00.8	Schedar	349°36.7	56°37.9				
3	31°23.1	254°29.5	16°53.9	237°49.6	12°10.5	189°33.8	-7°59.4	130°45.6	-22°00.8	130°45.6	-22°00.8	130°45.6	-22°00.8	Diphda	348°52.6	-17°53.3				
4	46°25.6	269°28.9	16°53.1	252°50.5	12°10.0	204°35.8	-7°59.5	145°48.0	-22°00.8	145°48.0	-22°00.8	145°48.0	-22°00.8	Achernar	335°24.3	-57°08.7				
5	61°28.0	284°28.3	16°52.4	267°51.4	12°09.4	219°37.8	-7°59.7	160°50.4	-22°00.9	160°50.4	-22°00.9	160°50.4	-22°00.9	Hamal	327°57.3	23°32.7				
6	76°30.5	299°27.8	16°51.6	282°52.4	12°08.9	234°39.8	-7°59.9	175°52.8	-22°00.9	175°52.8	-22°00.9	175°52.8	-22°00.9	Polaris	316°14.9	89°19.9				
7	91°32.9	314°27.2	16°50.8	297°53.3	12°08.3	249°41.8	-8°00.1	190°55.3	-22°00.9	190°55.3	-22°00.9	190°55.3	-22°00.9	Akamar	315°16.0	-40°13.9				
8	106°35.4	329°26.6	16°50.1	312°54.3	12°07.7	264°43.9	-8°00.3	205°57.7	-22°00.9	205°57.7	-22°00.9	205°57.7	-22°00.9	Menkar	314°11.9	4°09.5				
9	121°37.9	344°26.0	16°49.3	327°55.2	12°07.2	279°45.9	-8°00.4	221°00.1	-22°00.9	221°00.1	-22°00.9	221°00.1	-22°00.9	Mirfak	308°36.0	49°55.1				
10	136°40.3	359°25.4	16°48.5	342°56.2	12°06.6	294°47.9	-8°00.6	236°02.5	-22°00.9	236°02.5	-22°00.9	236°02.5	-22°00.9	Aldebaran	290°46.1	16°32.5				
11	151°42.8	14°24.8	16°47.8	357°57.1	12°06.0	309°49.9	-8°00.8	251°04.9	-22°00.9	251°04.9	-22°00.9	251°04.9	-22°00.9	Rigel	281°09.3	-8°10.9				
12	166°45.3	29°24.3	16°47.0	12°58.1	12°05.5	324°51.9	-8°01.0	266°07.3	-22°00.9	266°07.3	-22°00.9	266°07.3	-22°00.9	Capella	280°30.3	46°00.7				
13	181°47.7	44°23.7	16°46.2	27°59.0	12°04.9	339°54.0	-8°01.2	281°09.7	-22°00.9	281°09.7	-22°00.9	281°09.7	-22°00.9	Bellatrix	278°29.0	6°21.8				
14	196°50.2	59°23.1	16°45.5	42°60.0	12°04.3	354°56.0	-8°01.3	296°12.1	-22°01.0	296°12.1	-22°01.0	296°12.1	-22°01.0	Elnath	278°09.1	28°37.1				
15	211°52.7	74°22.5	16°44.7	58°00.9	12°03.8	9°58.0	-8°01.5	311°14.5	-22°01.0	311°14.5	-22°01.0	311°14.5	-22°01.0	Alnilam	275°43.5	-1°11.5				
16	226°55.1	89°21.9	16°43.9	73°01.9	12°03.2	25°00.0	-8°01.7	326°16.9	-22°01.0	326°16.9	-22°01.0	326°16.9	-22°01.0	Betelgeuse	270°58.3	7°24.5				
17	241°57.6	104°21.3	16°43.2	88°02.8	12°02.6	40°02.0	-8°01.9	341°19.3	-22°01.0	341°19.3	-22°01.0	341°19.3	-22°01.0	Canopus	263°55.1	-52°42.2				
18	257°00.0	119°20.7	16°42.4	103°03.8	12°02.1	55°04.0	-8°02.1	356°21.7	-22°01.0	356°21.7	-22°01.0	356°21.7	-22°01.0	Sirius	258°31.3	-16°44.2				
19	272°02.5	134°20.2	16°41.6	118°04.7	12°01.5	70°06.1	-8°02.3	11°24.1	-22°01.0	11°24.1	-22°01.0	11°24.1	-22°01.0	Adara	255°10.4	-28°59.7				
20	287°05.0	149°19.6	16°40.8	133°05.6	12°00.9	85°08.1	-8°02.4	26°26.6	-22°01.0	26°26.6	-22°01.0	26°26.6	-22°01.0	Procyon	244°56.9	5°10.9				
21	302°07.4	164°19.0	16°40.0	148°06.6	12°00.4	100°10.1	-8°02.6	41°29.0	-22°01.0	41°29.0	-22°01.0	41°29.0	-22°01.0	Pollux	243°24.4	27°58.9				
22	317°09.9	179°18.4	16°39.3	163°07.5	11°59.8	115°12.1	-8°02.8	56°31.4	-22°01.0	56°31.4	-22°01.0	56°31.4	-22°01.0	Avior	234°17.3	-59°33.8				
23	332°12.4	194°17.8	16°38.5	178°08.5	11°59.2	130°14.1	-8°03.0	71°33.8	-22°01.1	71°33.8	-22°01.1	71°33.8	-22°01.1	Suhail	222°50.7	-43°30.1				
Mer.pass.:0:54:			v-0.6 d-0.8 m-3.9			v0.9 d-0.6 m1.8			v2.0 d-0.2 m-1.6			v2.4 d-0.0 m0.4			Miaplacidus			221°39.8	-69°47.3	
															Alphard			217°53.6	-8°44.0	
															Regulus			207°40.8	11°52.9	
															Dubhe			193°48.9	61°39.4	
															Denebola			182°31.0	14°28.6	
															Gienah			175°49.6	-17°38.2	
															AcruX			173°06.7	-63°11.8	
															Gacrux			171°58.2	-57°12.7	
															Alioth			166°18.8	55°52.1	
															Spica			158°28.5	-11°15.0	
															Alcaid			152°57.0	49°13.9	
															Hadar			148°44.2	-60°27.5	
															Menkent			148°04.5	-36°27.3	
															Arcturus			145°53.2	19°06.1	
															Rigel Kent.			139°48.1	-60°54.5	
															Zubenelg.			137°02.4	-16°06.7	
															Kochab			137°20.8	74°05.4	
															Alphecca			126°08.8	26°39.8	
															Antares			112°22.8	-28°28.1	
															Atria			107°22.0	-69°03.6	
															Sabik			102°09.2	-15°44.6	
															Shaula			96°18.0	-37°06.9	
															Rasalhague			96°03.8	12°33.3	
															Etamin			90°44.7	51°29.7	
															Kaus Aust.			83°39.9	-34°22.4	
															Vega			80°36.9	38°48.4	
															Nunki			75°54.6	-26°16.3	
															Altair			62°05.3	8°55.2	
															Peacock			53°14.3	-56°40.6	
															Deneb			49°29.1	45°20.9	
															Enif			33°44.0	9°57.6	
															Alnair			27°39.8	-46°52.4	
															Fomalhaut			15°20.6	-29°31.6	
															Scheat			13°50.3	28°10.8	
															Markab			13°35.2	15°18.1	
															2017/9/7			SHA	Mer.pass	
															Venus			223°15.6	10:02	
															Mars			206°31.0	11:08	
															Jupiter			158°12.0	14:20	
															Saturn			99°22.7	18:15	
															2017/9/8			SHA	Mer.pass	
															Venus			222°02.4	10:03	
															Mars			205°54.6	11:07	
															Jupiter			158°01.3	14:17	
															Saturn			99°21.3	18:11	
															2017/9/9			SHA	Mer.pass	
															Venus			220°49.4	10:04	
															Mars			205°18.3	11:05	
															Jupiter			157°50.5	14:14	
															Saturn			99°19.9	18:07	
															Horizontal paralax					
															Venus:			0.1		
															Mars:			0.1		
Mer.pass.:0:46:			v-0.6 d-0.8 m-3.9			v1.0 d-0.6 m1.8			v2.0 d-0.2 m-1.6			v2.4 d-0.0 m0.5								

h		Sun			Moon									
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	180°28.4	6°04.5	351°25.9	11.6	-5°01.1	10.8	57.4	72	00:41	03:17	04:36	19:16	20:33	22:55
1	195°28.6	6°03.5	5°56.5	11.6	-4°50.3	10.8	57.5	70	01:49	03:36	04:45	19:08	20:15	21:58
2	210°28.8	6°02.6	20°27.1	11.6	-4°39.4	10.9	57.5	68	02:24	03:51	04:52	19:01	20:01	21:26
3	225°29.0	6°01.6	34°57.7	11.6	-4°28.6	10.9	57.5	66	02:48	04:03	04:58	18:55	19:50	21:03
4	240°29.2	6°00.7	49°28.3	11.6	-4°17.7	10.9	57.5	64	03:07	04:13	05:03	18:50	19:40	20:45
5	255°29.4	5°59.8	63°58.8	11.6	-4°06.7	10.9	57.6	62	03:21	04:21	05:08	18:46	19:32	20:31
6	270°29.7	5°58.8	78°29.4	11.6	-3°55.8	11.0	57.6	60	03:33	04:28	05:12	18:42	19:25	20:19
7	285°29.9	5°57.9	92°59.9	11.5	-3°44.8	11.0	57.6	58	03:44	04:34	05:15	18:39	19:19	20:10
8	300°30.1	5°57.0	107°30.5	11.5	-3°33.8	11.0	57.6	56	03:52	04:40	05:18	18:36	19:14	20:01
9	315°30.3	5°56.0	122°01.0	11.5	-3°22.7	11.1	57.6	54	04:00	04:44	05:21	18:33	19:09	19:54
10	330°30.5	5°55.1	136°31.5	11.5	-3°11.7	11.1	57.7	52	04:07	04:49	05:23	18:31	19:05	19:47
11	345°30.7	5°54.2	151°02.1	11.5	-3°00.6	11.1	57.7	50	04:13	04:52	05:26	18:29	19:02	19:41
12	0°30.9	5°53.2	165°32.6	11.5	-2°49.4	11.1	57.7	45	04:25	05:01	05:30	18:24	18:54	19:29
13	15°31.2	5°52.3	180°03.1	11.5	-2°38.3	11.2	57.7	40	04:34	05:07	05:34	18:20	18:47	19:20
14	30°31.4	5°51.3	194°33.5	11.5	-2°27.1	11.2	57.7	35	04:42	05:12	05:38	18:17	18:42	19:12
15	45°31.6	5°50.4	209°04.0	11.5	-2°16.0	11.2	57.8	30	04:48	05:17	05:41	18:14	18:38	19:06
16	60°31.8	5°49.5	223°34.4	11.4	-2°04.7	11.2	57.8	20	04:58	05:24	05:46	18:09	18:31	18:57
17	75°32.0	5°48.5	238°04.9	11.4	-1°53.5	11.2	57.8	10	05:05	05:29	05:50	18:05	18:26	18:50
18	90°32.2	5°47.6	252°35.3	11.4	-1°42.3	11.2	57.8	0	05:09	05:34	05:54	18:01	18:22	18:46
19	105°32.4	5°46.7	267°05.7	11.4	-1°31.0	11.3	57.9	-10	05:13	05:37	05:58	17:57	18:18	18:43
20	120°32.7	5°45.7	281°36.1	11.4	-1°19.8	11.3	57.9	-20	05:15	05:40	06:02	17:53	18:15	18:41
21	135°32.9	5°44.8	296°06.5	11.4	-1°08.5	11.3	57.9	-30	05:15	05:43	06:07	17:49	18:13	18:40
22	150°33.1	5°43.8	310°36.8	11.3	-0°57.2	11.3	57.9	-35	05:15	05:44	06:09	17:46	18:12	18:41
23	165°33.3	5°42.9	325°07.2	11.3	-0°45.9	11.3	57.9	-40	05:14	05:45	06:12	17:44	18:11	18:42
SD.=15.9 d=-0.9							S.D.=15.7							
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
									Thu	Fri	Sat	Thu	Fri	Sat
0	180°33.5	5°42.0	339°37.5	11.3	-0°34.5	11.3	58.0	72	19:32	19:24	19:15	05:55	07:46	09:39
1	195°33.7	5°41.0	354°07.8	11.3	-0°23.2	11.3	58.0	70	19:30	19:28	19:26	06:01	07:45	09:31
2	210°34.0	5°40.1	8°38.1	11.3	-0°11.9	11.3	58.0	68	19:28	19:31	19:34	06:06	07:44	09:24
3	225°34.2	5°39.1	23°08.3	11.3	-0°00.5	11.4	58.0	66	19:27	19:34	19:41	06:10	07:43	09:19
4	240°34.4	5°38.2	37°38.6	11.2	0°10.8	11.4	58.0	64	19:25	19:36	19:48	06:13	07:43	09:14
5	255°34.6	5°37.3	52°08.8	11.2	0°22.2	11.4	58.1	62	19:24	19:38	19:53	06:16	07:42	09:10
6	270°34.8	5°36.3	66°39.0	11.2	0°33.6	11.4	58.1	60	19:23	19:40	19:58	06:19	07:42	09:06
7	285°35.0	5°35.4	81°09.2	11.2	0°44.9	11.4	58.1	58	19:23	19:42	20:02	06:21	07:41	09:03
8	300°35.3	5°34.4	95°39.3	11.1	0°56.3	11.4	58.1	56	19:22	19:43	20:06	06:23	07:41	09:00
9	315°35.5	5°33.5	110°09.5	11.1	1°07.7	11.4	58.1	54	19:21	19:44	20:09	06:25	07:41	08:58
10	330°35.7	5°32.6	124°39.6	11.1	1°19.1	11.4	58.1	52	19:21	19:46	20:12	06:26	07:40	08:56
11	345°35.9	5°31.6	139°09.7	11.1	1°30.5	11.4	58.2	50	19:20	19:47	20:15	06:28	07:40	08:54
12	0°36.1	5°30.7	153°39.8	11.1	1°41.8	11.4	58.2	45	19:19	19:49	20:21	06:31	07:39	08:49
13	15°36.3	5°29.7	168°09.8	11.0	1°53.2	11.4	58.2	40	19:18	19:51	20:26	06:34	07:39	08:45
14	30°36.6	5°28.8	182°39.8	11.0	2°04.6	11.4	58.2	35	19:17	19:53	20:30	06:36	07:38	08:42
15	45°36.8	5°27.9	197°09.8	11.0	2°16.0	11.4	58.2	30	19:16	19:54	20:34	06:38	07:38	08:39
16	60°37.0	5°26.9	211°39.8	11.0	2°27.3	11.4	58.3	20	19:15	19:57	20:41	06:41	07:37	08:34
17	75°37.2	5°26.0	226°09.7	10.9	2°38.7	11.3	58.3	10	19:14	19:60	20:47	06:44	07:37	08:30
18	90°37.4	5°25.0	240°39.6	10.9	2°50.0	11.3	58.3	0	19:13	20:02	20:53	06:47	07:36	08:26
19	105°37.6	5°24.1	255°09.5	10.9	3°01.3	11.3	58.3	-10	19:11	20:04	20:58	06:50	07:35	08:22
20	120°37.9	5°23.1	269°39.4	10.8	3°12.7	11.3	58.3	-20	19:10	20:07	21:05	06:53	07:35	08:18
21	135°38.1	5°22.2	284°09.2	10.8	3°24.0	11.3	58.3	-30	19:09	20:10	21:12	06:56	07:34	08:13
22	150°38.3	5°21.3	298°39.0	10.8	3°35.3	11.3	58.4	-40	19:08	20:12	21:16	06:58	07:33	08:10
23	165°38.5	5°20.3	313°08.8	10.8	3°46.6	11.3	58.4	-35	19:08	20:13	21:20	06:60	07:33	08:07
SD.=15.9 d=-0.9							S.D.=15.8							
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun			Moon		
									Eqn.of Time	Mer.	Mer.	Mer.Pass.	Age	
									00 ^h	12 ^h	Pass	Upper	Lower	
0	180°38.7	5°19.4	327°38.5	10.7	3°57.9	11.3	58.4	7	01:53	02:04	11:57	00:35	12:59	17(98%)
1	195°38.9	5°18.4	342°08.2	10.7	4°09.1	11.3	58.4	8	02:14	02:24	11:57	01:24	13:48	18(94%)
2	210°39.2	5°17.5	356°37.9	10.7	4°20.4	11.2	58.4	9	02:35	02:45	11:57	02:13	14:39	19(88%)
3	225°39.4	5°16.5	11°07.5	10.6	4°31.6	11.2	58.4							
4	240°39.6	5°15.6	25°37.1	10.6	4°42.8	11.2	58.5							
5	255°39.8	5°14.7	40°06.7	10.6	4°54.0	11.2	58.5							
6	270°40.0	5°13.7	54°36.3	10.5	5°05.1	11.2	58.5							
7	285°40.2	5°12.8	69°05.8	10.5	5°16.3	11.1	58.5							
8	300°40.5	5°11.8	83°35.3	10.5	5°27.4	11.1	58.5							
9	315°40.7	5°10.9	98°04.7	10.4	5°38.5	11.1	58.5							
10	330°40.9	5°09.9	112°34.1	10.4	5°49.5	11.1	58.5							
11	345°41.1	5°09.0	127°03.5	10.4	6°00.6	11.0	58.6							
12	0°41.3	5°08.1	141°32.8	10.3	6°11.6	11.0	58.6							
13	15°41.6	5°07.1	156°02.1	10.3	6°22.6	11.0	58.6							
14	30°41.8	5°06.2	170°31.4	10.2	6°33.5	10.9	58.6							
15	45°42.0	5°05.2	185°00.6	10.2	6°44.4	10.9	58.6							
16	60°42.2	5°04.3	199°29.8	10.2	6°55.3	10.9	58.6							
17	75°42.4	5°03.3	213°58.9	10.1	7°06.2	10.8	58.6							
18	90°42.6	5°02.4	228°28.0	10.1	7°17.0	10.8	58.7							
19	105°42.9	5°01.4	242°57.1	10.0	7°27.8	10.8	58.7							
20	120°43.1	5°00.5	257°26.1	10.0	7°38.5	10.7	58.7							
21	135°43.3	4°59.5	271°55.1	10.0	7°49.2	10.7	58.7							
22	150°43.5	4°58.6	286°24.0	9.9	7°59.9	10.6	58.7							
23	165°43.7	4°57.6	300°52.9	9.9	8°10.5	10.6	58.7							
SD.=15.9 d=-0.9							S.D.=15.9							

September 10, 11, 12 (Sun., Mon., Tue.)

	Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	349°13.1	208°49.7	15°59.3	193°55.1	11°31.4	146°52.8	-8°11.9	88°31.5	-22°01.6	Alpheratz	357°40.2	29°11.3						
1	4°15.6	223°49.2	15°58.5	208°56.0	11°30.8	161°54.8	-8°12.1	103°33.9	-22°01.6	Ankaa	353°12.5	-42°12.5						
2	19°18.0	238°48.6	15°57.7	223°57.0	11°30.2	176°56.8	-8°12.3	118°36.3	-22°01.6	Schedar	349°36.7	56°37.9						
3	34°20.5	253°48.0	15°56.9	238°58.0	11°29.6	191°58.8	-8°12.5	133°38.6	-22°01.7	Diphda	348°52.6	-17°53.3						
4	49°23.0	268°47.5	15°56.1	253°58.9	11°29.1	207°00.8	-8°12.7	148°41.0	-22°01.7	Achernar	335°24.3	-57°08.7						
5	64°25.4	283°46.9	15°55.2	268°59.9	11°28.5	222°02.8	-8°12.8	163°43.4	-22°01.7	Hamal	327°57.3	23°32.7						
6	79°27.9	298°46.3	15°54.4	284°00.8	11°27.9	237°04.8	-8°13.0	178°45.8	-22°01.7	Polaris	316°13.6	89°19.9						
7	94°30.4	313°45.8	15°53.6	299°01.8	11°27.3	252°06.8	-8°13.2	193°48.2	-22°01.7	Akamar	315°16.0	-40°13.9						
8	109°32.8	328°45.2	15°52.8	314°02.7	11°26.8	267°08.9	-8°13.4	208°50.6	-22°01.7	Menkar	314°11.9	4°09.5						
9	124°35.3	343°44.6	15°51.9	329°03.7	11°26.2	282°10.9	-8°13.6	223°53.0	-22°01.7	Mirfak	308°36.0	49°55.1						
10	139°37.7	358°44.1	15°51.1	344°04.6	11°25.6	297°12.9	-8°13.8	238°55.4	-22°01.7	Aldebaran	290°46.0	16°32.5						
11	154°40.2	13°43.5	15°50.3	359°05.6	11°25.0	312°14.9	-8°13.9	253°57.8	-22°01.7	Rigel	281°09.3	-8°10.9						
12	169°42.7	28°43.0	15°49.5	14°06.5	11°24.5	327°16.9	-8°14.1	269°00.2	-22°01.8	Capella	280°30.2	46°00.7						
13	184°45.1	43°42.4	15°48.6	29°07.5	11°23.9	342°18.9	-8°14.3	284°02.6	-22°01.8	Bellatrix	278°29.0	6°21.8						
14	199°47.6	58°41.8	15°47.8	44°08.5	11°23.3	357°20.9	-8°14.5	299°05.0	-22°01.8	Elnath	278°09.0	28°37.1						
15	214°50.1	73°41.3	15°47.0	59°09.4	11°22.8	12°22.9	-8°14.7	314°07.4	-22°01.8	Alnilam	275°43.5	-1°11.5						
16	229°52.5	88°40.7	15°46.1	74°10.4	11°22.2	27°24.9	-8°14.9	329°09.8	-22°01.8	Betelgeuse	270°58.3	7°24.5						
17	244°55.0	103°40.2	15°45.3	89°11.3	11°21.6	42°26.9	-8°15.0	344°12.2	-22°01.8	Canopus	263°55.0	-52°42.1						
18	259°57.5	118°39.6	15°44.5	104°12.3	11°21.0	57°28.9	-8°15.2	359°14.6	-22°01.8	Sirius	258°31.2	-16°44.2						
19	274°59.9	133°39.0	15°43.6	119°13.2	11°20.5	72°31.0	-8°15.4	14°17.0	-22°01.8	Adara	255°10.4	-28°59.7						
20	290°02.4	148°38.5	15°42.8	134°14.2	11°19.9	87°33.0	-8°15.6	29°19.4	-22°01.9	Procyon	244°56.9	5°10.9						
21	305°04.9	163°37.9	15°42.0	149°15.1	11°19.3	102°35.0	-8°15.8	44°21.8	-22°01.9	Pollux	243°24.4	27°58.9						
22	320°07.3	178°37.4	15°41.1	164°16.1	11°18.7	117°37.8	-8°16.0	59°24.2	-22°01.9	Avior	234°17.3	-59°33.8						
23	335°09.8	193°36.8	15°40.3	179°17.1	11°18.2	132°39.0	-8°16.1	74°26.5	-22°01.9	Suhail	222°50.7	-43°30.1						
Mer.pass.:0:43: v-0.6 d-0.8 m-3.9 v1.0 d-0.6 m1.8 v2.0 d-0.2 m-1.6 v2.4 d-0.0 m0.5																		
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	350°12.2	208°36.2	15°39.5	194°18.0	11°17.6	147°41.0	-8°16.3	89°28.9	-22°01.9	Dubhe	193°48.9	61°39.4						
1	5°14.7	223°35.7	15°38.6	209°19.0	11°17.0	162°43.0	-8°16.5	104°31.3	-22°01.9	Denebola	182°31.0	14°28.6						
2	20°17.2	238°35.1	15°37.8	224°19.9	11°16.4	177°45.0	-8°16.7	119°33.7	-22°01.9	Genah	175°49.6	-17°38.2						
3	35°19.6	253°34.6	15°37.0	239°20.9	11°15.9	192°47.0	-8°16.9	134°36.1	-22°01.9	Acrux	173°06.7	-63°11.8						
4	50°22.1	268°34.0	15°36.1	254°21.8	11°15.3	207°49.0	-8°17.1	149°38.5	-22°01.9	Gacrux	171°58.2	-57°12.7						
5	65°24.6	283°33.4	15°35.3	269°22.8	11°14.7	222°51.0	-8°17.2	164°40.9	-22°02.0	Alioth	166°18.8	55°52.1						
6	80°27.0	298°32.9	15°34.4	284°23.7	11°14.1	237°53.0	-8°17.4	179°43.3	-22°02.0	Spica	158°28.5	-11°15.0						
7	95°29.5	313°32.3	15°33.6	299°24.7	11°13.6	252°55.0	-8°17.6	194°45.7	-22°02.0	Alcaid	152°57.1	49°13.9						
8	110°32.0	328°31.8	15°32.7	314°25.7	11°13.0	267°57.1	-8°17.8	209°48.1	-22°02.0	Hadar	148°44.2	-60°27.4						
9	125°34.4	343°31.2	15°31.9	329°26.6	11°12.4	282°59.1	-8°18.0	224°50.5	-22°02.0	Menkent	148°04.5	-36°27.3						
10	140°36.9	358°30.7	15°31.1	344°27.6	11°11.8	298°01.1	-8°18.2	239°52.9	-22°02.0	Arcturus	145°53.2	19°06.1						
11	155°39.3	13°30.1	15°30.2	359°28.5	11°11.3	313°03.1	-8°18.4	254°55.3	-22°02.0	Rigel Kent.	139°48.2	-60°54.4						
12	170°41.8	28°29.6	15°29.4	14°29.5	11°10.7	328°05.1	-8°18.5	269°57.6	-22°02.0	Zubenelg.	137°02.4	-16°06.7						
13	185°44.3	43°29.0	15°28.5	29°30.4	11°10.1	343°07.1	-8°18.7	285°00.0	-22°02.1	Kochab	137°20.9	74°05.4						
14	200°46.7	58°28.4	15°27.7	44°31.4	11°09.5	358°09.1	-8°18.9	300°02.4	-22°02.1	Alphecca	126°08.8	26°39.8						
15	215°49.2	73°27.9	15°26.8	59°32.4	11°08.9	13°11.1	-8°19.1	315°04.8	-22°02.1	Antares	112°22.8	-26°28.1						
16	230°51.7	88°27.3	15°26.0	74°33.3	11°08.4	28°13.1	-8°19.3	330°07.2	-22°02.1	Atria	107°22.0	-69°03.6						
17	245°54.1	103°26.8	15°25.1	89°34.3	11°07.8	43°15.1	-8°19.5	345°09.6	-22°02.1	Sabik	102°09.3	-15°44.6						
18	260°56.6	118°26.2	15°24.3	104°35.2	11°07.2	58°17.1	-8°19.6	0°12.0	-22°02.1	Shaula	96°18.0	-37°06.9						
19	275°59.1	133°25.7	15°23.4	119°36.2	11°06.6	73°19.1	-8°19.8	15°14.4	-22°02.1	Rasalhague	96°03.8	12°33.3						
20	291°01.5	148°25.1	15°22.6	134°37.2	11°06.1	88°21.1	-8°20.0	30°16.8	-22°02.1	Etamin	90°44.7	51°29.7						
21	306°04.0	163°24.6	15°21.7	149°38.1	11°05.5	103°23.1	-8°20.2	45°19.2	-22°02.1	Kaus Aust.	83°39.9	-34°22.4						
22	321°06.5	178°24.0	15°20.9	164°39.1	11°04.9	118°25.1	-8°20.4	60°21.5	-22°02.2	Vega	80°36.9	38°48.4						
23	336°08.9	193°23.5	15°20.0	179°40.0	11°04.3	133°27.2	-8°20.6	75°23.9	-22°02.2	Nunki	75°54.6	-26°16.3						
Mer.pass.:0:39: v-0.6 d-0.8 m-3.9 v1.0 d-0.6 m1.8 v2.0 d-0.2 m-1.6 v2.4 d-0.0 m0.5																		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	351°11.4	208°22.9	15°19.1	194°41.0	11°03.8	148°29.2	-8°20.7	90°26.3	-22°02.2	Enif	33°44.0	9°57.6						
1	6°13.8	223°22.4	15°18.3	209°41.9	11°03.2	163°31.2	-8°20.9	105°28.7	-22°02.2	Alnair	27°39.8	-46°52.4						
2	21°16.3	238°21.8	15°17.4	224°42.9	11°02.6	178°33.2	-8°21.1	120°31.1	-22°02.2	Fomalhaut	15°20.6	-29°31.6						
3	36°18.8	253°21.3	15°16.6	239°43.9	11°02.0	193°35.2	-8°21.3	135°33.5	-22°02.2	Scheat	13°50.3	28°10.8						
4	51°21.2	268°20.7	15°15.7	254°44.8	11°01.4	208°37.2	-8°21.5	150°35.9	-22°02.2	Markab	13°35.2	15°18.1						
5	66°23.7	283°20.2	15°14.9	269°45.8	11°00.9	223°39.2	-8°21.7	165°38.3	-22°02.2	2017/9/1	SHA	Mer.pass						
6	81°26.2	298°19.6	15°14.0	284°46.7	11°00.3	238°41.2	-8°21.9	180°40.7	-22°02.3	Venus	219°36.6	10:05						
7	96°28.6	313°19.1	15°13.1	299°47.7	10°59.7	253°43.2	-8°22.0	195°43.0	-22°02.3	Mars	204°42.0	11:04						
8	111°31.1	328°18.5	15°12.3	314°48.7	10°59.1	268°45.2	-8°22.2	210°45.4	-22°02.3	Jupiter	157°39.7	14:11						
9	126°33.6	343°18.0	15°11.4	329°49.6	10°58.5	283°47.2	-8°22.4	225°47.8	-22°02.3	Saturn	99°18.4	18:03						
10	141°36.0	358°17.4	15°10.5	344°50.6	10°58.0	298°49.2	-8°22.6	240°50.2	-22°02.3	2017/9/1	SHA	Mer.pass						
11	156°38.5	13°16.9	15°09.7	359°51.5	10°57.4	313°51.2	-8°22.8	255°52.6	-22°02.3	Venus	218°24.0	10:06						
12	171°41.0	28°16.3	15°08.8	14°52.5	10°56.8	328°53.2	-8°23.0	270°55.0	-22°02.3	Mars	204°05.8	11:02						
13	186°43.4	43°15.8	15°08.0	29°53.5	10°56.2	343°55.2	-8°23.1	285°57.4	-22°02.3	Jupiter	157°28.8	14:07						
14	201°45.9	58°15.2	15°07.1	44°54.4	10°55.7	358°57.2	-8°23.3	300°59.8	-22°02.4	Saturn	99°16.7	17:59						
15	216°48.3	73°14.7	15°06.2	59°55.4	10°55.1	13°59.2	-8°23.5	316°02.1	-22°02.4	2017/9/1	SHA	Mer.pass						
16	231°50.8	88°14.1	15°05.4	74°56.3	10°54.5	29°01.2	-8°23.7	331°04.5	-22°02.4	Venus	217°11.5	10:07						
17	246°53.3	103°13.6	15°04.5	89°57.3	10°53.9	44°03.2	-8°23.9	346°06.9	-22°02.4	Mars	203°29.6	11:01						
18	261°55.7	118°13.0	15°03.6	104°58.3	10°53.3	59°05.2	-8°24.1	1°09.3	-22°02.4	Jupiter	157°17.8	14:04						
19	276°58.2	133°12.5	15°02.7	119°59.2	10°52.8	74°07.2	-8°24.3	16°11.7	-22°02.4	Saturn	99°14.9	17:55						
20	292°00.7	148°12.0	15°01.9	135°00.2	10°52.2	89°09.2	-8°24.4	31°14.1	-22°02.4	Horizontal paralax								
21	307°03.1	163°11.4	15°01.0	150°01.														

September 13, 14 ,15 (Wed., Thu., Fri.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Wed	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass		
0	352°10.5	208°09.8	14°58.4	195°04.0	10°49.9	149°17.3	-8°25.2	91°23.6	-22°02.5				Alpheratz	357°40.2	29°11.3		
1	7°13.0	223°09.2	14°57.5	210°05.0	10°49.3	164°19.3	-8°25.4	106°26.0	-22°02.5				Ankaa	353°12.5	-42°12.5		
2	22°15.5	238°08.7	14°56.6	225°05.9	10°48.7	179°21.3	-8°25.5	121°28.4	-22°02.5				Schedar	349°36.6	56°38.0		
3	37°17.9	253°08.1	14°55.8	240°06.9	10°48.1	194°23.3	-8°25.7	136°30.8	-22°02.5				Diphda	348°52.6	-17°53.3		
4	52°20.4	268°07.6	14°54.9	255°07.9	10°47.5	209°25.3	-8°25.9	151°33.1	-22°02.5				Achernar	335°24.2	-57°08.7		
5	67°22.8	283°07.1	14°54.0	270°08.8	10°47.0	224°27.3	-8°26.1	166°35.5	-22°02.5				Hamal	327°57.3	23°32.7		
6	82°25.3	298°06.5	14°53.1	285°09.8	10°46.4	239°29.3	-8°26.3	181°37.9	-22°02.6				Polaris	316°12.2	89°20.0		
7	97°27.8	313°06.0	14°52.2	300°10.8	10°45.8	254°31.3	-8°26.5	196°40.3	-22°02.6				Akamar	315°15.9	-40°13.9		
8	112°30.2	328°05.4	14°51.4	315°11.7	10°45.2	269°33.3	-8°26.7	211°42.7	-22°02.6				Menkar	314°11.9	4°09.5		
9	127°32.7	343°04.9	14°50.5	330°12.7	10°44.6	284°35.3	-8°26.8	226°45.1	-22°02.6				Mirfak	308°35.9	49°55.1		
10	142°35.2	358°04.4	14°49.6	345°13.6	10°44.0	299°37.3	-8°27.0	241°47.4	-22°02.6				Aldebaran	290°46.0	16°32.5		
11	157°37.6	13°03.8	14°48.7	0°14.6	10°43.5	314°39.3	-8°27.2	256°49.8	-22°02.6				Rigel	281°09.3	-8°10.9		
12	172°40.1	28°03.3	14°47.8	15°15.6	10°42.9	329°41.3	-8°27.4	271°52.2	-22°02.6				Capella	280°30.2	46°00.7		
13	187°42.6	43°02.7	14°47.0	30°16.5	10°42.3	344°43.3	-8°27.6	286°54.6	-22°02.6				Bellatrix	278°28.9	6°21.8		
14	202°45.0	58°02.2	14°46.1	45°17.5	10°41.7	359°45.3	-8°27.8	301°57.0	-22°02.7				Elnath	278°09.0	28°37.1		
15	217°47.5	73°01.7	14°45.2	60°18.5	10°41.1	14°47.3	-8°28.0	316°59.4	-22°02.7				Alnilam	275°43.5	-1°11.5		
16	232°49.9	88°01.1	14°44.3	75°19.4	10°40.6	29°49.3	-8°28.1	322°01.7	-22°02.7				Betelgeuse	270°58.2	7°24.5		
17	247°52.4	103°00.6	14°43.4	90°20.4	10°40.0	44°51.3	-8°28.3	347°04.1	-22°02.7				Canopus	263°55.0	-52°42.1		
18	262°54.9	118°00.0	14°42.5	105°21.3	10°39.4	59°53.3	-8°28.5	2°06.5	-22°02.7				Sirius	258°31.2	-16°44.2		
19	277°57.3	132°59.5	14°41.6	120°22.3	10°38.8	74°55.3	-8°28.7	17°08.9	-22°02.7				Adara	255°10.4	-28°59.7		
20	292°59.8	147°59.0	14°40.8	135°23.3	10°38.2	89°57.3	-8°28.9	32°11.3	-22°02.7				Procyon	244°56.8	5°10.9		
21	308°02.3	162°58.4	14°39.9	150°24.2	10°37.6	104°59.3	-8°29.1	47°13.6	-22°02.7				Pollux	243°24.4	27°58.9		
22	323°04.7	177°57.9	14°39.0	165°25.2	10°37.1	120°01.3	-8°29.3	62°16.0	-22°02.7				Avior	234°17.2	-59°33.8		
23	338°07.2	192°57.4	14°38.1	180°26.2	10°36.5	135°03.3	-8°29.4	77°18.4	-22°02.8				Suhail	222°50.7	-43°30.1		
Mer.pass.:0:31:			v-0.5 d-0.9 m-3.9	v1.0 d-0.6 m1.8	v2.0 d-0.2 m-1.6	v2.4 d-0.0 m0.5							Miaplacidus	221°39.8	-69°47.2		
													Alphard	217°53.5	-8°44.0		
													Regulus	207°40.7	11°52.9		
													Dubhe	193°48.9	61°39.4		
													Denebola	182°31.0	14°28.6		
													Gienah	175°49.6	-17°38.2		
													Acrux	173°06.7	-63°11.7		
													Gacrux	171°58.2	-57°12.6		
													Alioth	166°18.8	55°52.1		
													Spica	158°28.5	-11°15.0		
													Alcaid	152°57.1	49°13.9		
													Hadar	148°44.2	-60°27.4		
													Menkent	148°04.5	-36°27.3		
													Arcturus	145°53.2	19°06.1		
													Rigel Kent.	139°48.2	-60°54.4		
													Zubenelg.	137°02.4	-16°06.7		
													Kochab	137°20.9	74°05.4		
													Alphecca	126°08.8	26°39.8		
													Antares	112°22.8	-26°28.1		
													Atria	107°22.1	-69°03.6		
													Sabik	102°09.3	-15°44.6		
													Shaula	96°18.0	-37°06.8		
													Rasalhague	96°03.8	12°33.3		
													Etamin	90°44.7	51°29.7		
													Kaus Aust.	83°39.9	-34°22.4		
													Vega	80°36.9	38°48.4		
													Nunki	75°54.7	-26°16.3		
													Altair	62°05.3	8°55.2		
													Peacock	53°14.4	-56°40.7		
													Deneb	49°29.2	45°20.9		
													Enif	33°44.0	9°57.6		
													Alnair	27°39.8	-46°52.4		
													Fomalhaut	15°20.6	-29°31.6		
													Scheat	13°50.3	28°10.8		
													Markab	13°35.2	15°18.1		
													2017/9/1	SHA	Mer.pass		
													Venus	215°59.3	10:08		
													Mars	202°53.5	10:59		
													Jupiter	157°06.7	14:01		
													Saturn	99°13.1	17:52		
													2017/9/1	SHA	Mer.pass		
													Venus	214°47.2	10:09		
													Mars	202°17.5	10:57		
													Jupiter	156°55.6	13:58		
													Saturn	99°11.1	17:48		
													2017/9/1	SHA	Mer.pass		
													Venus	213°35.2	10:09		
													Mars	201°41.5	10:56		
													Jupiter	156°44.5	13:55		
													Saturn	99°09.1	17:44		
													Horizontal paralax				
													Venus:		0.1		
													Mars:		0.1		
Mer.pass.:0:23:			v-0.5 d-0.9 m-3.9	v1.0 d-0.6 m1.8	v2.0 d-0.2 m-1.6	v2.4 d-0.0 m0.5											

h		Sun		Moon				Twilight							
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	180°59.8	3°48.2	275°57.1	6.6	17°59.3	4.6	59.3	72	02:00	03:50	05:03	18:45	19:57	21:43	
1	196°00.0	3°47.2	290°22.6	6.5	18°03.8	4.5	59.3	70	02:34	04:04	05:09	18:40	19:44	21:12	
2	211°00.3	3°46.3	304°48.1	6.5	18°08.3	4.4	59.3	68	02:57	04:15	05:13	18:35	19:33	20:50	
3	226°00.5	3°45.3	319°13.6	6.5	18°12.6	4.3	59.3	66	03:15	04:24	05:17	18:32	19:25	20:32	
4	241°00.7	3°44.4	333°39.0	6.4	18°16.8	4.1	59.3	64	03:29	04:32	05:20	18:29	19:17	20:19	
5	256°00.9	3°43.4	348°04.5	6.4	18°20.9	4.0	59.3	62	03:41	04:38	05:23	18:26	19:11	20:08	
6	271°01.2	3°42.4	2°29.8	6.4	18°24.8	3.9	59.3	60	03:51	04:43	05:26	18:24	19:06	19:58	
7	286°01.4	3°41.5	16°55.2	6.3	18°28.7	3.8	59.3	58	03:59	04:48	05:28	18:22	19:02	19:50	
8	301°01.6	3°40.5	31°20.5	6.3	18°32.4	3.7	59.3	56	04:06	04:52	05:30	18:20	18:58	19:43	
9	316°01.8	3°39.6	45°45.8	6.3	18°36.0	3.5	59.3	54	04:12	04:56	05:32	18:18	18:54	19:37	
10	331°02.0	3°38.6	60°11.1	6.3	18°39.5	3.4	59.3	52	04:18	04:59	05:33	18:17	18:51	19:32	
11	346°02.3	3°37.7	74°36.3	6.2	18°42.9	3.3	59.3	50	04:23	05:02	05:34	18:16	18:48	19:27	
12	1°02.5	3°36.7	89°01.5	6.2	18°46.1	3.2	59.3	45	04:33	05:08	05:38	18:13	18:42	19:17	
13	16°02.7	3°35.7	103°26.7	6.2	18°49.2	3.1	59.3	40	04:41	05:13	05:40	18:10	18:37	19:09	
14	31°02.9	3°34.8	117°51.9	6.2	18°52.2	2.9	59.3	35	04:47	05:17	05:42	18:08	18:34	19:03	
15	46°03.2	3°33.8	132°17.0	6.1	18°55.1	2.8	59.3	30	04:52	05:20	05:44	18:06	18:30	18:58	
16	61°03.4	3°32.9	146°42.1	6.1	18°57.8	2.7	59.3	20	04:59	05:25	05:47	18:03	18:26	18:51	
17	76°03.6	3°31.9	161°07.2	6.1	19°00.4	2.6	59.3	10	05:04	05:29	05:50	18:01	18:22	18:46	
18	91°03.8	3°31.0	175°32.3	6.1	19°02.9	2.4	59.3	0	05:08	05:32	05:52	17:59	18:19	18:43	
19	106°04.0	3°30.0	189°57.4	6.1	19°05.3	2.3	59.3	-10	05:09	05:34	05:55	17:57	18:18	18:42	
20	121°04.3	3°29.0	204°22.4	6.0	19°07.5	2.2	59.3	-20	05:09	05:35	05:57	17:54	18:16	18:42	
21	136°04.5	3°28.1	218°47.4	6.0	19°09.7	2.1	59.3	-30	05:08	05:36	05:59	17:52	18:16	18:44	
22	151°04.7	3°27.1	233°12.4	6.0	19°11.7	1.9	59.3	-35	05:06	05:36	06:01	17:51	18:16	18:45	
23	166°04.9	3°26.2	247°37.4	6.0	19°13.5	1.8	59.3	-40	05:04	05:35	06:02	17:49	18:16	18:48	
SD.=15.9		d=-1.0	S.D.=16.2												
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Wed	Thu	Fri	Wed	Thu	Fri	
0	181°05.2	3°25.2	262°02.4	6.0	19°15.3	1.7	59.3	72	--	--	--	--	--	--	
1	196°05.4	3°24.2	276°27.4	6.0	19°16.9	1.5	59.3	70	19:39	20:26	22:02	16:54	18:09	18:34	
2	211°05.6	3°23.3	290°52.4	6.0	19°18.3	1.4	59.3	68	20:30	21:23	22:45	16:03	17:12	17:51	
3	226°05.8	3°22.3	305°17.3	5.9	19°19.7	1.3	59.3	66	21:02	21:57	23:13	15:31	16:38	17:22	
4	241°06.0	3°21.4	319°42.2	5.9	19°20.9	1.2	59.3	64	21:26	22:22	23:35	15:08	16:13	17:00	
5	256°06.3	3°20.4	334°07.2	5.9	19°22.0	1.0	59.3	62	21:45	22:41	23:53	14:49	15:53	16:42	
6	271°06.5	3°19.4	348°32.1	5.9	19°23.0	0.9	59.3	60	22:00	22:57	--	14:34	15:37	16:28	
7	286°06.7	3°18.5	2°57.0	5.9	19°23.8	0.8	59.3	58	22:14	23:11	--	14:21	15:24	16:15	
8	301°06.9	3°17.5	17°21.9	5.9	19°24.5	0.6	59.3	56	22:25	23:23	--	14:09	15:12	16:04	
9	316°07.1	3°16.6	31°46.9	5.9	19°25.1	0.5	59.3	54	22:35	23:33	--	13:60	15:02	15:55	
10	331°07.4	3°15.6	46°11.8	5.9	19°25.6	0.4	59.3	52	22:44	23:42	--	13:51	14:53	15:46	
11	346°07.6	3°14.6	60°36.7	5.9	19°25.9	0.3	59.3	50	22:52	23:50	--	13:43	14:45	15:38	
12	1°07.8	3°13.7	75°01.6	5.9	19°26.1	0.1	59.3	45	23:09	--	00:07	13:26	14:27	15:22	
13	16°08.0	3°12.7	89°26.5	5.9	19°26.2	0.0	59.3	40	23:23	--	00:21	13:12	14:13	15:08	
14	31°08.3	3°11.8	103°51.4	5.9	19°26.1	-0.1	59.2	35	23:35	--	00:33	13:01	14:01	14:57	
15	46°08.5	3°10.8	118°16.3	5.9	19°25.9	-0.3	59.2	30	23:46	--	00:44	12:50	13:50	14:47	
16	61°08.7	3°09.8	132°41.3	5.9	19°25.6	-0.4	59.2	20	--	00:03	01:02	12:33	13:32	14:29	
17	76°08.9	3°08.9	147°06.2	5.9	19°25.2	-0.5	59.2	10	--	00:19	01:17	12:18	13:16	14:14	
18	91°09.1	3°07.9	161°31.1	5.9	19°24.6	-0.6	59.2	0	--	00:34	01:32	12:03	13:02	13:60	
19	106°09.4	3°07.0	175°56.1	5.9	19°23.9	-0.8	59.2	-10	--	00:49	01:47	11:49	12:47	13:46	
20	121°09.6	3°06.0	190°21.0	6.0	19°23.1	-0.9	59.2	-20	00:04	01:04	02:03	11:34	12:31	13:30	
21	136°09.8	3°05.0	204°46.0	6.0	19°22.1	-1.0	59.2	-30	00:21	01:22	02:21	11:16	12:13	13:13	
22	151°10.0	3°04.1	219°10.9	6.0	19°21.0	-1.2	59.2	-35	00:31	01:33	02:31	11:06	12:02	13:02	
23	166°10.3	3°03.1	233°35.9	6.0	19°19.8	-1.3	59.2	-40	00:42	01:45	02:43	10:54	11:50	12:50	
SD.=15.9		d=-1.0	S.D.=16.2												
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun	Mer.	Moon	Mer.	Age		
0	181°10.5	3°02.2	248°00.9	6.0	19°18.5	-1.4	59.2	13	Eqn.of Time	Pass	Upper	Lower	23(47%)		
1	196°10.7	3°01.2	262°25.9	6.0	19°17.0	-1.5	59.2	14	00 ^h	12 ^h	11:55	05:49	18:18	24(36%)	
2	211°10.9	3°00.2	276°51.0	6.0	19°15.4	-1.7	59.2	15	04:21	04:31	11:55	06:47	19:16	25(26%)	
3	226°11.2	2°59.3	291°16.0	6.1	19°13.7	-1.8	59.2		04:42	04:53	11:55	07:46	20:14		
4	241°11.4	2°58.3	305°41.1	6.1	19°11.8	-1.9	59.2								
5	256°11.6	2°57.3	320°06.2	6.1	19°09.8	-2.0	59.2								
6	271°11.8	2°56.4	334°31.3	6.1	19°07.7	-2.2	59.2								
7	286°12.0	2°55.4	348°56.4	6.1	19°05.5	-2.3	59.2								
8	301°12.3	2°54.5	3°21.5	6.2	19°03.2	-2.4	59.2								
9	316°12.5	2°53.5	17°46.7	6.2	19°00.7	-2.5	59.2								
10	331°12.7	2°52.5	32°11.9	6.2	18°58.1	-2.7	59.2								
11	346°12.9	2°51.6	46°37.1	6.2	18°55.4	-2.8	59.1								
12	1°13.2	2°50.6	61°02.4	6.3	18°52.5	-2.9	59.1								
13	16°13.4	2°49.6	75°27.6	6.3	18°49.5	-3.0	59.1								
14	31°13.6	2°48.7	89°52.9	6.3	18°46.4	-3.2	59.1								
15	46°13.8	2°47.7	104°18.3	6.3	18°43.2	-3.3	59.1								
16	61°14.0	2°46.8	118°43.6	6.4	18°39.9	-3.4	59.1								
17	76°14.3	2°45.8	133°09.0	6.4	18°36.4	-3.5	59.1								
18	91°14.5	2°44.8	147°34.5	6.4	18°32.8	-3.6	59.1								
19	106°14.7	2°43.9	161°59.9	6.5	18°29.2	-3.8	59.1								
20	121°14.9	2°42.9	176°25.4	6.5	18°25.3	-3.9	59.1								
21	136°15.2	2°41.9	190°50.9	6.5	18°21.4	-4.0	59.1								
22	151°15.4	2°41.0	205°16.5	6.6	18°17.3	-4.1	59.1								
23	166°15.6	2°40.0	219°42.1	6.6	18°13.2	-4.2	59.1								
SD.=15.9		d=-1.0	S.D.=16.2												

September 16, 17 ,18 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars			
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec				
0	355°07.9	207°31.4	13°53.6	196°13.5	10°07.8	151°41.2	-8°38.6	94°14.8	-22°03.4	109°17.2	-22°03.4	124°19.6	-22°03.4	Alpheratz 357°40.2	29°11.3			
1	10°10.4	222°30.9	13°52.6	211°14.4	10°07.2	166°43.2	-8°38.7	109°17.2	-22°03.4	109°17.2	-22°03.4	124°19.6	-22°03.4	Ankaa 353°12.5	-42°12.5			
2	25°12.9	237°30.4	13°51.7	226°15.4	10°06.6	181°45.2	-8°38.9	124°19.6	-22°03.4	124°19.6	-22°03.4	124°19.6	-22°03.4	Schedar 349°36.6	56°38.0			
3	40°15.3	252°29.9	13°50.8	241°16.4	10°06.0	196°47.2	-8°39.1	139°22.0	-22°03.4	139°22.0	-22°03.4	139°22.0	-22°03.4	Diphda 348°52.6	-17°53.3			
4	55°17.8	267°29.4	13°49.9	256°17.4	10°05.4	211°49.2	-8°39.3	154°24.3	-22°03.4	154°24.3	-22°03.4	154°24.3	-22°03.4	Achernar 335°24.2	-57°08.7			
5	70°20.3	282°28.8	13°48.9	271°18.3	10°04.9	226°51.2	-8°39.5	169°26.7	-22°03.5	169°26.7	-22°03.5	169°26.7	-22°03.5	Hamal 327°57.2	23°32.7			
6	85°22.7	297°28.3	13°48.0	286°19.3	10°04.3	241°53.2	-8°39.7	184°29.1	-22°03.5	184°29.1	-22°03.5	184°29.1	-22°03.5	Polaris 316°11.0	89°20.0			
7	100°25.2	312°27.8	13°47.1	301°20.3	10°03.7	256°55.2	-8°39.9	199°31.4	-22°03.5	199°31.4	-22°03.5	199°31.4	-22°03.5	Akamar 315°15.9	-40°13.9			
8	115°27.7	327°27.3	13°46.1	316°21.2	10°03.1	271°57.2	-8°40.0	214°33.8	-22°03.5	214°33.8	-22°03.5	214°33.8	-22°03.5	Menkar 314°11.8	4°09.5			
9	130°30.1	342°26.8	13°45.2	331°22.2	10°02.5	286°59.2	-8°40.2	229°36.2	-22°03.5	229°36.2	-22°03.5	229°36.2	-22°03.5	Mirfak 308°35.9	49°55.1			
10	145°32.6	357°26.2	13°44.3	346°23.2	10°01.9	302°01.2	-8°40.4	244°38.5	-22°03.5	244°38.5	-22°03.5	244°38.5	-22°03.5	Aldebaran 290°46.0	16°32.6			
11	160°35.0	12°25.7	13°43.3	1°24.1	10°01.3	317°03.2	-8°40.6	259°40.9	-22°03.5	259°40.9	-22°03.5	259°40.9	-22°03.5	Rigel 281°09.3	-8°10.9			
12	175°37.5	27°25.2	13°42.4	16°25.1	10°00.7	332°05.2	-8°40.8	274°43.3	-22°03.5	274°43.3	-22°03.5	274°43.3	-22°03.5	Capella 280°30.2	46°00.7			
13	190°40.0	42°24.7	13°41.5	31°26.1	10°00.1	347°07.2	-8°41.0	289°45.7	-22°03.6	289°45.7	-22°03.6	289°45.7	-22°03.6	Bellatrix 278°28.9	6°21.8			
14	205°42.4	57°24.2	13°40.5	46°27.0	9°59.6	2°09.1	-8°41.2	304°48.0	-22°03.6	304°48.0	-22°03.6	304°48.0	-22°03.6	Elnath 278°09.0	28°37.1			
15	220°44.9	72°23.7	13°39.6	61°28.0	9°59.0	17°11.1	-8°41.4	319°50.4	-22°03.6	319°50.4	-22°03.6	319°50.4	-22°03.6	Alnilam 275°43.5	-1°11.5			
16	235°47.4	87°23.1	13°38.7	76°29.0	9°58.4	32°13.1	-8°41.5	334°52.8	-22°03.6	334°52.8	-22°03.6	334°52.8	-22°03.6	Betelgeuse 270°58.2	7°24.5			
17	250°49.8	102°22.6	13°37.7	91°30.0	9°57.8	47°15.1	-8°41.7	349°55.1	-22°03.6	349°55.1	-22°03.6	349°55.1	-22°03.6	Canopus 263°55.0	-52°42.1			
18	265°52.3	117°22.1	13°36.8	106°30.9	9°57.2	62°17.1	-8°41.9	4°57.5	-22°03.6	4°57.5	-22°03.6	4°57.5	-22°03.6	Sirius 258°31.2	-16°44.2			
19	280°54.8	132°21.6	13°35.8	121°31.9	9°56.6	77°19.1	-8°42.1	19°59.9	-22°03.6	19°59.9	-22°03.6	19°59.9	-22°03.6	Adara 255°10.4	-28°59.7			
20	295°57.2	147°21.1	13°34.9	136°32.9	9°56.0	92°21.1	-8°42.3	35°02.2	-22°03.6	35°02.2	-22°03.6	35°02.2	-22°03.6	Procyon 244°56.8	5°10.9			
21	310°59.7	162°20.6	13°34.0	151°33.8	9°55.4	107°23.1	-8°42.5	50°04.6	-22°03.7	50°04.6	-22°03.7	50°04.6	-22°03.7	Pollux 243°24.3	27°58.9			
22	326°02.2	177°20.1	13°33.0	166°34.8	9°54.8	122°25.1	-8°42.7	65°07.0	-22°03.7	65°07.0	-22°03.7	65°07.0	-22°03.7	Avior 234°17.2	-59°33.8			
23	341°04.6	192°19.5	13°32.1	181°35.8	9°54.2	137°27.1	-8°42.8	80°09.3	-22°03.7	80°09.3	-22°03.7	80°09.3	-22°03.7	Suhail 222°50.6	-43°30.1			
Mer.pass.:0:19:			v-0.5 d-0.9 m-3.8			v1.0 d-0.6 m1.8			v2.0 d-0.2 m-1.6			v2.4 d-0.0 m0.5			Miaplacidus 221°39.7			-69°47.2
															Alphard 217°53.5			-8°44.0
															Regulus 207°40.7			11°52.9
															Dubhe 193°48.9			61°39.4
															Denebola 182°31.0			14°28.6
															Gienah 175°49.6			-17°38.2
															Acrux 173°06.7			-63°11.7
															Gacrux 171°58.2			-57°12.6
															Alioth 166°18.8			55°52.1
															Spica 158°28.5			-11°15.0
															Alcaid 152°57.1			49°13.8
															Hadar 148°44.2			-60°27.4
															Menkent 148°04.5			-36°27.3
															Arcturus 145°53.2			19°06.1
															Rigel Kent. 139°48.2			-60°54.4
															Zubenelg. 137°02.5			-16°06.7
															Kochab 137°21.0			74°05.4
															Alphecca 126°08.8			26°39.7
															Antares 112°22.8			-26°28.1
															Atria 107°22.1			-69°03.6
															Sabik 102°09.3			-15°44.6
															Shaula 96°18.0			-37°06.9
															Rasalhague 96°03.8			12°33.3
															Etamin 90°44.8			51°29.7
															Kaus Aust. 83°39.9			-34°22.4
															Vega 80°36.9			38°48.4
															Nunki 75°54.7			-26°16.3
															Altair 62°05.3			8°55.2
															Peacock 53°14.4			-56°40.7
															Deneb 49°29.2			45°20.9
															Enif 33°44.0			9°57.6
															Alnair 27°39.8			-46°52.5
															Fomalhaut 15°20.6			-29°31.6
															Scheat 13°50.2			28°10.8
															Markab 13°35.2			15°18.2
															2017/9/1 SHA Mer.pass			
															Venus 212°23.5			10:10
															Mars 201°05.5			10:54
															Jupiter 156°33.3			13:51
															Saturn 99°06.9			17:40
															2017/9/1 SHA Mer.pass			
															Venus 211°11.9			10:11
															Mars 200°29.7			10:53
															Jupiter 156°22.0			13:48
															Saturn 99°04.6			17:36
															2017/9/1 SHA Mer.pass			
															Venus 210°00.6			10:12
															Mars 199°53.8			10:51
															Jupiter 156°10.7			13:45
															Saturn 99°02.3			17:33
															Horizontal parallax			
															Venus: 0.1			
															Mars: 0.1			
Mer.pass.:0:11:			v-0.5 d-1.0 m-3.8			v1.0 d-0.6 m1.8			v2.0 d-0.2 m-1.6			v2.4 d-0.0 m0.5						

Sun				Moon			
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	181° 15.8	2° 39.0	234° 07.8	6.7	18° 08.9	-4.3	59.1
1	196° 16.0	2° 38.1	248° 33.4	6.7	18° 04.5	-4.5	59.0
2	211° 16.3	2° 37.1	262° 59.2	6.7	17° 59.0	-4.6	59.0
3	226° 16.5	2° 36.2	277° 24.9	6.8	17° 55.3	-4.7	59.0
4	241° 16.7	2° 35.2	291° 50.7	6.8	17° 50.6	-4.8	59.0
5	256° 16.9	2° 34.2	306° 16.6	6.9	17° 45.7	-4.9	59.0
6	271° 17.2	2° 33.3	320° 42.4	6.9	17° 40.8	-5.0	59.0
7	286° 17.4	2° 32.3	335° 08.4	7.0	17° 35.7	-5.1	59.0
8	301° 17.6	2° 31.3	349° 34.3	7.0	17° 30.5	-5.2	59.0
9	316° 17.8	2° 30.4	4° 00.4	7.0	17° 25.2	-5.4	59.0
10	331° 18.0	2° 29.4	18° 26.4	7.1	17° 19.8	-5.5	59.0
11	346° 18.3	2° 28.4	32° 52.5	7.1	17° 14.3	-5.6	58.9
12	1° 18.5	2° 27.5	47° 18.7	7.2	17° 08.6	-5.7	58.9
13	16° 18.7	2° 26.5	61° 44.9	7.2	17° 02.9	-5.8	58.9
14	31° 18.9	2° 25.5	76° 11.2	7.3	16° 57.1	-5.9	58.9
15	46° 19.2	2° 24.6	90° 37.5	7.3	16° 51.1	-6.0	58.9
16	61° 19.4	2° 23.6	105° 03.8	7.4	16° 45.1	-6.1	58.9
17	76° 19.6	2° 22.6	119° 30.2	7.4	16° 38.9	-6.2	58.9
18	91° 19.8	2° 21.7	133° 56.7	7.5	16° 32.7	-6.3	58.9
19	106° 20.1	2° 20.7	148° 23.2	7.5	16° 26.3	-6.4	58.9
20	121° 20.3	2° 19.7	162° 49.7	7.6	16° 19.9	-6.5	58.8
21	136° 20.5	2° 18.8	177° 16.3	7.6	16° 13.3	-6.6	58.8
22	151° 20.7	2° 17.8	191° 43.0	7.7	16° 06.7	-6.7	58.8
23	166° 20.9	2° 16.9	206° 09.7	7.7	15° 59.9	-6.8	58.8
	SD.=15.9	d=-1.0			S.D.=16.1		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	181° 21.2	2° 15.9	220° 36.5	7.8	15° 53.1	-6.9	58.8
1	196° 21.4	2° 14.9	235° 03.3	7.8	15° 46.1	-7.0	58.8
2	211° 21.6	2° 14.0	249° 30.1	7.9	15° 39.1	-7.1	58.8
3	226° 21.8	2° 13.0	263° 57.1	8.0	15° 32.0	-7.2	58.8
4	241° 22.1	2° 12.0	278° 24.1	8.0	15° 24.8	-7.3	58.7
5	256° 22.3	2° 11.1	292° 51.1	8.1	15° 17.5	-7.4	58.7
6	271° 22.5	2° 10.1	307° 18.2	8.1	15° 10.1	-7.4	58.7
7	286° 22.7	2° 09.1	321° 45.3	8.2	15° 02.6	-7.5	58.7
8	301° 22.9	2° 08.2	336° 12.5	8.2	14° 55.0	-7.6	58.7
9	316° 23.2	2° 07.2	350° 39.8	8.3	14° 47.3	-7.7	58.7
10	331° 23.4	2° 06.2	5° 07.1	8.3	14° 39.6	-7.8	58.7
11	346° 23.6	2° 05.3	19° 34.5	8.4	14° 31.8	-7.9	58.6
12	1° 23.8	2° 04.3	34° 01.9	8.5	14° 23.8	-8.0	58.6
13	16° 24.1	2° 03.3	48° 29.4	8.5	14° 15.8	-8.0	58.6
14	31° 24.3	2° 02.4	62° 57.0	8.6	14° 07.8	-8.1	58.6
15	46° 24.5	2° 01.4	77° 24.6	8.6	13° 59.6	-8.2	58.6
16	61° 24.7	2° 00.4	91° 52.2	8.7	13° 51.4	-8.3	58.6
17	76° 24.9	1° 59.5	106° 20.0	8.7	13° 43.1	-8.4	58.5
18	91° 25.2	1° 58.5	120° 47.7	8.8	13° 34.7	-8.4	58.5
19	106° 25.4	1° 57.5	135° 15.6	8.9	13° 26.2	-8.5	58.5
20	121° 25.6	1° 56.5	149° 43.5	8.9	13° 17.6	-8.6	58.5
21	136° 25.8	1° 55.6	164° 11.4	9.0	13° 09.0	-8.7	58.5
22	151° 26.1	1° 54.6	178° 39.4	9.0	13° 00.3	-8.7	58.5
23	166° 26.3	1° 53.6	193° 07.5	9.1	12° 51.6	-8.8	58.4
	SD.=15.9	d=-1.0			S.D.=16.0		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	181° 26.5	1° 52.7	207° 35.6	9.2	12° 42.7	-8.9	58.4
1	196° 26.7	1° 51.7	222° 03.8	9.2	12° 33.8	-8.9	58.4
2	211° 26.9	1° 50.7	236° 32.0	9.3	12° 24.9	-9.0	58.4
3	226° 27.2	1° 49.8	251° 00.3	9.3	12° 15.8	-9.1	58.4
4	241° 27.4	1° 48.8	265° 28.7	9.4	12° 06.7	-9.1	58.4
5	256° 27.6	1° 47.8	279° 57.1	9.4	11° 57.6	-9.2	58.3
6	271° 27.8	1° 46.9	294° 25.6	9.5	11° 48.3	-9.3	58.3
7	286° 28.1	1° 45.9	308° 54.1	9.6	11° 39.1	-9.3	58.3
8	301° 28.3	1° 44.9	323° 22.7	9.6	11° 29.7	-9.4	58.3
9	316° 28.5	1° 44.0	337° 51.3	9.7	11° 20.3	-9.4	58.3
10	331° 28.7	1° 43.0	352° 20.1	9.7	11° 10.8	-9.5	58.2
11	346° 28.9	1° 42.0	6° 48.8	9.8	11° 01.3	-9.6	58.2
12	1° 29.2	1° 41.1	21° 17.6	9.8	10° 51.7	-9.6	58.2
13	16° 29.4	1° 40.1	35° 46.5	9.9	10° 42.1	-9.7	58.2
14	31° 29.6	1° 39.1	50° 15.4	10.0	10° 32.4	-9.7	58.2
15	46° 29.8	1° 38.2	64° 44.4	10.0	10° 22.6	-9.8	58.2
16	61° 30.1	1° 37.2	79° 13.5	10.1	10° 12.8	-9.8	58.1
17	76° 30.3	1° 36.2	93° 42.6	10.1	10° 03.0	-9.9	58.1
18	91° 30.5	1° 35.2	108° 11.7	10.2	9° 53.1	-9.9	58.1
19	106° 30.7	1° 34.3	122° 40.9	10.2	9° 43.1	-10.0	58.1
20	121° 30.9	1° 33.3	137° 10.2	10.3	9° 33.1	-10.0	58.1
21	136° 31.2	1° 32.3	151° 39.5	10.3	9° 23.1	-10.1	58.0
22	151° 31.4	1° 31.4	166° 08.9	10.4	9° 13.0	-10.1	58.0
23	166° 31.6	1° 30.4	180° 38.3	10.5	9° 02.9	-10.1	58.0
	SD.=15.9	d=-1.0			S.D.=15.9		

Lat.	Twilight			Sunset	Twilight	
	Naut.	Civil	Sunrise		Civil	Naut.
72	02:25	04:06	05:17	18:29	19:39	21:18
70	02:52	04:17	05:21	18:26	19:28	20:52
68	03:12	04:27	05:24	18:23	19:20	20:33
66	03:28	04:34	05:27	18:20	19:12	20:18
64	03:40	04:41	05:29	18:18	19:06	20:06
62	03:50	04:46	05:31	18:16	19:01	19:56
60	03:59	04:51	05:33	18:15	18:57	19:48
58	04:07	04:55	05:34	18:13	18:53	19:40
56	04:13	04:58	05:36	18:12	18:49	19:34
54	04:19	05:01	05:37	18:11	18:46	19:29
52	04:23	05:04	05:38	18:10	18:44	19:24
50	04:28	05:06	05:39	18:09	18:41	19:20
45	04:37	05:12	05:41	18:07	18:36	19:11
40	04:44	05:16	05:43	18:05	18:32	19:04
35	04:49	05:19	05:44	18:04	18:29	18:59
30	04:54	05:22	05:46	18:03	18:27	18:55
20	05:00	05:26	05:48	18:01	18:23	18:48
10	05:04	05:29	05:50	17:59	18:20	18:45
0	05:06	05:30	05:51	17:58	18:18	18:42
-10	05:07	05:32	05:53	17:56	18:17	18:42
-20	05:07	05:32	05:54	17:55	18:17	18:43
-30	05:04	05:32	05:56	17:54	18:17	18:45
-35	05:02	05:31	05:57	17:53	18:18	18:47
-40	04:59	05:30	05:57	17:52	18:19	18:51
-45	04:55	05:29	05:58	17:51	18:20	18:55
-50	04:50	05:28	05:60	17:50	18:22	19:00
-52	04:47	05:27	06:00	17:50	18:23	19:03
-54	04:44	05:26	06:01	17:49	18:24	19:06
-56	04:41	05:24	06:01	17:49	18:26	19:09
-58	04:37	05:23	06:02	17:48	18:27	19:13
-60	04:33	05:22	06:03	17:47	18:29	19:18

Lat.	Moonrise			Moonset		
	Sat	Sun	Mon	Sat	Sun	Mon
72	23:13	--	01:23	19:22	19:06	18:54
70	23:54	--	01:46	18:40	18:41	18:40
68	--	00:22	02:04	18:11	18:22	18:28
66	--	00:43	02:18	17:50	18:07	18:18
64	--	00:60	02:30	17:32	17:54	18:10
62	--	01:14	02:40	17:18	17:43	18:03
60	00:07	01:25	02:48	17:05	17:34	17:56
58	00:19	01:35	02:55	16:55	17:26	17:51
56	00:30	01:44	03:02	16:46	17:19	17:46
54	00:39	01:52	03:08	16:37	17:12	17:41
52	00:48	01:59	03:13	16:30	17:07	17:37
50	00:55	02:05	03:18	16:23	17:01	17:34
45	01:11	02:19	03:28	16:09	16:50	17:26
40	01:24	02:30	03:36	15:57	16:41	17:19
35	01:35	02:39	03:44	15:47	16:33	17:13
30	01:45	02:47	03:50	15:38	16:25	17:08
20	02:02	03:02	04:01	15:23	16:13	16:59
10	02:16	03:14	04:10	15:09	16:02	16:51
0	02:30	03:26	04:19	14:57	15:52	16:44
-10	02:43	03:37	04:28	14:44	15:41	16:37
-20	02:58	03:50	04:38	14:30	15:30	16:29
-30	03:15	04:04	04:49	14:15	15:17	16:19
-35	03:24	04:12	04:55	14:05	15:10	16:14
-40	03:35	04:21	05:02	13:55	15:01	16:08
-45	03:48	04:32	05:10	13:43	14:51	16:01
-50	04:04	04:45	05:20	13:28	14:39	15:52
-52	04:11	04:51	05:25	13:20	14:34	15:48
-54	04:20	04:58	05:30	13:13	14:27	15:44
-56	04:29	05:06	05:35	13:04	14:20	15:39
-58	04:39	05:14	05:41	12:54	14:13	15:34
-60	04:51	05:23	05:48	12:42	14:04	15:27

Day	Sun			Moon		
	Eqn. of Time	Mer. Pass	Mer. Pass	Upper	Lower	Age
16	05:03	05:14	11:54	08:43	21:11	26(16%)
17	05:25	05:35	11:54	09:38	22:05	27(9%)
18	05:46	05:57	11:54	10:31	22:57	28(4%)

September 19, 20 ,21 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	358°05.4	206°54.7	12°45.2	197°23.4	9°25.2	154°04.7	-8°52.0	97°05.2	-22°04.3	Alpheratz	357°40.1	29°11.4
1	13°07.8	221°54.2	12°44.2	212°24.4	9°24.6	169°06.6	-8°52.2	112°07.5	-22°04.4	Ankaa	353°12.5	-42°12.5
2	28°10.3	236°53.7	12°43.2	227°25.4	9°24.0	184°08.6	-8°52.4	127°09.9	-22°04.4	Schedar	349°36.6	56°38.0
3	43°12.7	251°53.2	12°42.2	242°26.4	9°23.4	199°10.6	-8°52.6	142°12.2	-22°04.4	Diphda	348°52.6	-17°53.3
4	58°15.2	266°52.7	12°41.3	257°27.3	9°22.8	214°12.6	-8°52.8	157°14.6	-22°04.4	Achernar	335°24.2	-57°08.7
5	73°17.7	281°52.2	12°40.3	272°28.3	9°22.2	229°14.6	-8°53.0	172°17.0	-22°04.4	Hamal	327°57.2	23°32.7
6	88°20.1	296°51.7	12°39.3	287°29.3	9°21.7	244°16.6	-8°53.2	187°19.3	-22°04.4	Polaris	316°10.0	89°20.0
7	103°22.6	311°51.2	12°38.3	302°30.3	9°21.1	259°18.6	-8°53.3	202°21.7	-22°04.4	Akamar	315°15.9	-40°13.9
8	118°25.1	326°50.7	12°37.3	317°31.2	9°20.5	274°20.6	-8°53.5	217°24.0	-22°04.4	Menkar	314°11.8	4°09.5
9	133°27.5	341°50.2	12°36.4	332°32.2	9°19.9	289°22.6	-8°53.7	232°26.4	-22°04.5	Mirfak	308°35.9	49°55.1
10	148°30.0	356°49.7	12°35.4	347°33.2	9°19.3	304°24.5	-8°53.9	247°28.7	-22°04.5	Aldebaran	290°46.0	16°32.6
11	163°32.5	11°49.3	12°34.4	2°34.2	9°18.7	319°26.5	-8°54.1	262°31.1	-22°04.5	Rigel	281°09.2	-8°10.9
12	178°34.9	26°48.8	12°33.4	17°35.1	9°18.1	334°28.5	-8°54.3	277°33.5	-22°04.5	Capella	280°30.1	46°00.7
13	193°37.4	41°48.3	12°32.4	32°36.1	9°17.5	349°30.5	-8°54.5	292°35.8	-22°04.5	Bellatrix	278°28.9	6°21.8
14	208°39.9	56°47.8	12°31.5	47°37.1	9°16.9	4°32.5	-8°54.7	307°38.2	-22°04.5	Elnath	278°08.9	28°37.1
15	223°42.3	71°47.3	12°30.5	62°38.1	9°16.3	19°34.5	-8°54.9	322°40.5	-22°04.5	Alnilam	275°43.4	-1°11.5
16	238°44.8	86°46.8	12°29.5	77°39.0	9°15.7	34°36.5	-8°55.0	337°42.9	-22°04.6	Betelgeuse	270°58.2	7°24.5
17	253°47.2	101°46.3	12°28.5	92°40.0	9°15.1	49°38.5	-8°55.2	352°45.2	-22°04.6	Canopus	263°54.9	-52°42.1
18	268°49.7	116°45.8	12°27.5	107°41.0	9°14.5	64°40.4	-8°55.4	7°47.6	-22°04.6	Sirius	258°31.2	-16°44.2
19	283°52.2	131°45.3	12°26.5	122°42.0	9°13.9	79°42.4	-8°55.6	22°50.0	-22°04.6	Adara	255°10.4	-28°59.7
20	298°54.6	146°44.8	12°25.5	137°42.9	9°13.3	94°44.4	-8°55.8	37°52.3	-22°04.6	Procyon	244°56.8	5°10.9
21	313°57.1	161°44.3	12°24.6	152°43.9	9°12.7	109°46.4	-8°56.0	52°54.7	-22°04.6	Pollux	243°24.3	27°58.9
22	328°59.6	176°43.8	12°23.6	167°44.9	9°12.1	124°48.4	-8°56.2	67°57.0	-22°04.6	Avior	234°17.2	-59°33.8
23	344°02.0	191°43.3	12°22.6	182°45.9	9°11.5	139°50.4	-8°56.4	82°59.4	-22°04.7	Suhail	222°50.6	-43°30.1
Mer.pass.:0:07:		v-0.5 d-1.0 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.2 m-1.6		v2.4 d-0.0 m0.5		Miaplacidus	221°39.7	-69°47.2
										Alphard	217°53.5	-8°44.0
										Regulus	207°40.7	11°52.9
										Dubhe	193°48.9	61°39.4
										Denebola	182°31.0	14°28.6
										Genah	175°49.6	-17°38.2
										Acrux	173°06.7	-63°11.7
										Gacrux	171°58.2	-57°12.6
										Alioth	166°18.8	55°52.1
										Spica	158°28.5	-11°15.0
										Alcaid	152°57.1	49°13.8
										Hadar	148°44.3	-60°27.4
										Menkent	148°04.5	-36°27.3
										Arcturus	145°53.2	19°06.0
										Rigel Kent.	139°48.2	-60°54.4
										Zubenelg.	137°02.5	-16°06.7
										Kochab	137°21.0	74°05.4
										Alphecca	126°08.8	26°39.7
										Antares	112°22.8	-28°28.1
										Atria	107°22.2	-69°03.6
										Sabik	102°09.3	-15°44.6
										Shaula	96°18.1	-37°06.9
										Rasalhague	96°03.8	12°33.3
										Etamin	90°44.8	51°29.7
										Kaus Aust.	83°39.9	-34°22.4
										Vega	80°37.0	38°48.4
										Nunki	75°54.7	-26°16.3
										Altair	62°05.4	8°55.2
										Peacock	53°14.4	-56°40.7
										Deneb	49°29.2	45°21.0
										Enif	33°44.0	9°57.6
										Alnair	27°39.8	-46°52.5
										Fomalhaut	15°20.6	-29°31.6
										Scheat	13°50.3	28°10.8
										Markab	13°35.2	15°18.2
										2017/9/1	SHA	Mer.pass
										Venus	208°49.4	10:13
										Mars	199°18.1	10:50
										Jupiter	155°59.3	13:42
										Saturn	98°59.8	17:29
										2017/9/2	SHA	Mer.pass
										Venus	207°38.3	10:13
										Mars	198°42.4	10:48
										Jupiter	155°47.9	13:39
										Saturn	98°57.2	17:25
										2017/9/2	SHA	Mer.pass
										Venus	206°27.5	10:14
										Mars	198°06.7	10:47
										Jupiter	155°36.4	13:36
										Saturn	98°54.6	17:21
										Horizontal paralax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:23:55		v-0.5 d-1.0 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.2 m-1.5		v2.4 d-0.0 m0.5				

Sun			Moon												
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	181°31.8	1°29.4	195°07.8	10.5	8°52.7	-10.2	58.0	72	02:46	04:21	05:30	18:14	19:23	20:55	
1	196°32.0	1°28.5	209°37.3	10.6	8°42.5	-10.2	57.9	70	03:09	04:30	05:33	18:12	19:14	20:34	
2	211°32.3	1°27.5	224°06.9	10.6	8°32.3	-10.3	57.9	68	03:26	04:38	05:35	18:10	19:06	20:17	
3	226°32.5	1°26.5	238°36.5	10.7	8°22.0	-10.3	57.9	66	03:39	04:44	05:36	18:09	19:00	20:04	
4	241°32.7	1°25.6	253°06.2	10.7	8°11.6	-10.3	57.9	64	03:50	04:50	05:38	18:07	18:55	19:54	
5	256°32.9	1°24.6	267°36.0	10.8	8°01.3	-10.4	57.9	62	03:50	04:54	05:39	18:06	18:51	19:45	
6	271°33.2	1°23.6	282°05.8	10.8	7°50.9	-10.4	57.8	60	04:07	04:58	05:40	18:06	18:47	19:38	
7	286°33.4	1°22.6	296°35.6	10.9	7°40.4	-10.5	57.8	58	04:14	05:01	05:41	18:05	18:44	19:31	
8	301°33.6	1°21.7	311°05.5	10.9	7°30.0	-10.5	57.8	56	04:20	05:04	05:42	18:04	18:41	19:26	
9	316°33.8	1°20.7	325°35.5	11.0	7°19.5	-10.5	57.8	54	04:25	05:07	05:42	18:03	18:39	19:21	
10	331°34.0	1°19.7	340°05.5	11.0	7°08.9	-10.5	57.7	52	04:29	05:09	05:43	18:03	18:37	19:16	
11	346°34.3	1°18.8	354°35.5	11.1	6°58.4	-10.6	57.7	50	04:33	05:11	05:43	18:02	18:35	19:13	
12	1°34.5	1°17.8	9°05.6	11.1	6°47.8	-10.6	57.7	45	04:41	05:15	05:45	18:01	18:30	19:05	
13	16°34.7	1°16.8	23°35.7	11.2	6°37.1	-10.6	57.7	40	04:47	05:19	05:46	18:00	18:27	18:59	
14	31°34.9	1°15.9	38°05.9	11.2	6°26.5	-10.7	57.7	35	04:52	05:21	05:47	17:59	18:25	18:54	
15	46°35.2	1°14.9	52°36.2	11.3	6°15.8	-10.7	57.6	30	04:55	05:23	05:47	17:59	18:23	18:51	
16	61°35.4	1°13.9	67°06.5	11.3	6°05.1	-10.7	57.6	20	05:01	05:26	05:48	17:58	18:20	18:46	
17	76°35.6	1°12.9	81°36.8	11.4	5°54.4	-10.7	57.6	10	05:04	05:28	05:49	17:57	18:18	18:43	
18	91°35.8	1°12.0	96°07.2	11.4	5°43.7	-10.8	57.6	0	05:05	05:29	05:50	17:57	18:17	18:41	
19	106°36.0	1°11.0	110°37.6	11.4	5°32.9	-10.8	57.5	-10	05:05	05:30	05:51	17:56	18:17	18:41	
20	121°36.3	1°10.0	125°08.1	11.5	5°22.1	-10.8	57.5	-20	05:04	05:29	05:51	17:56	18:18	18:43	
21	136°36.5	1°09.1	139°38.6	11.5	5°11.3	-10.8	57.5	-30	05:00	05:28	05:52	17:55	18:19	18:47	
22	151°36.7	1°08.1	154°09.1	11.6	5°00.5	-10.8	57.5	-35	04:58	05:27	05:52	17:55	18:20	18:50	
23	166°36.9	1°07.1	168°39.8	11.6	4°49.7	-10.8	57.4	-40	04:54	05:26	05:52	17:55	18:22	18:53	
SD.=15.9			d=-1.0				S.D.=15.8								
<hr/>															
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset			
								Tue	Wed	Thu	Tue	Wed	Thu		
0	181°37.1	1°06.1	183°10.4	11.7	4°38.8	-10.9	57.4	72	03:21	05:13	07:01	18:45	18:37	18:29	
1	196°37.4	1°05.2	197°41.1	11.7	4°27.9	-10.9	57.4	70	03:34	05:18	06:59	18:38	18:36	18:33	
2	211°37.6	1°04.2	212°11.8	11.8	4°17.0	-10.9	57.4	68	03:45	05:23	06:58	18:32	18:34	18:37	
3	226°37.8	1°03.2	226°42.6	11.8	4°06.1	-10.9	57.4	66	03:53	05:26	06:57	18:26	18:33	18:40	
4	241°38.0	1°02.3	241°13.4	11.8	3°55.2	-10.9	57.3	64	04:00	05:29	06:56	18:22	18:32	18:42	
5	256°38.2	1°01.3	255°44.3	11.9	3°44.3	-10.9	57.3	62	04:06	05:32	06:55	18:18	18:32	18:44	
6	271°38.5	1°00.3	270°15.2	11.9	3°33.4	-10.9	57.3	60	04:12	05:34	06:54	18:15	18:31	18:46	
7	286°38.7	0°59.4	284°46.1	12.0	3°22.4	-10.9	57.3	58	04:16	05:36	06:54	18:12	18:30	18:48	
8	301°38.9	0°58.4	299°17.1	12.0	3°11.5	-10.9	57.2	56	04:20	05:38	06:53	18:09	18:30	18:50	
9	316°39.1	0°57.4	313°48.1	12.0	3°00.6	-11.0	57.2	54	04:24	05:39	06:53	18:06	18:29	18:51	
10	331°39.4	0°56.4	328°19.1	12.1	2°49.6	-11.0	57.2	52	04:27	05:41	06:52	18:04	18:29	18:52	
11	346°39.6	0°55.5	342°50.2	12.1	2°38.6	-11.0	57.2	50	04:30	05:42	06:52	18:02	18:28	18:53	
12	1°39.8	0°54.5	357°21.4	12.1	2°27.7	-11.0	57.1	45	04:37	05:45	06:51	17:58	18:27	18:56	
13	16°40.0	0°53.5	11°52.5	12.2	2°16.7	-11.0	57.1	40	04:42	05:47	06:50	17:54	18:27	18:58	
14	31°40.2	0°52.6	26°23.7	12.2	2°05.7	-11.0	57.1	35	04:47	05:49	06:50	17:51	18:26	18:60	
15	46°40.5	0°51.6	40°55.0	12.3	1°54.7	-11.0	57.1	30	04:51	05:51	06:49	17:48	18:25	19:01	
16	61°40.7	0°50.6	55°26.2	12.3	1°43.8	-11.0	57.0	20	04:58	05:54	06:48	17:43	18:24	19:04	
17	76°40.9	0°49.6	69°57.5	12.3	1°32.8	-11.0	57.0	10	05:05	05:57	06:48	17:38	18:23	19:07	
18	91°41.1	0°48.7	84°28.9	12.4	1°21.8	-11.0	57.0	0	05:10	05:59	06:47	17:34	18:22	19:09	
19	106°41.3	0°47.7	99°00.2	12.4	1°10.9	-11.0	57.0	-10	05:16	06:02	06:46	17:30	18:21	19:11	
20	121°41.6	0°46.7	113°31.7	12.4	0°59.9	-11.0	56.9	-20	05:23	06:05	06:45	17:25	18:20	19:14	
21	136°41.8	0°45.8	128°03.1	12.5	0°49.0	-11.0	56.9	-30	05:30	06:08	06:45	17:20	18:19	19:17	
22	151°42.0	0°44.8	142°34.6	12.5	0°38.0	-10.9	56.9	-35	05:34	06:10	06:44	17:17	18:18	19:18	
23	166°42.2	0°43.8	157°06.1	12.5	0°27.1	-10.9	56.8	-40	05:38	06:12	06:44	17:14	18:18	19:20	
SD.=15.9			d=-1.0				S.D.=15.7								
<hr/>															
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Moon		Age		
									Eqn.of Time	Mer.	Mer.Pass.				
									00 ^h	12 ^h	Upper	Lower			
0	181°42.4	0°42.8	171°37.6	12.5	0°16.1	-10.9	56.8	19	06:07	06:18	11:53	11:22	23:46	29(1%)	
1	196°42.7	0°41.9	186°09.1	12.6	0°05.2	-10.9	56.8	20	06:28	06:39	11:53	12:10	00:34	0(0%)	
2	211°42.9	0°40.9	200°40.7	12.6	-0°05.7	-10.9	56.8	21	06:50	07:00	11:53	12:57	00:34	1(2%)	
3	226°43.1	0°39.9	215°12.3	12.6	-0°16.6	-10.9	56.7								
4	241°43.3	0°38.9	229°44.0	12.7	-0°27.5	-10.9	56.7								
5	256°43.5	0°38.0	244°15.7	12.7	-0°38.4	-10.9	56.7								
6	271°43.8	0°37.0	258°47.4	12.7	-0°49.3	-10.9	56.7								
7	286°44.0	0°36.0	273°19.1	12.7	-1°00.1	-10.9	56.6								
8	301°44.2	0°35.1	287°50.8	12.8	-1°11.0	-10.8	56.6								
9	316°44.4	0°34.1	302°22.6	12.8	-1°21.8	-10.8	56.6								
10	331°44.6	0°33.1	316°54.4	12.8	-1°32.6	-10.8	56.6								
11	346°44.9	0°32.1	331°26.2	12.8	-1°43.4	-10.8	56.5								
12	1°45.1	0°31.2	345°58.1	12.9	-1°54.2	-10.8	56.5								
13	16°45.3	0°30.2	0°30.0	12.9	-2°04.9	-10.7	56.5								
14	31°45.5	0°29.2	15°01.8	12.9	-2°15.7	-10.7	56.5								
15	46°45.7	0°28.3	29°33.8	12.9	-2°26.4	-10.7	56.4								
16	61°46.0	0°27.3	44°05.7	12.9	-2°37.1	-10.7	56.4								
17	76°46.2	0°26.3	58°37.7	13.0	-2°47.8	-10.7	56.4								
18	91°46.4	0°25.3	73°09.6	13.0	-2°58.4	-10.6	56.4								
19	106°46.6	0°24.4	87°41.6	13.0	-3°09.0	-10.6	56.3								
20	121°46.8	0°23.4	102°13.6	13.0	-3°19.6	-10.6	56.3								
21	136°47.1	0°22.4	116°45.7	13.0	-3°30.2	-10.6	56.3								
22	151°47.3	0°21.4	131°17.7	13.1	-3°40.8	-10.5	56.3								
23	166°47.5	0°20.5	145°49.8	13.1	-3°51.3	-10.5	56.2								
SD.=15.9			d=-1.0				S.D.=15.5								

September 22, 23 ,24 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	1°02.8	206°19.6	11°33.4	198°33.8	8°42.2	156°27.6	-9°05.6	99°54.6	-22°05.3	Alpheratz	357°40.1	29°11.4
1	16°05.2	221°19.1	11°32.4	213°34.8	8°41.6	171°29.6	-9°05.8	114°56.9	-22°05.3	Ankaa	353°12.5	-42°12.6
2	31°07.7	236°18.6	11°31.4	228°35.8	8°41.0	186°31.6	-9°06.0	129°59.3	-22°05.4	Schedar	349°36.6	56°38.0
3	46°10.2	251°18.1	11°30.4	243°36.8	8°40.4	201°33.6	-9°06.2	145°01.6	-22°05.4	Diphda	348°52.6	-17°53.3
4	61°12.6	266°17.7	11°29.4	258°37.8	8°39.8	216°35.6	-9°06.4	160°04.0	-22°05.4	Achernar	335°24.2	-57°08.8
5	76°15.1	281°17.2	11°28.3	273°38.8	8°39.2	231°37.5	-9°06.5	175°06.3	-22°05.4	Hamal	327°57.2	23°32.7
6	91°17.5	296°16.7	11°27.3	288°39.7	8°38.6	246°39.5	-9°06.7	190°08.7	-22°05.4	Polaris	316°08.9	89°20.0
7	106°20.0	311°16.2	11°26.3	303°40.7	8°38.0	261°41.5	-9°06.9	205°11.0	-22°05.4	Akamar	315°15.9	-40°14.0
8	121°22.5	326°15.8	11°25.3	318°41.7	8°37.4	276°43.5	-9°07.1	220°13.4	-22°05.4	Menkar	314°11.8	4°09.5
9	136°24.9	341°15.3	11°24.3	333°42.7	8°36.8	291°45.5	-9°07.3	235°15.7	-22°05.5	Mirfak	308°35.9	49°55.1
10	151°27.4	356°14.8	11°23.2	348°43.7	8°36.2	306°47.5	-9°07.5	250°18.0	-22°05.5	Aldebaran	290°46.0	16°32.6
11	166°29.9	11°14.3	11°22.2	3°44.6	8°35.6	321°49.4	-9°07.7	265°20.4	-22°05.5	Rigel	281°09.2	-8°10.9
12	181°32.3	26°13.9	11°21.2	18°45.6	8°35.0	336°51.4	-9°07.9	280°22.7	-22°05.5	Capella	280°30.1	46°00.7
13	196°34.8	41°13.4	11°20.2	33°46.6	8°34.4	351°53.4	-9°08.1	295°25.1	-22°05.5	Bellatrix	278°28.9	6°21.8
14	211°37.3	56°12.9	11°19.1	48°47.6	8°33.8	6°55.4	-9°08.2	310°27.4	-22°05.5	Elnath	278°08.9	28°37.1
15	226°39.7	71°12.4	11°18.1	63°48.6	8°33.2	21°57.4	-9°08.4	325°29.8	-22°05.5	Alnilam	275°43.4	-1°11.5
16	241°42.2	86°12.0	11°17.1	78°49.6	8°32.6	36°59.3	-9°08.6	340°32.1	-22°05.6	Betelgeuse	270°58.2	7°24.5
17	256°44.7	101°11.5	11°16.1	93°50.5	8°31.9	52°01.3	-9°08.8	355°34.5	-22°05.6	Canopus	263°54.9	-52°42.1
18	271°47.1	116°11.0	11°15.0	108°51.5	8°31.3	67°03.3	-9°09.0	10°36.8	-22°05.6	Sirius	258°31.2	-16°44.2
19	286°49.6	131°10.5	11°14.0	123°52.5	8°30.7	82°05.3	-9°09.2	25°39.1	-22°05.6	Adara	255°10.3	-28°59.7
20	301°52.0	146°10.1	11°13.0	138°53.5	8°30.1	97°07.3	-9°09.4	40°41.5	-22°05.6	Procyon	244°56.8	5°10.9
21	316°54.5	161°09.6	11°11.9	153°54.5	8°29.5	112°09.2	-9°09.6	55°43.8	-22°05.6	Pollux	243°24.3	27°58.9
22	331°57.0	176°09.1	11°10.9	168°55.5	8°28.9	127°11.2	-9°09.8	70°46.2	-22°05.6	Avior	234°17.2	-59°33.8
23	346°59.4	191°08.7	11°09.9	183°56.4	8°28.3	142°13.2	-9°09.9	85°48.5	-22°05.7	Suhail	222°50.6	-43°30.1
Mer.pass.:23:51		v-0.5 d-1.0 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.2 m-1.5		v2.3 d-0.0 m0.5		Miaplacidus	221°39.7	-69°47.2
										Alphard	217°53.5	-8°44.0
										Regulus	207°40.7	11°52.9
										Dubhe	193°48.9	61°39.3
										Denebola	182°31.0	14°28.6
										Gienah	175°49.6	-17°38.2
										Acrux	173°06.7	-63°11.7
										Gacrux	171°58.2	-57°12.6
										Alioth	166°18.8	55°52.1
										Spica	158°28.5	-11°15.0
										Alcaid	152°57.1	49°13.8
										Hadar	148°44.3	-60°27.4
										Menkent	148°04.5	-36°27.2
										Arcturus	145°53.3	19°06.0
										Rigel Kent.	139°48.3	-60°54.4
										Zubenelg.	137°02.5	-16°06.7
										Kochab	137°21.1	74°05.3
										Alphecca	126°08.8	26°39.7
										Antares	112°22.9	-29°28.1
										Atria	107°22.2	-69°03.6
										Sabik	102°09.3	-15°44.6
										Shaula	96°18.1	-37°06.9
										Rasalhague	96°03.9	12°33.3
										Etamin	90°44.8	51°29.7
										Kaus Aust.	83°40.0	-34°22.4
										Vega	80°37.0	38°48.4
										Nunki	75°54.7	-26°16.3
										Altair	62°05.4	8°55.2
										Peacock	53°14.4	-56°40.7
										Deneb	49°29.2	45°21.0
										Enif	33°44.1	9°57.6
										Alnair	27°39.8	-46°52.5
										Fomalhaut	15°20.6	-29°31.6
										Scheat	13°50.3	28°10.9
										Markab	13°35.2	15°18.2
										2017/9/2	SHA	Mer.pass
										Venus	205°16.8	10:15
										Mars	197°31.1	10:45
										Jupiter	155°24.9	13:32
										Saturn	98°51.8	17:18
										2017/9/2	SHA	Mer.pass
										Venus	204°06.3	10:16
										Mars	196°55.5	10:43
										Jupiter	155°13.3	13:29
										Saturn	98°49.0	17:14
										2017/9/2	SHA	Mer.pass
										Venus	202°55.9	10:17
										Mars	196°20.0	10:42
										Jupiter	155°01.7	13:26
										Saturn	98°46.0	17:10
										Horizontal paralax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:23:44		v-0.5 d-1.0 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.2 m-1.5		v2.3 d-0.0 m0.5				

h		Sun			Moon									
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	181°47.7	0°19.5	160°21.9	13.1	-4°01.8	-10.5	56.2	72	03:05	04:35	05:44	17:59	19:06	20:35
1	196°47.9	0°18.5	174°54.0	13.1	-4°12.2	-10.4	56.2	70	03:24	04:43	05:44	17:58	18:59	20:16
2	211°48.2	0°17.6	189°26.1	13.1	-4°22.7	-10.4	56.2	68	03:39	04:49	05:45	17:58	18:53	20:02
3	226°48.4	0°16.6	203°58.3	13.1	-4°33.1	-10.4	56.1	66	03:51	04:54	05:46	17:57	18:48	19:51
4	241°48.6	0°15.6	218°30.4	13.2	-4°43.4	-10.4	56.1	64	04:00	04:58	05:46	17:57	18:44	19:42
5	256°48.8	0°14.6	233°02.6	13.2	-4°53.8	-10.3	56.1	62	04:08	05:02	05:47	17:57	18:41	19:34
6	271°49.0	0°13.7	247°34.7	13.2	-5°04.1	-10.3	56.1	60	04:15	05:05	05:47	17:56	18:38	19:28
7	286°49.3	0°12.7	262°06.9	13.2	-5°14.4	-10.3	56.0	58	04:21	05:08	05:47	17:56	18:35	19:22
8	301°49.5	0°11.7	276°39.1	13.2	-5°24.6	-10.2	56.0	56	04:26	05:10	05:47	17:56	18:33	19:17
9	316°49.7	0°10.7	291°11.4	13.2	-5°34.8	-10.2	56.0	54	04:30	05:12	05:48	17:56	18:31	19:13
10	331°49.9	0°09.8	305°43.6	13.2	-5°45.0	-10.2	56.0	52	04:34	05:14	05:48	17:56	18:29	19:09
11	346°50.1	0°08.8	320°15.8	13.2	-5°55.1	-10.1	55.9	50	04:38	05:16	05:48	17:56	18:28	19:06
12	1°50.4	0°07.8	334°48.1	13.3	-6°05.2	-10.1	55.9	48	04:45	05:19	05:48	17:55	18:25	18:59
13	16°50.6	0°06.9	349°20.3	13.3	-6°15.3	-10.0	55.9	45	04:50	05:22	05:49	17:55	18:22	18:54
14	31°50.8	0°05.9	3°52.6	13.3	-6°25.3	-10.0	55.9	40	04:54	05:24	05:49	17:55	18:20	18:50
15	46°51.0	0°04.9	18°24.9	13.3	-6°35.3	-10.0	55.8	35	04:57	05:25	05:49	17:55	18:19	18:47
16	61°51.2	0°03.9	32°57.2	13.3	-6°45.2	-9.9	55.8	30	05:01	05:27	05:49	17:55	18:17	18:43
17	76°51.5	0°03.0	47°29.5	13.3	-6°55.1	-9.9	55.8	20	05:04	05:28	05:49	17:55	18:16	18:41
18	91°51.7	0°02.0	62°01.8	13.3	-7°05.0	-9.8	55.8	10	05:04	05:28	05:49	17:56	18:16	18:40
19	106°51.9	0°01.0	76°34.1	13.3	-7°14.8	-9.8	55.7	-10	05:04	05:28	05:49	17:56	18:17	18:41
20	121°52.1	0°00.0	91°06.4	13.3	-7°24.6	-9.8	55.7	-20	05:01	05:27	05:49	17:56	18:18	18:44
21	136°52.3	-0°00.9	105°38.7	13.3	-7°34.3	-9.7	55.7	-30	04:56	05:24	05:48	17:57	18:21	18:49
22	151°52.5	-0°01.9	120°11.0	13.3	-7°44.0	-9.7	55.7	-35	04:53	05:23	05:48	17:57	18:23	18:52
23	166°52.8	-0°02.9	134°43.4	13.3	-7°53.7	-9.6	55.6	-40	04:49	05:21	05:48	17:58	18:25	18:56
SD.=15.9 d=-1.0 S.D.=15.3							-45	04:43	05:18	05:47	17:58	18:28	19:02	
							-50	04:36	05:14	05:46	17:59	18:31	19:10	
							-52	04:33	05:13	05:46	17:59	18:33	19:13	
							-54	04:29	05:11	05:46	17:60	18:35	19:17	
							-56	04:24	05:08	05:46	18:00	18:37	19:22	
							-58	04:19	05:06	05:45	18:01	18:40	19:27	
							-60	04:13	05:03	05:45	18:01	18:43	19:33	
							Moonrise			Moonset				
							Lat.	Fri	Sat	Sun	Fri	Sat	Sun	
							72	08:46	10:31	12:18	18:20	18:11	17:58	
							70	08:37	10:15	11:51	18:31	18:28	18:26	
							68	08:31	10:02	11:31	18:39	18:42	18:47	
							66	08:25	09:51	11:16	18:46	18:54	19:04	
							64	08:20	09:43	11:03	18:52	19:04	19:18	
							62	08:16	09:35	10:52	18:57	19:12	19:29	
							60	08:13	09:29	10:43	19:02	19:19	19:39	
							58	08:10	09:23	10:35	19:06	19:25	19:48	
							56	08:07	09:18	10:28	19:10	19:31	19:55	
							54	08:04	09:14	10:21	19:13	19:36	20:02	
							52	08:02	09:10	10:16	19:16	19:41	20:08	
							50	08:00	09:06	10:11	19:19	19:45	20:14	
							45	07:56	08:58	09:60	19:24	19:54	20:25	
							40	07:52	08:52	09:50	19:29	20:01	20:35	
							35	07:49	08:46	09:43	19:34	20:08	20:44	
							30	07:46	08:41	09:36	19:37	20:14	20:51	
							20	07:41	08:33	09:24	19:44	20:24	21:04	
							10	07:37	08:26	09:14	19:50	20:32	21:16	
							0	07:33	08:19	09:04	19:55	20:41	21:26	
							-10	07:29	08:12	08:55	20:00	20:49	21:37	
							-20	07:25	08:05	08:45	20:06	20:58	21:49	
							-30	07:20	07:56	08:33	20:13	21:08	22:02	
							-35	07:18	07:52	08:27	20:17	21:14	22:09	
							-40	07:15	07:46	08:19	20:21	21:20	22:18	
							-45	07:11	07:40	08:11	20:26	21:28	22:28	
							-50	07:07	07:33	08:00	20:32	21:37	22:40	
							-52	07:05	07:29	07:55	20:35	21:42	22:46	
							-54	07:03	07:26	07:50	20:38	21:46	22:53	
							-56	07:01	07:22	07:44	20:41	21:52	22:60	
							-58	06:59	07:17	07:38	20:45	21:58	23:08	
							-60	06:56	07:12	07:30	20:49	22:04	23:17	
							Sun			Moon				
							Day	Eqn.of Time	Mer.	Mer.Pass.	Age			
								00 ^h	12 ^h	Pass	Upper	Lower		
							22	07:11	07:21	11:52	13:44	01:21	2(6%)	
							23	07:32	07:42	11:52	14:29	02:06	3(11%)	
							24	07:53	08:03	11:51	15:15	02:52	4(18%)	
SD.=15.9 d=-1.0 S.D.=15.0														

September 25, 26 ,27 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	4°00.2	205°45.9	10°18.7	199°44.7	7°58.7	158°50.2	-9°19.2	102°43.1	-22°06.4	Alpheratz	357°40.1	29°11.4	
1	19°02.6	220°45.4	10°17.7	214°45.7	7°58.1	173°52.1	-9°19.4	117°45.5	-22°06.4	Ankaa	353°12.5	-42°12.6	
2	34°05.1	235°45.0	10°16.6	229°46.7	7°57.5	188°54.1	-9°19.6	132°47.8	-22°06.4	Schedar	349°36.6	56°38.0	
3	49°07.6	250°44.5	10°15.5	244°47.7	7°56.9	203°56.1	-9°19.8	147°50.1	-22°06.4	Diphda	348°52.6	-17°53.3	
4	64°10.0	265°44.1	10°14.5	259°48.7	7°56.3	218°58.1	-9°20.0	162°52.5	-22°06.4	Achernar	335°24.2	-57°08.8	
5	79°12.5	280°43.6	10°13.4	274°49.6	7°55.7	234°00.0	-9°20.2	177°54.8	-22°06.4	Hamal	327°57.2	23°32.7	
6	94°15.0	295°43.2	10°12.4	289°50.6	7°55.1	249°02.0	-9°20.4	192°57.1	-22°06.4	Polaris	316°07.7	89°20.0	
7	109°17.4	310°42.7	10°11.3	304°51.6	7°54.5	264°04.0	-9°20.6	207°59.5	-22°06.5	Akamar	315°15.9	-40°14.0	
8	124°19.9	325°42.2	10°10.2	319°52.6	7°53.8	279°06.0	-9°20.7	223°01.8	-22°06.5	Menkar	314°11.8	4°09.5	
9	139°22.4	340°41.8	10°09.2	334°53.6	7°53.2	294°07.9	-9°20.9	238°04.1	-22°06.5	Mirfak	308°35.8	49°55.2	
10	154°24.8	355°41.3	10°08.1	349°54.6	7°52.6	309°09.9	-9°21.1	253°06.5	-22°06.5	Aldebaran	290°45.9	16°32.6	
11	169°27.3	10°40.9	10°07.0	4°55.6	7°52.0	324°11.9	-9°21.3	268°08.8	-22°06.5	Rigel	281°09.2	-8°10.9	
12	184°29.7	25°40.4	10°06.0	19°56.6	7°51.4	339°13.9	-9°21.5	283°11.1	-22°06.5	Capella	280°30.1	46°00.7	
13	199°32.2	40°40.0	10°04.9	34°57.6	7°50.8	354°15.8	-9°21.7	298°13.5	-22°06.5	Bellatrix	278°28.8	6°21.8	
14	214°34.7	55°39.5	10°03.9	49°58.5	7°50.2	9°17.8	-9°21.9	313°15.8	-22°06.6	Elnath	278°08.9	28°37.1	
15	229°37.1	70°39.1	10°02.8	64°59.5	7°49.6	24°19.8	-9°22.1	328°18.1	-22°06.6	Alnilam	275°43.4	-1°11.5	
16	244°39.6	85°38.6	10°01.7	80°00.5	7°49.0	39°21.8	-9°22.3	343°20.5	-22°06.6	Betelgeuse	270°58.2	7°24.5	
17	259°42.1	100°38.2	10°00.7	95°01.5	7°48.4	54°23.8	-9°22.5	358°22.8	-22°06.6	Canopus	263°54.9	-52°42.1	
18	274°44.5	115°37.7	9°59.6	110°02.5	7°47.8	69°25.7	-9°22.6	13°25.1	-22°06.6	Sirius	258°31.1	-16°44.2	
19	289°47.0	130°37.2	9°58.5	125°03.5	7°47.2	84°27.7	-9°22.8	28°27.5	-22°06.6	Adara	255°10.3	-28°59.7	
20	304°49.5	145°36.8	9°57.5	140°04.5	7°46.6	99°29.7	-9°23.0	43°29.8	-22°06.6	Procyon	244°56.8	5°10.9	
21	319°51.9	160°36.3	9°56.4	155°05.5	7°46.0	114°31.7	-9°23.2	58°32.1	-22°06.7	Pollux	243°24.3	27°58.8	
22	334°54.4	175°35.9	9°55.3	170°06.4	7°45.3	129°33.6	-9°23.4	73°34.5	-22°06.7	Avior	234°17.1	-59°33.8	
23	349°56.9	190°35.4	9°54.3	185°07.4	7°44.7	144°35.6	-9°23.6	88°36.8	-22°06.7	Suhail	222°50.6	-43°30.1	
Mer.pass.:23:40		v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.2 m-1.5		v2.3 d-0.0 m0.5		Miaplacidus		221°39.6	-69°47.2
										Alphard		217°53.5	-8°44.0
										Regulus		207°40.7	11°52.9
										Dubhe		193°48.9	61°39.3
										Denebola		182°31.0	14°28.6
										Gienah		175°49.6	-17°38.2
										AcruX		173°06.7	-63°11.7
										Gacrux		171°58.2	-57°12.6
										Alioth		166°18.8	55°52.0
										Spica		158°28.5	-11°15.0
										Alcaid		152°57.1	49°13.8
										Hadar		148°44.3	-60°27.4
										Menkent		148°04.5	-36°27.2
										Arcturus		145°53.3	19°06.0
										Rigel Kent.		139°48.3	-60°54.4
										Zubenelg.		137°02.5	-16°06.7
										Kochab		137°21.1	74°05.3
										Alphecca		126°08.8	26°39.7
										Antares		112°22.9	-26°28.1
										Atria		107°22.2	-69°03.6
										Sabik		102°09.3	-15°44.6
										Shaula		96°18.1	-37°06.8
										Rasalhague		96°03.9	12°33.3
										Etamin		90°44.8	51°29.7
										Kaus Aust.		83°40.0	-34°22.4
										Vega		80°37.0	38°48.4
										Nunki		75°54.7	-26°16.3
										Altair		62°05.4	8°55.2
										Peacock		53°14.5	-56°40.7
										Deneb		49°29.2	45°21.0
										Enif		33°44.1	9°57.6
										Alnair		27°39.8	-46°52.5
										Fomalhaut		15°20.6	-29°31.6
										Scheat		13°50.3	28°10.9
										Markab		13°35.2	15°18.2
										2017/9/2		SHA	Mer.pass
										Venus		201°45.7	10:17
										Mars		195°44.5	10:40
										Jupiter		154°50.0	13:23
										Saturn		98°43.0	17:06
										2017/9/2		SHA	Mer.pass
										Venus		200°35.7	10:18
										Mars		195°09.1	10:39
										Jupiter		154°38.3	13:20
										Saturn		98°39.8	17:03
										2017/9/2		SHA	Mer.pass
										Venus		199°25.8	10:19
										Mars		194°33.7	10:37
										Jupiter		154°26.5	13:17
										Saturn		98°36.6	16:59
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:23:32		v-0.4 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.2 m-1.5		v2.3 d-0.0 m0.5					

h		Sun					Moon								
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	182°03.4	-0°50.6	127°05.4	13.1	-14°40.7	-6.8	54.7	72	03:23	04:49	05:57	17:43	18:50	20:15	
1	197°03.6	-0°51.6	141°37.5	13.1	-14°47.4	-6.7	54.6	70	03:39	04:55	05:56	17:44	18:45	20:00	
2	212°03.8	-0°52.5	156°09.6	13.1	-14°54.1	-6.6	54.6	68	03:52	04:60	05:56	17:45	18:40	19:48	
3	227°04.1	-0°53.5	170°41.7	13.1	-15°00.7	-6.6	54.6	66	04:02	05:04	05:55	17:46	18:37	19:38	
4	242°04.3	-0°54.5	185°13.7	13.1	-15°07.2	-6.5	54.6	64	04:10	05:07	05:55	17:46	18:33	19:30	
5	257°04.5	-0°55.5	199°45.8	13.0	-15°13.7	-6.4	54.6	62	04:17	05:10	05:54	17:47	18:31	19:24	
6	272°04.7	-0°56.4	214°17.8	13.0	-15°20.1	-6.4	54.6	60	04:23	05:12	05:54	17:47	18:29	19:18	
7	287°04.9	-0°57.4	228°49.8	13.0	-15°26.4	-6.3	54.6	58	04:28	05:14	05:54	17:48	18:27	19:13	
8	302°05.1	-0°58.4	243°21.8	13.0	-15°32.7	-6.2	54.5	56	04:32	05:16	05:53	17:48	18:25	19:09	
9	317°05.3	-0°59.4	257°53.8	13.0	-15°38.8	-6.1	54.5	54	04:36	05:18	05:53	17:48	18:24	19:05	
10	332°05.6	-1°00.3	272°25.8	13.0	-15°44.9	-6.1	54.5	52	04:39	05:19	05:53	17:49	18:22	19:02	
11	347°05.8	-1°01.3	286°57.8	13.0	-15°50.9	-6.0	54.5	50	04:42	05:20	05:53	17:49	18:21	18:59	
12	2°06.0	-1°02.3	301°29.7	12.9	-15°56.9	-5.9	54.5	45	04:48	05:23	05:52	17:50	18:19	18:53	
13	17°06.2	-1°03.2	316°01.7	12.9	-16°02.8	-5.8	54.5	40	04:53	05:24	05:51	17:50	18:17	18:49	
14	32°06.4	-1°04.2	330°33.6	12.9	-16°08.6	-5.8	54.5	35	04:56	05:26	05:51	17:51	18:16	18:46	
15	47°06.6	-1°05.2	345°05.5	12.9	-16°14.3	-5.7	54.5	30	04:59	05:27	05:51	17:51	18:15	18:43	
16	62°06.9	-1°06.2	359°37.4	12.9	-16°19.9	-5.6	54.4	20	05:02	05:28	05:50	17:52	18:14	18:40	
17	77°07.1	-1°07.1	14°09.3	12.9	-16°25.5	-5.5	54.4	10	05:04	05:28	05:49	17:53	18:14	18:39	
18	92°07.3	-1°08.1	28°41.1	12.9	-16°31.0	-5.5	54.4	0	05:03	05:27	05:48	17:54	18:15	18:39	
19	107°07.5	-1°09.1	43°13.0	12.8	-16°36.4	-5.4	54.4	-10	05:02	05:26	05:47	17:56	18:17	18:41	
20	122°07.7	-1°10.1	57°44.8	12.8	-16°41.8	-5.3	54.4	-20	04:58	05:24	05:46	17:57	18:19	18:45	
21	137°07.9	-1°11.0	72°16.6	12.8	-16°47.0	-5.2	54.4	-30	04:53	05:21	05:44	17:59	18:22	18:50	
22	152°08.1	-1°12.0	86°48.4	12.8	-16°52.2	-5.1	54.4	-35	04:49	05:18	05:44	17:60	18:25	18:54	
23	167°08.4	-1°13.0	101°20.2	12.8	-16°57.3	-5.1	54.4	-40	04:44	05:16	05:43	18:01	18:28	18:60	
SD.=15.9 d=-1.0 S.D.=14.9															
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset			
								Mon	Tue	Wed	Mon	Tue	Wed		
0	182°08.6	-1°14.0	115°52.0	12.8	-17°02.4	-5.0	54.4	72	14:13	--	--	17:39	--	--	
1	197°08.8	-1°14.9	130°23.7	12.8	-17°07.3	-4.9	54.4	70	13:28	15:04	16:34	18:25	18:26	18:35	
2	212°09.0	-1°15.9	144°55.5	12.7	-17°12.2	-4.8	54.3	68	12:59	14:21	15:33	18:55	19:10	19:36	
3	227°09.2	-1°16.9	159°27.2	12.7	-17°17.0	-4.8	54.3	66	12:37	13:53	14:59	19:18	19:39	20:11	
4	242°09.4	-1°17.9	173°58.9	12.7	-17°21.7	-4.7	54.3	64	12:20	13:31	14:34	19:36	20:01	20:36	
5	257°09.6	-1°18.8	188°30.6	12.7	-17°26.3	-4.6	54.3	62	12:05	13:13	14:14	19:51	20:18	20:55	
6	272°09.8	-1°19.8	203°02.3	12.7	-17°30.9	-4.5	54.3	60	11:53	12:59	13:58	20:03	20:33	21:11	
7	287°10.1	-1°20.8	217°34.0	12.7	-17°35.4	-4.4	54.3	58	11:43	12:47	13:45	20:14	20:46	21:25	
8	302°10.3	-1°21.7	232°05.6	12.6	-17°39.8	-4.4	54.3	56	11:34	12:36	13:33	20:23	20:57	21:37	
9	317°10.5	-1°22.7	246°37.3	12.6	-17°44.1	-4.3	54.3	54	11:26	12:27	13:23	20:31	21:06	21:47	
10	332°10.7	-1°23.7	261°08.9	12.6	-17°48.3	-4.2	54.3	52	11:19	12:19	13:14	20:39	21:15	21:56	
11	347°10.9	-1°24.7	275°40.5	12.6	-17°52.5	-4.1	54.3	50	11:12	12:11	13:06	20:46	21:22	22:04	
12	2°11.1	-1°25.6	290°12.1	12.6	-17°56.5	-4.0	54.3	45	10:59	11:55	12:48	21:00	21:39	22:22	
13	17°11.3	-1°26.6	304°43.6	12.6	-18°00.5	-3.9	54.3	40	10:47	11:42	12:34	21:12	21:52	22:36	
14	32°11.6	-1°27.6	319°15.2	12.5	-18°04.4	-3.9	54.3	35	10:38	11:31	12:22	21:22	22:03	22:48	
15	47°11.8	-1°28.6	333°46.7	12.5	-18°08.2	-3.8	54.3	30	10:29	11:21	12:12	21:31	22:13	22:59	
16	62°12.0	-1°29.5	348°18.3	12.5	-18°12.0	-3.7	54.3	20	10:15	11:05	11:54	21:47	22:31	23:17	
17	77°12.2	-1°30.5	2°49.8	12.5	-18°15.6	-3.6	54.3	10	10:02	10:50	11:39	22:00	22:46	23:33	
18	92°12.4	-1°31.5	17°21.3	12.5	-18°19.2	-3.5	54.3	0	09:50	10:37	11:24	22:13	22:60	23:47	
19	107°12.6	-1°32.5	31°52.7	12.5	-18°22.7	-3.4	54.2	-10	09:39	10:24	11:10	22:25	23:14	--	
20	122°12.8	-1°33.4	46°24.2	12.5	-18°26.1	-3.4	54.2	-20	09:26	10:09	10:54	22:39	23:29	--	
21	137°13.0	-1°34.4	60°55.7	12.4	-18°29.4	-3.3	54.2	-30	09:12	09:53	10:37	22:55	23:46	--	
22	152°13.3	-1°35.4	75°27.1	12.4	-18°32.6	-3.2	54.2	-40	09:04	09:43	10:26	23:04	23:56	--	
23	167°13.5	-1°36.3	89°58.5	12.4	-18°35.8	-3.1	54.2	-35	08:54	09:33	10:15	23:14	--	00:08	
SD.=16.0 d=-1.0 S.D.=14.8															
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun			Moon			
									Eqn.of Time	Mer.	Mer.Pass.	Age			
0	182°13.7	-1°37.3	104°29.9	12.4	-18°38.8	-3.0	54.2	25	00 ^h	08:14	08:24	11:51	16:01	03:38	5(26%)
1	197°13.9	-1°38.3	119°01.3	12.4	-18°41.8	-2.9	54.2	26	08:34	08:44	11:51	16:48	04:24	6(35%)	
2	212°14.1	-1°39.3	133°32.7	12.4	-18°44.7	-2.8	54.2	27	08:55	09:05	11:50	17:35	05:11	7(44%)	
3	227°14.3	-1°40.2	148°04.0	12.4	-18°47.5	-2.8	54.2								
4	242°14.5	-1°41.2	162°35.4	12.3	-18°50.2	-2.7	54.2								
5	257°14.7	-1°42.2	177°06.7	12.3	-18°52.9	-2.6	54.2								
6	272°15.0	-1°43.2	191°38.0	12.3	-18°55.4	-2.5	54.2								
7	287°15.2	-1°44.1	206°09.3	12.3	-18°57.9	-2.4	54.2								
8	302°15.4	-1°45.1	220°40.6	12.3	-19°00.3	-2.3	54.2								
9	317°15.6	-1°46.1	235°11.9	12.3	-19°02.5	-2.2	54.2								
10	332°15.8	-1°47.1	249°43.2	12.3	-19°04.7	-2.2	54.2								
11	347°16.0	-1°48.0	264°14.4	12.2	-19°06.9	-2.1	54.2								
12	2°16.2	-1°49.0	278°45.6	12.2	-19°08.9	-2.0	54.2								
13	17°16.4	-1°50.0	293°16.8	12.2	-19°10.8	-1.9	54.2								
14	32°16.6	-1°50.9	307°48.0	12.2	-19°12.7	-1.8	54.2								
15	47°16.9	-1°51.9	322°19.2	12.2	-19°14.4	-1.7	54.2								
16	62°17.1	-1°52.9	336°50.4	12.2	-19°16.1	-1.6	54.2								
17	77°17.3	-1°53.9	351°21.6	12.2	-19°17.7	-1.5	54.2								
18	92°17.5	-1°54.8	5°52.7	12.1	-19°19.2	-1.5	54.2								
19	107°17.7	-1°55.8	20°23.9	12.1	-19°20.6	-1.4	54.2								
20	122°17.9	-1°56.8	34°55.0	12.1	-19°21.9	-1.3	54.3								
21	137°18.1	-1°57.8	49°26.1	12.1	-19°23.1	-1.2	54.3								
22	152°18.3	-1°58.7	63°57.2	12.1	-19°24.3	-1.1	54.3								
23	167°18.5	-1°59.7	78°28.3	12.1	-19°25.3	-1.0	54.3								
SD.=16.0 d=-1.0 S.D.=14.8															

September 28, 29 ,30 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	6°57.6	205°13.6	9°01.3	200°56.0	7°14.8	161°12.3	-9°32.9	105°30.8	-22°07.4	Alpheratz	357°40.1	29°11.4
1	22°00.1	220°13.2	9°00.2	215°57.0	7°14.2	176°14.3	-9°33.1	120°33.1	-22°07.4	Ankaa	353°12.5	-42°12.6
2	37°02.5	235°12.7	8°59.1	230°58.0	7°13.6	191°16.2	-9°33.3	135°35.5	-22°07.4	Schedar	349°36.6	56°38.0
3	52°05.0	250°12.3	8°58.0	245°59.0	7°13.0	206°18.2	-9°33.5	150°37.8	-22°07.5	Diphda	348°52.6	-17°53.3
4	67°07.4	265°11.8	8°56.9	260°60.0	7°12.4	221°20.2	-9°33.7	165°40.1	-22°07.5	Achernar	335°24.2	-57°08.8
5	82°09.9	280°11.4	8°55.8	276°01.0	7°11.8	236°22.1	-9°33.9	180°42.4	-22°07.5	Hamal	327°57.2	23°32.7
6	97°12.4	295°11.0	8°54.7	291°01.9	7°11.2	251°24.1	-9°34.1	195°44.7	-22°07.5	Polaris	316°06.6	89°20.0
7	112°14.8	310°10.5	8°53.6	306°02.9	7°10.6	266°26.1	-9°34.3	210°47.1	-22°07.5	Akamar	315°15.8	-40°14.0
8	127°17.3	325°10.1	8°52.5	321°03.9	7°10.0	281°28.1	-9°34.4	225°49.4	-22°07.5	Menkar	314°11.8	4°09.5
9	142°19.8	340°09.6	8°51.4	336°04.9	7°09.3	296°30.0	-9°34.6	240°51.7	-22°07.5	Mirfak	308°35.8	49°55.2
10	157°22.2	355°09.2	8°50.3	351°05.9	7°08.7	311°32.0	-9°34.8	255°54.0	-22°07.6	Aldebaran	290°45.9	16°32.6
11	172°24.7	10°08.8	8°49.2	6°06.9	7°08.1	326°34.0	-9°35.0	270°56.4	-22°07.6	Rigel	281°09.2	-8°10.9
12	187°27.2	25°08.3	8°48.1	21°07.9	7°07.5	341°35.9	-9°35.2	285°58.7	-22°07.6	Capella	280°30.0	46°00.7
13	202°29.6	40°07.9	8°47.0	36°08.9	7°06.9	356°37.9	-9°35.4	301°01.0	-22°07.6	Bellatrix	278°28.8	6°21.8
14	217°32.1	55°07.5	8°45.9	51°09.9	7°06.3	11°39.9	-9°35.6	316°03.3	-22°07.6	Elnath	278°08.9	28°37.1
15	232°34.6	70°07.0	8°44.8	66°10.9	7°05.7	26°41.8	-9°35.8	331°05.6	-22°07.6	Alnilam	275°43.4	-1°11.5
16	247°37.0	85°06.6	8°43.7	81°11.9	7°05.1	41°43.8	-9°36.0	346°08.0	-22°07.6	Betelgeuse	270°58.1	7°24.5
17	262°39.5	100°06.2	8°42.6	96°12.9	7°04.4	56°45.8	-9°36.2	1°10.3	-22°07.7	Canopus	263°54.8	-52°42.1
18	277°41.9	115°05.7	8°41.5	111°13.9	7°03.8	71°47.8	-9°36.3	16°12.6	-22°07.7	Sirius	258°31.1	-16°44.2
19	292°44.4	130°05.3	8°40.4	126°14.9	7°03.2	86°49.7	-9°36.5	31°14.9	-22°07.7	Adara	255°10.3	-28°59.7
20	307°46.9	145°04.8	8°39.3	141°15.9	7°02.6	101°51.7	-9°36.7	46°17.2	-22°07.7	Procyon	244°56.7	5°10.9
21	322°49.3	160°04.4	8°38.2	156°16.9	7°02.0	116°53.7	-9°36.9	61°19.6	-22°07.7	Pollux	243°24.2	27°58.8
22	337°51.8	175°04.0	8°37.1	171°17.8	7°01.4	131°55.6	-9°37.1	76°21.9	-22°07.7	Avior	234°17.1	-59°33.8
23	352°54.3	190°03.5	8°36.0	186°18.8	7°00.8	146°57.6	-9°37.3	91°24.2	-22°07.8	Suhail	222°50.6	-43°30.0
Mer.pass.:23:28		v-0.4 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.2 m-1.5		v2.3 d-0.0 m0.5		Miaplacidus	221°39.6	-69°47.2
										Alphard	217°53.5	-8°44.0
										Regulus	207°40.7	11°52.9
										Dubhe	193°48.9	61°39.3
										Denebola	182°31.0	14°28.6
										Gienah	175°49.6	-17°38.2
										Acrux	173°06.7	-63°11.7
										Gacrux	171°58.2	-57°12.6
										Alioth	166°18.8	55°52.0
										Spica	158°28.5	-11°15.0
										Alcaid	152°57.1	49°13.8
										Hadar	148°44.3	-60°27.4
										Menkent	148°04.5	-36°27.2
										Arcturus	145°53.3	19°06.0
										Rigel Kent.	139°48.3	-60°54.4
										Zubenelg.	137°02.5	-16°06.7
										Kochab	137°21.2	74°05.3
										Alphecca	126°08.8	26°39.7
										Antares	112°22.9	-26°28.1
										Atria	107°22.3	-69°03.6
										Sabik	102°09.3	-15°44.6
										Shaula	96°18.1	-37°06.8
										Rasalhague	96°03.9	12°33.2
										Etamin	90°44.9	51°29.7
										Kaus Aust.	83°40.0	-34°22.4
										Vega	80°37.0	38°48.4
										Nunki	75°54.7	-26°16.3
										Altair	62°05.4	8°55.2
										Peacock	53°14.5	-56°40.7
										Deneb	49°29.2	45°21.0
										Enif	33°44.1	9°57.6
										Alnair	27°39.8	-46°52.5
										Fomalhaut	15°20.6	-29°31.6
										Scheat	13°50.3	28°10.9
										Markab	13°35.2	15°18.2
										2017/9/2	SHA	Mer.pass
										Venus	198°16.0	10:19
										Mars	193°58.4	10:36
										Jupiter	154°14.7	13:13
										Saturn	98°33.2	16:55
										2017/9/2	SHA	Mer.pass
										Venus	197°06.4	10:20
										Mars	193°23.1	10:34
										Jupiter	154°02.8	13:10
										Saturn	98°29.8	16:52
										2017/9/3	SHA	Mer.pass
										Venus	195°56.9	10:21
										Mars	192°47.8	10:32
										Jupiter	153°51.0	13:07
										Saturn	98°26.3	16:48
										Horizontal parallax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:23:20		v-0.4 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.2 m-1.5		v2.3 d-0.0 m0.5				

h		Sun					Moon														
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight									
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.								
0	182° 18.8	-2° 00.7	92° 59.4	12.1	-19° 26.3	-0.9	54.3	72	03:39	05:03	06:10	17:28	18:35	19:57							
1	197° 19.0	-2° 01.6	107° 30.4	12.1	-19° 27.1	-0.8	54.3	70	03:53	05:07	06:08	17:30	18:31	19:44							
2	212° 19.2	-2° 02.6	122° 01.5	12.0	-19° 27.9	-0.7	54.3	68	04:04	05:11	06:06	17:32	18:28	19:34							
3	227° 19.4	-2° 03.6	136° 32.5	12.0	-19° 28.6	-0.6	54.3	66	04:12	05:14	06:05	17:34	18:25	19:26							
4	242° 19.6	-2° 04.6	151° 03.6	12.0	-19° 29.2	-0.6	54.3	64	04:19	05:16	06:03	17:36	18:23	19:19							
5	257° 19.8	-2° 05.5	165° 34.6	12.0	-19° 29.7	-0.5	54.3	62	04:25	05:18	06:02	17:37	18:21	19:13							
6	272° 20.0	-2° 06.5	180° 05.6	12.0	-19° 30.1	-0.4	54.3	60	04:31	05:20	06:01	17:38	18:19	19:08							
7	287° 20.2	-2° 07.5	194° 36.6	12.0	-19° 30.5	-0.3	54.3	58	04:35	05:21	06:00	17:39	18:18	19:04							
8	302° 20.4	-2° 08.5	209° 07.6	12.0	-19° 30.7	-0.2	54.3	56	04:39	05:22	05:59	17:40	18:17	19:00							
9	317° 20.6	-2° 09.4	223° 38.6	12.0	-19° 30.8	-0.1	54.3	54	04:42	05:23	05:58	17:41	18:16	18:57							
10	332° 20.8	-2° 10.4	238° 09.5	12.0	-19° 30.9	-0.0	54.3	52	04:45	05:24	05:58	17:42	18:15	18:55							
11	347° 21.1	-2° 11.4	252° 40.5	12.0	-19° 30.9	0.1	54.3	50	04:47	05:25	05:57	17:43	18:15	18:52							
12	2° 21.3	-2° 12.3	267° 11.4	11.9	-19° 30.7	0.2	54.4	48	04:52	05:26	05:56	17:44	18:13	18:47							
13	17° 21.5	-2° 13.3	281° 42.4	11.9	-19° 30.5	0.3	54.4	45	04:56	05:27	05:54	17:45	18:12	18:44							
14	32° 21.7	-2° 14.3	296° 13.3	11.9	-19° 30.2	0.4	54.4	40	04:59	05:28	05:53	17:47	18:12	18:41							
15	47° 21.9	-2° 15.3	310° 44.2	11.9	-19° 29.8	0.4	54.4	35	05:01	05:28	05:52	17:48	18:12	18:39							
16	62° 22.1	-2° 16.2	325° 15.1	11.9	-19° 29.3	0.5	54.4	30	05:03	05:28	05:50	17:50	18:12	18:37							
17	77° 22.3	-2° 17.2	339° 46.0	11.9	-19° 28.7	0.6	54.4	20	05:03	05:28	05:49	17:52	18:13	18:37							
18	92° 22.5	-2° 18.2	354° 16.9	11.9	-19° 28.1	0.7	54.4	10	05:02	05:26	05:47	17:53	18:14	18:38							
19	107° 22.7	-2° 19.1	8° 47.8	11.9	-19° 27.3	0.8	54.4	-10	04:60	05:24	05:45	17:55	18:16	18:41							
20	122° 22.9	-2° 20.1	23° 18.7	11.9	-19° 26.5	0.9	54.4	-20	04:55	05:21	05:43	17:58	18:20	18:45							
21	137° 23.1	-2° 21.1	37° 49.6	11.9	-19° 25.5	1.0	54.4	-30	04:49	05:17	05:41	18:00	18:24	18:52							
22	152° 23.4	-2° 22.1	52° 20.4	11.9	-19° 24.5	1.1	54.5	-35	04:44	05:14	05:39	18:02	18:27	18:57							
23	167° 23.6	-2° 23.0	66° 51.3	11.8	-19° 23.3	1.2	54.5	-40	04:39	05:11	05:38	18:04	18:31	19:03							
SD.=16.0		d=-1.0	S.D.=14.8					-45	04:31	05:06	05:36	18:06	18:35	19:10	-50	04:22	05:01	05:33	18:08	18:41	19:20
SD.=16.0		d=-1.0	S.D.=14.9					-52	04:18	04:58	05:32	18:09	18:43	19:24	-54	04:13	04:55	05:31	18:11	18:46	19:29
SD.=16.0		d=-1.0	S.D.=14.9					-56	04:07	04:52	05:30	18:12	18:50	19:35	-58	04:00	04:48	05:28	18:14	18:54	19:42
SD.=16.0		d=-1.0	S.D.=14.9					-60	03:53	04:44	05:26	18:16	18:58	19:50							
SD.=16.0		d=-1.0	S.D.=14.9					Moonrise			Moonset										
SD.=16.0		d=-1.0	S.D.=14.9					Lat.	Thu	Fri	Sat	Thu	Fri	Sat							
SD.=16.0		d=-1.0	S.D.=14.9					72	--	--	18:46	--	--	21:24							
SD.=16.0		d=-1.0	S.D.=14.9					70	17:32	17:48	17:50	19:16	20:41	22:19							
SD.=16.0		d=-1.0	S.D.=14.9					68	16:27	16:59	17:17	20:22	21:30	22:52							
SD.=16.0		d=-1.0	S.D.=14.9					66	15:51	16:28	16:52	20:58	22:00	23:16							
SD.=16.0		d=-1.0	S.D.=14.9					64	15:25	16:05	16:33	21:23	22:23	23:35							
SD.=16.0		d=-1.0	S.D.=14.9					62	15:05	15:46	16:17	21:43	22:42	23:50							
SD.=16.0		d=-1.0	S.D.=14.9					60	14:49	15:31	16:04	21:59	22:57	--							
SD.=16.0		d=-1.0	S.D.=14.9					58	14:35	15:18	15:53	22:13	23:09	--							
SD.=16.0		d=-1.0	S.D.=14.9					56	14:23	15:07	15:43	22:25	23:21	--							
SD.=16.0		d=-1.0	S.D.=14.9					54	14:13	14:57	15:34	22:35	23:30	--							
SD.=16.0		d=-1.0	S.D.=14.9					52	14:04	14:48	15:26	22:44	23:39	--							
SD.=16.0		d=-1.0	S.D.=14.9					50	13:56	14:40	15:19	22:52	23:47	--							
SD.=16.0		d=-1.0	S.D.=14.9					45	13:38	14:23	15:04	23:10	--	00:03							
SD.=16.0		d=-1.0	S.D.=14.9					40	13:24	14:09	14:52	23:24	--	00:16							
SD.=16.0		d=-1.0	S.D.=14.9					35	13:11	13:58	14:41	23:36	--	00:28							
SD.=16.0		d=-1.0	S.D.=14.9					30	13:01	13:48	14:32	23:47	--	00:38							
SD.=16.0		d=-1.0	S.D.=14.9					20	12:43	13:30	14:16	--	00:05	00:55							
SD.=16.0		d=-1.0	S.D.=14.9					10	12:27	13:15	14:02	--	00:21	01:10							
SD.=16.0		d=-1.0	S.D.=14.9					0	12:12	13:00	13:49	--	00:35	01:24							
SD.=16.0		d=-1.0	S.D.=14.9					-10	11:57	12:46	13:36	00:02	00:50	01:37							
SD.=16.0		d=-1.0	S.D.=14.9					-20	11:41	12:31	13:21	00:18	01:06	01:52							
SD.=16.0		d=-1.0	S.D.=14.9					-30	11:23	12:13	13:05	00:36	01:24	02:09							
SD.=16.0		d=-1.0	S.D.=14.9					-35	11:13	12:03	12:56	00:46	01:34	02:19							
SD.=16.0		d=-1.0	S.D.=14.9					-40	11:01	11:51	12:45	00:58	01:46	02:30							
SD.=16.0		d=-1.0	S.D.=14.9					-45	10:46	11:37	12:33	01:13	01:60	02:43							
SD.=16.0		d=-1.0	S.D.=14.9					-50	10:29	11:20	12:17	01:30	02:17	02:59							
SD.=16.0		d=-1.0	S.D.=14.9					-52	10:21	11:12	12:10	01:38	02:25	03:06							
SD.=16.0		d=-1.0	S.D.=14.9					-54	10:12	11:03	12:02	01:47	02:34	03:15							
SD.=16.0		d=-1.0	S.D.=14.9					-56	10:01	10:53	11:53	01:57	02:44	03:24							
SD.=16.0		d=-1.0	S.D.=14.9					-58	09:50	10:42	11:43	02:09	02:56	03:34							
SD.=16.0		d=-1.0	S.D.=14.9					-60	09:36	10:29	11:31	02:23	03:09	03:46							
SD.=16.0		d=-1.0	S.D.=15.0					Sun			Moon										
SD.=16.0		d=-1.0	S.D.=15.0					Day	Eqn.of Time	Mer.	Mer.	Mer.	Age								
SD.=16.0		d=-1.0	S.D.=15.0						00 ^h	12 ^h	Pass	Upper	Lower								
SD.=16.0		d=-1.0	S.D.=15.0					28	09:15	09:25	11:50	18:23	05:59	8(54%)							
SD.=16.0		d=-1.0	S.D.=15.0					29	09:35	09:45	11:50	19:11	06:47	9(63%)							
SD.=16.0		d=-1.0	S.D.=15.0					30	09:55	10:05	11:49	20:00	07:36	10(72%)							

October 01, 02 ,03 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	9°55.0	204°42.5	7°41.4	202°07.6	6°30.7	163°34.0	-9°46.6	108°17.7	-22°08.5	Alpheratz	357°40.1	29°11.4
1	24°57.5	219°42.1	7°40.3	217°08.6	6°30.0	178°36.0	-9°46.8	123°20.0	-22°08.5	Ankaa	353°12.5	-42°12.6
2	39°59.9	234°41.7	7°39.2	232°09.6	6°29.4	193°38.0	-9°47.0	138°22.3	-22°08.5	Schedar	349°36.6	56°38.1
3	55°02.4	249°41.2	7°38.1	247°10.6	6°28.8	208°39.9	-9°47.2	153°24.6	-22°08.5	Diphda	348°52.6	-17°53.3
4	70°04.9	264°40.8	7°36.9	262°11.6	6°28.2	223°41.9	-9°47.4	168°26.9	-22°08.6	Achernar	335°24.1	-57°08.8
5	85°07.3	279°40.4	7°35.8	277°12.6	6°27.6	238°43.9	-9°47.6	183°29.2	-22°08.6	Hamal	327°57.2	23°32.7
6	100°09.8	294°40.0	7°34.7	292°13.6	6°27.0	253°45.8	-9°47.8	198°31.5	-22°08.6	Polaris	316°05.7	89°20.0
7	115°12.3	309°39.5	7°33.5	307°14.6	6°26.3	268°47.8	-9°48.0	213°33.8	-22°08.6	Akamar	315°15.8	-40°14.0
8	130°14.7	324°39.1	7°32.4	322°15.6	6°25.7	283°49.8	-9°48.2	228°36.1	-22°08.6	Menkar	314°11.8	4°09.5
9	145°17.2	339°38.7	7°31.3	337°16.6	6°25.1	298°51.7	-9°48.4	243°38.5	-22°08.6	Mirfak	308°35.8	49°55.2
10	160°19.6	354°38.3	7°30.2	352°17.6	6°24.5	313°53.7	-9°48.6	258°40.8	-22°08.6	Aldebaran	290°45.9	16°32.6
11	175°22.1	9°37.9	7°29.0	7°18.6	6°23.9	328°55.7	-9°48.7	273°43.1	-22°08.7	Rigel	281°09.2	-8°10.9
12	190°24.6	24°37.4	7°27.9	22°19.6	6°23.3	343°57.6	-9°48.9	288°45.4	-22°08.7	Capella	280°30.0	46°00.7
13	205°27.0	39°37.0	7°26.8	37°20.6	6°22.6	358°59.6	-9°49.1	303°47.7	-22°08.7	Bellatrix	278°28.8	6°21.8
14	220°29.5	54°36.6	7°25.7	52°21.6	6°22.0	14°01.6	-9°49.3	318°50.0	-22°08.7	Elnath	278°08.9	28°37.1
15	235°32.0	69°36.2	7°24.5	67°22.6	6°21.4	29°03.5	-9°49.5	333°52.3	-22°08.7	Alnilam	275°43.4	-1°11.5
16	250°34.4	84°35.8	7°23.4	82°23.6	6°20.8	44°05.5	-9°49.7	348°54.6	-22°08.7	Betelgeuse	270°58.1	7°24.5
17	265°36.9	99°35.3	7°22.3	97°24.6	6°20.2	59°07.5	-9°49.9	3°56.9	-22°08.8	Canopus	263°54.8	-52°42.1
18	280°39.4	114°34.9	7°21.1	112°25.6	6°19.6	74°09.4	-9°50.1	18°59.2	-22°08.8	Sirius	258°31.1	-16°44.2
19	295°41.8	129°34.5	7°20.0	127°26.6	6°18.9	89°11.4	-9°50.3	34°01.5	-22°08.8	Adara	255°10.3	-28°59.7
20	310°44.3	144°34.1	7°18.9	142°27.6	6°18.3	104°13.3	-9°50.5	49°03.9	-22°08.8	Procyon	244°56.7	5°10.9
21	325°46.8	159°33.6	7°17.7	157°28.6	6°17.7	119°15.3	-9°50.7	64°06.2	-22°08.8	Pollux	243°24.2	27°58.8
22	340°49.2	174°33.2	7°16.6	172°29.6	6°17.1	134°17.3	-9°50.8	79°08.5	-22°08.8	Avior	234°17.1	-59°33.8
23	355°51.7	189°32.8	7°15.5	187°30.6	6°16.5	149°19.2	-9°51.0	94°10.8	-22°08.8	Suhail	222°50.5	-43°30.0
Mer.pass.:23:16		v-0.4 d-1.1	m-3.8	v1.0 d-0.6	m1.8	v2.0 d-0.2	m-1.5	v2.3 d-0.0	m0.5	Miaplacidus	221°39.6	-69°47.2
										Alphard	217°53.4	-8°44.0
										Regulus	207°40.7	11°52.9
										Dubhe	193°48.8	61°39.3
										Denebola	182°31.0	14°28.6
										Genah	175°49.6	-17°38.2
										Acrux	173°06.7	-63°11.7
										Gacrux	171°58.2	-57°12.6
										Alioth	166°18.8	55°52.0
										Spica	158°28.5	-11°15.0
										Alcaid	152°57.1	49°13.8
										Hadar	148°44.3	-60°27.4
										Menkent	148°04.5	-36°27.2
										Arcturus	145°53.3	19°06.0
										Rigel Kent.	139°48.3	-60°54.4
										Zubenelg.	137°02.5	-16°06.7
										Kochab	137°21.2	74°05.3
										Alphecca	126°08.9	26°39.7
										Antares	112°22.9	-26°28.1
										Atria	107°22.3	-69°03.5
										Sabik	102°09.4	-15°44.6
										Shaula	96°18.1	-37°06.8
										Rasalhague	96°03.9	12°33.2
										Etamin	90°44.9	51°29.7
										Kaus Aust.	83°40.0	-34°22.4
										Vega	80°37.0	38°48.4
										Nunki	75°54.7	-26°16.3
										Altair	62°05.4	8°55.2
										Peacock	53°14.5	-56°40.7
										Deneb	49°29.3	45°21.0
										Enif	33°44.1	9°57.6
										Alnair	27°39.8	-46°52.5
										Fomalhaut	15°20.6	-29°31.6
										Scheat	13°50.3	28°10.9
										Markab	13°35.2	15°18.2
										2017/10/	SHA	Mer.pass
										Venus	194°47.5	10:21
										Mars	192°12.6	10:31
										Jupiter	153°39.0	13:04
										Saturn	98°22.6	16:44
										2017/10/	SHA	Mer.pass
										Venus	193°38.2	10:22
										Mars	191°37.5	10:29
										Jupiter	153°27.1	13:01
										Saturn	98°18.9	16:41
										2017/10/	SHA	Mer.pass
										Venus	192°29.1	10:23
										Mars	191°02.3	10:28
										Jupiter	153°15.1	12:58
										Saturn	98°15.1	16:37
										Horizontal paralax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:23:08		v-0.4 d-1.1	m-3.8	v1.0 d-0.6	m1.8	v2.0 d-0.2	m-1.5	v2.3 d-0.0	m0.5			

h		Sun			Moon									
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	182° 33.6	-3° 10.6	57° 57.8	11.7	-16° 36.5	5.6	55.4	72	03:55	05:17	06:24	17:12	18:19	19:40
1	197° 33.8	-3° 11.6	72° 28.5	11.7	-16° 30.8	5.7	55.4	70	04:06	05:19	06:20	17:17	18:17	19:29
2	212° 34.0	-3° 12.5	86° 59.2	11.7	-16° 25.1	5.8	55.4	68	04:15	05:21	06:17	17:20	18:15	19:21
3	227° 34.2	-3° 13.5	101° 29.9	11.7	-16° 19.3	5.8	55.5	66	04:23	05:23	06:14	17:23	18:14	19:14
4	242° 34.4	-3° 14.5	116° 00.6	11.7	-16° 13.4	5.9	55.5	64	04:29	05:25	06:12	17:25	18:12	19:08
5	257° 34.6	-3° 15.4	130° 31.3	11.7	-16° 07.5	6.0	55.5	62	04:34	05:26	06:10	17:27	18:11	19:03
6	272° 34.8	-3° 16.4	145° 02.0	11.7	-16° 01.4	6.1	55.5	60	04:38	05:27	06:08	17:29	18:10	18:59
7	287° 35.0	-3° 17.4	159° 32.7	11.7	-15° 55.3	6.2	55.6	58	04:42	05:27	06:07	17:31	18:10	18:55
8	302° 35.2	-3° 18.4	174° 03.4	11.7	-15° 49.0	6.3	55.6	56	04:45	05:28	06:05	17:32	18:09	18:52
9	317° 35.4	-3° 19.3	188° 34.1	11.7	-15° 42.7	6.3	55.6	54	04:47	05:29	06:04	17:34	18:09	18:50
10	332° 35.6	-3° 20.3	203° 04.9	11.7	-15° 36.3	6.4	55.6	52	04:50	05:29	06:03	17:35	18:08	18:48
11	347° 35.8	-3° 21.3	217° 35.6	11.7	-15° 29.9	6.5	55.7	50	04:52	05:29	06:02	17:36	18:08	18:46
12	2° 36.0	-3° 22.2	232° 06.3	11.7	-15° 23.3	6.6	55.7	48	04:56	05:30	05:59	17:38	18:08	18:42
13	17° 36.2	-3° 23.2	246° 37.0	11.7	-15° 16.7	6.7	55.7	46	04:59	05:30	05:57	17:41	18:08	18:39
14	32° 36.4	-3° 24.2	261° 07.7	11.7	-15° 10.0	6.8	55.8	44	05:01	05:30	05:56	17:42	18:08	18:37
15	47° 36.6	-3° 25.1	275° 38.4	11.7	-15° 03.2	6.8	55.8	42	05:02	05:30	05:54	17:44	18:08	18:36
16	62° 36.8	-3° 26.1	290° 09.1	11.7	-14° 56.3	6.9	55.8	40	05:04	05:29	05:51	17:47	18:09	18:35
17	77° 37.0	-3° 27.1	304° 39.8	11.7	-14° 49.3	7.0	55.8	38	05:03	05:28	05:49	17:50	18:11	18:35
18	92° 37.2	-3° 28.0	319° 10.5	11.7	-14° 42.3	7.1	55.9	36	05:01	05:25	05:46	17:53	18:13	18:37
19	107° 37.5	-3° 29.0	333° 41.2	11.7	-14° 35.1	7.2	55.9	34	04:58	05:22	05:43	17:55	18:16	18:41
20	122° 37.7	-3° 30.0	348° 11.9	11.7	-14° 27.9	7.2	55.9	32	04:53	05:18	05:40	17:58	18:20	18:46
21	137° 37.9	-3° 30.9	2° 42.6	11.7	-14° 20.7	7.3	56.0	30	04:45	05:13	05:37	18:02	18:26	18:54
22	152° 38.1	-3° 31.9	17° 13.3	11.7	-14° 13.3	7.4	56.0	28	04:40	05:10	05:35	18:04	18:30	18:59
23	167° 38.3	-3° 32.9	31° 44.0	11.7	-14° 05.9	7.5	56.0	26	04:33	05:06	05:33	18:07	18:34	19:06
SD.=16.0 d=-1.0							S.D.=15.1							
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
									Sun	Mon	Tue	Sun	Mon	Tue
0	182° 38.5	-3° 33.8	46° 14.7	11.7	-13° 58.3	7.6	56.0	72	18:21	18:07	17:57	23:31	--	01:26
1	197° 38.6	-3° 34.8	60° 45.4	11.7	-13° 50.7	7.6	56.1	70	17:50	17:48	17:46	--	00:01	01:43
2	212° 38.8	-3° 35.8	75° 16.1	11.7	-13° 43.1	7.7	56.1	68	17:27	17:33	17:36	--	00:23	01:57
3	227° 39.0	-3° 36.7	89° 46.8	11.7	-13° 35.3	7.8	56.1	66	17:09	17:20	17:29	--	00:40	02:09
4	242° 39.2	-3° 37.7	104° 17.5	11.7	-13° 27.5	7.9	56.2	64	16:54	17:10	17:22	--	00:54	02:18
5	257° 39.4	-3° 38.7	118° 48.2	11.7	-13° 19.6	7.9	56.2	62	16:42	17:01	17:16	--	01:06	02:26
6	272° 39.6	-3° 39.6	133° 18.9	11.7	-13° 11.6	8.0	56.2	60	16:31	16:53	17:12	00:03	01:16	02:33
7	287° 39.8	-3° 40.6	147° 49.6	11.7	-13° 03.6	8.1	56.2	58	16:22	16:46	17:07	00:14	01:24	02:39
8	302° 40.0	-3° 41.6	162° 20.3	11.7	-12° 55.4	8.2	56.3	56	16:14	16:40	17:03	00:23	01:32	02:45
9	317° 40.2	-3° 42.6	176° 51.0	11.7	-12° 47.2	8.2	56.3	54	16:07	16:35	16:60	00:32	01:39	02:49
10	332° 40.4	-3° 43.5	191° 21.7	11.7	-12° 39.0	8.3	56.3	52	16:00	16:30	16:57	00:39	01:45	02:54
11	347° 40.6	-3° 44.5	205° 52.4	11.7	-12° 30.6	8.4	56.4	50	15:54	16:25	16:54	00:46	01:50	02:58
12	2° 40.8	-3° 45.5	220° 23.1	11.7	-12° 22.2	8.5	56.4	48	15:41	16:16	16:47	01:00	02:02	03:06
13	17° 41.0	-3° 46.4	234° 53.8	11.7	-12° 13.7	8.5	56.4	46	15:31	16:07	16:42	01:12	02:11	03:13
14	32° 41.2	-3° 47.4	249° 24.5	11.7	-12° 05.2	8.6	56.5	44	15:22	16:01	16:37	01:22	02:20	03:19
15	47° 41.4	-3° 48.4	263° 55.1	11.7	-11° 56.5	8.7	56.5	42	15:14	15:54	16:33	01:31	02:27	03:24
16	62° 41.6	-3° 49.3	278° 25.8	11.7	-11° 47.9	8.7	56.5	40	15:00	15:44	16:26	01:46	02:39	03:34
17	77° 41.8	-3° 50.3	292° 56.5	11.7	-11° 39.1	8.8	56.5	38	14:48	15:34	16:20	01:60	02:50	03:42
18	92° 42.0	-3° 51.3	307° 27.2	11.7	-11° 30.2	8.9	56.6	36	14:37	15:26	16:14	02:12	03:00	03:49
19	107° 42.2	-3° 52.2	321° 57.8	11.7	-11° 21.3	8.9	56.6	34	14:26	15:17	16:08	02:24	03:10	03:56
20	122° 42.4	-3° 53.2	336° 28.5	11.7	-11° 12.4	9.0	56.6	32	14:14	15:07	16:02	02:37	03:21	04:04
21	137° 42.6	-3° 54.1	350° 59.2	11.7	-11° 03.3	9.1	56.7	30	13:60	14:57	15:55	02:52	03:33	04:13
22	152° 42.8	-3° 55.1	5° 29.8	11.7	-10° 54.2	9.1	56.7	28	13:52	14:50	15:51	03:01	03:40	04:18
23	167° 43.0	-3° 56.1	20° 00.5	11.6	-10° 45.1	9.2	56.7	26	13:43	14:43	15:46	03:11	03:48	04:24
SD.=16.0 d=-1.0							S.D.=15.3							
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun			Moon		
									Eqn.of Time	Mer.	Mer.Pass.	Age		
0	182° 43.2	-3° 57.0	34° 31.1	11.6	-10° 35.8	9.3	56.8	1	10:14	10:24	11:49	20:48	08:24	11(81%)
1	197° 43.4	-3° 58.0	49° 01.8	11.6	-10° 26.5	9.3	56.8	2	10:34	10:43	11:49	21:37	09:13	12(88%)
2	212° 43.6	-3° 59.0	63° 32.4	11.6	-10° 17.2	9.4	56.8	3	10:53	11:02	11:48	22:25	10:01	13(94%)
3	227° 43.8	-3° 59.9	78° 03.0	11.6	-10° 07.7	9.5	56.9							
4	242° 44.0	-4° 00.9	92° 33.6	11.6	-9° 58.3	9.5	56.9							
5	257° 44.2	-4° 01.9	107° 04.3	11.6	-9° 48.7	9.6	56.9							
6	272° 44.4	-4° 02.8	121° 34.9	11.6	-9° 39.1	9.6	56.9							
7	287° 44.6	-4° 03.8	136° 05.5	11.6	-9° 29.4	9.7	57.0							
8	302° 44.8	-4° 04.8	150° 36.1	11.6	-9° 19.7	9.8	57.0							
9	317° 45.0	-4° 05.7	165° 06.7	11.6	-9° 09.9	9.8	57.0							
10	332° 45.2	-4° 06.7	179° 37.3	11.6	-9° 00.1	9.9	57.1							
11	347° 45.4	-4° 07.7	194° 07.8	11.6	-8° 50.1	9.9	57.1							
12	2° 45.6	-4° 08.6	208° 38.4	11.6	-8° 40.2	10.0	57.1							
13	17° 45.7	-4° 09.6	223° 09.0	11.6	-8° 30.2	10.0	57.2							
14	32° 45.9	-4° 10.6	237° 39.5	11.5	-8° 20.1	10.1	57.2							
15	47° 46.1	-4° 11.5	252° 10.0	11.5	-8° 10.0	10.2	57.2							
16	62° 46.3	-4° 12.5	266° 40.6	11.5	-7° 59.8	10.2	57.3							
17	77° 46.5	-4° 13.5	281° 11.1	11.5	-7° 49.6	10.3	57.3							
18	92° 46.7	-4° 14.4	295° 41.6	11.5	-7° 39.3	10.3	57.3							
19	107° 46.9	-4° 15.4	310° 12.1	11.5	-7° 28.9	10.4	57.4							
20	122° 47.1	-4° 16.3	324° 42.6	11.5	-7° 18.5	10.4	57.4							
21	137° 47.3	-4° 17.3	339° 13.1	11.5	-7° 08.1	10.5	57.4							
22	152° 47.5	-4° 18.3	353° 43.5	11.5	-6° 57.6	10.5	57.4							
23	167° 47.7	-4° 19.2	8° 14.0	11.4	-6° 47.1	10.6	57.5							
SD.=16.0 d=-1.0							S.D.=15.5							

October 04, 05 ,06 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		Stars				
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	12°52.4	204°12.5	6°19.5	203°19.6	5°46.2	165°55.4	-10°00.4	111°03.7	-22°09.6	Alpheratz	357°40.1	29°11.4		
1	27°54.9	219°12.1	6°18.3	218°20.6	5°45.5	180°57.4	-10°00.6	126°06.0	-22°09.6	Ankaa	353°12.5	-42°12.6		
2	42°57.3	234°11.6	6°17.2	233°21.6	5°44.9	195°59.4	-10°00.8	141°08.3	-22°09.6	Schedar	349°36.6	56°38.1		
3	57°59.8	249°11.2	6°16.0	248°22.6	5°44.3	211°01.3	-10°01.0	156°10.6	-22°09.7	Diphda	348°52.6	-17°53.3		
4	73°02.3	264°10.8	6°14.9	263°23.6	5°43.7	226°03.3	-10°01.2	171°12.9	-22°09.7	Achernar	335°24.1	-57°08.8		
5	88°04.7	279°10.4	6°13.7	278°24.6	5°43.1	241°05.2	-10°01.4	186°15.2	-22°09.7	Hamal	327°57.2	23°32.7		
6	103°07.2	294°10.0	6°12.6	293°25.6	5°42.4	256°07.2	-10°01.5	201°17.5	-22°09.7	Polaris	316°04.9	89°20.1		
7	118°09.7	309°09.6	6°11.4	308°26.7	5°41.8	271°09.2	-10°01.7	216°19.8	-22°09.7	Akamar	315°15.8	-40°14.0		
8	133°12.1	324°09.2	6°10.3	323°27.7	5°41.2	286°11.1	-10°01.9	231°22.1	-22°09.7	Menkar	314°11.7	4°09.5		
9	148°14.6	339°08.8	6°09.1	338°28.7	5°40.6	301°13.1	-10°02.1	246°24.4	-22°09.7	Mirfak	308°35.8	49°55.2		
10	163°17.1	354°08.4	6°08.0	353°29.7	5°40.0	316°15.1	-10°02.3	261°26.7	-22°09.8	Aldebaran	290°45.9	16°32.6		
11	178°19.5	9°07.9	6°06.8	8°30.7	5°39.3	331°17.0	-10°02.5	276°29.0	-22°09.8	Rigel	281°09.1	-8°10.9		
12	193°22.0	24°07.5	6°05.6	23°31.7	5°38.7	346°19.0	-10°02.7	291°31.3	-22°09.8	Capella	280°30.0	46°00.7		
13	208°24.5	39°07.1	6°04.5	38°32.7	5°38.1	1°20.9	-10°02.9	306°33.6	-22°09.8	Bellatrix	278°28.8	6°21.8		
14	223°26.9	54°06.7	6°03.3	53°33.7	5°37.5	16°22.9	-10°03.1	321°35.9	-22°09.8	Elnath	278°08.8	28°37.1		
15	238°29.4	69°06.3	6°02.2	68°34.7	5°36.9	31°24.9	-10°03.3	336°38.2	-22°09.8	Alnilam	275°43.3	-1°11.5		
16	253°31.8	84°05.9	6°01.0	83°35.7	5°36.2	46°26.8	-10°03.5	351°40.5	-22°09.9	Betelgeuse	270°58.1	7°24.5		
17	268°34.3	99°05.5	5°59.9	98°36.7	5°35.6	61°28.8	-10°03.6	6°42.8	-22°09.9	Canopus	263°54.8	-52°42.1		
18	283°36.8	114°05.1	5°58.7	113°37.7	5°35.0	76°30.7	-10°03.8	21°45.1	-22°09.9	Sirius	258°31.1	-16°44.2		
19	298°39.2	129°04.7	5°57.5	128°38.7	5°34.4	91°32.7	-10°04.0	36°47.4	-22°09.9	Adara	255°10.2	-28°59.7		
20	313°41.7	144°04.3	5°56.4	143°39.7	5°33.8	106°34.7	-10°04.2	51°49.7	-22°09.9	Procyon	244°56.7	5°10.9		
21	328°44.2	159°03.9	5°55.2	158°40.7	5°33.1	121°36.6	-10°04.4	66°52.0	-22°09.9	Pollux	243°24.2	27°58.8		
22	343°46.6	174°03.5	5°54.1	173°41.7	5°32.5	136°38.6	-10°04.6	81°54.3	-22°09.9	Avior	234°17.0	-59°33.7		
23	358°49.1	189°03.0	5°52.9	188°42.7	5°31.9	151°40.5	-10°04.8	96°56.6	-22°10.0	Suhail	222°50.5	-43°30.0		
Mer.pass.:23:04											v-0.4 d-1.2 m-3.8	v1.0 d-0.6 m1.8	v2.0 d-0.2 m-1.5	v2.3 d-0.0 m0.5
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	13°51.6	204°02.6	5°51.8	203°43.7	5°31.3	166°42.5	-10°05.0	111°58.8	-22°10.0	Alphard	217°53.4	-8°44.0		
1	28°54.0	219°02.2	5°50.6	218°44.7	5°30.7	181°44.5	-10°05.2	127°01.1	-22°10.0	Regulus	207°40.7	11°52.9		
2	43°56.5	234°01.8	5°49.4	233°45.7	5°30.0	196°46.4	-10°05.4	142°03.4	-22°10.0	Dubhe	193°48.8	61°39.3		
3	58°59.0	249°01.4	5°48.3	248°46.7	5°29.4	211°48.4	-10°05.6	157°05.7	-22°10.0	Denebola	182°31.0	14°28.5		
4	74°01.4	264°01.0	5°47.1	263°47.7	5°28.8	226°50.3	-10°05.7	172°08.0	-22°10.0	Gienah	175°49.6	-17°38.2		
5	89°03.9	279°00.6	5°46.0	278°48.7	5°28.2	241°52.3	-10°05.9	187°10.3	-22°10.1	Acrux	173°06.7	-63°11.6		
6	104°06.3	294°00.2	5°44.8	293°49.7	5°27.5	256°54.3	-10°06.1	202°12.6	-22°10.1	Gacrux	171°58.2	-57°12.6		
7	119°08.8	309°59.8	5°43.6	308°50.7	5°26.9	271°56.2	-10°06.3	217°14.9	-22°10.1	Alioth	166°18.8	55°52.0		
8	134°11.3	323°59.4	5°42.5	323°51.7	5°26.3	286°58.2	-10°06.5	232°17.2	-22°10.1	Spica	158°28.5	-11°15.0		
9	149°13.7	338°59.0	5°41.3	338°52.7	5°25.7	302°00.1	-10°06.7	247°19.5	-22°10.1	Alcaid	152°57.1	49°13.8		
10	164°16.2	353°58.6	5°40.1	353°53.7	5°25.1	317°02.1	-10°06.9	262°21.8	-22°10.1	Hadar	148°44.3	-60°27.4		
11	179°18.7	8°58.2	5°39.0	8°54.7	5°24.4	332°04.1	-10°07.1	277°24.1	-22°10.1	Menkent	148°04.5	-36°27.2		
12	194°21.1	23°57.8	5°37.8	23°55.7	5°23.8	347°06.0	-10°07.3	292°26.4	-22°10.2	Arcturus	145°53.3	19°06.0		
13	209°23.6	38°57.4	5°36.7	38°56.7	5°23.2	2°08.0	-10°07.5	307°28.7	-22°10.2	Rigel Kent.	139°48.3	-60°54.4		
14	224°26.1	53°57.0	5°35.5	53°57.8	5°22.6	17°09.9	-10°07.7	322°31.0	-22°10.2	Zubenelg.	137°02.5	-16°06.7		
15	239°28.5	68°56.5	5°34.3	68°58.8	5°22.0	32°11.9	-10°07.8	337°33.3	-22°10.2	Kochab	137°21.2	74°05.3		
16	254°31.0	83°56.1	5°33.2	83°59.8	5°21.3	47°13.9	-10°08.0	352°35.6	-22°10.2	Alphecca	126°08.9	26°39.7		
17	269°33.4	98°55.7	5°32.0	99°00.8	5°20.7	62°15.8	-10°08.2	7°37.9	-22°10.2	Antares	112°22.9	-26°28.1		
18	284°35.9	113°55.3	5°30.8	114°01.8	5°20.1	77°17.8	-10°08.4	22°40.2	-22°10.3	Atria	107°22.4	-69°03.5		
19	299°38.4	128°54.9	5°29.7	129°02.8	5°19.5	92°19.7	-10°08.6	37°42.5	-22°10.3	Sabik	102°09.4	-15°44.6		
20	314°40.8	143°54.5	5°28.5	144°03.8	5°18.8	107°21.7	-10°08.8	52°44.8	-22°10.3	Shaula	96°18.1	-37°06.8		
21	329°43.3	158°54.1	5°27.3	159°04.8	5°18.2	122°23.7	-10°09.0	67°47.0	-22°10.3	Rasalhague	96°03.9	12°33.2		
22	344°45.8	173°53.7	5°26.2	174°05.8	5°17.6	137°25.6	-10°09.2	82°49.3	-22°10.3	Etamin	90°44.9	51°29.7		
23	359°48.2	188°53.3	5°25.0	189°06.8	5°17.0	152°27.6	-10°09.4	97°51.6	-22°10.3	Kaus Aust.	83°40.0	-34°22.4		
Mer.pass.:23:00											v-0.4 d-1.2 m-3.8	v1.0 d-0.6 m1.8	v2.0 d-0.2 m-1.5	v2.3 d-0.0 m0.5
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	14°50.7	203°52.9	5°23.8	204°07.8	5°16.4	167°29.5	-10°09.6	112°53.9	-22°10.4	Alnair	27°39.8	-46°52.5		
1	29°53.2	218°52.5	5°22.7	219°08.8	5°15.7	182°31.5	-10°09.8	127°56.2	-22°10.4	Fomalhaut	15°20.6	-29°31.7		
2	44°55.6	233°52.1	5°21.5	234°09.8	5°15.1	197°33.5	-10°09.9	142°58.5	-22°10.4	Scheat	13°50.3	28°10.9		
3	59°58.1	248°51.7	5°20.3	249°10.8	5°14.5	212°35.4	-10°10.1	158°00.8	-22°10.4	Markab	13°35.2	15°18.2		
4	75°00.6	263°51.3	5°19.2	264°11.8	5°13.9	227°37.4	-10°10.3	173°03.1	-22°10.4	2017/10/		SHA	Mer.pass	
5	90°03.0	278°50.9	5°18.0	279°12.8	5°13.2	242°39.3	-10°10.5	188°05.4	-22°10.4	Venus	191°20.0	10:23		
6	105°05.5	293°50.5	5°16.8	294°13.8	5°12.6	257°41.3	-10°10.7	203°07.7	-22°10.4	Mars	190°27.2	10:26		
7	120°07.9	308°50.1	5°15.7	309°14.8	5°12.0	272°43.2	-10°10.9	218°10.0	-22°10.5	Jupiter	153°03.0	12:55		
8	135°10.4	323°49.7	5°14.5	324°15.8	5°11.4	287°45.2	-10°11.1	233°12.3	-22°10.5	Saturn	98°11.3	16:33		
9	150°12.9	338°49.3	5°13.3	339°16.8	5°10.8	302°47.2	-10°11.3	248°14.6	-22°10.5	2017/10/		SHA	Mer.pass	
10	165°15.3	353°48.9	5°12.2	354°17.8	5°10.1	317°49.1	-10°11.5	263°16.8	-22°10.5	Venus	190°11.1	10:24		
11	180°17.8	8°48.5	5°11.0	9°18.8	5°09.5	332°51.1	-10°11.7	278°19.1	-22°10.5	Mars	189°52.1	10:24		
12	195°20.3	23°48.1	5°09.8	24°19.9	5°08.9	347°53.0	-10°11.9	293°21.4	-22°10.5	Jupiter	152°50.9	12:51		
13	210°22.7	38°47.7	5°08.6	39°20.9	5°08.3	2°55.0	-10°12.0	308°23.7	-22°10.6	Saturn	98°07.3	16:30		
14	225°25.2	53°47.3	5°07.5	54°21.9	5°07.6	17°57.0	-10°12.2	323°26.0	-22°10.6	2017/10/		SHA	Mer.pass	
15	240°27.7	68°46.9	5°06.3	69°22.9	5°07.0	32°58.9	-10°12.4	338°28.3	-22°10.6	Venus	189°02.2	10:25		
16	255°30.1	83°46.5	5°05.1	84°23.9	5°06.4	48°00.9	-10°12.6	353°30.6	-22°10.6	Mars	189°17.1	10:23		
17	270°32.6	98°46.1	5°04.0	99°24.9	5°05.8	63°02.8	-10°12.8	8°32.9	-22°10.6	Jupiter	152°38.8	12:48		
18	285°35.0	113°45.6	5°02.8	114°25.9	5°05.2	78°04.8	-10°13.0	23°35.2	-22°10.6	Saturn	98°03.2	16:26		
19	300°37.5	128°45.2	5°01.6	129°26.9	5°04.5	93°06.7	-10°13.2	38°37.5	-22°10.6	Horizontal parallax				
20	315°40.0	143°44.8	5°00.4	144°27.9	5°03.9	108°08.7	-10°13.4	53°39.8	-22°10.7	Venus:	0.1			
21	330°42.4	158°44.4	4°59.3	159°28.9	5°03.3	123°10.7	-10°13.6	68°42.0	-22°10.7	Mars:	0.1			
22	345°44.9	173°44.0	4°58.1	174°29.9	5°02.7	138°12.6	-10°13.8	83°44.3	-22°10.7					
23	0°47.4	188°43.6	4°56.9	189°30.9	5°02.0	153°14.6	-10°14.0	98°46.6	-22°10.7					
Mer.pass.:22:56											v-0.4 d-1.2 m-3.8	v1.0 d-0.6 m1.8	v2.0 d-0.2 m-1.5	v2.3 d-0.0 m0.5

h		Sun		Moon				Twilight			Twilight				
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	182°47.9	-4°20.2	22°44.4	11.4	-6°36.5	10.6	57.5	72	04:10	05:30	06:38	16:57	18:04	19:24	
1	197°48.1	-4°21.2	37°14.8	11.4	-6°25.9	10.7	57.5	70	04:19	05:31	06:32	17:03	18:03	19:15	
2	212°48.3	-4°22.1	51°45.2	11.4	-6°15.2	10.7	57.6	68	04:27	05:32	06:28	17:07	18:03	19:08	
3	227°48.5	-4°23.1	66°15.6	11.4	-6°04.5	10.7	57.6	66	04:33	05:33	06:24	17:11	18:02	19:02	
4	242°48.7	-4°24.1	80°46.0	11.4	-5°53.7	10.8	57.6	64	04:38	05:33	06:21	17:15	18:02	18:57	
5	257°48.8	-4°25.0	95°16.4	11.4	-5°42.9	10.8	57.7	62	04:42	05:34	06:18	17:18	18:02	18:53	
6	272°49.0	-4°26.0	109°46.7	11.3	-5°32.1	10.9	57.7	60	04:45	05:34	06:15	17:20	18:02	18:50	
7	287°49.2	-4°26.9	124°17.1	11.3	-5°21.2	10.9	57.7	58	04:48	05:34	06:13	17:22	18:01	18:47	
8	302°49.4	-4°27.9	138°47.4	11.3	-5°10.2	10.9	57.8	56	04:51	05:34	06:11	17:24	18:01	18:44	
9	317°49.6	-4°28.9	153°17.7	11.3	-4°59.3	11.0	57.8	54	04:53	05:34	06:09	17:26	18:02	18:42	
10	332°49.8	-4°29.8	167°48.0	11.3	-4°48.3	11.0	57.8	52	04:55	05:34	06:08	17:28	18:02	18:41	
11	347°50.0	-4°30.8	182°18.3	11.3	-4°37.2	11.1	57.8	50	04:57	05:34	06:06	17:30	18:02	18:39	
12	2°50.2	-4°31.8	196°48.5	11.2	-4°26.1	11.1	57.9	48	04:59	05:34	06:03	17:33	18:02	18:36	
13	17°50.4	-4°32.7	211°18.8	11.2	-4°15.0	11.1	57.9	46	05:02	05:33	06:00	17:36	18:03	18:34	
14	32°50.6	-4°33.7	225°49.0	11.2	-4°03.9	11.2	58.0	44	05:03	05:33	05:58	17:38	18:04	18:33	
15	47°50.8	-4°34.6	240°19.2	11.2	-3°52.7	11.2	58.0	42	05:04	05:32	05:56	17:41	18:04	18:32	
16	62°50.9	-4°35.6	254°49.3	11.2	-3°41.5	11.2	58.0	40	05:04	05:30	05:52	17:45	18:07	18:32	
17	77°51.1	-4°36.6	269°19.5	11.1	-3°30.2	11.3	58.0	38	05:03	05:27	05:48	17:48	18:09	18:34	
18	92°51.3	-4°37.5	283°49.6	11.1	-3°18.9	11.3	58.1	36	05:00	05:24	05:45	17:52	18:12	18:36	
19	107°51.5	-4°38.5	298°19.7	11.1	-3°07.6	11.3	58.1	34	04:56	05:21	05:42	17:55	18:16	18:41	
20	122°51.7	-4°39.5	312°49.8	11.1	-2°56.3	11.4	58.1	32	04:50	05:16	05:38	17:59	18:21	18:47	
21	137°51.9	-4°40.4	327°19.9	11.1	-2°44.9	11.4	58.1	30	04:41	05:09	05:33	18:04	18:28	18:56	
22	152°52.1	-4°41.4	341°50.0	11.0	-2°33.5	11.4	58.2	28	04:35	05:05	05:31	18:06	18:32	19:02	
23	167°52.3	-4°42.3	356°20.0	11.0	-2°22.1	11.4	58.2	26	04:28	05:01	05:28	18:10	18:37	19:09	
SD.=16.0		d=-1.0	S.D.=15.7												
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Wed	Thu	Fri	Wed	Thu	Fri	
0	182°52.5	-4°43.3	10°50.0	11.0	-2°10.7	11.5	58.2	72	17:48	17:39	17:30	03:18	05:11	07:06	
1	197°52.7	-4°44.3	25°20.0	11.0	-1°59.2	11.5	58.3	70	17:43	17:40	17:38	03:27	05:13	07:00	
2	212°52.8	-4°45.2	39°49.9	10.9	-1°47.7	11.5	58.3	68	17:39	17:42	17:44	03:35	05:14	06:56	
3	227°53.0	-4°46.2	54°19.8	10.9	-1°36.2	11.5	58.3	66	17:36	17:43	17:50	03:41	05:15	06:52	
4	242°53.2	-4°47.2	68°49.7	10.9	-1°24.7	11.5	58.3	64	17:33	17:43	17:55	03:46	05:16	06:49	
5	257°53.4	-4°48.1	83°19.6	10.9	-1°13.1	11.6	58.4	62	17:31	17:44	17:59	03:50	05:17	06:47	
6	272°53.6	-4°49.1	97°49.5	10.8	-1°01.6	11.6	58.4	60	17:28	17:45	18:02	03:54	05:18	06:44	
7	287°53.8	-4°50.0	112°19.3	10.8	-0°50.0	11.6	58.4	58	17:27	17:46	18:05	03:58	05:19	06:42	
8	302°54.0	-4°51.0	126°49.1	10.8	-0°38.4	11.6	58.4	56	17:25	17:46	18:08	04:01	05:19	06:40	
9	317°54.2	-4°52.0	141°18.9	10.8	-0°26.8	11.6	58.5	54	17:23	17:47	18:11	04:04	05:20	06:39	
10	332°54.4	-4°52.9	155°48.6	10.7	-0°15.2	11.6	58.5	52	17:22	17:47	18:13	04:06	05:21	06:37	
11	347°54.5	-4°53.9	170°18.3	10.7	-0°03.5	11.6	58.5	50	17:21	17:47	18:15	04:08	05:21	06:36	
12	2°54.7	-4°54.8	184°48.0	10.7	0°08.1	11.7	58.6	48	17:18	17:48	18:20	04:13	05:22	06:33	
13	17°54.9	-4°55.8	199°17.7	10.6	0°19.8	11.7	58.6	46	17:16	17:49	18:24	04:17	05:23	06:30	
14	32°55.1	-4°56.8	213°47.3	10.6	0°31.5	11.7	58.6	44	17:14	17:50	18:27	04:21	05:24	06:28	
15	47°55.3	-4°57.7	228°16.9	10.6	0°43.1	11.7	58.6	42	17:12	17:50	18:30	04:24	05:24	06:26	
16	62°55.5	-4°58.7	242°46.4	10.5	0°54.8	11.7	58.7	40	17:09	17:51	18:36	04:29	05:25	06:23	
17	77°55.7	-4°59.6	257°16.0	10.5	1°06.5	11.7	58.7	38	17:06	17:52	18:40	04:33	05:26	06:20	
18	92°55.9	-5°00.6	271°45.5	10.5	1°18.2	11.7	58.7	36	17:03	17:53	18:45	04:38	05:27	06:18	
19	107°56.0	-5°01.6	286°14.9	10.4	1°29.9	11.7	58.7	34	17:01	17:54	18:49	04:42	05:28	06:15	
20	122°56.2	-5°02.5	300°44.3	10.4	1°41.6	11.7	58.8	32	16:58	17:55	18:54	04:46	05:29	06:12	
21	137°56.4	-5°03.5	315°13.7	10.4	1°53.3	11.7	58.8	30	16:55	17:57	18:60	04:51	05:30	06:09	
22	152°56.6	-5°04.4	329°43.1	10.3	2°05.0	11.7	58.8	28	16:53	17:57	19:03	04:54	05:30	06:07	
23	167°56.8	-5°05.4	344°12.4	10.3	2°16.7	11.7	58.8	26	16:51	17:58	19:06	04:57	05:31	06:05	
SD.=16.0		d=-1.0	S.D.=15.9												
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Moon		Age		
0	182°57.0	-5°06.3	358°41.7	10.3	2°28.4	11.7	58.8	4	Eqn.of Time	Mer.	Mer.Pass.		Age		
1	197°57.2	-5°07.3	13°11.0	10.2	2°40.1	11.7	58.9	5	00 ^h	Pass	Upper	Lower			
2	212°57.3	-5°08.3	27°40.2	10.2	2°51.7	11.7	58.9	6	11:11	11:21	11:48	23:15	10:50	14(98%)	
3	227°57.5	-5°09.2	42°09.4	10.2	3°03.4	11.7	58.9		11:30	11:39	11:48	00:05	11:40	15(100%)	
4	242°57.7	-5°10.2	56°38.5	10.1	3°15.1	11.7	58.9		11:48	11:57	11:48	00:05	12:31	16(99%)	
5	257°57.9	-5°11.1	71°07.6	10.1	3°26.7	11.7	59.0								
6	272°58.1	-5°12.1	85°36.7	10.1	3°38.4	11.6	59.0								
7	287°58.3	-5°13.1	100°05.8	10.0	3°50.0	11.6	59.0								
8	302°58.4	-5°14.0	114°34.7	10.0	4°01.7	11.6	59.0								
9	317°58.6	-5°15.0	129°03.7	9.9	4°13.3	11.6	59.0								
10	332°58.8	-5°15.9	143°32.6	9.9	4°24.9	11.6	59.1								
11	347°59.0	-5°16.9	158°01.5	9.9	4°36.4	11.6	59.1								
12	2°59.2	-5°17.8	172°30.3	9.8	4°48.0	11.5	59.1								
13	17°59.4	-5°18.8	186°59.1	9.8	4°59.5	11.5	59.1								
14	32°59.5	-5°19.8	201°27.9	9.7	5°11.0	11.5	59.1								
15	47°59.7	-5°20.7	215°56.6	9.7	5°22.5	11.5	59.2								
16	62°59.9	-5°21.7	230°25.3	9.6	5°34.0	11.5	59.2								
17	78°00.1	-5°22.6	244°53.9	9.6	5°45.5	11.4	59.2								
18	93°00.3	-5°23.6	259°22.5	9.6	5°56.9	11.4	59.2								
19	108°00.5	-5°24.5	273°51.0	9.5	6°08.3	11.4	59.2								
20	123°00.6	-5°25.5	288°19.5	9.5	6°19.6	11.3	59.3								
21	138°00.8	-5°26.5	302°48.0	9.4	6°31.0	11.3	59.3								
22	153°01.0	-5°27.4	317°16.4	9.4	6°42.3	11.3	59.3								
23	168°01.2	-5°28.4	331°44.7	9.3	6°53.5	11.3	59.3								
SD.=16.0		d=-1.0	S.D.=16.1												

October 07, 08 ,09 (Sat., Sun., Mon.)

Aries		Venus		Mars		Jupiter		Saturn		Stars				
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	15°49.8	203°43.2	4°55.7	204°31.9	5°01.4	168°16.5	-10°14.1	113°48.9	-22°10.7	Alpheratz	357°40.1	29°11.4		
1	30°52.3	218°42.8	4°54.6	219°32.9	5°00.8	183°18.5	-10°14.3	128°51.2	-22°10.7	Ankaa	353°12.5	-42°12.6		
2	45°54.8	233°42.4	4°53.4	234°33.9	5°00.2	198°20.4	-10°14.5	143°53.5	-22°10.8	Schedar	349°36.6	56°38.1		
3	60°57.2	248°42.0	4°52.2	249°34.9	4°59.5	213°22.4	-10°14.7	158°55.8	-22°10.8	Diphda	348°52.6	-17°53.3		
4	75°59.7	263°41.6	4°51.0	264°35.9	4°58.9	228°24.4	-10°14.9	173°58.1	-22°10.8	Achernar	335°24.1	-57°08.8		
5	91°02.2	278°41.2	4°49.9	279°36.9	4°58.3	243°26.3	-10°15.1	189°00.4	-22°10.8	Hamal	327°57.2	23°32.7		
6	106°04.6	293°40.8	4°48.7	294°37.9	4°57.7	258°28.3	-10°15.3	204°02.6	-22°10.8	Polaris	316°04.1	89°20.1		
7	121°07.1	308°40.4	4°47.5	309°39.0	4°57.0	273°30.2	-10°15.5	219°04.9	-22°10.8	Akamar	315°15.8	-40°14.0		
8	136°09.5	323°40.0	4°46.3	324°40.0	4°56.4	288°32.2	-10°15.7	234°07.2	-22°10.9	Menkar	314°11.7	4°09.5		
9	151°12.0	338°39.6	4°45.2	339°41.0	4°55.8	303°34.1	-10°15.9	249°09.5	-22°10.9	Mirfak	308°35.8	49°55.2		
10	166°14.5	353°39.2	4°44.0	354°42.0	4°55.2	318°36.1	-10°16.1	264°11.8	-22°10.9	Aldebaran	290°45.9	16°32.6		
11	181°16.9	8°38.8	4°42.8	9°43.0	4°54.6	333°38.1	-10°16.2	279°14.1	-22°10.9	Rigel	281°09.1	-8°10.9		
12	196°19.4	23°38.4	4°41.6	24°44.0	4°53.9	348°40.0	-10°16.4	294°16.4	-22°10.9	Capella	280°30.0	46°00.7		
13	211°21.9	38°38.0	4°40.5	39°45.0	4°53.3	3°42.0	-10°16.6	309°18.7	-22°10.9	Bellatrix	278°28.8	6°21.8		
14	226°24.3	53°37.6	4°39.3	54°46.0	4°52.7	18°43.9	-10°16.8	324°21.0	-22°10.9	Elnath	278°08.8	28°37.1		
15	241°26.8	68°37.2	4°38.1	69°47.0	4°52.1	33°45.9	-10°17.0	339°23.2	-22°11.0	Alnilam	275°43.3	-1°11.5		
16	256°29.3	83°36.8	4°36.9	84°48.0	4°51.4	48°47.8	-10°17.2	354°25.5	-22°11.0	Betelgeuse	270°58.1	7°24.5		
17	271°31.7	98°36.4	4°35.7	99°49.0	4°50.8	63°49.8	-10°17.4	9°27.8	-22°11.0	Canopus	263°54.8	-52°42.1		
18	286°34.2	113°36.0	4°34.6	114°50.0	4°50.2	78°51.8	-10°17.6	24°30.1	-22°11.0	Sirius	258°31.0	-16°44.2		
19	301°36.6	128°35.6	4°33.4	129°51.0	4°49.6	93°53.7	-10°17.8	39°32.4	-22°11.0	Adara	255°10.2	-28°59.7		
20	316°39.1	143°35.2	4°32.2	144°52.0	4°48.9	108°55.7	-10°18.0	54°34.7	-22°11.0	Procyon	244°56.7	5°10.9		
21	331°41.6	158°34.8	4°31.0	159°53.0	4°48.3	123°57.6	-10°18.2	69°37.0	-22°11.1	Pollux	243°24.2	27°58.8		
22	346°44.0	173°34.4	4°29.9	174°54.0	4°47.7	138°59.6	-10°18.3	84°39.2	-22°11.1	Avior	234°17.0	-59°33.7		
23	1°46.5	188°34.0	4°28.7	189°55.1	4°47.1	154°01.5	-10°18.5	99°41.5	-22°11.1	Suhail	222°50.5	-43°30.0		
Mer.pass.:22:52											v-0.4 d-1.2 m-3.8	v1.0 d-0.6 m1.8	v2.0 d-0.2 m-1.5	v2.3 d-0.0 m0.5
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	16°49.0	203°33.6	4°27.5	204°56.1	4°46.4	169°03.5	-10°18.7	114°43.8	-22°11.1	Dubhe	193°48.8	61°39.3		
1	31°51.4	218°33.2	4°26.3	219°57.1	4°45.8	184°05.5	-10°18.9	129°46.1	-22°11.1	Denebola	182°31.0	14°28.5		
2	46°53.9	233°32.8	4°25.1	234°58.1	4°45.2	199°07.4	-10°19.1	144°48.4	-22°11.1	Genah	175°49.6	-17°38.2		
3	61°56.4	248°32.4	4°23.9	249°59.1	4°44.6	214°09.4	-10°19.3	159°50.7	-22°11.2	Acrux	173°06.7	-63°11.6		
4	76°58.8	263°32.0	4°22.8	265°00.1	4°43.9	229°11.3	-10°19.5	174°53.0	-22°11.2	Gacrux	171°58.2	-57°12.5		
5	92°01.3	278°31.7	4°21.6	280°01.1	4°43.3	244°13.3	-10°19.7	189°55.2	-22°11.2	Alioth	166°18.8	55°52.0		
6	107°03.8	293°31.3	4°20.4	295°02.1	4°42.7	259°15.2	-10°19.9	204°57.5	-22°11.2	Spica	158°28.5	-11°15.0		
7	122°06.2	308°30.9	4°19.2	310°03.1	4°42.1	274°17.2	-10°20.1	219°59.8	-22°11.2	Alcaid	152°57.1	49°13.7		
8	137°08.7	323°30.5	4°18.0	325°04.1	4°41.4	289°19.1	-10°20.3	235°02.1	-22°11.2	Hadar	148°44.3	-60°27.3		
9	152°11.1	338°30.1	4°16.9	340°05.1	4°40.8	304°21.1	-10°20.4	250°04.4	-22°11.2	Menkent	148°04.5	-36°27.2		
10	167°13.6	353°29.7	4°15.7	355°06.1	4°40.2	319°23.1	-10°20.6	265°06.7	-22°11.3	Arcturus	145°53.3	19°06.0		
11	182°16.1	8°29.3	4°14.5	10°07.1	4°39.6	334°25.0	-10°20.8	280°09.0	-22°11.3	Rigel Kent.	139°48.3	-60°54.3		
12	197°18.5	23°28.9	4°13.3	25°08.1	4°38.9	349°27.0	-10°21.0	295°11.2	-22°11.3	Zubenelg.	137°02.5	-16°06.7		
13	212°21.0	38°28.5	4°12.1	40°09.2	4°38.3	4°28.9	-10°21.2	310°13.5	-22°11.3	Kochab	137°21.2	74°05.3		
14	227°23.5	53°28.1	4°10.9	55°10.2	4°37.7	19°30.9	-10°21.4	325°15.8	-22°11.3	Alphecca	126°08.9	26°39.7		
15	242°25.9	68°27.7	4°09.7	70°11.2	4°37.1	34°32.8	-10°21.6	340°18.1	-22°11.3	Antares	112°22.9	-26°28.1		
16	257°28.4	83°27.3	4°08.6	85°12.2	4°36.5	49°34.8	-10°21.8	355°20.4	-22°11.4	Atria	107°22.4	-69°03.5		
17	272°30.9	98°26.9	4°07.4	100°13.2	4°35.8	64°36.7	-10°22.0	10°22.7	-22°11.4	Sabik	102°09.4	-15°44.6		
18	287°33.3	113°26.5	4°06.2	115°14.2	4°35.2	79°38.7	-10°22.2	25°24.9	-22°11.4	Shaula	96°18.2	-37°06.8		
19	302°35.8	128°26.1	4°05.0	130°15.2	4°34.6	94°40.7	-10°22.4	40°27.2	-22°11.4	Rasalhague	96°03.9	12°33.2		
20	317°38.3	143°25.7	4°03.8	145°16.2	4°34.0	109°42.6	-10°22.5	55°29.5	-22°11.4	Etamin	90°45.0	51°29.7		
21	332°40.7	158°25.3	4°02.6	160°17.2	4°33.3	124°44.6	-10°22.7	70°31.8	-22°11.4	Kaus Aust.	83°40.0	-34°22.4		
22	347°43.2	173°24.9	4°01.5	175°18.2	4°32.7	139°46.5	-10°22.9	85°34.1	-22°11.5	Vega	80°37.1	38°48.4		
23	2°45.6	188°24.5	4°00.3	190°19.2	4°32.1	154°48.5	-10°23.1	100°36.4	-22°11.5	Nunki	75°54.8	-26°16.3		
Mer.pass.:22:48											v-0.4 d-1.2 m-3.8	v1.0 d-0.6 m1.8	v2.0 d-0.2 m-1.5	v2.3 d-0.0 m0.5
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	17°48.1	203°24.1	3°59.1	205°20.2	4°31.5	169°50.4	-10°23.3	115°38.6	-22°11.5	Enif	33°44.1	9°57.6		
1	32°50.6	218°23.7	3°57.9	220°21.2	4°30.8	184°52.4	-10°23.5	130°40.9	-22°11.5	Alnair	27°39.9	-46°52.5		
2	47°53.0	233°23.3	3°56.7	235°22.3	4°30.2	199°54.3	-10°23.7	145°43.2	-22°11.5	Fomalhaut	15°20.6	-29°31.7		
3	62°55.5	248°22.9	3°55.5	250°23.3	4°29.6	214°56.3	-10°23.9	160°45.5	-22°11.5	Scheat	13°50.3	28°10.9		
4	77°58.0	263°22.5	3°54.3	265°24.3	4°28.9	229°58.2	-10°24.1	175°47.8	-22°11.5	Markab	13°35.2	15°18.2		
5	93°00.4	278°22.1	3°53.1	280°25.3	4°28.3	245°00.2	-10°24.3	190°50.0	-22°11.6	2017/10/ Venus	187°53.4	10:25		
6	108°02.9	293°21.7	3°52.0	295°26.3	4°27.7	260°02.2	-10°24.5	205°52.3	-22°11.6	Mars	188°42.1	10:21		
7	123°05.4	308°21.3	3°50.8	310°27.3	4°27.1	275°04.1	-10°24.6	220°54.6	-22°11.6	Jupiter	152°26.7	12:45		
8	138°07.8	323°20.9	3°49.6	325°28.3	4°26.4	290°06.1	-10°24.8	235°56.9	-22°11.6	Saturn	97°59.1	16:22		
9	153°10.3	338°20.5	3°48.4	340°29.3	4°25.8	305°08.0	-10°25.0	250°59.2	-22°11.6	2017/10/ Venus	186°44.7	10:26		
10	168°12.7	353°20.1	3°47.2	355°30.3	4°25.2	320°10.0	-10°25.2	266°01.5	-22°11.6	Mars	188°07.1	10:20		
11	183°15.2	8°19.8	3°46.0	10°31.3	4°24.6	335°11.9	-10°25.4	281°03.7	-22°11.7	Jupiter	152°14.5	12:42		
12	198°17.7	23°19.4	3°44.8	25°32.3	4°23.9	350°13.9	-10°25.6	296°06.0	-22°11.7	Saturn	97°54.9	16:19		
13	213°20.1	38°19.0	3°43.6	40°33.3	4°23.3	5°15.8	-10°25.8	311°08.3	-22°11.7	2017/10/ Venus	185°36.0	10:27		
14	228°22.6	53°18.6	3°42.4	55°34.3	4°22.7	20°17.8	-10°26.0	326°10.6	-22°11.7	Mars	187°32.1	10:18		
15	243°25.1	68°18.2	3°41.2	70°35.4	4°22.1	35°19.7	-10°26.2	341°12.9	-22°11.7	Jupiter	152°02.3	12:39		
16	258°27.5	83°17.8	3°40.1	85°36.4	4°21.4	50°21.7	-10°26.4	356°15.1	-22°11.7	Saturn	97°50.5	16:15		
17	273°30.0	98°17.4	3°38.9	100°37.4	4°20.8	65°23.7	-10°26.6	11°17.4	-22°11.8	Horizontal paralax Venus:	0.1			
18	288°32.5	113°17.0	3°37.7	115°38.4	4°20.2	80°25.6	-10°26.7	26°19.7	-22°11.8	Mars:	0.1			
19	303°34.9	128°16.6	3°36.5	130°39.4	4°19.6	95°27.6	-10°26.9	41°22.0	-22°11.8					
20	318°37.4	143°16.2	3°35.3	145°40.4	4°18.9	110°29.5	-10°27.1	56°24.3	-22°11.8					
21	333°39.9	158°15.8	3°34.1	160°41.4	4°18.3	125°31.5	-10°27.3	71°26.5	-22°11.8					
22	348°42.3	173°15.4	3°32.9	175°42.4	4°17.7	140°33.4	-10°27.5	86°28.8	-22°11.8					
23	3°44.8	188°15.0	3°31.7	190°43.4	4°17.1	155°35.4	-10°27.7	101°31.1	-22°11.8					
Mer.pass.:22:45											v-0.4 d-1.2 m-3.8	v1.0 d-0.6 m1.8	v2.0 d-0.2 m-1.5	v2.3 d-0.0 m0.5

h		Sun			Moon												
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight					
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.				
0	183°01.4	-5°29.3	346°13.1	9.3	7°04.8	11.2	59.3	72	04:24	05:43	06:51	16:42	17:49	19:08			
1	198°01.6	-5°30.3	0°41.3	9.3	7°16.0	11.2	59.3	70	04:32	05:43	06:44	16:49	17:50	19:01			
2	213°01.7	-5°31.2	15°09.6	9.2	7°27.1	11.1	59.4	68	04:38	05:43	06:38	16:55	17:51	18:55			
3	228°01.9	-5°32.2	29°37.7	9.2	7°38.3	11.1	59.4	66	04:43	05:42	06:34	16:60	17:51	18:50			
4	243°02.1	-5°33.2	44°05.9	9.1	7°49.3	11.1	59.4	64	04:47	05:42	06:29	17:04	17:52	18:47			
5	258°02.3	-5°34.1	58°34.0	9.1	8°00.4	11.0	59.4	62	04:50	05:41	06:26	17:08	17:52	18:43			
6	273°02.5	-5°35.1	73°02.0	9.0	8°11.4	11.0	59.4	60	04:53	05:41	06:23	17:11	17:53	18:41			
7	288°02.6	-5°36.0	87°30.0	9.0	8°22.4	10.9	59.4	58	04:55	05:40	06:20	17:14	17:53	18:39			
8	303°02.8	-5°37.0	101°58.0	8.9	8°33.3	10.9	59.4	56	04:57	05:40	06:17	17:17	17:54	18:37			
9	318°03.0	-5°37.9	116°25.9	8.9	8°44.1	10.8	59.5	54	04:59	05:40	06:15	17:19	17:54	18:35			
10	333°03.2	-5°38.9	130°53.7	8.8	8°55.0	10.8	59.5	52	04:60	05:39	06:13	17:21	17:55	18:34			
11	348°03.4	-5°39.8	145°21.5	8.8	9°05.7	10.7	59.5	50	05:01	05:39	06:11	17:23	17:55	18:33			
12	3°03.5	-5°40.8	159°49.3	8.7	9°16.5	10.7	59.5	45	05:03	05:37	06:07	17:27	17:57	18:31			
13	18°03.7	-5°41.7	174°17.0	8.7	9°27.1	10.6	59.5	40	05:05	05:36	06:03	17:31	17:58	18:29			
14	33°03.9	-5°42.7	188°44.7	8.6	9°37.7	10.6	59.5	35	05:06	05:35	06:00	17:34	17:60	18:29			
15	48°04.1	-5°43.7	203°12.3	8.6	9°48.3	10.5	59.5	30	05:06	05:34	05:58	17:37	18:01	18:29			
16	63°04.2	-5°44.6	217°39.8	8.5	9°58.8	10.5	59.6	20	05:05	05:31	05:53	17:42	18:04	18:30			
17	78°04.4	-5°45.6	232°07.3	8.5	10°09.3	10.4	59.6	10	05:03	05:27	05:48	17:46	18:08	18:32			
18	93°04.6	-5°46.5	246°34.8	8.4	10°19.7	10.4	59.6	0	04:59	05:23	05:44	17:51	18:12	18:36			
19	108°04.8	-5°47.5	261°02.2	8.4	10°30.0	10.3	59.6	-10	04:54	05:19	05:40	17:55	18:16	18:41			
20	123°05.0	-5°48.4	275°29.6	8.3	10°40.3	10.2	59.6	-20	04:47	05:13	05:35	17:60	18:22	18:48			
21	138°05.1	-5°49.4	289°56.9	8.3	10°50.5	10.2	59.6	-30	04:37	05:06	05:30	18:06	18:30	18:58			
22	153°05.3	-5°50.3	304°24.2	8.2	11°00.6	10.1	59.6	-35	04:31	05:01	05:27	18:09	18:34	19:05			
23	168°05.5	-5°51.3	318°51.4	8.2	11°10.7	10.1	59.6	-40	04:23	04:56	05:23	18:13	18:40	19:13			
							S.D.=16.2	-45	04:13	04:49	05:19	18:17	18:47	19:23			
								-50	04:01	04:41	05:14	18:22	18:55	19:35			
								-52	03:55	04:37	05:11	18:25	18:59	19:42			
								-54	03:48	04:32	05:09	18:27	19:04	19:49			
								-56	03:40	04:28	05:06	18:30	19:09	19:57			
								-58	03:31	04:22	05:03	18:34	19:15	20:06			
								-60	03:21	04:16	04:59	18:37	19:21	20:17			
												Moonrise			Moonset		
								Lat.	Sat	Sun	Mon	Sat	Sun	Mon			
								72	17:20	17:07	16:45	09:05	11:12	13:33			
								70	17:36	17:34	17:34	08:52	10:47	12:45			
								68	17:48	17:55	18:06	08:41	10:27	12:14			
								66	17:59	18:11	18:29	08:32	10:12	11:51			
								64	18:08	18:24	18:48	08:24	09:60	11:33			
								62	18:15	18:36	19:03	08:18	09:49	11:19			
								60	18:22	18:45	19:16	08:12	09:40	11:06			
								58	18:28	18:54	19:27	08:07	09:32	10:56			
								56	18:33	19:02	19:37	08:03	09:25	10:46			
								54	18:37	19:08	19:45	07:59	09:19	10:38			
								52	18:42	19:14	19:53	07:55	09:14	10:31			
								50	18:45	19:20	20:00	07:52	09:09	10:24			
								45	18:54	19:32	20:15	07:45	08:58	10:10			
								40	19:01	19:42	20:27	07:39	08:49	09:59			
								35	19:07	19:50	20:38	07:34	08:42	09:49			
								30	19:12	19:58	20:47	07:30	08:35	09:40			
								20	19:22	20:11	21:03	07:23	08:23	09:25			
								10	19:30	20:22	21:17	07:16	08:13	09:12			
								0	19:38	20:33	21:30	07:10	08:04	09:00			
								-10	19:46	20:44	21:44	07:04	07:54	08:48			
								-20	19:54	20:56	21:58	06:57	07:44	08:35			
								-30	20:04	21:09	22:14	06:49	07:33	08:20			
								-35	20:10	21:17	22:24	06:45	07:26	08:12			
								-40	20:16	21:26	22:35	06:40	07:19	08:02			
								-45	20:24	21:36	22:47	06:35	07:10	07:51			
								-50	20:33	21:49	23:03	06:28	06:60	07:37			
								-52	20:37	21:55	23:10	06:25	06:55	07:31			
								-54	20:41	22:02	23:19	06:21	06:50	07:24			
								-56	20:47	22:09	23:28	06:18	06:44	07:16			
								-58	20:52	22:17	23:38	06:14	06:38	07:07			
								-60	20:59	22:27	23:50	06:09	06:30	06:57			
												Sun			Moon		
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age					
									00 ^h	12 ^h	Pass	Upper	Lower				
								7	12:05	12:14	11:47	00:57	13:23	17(96%)			
								8	12:23	12:31	11:47	01:50	14:18	18(90%)			
								9	12:39	12:47	11:47	02:46	15:15	19(82%)			
							S.D.=16.3										
Sun		GHA	Dec	GHA	ν	Dec	d	HP									
0	183°05.7	-5°52.2	333°18.6	8.1	11°20.7	10.0	59.6										
1	198°05.8	-5°53.2	347°45.7	8.1	11°30.7	9.9	59.6										
2	213°06.0	-5°54.1	2°12.7	8.0	11°40.6	9.8	59.7										
3	228°06.2	-5°55.1	16°39.8	8.0	11°50.4	9.8	59.7										
4	243°06.4	-5°56.1	31°06.7	7.9	12°00.1	9.7	59.7										
5	258°06.5	-5°57.0	45°33.7	7.9	12°09.8	9.6	59.7										
6	273°06.7	-5°58.0	60°00.5	7.8	12°19.4	9.6	59.7										
7	288°06.9	-5°58.9	74°27.3	7.8	12°28.9	9.5	59.7										
8	303°07.1	-5°59.9	88°54.1	7.7	12°38.4	9.4	59.7										
9	318°07.3	-6°00.8	103°20.8	7.7	12°47.7	9.3	59.7										
10	333°07.4	-6°01.8	117°47.5	7.6	12°57.0	9.2	59.7										
11	348°07.6	-6°02.7	132°14.1	7.6	13°06.2	9.2	59.7										
12	3°07.8	-6°03.7	146°40.7	7.6	13°15.3	9.1	59.7										
13	18°07.9	-6°04.6	161°07.2	7.5	13°24.4	9.0	59.7										
14	33°08.1	-6°05.6	175°33.7	7.5	13°33.3	8.9	59.7										
15	48°08.3	-6°06.5	190°00.2	7.4	13°42.2	8.8	59.7										
16	63°08.5	-6°07.5	204°26.5	7.4	13°51.0	8.7	59.7										
17	78°08.6	-6°08.4	218°52.9	7.3	13°59.7	8.7	59.7										
18	93°08.8	-6°09.4	233°19.2	7.3	14°08.3	8.6	59.7										
19	108°09.0	-6°10.3	247°45.4	7.2	14°16.8	8.5	59.8										
20	123°09.2	-6°11.3	262°11.6	7.2	14°25.3	8.4	59.8										
21	138°09.3	-6°12.2	276°37.7	7.1	14°33.6	8.3	59.8										
22	153°09.5	-6°13.2	291°03.9	7.1	14°41.9	8.2	59.8										
23	168°09.7	-6°14.1	305°29.9	7.0	14°50.0	8.1	59.8										
							S.D.=16.3										
Mon		GHA	Dec	GHA	ν	Dec	d	HP									
0	183°09.9	-6°15.1	319°55.9	7.0	14°58.1	8.0	59.8										
1	198°10.0	-6°16.0	334°21.9	6.9	15°06.0	7.9	59.8										
2	213°10.2	-6°17.0	348°47.8	6.9	15°13.9	7.8	59.8										
3	228°10.4	-6°17.9	3°13.7	6.9	15°21.7	7.7	59.8										
4	243°10.5	-6°18.9	17°39.5	6.8	15°29.3	7.6	59.8										
5	258°10.7	-6°19.8	32°05.3	6.8	15°36.9	7.5	59.8										
6	273°10.9	-6°20.8	46°31.1	6.7	15°44.4	7.4	59.8										
7	288°11.1	-6°21.7	60°56.8	6.7	15°51.7	7.3	59.8										
8	303°11.2	-6°22.7	75°22.4	6.6	15°59.0	7.2	59.8										
9	318°11.4	-6°23.6	89°48.1	6.6	16°06.1	7.1	59.8										
10	333°11.6	-6°24.6	104°13.7	6.6	16°13.2	7.0	59.8										
11	348°11.7	-6°25.5	118°39.2	6.5	16°20.1	6.9	59.8										
12	3°11.9	-6°26.5	133°04.7	6.5	16°27.0	6.8	59.8										
13	18°12.1	-6°27.4	147°30.2	6.5	16°33.7	6.7	59.8										
14	33°12.2	-6°28.4	161°55.6	6.4	16°40.3	6.6	59.8										
15	48°12.4	-6°29.3	176°21.0	6.4	16°46.8	6.4	59.8										
16	63°12.6	-6°30.3	190°46.4	6.3	16°53.2	6.3	59.8										
17	78°12.8	-6°31.2	205°11.7	6.3	16°59.5	6.2	59.8										
18	93°12.9	-6°32.1	219°37.0	6.3	17°05.6	6.1	59.7										
19	108°13.1	-6°33.1	234°02.2	6.2	17°11.7	6.0	59.7										
20	123°13.3	-6°34.0	248°27.4	6.2	17°17.6	5.9	59.7										
21	138°13.4	-6°35.0	262°52.6	6.2	17°23.5	5.8	59.7										
22	153°13.6	-6°35.9	277°17.8	6.1	17°29.2	5.6	59.7										
23	168°13.8	-6°36.9	291°42.9	6.1	17°34.8	5.5	59.7										
							S.D.=16.3										

October 10, 11 ,12 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	18°47.2	203°14.6	3°30.5	205°44.4	4°16.4	170°37.3	-10°27.9	116°33.4	-22°11.9	Alpheratz	357°40.1	29°11.4
1	33°49.7	218°14.2	3°29.3	220°45.4	4°15.8	185°39.3	-10°28.1	131°35.7	-22°11.9	Ankaa	353°12.5	-42°12.6
2	48°52.2	233°13.8	3°28.1	235°46.5	4°15.2	200°41.2	-10°28.3	146°37.9	-22°11.9	Schedar	349°36.6	56°38.1
3	63°54.6	248°13.4	3°26.9	250°47.5	4°14.6	215°43.2	-10°28.5	161°40.2	-22°11.9	Diphda	348°52.6	-17°53.4
4	78°57.1	263°13.0	3°25.8	265°48.5	4°13.9	230°45.1	-10°28.7	176°42.5	-22°11.9	Achernar	335°24.1	-57°08.8
5	93°59.6	278°12.6	3°24.6	280°49.5	4°13.3	245°47.1	-10°28.8	191°44.8	-22°11.9	Hamal	327°57.2	23°32.7
6	109°02.0	293°12.3	3°23.4	295°50.5	4°12.7	260°49.1	-10°29.0	206°47.0	-22°12.0	Polaris	316°03.1	89°20.1
7	124°04.5	308°11.9	3°22.2	310°51.5	4°12.1	275°51.0	-10°29.2	221°49.3	-22°12.0	Akamar	315°15.8	-40°14.0
8	139°07.0	323°11.5	3°21.0	325°52.5	4°11.4	290°53.0	-10°29.4	236°51.6	-22°12.0	Menkar	314°11.7	4°09.5
9	154°09.4	338°11.1	3°19.8	340°53.5	4°10.8	305°54.9	-10°29.6	251°53.9	-22°12.0	Mirfak	308°35.7	49°55.2
10	169°11.9	353°10.7	3°18.6	355°54.5	4°10.2	320°56.9	-10°29.8	266°56.2	-22°12.0	Aldebaran	290°45.8	16°32.6
11	184°14.4	8°10.3	3°17.4	10°55.5	4°09.5	335°58.8	-10°30.0	281°58.4	-22°12.0	Rigel	281°09.1	-8°10.9
12	199°16.8	23°09.9	3°16.2	25°56.5	4°08.9	351°00.8	-10°30.2	297°00.7	-22°12.1	Capella	280°29.9	46°00.7
13	214°19.3	38°09.5	3°15.0	40°57.5	4°08.3	6°02.7	-10°30.4	312°03.0	-22°12.1	Bellatrix	278°28.7	6°21.8
14	229°21.7	53°09.1	3°13.8	55°58.6	4°07.7	21°04.7	-10°30.6	327°05.3	-22°12.1	Elnath	278°08.8	28°37.1
15	244°24.2	68°08.7	3°12.6	70°59.6	4°07.0	36°06.6	-10°30.8	342°07.5	-22°12.1	Alnilam	275°43.3	-1°11.5
16	259°26.7	83°08.3	3°11.4	86°00.6	4°06.4	51°08.6	-10°30.9	357°09.8	-22°12.1	Betelgeuse	270°58.1	7°24.5
17	274°29.1	98°07.9	3°10.2	101°01.6	4°05.8	66°10.5	-10°31.1	12°12.1	-22°12.1	Canopus	263°54.7	-52°42.2
18	289°31.6	113°07.5	3°09.0	116°02.6	4°05.2	81°12.5	-10°31.3	27°14.4	-22°12.1	Sirius	258°31.0	-16°44.2
19	304°34.1	128°07.1	3°07.8	131°03.6	4°04.5	96°14.4	-10°31.5	42°16.6	-22°12.2	Adara	255°10.2	-28°59.7
20	319°36.5	143°06.7	3°06.6	146°04.6	4°03.9	111°16.4	-10°31.7	57°18.9	-22°12.2	Procyon	244°56.6	5°10.9
21	334°39.0	158°06.3	3°05.4	161°05.6	4°03.3	126°18.3	-10°31.9	72°21.2	-22°12.2	Pollux	243°24.1	27°58.8
22	349°41.5	173°06.0	3°04.2	176°06.6	4°02.7	141°20.3	-10°32.1	87°23.5	-22°12.2	Avior	234°17.0	-59°33.7
23	4°43.9	188°05.6	3°03.0	191°07.6	4°02.0	156°22.3	-10°32.3	102°25.7	-22°12.2	Suhail	222°50.5	-43°30.0
Mer.pass.:22:41		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.2 m-1.5		v2.3 d-0.0 m0.5		Miaplacidus	221°39.4	-69°47.1
										Alphard	217°53.4	-8°44.0
										Regulus	207°40.6	11°52.9
										Dubhe	193°48.8	61°39.2
										Denebola	182°31.0	14°28.5
										Genah	175°49.6	-17°38.2
										Acru	173°06.7	-63°11.6
										Gacrux	171°58.2	-57°12.5
										Alioth	166°18.8	55°51.9
										Spica	158°28.5	-11°15.0
										Alcaid	152°57.1	49°13.7
										Hadar	148°44.3	-60°27.3
										Menkent	148°04.5	-36°27.2
										Arcturus	145°53.3	19°06.0
										Rigel Kent.	139°48.3	-60°54.3
										Zubenelg.	137°02.5	-16°06.7
										Kochab	137°21.3	74°05.3
										Alphecca	126°08.9	26°39.7
										Antares	112°22.9	-26°28.0
										Atria	107°22.4	-69°03.5
										Sabik	102°09.4	-15°44.5
										Shaula	96°18.2	-37°06.8
										Rasalhague	96°03.9	12°33.2
										Etamin	90°45.0	51°29.7
										Kaus Aust.	83°40.1	-34°22.4
										Vega	80°37.1	38°48.4
										Nunki	75°54.8	-26°16.3
										Altair	62°05.4	8°55.2
										Peacock	53°14.6	-56°40.7
										Deneb	49°29.3	45°21.0
										Enif	33°44.1	9°57.6
										Alnair	27°39.9	-46°52.5
										Fomalhaut	15°20.6	-29°31.7
										Scheat	13°50.3	28°10.9
										Markab	13°35.2	15°18.2
										2017/10/	SHA	Mer.pass
										Venus	184°27.4	10:27
										Mars	186°57.2	10:16
										Jupiter	151°50.1	12:36
										Saturn	97°46.1	16:11
										2017/10/	SHA	Mer.pass
										Venus	183°18.8	10:28
										Mars	186°22.3	10:15
										Jupiter	151°37.8	12:33
										Saturn	97°41.6	16:08
										2017/10/	SHA	Mer.pass
										Venus	182°10.2	10:29
										Mars	185°47.4	10:13
										Jupiter	151°25.5	12:30
										Saturn	97°37.1	16:04
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:22:33		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.2 m-1.5		v2.3 d-0.0 m0.5				

October 13, 14 ,15 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	21°44.7	202°46.4	2°04.1	206°57.1	3°31.3	172°57.9	-10°41.6	119°17.1	-22°13.0	Alpheratz	357°40.1	29°11.4	
1	36°47.1	217°46.0	2°02.9	221°58.2	3°30.6	187°59.8	-10°41.8	134°19.3	-22°13.0	Ankaa	353°12.5	-42°12.6	
2	51°49.6	232°45.6	2°01.7	236°59.2	3°30.0	203°01.8	-10°42.0	149°21.6	-22°13.0	Schedar	349°36.6	56°38.1	
3	66°52.1	247°45.2	2°00.5	252°00.2	3°29.4	218°03.7	-10°42.2	164°23.9	-22°13.1	Diphda	348°52.6	-17°53.4	
4	81°54.5	262°44.8	1°59.3	267°01.2	3°28.8	233°05.7	-10°42.4	179°26.2	-22°13.1	Achernar	335°24.1	-57°08.9	
5	96°57.0	277°44.4	1°58.1	282°02.2	3°28.1	248°07.6	-10°42.6	194°28.4	-22°13.1	Hamal	327°57.1	23°32.7	
6	111°59.5	292°44.0	1°56.9	297°03.2	3°27.5	263°09.6	-10°42.8	209°30.7	-22°13.1	Polaris	316°02.3	89°20.1	
7	127°01.9	307°43.6	1°55.7	312°04.2	3°26.9	278°11.5	-10°43.0	224°33.0	-22°13.1	Akamars	315°15.8	-40°14.0	
8	142°04.4	322°43.2	1°54.5	327°05.2	3°26.2	293°13.5	-10°43.1	239°35.2	-22°13.1	Menkar	314°11.7	4°09.5	
9	157°06.8	337°42.8	1°53.3	342°06.2	3°25.6	308°15.4	-10°43.3	254°37.5	-22°13.2	Mirfak	308°35.7	49°55.2	
10	172°09.3	352°42.4	1°52.1	357°07.3	3°25.0	323°17.4	-10°43.5	269°39.8	-22°13.2	Aldebaran	290°45.8	16°32.6	
11	187°11.8	7°42.1	1°50.9	12°08.3	3°24.4	338°19.3	-10°43.7	284°42.0	-22°13.2	Rigel	281°09.1	-8°10.9	
12	202°14.2	22°41.7	1°49.6	27°09.3	3°23.7	353°21.3	-10°43.9	299°44.3	-22°13.2	Capella	280°29.9	46°00.7	
13	217°16.7	37°41.3	1°48.4	42°10.3	3°23.1	8°23.2	-10°44.1	314°46.6	-22°13.2	Bellatrix	278°28.7	6°21.8	
14	232°19.2	52°40.9	1°47.2	57°11.3	3°22.5	23°25.2	-10°44.3	329°48.8	-22°13.2	Elnath	278°08.8	28°37.1	
15	247°21.6	67°40.5	1°46.0	72°12.3	3°21.8	38°27.1	-10°44.5	344°51.1	-22°13.2	Alnilam	275°43.3	-1°11.5	
16	262°24.1	82°40.1	1°44.8	87°13.3	3°21.2	53°29.1	-10°44.7	359°53.4	-22°13.3	Betelgeuse	270°58.0	7°24.5	
17	277°26.6	97°39.7	1°43.6	102°14.3	3°20.6	68°31.0	-10°44.9	14°55.6	-22°13.3	Canopus	263°54.7	-52°42.2	
18	292°29.0	112°39.3	1°42.4	117°15.4	3°20.0	83°33.0	-10°45.0	29°57.9	-22°13.3	Sirius	258°31.0	-16°44.2	
19	307°31.5	127°38.9	1°41.2	132°16.4	3°19.3	98°34.9	-10°45.2	45°00.2	-22°13.3	Adara	255°10.2	-28°59.7	
20	322°33.9	142°38.5	1°40.0	147°17.4	3°18.7	113°36.9	-10°45.4	60°02.4	-22°13.3	Procyon	244°56.6	5°10.9	
21	337°36.4	157°38.2	1°38.8	162°18.4	3°18.1	128°38.8	-10°45.6	75°04.7	-22°13.3	Pollux	243°24.1	27°58.8	
22	352°38.9	172°37.8	1°37.6	177°19.4	3°17.4	143°40.8	-10°45.8	90°07.0	-22°13.4	Avior	234°16.9	-59°33.7	
23	7°41.3	187°37.4	1°36.3	192°20.4	3°16.8	158°42.7	-10°46.0	105°09.2	-22°13.4	Suhail	222°50.4	-43°30.0	
Mer.pass.:22:29		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.2 m-1.5		v2.3 d-0.0 m0.5		Miaplacidus		221°39.4	-69°47.1
										Alphard		217°53.4	-8°44.0
										Regulus		207°40.6	11°52.9
										Dubhe		193°48.8	61°39.2
										Denebola		182°30.9	14°28.5
										Gienah		175°49.6	-17°38.2
										Acrux		173°06.6	-63°11.6
										Gacrux		171°58.1	-57°12.5
										Alioth		166°18.8	55°51.9
										Spica		158°28.5	-11°15.0
										Alcaid		152°57.1	49°13.7
										Hadar		148°44.3	-60°27.3
										Menkent		148°04.5	-36°27.2
										Arcturus		145°53.3	19°06.0
										Rigel Kent.		139°48.3	-60°54.3
										Zubenelg.		137°02.5	-16°06.7
										Kochab		137°21.3	74°05.2
										Alphecca		126°08.9	26°39.7
										Antares		112°22.9	-26°28.0
										Atria		107°22.4	-69°03.5
										Sabik		102°09.4	-15°44.6
										Shaula		96°18.2	-37°06.8
										Rasalhague		96°03.9	12°33.2
										Etamin		90°45.0	51°29.7
										Kaus Aust.		83°40.1	-34°22.4
										Vega		80°37.1	38°48.4
										Nunki		75°54.8	-26°16.3
										Altair		62°05.5	8°55.2
										Peacock		53°14.6	-56°40.7
										Deneb		49°29.3	45°21.0
										Enif		33°44.1	9°57.6
										Alnair		27°39.9	-46°52.5
										Fomalhaut		15°20.6	-29°31.7
										Scheat		13°50.3	28°10.9
										Markab		13°35.2	15°18.2
										2017/10/		SHA	Mer.pass
										Venus		181°01.7	10:29
										Mars		185°12.5	10:12
										Jupiter		151°13.2	12:27
										Saturn		97°32.4	16:00
										2017/10/		SHA	Mer.pass
										Venus		179°53.2	10:30
										Mars		184°37.6	10:10
										Jupiter		151°00.9	12:23
										Saturn		97°27.7	15:57
										2017/10/		SHA	Mer.pass
										Venus		178°44.7	10:30
										Mars		184°02.8	10:08
										Jupiter		150°48.5	12:20
										Saturn		97°22.9	15:53
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:22:21		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.3 d-0.0 m0.5					

October 16, 17 ,18 (Mon., Tue., Wed.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Mon	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass		
0	24°42.1	202°18.2	0°36.9	208°10.0	2°46.0	175°18.2	-10°55.3	122°00.1	-22°14.2	Alpheratz	357°40.1	29°11.4					
1	39°44.5	217°17.8	0°35.7	223°11.0	2°45.3	190°20.1	-10°55.5	137°02.3	-22°14.2	Ankaa	353°12.5	-42°12.6					
2	54°47.0	232°17.5	0°34.5	238°12.1	2°44.7	205°22.1	-10°55.7	152°04.6	-22°14.2	Schedar	349°36.6	56°38.1					
3	69°49.5	247°17.1	0°33.3	253°13.1	2°44.1	220°24.0	-10°55.9	167°06.8	-22°14.2	Diphda	348°52.6	-17°53.4					
4	84°51.9	262°16.7	0°32.0	268°14.1	2°43.5	235°26.0	-10°56.1	182°09.1	-22°14.2	Achernar	335°24.1	-57°08.9					
5	99°54.4	277°16.3	0°30.8	283°15.1	2°42.8	250°27.9	-10°56.3	197°11.3	-22°14.2	Hamal	327°57.1	23°32.7					
6	114°56.9	292°15.9	0°29.6	298°16.1	2°42.2	265°29.9	-10°56.4	212°13.6	-22°14.3	Polaris	316°01.7	89°20.1					
7	129°59.3	307°15.5	0°28.4	313°17.1	2°41.6	280°31.8	-10°56.6	227°15.9	-22°14.3	Akamar	315°15.8	-40°14.0					
8	145°01.8	322°15.1	0°27.2	328°18.1	2°40.9	295°33.7	-10°56.8	242°18.1	-22°14.3	Menkar	314°11.7	4°09.5					
9	160°04.3	337°14.7	0°26.0	343°19.1	2°40.3	310°35.7	-10°57.0	257°20.4	-22°14.3	Mirfak	308°35.7	49°55.2					
10	175°06.7	352°14.3	0°24.7	358°20.2	2°39.7	325°37.6	-10°57.2	272°22.6	-22°14.3	Aldebaran	290°45.8	16°32.6					
11	190°09.2	7°13.9	0°23.5	13°21.2	2°39.0	340°39.6	-10°57.4	287°24.9	-22°14.3	Rigel	281°09.1	-8°10.9					
12	205°11.6	22°13.5	0°22.3	28°22.2	2°38.4	355°41.5	-10°57.6	302°27.1	-22°14.4	Capella	280°29.9	46°00.7					
13	220°14.1	37°13.1	0°21.1	43°23.2	2°37.8	10°43.5	-10°57.8	317°29.4	-22°14.4	Bellatrix	278°28.7	6°21.8					
14	235°16.6	52°12.8	0°19.9	58°24.2	2°37.2	25°45.4	-10°58.0	332°31.7	-22°14.4	Elnath	278°08.7	28°37.1					
15	250°19.0	67°12.4	0°18.7	73°25.2	2°36.5	40°47.4	-10°58.2	347°33.9	-22°14.4	Alnilam	275°43.3	-1°11.5					
16	265°21.5	82°12.0	0°17.4	88°26.2	2°35.9	55°49.3	-10°58.3	2°36.2	-22°14.4	Betelgeuse	270°58.0	7°24.5					
17	280°24.0	97°11.6	0°16.2	103°27.3	2°35.3	70°51.3	-10°58.5	17°38.4	-22°14.4	Canopus	263°54.7	-52°42.2					
18	295°26.4	112°11.2	0°15.0	118°28.3	2°34.6	85°53.2	-10°58.7	32°40.7	-22°14.4	Sirius	258°31.0	-16°44.2					
19	310°28.9	127°10.8	0°13.8	133°29.3	2°34.0	100°55.2	-10°58.9	47°42.9	-22°14.5	Adara	255°10.1	-28°59.7					
20	325°31.4	142°10.4	0°12.6	148°30.3	2°33.4	115°57.1	-10°59.1	62°45.2	-22°14.5	Procyon	244°56.6	5°10.9					
21	340°33.8	157°10.0	0°11.4	163°31.3	2°32.7	130°59.1	-10°59.3	77°47.5	-22°14.5	Pollux	243°24.1	27°58.8					
22	355°36.3	172°09.6	0°10.1	178°32.3	2°32.1	146°01.0	-10°59.5	92°49.7	-22°14.5	Avior	234°16.9	-59°33.7					
23	10°38.8	187°09.2	0°08.9	193°33.3	2°31.5	161°02.9	-10°59.7	107°52.0	-22°14.5	Suhail	222°50.4	-43°30.0					
Mer.pass.:22:17			v-0.4 d-1.2 m-3.8			v1.0 d-0.6 m1.8			v1.9 d-0.2 m-1.5			v2.3 d-0.0 m0.5			Miaplacidus 221°39.3 -69°47.1		
															Alphard 217°53.4 -8°44.0		
															Regulus 207°40.6 11°52.9		
															Dubhe 193°48.7 61°39.2		
															Denebola 182°30.9 14°28.5		
															Gienah 175°49.6 -17°38.2		
															AcruX 173°06.6 -63°11.6		
															Gacrux 171°58.1 -57°12.5		
															Alioth 166°18.8 55°51.9		
															Spica 158°28.5 -11°15.0		
															Alcaid 152°57.1 49°13.7		
															Hadar 148°44.3 -60°27.3		
															Menkent 148°04.5 -36°27.2		
															Arcturus 145°53.3 19°06.0		
															Rigel Kent. 139°48.3 -60°54.3		
															Zubenelg. 137°02.5 -16°06.7		
															Kochab 137°21.3 74°05.2		
															Alphecca 126°08.9 26°39.7		
															Antares 112°22.9 -26°28.0		
															Atria 107°22.5 -69°03.5		
															Sabik 102°09.4 -15°44.6		
															Shaula 96°18.2 -37°06.8		
															Rasalhague 96°04.0 12°33.2		
															Etamin 90°45.0 51°29.7		
															Kaus Aust. 83°40.1 -34°22.4		
															Vega 80°37.1 38°48.4		
															Nunki 75°54.8 -26°16.3		
															Altair 62°05.5 8°55.2		
															Peacock 53°14.6 -56°40.7		
															Deneb 49°29.4 45°21.0		
															Enif 33°44.1 9°57.6		
															Alnair 27°39.9 -46°52.5		
															Fomalhaut 15°20.6 -29°31.7		
															Scheat 13°50.3 28°10.9		
															Markab 13°35.2 15°18.2		
															2017/10/ SHA Mer.pass		
															Venus 177°36.2 10:31		
															Mars 183°27.9 10:07		
															Jupiter 150°36.1 12:17		
															Saturn 97°18.0 15:50		
															2017/10/ SHA Mer.pass		
															Venus 176°27.6 10:32		
															Mars 182°53.1 10:05		
															Jupiter 150°23.7 12:14		
															Saturn 97°13.0 15:46		
															2017/10/ SHA Mer.pass		
															Venus 175°19.1 10:32		
															Mars 182°18.3 10:03		
															Jupiter 150°11.2 12:11		
															Saturn 97°08.0 15:42		
															Horizontal parallax		
															Venus: 0.1		
															Mars: 0.1		
Mer.pass.:22:09			v-0.4 d-1.2 m-3.8			v1.0 d-0.6 m1.8			v1.9 d-0.2 m-1.5			v2.3 d-0.0 m0.5					

October 19, 20 ,21 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars				
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	27°39.5	201°50.0	-0°50.8	209°23.0	2°00.6	177°38.3	-11°09.0	124°42.3	-22°15.3	Alpheratz	357°40.1	29°11.4		
1	42°42.0	216°49.6	-0°52.1	224°24.0	1°59.9	192°40.2	-11°09.1	139°44.6	-22°15.3	Ankaa	353°12.5	-42°12.7		
2	57°44.4	231°49.2	-0°53.3	239°25.1	1°59.3	207°42.2	-11°09.3	154°46.8	-22°15.3	Schedar	349°36.6	56°38.1		
3	72°46.9	246°48.8	-0°54.5	254°26.1	1°58.7	222°44.1	-11°09.5	169°49.1	-22°15.4	Diphda	348°52.6	-17°53.4		
4	87°49.3	261°48.4	-0°55.7	269°27.1	1°58.1	237°46.0	-11°09.7	184°51.3	-22°15.4	Achernar	335°24.1	-57°08.9		
5	102°51.8	276°48.0	-0°56.9	284°28.1	1°57.4	252°48.0	-11°09.9	199°53.6	-22°15.4	Hamal	327°57.1	23°32.7		
6	117°54.3	291°47.6	-0°58.2	299°29.1	1°56.8	267°49.9	-11°10.1	214°55.8	-22°15.4	Polaris	316°01.2	89°20.1		
7	132°56.7	306°47.2	-0°59.4	314°30.1	1°56.2	282°51.9	-11°10.3	229°58.1	-22°15.4	Akamar	315°15.8	-40°14.0		
8	147°59.2	321°46.9	-1°00.6	329°31.2	1°55.5	297°53.8	-11°10.5	245°00.3	-22°15.4	Menkar	314°11.7	4°09.5		
9	163°01.7	336°46.5	-1°01.8	344°32.2	1°54.9	312°55.8	-11°10.7	260°02.6	-22°15.4	Mirfak	308°35.7	49°55.2		
10	178°04.1	351°46.1	-1°03.0	359°33.2	1°54.3	327°57.7	-11°10.8	275°04.8	-22°15.5	Aldebaran	290°45.8	16°32.6		
11	193°06.6	6°45.7	-1°04.3	14°34.2	1°53.6	342°59.7	-11°11.0	290°07.0	-22°15.5	Rigel	281°09.0	-8°10.9		
12	208°09.1	21°45.3	-1°05.5	29°35.2	1°53.0	358°01.6	-11°11.2	305°09.3	-22°15.5	Capella	280°29.9	46°00.7		
13	223°11.5	36°44.9	-1°06.7	44°36.2	1°52.4	13°03.5	-11°11.4	320°11.5	-22°15.5	Bellatrix	278°28.7	6°21.8		
14	238°14.0	51°44.5	-1°07.9	59°37.2	1°51.7	28°05.5	-11°11.6	335°13.8	-22°15.5	Elnath	278°08.7	28°37.1		
15	253°16.5	66°44.1	-1°09.1	74°38.3	1°51.1	43°07.4	-11°11.8	350°16.0	-22°15.5	Alnilam	275°43.2	-1°11.5		
16	268°18.9	81°43.7	-1°10.4	89°39.3	1°50.5	58°09.4	-11°12.0	5°18.3	-22°15.6	Betelgeuse	270°58.0	7°24.5		
17	283°21.4	96°43.3	-1°11.6	104°40.3	1°49.8	73°11.3	-11°12.2	20°20.5	-22°15.6	Canopus	263°54.6	-52°42.2		
18	298°23.8	111°42.9	-1°12.8	119°41.3	1°49.2	88°13.3	-11°12.4	35°22.8	-22°15.6	Sirius	258°31.0	-16°44.2		
19	313°26.3	126°42.5	-1°14.0	134°42.3	1°48.6	103°15.2	-11°12.5	50°25.0	-22°15.6	Adara	255°10.1	-28°59.7		
20	328°28.8	141°42.1	-1°15.2	149°43.3	1°48.0	118°17.2	-11°12.7	65°27.3	-22°15.6	Procyon	244°56.6	5°10.9		
21	343°31.2	156°41.7	-1°16.5	164°44.3	1°47.3	133°19.1	-11°12.9	80°29.5	-22°15.6	Pollux	243°24.1	27°58.8		
22	358°33.7	171°41.3	-1°17.7	179°45.4	1°46.7	148°21.0	-11°13.1	95°31.8	-22°15.7	Avior	234°16.9	-59°33.7		
23	13°36.2	186°40.9	-1°18.9	194°46.4	1°46.1	163°23.0	-11°13.3	110°34.0	-22°15.7	Suhail	222°50.4	-43°30.0		
Mer.pass.:22:05										v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8	v1.9 d-0.2 m-1.5	v2.2 d-0.0 m0.5
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec					
0	28°38.6	201°40.5	-1°20.1	209°47.4	1°45.4	178°24.9	-11°13.5	125°36.3	-22°15.7	Dubhe	193°48.7	61°39.2		
1	43°41.1	216°40.1	-1°21.4	224°48.4	1°44.8	193°26.9	-11°13.7	140°38.5	-22°15.7	Denebola	182°30.9	14°28.5		
2	58°43.6	231°39.7	-1°22.6	239°49.4	1°44.2	208°28.8	-11°13.9	155°40.7	-22°15.7	Gienah	175°49.6	-17°38.2		
3	73°46.0	246°39.3	-1°23.8	254°50.4	1°43.5	223°30.8	-11°14.1	170°43.0	-22°15.7	Acrux	173°06.6	-63°11.6		
4	88°48.5	261°38.9	-1°25.0	269°51.5	1°42.9	238°32.7	-11°14.2	185°45.2	-22°15.8	Gacrux	171°58.1	-57°12.5		
5	103°50.9	276°38.6	-1°26.2	284°52.5	1°42.3	253°34.6	-11°14.4	200°47.5	-22°15.8	Alioth	166°18.8	55°51.9		
6	118°53.4	291°38.2	-1°27.5	299°53.5	1°41.6	268°36.6	-11°14.6	215°49.7	-22°15.8	Spica	158°28.5	-11°15.0		
7	133°55.9	306°37.8	-1°28.7	314°54.5	1°41.0	283°38.5	-11°14.8	230°52.0	-22°15.8	Alcaid	152°57.1	49°13.7		
8	148°58.3	321°37.4	-1°29.9	329°55.5	1°40.4	298°40.5	-11°15.0	245°54.2	-22°15.8	Hadar	148°44.3	-60°27.3		
9	164°00.8	336°37.0	-1°31.1	344°56.5	1°39.7	313°42.4	-11°15.2	260°56.5	-22°15.8	Menkent	148°04.5	-36°27.2		
10	179°03.3	351°36.6	-1°32.3	359°57.5	1°39.1	328°44.4	-11°15.4	275°58.7	-22°15.8	Arcturus	145°53.3	19°06.0		
11	194°05.7	6°36.2	-1°33.6	14°58.6	1°38.5	343°46.3	-11°15.6	291°00.9	-22°15.9	Rigel Kent.	139°48.3	-60°54.3		
12	209°08.2	21°35.8	-1°34.8	29°59.6	1°37.9	358°48.3	-11°15.7	306°03.2	-22°15.9	Zubenelg.	137°02.5	-16°06.7		
13	224°10.7	36°35.4	-1°36.0	45°00.6	1°37.2	13°50.2	-11°15.9	321°05.4	-22°15.9	Kochab	137°21.3	74°05.2		
14	239°13.1	51°35.0	-1°37.2	60°01.6	1°36.6	28°52.1	-11°16.1	336°07.7	-22°15.9	Alphecca	126°08.9	26°39.7		
15	254°15.6	66°34.6	-1°38.5	75°02.6	1°36.0	43°54.1	-11°16.3	351°09.9	-22°15.9	Antares	112°23.0	-26°28.0		
16	269°18.1	81°34.2	-1°39.7	90°03.6	1°35.3	58°56.0	-11°16.5	6°12.2	-22°15.9	Atria	107°22.5	-69°03.5		
17	284°20.5	96°33.8	-1°40.9	105°04.7	1°34.7	73°58.0	-11°16.7	21°14.4	-22°16.0	Sabik	102°09.4	-15°44.6		
18	299°23.0	111°33.4	-1°42.1	120°05.7	1°34.1	88°59.9	-11°16.9	36°16.7	-22°16.0	Shaula	96°18.2	-37°06.8		
19	314°25.4	126°33.0	-1°43.3	135°06.7	1°33.4	104°01.9	-11°17.1	51°18.9	-22°16.0	Rasalhague	96°04.0	12°33.2		
20	329°27.9	141°32.6	-1°44.6	150°07.7	1°32.8	119°03.8	-11°17.3	66°21.1	-22°16.0	Etamin	90°45.0	51°29.6		
21	344°30.4	156°32.2	-1°45.8	165°08.7	1°32.2	134°05.7	-11°17.4	81°23.4	-22°16.0	Kaus Aust.	83°40.1	-34°22.4		
22	359°32.8	171°31.8	-1°47.0	180°09.7	1°31.5	149°07.7	-11°17.6	96°25.6	-22°16.0	Vega	80°37.2	38°48.4		
23	14°35.3	186°31.4	-1°48.2	195°10.8	1°30.9	164°09.6	-11°17.8	111°27.9	-22°16.1	Nunki	75°54.8	-26°16.3		
Mer.pass.:22:01										v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8	v1.9 d-0.2 m-1.5	v2.2 d-0.0 m0.5
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec					
0	29°37.8	201°31.0	-1°49.4	210°11.8	1°30.3	179°11.6	-11°18.0	126°30.1	-22°16.1	Enif	33°44.1	9°57.6		
1	44°40.2	216°30.6	-1°50.7	225°12.8	1°29.6	194°13.5	-11°18.2	141°32.4	-22°16.1	Alnair	27°39.9	-46°52.6		
2	59°42.7	231°30.2	-1°51.9	240°13.8	1°29.0	209°15.5	-11°18.4	156°34.6	-22°16.1	Fomalhaut	15°20.6	-29°31.7		
3	74°45.2	246°29.8	-1°53.1	255°14.8	1°28.4	224°17.4	-11°18.6	171°36.8	-22°16.1	Scheat	13°50.3	28°10.9		
4	89°47.6	261°29.4	-1°54.3	270°15.8	1°27.8	239°19.3	-11°18.8	186°39.1	-22°16.1	Markab	13°35.2	15°18.2		
5	104°50.1	276°29.0	-1°55.5	285°16.8	1°27.1	254°21.3	-11°19.0	201°41.3	-22°16.1	2017/10/ Venus	174°10.5	10:33		
6	119°52.6	291°28.6	-1°56.8	300°17.9	1°26.5	269°23.2	-11°19.1	216°43.6	-22°16.2	Mars	181°43.5	10:02		
7	134°55.0	306°28.2	-1°58.0	315°18.9	1°25.9	284°25.2	-11°19.3	231°45.8	-22°16.2	Jupiter	149°58.8	12:08		
8	149°57.5	321°27.8	-1°59.2	330°19.9	1°25.2	299°27.1	-11°19.5	246°48.1	-22°16.2	Saturn	97°02.8	15:39		
9	164°59.9	336°27.4	-2°00.4	345°20.9	1°24.6	314°29.1	-11°19.7	261°50.3	-22°16.2	2017/10/ Venus	173°01.9	10:34		
10	180°02.4	351°27.0	-2°01.7	0°21.9	1°24.0	329°31.0	-11°19.9	276°52.5	-22°16.2	Mars	181°08.8	10:00		
11	195°04.9	6°26.6	-2°02.9	15°22.9	1°23.3	344°32.9	-11°20.1	291°54.8	-22°16.2	Jupiter	149°46.3	12:05		
12	210°07.3	21°26.2	-2°04.1	30°24.0	1°22.7	359°34.9	-11°20.3	306°57.0	-22°16.3	Saturn	96°57.6	15:35		
13	225°09.8	36°25.8	-2°05.3	45°25.0	1°22.1	14°36.8	-11°20.5	321°59.3	-22°16.3	2017/10/ Venus	171°53.2	10:34		
14	240°12.3	51°25.4	-2°06.5	60°26.0	1°21.4	29°38.8	-11°20.6	337°01.5	-22°16.3	Mars	180°34.0	09:59		
15	255°14.7	66°25.0	-2°07.8	75°27.0	1°20.8	44°40.7	-11°20.8	352°03.7	-22°16.3	Jupiter	149°33.8	12:02		
16	270°17.2	81°24.6	-2°09.0	90°28.0	1°20.2	59°42.7	-11°21.0	7°06.0	-22°16.3	Saturn	96°52.3	15:32		
17	285°19.7	96°24.2	-2°10.2	105°29.0	1°19.5	74°44.6	-11°21.2	22°08.2	-22°16.3	Horizontal parallax				
18	300°22.1	111°23.8	-2°11.4	120°30.1	1°18.9	89°46.5	-11°21.4	37°10.5	-22°16.4	Venus:		0.1		
19	315°24.6	126°23.4	-2°12.6	135°31.1	1°18.3	104°48.5	-11°21.6	52°12.7	-22°16.4	Mars:		0.1		
20	330°27.0	141°23.0	-2°13.9	150°32.1	1°17.7	119°50.4	-11°21.8	67°14.9	-22°16.4					
21	345°29.5	156°22.6	-2°15.1	165°33.1	1°17.0	134°52.4	-11°22.0	82°17.2	-22°16.4					
22	0°32.0	171°22.2	-2°16.3	180°34.1	1°16.4	149°54.3	-11°22.2	97°19.4	-22°16.4					
23	15°34.4	186°21.8	-2°17.5	195°35.1	1°15.8	164°56.3	-11°22.3	112°21.7	-22°16.4					
Mer.pass.:21:57										v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8	v1.9 d-0.2 m-1.5	v2.2 d-0.0 m0.5

Sun				Moon			
h	Sun		Moon		Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	183°44.6	-9°58.0	190°58.4	13.3	-2°39.8	-10.7	56.1
1	198°44.7	-9°58.9	205°30.7	13.3	-2°50.5	-10.7	56.1
2	213°44.8	-9°59.8	220°02.9	13.3	-3°01.1	-10.6	56.1
3	228°44.9	-10°00.7	234°35.2	13.3	-3°11.8	-10.6	56.1
4	243°45.1	-10°01.6	249°07.5	13.3	-3°22.4	-10.6	56.0
5	258°45.2	-10°02.5	263°39.9	13.3	-3°32.9	-10.6	56.0
6	273°45.3	-10°03.4	278°12.2	13.3	-3°43.5	-10.5	56.0
7	288°45.4	-10°04.3	292°44.5	13.3	-3°54.0	-10.5	56.0
8	303°45.5	-10°05.2	307°16.9	13.3	-4°04.6	-10.5	55.9
9	318°45.6	-10°06.1	321°49.2	13.4	-4°15.0	-10.5	55.9
10	333°45.7	-10°07.0	336°21.6	13.4	-4°25.5	-10.4	55.9
11	348°45.8	-10°07.9	350°53.9	13.4	-4°35.9	-10.4	55.9
12	3°46.0	-10°08.8	5°26.3	13.4	-4°46.3	-10.4	55.9
13	18°46.1	-10°09.7	19°58.7	13.4	-4°56.7	-10.4	55.8
14	33°46.2	-10°10.6	34°31.1	13.4	-5°07.1	-10.3	55.8
15	48°46.3	-10°11.5	49°03.5	13.4	-5°17.4	-10.3	55.8
16	63°46.4	-10°12.4	63°35.9	13.4	-5°27.7	-10.3	55.8
17	78°46.5	-10°13.3	78°08.3	13.4	-5°37.9	-10.2	55.8
18	93°46.6	-10°14.2	92°40.7	13.4	-5°48.1	-10.2	55.7
19	108°46.7	-10°15.1	107°13.1	13.4	-5°58.3	-10.2	55.7
20	123°46.8	-10°16.0	121°45.5	13.4	-6°08.5	-10.1	55.7
21	138°46.9	-10°16.9	136°18.0	13.4	-6°18.6	-10.1	55.7
22	153°47.1	-10°17.8	150°50.4	13.4	-6°28.7	-10.1	55.7
23	168°47.2	-10°18.7	165°22.8	13.4	-6°38.7	-10.0	55.6
SD.=16.1			d=-0.9		S.D.=15.3		

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183°47.3	-10°19.6	179°55.2	13.4	-6°48.7	-10.0	55.6
1	198°47.4	-10°20.5	194°27.6	13.4	-6°58.7	-10.0	55.6
2	213°47.5	-10°21.3	209°00.1	13.4	-7°08.6	-9.9	55.6
3	228°47.6	-10°22.2	223°32.5	13.4	-7°18.5	-9.9	55.6
4	243°47.7	-10°23.1	238°04.9	13.4	-7°28.4	-9.8	55.5
5	258°47.8	-10°24.0	252°37.4	13.4	-7°38.2	-9.8	55.5
6	273°47.9	-10°24.9	267°09.8	13.4	-7°47.9	-9.7	55.5
7	288°48.0	-10°25.8	281°42.2	13.4	-7°57.7	-9.7	55.5
8	303°48.1	-10°26.7	296°14.6	13.4	-8°07.4	-9.7	55.5
9	318°48.2	-10°27.6	310°47.0	13.4	-8°17.0	-9.6	55.4
10	333°48.3	-10°28.5	325°19.5	13.4	-8°26.6	-9.6	55.4
11	348°48.4	-10°29.4	339°51.9	13.4	-8°36.1	-9.5	55.4
12	3°48.5	-10°30.3	354°24.3	13.4	-8°45.7	-9.5	55.4
13	18°48.7	-10°31.2	8°56.7	13.4	-8°55.1	-9.4	55.4
14	33°48.8	-10°32.1	23°29.1	13.4	-9°04.5	-9.4	55.4
15	48°48.9	-10°33.0	38°01.5	13.4	-9°13.9	-9.3	55.3
16	63°49.0	-10°33.9	52°33.9	13.4	-9°23.2	-9.3	55.3
17	78°49.1	-10°34.8	67°06.3	13.4	-9°32.5	-9.2	55.3
18	93°49.2	-10°35.7	81°38.7	13.4	-9°41.7	-9.2	55.3
19	108°49.3	-10°36.5	96°11.0	13.4	-9°50.9	-9.1	55.3
20	123°49.4	-10°37.4	110°43.4	13.4	-10°00.0	-9.1	55.2
21	138°49.5	-10°38.3	125°15.8	13.4	-10°09.1	-9.0	55.2
22	153°49.6	-10°39.2	139°48.1	13.4	-10°18.1	-9.0	55.2
23	168°49.7	-10°40.1	154°20.5	13.3	-10°27.1	-8.9	55.2
SD.=16.1			d=-0.9		S.D.=15.2		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	183°49.8	-10°41.0	168°52.8	13.3	-10°36.0	-8.9	55.2
1	198°49.9	-10°41.9	183°25.1	13.3	-10°44.8	-8.8	55.1
2	213°50.0	-10°42.8	197°57.5	13.3	-10°53.7	-8.8	55.1
3	228°50.1	-10°43.7	212°29.8	13.3	-11°02.4	-8.7	55.1
4	243°50.2	-10°44.6	227°02.1	13.3	-11°11.1	-8.7	55.1
5	258°50.3	-10°45.5	241°34.4	13.3	-11°19.7	-8.6	55.1
6	273°50.4	-10°46.3	256°06.7	13.3	-11°28.3	-8.6	55.1
7	288°50.5	-10°47.2	270°39.0	13.3	-11°36.9	-8.5	55.0
8	303°50.6	-10°48.1	285°11.2	13.3	-11°45.3	-8.4	55.0
9	318°50.7	-10°49.0	299°43.5	13.3	-11°53.7	-8.4	55.0
10	333°50.8	-10°49.9	314°15.8	13.2	-12°02.1	-8.3	55.0
11	348°50.9	-10°50.8	328°48.0	13.2	-12°10.4	-8.3	55.0
12	3°51.0	-10°51.7	343°20.2	13.2	-12°18.6	-8.2	55.0
13	18°51.1	-10°52.6	357°52.4	13.2	-12°26.8	-8.1	54.9
14	33°51.2	-10°53.4	12°24.6	13.2	-12°34.9	-8.1	54.9
15	48°51.3	-10°54.3	26°56.8	13.2	-12°42.9	-8.0	54.9
16	63°51.4	-10°55.2	41°29.0	13.2	-12°50.9	-8.0	54.9
17	78°51.5	-10°56.1	56°01.2	13.2	-12°58.9	-7.9	54.9
18	93°51.6	-10°57.0	70°33.4	13.2	-13°06.7	-7.8	54.9
19	108°51.6	-10°57.9	85°05.5	13.1	-13°14.5	-7.8	54.8
20	123°51.7	-10°58.8	99°37.6	13.1	-13°22.2	-7.7	54.8
21	138°51.8	-10°59.6	114°09.8	13.1	-13°29.9	-7.6	54.8
22	153°51.9	-11°00.5	128°41.9	13.1	-13°37.5	-7.6	54.8
23	168°52.0	-11°01.4	143°14.0	13.1	-13°45.1	-7.5	54.8
SD.=16.1			d=-0.9		S.D.=15.0		

Twilight				Moonrise			Moonset		
Lat.	Naut.	Civil	Sunrise	Thu	Fri	Sat	Thu	Fri	Sat
72	05:18	06:36	07:50	16:35	16:26	16:14			
70	05:19	06:30	07:35	16:43	16:40	16:37			
68	05:20	06:24	07:23	16:50	16:52	16:55			
66	05:20	06:20	07:13	16:55	17:02	17:10			
64	05:21	06:16	07:05	16:60	17:10	17:22			
62	05:21	06:12	06:58	16:60	17:17	17:33			
60	05:21	06:09	06:52	16:60	17:23	17:41			
58	05:21	06:06	06:47	16:60	17:29	17:49			
56	05:21	06:04	06:42	16:60	17:34	17:56			
54	05:20	06:01	06:38	16:60	17:38	18:02			
52	05:20	05:59	06:34	16:60	17:42	18:08			
50	05:20	05:57	06:30	16:60	17:46	18:13			
45	05:18	05:52	06:22	16:60	17:53	18:24			
40	05:17	05:48	06:16	16:60	18:00	18:33			
35	05:15	05:45	06:10	16:60	18:06	18:41			
30	05:13	05:41	06:05	16:60	18:11	18:48			
20	05:08	05:34	05:57	16:60	18:19	18:60			
10	05:03	05:27	05:49	16:60	18:27	19:10			
0	04:56	05:20	05:41	16:60	18:34	19:20			
-10	04:48	05:13	05:34	16:60	18:41	19:30			
-20	04:37	05:03	05:26	16:60	18:49	19:40			
-30	04:23	04:52	05:17	16:60	18:58	19:52			
-35	04:14	04:45	05:11	16:60	19:03	19:59			
-40	04:03	04:37	05:05	16:60	19:09	20:07			
-45	03:50	04:27	04:58	16:60	19:15	20:17			
-50	03:32	04:15	04:49	16:60	19:21	20:29			
-52	03:24	04:09	04:45	16:60	19:27	20:42			
-54	03:14	04:02	04:40	16:60	19:33	20:58			
-56	03:03	03:55	04:35	16:60	19:39				
-58	02:50	03:46	04:30	16:60	19:45				
-60	02:34	03:37	04:24	16:60	19:55				

Day	Sun			Moon		
	Eqn.of Time	Mer.	Mer.Pass.	Age		
	00 ^h	12 ^h	Upper	Lower		
19	14:58	15:04	11:44	11:37	00:00	29(0%)
20	15:09	15:14	11:44	12:23	00:00	1(1%)
21	15:19	15:24	11:44	13:08	00:45	2(3%)

October 22, 23 ,24 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	30°36.9	201°21.4	-2°18.7	210°36.2	1°15.1	179°58.2	-11°22.5	127°23.9	-22°16.4	Alpheratz	357°40.2	29°11.4
1	45°39.4	216°21.0	-2°20.0	225°37.2	1°14.5	195°00.1	-11°22.7	142°26.1	-22°16.5	Ankaa	353°12.5	-42°12.7
2	60°41.8	231°20.6	-2°21.2	240°38.2	1°13.9	210°02.1	-11°22.9	157°28.4	-22°16.5	Schedar	349°36.6	56°38.2
3	75°44.3	246°20.2	-2°22.4	255°39.2	1°13.2	225°04.0	-11°23.1	172°30.6	-22°16.5	Diphda	348°52.6	-17°53.4
4	90°46.8	261°19.8	-2°23.6	270°40.2	1°12.6	240°06.0	-11°23.3	187°32.9	-22°16.5	Achernar	335°24.1	-57°08.9
5	105°49.2	276°19.4	-2°24.9	285°41.2	1°12.0	255°07.9	-11°23.5	202°35.1	-22°16.5	Hamal	327°57.1	23°32.8
6	120°51.7	291°19.0	-2°26.1	300°42.2	1°11.3	270°09.9	-11°23.7	217°37.3	-22°16.5	Polaris	316°00.5	89°20.2
7	135°54.2	306°18.6	-2°27.3	315°43.3	1°10.7	285°11.8	-11°23.8	232°39.6	-22°16.6	Akamar	315°15.7	-40°14.1
8	150°56.6	321°18.2	-2°28.5	330°44.3	1°10.1	300°13.7	-11°24.0	247°41.8	-22°16.6	Menkar	314°11.7	4°09.5
9	165°59.1	336°17.8	-2°29.7	345°45.3	1°09.4	315°15.7	-11°24.2	262°44.1	-22°16.6	Mirfak	308°35.7	49°55.2
10	181°01.5	351°17.4	-2°31.0	0°46.3	1°08.8	330°17.6	-11°24.4	277°46.3	-22°16.6	Aldebaran	290°45.8	16°32.6
11	196°04.0	6°17.0	-2°32.2	15°47.3	1°08.2	345°19.6	-11°24.6	292°48.5	-22°16.6	Rigel	281°09.0	-8°10.9
12	211°06.5	21°16.6	-2°33.4	30°48.3	1°07.5	0°21.5	-11°24.8	307°50.8	-22°16.6	Capella	280°29.8	46°00.7
13	226°08.9	36°16.2	-2°34.6	45°49.4	1°06.9	15°23.4	-11°25.0	322°53.0	-22°16.7	Bellatrix	278°28.7	6°21.8
14	241°11.4	51°15.8	-2°35.8	60°50.4	1°06.3	30°25.4	-11°25.2	337°55.2	-22°16.7	Elnath	278°08.7	28°37.1
15	256°13.9	66°15.4	-2°37.1	75°51.4	1°05.7	45°27.3	-11°25.3	352°57.5	-22°16.7	Alnilam	275°43.2	-1°11.5
16	271°16.3	81°15.0	-2°38.3	90°52.4	1°05.0	60°29.3	-11°25.5	7°59.7	-22°16.7	Betelgeuse	270°58.0	7°24.5
17	286°18.8	96°14.6	-2°39.5	105°53.4	1°04.4	75°31.2	-11°25.7	23°02.0	-22°16.7	Canopus	263°54.6	-52°42.2
18	301°21.3	111°14.2	-2°40.7	120°54.4	1°03.8	90°33.2	-11°25.9	38°04.2	-22°16.7	Sirius	258°30.9	-16°44.2
19	316°23.7	126°13.8	-2°41.9	135°55.5	1°03.1	105°35.1	-11°26.1	53°06.4	-22°16.7	Adara	255°10.1	-28°59.7
20	331°26.2	141°13.4	-2°43.2	150°56.5	1°02.5	120°37.0	-11°26.3	68°08.7	-22°16.8	Procyon	244°56.6	5°10.9
21	346°28.7	156°13.0	-2°44.4	165°57.5	1°01.9	135°39.0	-11°26.5	83°10.9	-22°16.8	Pollux	243°24.1	27°58.8
22	1°31.1	171°12.6	-2°45.6	180°58.5	1°01.2	150°40.9	-11°26.7	98°13.1	-22°16.8	Avior	234°16.8	-59°33.7
23	16°33.6	186°12.2	-2°46.8	195°59.5	1°00.6	165°42.9	-11°26.8	113°15.4	-22°16.8	Suhail	222°50.4	-43°30.0
Mer.pass.:21:53		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.5		Miaplacidus	221°39.2	-69°47.1
										Alphard	217°53.3	-8°44.0
										Regulus	207°40.6	11°52.8
										Dubhe	193°48.7	61°39.2
										Denebola	182°30.9	14°28.5
										Genah	175°49.6	-17°38.2
										Acrux	173°06.6	-63°11.6
										Gacrux	171°58.1	-57°12.5
										Alioth	166°18.8	55°51.9
										Spica	158°28.5	-11°15.0
										Alcaid	152°57.1	49°13.7
										Hadar	148°44.3	-60°27.3
										Menkent	148°04.5	-36°27.2
										Arcturus	145°53.3	19°06.0
										Rigel Kent.	139°48.3	-60°54.3
										Zubenelg.	137°02.5	-16°06.7
										Kochab	137°21.4	74°05.2
										Alphecca	126°08.9	26°39.7
										Antares	112°23.0	-26°28.0
										Atria	107°22.5	-69°03.5
										Sabik	102°09.4	-15°44.6
										Shaula	96°18.2	-37°06.8
										Rasalhague	96°04.0	12°33.2
										Etamin	90°45.1	51°29.6
										Kaus Aust.	83°40.1	-34°22.4
										Vega	80°37.2	38°48.4
										Nunki	75°54.8	-26°16.3
										Altair	62°05.5	8°55.2
										Peacock	53°14.7	-56°40.7
										Deneb	49°29.4	45°21.0
										Enif	33°44.1	9°57.6
										Alnair	27°39.9	-46°52.6
										Fomalhaut	15°20.6	-29°31.7
										Scheat	13°50.3	28°10.9
										Markab	13°35.2	15°18.2
										2017/10/ Venus	170°44.5	10:35
										Mars	179°59.2	09:57
										Jupiter	149°21.3	11:59
										Saturn	96°47.0	15:28
										2017/10/ Venus	169°35.8	10:35
										Mars	179°24.5	09:55
										Jupiter	149°08.8	11:55
										Saturn	96°41.6	15:25
										2017/10/ Venus	168°26.9	10:36
										Mars	178°49.8	09:54
										Jupiter	148°56.2	11:52
										Saturn	96°36.1	15:21
										Horizontal paralax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:21:46		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.6				

Sun								Moon							
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	183°52.1	-11°02.3	157°46.1	13.1	-13°52.5	-7.4	54.8	72	05:30	06:50	08:06	15:21	16:37	17:56	
1	198°52.2	-11°03.2	172°18.1	13.1	-13°59.9	-7.4	54.7	70	05:30	06:41	07:49	15:39	16:45	17:57	
2	213°52.3	-11°04.1	186°50.2	13.1	-14°07.3	-7.3	54.7	68	05:30	06:35	07:35	15:52	16:52	17:57	
3	228°52.4	-11°04.9	201°22.2	13.0	-14°14.5	-7.2	54.7	66	05:29	06:29	07:24	16:04	16:58	17:58	
4	243°52.5	-11°05.8	215°54.3	13.0	-14°21.7	-7.2	54.7	64	05:29	06:24	07:14	16:13	17:03	17:58	
5	258°52.6	-11°06.7	230°26.3	13.0	-14°28.9	-7.1	54.7	62	05:28	06:20	07:07	16:21	17:07	17:59	
6	273°52.7	-11°07.6	244°58.3	13.0	-14°35.9	-7.0	54.7	60	05:28	06:16	06:60	16:28	17:11	17:60	
7	288°52.8	-11°08.5	259°30.3	13.0	-14°42.9	-7.0	54.7	58	05:27	06:13	06:54	16:34	17:15	18:00	
8	303°52.9	-11°09.4	274°02.3	13.0	-14°49.8	-6.9	54.6	56	05:26	06:10	06:48	16:40	17:18	18:01	
9	318°53.0	-11°10.2	288°34.2	13.0	-14°56.7	-6.8	54.6	54	05:26	06:07	06:43	16:44	17:21	18:02	
10	333°53.1	-11°11.1	303°06.2	12.9	-15°03.5	-6.7	54.6	52	05:25	06:04	06:39	16:49	17:24	18:03	
11	348°53.1	-11°12.0	317°38.1	12.9	-15°10.2	-6.7	54.6	50	05:24	06:02	06:35	16:53	17:26	18:04	
12	3°53.2	-11°12.9	332°10.0	12.9	-15°16.8	-6.6	54.6	48	05:22	05:56	06:26	17:02	17:32	18:06	
13	18°53.3	-11°13.8	346°41.9	12.9	-15°23.4	-6.5	54.6	46	05:20	05:51	06:19	17:09	17:37	18:08	
14	33°53.4	-11°14.6	1°13.8	12.9	-15°29.9	-6.5	54.6	44	05:17	05:47	06:13	17:15	17:41	18:11	
15	48°53.5	-11°15.5	15°45.7	12.9	-15°36.3	-6.4	54.5	42	05:15	05:43	06:07	17:21	17:45	18:13	
16	63°53.6	-11°16.4	30°17.6	12.9	-15°42.6	-6.3	54.5	40	05:09	05:35	05:58	17:31	17:53	18:19	
17	78°53.7	-11°17.3	44°49.4	12.8	-15°48.9	-6.2	54.5	38	05:03	05:28	05:49	17:39	18:01	18:26	
18	93°53.8	-11°18.2	59°21.3	12.8	-15°55.1	-6.2	54.5	36	04:55	05:20	05:41	17:48	18:09	18:33	
19	108°53.9	-11°19.0	73°53.1	12.8	-16°01.2	-6.1	54.5	34	04:46	05:11	05:33	17:56	18:18	18:43	
20	123°54.0	-11°19.9	88°24.9	12.8	-16°07.3	-6.0	54.5	32	04:35	05:01	05:24	18:05	18:28	18:54	
21	138°54.0	-11°20.8	102°56.7	12.8	-16°13.2	-5.9	54.5	30	04:19	04:49	05:13	18:16	18:40	19:10	
22	153°54.1	-11°21.7	117°28.5	12.8	-16°19.1	-5.9	54.5	28	04:10	04:41	05:07	18:22	18:48	19:20	
23	168°54.2	-11°22.5	132°00.2	12.8	-16°24.9	-5.8	54.4	26	03:58	04:32	05:01	18:29	18:57	19:31	
SD.=16.1 d=-0.9								S.D.=14.9							
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset			
								Sun	Mon	Tue	Sun	Mon	Tue		
0	183°54.3	-11°23.4	146°32.0	12.7	-16°30.7	-5.7	54.4	72	11:41	14:06	--	15:57	15:09	--	
1	198°54.4	-11°24.3	161°03.7	12.7	-16°36.3	-5.6	54.4	70	11:04	12:43	14:21	16:35	16:33	16:33	
2	213°54.5	-11°25.2	175°35.4	12.7	-16°41.9	-5.5	54.4	68	10:38	12:05	13:23	17:01	17:12	17:31	
3	228°54.6	-11°26.0	190°07.1	12.7	-16°47.4	-5.5	54.4	66	10:18	11:38	12:49	17:22	17:39	18:05	
4	243°54.6	-11°26.9	204°38.8	12.7	-16°52.9	-5.4	54.4	64	10:03	11:17	12:25	17:38	17:60	18:30	
5	258°54.7	-11°27.8	219°10.5	12.7	-16°58.2	-5.3	54.4	62	09:50	11:01	12:06	17:52	18:17	18:49	
6	273°54.8	-11°28.7	233°42.1	12.7	-17°03.5	-5.2	54.4	60	09:39	10:47	11:50	18:03	18:31	19:05	
7	288°54.9	-11°29.5	248°13.8	12.6	-17°08.7	-5.1	54.4	58	09:29	10:35	11:36	18:13	18:43	19:19	
8	303°55.0	-11°30.4	262°45.4	12.6	-17°13.8	-5.1	54.3	56	09:21	10:25	11:25	18:22	18:53	19:30	
9	318°55.1	-11°31.3	277°17.0	12.6	-17°18.8	-5.0	54.3	54	09:13	10:16	11:15	18:30	19:02	19:41	
10	333°55.2	-11°32.2	291°48.7	12.6	-17°23.8	-4.9	54.3	52	09:07	10:08	11:06	18:37	19:11	19:50	
11	348°55.2	-11°33.0	306°20.2	12.6	-17°28.6	-4.8	54.3	50	09:01	10:01	10:58	18:43	19:18	19:58	
12	3°55.3	-11°33.9	320°51.8	12.6	-17°33.4	-4.7	54.3	48	08:48	09:46	10:41	18:57	19:34	20:15	
13	18°55.4	-11°34.8	335°23.4	12.6	-17°38.1	-4.7	54.3	46	08:37	09:33	10:27	19:08	19:47	20:29	
14	33°55.5	-11°35.7	349°54.9	12.5	-17°42.7	-4.6	54.3	44	08:28	09:23	10:15	19:18	19:58	20:41	
15	48°55.6	-11°36.5	4°26.5	12.5	-17°47.3	-4.5	54.3	42	08:20	09:13	10:05	19:27	20:08	20:52	
16	63°55.7	-11°37.4	18°58.0	12.5	-17°51.7	-4.4	54.3	40	08:07	08:57	09:47	19:41	20:25	21:10	
17	78°55.7	-11°38.3	33°29.5	12.5	-17°56.1	-4.3	54.3	38	07:55	08:43	09:32	19:54	20:39	21:26	
18	93°55.8	-11°39.1	48°01.0	12.5	-18°00.4	-4.3	54.3	36	07:44	08:30	09:17	20:06	20:53	21:40	
19	108°55.9	-11°40.0	62°32.5	12.5	-18°04.6	-4.2	54.2	34	07:33	08:17	09:03	20:18	21:07	21:55	
20	123°56.0	-11°40.9	77°04.0	12.5	-18°08.7	-4.1	54.2	32	07:21	08:04	08:48	20:31	21:21	22:11	
21	138°56.1	-11°41.8	91°35.4	12.5	-18°12.8	-4.0	54.2	30	07:08	07:48	08:30	20:46	21:38	22:29	
22	153°56.2	-11°42.6	106°06.9	12.4	-18°16.7	-3.9	54.2	28	07:00	07:39	08:20	20:55	21:48	22:40	
23	168°56.2	-11°43.5	120°38.3	12.4	-18°20.6	-3.8	54.2	26	06:51	07:28	08:09	21:04	21:59	22:52	
SD.=16.1 d=-0.9								S.D.=14.8							
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Moon		Age		
									Eqn.of Time	Mer.	Mer.Pass.	Upper	Lower		
0	183°56.3	-11°44.4	135°09.7	12.4	-18°24.4	-3.7	54.2	22	00 ^h	12 ^h	Pass	13:54	01:31	3(7%)	
1	198°56.4	-11°45.2	149°41.1	12.4	-18°28.1	-3.7	54.2	23	15:37	15:41	11:44	14:41	02:18	4(13%)	
2	213°56.5	-11°46.1	164°12.5	12.4	-18°31.7	-3.6	54.2	24	15:45	15:49	11:44	15:28	03:05	5(20%)	
3	228°56.6	-11°47.0	178°43.9	12.4	-18°35.3	-3.5	54.2								
4	243°56.6	-11°47.8	193°15.3	12.4	-18°38.7	-3.4	54.2								
5	258°56.7	-11°48.7	207°46.7	12.4	-18°42.1	-3.3	54.2								
6	273°56.8	-11°49.6	222°18.0	12.3	-18°45.3	-3.2	54.2								
7	288°56.9	-11°50.4	236°49.4	12.3	-18°48.5	-3.1	54.2								
8	303°56.9	-11°51.3	251°20.7	12.3	-18°51.6	-3.1	54.2								
9	318°57.0	-11°52.2	265°52.0	12.3	-18°54.6	-3.0	54.2								
10	333°57.1	-11°53.0	280°23.3	12.3	-18°57.6	-2.9	54.2								
11	348°57.2	-11°53.9	294°54.6	12.3	-19°00.4	-2.8	54.2								
12	3°57.3	-11°54.8	309°25.9	12.3	-19°03.2	-2.7	54.1								
13	18°57.3	-11°55.6	323°57.2	12.3	-19°05.8	-2.6	54.1								
14	33°57.4	-11°56.5	338°28.4	12.3	-19°08.4	-2.5	54.1								
15	48°57.5	-11°57.4	352°59.7	12.3	-19°10.9	-2.4	54.1								
16	63°57.6	-11°58.2	7°30.9	12.2	-19°13.3	-2.4	54.1								
17	78°57.6	-11°59.1	22°02.2	12.2	-19°15.6	-2.3	54.1								
18	93°57.7	-11°60.0	36°33.4	12.2	-19°17.8	-2.2	54.1								
19	108°57.8	-12°00.8	51°04.6	12.2	-19°20.0	-2.1	54.1								
20	123°57.9	-12°01.7	65°35.9	12.2	-19°22.0	-2.0	54.1								
21	138°57.9	-12°02.6	80°07.1	12.2	-19°24.0	-1.9	54.1								
22	153°58.0	-12°03.4	94°38.3	12.2	-19°25.9	-1.8	54.1								
23	168°58.1	-12°04.3	109°09.5	12.2	-19°27.6	-1.7	54.1								
SD.=16.1 d=-0.9								S.D.=14.8							

October 25, 26 ,27 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	33°34.3	200°52.3	-3°46.5	211°49.3	0°29.7	182°18.0	-11°36.0	130°04.8	-22°17.6	Alpheratz	357°40.2	29°11.4
1	48°36.8	215°51.9	-3°47.7	226°50.4	0°29.0	197°19.9	-11°36.2	145°07.1	-22°17.6	Ankaa	353°12.5	-42°12.7
2	63°39.2	230°51.5	-3°48.9	241°51.4	0°28.4	212°21.9	-11°36.4	160°09.3	-22°17.6	Schedar	349°36.6	56°38.2
3	78°41.7	245°51.1	-3°50.2	256°52.4	0°27.8	227°23.8	-11°36.6	175°11.5	-22°17.6	Diphda	348°52.6	-17°53.4
4	93°44.2	260°50.6	-3°51.4	271°53.4	0°27.1	242°25.8	-11°36.8	190°13.8	-22°17.6	Achernar	335°24.1	-57°08.9
5	108°46.6	275°50.2	-3°52.6	286°54.4	0°26.5	257°27.7	-11°37.0	205°16.0	-22°17.7	Hamal	327°57.1	23°32.8
6	123°49.1	290°49.8	-3°53.8	301°55.4	0°25.9	272°29.6	-11°37.1	220°18.2	-22°17.7	Polaris	315°59.9	89°20.2
7	138°51.6	305°49.4	-3°55.0	316°56.5	0°25.2	287°31.6	-11°37.3	235°20.4	-22°17.7	Akamar	315°15.7	-40°14.1
8	153°54.0	320°49.0	-3°56.2	331°57.5	0°24.6	302°33.5	-11°37.5	250°22.7	-22°17.7	Menkar	314°11.7	4°09.5
9	168°56.5	335°48.6	-3°57.4	346°58.5	0°24.0	317°35.5	-11°37.7	265°24.9	-22°17.7	Mirfak	308°35.6	49°55.3
10	183°59.0	350°48.2	-3°58.7	1°59.5	0°23.3	332°37.4	-11°37.9	280°27.1	-22°17.7	Aldebaran	290°45.8	16°32.6
11	199°01.4	5°47.8	-3°59.9	17°00.5	0°22.7	347°39.3	-11°38.1	295°29.4	-22°17.8	Rigel	281°09.0	-8°10.9
12	214°03.9	20°47.4	-4°01.1	32°01.6	0°22.1	2°41.3	-11°38.3	310°31.6	-22°17.8	Capella	280°29.8	46°00.7
13	229°06.4	35°46.9	-4°02.3	47°02.6	0°21.5	17°43.2	-11°38.5	325°33.8	-22°17.8	Bellatrix	278°28.6	6°21.8
14	244°08.8	50°46.5	-4°03.5	62°03.6	0°20.8	32°45.2	-11°38.6	340°36.0	-22°17.8	Elnath	278°08.7	28°37.1
15	259°11.3	65°46.1	-4°04.7	77°04.6	0°20.2	47°47.1	-11°38.8	355°38.3	-22°17.8	Alnilam	275°43.2	-1°11.5
16	274°13.7	80°45.7	-4°06.0	92°05.6	0°19.6	62°49.0	-11°39.0	10°40.5	-22°17.8	Betelgeuse	270°57.9	7°24.5
17	289°16.2	95°45.3	-4°07.2	107°06.6	0°18.9	77°51.0	-11°39.2	25°42.7	-22°17.8	Canopus	263°54.6	-52°42.2
18	304°18.7	110°44.9	-4°08.4	122°07.7	0°18.3	92°52.9	-11°39.4	40°45.0	-22°17.9	Sirius	258°30.9	-16°44.2
19	319°21.1	125°44.5	-4°09.6	137°08.7	0°17.7	107°54.9	-11°39.6	55°47.2	-22°17.9	Adara	255°10.1	-28°59.7
20	334°23.6	140°44.1	-4°10.8	152°09.7	0°17.0	122°56.8	-11°39.8	70°49.4	-22°17.9	Procyon	244°56.5	5°10.8
21	349°26.1	155°43.6	-4°12.0	167°10.7	0°16.4	137°58.8	-11°39.9	85°51.6	-22°17.9	Pollux	243°24.0	27°58.8
22	4°28.5	170°43.2	-4°13.2	182°11.7	0°15.8	153°00.7	-11°40.1	100°53.9	-22°17.9	Avior	234°16.8	-59°33.7
23	19°31.0	185°42.8	-4°14.4	197°12.7	0°15.1	168°02.6	-11°40.3	115°56.1	-22°17.9	Suhail	222°50.3	-43°30.0
Mer.pass.:21:42		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.6		Miaplacidus	221°39.2	-69°47.1
										Alphard	217°53.3	-8°44.0
										Regulus	207°40.5	11°52.8
										Dubhe	193°48.6	61°39.2
										Denebola	182°30.9	14°28.5
										Genah	175°49.5	-17°38.2
										Acrux	173°06.6	-63°11.6
										Gacrux	171°58.1	-57°12.5
										Alioth	166°18.8	55°51.9
										Spica	158°28.5	-11°15.0
										Alcaid	152°57.1	49°13.6
										Hadar	148°44.3	-60°27.3
										Menkent	148°04.5	-36°27.2
										Arcturus	145°53.3	19°05.9
										Rigel Kent.	139°48.3	-60°54.3
										Zubenelg.	137°02.5	-16°06.7
										Kochab	137°21.4	74°05.2
										Alphecca	126°08.9	26°39.6
										Antares	112°23.0	-26°28.0
										Atria	107°22.5	-69°03.5
										Sabik	102°09.4	-15°44.6
										Shaula	96°18.2	-37°06.8
										Rasalhague	96°04.0	12°33.2
										Etamin	90°45.1	51°29.6
										Kaus Aust.	83°40.1	-34°22.4
										Vega	80°37.2	38°48.4
										Nunki	75°54.9	-26°16.3
										Altair	62°05.5	8°55.2
										Peacock	53°14.7	-56°40.7
										Deneb	49°29.4	45°21.0
										Enif	33°44.2	9°57.6
										Alnair	27°39.9	-46°52.6
										Fomalhaut	15°20.6	-29°31.7
										Scheat	13°50.3	28°10.9
										Markab	13°35.2	15°18.2
										2017/10/	SHA	Mer.pass
										Venus	167°18.0	10:37
										Mars	178°15.0	09:52
										Jupiter	148°43.7	11:49
										Saturn	96°30.5	15:17
										2017/10/	SHA	Mer.pass
										Venus	166°08.9	10:37
										Mars	177°40.3	09:50
										Jupiter	148°31.1	11:46
										Saturn	96°24.9	15:14
										2017/10/	SHA	Mer.pass
										Venus	164°59.8	10:38
										Mars	177°05.6	09:49
										Jupiter	148°18.5	11:43
										Saturn	96°19.2	15:10
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:21:34		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.6				

h		Sun					Moon										
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight					
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.				
0	183°58.1	-12°05.1	123°40.6	12.2	-19°29.3	-1.6	54.1	72	05:43	07:03	08:22	15:04	16:23	17:43			
1	198°58.2	-12°06.0	138°11.8	12.2	-19°30.9	-1.6	54.1	70	05:41	06:53	08:02	15:24	16:33	17:45			
2	213°58.3	-12°06.9	152°43.0	12.2	-19°32.4	-1.5	54.1	68	05:40	06:45	07:47	15:40	16:41	17:47			
3	228°58.4	-12°07.7	167°14.1	12.2	-19°33.9	-1.4	54.1	66	05:38	06:39	07:34	15:52	16:48	17:48			
4	243°58.4	-12°08.6	181°45.3	12.2	-19°35.2	-1.3	54.1	64	05:37	06:33	07:24	16:03	16:54	17:50			
5	258°58.5	-12°09.5	196°16.4	12.1	-19°36.4	-1.2	54.1	62	05:36	06:28	07:15	16:12	16:59	17:51			
6	273°58.6	-12°10.3	210°47.6	12.1	-19°37.6	-1.1	54.1	60	05:34	06:23	07:07	16:20	17:04	17:52			
7	288°58.7	-12°11.2	225°18.7	12.1	-19°38.7	-1.0	54.1	58	05:33	06:19	07:00	16:27	17:08	17:54			
8	303°58.7	-12°12.0	239°49.9	12.1	-19°39.6	-0.9	54.1	56	05:32	06:16	06:54	16:33	17:11	17:55			
9	318°58.8	-12°12.9	254°21.0	12.1	-19°40.5	-0.8	54.1	54	05:31	06:12	06:49	16:38	17:15	17:56			
10	333°58.9	-12°13.7	268°52.1	12.1	-19°41.3	-0.7	54.1	52	05:30	06:09	06:44	16:43	17:18	17:57			
11	348°58.9	-12°14.6	283°23.2	12.1	-19°42.0	-0.7	54.1	50	05:29	06:06	06:40	16:47	17:21	17:58			
12	3°59.0	-12°15.5	297°54.3	12.1	-19°42.6	-0.6	54.1	45	05:26	06:00	06:30	16:57	17:27	18:01			
13	18°59.1	-12°16.3	312°25.4	12.1	-19°43.1	-0.5	54.1	45	05:23	05:55	06:22	17:05	17:33	18:04			
14	33°59.1	-12°17.2	326°56.5	12.1	-19°43.6	-0.4	54.1	40	05:20	05:50	06:16	17:12	17:38	18:07			
15	48°59.2	-12°18.0	341°27.6	12.1	-19°43.9	-0.3	54.1	35	05:17	05:45	06:09	17:18	17:43	18:11			
16	63°59.3	-12°18.9	355°58.7	12.1	-19°44.2	-0.2	54.1	30	05:10	05:36	05:59	17:29	17:51	18:17			
17	78°59.3	-12°19.7	10°29.8	12.1	-19°44.3	-0.1	54.1	20	05:03	05:28	05:49	17:38	17:60	18:25			
18	93°59.4	-12°20.6	25°00.9	12.1	-19°44.4	0.0	54.2	10	04:55	05:19	05:41	17:47	18:09	18:33			
19	108°59.5	-12°21.5	39°32.0	12.1	-19°44.4	0.1	54.2	0	04:45	05:10	05:32	17:57	18:18	18:43			
20	123°59.5	-12°22.3	54°03.1	12.1	-19°44.2	0.2	54.2	-10	04:32	04:59	05:22	18:06	18:29	18:56			
21	138°59.6	-12°23.2	68°34.2	12.1	-19°44.0	0.3	54.2	-20	04:16	04:46	05:11	18:18	18:43	19:12			
22	153°59.7	-12°24.0	83°05.2	12.1	-19°43.7	0.3	54.2	-30	04:06	04:38	05:04	18:24	18:51	19:23			
23	168°59.7	-12°24.9	97°36.3	12.1	-19°43.3	0.4	54.2	-35	03:53	04:28	04:57	18:32	19:01	19:35			
SD.=16.1		d=-0.9	S.D.=14.8					-40	03:38	04:16	04:48	18:41	19:12	19:51			
								-50	03:18	04:02	04:37	18:52	19:27	20:12			
								-52	03:08	03:55	04:32	18:57	19:34	20:22			
								-54	02:57	03:47	04:27	19:02	19:42	20:33			
								-56	02:44	03:39	04:21	19:09	19:51	20:47			
								-58	02:28	03:29	04:14	19:15	20:01	21:03			
								-60	02:08	03:17	04:06	19:23	20:13	21:23			
								Moonrise			Moonset						
								Lat.	Wed	Thu	Fri	Wed	Thu	Fri			
								72	--	--	--	--	--	--			
								70	15:44	16:07	16:09	16:49	18:05	19:43			
								68	14:26	15:06	15:27	18:07	19:07	20:24			
								66	13:48	14:31	14:59	18:45	19:41	20:52			
								64	13:21	14:05	14:37	19:12	20:06	21:13			
								62	13:01	13:46	14:20	19:32	20:26	21:30			
								60	12:44	13:29	14:06	19:49	20:42	21:44			
								58	12:30	13:16	13:53	20:03	20:56	21:56			
								56	12:18	13:04	13:43	20:15	21:07	22:06			
								54	12:08	12:54	13:33	20:26	21:17	22:16			
								52	11:58	12:44	13:25	20:35	21:26	22:24			
								50	11:50	12:36	13:17	20:43	21:35	22:31			
								45	11:32	12:19	13:01	21:01	21:52	22:47			
								40	11:17	12:04	12:48	21:16	22:06	22:60			
								35	11:05	11:52	12:36	21:28	22:18	23:10			
								30	10:54	11:42	12:27	21:39	22:28	23:20			
								20	10:36	11:24	12:09	21:57	22:46	23:36			
								10	10:20	11:08	11:55	22:13	23:02	23:50			
								0	10:05	10:53	11:41	22:28	23:16	--			
								-10	09:50	10:38	11:27	22:43	23:30	--			
								-20	09:34	10:22	11:12	22:59	23:46	--			
								-30	09:16	10:04	10:55	23:17	--	00:03			
								-35	09:05	09:53	10:45	23:28	--	00:14			
								-40	08:53	09:41	10:33	23:40	--	00:25			
								-45	08:39	09:27	10:20	23:55	--	00:39			
								-50	08:21	09:10	10:04	--	00:12	00:56			
								-52	08:13	09:01	09:56	--	00:21	01:04			
								-54	08:04	08:52	09:47	--	00:30	01:13			
								-56	07:53	08:42	09:38	--	00:40	01:22			
								-58	07:41	08:30	09:27	00:03	00:52	01:34			
								-60	07:28	08:16	09:14	00:16	01:06	01:47			
								Sun			Moon						
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age					
									00 ^h	12 ^h	Pass	Upper	Lower				
								25	15:53	15:56	11:44	16:16	03:52	6(28%)			
								26	15:59	16:02	11:43	17:04	04:40	7(37%)			
								27	16:05	16:08	11:43	17:52	05:28	8(46%)			
								SD.=16.1		d=-0.8		S.D.=14.8					

October 28, 29 ,30 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass		
0	36°31.7	200°22.3	-5°13.8	213°02.6	-0°15.8	184°37.7	-11°49.4	132°45.1	-22°18.7	Alpheratz	357°40.2	29°11.5					
1	51°34.2	215°21.9	-5°15.0	228°03.6	-0°16.4	199°39.6	-11°49.6	147°47.4	-22°18.7	Ankaa	353°12.5	-42°12.7					
2	66°36.7	230°21.5	-5°16.2	243°04.6	-0°17.0	214°41.6	-11°49.8	162°49.6	-22°18.7	Schedar	349°36.6	56°38.2					
3	81°39.1	245°21.0	-5°17.4	258°05.6	-0°17.7	229°43.5	-11°50.0	177°51.8	-22°18.7	Diphda	348°52.6	-17°53.4					
4	96°41.6	260°20.6	-5°18.6	273°06.7	-0°18.3	244°45.5	-11°50.2	192°54.0	-22°18.8	Achernar	335°24.1	-57°08.9					
5	111°44.1	275°20.2	-5°19.8	288°07.7	-0°18.9	259°47.4	-11°50.4	207°56.2	-22°18.8	Hamal	327°57.1	23°32.8					
6	126°46.5	290°19.8	-5°21.0	303°08.7	-0°19.6	274°49.3	-11°50.5	222°58.5	-22°18.8	Polaris	315°59.5	89°20.2					
7	141°49.0	305°19.3	-5°22.2	318°09.7	-0°20.2	289°51.3	-11°50.7	238°00.7	-22°18.8	Akamar	315°15.7	-40°14.1					
8	156°51.5	320°18.9	-5°23.4	333°10.7	-0°20.8	304°53.2	-11°50.9	253°02.9	-22°18.8	Menkar	314°11.7	4°09.5					
9	171°53.9	335°18.5	-5°24.6	348°11.7	-0°21.4	319°55.2	-11°51.1	268°05.1	-22°18.8	Mirfak	308°35.6	49°55.3					
10	186°56.4	350°18.1	-5°25.8	3°12.8	-0°22.1	334°57.1	-11°51.3	283°07.4	-22°18.9	Aldebaran	290°45.7	16°32.6					
11	201°58.8	5°17.6	-5°27.0	18°13.8	-0°22.7	349°59.0	-11°51.5	298°09.6	-22°18.9	Rigel	281°09.0	-8°10.9					
12	217°01.3	20°17.2	-5°28.2	33°14.8	-0°23.3	5°01.0	-11°51.7	313°11.8	-22°18.9	Capella	280°29.8	46°00.7					
13	232°03.8	35°16.8	-5°29.4	48°15.8	-0°24.0	20°02.9	-11°51.8	328°14.0	-22°18.9	Bellatrix	278°28.6	6°21.8					
14	247°06.2	50°16.4	-5°30.6	63°16.8	-0°24.6	35°04.9	-11°52.0	343°16.2	-22°18.9	Elnath	278°08.7	28°37.1					
15	262°08.7	65°15.9	-5°31.8	78°17.9	-0°25.2	50°06.8	-11°52.2	358°18.5	-22°18.9	Alnilam	275°43.2	-1°11.5					
16	277°11.2	80°15.5	-5°33.0	93°18.9	-0°25.9	65°08.7	-11°52.4	13°20.7	-22°18.9	Betelgeuse	270°57.9	7°24.5					
17	292°13.6	95°15.1	-5°34.3	108°19.9	-0°26.5	80°10.7	-11°52.6	28°22.9	-22°19.0	Canopus	263°54.6	-52°42.2					
18	307°16.1	110°14.6	-5°35.5	123°20.9	-0°27.1	95°12.6	-11°52.8	43°25.1	-22°19.0	Sirius	258°30.9	-16°44.2					
19	322°18.6	125°14.2	-5°36.7	138°21.9	-0°27.7	110°14.5	-11°53.0	58°27.3	-22°19.0	Adara	255°10.1	-28°59.7					
20	337°21.0	140°13.8	-5°37.9	153°22.9	-0°28.4	125°16.5	-11°53.1	73°29.6	-22°19.0	Procyon	244°56.5	5°10.8					
21	352°23.5	155°13.4	-5°39.1	168°24.0	-0°29.0	140°18.4	-11°53.3	88°31.8	-22°19.0	Pollux	243°24.0	27°58.8					
22	7°25.9	170°12.9	-5°40.3	183°25.0	-0°29.6	155°20.4	-11°53.5	103°34.0	-22°19.0	Avior	234°16.8	-59°33.7					
23	22°28.4	185°12.5	-5°41.5	198°26.0	-0°30.3	170°22.3	-11°53.7	118°36.2	-22°19.0	Suhail	222°50.3	-43°30.0					
Mer.pass.:21:30			v-0.4 d-1.2 m-3.8			v1.0 d-0.6 m1.8			v1.9 d-0.2 m-1.5			v2.2 d-0.0 m0.6					

Sun	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec						
0	37°30.9	200°12.1	-5°42.7	213°27.0	-0°30.9	185°24.2	-11°53.9	133°38.4	-22°19.1					
1	52°33.3	215°11.6	-5°43.9	228°28.0	-0°31.5	200°26.2	-11°54.1	148°40.7	-22°19.1					
2	67°35.8	230°11.2	-5°45.1	243°29.0	-0°32.2	215°28.1	-11°54.2	163°42.9	-22°19.1					
3	82°38.3	245°10.8	-5°46.3	258°30.1	-0°32.8	230°30.1	-11°54.4	178°45.1	-22°19.1					
4	97°40.7	260°10.4	-5°47.5	273°31.1	-0°33.4	245°32.0	-11°54.6	193°47.3	-22°19.1					
5	112°43.2	275°09.9	-5°48.7	288°32.1	-0°34.0	260°33.9	-11°54.8	208°49.5	-22°19.1					
6	127°45.7	290°09.5	-5°49.9	303°33.1	-0°34.7	275°35.9	-11°55.0	223°51.8	-22°19.2					
7	142°48.1	305°09.1	-5°51.1	318°34.1	-0°35.3	290°37.8	-11°55.2	238°54.0	-22°19.2					
8	157°50.6	320°08.6	-5°52.3	333°35.1	-0°35.9	305°39.8	-11°55.4	253°56.2	-22°19.2					
9	172°53.1	335°08.2	-5°53.5	348°36.2	-0°36.6	320°41.7	-11°55.5	268°58.4	-22°19.2					
10	187°55.5	350°07.8	-5°54.7	3°37.2	-0°37.2	335°43.6	-11°55.7	283°00.6	-22°19.2					
11	202°58.0	5°07.3	-5°55.9	18°38.2	-0°37.8	350°45.6	-11°55.9	299°02.8	-22°19.2					
12	218°00.4	20°06.9	-5°57.1	33°39.2	-0°38.5	5°47.5	-11°56.1	314°05.1	-22°19.2					
13	233°02.9	35°06.5	-5°58.3	48°40.2	-0°39.1	20°49.5	-11°56.3	329°07.3	-22°19.3					
14	248°05.4	50°06.1	-5°59.5	63°41.3	-0°39.7	35°51.4	-11°56.5	344°09.5	-22°19.3					
15	263°07.8	65°05.6	-6°00.7	78°42.3	-0°40.3	50°53.3	-11°56.6	359°11.7	-22°19.3					
16	278°10.3	80°05.2	-6°01.9	93°43.3	-0°41.0	65°55.3	-11°56.8	14°13.9	-22°19.3					
17	293°12.8	95°04.8	-6°03.1	108°44.3	-0°41.6	80°57.2	-11°57.0	29°16.2	-22°19.3					
18	308°15.2	110°04.3	-6°04.3	123°45.3	-0°42.2	95°59.2	-11°57.2	44°18.4	-22°19.3					
19	323°17.7	125°03.9	-6°05.5	138°46.3	-0°42.9	111°01.1	-11°57.4	59°20.6	-22°19.4					
20	338°20.2	140°03.5	-6°06.7	153°47.4	-0°43.5	126°03.0	-11°57.6	74°22.8	-22°19.4					
21	353°22.6	155°03.0	-6°07.9	168°48.4	-0°44.1	141°05.0	-11°57.8	89°25.0	-22°19.4					
22	8°25.1	170°02.6	-6°09.1	183°49.4	-0°44.8	156°06.9	-11°57.9	104°27.2	-22°19.4					
23	23°27.6	185°02.2	-6°10.3	198°50.4	-0°45.4	171°08.9	-11°58.1	119°29.5	-22°19.4					
Mer.pass.:21:26			v-0.4 d-1.2 m-3.8			v1.0 d-0.6 m1.8			v1.9 d-0.2 m-1.5			v2.2 d-0.0 m0.6		

Mon	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec						
0	38°30.0	200°01.7	-6°11.5	213°51.4	-0°46.0	186°10.8	-11°58.3	134°31.7	-22°19.4					
1	53°32.5	215°01.3	-6°12.7	228°52.4	-0°46.6	201°12.7	-11°58.5	149°33.9	-22°19.4					
2	68°34.9	230°00.9	-6°13.9	243°53.5	-0°47.3	216°14.7	-11°58.7	164°36.1	-22°19.5					
3	83°37.4	245°00.4	-6°15.1	258°54.5	-0°47.9	231°16.6	-11°58.9	179°38.3	-22°19.5					
4	98°39.9	259°00.0	-6°16.3	273°55.5	-0°48.5	246°18.5	-11°59.0	194°40.5	-22°19.5					
5	113°42.3	274°59.5	-6°17.5	288°56.5	-0°49.2	261°20.5	-11°59.2	209°42.8	-22°19.5					
6	128°44.8	289°59.1	-6°18.7	303°57.5	-0°49.8	276°22.4	-11°59.4	224°45.0	-22°19.5					
7	143°47.3	304°58.7	-6°19.9	318°58.5	-0°50.4	291°24.4	-11°59.6	239°47.2	-22°19.5					
8	158°49.7	319°58.2	-6°21.1	333°59.6	-0°51.1	306°26.3	-11°59.8	254°49.4	-22°19.6					
9	173°52.2	334°57.8	-6°22.3	349°00.6	-0°51.7	321°28.2	-11°60.0	269°51.6	-22°19.6					
10	188°54.7	349°57.4	-6°23.5	4°01.6	-0°52.3	336°30.2	-12°00.2	284°53.8	-22°19.6					
11	203°57.1	4°56.9	-6°24.6	19°02.6	-0°52.9	351°32.1	-12°00.3	299°56.1	-22°19.6					
12	218°59.6	19°56.5	-6°25.8	34°03.6	-0°53.6	6°34.1	-12°00.5	314°58.3	-22°19.6					
13	234°02.0	34°56.1	-6°27.0	49°04.6	-0°54.2	21°36.0	-12°00.7	330°00.5	-22°19.6					
14	249°04.5	49°55.6	-6°28.2	64°05.7	-0°54.8	36°37.9	-12°00.9	345°02.7	-22°19.6					
15	264°07.0	64°55.2	-6°29.4	79°06.7	-0°55.5	51°39.9	-12°01.1	0°04.9	-22°19.7					
16	279°09.4	79°54.7	-6°30.6	94°07.7	-0°56.1	66°41.8	-12°01.3	15°07.1	-22°19.7					
17	294°11.9	94°54.3	-6°31.8	109°08.7	-0°56.7	81°43.8	-12°01.4	30°09.3	-22°19.7					
18	309°14.4	109°53.9	-6°33.0	124°09.7	-0°57.3	96°45.7	-12°01.6	45°11.6	-22°19.7					
19	324°16.8	124°53.4	-6°34.2	139°10.8	-0°58.0	111°47.6	-12°01.8	60°13.8	-22°19.7					
20	339°19.3	139°53.0	-6°35.4	154°11.8	-0°58.6	126°49.6	-12°02.0	75°16.0	-22°19.7					
21	354°21.8	154°52.5	-6°36.6	169°12.8	-0°59.2	141°51.5	-12°02.2	90°18.2	-22°19.7					
22	9°24.2	169°52.1	-6°37.8	184°13.8	-0°59.9	156°53.5	-12°02.4	105°20.4	-22°19.8					
23	24°26.7	184°51.7	-6°39.0	199°14.8	-1°00.5	171°55.4	-12°02.5	120°22.6	-22°19.8					
Mer.pass.:21:22			v-0.4 d-1.2 m-3.8			v1.0 d-0.6 m1.8			v1.9 d-0.2 m-1.5			v2.2 d-0.0 m0.6		

2017/10/	SHA	Mer.pass
Venus	163°50.6	10:39
Mars	176°30.9	09:47
Jupiter	148°06.0	11:40
Saturn	96°13.4	15:07
2017/10/	SHA	Mer.pass
Venus	162°41.2	10:40
Mars	175°56.1	09:46
Jupiter	147°53.4	11:37
Saturn	96°07.6	15:03
2017/10/	SHA	Mer.pass
Venus	161°31.7	10:40
Mars	175°21.4	09:44
Jupiter	147°40.8	11:34
Saturn	96°01.7	14:60
Horizontal paralax		
Venus:		0.1
Mars:		0.1

October 31, 01 ,02 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	39°29.2	199°51.2	-6°40.2	214°15.8	-1°01.1	186°57.3	-12°02.7	135°24.9	-22°19.8	Alpheratz	357°40.2	29°11.5
1	54°31.6	214°50.8	-6°41.4	229°16.9	-1°01.8	201°59.3	-12°02.9	150°27.1	-22°19.8	Ankaa	353°12.5	-42°12.7
2	69°34.1	229°50.3	-6°42.6	244°17.9	-1°02.4	217°01.2	-12°03.1	165°29.3	-22°19.8	Schedar	349°36.6	56°38.2
3	84°36.5	244°49.9	-6°43.8	259°18.9	-1°03.0	232°03.1	-12°03.3	180°31.5	-22°19.8	Diphda	348°52.6	-17°53.4
4	99°39.0	259°49.5	-6°44.9	274°19.9	-1°03.6	247°05.1	-12°03.5	195°33.7	-22°19.9	Achernar	335°24.1	-57°08.9
5	114°41.5	274°49.0	-6°46.1	289°20.9	-1°04.3	262°07.0	-12°03.6	210°35.9	-22°19.9	Hamal	327°57.1	23°32.8
6	129°43.9	289°48.6	-6°47.3	304°21.9	-1°04.9	277°09.0	-12°03.8	225°38.1	-22°19.9	Polaris	315°59.3	89°20.2
7	144°46.4	304°48.1	-6°48.5	319°23.0	-1°05.5	292°10.9	-12°04.0	240°40.3	-22°19.9	Akamar	315°15.7	-40°14.1
8	159°48.9	319°47.7	-6°49.7	334°24.0	-1°06.2	307°12.8	-12°04.2	255°42.6	-22°19.9	Menkar	314°11.7	4°09.5
9	174°51.3	334°47.2	-6°50.9	349°25.0	-1°06.8	322°14.8	-12°04.4	270°44.8	-22°19.9	Mirfak	308°35.6	49°55.3
10	189°53.8	349°46.8	-6°52.1	4°26.0	-1°07.4	337°16.7	-12°04.6	285°47.0	-22°19.9	Aldebaran	290°45.7	16°32.6
11	204°56.3	4°46.4	-6°53.3	19°27.0	-1°08.0	352°18.7	-12°04.7	300°49.2	-22°20.0	Rigel	281°09.0	-8°10.9
12	219°58.7	19°45.9	-6°54.5	34°28.0	-1°08.7	7°20.6	-12°04.9	315°51.4	-22°20.0	Capella	280°29.8	46°00.7
13	235°01.2	34°45.5	-6°55.7	49°29.1	-1°09.3	22°22.5	-12°05.1	330°53.6	-22°20.0	Bellatrix	278°28.6	6°21.8
14	250°03.7	49°45.0	-6°56.8	64°30.1	-1°09.9	37°24.5	-12°05.3	345°55.8	-22°20.0	Elnath	278°08.6	28°37.1
15	265°06.1	64°44.6	-6°58.0	79°31.1	-1°10.6	52°26.4	-12°05.5	0°58.1	-22°20.0	Alnilam	275°43.2	-1°11.5
16	280°08.6	79°44.1	-6°59.2	94°32.1	-1°11.2	67°28.4	-12°05.7	16°00.3	-22°20.0	Betelgeuse	270°57.9	7°24.5
17	295°11.0	94°43.7	-7°00.4	109°33.1	-1°11.8	82°30.3	-12°05.8	31°02.5	-22°20.1	Canopus	263°54.5	-52°42.2
18	310°13.5	109°43.3	-7°01.6	124°34.1	-1°12.4	97°32.2	-12°06.0	46°04.7	-22°20.1	Sirius	258°30.9	-16°44.2
19	325°16.0	124°42.8	-7°02.8	139°35.2	-1°13.1	112°34.2	-12°06.2	61°06.9	-22°20.1	Adara	255°10.0	-28°59.7
20	340°18.4	139°42.4	-7°04.0	154°36.2	-1°13.7	127°36.1	-12°06.4	76°09.1	-22°20.1	Procyon	244°56.5	5°10.8
21	355°20.9	154°41.9	-7°05.2	169°37.2	-1°14.3	142°38.1	-12°06.6	91°11.3	-22°20.1	Pollux	243°24.0	27°58.8
22	10°23.4	169°41.5	-7°06.4	184°38.2	-1°15.0	157°40.0	-12°06.8	106°13.5	-22°20.1	Avior	234°16.7	-59°33.7
23	25°25.8	184°41.0	-7°07.5	199°39.2	-1°15.6	172°41.9	-12°06.9	121°15.8	-22°20.1	Suhail	222°50.3	-43°30.0
Mer.pass.:21:18		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.6		Miaplacidus	221°39.1	-69°47.1
										Alphard	217°53.3	-8°44.1
										Regulus	207°40.5	11°52.8
										Dubhe	193°48.6	61°39.1
										Denebola	182°30.9	14°28.5
										Gienah	175°49.5	-17°38.2
										Acrux	173°06.5	-63°11.5
										Gacrux	171°58.0	-57°12.5
										Alioth	166°18.7	55°51.8
										Spica	158°28.5	-11°15.0
										Alcaid	152°57.1	49°13.6
										Hadar	148°44.3	-60°27.3
										Menkent	148°04.5	-36°27.2
										Arcturus	145°53.3	19°05.9
										Rigel Kent.	139°48.3	-60°54.3
										Zubenelg.	137°02.5	-16°06.7
										Kochab	137°21.4	74°05.1
										Alphecca	126°08.9	26°39.6
										Antares	112°23.0	-26°28.0
										Atria	107°22.6	-69°03.5
										Sabik	102°09.5	-15°44.6
										Shaula	96°18.2	-37°06.8
										Rasalhague	96°04.0	12°33.2
										Etamin	90°45.1	51°29.6
										Kaus Aust.	83°40.1	-34°22.4
										Vega	80°37.2	38°48.4
										Nunki	75°54.9	-26°16.3
										Altair	62°05.5	8°55.2
										Peacock	53°14.7	-56°40.7
										Deneb	49°29.5	45°21.0
										Enif	33°44.2	9°57.6
										Alnair	27°40.0	-46°52.6
										Fomalhaut	15°20.6	-29°31.7
										Scheat	13°50.3	28°10.9
										Markab	13°35.2	15°18.2
										2017/10/	SHA	Mer.pass
										Venus	160°22.1	10:41
										Mars	174°46.7	09:42
										Jupiter	147°28.2	11:31
										Saturn	95°55.7	14:56
										2017/11/	SHA	Mer.pass
										Venus	159°12.3	10:42
										Mars	174°12.0	09:41
										Jupiter	147°15.6	11:28
										Saturn	95°49.7	14:53
										2017/11/	SHA	Mer.pass
										Venus	158°02.3	10:42
										Mars	173°37.2	09:39
										Jupiter	147°03.0	11:24
										Saturn	95°43.6	14:49
										Horizontal parallax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:21:10		v-0.5 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.6				

h		Sun		Moon											
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	184°05.4	-14°05.7	54°28.5	12.0	-8°26.3	10.1	56.9	72	06:07	07:30	08:58	14:28	15:56	17:19	
1	199°05.4	-14°06.5	68°59.6	12.0	-8°16.2	10.1	57.0	70	06:03	07:17	08:31	14:55	16:09	17:23	
2	214°05.4	-14°07.3	83°30.6	12.0	-8°06.0	10.2	57.0	68	05:59	07:06	08:11	15:15	16:20	17:27	
3	229°05.5	-14°08.1	98°01.6	12.0	-7°55.8	10.2	57.0	66	05:56	06:57	07:56	15:30	16:29	17:30	
4	244°05.5	-14°08.9	112°32.5	12.0	-7°45.6	10.3	57.1	64	05:53	06:50	07:43	15:43	16:36	17:33	
5	259°05.5	-14°09.7	127°03.5	11.9	-7°35.3	10.3	57.1	62	05:50	06:43	07:32	15:54	16:43	17:36	
6	274°05.5	-14°10.5	141°34.4	11.9	-7°24.9	10.4	57.1	60	05:48	06:37	07:23	16:04	16:49	17:38	
7	289°05.6	-14°11.3	156°05.3	11.9	-7°14.5	10.4	57.2	58	05:46	06:32	07:14	16:12	16:54	17:41	
8	304°05.6	-14°12.1	170°36.2	11.9	-7°04.1	10.5	57.2	56	05:43	06:28	07:07	16:19	16:59	17:43	
9	319°05.6	-14°12.9	185°07.1	11.9	-6°53.6	10.5	57.3	54	05:41	06:23	07:01	16:26	17:03	17:45	
10	334°05.6	-14°13.7	199°38.0	11.9	-6°43.0	10.6	57.3	52	05:39	06:19	06:55	16:31	17:07	17:47	
11	349°05.7	-14°14.5	214°08.8	11.8	-6°32.4	10.6	57.3	50	05:38	06:16	06:50	16:37	17:11	17:49	
12	4°05.7	-14°15.3	228°39.6	11.8	-6°21.8	10.7	57.4	45	05:33	06:08	06:39	16:48	17:19	17:53	
13	19°05.7	-14°16.2	243°10.4	11.8	-6°11.1	10.7	57.4	40	05:29	06:01	06:29	16:58	17:26	17:58	
14	34°05.7	-14°17.0	257°41.2	11.8	-6°00.3	10.8	57.4	35	05:25	05:55	06:21	17:06	17:32	18:02	
15	49°05.7	-14°17.8	272°12.0	11.7	-5°49.5	10.8	57.5	30	05:21	05:49	06:14	17:13	17:38	18:06	
16	64°05.8	-14°18.6	286°42.7	11.7	-5°38.7	10.9	57.5	20	05:13	05:39	06:02	17:25	17:48	18:14	
17	79°05.8	-14°19.4	301°13.4	11.7	-5°27.8	10.9	57.6	10	05:04	05:29	05:51	17:37	17:58	18:23	
18	94°05.8	-14°20.2	315°44.1	11.7	-5°16.9	10.9	57.6	0	04:54	05:19	05:40	17:47	18:08	18:33	
19	109°05.8	-14°21.0	330°14.7	11.6	-5°05.9	11.0	57.6	-10	04:42	05:08	05:30	17:58	18:19	18:45	
20	124°05.8	-14°21.8	344°45.4	11.6	-4°54.9	11.0	57.7	-20	04:28	04:55	05:18	18:09	18:32	18:59	
21	139°05.9	-14°22.6	358°16.0	11.6	-4°43.9	11.1	57.7	-30	04:10	04:40	05:05	18:22	18:48	19:18	
22	154°05.9	-14°23.4	13°46.5	11.6	-4°32.8	11.1	57.7	-35	03:58	04:31	04:58	18:30	18:57	19:29	
23	169°05.9	-14°24.2	28°17.1	11.5	-4°21.6	11.1	57.8	-40	03:44	04:20	04:49	18:39	19:08	19:44	
SD.=16.1			d=-0.8		S.D.=15.5										
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset			
									Tue	Wed	Thu	Tue	Wed	Thu	
0	184°05.9	-14°25.0	42°47.6	11.5	-4°10.5	11.2	57.8	72	16:06	15:56	15:47	00:34	02:26	04:20	
1	199°05.9	-14°25.8	57°18.1	11.5	-3°59.3	11.2	57.9	70	15:58	15:55	15:51	00:47	02:31	04:18	
2	214°06.0	-14°26.6	71°48.6	11.4	-3°48.0	11.3	57.9	68	15:51	15:53	15:55	00:58	02:36	04:17	
3	229°06.0	-14°27.4	86°19.0	11.4	-3°36.8	11.3	57.9	66	15:46	15:52	15:58	01:07	02:40	04:15	
4	244°06.0	-14°28.2	100°49.4	11.4	-3°25.5	11.3	58.0	64	15:41	15:51	16:01	01:14	02:43	04:14	
5	259°06.0	-14°29.0	115°19.8	11.4	-3°14.1	11.4	58.0	62	15:37	15:50	16:04	01:21	02:45	04:14	
6	274°06.0	-14°29.8	129°50.1	11.3	-3°02.7	11.4	58.0	60	15:33	15:49	16:06	01:26	02:48	04:13	
7	289°06.0	-14°30.6	144°20.4	11.3	-2°51.3	11.4	58.1	58	15:30	15:49	16:08	01:31	02:50	04:12	
8	304°06.1	-14°31.4	158°50.7	11.3	-2°39.9	11.5	58.1	56	15:27	15:48	16:09	01:35	02:52	04:12	
9	319°06.1	-14°32.2	173°20.9	11.2	-2°28.4	11.5	58.1	54	15:25	15:47	16:11	01:39	02:54	04:11	
10	334°06.1	-14°33.0	187°51.2	11.2	-2°16.9	11.5	58.2	52	15:22	15:47	16:12	01:42	02:55	04:11	
11	349°06.1	-14°33.8	202°21.3	11.2	-2°05.4	11.5	58.2	50	15:20	15:47	16:13	01:45	02:56	04:10	
12	4°06.1	-14°34.6	216°51.5	11.1	-1°53.9	11.6	58.3	45	15:16	15:46	16:16	01:52	02:59	04:09	
13	19°06.1	-14°35.4	231°21.6	11.1	-1°42.3	11.6	58.3	40	15:12	15:45	16:19	01:58	03:02	04:09	
14	34°06.2	-14°36.2	245°51.6	11.0	-1°30.7	11.6	58.3	35	15:08	15:44	16:21	02:03	03:04	04:08	
15	49°06.2	-14°36.9	260°21.7	11.0	-1°19.1	11.6	58.4	30	15:05	15:43	16:22	02:07	03:06	04:07	
16	64°06.2	-14°37.7	274°51.6	11.0	-1°07.4	11.7	58.4	20	15:00	15:42	16:26	02:14	03:09	04:06	
17	79°06.2	-14°38.5	289°21.6	10.9	-0°55.7	11.7	58.4	10	14:56	15:41	16:28	02:20	03:12	04:05	
18	94°06.2	-14°39.3	303°51.5	10.9	-0°44.0	11.7	58.5	0	14:51	15:40	16:31	02:26	03:15	04:04	
19	109°06.2	-14°40.1	318°21.4	10.9	-0°32.3	11.7	58.5	-10	14:47	15:40	16:34	02:32	03:17	04:03	
20	124°06.2	-14°40.9	332°51.2	10.8	-0°20.6	11.7	58.6	-20	14:43	15:39	16:37	02:38	03:20	04:02	
21	139°06.2	-14°41.7	347°21.0	10.8	-0°08.9	11.8	58.6	-30	14:37	15:38	16:40	02:45	03:23	04:01	
22	154°06.3	-14°42.5	1°50.7	10.7	0°02.9	11.8	58.6	-40	14:34	15:37	16:42	02:49	03:25	04:01	
23	169°06.3	-14°43.3	16°20.5	10.7	0°14.7	11.8	58.7	-35	14:31	15:36	16:44	02:54	03:27	03:60	
SD.=16.1			d=-0.8		S.D.=15.8										
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun			Moon			
									Eqn.of Time	Mer.	Mer.Pass.	Age			
									00 ^h	12 ^h	Pass	Upper	Lower		
0	184°06.3	-14°44.1	30°50.1	10.6	0°26.5	11.8	58.7	31	16:21	16:23	11:43	21:03	08:38	12(83%)	
1	199°06.3	-14°44.9	45°19.7	10.6	0°38.3	11.8	58.7	1	16:24	16:24	11:43	21:52	09:27	13(90%)	
2	214°06.3	-14°45.7	59°49.3	10.6	0°50.1	11.8	58.8	2	16:25	16:25	11:43	22:43	10:17	14(96%)	
3	229°06.3	-14°46.5	74°18.8	10.5	1°01.9	11.8	58.8								
4	244°06.3	-14°47.2	88°48.3	10.5	1°13.8	11.8	58.8								
5	259°06.3	-14°48.0	103°17.8	10.4	1°25.6	11.9	58.9								
6	274°06.3	-14°48.8	117°47.2	10.4	1°37.5	11.9	58.9								
7	289°06.3	-14°49.6	132°16.5	10.3	1°49.3	11.9	58.9								
8	304°06.3	-14°50.4	146°45.8	10.3	2°01.2	11.9	59.0								
9	319°06.4	-14°51.2	161°15.0	10.2	2°13.1	11.9	59.0								
10	334°06.4	-14°52.0	175°44.2	10.2	2°24.9	11.9	59.0								
11	349°06.4	-14°52.8	190°13.4	10.1	2°36.8	11.9	59.1								
12	4°06.4	-14°53.5	204°42.5	10.1	2°48.7	11.9	59.1								
13	19°06.4	-14°54.3	219°11.5	10.0	3°00.6	11.9	59.1								
14	34°06.4	-14°55.1	233°40.5	10.0	3°12.4	11.9	59.2								
15	49°06.4	-14°55.9	248°09.5	9.9	3°24.3	11.9	59.2								
16	64°06.4	-14°56.7	262°38.4	9.9	3°36.1	11.9	59.2								
17	79°06.4	-14°57.5	277°07.2	9.8	3°48.0	11.8	59.3								
18	94°06.4	-14°58.2	291°36.0	9.8	3°59.8	11.8	59.3								
19	109°06.4	-14°59.0	306°04.7	9.7	4°11.7	11.8	59.3								
20	124°06.4	-14°59.8	320°33.4	9.7	4°23.5	11.8	59.4								
21	139°06.4	-15°00.6	335°02.1	9.6	4°35.3	11.8	59.4								
22	154°06.4	-15°01.4	349°30.6	9.5	4°47.1	11.8	59.4								
23	169°06.4	-15°02.2	3°59.1	9.5	4°58.9	11.8	59.5								
SD.=16.1			d=-0.8		S.D.=16.0										

November 03, 04 ,05 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	42°26.6	199°18.8	-8°05.4	215°29.1	-1°46.4	189°16.9	-12°15.9	138°04.0	-22°20.9	Alpheratz	357°40.2	29°11.5
1	57°29.0	214°18.3	-8°06.6	230°30.1	-1°47.0	204°18.9	-12°16.1	153°06.2	-22°20.9	Ankaa	353°12.5	-42°12.7
2	72°31.5	229°17.9	-8°07.7	245°31.1	-1°47.6	219°20.8	-12°16.3	168°08.4	-22°20.9	Schedar	349°36.6	56°38.2
3	87°34.0	244°17.4	-8°08.9	260°32.1	-1°48.2	234°22.8	-12°16.4	183°10.6	-22°20.9	Diphda	348°52.6	-17°53.4
4	102°36.4	259°17.0	-8°10.1	275°33.1	-1°48.9	249°24.7	-12°16.6	198°12.8	-22°20.9	Achernar	335°24.1	-57°09.0
5	117°38.9	274°16.5	-8°11.3	290°34.1	-1°49.5	264°26.6	-12°16.8	213°15.0	-22°20.9	Hamal	327°57.1	23°32.8
6	132°41.3	289°16.0	-8°12.4	305°35.2	-1°50.1	279°28.6	-12°17.0	228°17.2	-22°21.0	Polaris	315°59.0	89°20.2
7	147°43.8	304°15.6	-8°13.6	320°36.2	-1°50.8	294°30.5	-12°17.2	243°19.5	-22°21.0	Akamar	315°15.7	-40°14.1
8	162°46.3	319°15.1	-8°14.8	335°37.2	-1°51.4	309°32.4	-12°17.4	258°21.7	-22°21.0	Menkar	314°11.6	4°09.5
9	177°48.7	334°14.6	-8°16.0	350°38.2	-1°52.0	324°34.4	-12°17.5	273°23.9	-22°21.0	Mirfak	308°35.6	49°55.3
10	192°51.2	349°14.2	-8°17.1	5°39.2	-1°52.6	339°36.3	-12°17.7	288°26.1	-22°21.0	Aldebaran	290°45.7	16°32.6
11	207°53.7	4°13.7	-8°18.3	20°40.2	-1°53.3	354°38.3	-12°17.9	303°28.3	-22°21.0	Rigel	281°09.0	-8°10.9
12	222°56.1	19°13.2	-8°19.5	35°41.2	-1°53.9	9°40.2	-12°18.1	318°30.5	-22°21.0	Capella	280°29.7	46°00.7
13	237°58.6	34°12.8	-8°20.6	50°42.3	-1°54.5	24°42.1	-12°18.3	333°32.7	-22°21.1	Bellatrix	278°28.6	6°21.8
14	253°01.1	49°12.3	-8°21.8	65°43.3	-1°55.1	39°44.1	-12°18.4	348°34.9	-22°21.1	Elnath	278°08.6	28°37.1
15	268°03.5	64°11.8	-8°23.0	80°44.3	-1°55.8	54°46.0	-12°18.6	3°37.1	-22°21.1	Alnilam	275°43.1	-1°11.5
16	283°06.0	79°11.4	-8°24.1	95°45.3	-1°56.4	69°48.0	-12°18.8	18°39.3	-22°21.1	Betelgeuse	270°57.9	7°24.5
17	298°08.5	94°10.9	-8°25.3	110°46.3	-1°57.0	84°49.9	-12°19.0	33°41.5	-22°21.1	Canopus	263°54.5	-52°42.2
18	313°10.9	109°10.5	-8°26.5	125°47.3	-1°57.7	99°51.8	-12°19.2	48°43.7	-22°21.1	Sirius	258°30.9	-16°44.2
19	328°13.4	124°10.0	-8°27.6	140°48.4	-1°58.3	114°53.8	-12°19.4	63°45.9	-22°21.1	Adara	255°10.0	-28°59.7
20	343°15.8	139°09.5	-8°28.8	155°49.4	-1°58.9	129°55.7	-12°19.5	78°48.1	-22°21.2	Procyon	244°56.5	5°10.8
21	358°18.3	154°09.1	-8°30.0	170°50.4	-1°59.5	144°57.7	-12°19.7	93°50.3	-22°21.2	Pollux	243°24.0	27°58.8
22	13°20.8	169°08.6	-8°31.2	185°51.4	-2°00.2	159°59.6	-12°19.9	108°52.5	-22°21.2	Avior	234°16.7	-59°33.8
23	28°23.2	184°08.1	-8°32.3	200°52.4	-2°00.8	175°01.5	-12°20.1	123°54.7	-22°21.2	Suhail	222°50.3	-43°30.0
Mer.pass.:21:06		v-0.5 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.6		Miaplacidus	221°39.0	-69°47.1
										Alphard	217°53.2	-8°44.1
										Regulus	207°40.5	11°52.8
										Dubhe	193°48.5	61°39.1
										Denebola	182°30.8	14°28.5
										Gienah	175°49.5	-17°38.2
										Acrux	173°06.5	-63°11.5
										Gacrux	171°58.0	-57°12.5
										Alioth	166°18.7	55°51.8
										Spica	158°28.5	-11°15.0
										Alcaid	152°57.1	49°13.6
										Hadar	148°44.3	-60°27.2
										Menkent	148°04.5	-36°27.2
										Arcturus	145°53.3	19°05.9
										Rigel Kent.	139°48.3	-60°54.2
										Zubenelg.	137°02.5	-16°06.7
										Kochab	137°21.4	74°05.1
										Alphecca	126°08.9	26°39.6
										Antares	112°23.0	-26°28.0
										Atria	107°22.6	-69°03.4
										Sabik	102°09.5	-15°44.6
										Shaula	96°18.3	-37°06.8
										Rasalhague	96°04.0	12°33.2
										Etamin	90°45.2	51°29.6
										Kaus Aust.	83°40.2	-34°22.4
										Vega	80°37.2	38°48.4
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°55.2
										Peacock	53°14.8	-56°40.7
										Deneb	49°29.5	45°21.0
										Enif	33°44.2	9°57.6
										Alnair	27°40.0	-46°52.6
										Fomalhaut	15°20.7	-29°31.7
										Scheat	13°50.4	28°10.9
										Markab	13°35.2	15°18.2
										2017/11/	SHA	Mer.pass
										Venus	156°52.2	10:43
										Mars	173°02.5	09:37
										Jupiter	146°50.4	11:21
										Saturn	95°37.4	14:46
										2017/11/	SHA	Mer.pass
										Venus	155°41.9	10:44
										Mars	172°27.7	09:36
										Jupiter	146°37.8	11:18
										Saturn	95°31.2	14:42
										2017/11/	SHA	Mer.pass
										Venus	154°31.5	10:45
										Mars	171°53.0	09:34
										Jupiter	146°25.2	11:15
										Saturn	95°25.0	14:39
										Horizontal parallax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:20:58		v-0.5 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.5				

Sun			Moon					Twilight						
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
0	184°06.4	-15°02.9	18°27.6	9.4	5°10.7	11.8	59.5	72	06:19	07:44	09:17	14:08	15:42	17:07
1	199°06.4	-15°03.7	32°56.0	9.4	5°22.4	11.7	59.5	70	06:13	07:29	08:47	14:39	15:57	17:13
2	214°06.4	-15°04.5	47°24.3	9.3	5°34.1	11.7	59.6	68	06:08	07:17	08:24	15:02	16:09	17:17
3	229°06.4	-15°05.3	61°52.6	9.3	5°45.9	11.7	59.6	66	06:04	07:07	08:07	15:19	16:19	17:22
4	244°06.4	-15°06.1	76°20.8	9.2	5°57.5	11.7	59.6	64	06:01	06:58	07:52	15:34	16:28	17:25
5	259°06.4	-15°06.8	90°49.0	9.1	6°09.2	11.7	59.6	62	05:57	06:51	07:40	15:46	16:35	17:29
6	274°06.4	-15°07.6	105°17.1	9.1	6°20.9	11.6	59.7	60	05:54	06:44	07:30	15:56	16:42	17:32
7	289°06.4	-15°08.4	119°45.2	9.0	6°32.5	11.6	59.7	58	05:52	06:39	07:21	16:05	16:48	17:35
8	304°06.4	-15°09.2	134°13.1	9.0	6°44.1	11.6	59.7	56	05:49	06:33	07:14	16:13	16:53	17:37
9	319°06.4	-15°09.9	148°41.1	8.9	6°55.6	11.5	59.8	54	05:47	06:29	07:07	16:20	16:58	17:40
10	334°06.4	-15°10.7	163°08.9	8.8	7°07.1	11.5	59.8	52	05:44	06:24	07:00	16:26	17:02	17:42
11	349°06.4	-15°11.5	177°36.7	8.8	7°18.6	11.5	59.8	50	05:42	06:21	06:55	16:32	17:06	17:44
12	4°06.4	-15°12.3	192°04.5	8.7	7°30.1	11.4	59.8	45	05:37	06:12	06:43	16:44	17:15	17:50
13	19°06.4	-15°13.1	206°32.2	8.7	7°41.5	11.4	59.9	40	05:32	06:04	06:33	16:54	17:22	17:55
14	34°06.4	-15°13.8	220°59.8	8.6	7°52.9	11.4	59.9	35	05:28	05:58	06:24	17:03	17:29	17:59
15	49°06.4	-15°14.6	235°27.3	8.5	8°04.3	11.3	59.9	30	05:23	05:51	06:16	17:11	17:35	18:04
16	64°06.4	-15°15.4	249°54.8	8.5	8°15.6	11.3	59.9	20	05:14	05:40	06:03	17:24	17:47	18:13
17	79°06.4	-15°16.1	264°22.3	8.4	8°26.9	11.3	60.0	10	05:04	05:29	05:51	17:36	17:58	18:23
18	94°06.4	-15°16.9	278°49.6	8.3	8°38.1	11.2	60.0	0	04:54	05:19	05:40	17:47	18:08	18:33
19	109°06.4	-15°17.7	293°16.9	8.3	8°49.3	11.2	60.0	-10	04:41	05:07	05:29	17:58	18:20	18:46
20	124°06.4	-15°18.5	307°44.2	8.2	9°00.5	11.1	60.0	-20	04:27	04:54	05:17	18:11	18:34	19:01
21	139°06.4	-15°19.2	322°11.4	8.1	9°11.6	11.1	60.1	-30	04:07	04:37	05:03	18:25	18:50	19:21
22	154°06.4	-15°20.0	336°38.5	8.1	9°22.6	11.0	60.1	-35	03:55	04:28	04:55	18:33	19:00	19:33
23	169°06.4	-15°20.8	351°05.5	8.0	9°33.6	11.0	60.1	-40	03:40	04:16	04:45	18:42	19:12	19:48
SD.=16.1			d=-0.8		S.D.=16.2									
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Fri	Sat	Sun	Fri	Sat	Sun
0	184°06.4	-15°21.5	5°32.5	7.9	9°44.6	10.9	60.1	-52	02:57	03:36	04:15	19:13	19:53	20:44
1	199°06.4	-15°22.3	19°59.4	7.9	9°55.5	10.9	60.1	-54	02:31	03:26	04:08	19:20	20:02	20:59
2	214°06.4	-15°23.1	34°26.3	7.8	10°06.3	10.8	60.2	-56	02:13	03:15	04:00	19:28	20:13	21:16
3	229°06.4	-15°23.9	48°53.1	7.8	10°17.1	10.8	60.2	-58	01:52	03:03	03:52	19:37	20:26	21:39
4	244°06.3	-15°24.6	63°19.8	7.7	10°27.8	10.7	60.2	-60	01:23	02:48	03:42	19:47	20:42	22:09
5	259°06.3	-15°25.4	77°46.4	7.6	10°38.5	10.6	60.2							
6	274°06.3	-15°26.2	92°13.0	7.6	10°49.1	10.6	60.2							
7	289°06.3	-15°26.9	106°39.6	7.5	10°59.7	10.5	60.3							
8	304°06.3	-15°27.7	121°06.0	7.4	11°10.1	10.5	60.3							
9	319°06.3	-15°28.5	135°32.4	7.4	11°20.6	10.4	60.3							
10	334°06.3	-15°29.2	149°58.7	7.3	11°30.9	10.3	60.3							
11	349°06.3	-15°30.0	164°25.0	7.2	11°41.2	10.3	60.3							
12	4°06.3	-15°30.8	178°51.2	7.2	11°51.4	10.2	60.4							
13	19°06.3	-15°31.5	193°17.3	7.1	12°01.6	10.1	60.4							
14	34°06.2	-15°32.3	207°43.4	7.0	12°11.7	10.0	60.4							
15	49°06.2	-15°33.1	222°09.4	7.0	12°21.7	10.0	60.4							
16	64°06.2	-15°33.8	236°35.4	6.9	12°31.6	9.9	60.4							
17	79°06.2	-15°34.6	251°01.2	6.8	12°41.4	9.8	60.4							
18	94°06.2	-15°35.3	265°27.1	6.8	12°51.2	9.7	60.5							
19	109°06.2	-15°36.1	279°52.8	6.7	13°00.9	9.6	60.5							
20	124°06.2	-15°36.9	294°18.5	6.7	13°10.5	9.6	60.5							
21	139°06.2	-15°37.6	308°44.1	6.6	13°20.0	9.5	60.5							
22	154°06.1	-15°38.4	323°09.7	6.5	13°29.4	9.4	60.5							
23	169°06.1	-15°39.1	337°35.2	6.5	13°38.8	9.3	60.5							
SD.=16.1			d=-0.8		S.D.=16.4									
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Moon		Age	
0	184°06.1	-15°39.9	352°00.6	6.4	13°48.1	9.2	60.5	3	Eqn.of Time	Mer.	Mer.Pass.	Upper	Lower	15(99%)
1	199°06.1	-15°40.7	6°26.0	6.3	13°57.2	9.1	60.5	4	00 ^h	Pass				16(100%)
2	214°06.1	-15°41.4	20°51.3	6.3	14°06.3	9.0	60.5	5	12 ^h					17(97%)
3	229°06.1	-15°42.2	35°16.6	6.2	14°15.3	8.9	60.6							
4	244°06.1	-15°42.9	49°41.8	6.2	14°24.2	8.9	60.6							
5	259°06.0	-15°43.7	64°06.9	6.1	14°33.0	8.8	60.6							
6	274°06.0	-15°44.5	78°32.0	6.0	14°41.7	8.7	60.6							
7	289°06.0	-15°45.2	92°57.0	6.0	14°50.4	8.6	60.6							
8	304°06.0	-15°46.0	107°21.9	5.9	14°58.9	8.5	60.6							
9	319°06.0	-15°46.7	121°46.8	5.9	15°07.3	8.4	60.6							
10	334°05.9	-15°47.5	136°11.7	5.8	15°15.6	8.3	60.6							
11	349°05.9	-15°48.2	150°36.5	5.8	15°23.8	8.2	60.6							
12	4°05.9	-15°49.0	165°01.2	5.7	15°31.9	8.1	60.6							
13	19°05.9	-15°49.7	179°25.9	5.7	15°39.9	7.9	60.6							
14	34°05.9	-15°50.5	193°50.5	5.6	15°47.8	7.8	60.6							
15	49°05.8	-15°51.3	208°15.1	5.5	15°55.6	7.7	60.6							
16	64°05.8	-15°52.0	222°39.6	5.5	16°03.3	7.6	60.6							
17	79°05.8	-15°52.8	237°04.1	5.4	16°10.9	7.5	60.7							
18	94°05.8	-15°53.5	251°28.5	5.4	16°18.3	7.4	60.7							
19	109°05.8	-15°54.3	265°52.8	5.3	16°25.7	7.3	60.7							
20	124°05.7	-15°55.0	280°17.2	5.3	16°32.9	7.2	60.7							
21	139°05.7	-15°55.8	294°41.4	5.2	16°40.0	7.1	60.7							
22	154°05.7	-15°56.5	309°05.7	5.2	16°47.0	6.9	60.7							
23	169°05.7	-15°57.3	323°29.8	5.2	16°53.9	6.8	60.7							
SD.=16.1			d=-0.8		S.D.=16.5									

November 06, 07 ,08 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	45°24.0	198°44.8	-9°29.1	216°42.2	-2°31.5	191°36.5	-12°28.9	140°42.6	-22°21.9	Alpheratz	357°40.2	29°11.5
1	60°26.4	213°44.3	-9°30.2	231°43.2	-2°32.1	206°38.5	-12°29.1	155°44.8	-22°21.9	Ankaa	353°12.5	-42°12.7
2	75°28.9	228°43.8	-9°31.4	246°44.2	-2°32.7	221°40.4	-12°29.3	170°47.0	-22°21.9	Schedar	349°36.6	56°38.2
3	90°31.4	243°43.3	-9°32.5	261°45.2	-2°33.3	236°42.4	-12°29.5	185°49.2	-22°21.9	Diphda	348°52.6	-17°53.4
4	105°33.8	258°42.8	-9°33.7	276°46.2	-2°34.0	251°44.3	-12°29.7	200°51.4	-22°22.0	Achernar	335°24.1	-57°09.0
5	120°36.3	273°42.3	-9°34.8	291°47.3	-2°34.6	266°46.2	-12°29.8	215°53.6	-22°22.0	Hamal	327°57.1	23°32.8
6	135°38.8	288°41.9	-9°36.0	306°48.3	-2°35.2	281°48.2	-12°30.0	230°55.8	-22°22.0	Polaris	315°58.6	89°20.3
7	150°41.2	303°41.4	-9°37.1	321°49.3	-2°35.8	296°50.1	-12°30.2	245°58.0	-22°22.0	Akamar	315°15.7	-40°14.1
8	165°43.7	318°40.9	-9°38.3	336°50.3	-2°36.5	311°52.0	-12°30.4	261°00.2	-22°22.0	Menkar	314°11.6	4°09.5
9	180°46.2	333°40.4	-9°39.4	351°51.3	-2°37.1	326°54.0	-12°30.6	276°02.4	-22°22.0	Mirfak	308°35.6	49°55.3
10	195°48.6	348°39.9	-9°40.6	6°52.3	-2°37.7	341°55.9	-12°30.7	291°04.6	-22°22.0	Aldebaran	290°45.7	16°32.6
11	210°51.1	3°39.4	-9°41.7	21°53.4	-2°38.3	356°57.9	-12°30.9	306°06.8	-22°22.1	Rigel	281°08.9	-8°11.0
12	225°53.6	18°38.9	-9°42.9	36°54.4	-2°39.0	11°59.8	-12°31.1	321°09.0	-22°22.1	Capella	280°29.7	46°00.7
13	240°56.0	33°38.4	-9°44.0	51°55.4	-2°39.6	27°01.7	-12°31.3	336°11.2	-22°22.1	Bellatrix	278°28.6	6°21.8
14	255°58.5	48°37.9	-9°45.2	66°56.4	-2°40.2	42°03.7	-12°31.5	351°13.4	-22°22.1	Elnath	278°08.6	28°37.1
15	271°00.9	63°37.5	-9°46.3	81°57.4	-2°40.8	57°05.6	-12°31.6	6°15.6	-22°22.1	Alnilam	275°43.1	-1°11.5
16	286°03.4	78°37.0	-9°47.5	96°58.4	-2°41.5	72°07.6	-12°31.8	21°17.8	-22°22.1	Betelgeuse	270°57.9	7°24.5
17	301°05.9	93°36.5	-9°48.6	111°59.4	-2°42.1	87°09.5	-12°32.0	36°20.0	-22°22.1	Canopus	263°54.5	-52°42.2
18	316°08.3	108°36.0	-9°49.7	127°00.5	-2°42.7	102°11.4	-12°32.2	51°22.2	-22°22.2	Sirius	258°30.8	-16°44.3
19	331°10.8	123°35.5	-9°50.9	142°01.5	-2°43.3	117°13.4	-12°32.4	66°24.4	-22°22.2	Adara	255°10.0	-28°59.7
20	346°13.3	138°35.0	-9°52.0	157°02.5	-2°44.0	132°15.3	-12°32.5	81°26.6	-22°22.2	Procyon	244°56.4	5°10.8
21	1°15.7	153°34.5	-9°53.2	172°03.5	-2°44.6	147°17.3	-12°32.7	96°28.8	-22°22.2	Pollux	243°23.9	27°58.8
22	16°18.2	168°34.0	-9°54.3	187°04.5	-2°45.2	162°19.2	-12°32.9	111°31.0	-22°22.2	Avior	234°16.6	-59°33.8
23	31°20.7	183°33.5	-9°55.5	202°05.5	-2°45.8	177°21.1	-12°33.1	126°33.2	-22°22.2	Suhail	222°50.2	-43°30.0
Mer.pass.:20:54		v-0.5 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.5		Miaplacidus	221°39.0	-69°47.1
										Alphard	217°53.2	-8°44.1
										Regulus	207°40.4	11°52.8
										Dubhe	193°48.5	61°39.1
										Denebola	182°30.8	14°28.4
										Gienah	175°49.5	-17°38.2
										Acrux	173°06.5	-63°11.5
										Gacrux	171°58.0	-57°12.4
										Alioth	166°18.7	55°51.8
										Spica	158°28.4	-11°15.0
										Alcaid	152°57.1	49°13.6
										Hadar	148°44.3	-60°27.2
										Menkent	148°04.5	-36°27.2
										Arcturus	145°53.3	19°05.9
										Rigel Kent.	139°48.3	-60°54.2
										Zubenelg.	137°02.5	-16°06.7
										Kochab	137°21.4	74°05.1
										Alphecca	126°08.9	26°39.6
										Antares	112°23.0	-26°28.0
										Atria	107°22.6	-69°03.4
										Sabik	102°09.5	-15°44.6
										Shaula	96°18.3	-37°06.8
										Rasalhague	96°04.0	12°33.2
										Etamin	90°45.2	51°29.6
										Kaus Aust.	83°40.2	-34°22.4
										Vega	80°37.3	38°48.4
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°55.2
										Peacock	53°14.8	-56°40.7
										Deneb	49°29.5	45°21.0
										Enif	33°44.2	9°57.6
										Alnair	27°40.0	-46°52.6
										Fomalhaut	15°20.7	-29°31.7
										Scheat	13°50.4	28°10.9
										Markab	13°35.2	15°18.2
										2017/11/	SHA	Mer.pass
										Venus	153°20.8	10:45
										Mars	171°18.2	09:33
										Jupiter	146°12.6	11:12
										Saturn	95°18.7	14:35
										2017/11/	SHA	Mer.pass
										Venus	152°09.9	10:46
										Mars	170°43.4	09:31
										Jupiter	145°60.0	11:09
										Saturn	95°12.3	14:32
										2017/11/	SHA	Mer.pass
										Venus	150°58.8	10:47
										Mars	170°08.6	09:29
										Jupiter	145°47.4	11:06
										Saturn	95°05.8	14:28
										Horizontal paralax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:20:47		v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.5				

h		Sun		Moon				Twilight									
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.			
0	184°05.7	-15°58.0	337°54.0	5.1	17°00.6	6.7	60.7	72	06:30	07:57	09:39	13:47	15:28	16:56			
1	199°05.6	-15°58.8	352°18.1	5.1	17°07.3	6.6	60.7	70	06:23	07:41	09:03	14:24	15:46	17:03			
2	214°05.6	-15°59.5	6°42.1	5.0	17°13.8	6.5	60.7	68	06:18	07:27	08:37	14:49	15:59	17:08			
3	229°05.6	-16°00.3	21°06.1	5.0	17°20.2	6.3	60.7	66	06:13	07:16	08:18	15:09	16:10	17:14			
4	244°05.6	-16°01.0	35°30.1	4.9	17°26.5	6.2	60.7	64	06:08	07:06	08:02	15:24	16:20	17:18			
5	259°05.5	-16°01.7	49°54.0	4.9	17°32.6	6.1	60.7	62	06:04	06:58	07:49	15:38	16:28	17:22			
6	274°05.5	-16°02.5	64°17.9	4.9	17°38.7	6.0	60.7	60	06:01	06:51	07:38	15:49	16:35	17:26			
7	289°05.5	-16°03.2	78°41.7	4.8	17°44.6	5.8	60.7	58	05:58	06:45	07:28	15:58	16:42	17:29			
8	304°05.4	-16°04.0	93°05.5	4.8	17°50.3	5.7	60.7	56	05:54	06:39	07:20	16:07	16:47	17:32			
9	319°05.4	-16°04.7	107°29.3	4.8	17°56.0	5.6	60.6	54	05:52	06:34	07:13	16:14	16:53	17:35			
10	334°05.4	-16°05.5	121°53.1	4.7	18°01.5	5.5	60.6	52	05:49	06:29	07:06	16:21	16:57	17:38			
11	349°05.4	-16°06.2	136°16.8	4.7	18°06.9	5.3	60.6	50	05:46	06:25	06:50	16:27	17:02	17:40			
12	4°05.3	-16°07.0	150°40.5	4.7	18°12.1	5.2	60.6	45	05:41	06:16	06:47	16:40	17:11	17:46			
13	19°05.3	-16°07.7	165°04.1	4.6	18°17.3	5.1	60.6	40	05:35	06:08	06:36	16:51	17:19	17:52			
14	34°05.3	-16°08.4	179°27.8	4.6	18°22.3	4.9	60.6	35	05:30	06:00	06:27	17:00	17:27	17:57			
15	49°05.3	-16°09.2	193°51.4	4.6	18°27.1	4.8	60.6	30	05:25	05:54	06:19	17:08	17:33	18:02			
16	64°05.2	-16°09.9	208°14.9	4.6	18°31.9	4.7	60.6	20	05:15	05:42	06:04	17:23	17:46	18:12			
17	79°05.2	-16°10.7	222°38.5	4.5	18°36.5	4.5	60.6	10	05:05	05:30	05:52	17:35	17:57	18:22			
18	94°05.2	-16°11.4	237°02.0	4.5	18°40.9	4.4	60.6	0	04:54	05:19	05:40	17:47	18:09	18:34			
19	109°05.1	-16°12.2	251°25.5	4.5	18°45.3	4.3	60.6	-10	04:41	05:06	05:28	17:59	18:21	18:47			
20	124°05.1	-16°12.9	265°49.0	4.5	18°49.5	4.1	60.6	-20	04:25	04:52	05:15	18:12	18:35	19:03			
21	139°05.1	-16°13.6	280°12.5	4.5	18°53.5	4.0	60.6	-30	04:05	04:35	05:01	18:27	18:53	19:23			
22	154°05.0	-16°14.4	294°36.0	4.4	18°57.5	3.9	60.6	-35	03:52	04:25	04:52	18:36	19:03	19:36			
23	169°05.0	-16°15.1	308°59.4	4.4	19°01.2	3.7	60.5	-40	03:36	04:12	04:42	18:46	19:16	19:52			
SD.=16.1		d=-0.7	S.D.=16.5														
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Mon	Tue	Wed	Mon	Tue	Wed			
0	184°05.0	-16°15.8	323°22.8	4.4	19°04.9	3.6	60.5	-45	03:17	03:58	04:30	18:58	19:31	20:12			
1	199°04.9	-16°16.6	337°46.2	4.4	19°08.4	3.4	60.5	-50	02:51	03:39	04:16	19:12	19:50	20:38			
2	214°04.9	-16°17.3	352°09.7	4.4	19°11.8	3.3	60.5	-52	02:37	03:30	04:10	19:19	19:59	20:52			
3	229°04.9	-16°18.1	6°33.1	4.4	19°15.0	3.2	60.5	-54	02:22	03:20	04:02	19:26	20:09	21:08			
4	244°04.8	-16°18.8	20°56.4	4.4	19°18.1	3.0	60.5	-56	02:03	03:08	03:54	19:35	20:21	21:27			
5	259°04.8	-16°19.5	35°19.8	4.4	19°21.0	2.9	60.5	-58	01:39	02:54	03:45	19:44	20:35	21:52			
6	274°04.8	-16°20.3	49°43.2	4.4	19°23.9	2.7	60.5	-60	01:04	02:38	03:34	19:55	20:52	22:29			
7	289°04.7	-16°21.0	64°06.6	4.4	19°26.5	2.6	60.5	Moonrise							Moonset		
8	304°04.7	-16°21.7	78°30.0	4.4	19°29.1	2.5	60.4	Lat.	Mon	Tue	Wed	Mon	Tue	Wed			
9	319°04.7	-16°22.5	92°53.3	4.4	19°31.5	2.3	60.4	72	--	--	--	--	--	--			
10	334°04.6	-16°23.2	107°16.7	4.4	19°33.7	2.2	60.4	70	15:44	15:55	17:04	12:12	14:09	15:06			
11	349°04.6	-16°23.9	121°40.1	4.4	19°35.8	2.0	60.4	68	16:26	17:01	18:07	11:30	13:03	14:04			
12	4°04.6	-16°24.7	136°03.5	4.4	19°37.8	1.9	60.4	66	16:55	17:37	18:42	11:02	12:27	13:29			
13	19°04.5	-16°25.4	150°26.9	4.4	19°39.6	1.8	60.4	64	17:17	18:03	19:07	10:40	12:02	13:03			
14	34°04.5	-16°26.1	164°50.3	4.4	19°41.3	1.6	60.4	62	17:35	18:23	19:27	10:23	11:41	12:43			
15	49°04.4	-16°26.9	179°13.7	4.4	19°42.8	1.5	60.3	60	17:50	18:40	19:43	10:08	11:25	12:27			
16	64°04.4	-16°27.6	193°37.1	4.4	19°44.2	1.3	60.3	58	18:02	18:54	19:57	09:56	11:11	12:13			
17	79°04.4	-16°28.3	208°00.5	4.4	19°45.5	1.2	60.3	56	18:13	19:06	20:09	09:46	10:59	12:01			
18	94°04.3	-16°29.0	222°24.0	4.5	19°46.6	1.0	60.3	54	18:23	19:16	20:19	09:36	10:49	11:51			
19	109°04.3	-16°29.8	236°47.5	4.5	19°47.6	0.9	60.3	52	18:32	19:25	20:28	09:28	10:40	11:41			
20	124°04.3	-16°30.5	251°11.0	4.5	19°48.4	0.8	60.3	50	18:39	19:34	20:36	09:21	10:31	11:33			
21	139°04.2	-16°31.2	265°34.5	4.5	19°49.1	0.6	60.2	45	18:56	19:52	20:54	09:05	10:14	11:15			
22	154°04.2	-16°32.0	279°58.0	4.5	19°49.7	0.5	60.2	40	19:09	20:06	21:08	08:52	09:59	11:01			
23	169°04.1	-16°32.7	294°21.5	4.6	19°50.1	0.3	60.2	35	19:21	20:18	21:20	08:41	09:47	10:48			
SD.=16.1		d=-0.7	S.D.=16.5														
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun	Mer.	Moon		Age				
0	184°04.1	-16°33.4	308°45.1	4.6	19°50.4	0.2	60.2	Eqn.of Time <td>Mer.<td>Mer.Pass.<td colspan="2"></td><td></td></td></td>	Mer. <td>Mer.Pass.<td colspan="2"></td><td></td></td>	Mer.Pass. <td colspan="2"></td> <td></td>							
1	199°04.0	-16°34.1	323°08.7	4.6	19°50.5	0.1	60.2	00 ^h	12 ^h	Pass	Upper	Lower					
2	214°04.0	-16°34.9	337°32.3	4.6	19°50.5	-0.1	60.1	6	16:23	16:21	11:43	01:32	14:02	18(92%)			
3	229°04.0	-16°35.6	351°56.0	4.7	19°50.4	-0.2	60.1	7	16:20	16:18	11:43	02:32	15:03	19(85%)			
4	244°03.9	-16°36.3	6°19.7	4.7	19°50.1	-0.4	60.1	8	16:16	16:14	11:43	03:33	16:03	20(76%)			
5	259°03.9	-16°37.0	20°43.4	4.7	19°49.7	-0.5	60.1										
6	274°03.8	-16°37.8	35°07.1	4.8	19°49.1	-0.6	60.1										
7	289°03.8	-16°38.5	49°30.9	4.8	19°48.4	-0.8	60.0										
8	304°03.7	-16°39.2	63°54.7	4.8	19°47.6	-0.9	60.0										
9	319°03.7	-16°39.9	78°18.6	4.9	19°46.6	-1.0	60.0										
10	334°03.7	-16°40.7	92°42.4	4.9	19°45.5	-1.2	60.0										
11	349°03.6	-16°41.4	107°06.4	5.0	19°44.2	-1.3	60.0										
12	4°03.6	-16°42.1	121°30.4	5.0	19°42.8	-1.5	59.9										
13	19°03.5	-16°42.8	135°54.4	5.0	19°41.3	-1.6	59.9										
14	34°03.5	-16°43.5	150°18.4	5.1	19°39.7	-1.7	59.9										
15	49°03.4	-16°44.3	164°42.5	5.1	19°37.9	-1.9	59.9										
16	64°03.4	-16°45.0	179°06.7	5.2	19°36.0	-2.0	59.8										
17	79°03.3	-16°45.7	193°30.9	5.2	19°33.9	-2.1	59.8										
18	94°03.3	-16°46.4	207°55.1	5.3	19°31.7	-2.3	59.8										
19	109°03.2	-16°47.1	222°19.4	5.3	19°29.4	-2.4	59.8										
20	124°03.2	-16°47.8	236°43.8	5.4	19°27.0	-2.5	59.8										
21	139°03.1	-16°48.6	251°08.1	5.4	19°24.4	-2.6	59.7										
22	154°03.1	-16°49.3	265°32.6	5.5	19°21.7	-2.8	59.7										
23	169°03.0	-16°50.0	279°57.1	5.5	19°18.8	-2.9	59.7										
SD.=16.1		d=-0.7	S.D.=16.4														

November 09, 10, 11 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	48°21.4	198°08.9	-10°50.9	217°55.2	-3°16.4	193°56.2	-12°41.8	143°20.8	-22°22.9	Alpheratz	357°40.2	29°11.5
1	63°23.9	213°08.4	-10°52.0	232°56.2	-3°17.0	208°58.1	-12°42.0	158°22.9	-22°22.9	Ankaa	353°12.5	-42°12.7
2	78°26.3	228°07.9	-10°53.2	247°57.2	-3°17.6	224°00.0	-12°42.2	173°25.1	-22°22.9	Schedar	349°36.6	56°38.2
3	93°28.8	243°07.4	-10°54.3	262°58.2	-3°18.2	239°02.0	-12°42.4	188°27.3	-22°23.0	Diphda	348°52.6	-17°53.4
4	108°31.3	258°06.8	-10°55.4	277°59.2	-3°18.9	254°03.9	-12°42.5	203°29.5	-22°23.0	Achernar	335°24.1	-57°09.0
5	123°33.7	273°06.3	-10°56.5	293°00.3	-3°19.5	269°05.9	-12°42.7	218°31.7	-22°23.0	Hamal	327°57.1	23°32.8
6	138°36.2	288°05.8	-10°57.6	308°01.3	-3°20.1	284°07.8	-12°42.9	233°33.9	-22°23.0	Polaris	315°58.3	89°20.3
7	153°38.7	303°05.3	-10°58.8	323°02.3	-3°20.7	299°09.7	-12°43.1	248°36.1	-22°23.0	Akamar	315°15.7	-40°14.1
8	168°41.1	318°04.8	-10°59.9	338°03.3	-3°21.3	314°11.7	-12°43.3	263°38.3	-22°23.0	Menkar	314°11.6	4°09.5
9	183°43.6	333°04.3	-11°01.0	353°04.3	-3°22.0	329°13.6	-12°43.4	278°40.5	-22°23.0	Mirfak	308°35.6	49°55.3
10	198°46.0	348°03.8	-11°02.1	8°05.3	-3°22.6	344°15.6	-12°43.6	293°42.7	-22°23.1	Aldebaran	290°45.7	16°32.6
11	213°48.5	3°03.2	-11°03.2	23°06.3	-3°23.2	359°17.5	-12°43.8	308°44.9	-22°23.1	Rigel	281°08.9	-8°11.0
12	228°51.0	18°02.7	-11°04.3	38°07.3	-3°23.8	14°19.4	-12°44.0	323°47.1	-22°23.1	Capella	280°29.7	46°00.7
13	243°53.4	33°02.2	-11°05.5	53°08.4	-3°24.5	29°21.4	-12°44.1	338°49.2	-22°23.1	Bellatrix	278°28.6	6°21.8
14	258°55.9	48°01.7	-11°06.6	68°09.4	-3°25.1	44°23.3	-12°44.3	353°51.4	-22°23.1	Elnath	278°08.6	28°37.1
15	273°58.4	63°01.2	-11°07.7	83°10.4	-3°25.7	59°25.3	-12°44.5	8°53.6	-22°23.1	Alnilam	275°43.1	-1°11.5
16	289°00.8	78°00.6	-11°08.8	98°11.4	-3°26.3	74°27.2	-12°44.7	23°55.8	-22°23.1	Betelgeuse	270°57.9	7°24.5
17	304°03.3	93°00.1	-11°09.9	113°12.4	-3°26.9	89°29.1	-12°44.9	38°58.0	-22°23.1	Canopus	263°54.5	-52°42.2
18	319°05.8	107°59.6	-11°11.0	128°13.4	-3°27.6	104°31.1	-12°45.0	54°00.2	-22°23.2	Sirius	258°30.8	-16°44.3
19	334°08.2	122°59.1	-11°12.1	143°14.4	-3°28.2	119°33.0	-12°45.2	69°02.4	-22°23.2	Adara	255°10.0	-28°59.7
20	349°10.7	137°58.6	-11°13.3	158°15.4	-3°28.8	134°35.0	-12°45.4	84°04.6	-22°23.2	Procyon	244°56.4	5°10.8
21	4°13.2	152°58.0	-11°14.4	173°16.5	-3°29.4	149°36.9	-12°45.6	99°06.8	-22°23.2	Pollux	243°23.9	27°58.8
22	19°15.6	167°57.5	-11°15.5	188°17.5	-3°30.0	164°38.8	-12°45.7	114°09.0	-22°23.2	Avior	234°16.6	-59°33.8
23	34°18.1	182°57.0	-11°16.6	203°18.5	-3°30.7	179°40.8	-12°45.9	129°11.2	-22°23.2	Suhail	222°50.2	-43°30.0
Mer.pass.:20:43		v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.5		Miaplacidus	221°38.9	-69°47.1
										Alphard	217°53.2	-8°44.1
										Regulus	207°40.4	11°52.8
										Dubhe	193°48.5	61°39.1
										Denebola	182°30.8	14°28.4
										Gienah	175°49.5	-17°38.2
										Acrux	173°06.4	-63°11.5
										Gacrux	171°58.0	-57°12.4
										Alioth	166°18.7	55°51.8
										Spica	158°28.4	-11°15.0
										Alcaid	152°57.1	49°13.6
										Hadar	148°44.2	-60°27.2
										Menkent	148°04.5	-36°27.1
										Arcturus	145°53.2	19°05.9
										Rigel Kent.	139°48.3	-60°54.2
										Zubenelg.	137°02.5	-16°06.7
										Kochab	137°21.4	74°05.1
										Alphecca	126°08.9	26°39.6
										Antares	112°23.0	-26°28.0
										Atria	107°22.6	-69°03.4
										Sabik	102°09.5	-15°44.6
										Shaula	96°18.3	-37°06.8
										Rasalhague	96°04.0	12°33.2
										Etamin	90°45.2	51°29.6
										Kaus Aust.	83°40.2	-34°22.4
										Vega	80°37.3	38°48.4
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°55.1
										Peacock	53°14.8	-56°40.7
										Deneb	49°29.5	45°21.0
										Enif	33°44.2	9°57.6
										Alnair	27°40.0	-46°52.6
										Fomalhaut	15°20.7	-29°31.7
										Scheat	13°50.4	28°10.9
										Markab	13°35.3	15°18.2
										2017/11/	SHA	Mer.pass
										Venus	149°47.5	10:48
										Mars	169°33.8	09:28
										Jupiter	145°34.8	11:03
										Saturn	94°59.3	14:25
										2017/11/	SHA	Mer.pass
										Venus	148°35.9	10:49
										Mars	168°59.0	09:26
										Jupiter	145°22.2	10:60
										Saturn	94°52.8	14:21
										2017/11/	SHA	Mer.pass
										Venus	147°24.2	10:49
										Mars	168°24.1	09:24
										Jupiter	145°09.6	10:57
										Saturn	94°46.2	14:18
										Horizontal parallax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:20:35		v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.5				

Sun			Moon					Twilight						
h	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
0	184°03.0	-16°50.7	294°21.7	5.6	19°15.9	-3.0	59.7	72	06:42	08:11	10:04	13:23	15:15	16:45
1	199°02.9	-16°51.4	308°46.3	5.6	19°12.8	-3.2	59.6	70	06:33	07:52	09:19	14:07	15:34	16:53
2	214°02.9	-16°52.1	323°11.0	5.7	19°09.5	-3.3	59.6	68	06:27	07:37	08:50	14:36	15:49	16:60
3	229°02.8	-16°52.8	337°35.7	5.8	19°06.2	-3.4	59.6	66	06:21	07:25	08:29	14:58	16:02	17:06
4	244°02.8	-16°53.6	352°00.5	5.8	19°02.7	-3.5	59.6	64	06:16	07:15	08:12	15:15	16:12	17:11
5	259°02.7	-16°54.3	6°25.3	5.9	18°59.1	-3.7	59.5	62	06:11	07:06	07:58	15:29	16:21	17:16
6	274°02.7	-16°55.0	20°50.3	5.9	18°55.4	-3.8	59.5	60	06:07	06:58	07:46	15:41	16:29	17:20
7	289°02.6	-16°55.7	35°15.2	6.0	18°51.6	-3.9	59.5	58	06:03	06:51	07:35	15:52	16:36	17:24
8	304°02.6	-16°56.4	49°40.3	6.1	18°47.6	-4.0	59.5	56	05:56	06:45	07:26	16:01	16:42	17:27
9	319°02.5	-16°57.1	64°05.4	6.1	18°43.5	-4.1	59.4	54	05:57	06:39	07:18	16:09	16:48	17:30
10	334°02.5	-16°57.8	78°30.5	6.2	18°39.3	-4.3	59.4	52	05:54	06:34	07:11	16:16	16:53	17:33
11	349°02.4	-16°58.5	92°55.8	6.3	18°35.0	-4.4	59.4	50	05:51	06:30	07:05	16:23	16:57	17:36
12	4°02.4	-16°59.2	107°21.1	6.3	18°30.6	-4.5	59.4	45	05:44	06:20	06:51	16:36	17:08	17:43
13	19°02.3	-16°59.9	121°46.4	6.4	18°26.0	-4.6	59.3	40	05:38	06:11	06:39	16:48	17:17	17:49
14	34°02.2	-17°00.7	136°11.9	6.5	18°21.4	-4.7	59.3	35	05:33	06:03	06:30	16:58	17:24	17:55
15	49°02.2	-17°01.4	150°37.4	6.5	18°16.6	-4.8	59.3	30	05:27	05:56	06:21	17:07	17:32	18:00
16	64°02.1	-17°02.1	165°03.0	6.6	18°11.7	-5.0	59.2	20	05:17	05:43	06:06	17:22	17:45	18:11
17	79°02.1	-17°02.8	179°28.6	6.7	18°06.7	-5.1	59.2	10	05:06	05:31	05:53	17:35	17:57	18:22
18	94°02.0	-17°03.5	193°54.3	6.7	18°01.6	-5.2	59.2	0	04:54	05:19	05:40	17:47	18:09	18:34
19	109°02.0	-17°04.2	208°20.1	6.8	17°56.4	-5.3	59.2	-10	04:40	05:06	05:28	18:00	18:22	18:48
20	124°01.9	-17°04.9	222°45.9	6.9	17°51.0	-5.4	59.1	-20	04:23	04:51	05:14	18:14	18:37	19:05
21	139°01.8	-17°05.6	237°11.9	7.0	17°45.6	-5.5	59.1	-30	04:02	04:33	04:59	18:30	18:55	19:26
22	154°01.8	-17°06.3	251°37.9	7.0	17°40.0	-5.6	59.1	-35	03:49	04:22	04:50	18:39	19:07	19:40
23	169°01.7	-17°07.0	266°03.9	7.1	17°34.4	-5.7	59.1	-40	03:32	04:09	04:39	18:49	19:20	19:57
SD.=16.1			d=-0.7			S.D.=16.3								
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
0	184°01.7	-17°07.7	280°30.1	7.2	17°28.6	-5.8	59.0	-50	02:44	03:34	04:12	19:17	19:55	20:45
1	199°01.6	-17°08.4	294°56.3	7.3	17°22.7	-5.9	59.0	-52	02:30	03:24	04:04	19:25	20:05	20:60
2	214°01.5	-17°09.1	309°22.6	7.3	17°16.8	-6.0	59.0	-54	02:13	03:13	03:57	19:33	20:16	21:17
3	229°01.5	-17°09.8	323°49.0	7.4	17°10.7	-6.1	58.9	-56	01:53	03:01	03:48	19:42	20:29	21:38
4	244°01.4	-17°10.5	338°15.4	7.5	17°04.5	-6.2	58.9	-58	01:25	02:46	03:38	19:52	20:44	22:07
5	259°01.4	-17°11.2	352°41.9	7.6	16°58.2	-6.3	58.9	-60	00:41	02:28	03:26	20:04	21:02	22:56
6	274°01.3	-17°11.9	7°08.5	7.6	16°51.9	-6.4	58.9							
7	289°01.2	-17°12.6	21°35.2	7.7	16°45.4	-6.5	58.8							
8	304°01.2	-17°13.3	36°01.9	7.8	16°38.8	-6.6	58.8							
9	319°01.1	-17°14.0	50°28.7	7.9	16°32.2	-6.7	58.8							
10	334°01.1	-17°14.7	64°55.6	7.9	16°25.4	-6.8	58.8							
11	349°01.0	-17°15.4	79°22.6	8.0	16°18.6	-6.9	58.7							
12	4°00.9	-17°16.1	93°49.6	8.1	16°11.6	-7.0	58.7							
13	19°00.9	-17°16.8	108°16.8	8.2	16°04.6	-7.1	58.7							
14	34°00.8	-17°17.5	122°43.9	8.2	15°57.5	-7.2	58.6							
15	49°00.7	-17°18.2	137°11.2	8.3	15°50.3	-7.3	58.6							
16	64°00.7	-17°18.9	151°38.6	8.4	15°43.0	-7.3	58.6							
17	79°00.6	-17°19.6	166°06.0	8.5	15°35.6	-7.4	58.6							
18	94°00.5	-17°20.3	180°33.5	8.5	15°28.1	-7.5	58.5							
19	109°00.5	-17°21.0	195°01.1	8.6	15°20.6	-7.6	58.5							
20	124°00.4	-17°21.7	209°28.7	8.7	15°12.9	-7.7	58.5							
21	139°00.3	-17°22.3	223°56.5	8.8	15°05.2	-7.8	58.4							
22	154°00.3	-17°23.0	238°24.3	8.8	14°57.4	-7.8	58.4							
23	169°00.2	-17°23.7	252°52.1	8.9	14°49.5	-7.9	58.4							
SD.=16.2			d=-0.7			S.D.=16.1								
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Thu	Fri	Sat	Thu	Fri	Sat
0	184°00.1	-17°24.4	267°20.1	9.0	14°41.6	-8.0	58.4	72	17:24	20:20	22:26	16:50	15:50	15:33
1	199°00.1	-17°25.1	281°48.1	9.1	14°33.6	-8.1	58.3	70	18:59	20:55	22:46	15:14	15:13	15:11
2	213°60.0	-17°25.8	296°16.2	9.1	14°25.4	-8.1	58.3	68	19:39	21:20	23:01	14:34	14:47	14:54
3	228°59.9	-17°26.5	310°44.4	9.2	14°17.3	-8.2	58.3	66	20:06	21:39	23:14	14:06	14:27	14:41
4	243°59.9	-17°27.2	325°12.7	9.3	14°09.0	-8.3	58.2	64	20:27	21:55	23:24	13:44	14:11	14:29
5	258°59.8	-17°27.9	339°41.0	9.4	14°00.7	-8.4	58.2	62	20:44	22:08	23:33	13:27	13:58	14:19
6	273°59.7	-17°28.5	354°09.4	9.4	13°52.3	-8.4	58.2	60	20:58	22:18	23:41	13:13	13:46	14:11
7	288°59.6	-17°29.2	8°37.9	9.5	13°43.8	-8.5	58.2	58	21:10	22:28	23:47	13:00	13:36	14:04
8	303°59.6	-17°29.9	23°06.4	9.6	13°35.3	-8.6	58.1	56	21:20	22:36	23:53	12:50	13:28	13:57
9	318°59.5	-17°30.6	37°35.0	9.7	13°26.7	-8.6	58.1	54	21:29	22:43	23:58	12:40	13:20	13:51
10	333°59.4	-17°31.3	52°03.7	9.7	13°18.0	-8.7	58.1	52	21:37	22:50	--	12:32	13:13	13:46
11	348°59.4	-17°32.0	66°32.5	9.8	13°09.3	-8.8	58.0	50	21:45	22:56	--	12:24	13:06	13:41
12	3°59.3	-17°32.7	81°01.4	9.9	13°00.4	-8.8	58.0	45	22:00	23:08	--	12:08	12:53	13:31
13	18°59.2	-17°33.3	95°30.3	9.9	12°51.6	-8.9	58.0	40	22:13	23:19	--	11:55	12:42	13:22
14	33°59.1	-17°34.0	109°59.3	10.0	12°42.6	-9.0	58.0	35	22:24	23:28	--	11:43	12:32	13:14
15	48°59.1	-17°34.7	124°28.3	10.1	12°33.7	-9.0	57.9	30	22:33	23:35	--	11:33	12:23	13:08
16	63°59.0	-17°35.4	138°57.4	10.2	12°24.6	-9.1	57.9	20	22:50	23:49	--	11:16	12:09	12:56
17	78°58.9	-17°36.1	153°26.6	10.2	12°15.5	-9.1	57.9	10	23:04	--	00:01	11:01	11:56	12:46
18	93°58.8	-17°36.8	167°55.9	10.3	12°06.3	-9.2	57.9	0	23:17	--	00:12	10:47	11:43	12:37
19	108°58.8	-17°37.4	182°25.2	10.4	11°57.1	-9.3	57.8	-10	23:30	--	00:23	10:33	11:31	12:27
20	123°58.7	-17°38.1	196°54.6	10.4	11°47.8	-9.3	57.8	-20	23:44	--	00:34	10:18	11:18	12:17
21	138°58.6	-17°38.8	211°24.1	10.5	11°38.5	-9.4	57.8	-30	--	00:01	00:48	10:00	11:03	12:05
22	153°58.5	-17°39.5	225°53.6	10.6	11°29.1	-9.4	57.7	-35	--	00:10	00:55	09:50	10:54	11:58
23	168°58.5	-17°40.2	240°23.2	10.6	11°19.6	-9.5	57.7	-40	--	00:21	01:04	09:38	10:44	11:50
SD.=16.2			d=-0.7			S.D.=15.9								
Day	Eqn. of Time	Mer. Pass	Mer. Pass	Age										
	00 ^h	12 ^h	Pass	Upper	Lower									
9	16:12	16:09	11:43	04:33	17:02	21(65%)								
10	16:07	16:04	11:43	05:30	17:57	22(54%)								
11	16:01	15:57	11:44	06:24	18:49	23(43%)								

November 12, 13, 14 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	51°18.8	197°30.9	-12°10.5	219°08.0	-4°01.0	196°15.8	-12°54.6	145°58.4	-22°23.9	Alpheratz	357°40.2	29°11.5	
1	66°21.3	212°30.4	-12°11.6	234°09.0	-4°01.7	211°17.8	-12°54.7	161°00.6	-22°23.9	Ankaa	353°12.5	-42°12.7	
2	81°23.7	227°29.9	-12°12.7	249°10.1	-4°02.3	226°19.7	-12°54.9	176°02.8	-22°23.9	Schedar	349°36.6	56°38.2	
3	96°26.2	242°29.3	-12°13.8	264°11.1	-4°02.9	241°21.7	-12°55.1	191°05.0	-22°23.9	Diphda	348°52.6	-17°53.4	
4	111°28.7	257°28.8	-12°14.8	279°12.1	-4°03.5	256°23.6	-12°55.3	206°07.1	-22°23.9	Achernar	335°24.1	-57°09.0	
5	126°31.1	272°28.2	-12°15.9	294°13.1	-4°04.1	271°25.6	-12°55.4	221°09.3	-22°24.0	Hamal	327°57.1	23°32.8	
6	141°33.6	287°27.7	-12°17.0	309°14.1	-4°04.8	286°27.5	-12°55.6	236°11.5	-22°24.0	Polaris	315°58.4	89°20.3	
7	156°36.1	302°27.1	-12°18.1	324°15.1	-4°05.4	301°29.4	-12°55.8	251°13.7	-22°24.0	Akamar	315°15.7	-40°14.1	
8	171°38.5	317°26.6	-12°19.2	339°16.1	-4°06.0	316°31.4	-12°56.0	266°15.9	-22°24.0	Menkar	314°11.6	4°09.5	
9	186°41.0	332°26.1	-12°20.3	354°17.1	-4°06.6	331°33.3	-12°56.1	281°18.1	-22°24.0	Mirfak	308°35.6	49°55.3	
10	201°43.5	347°25.5	-12°21.4	9°18.1	-4°07.2	346°35.3	-12°56.3	296°20.3	-22°24.0	Aldebaran	290°45.7	16°32.6	
11	216°45.9	2°25.0	-12°22.4	24°19.2	-4°07.9	1°37.2	-12°56.5	311°22.4	-22°24.0	Rigel	281°08.9	-8°11.0	
12	231°48.4	17°24.4	-12°23.5	39°20.2	-4°08.5	16°39.1	-12°56.7	326°24.6	-22°24.0	Capella	280°29.7	46°00.8	
13	246°50.9	32°23.9	-12°24.6	54°21.2	-4°09.1	31°41.1	-12°56.8	341°26.8	-22°24.1	Bellatrix	278°28.5	6°21.8	
14	261°53.3	47°23.3	-12°25.7	69°22.2	-4°09.7	46°43.0	-12°57.0	356°29.0	-22°24.1	Elnath	278°08.6	28°37.1	
15	276°55.8	62°22.8	-12°26.8	84°23.2	-4°10.3	61°45.0	-12°57.2	11°31.2	-22°24.1	Alnilam	275°43.1	-1°11.5	
16	291°58.2	77°22.2	-12°27.8	99°24.2	-4°10.9	76°46.9	-12°57.4	26°33.4	-22°24.1	Betelgeuse	270°57.8	7°24.5	
17	307°00.7	92°21.7	-12°28.9	114°25.2	-4°11.6	91°48.8	-12°57.5	41°35.5	-22°24.1	Canopus	263°54.4	-52°42.3	
18	322°03.2	107°21.1	-12°30.0	129°26.2	-4°12.2	106°50.8	-12°57.7	56°37.7	-22°24.1	Sirius	258°30.8	-16°44.3	
19	337°05.6	122°20.6	-12°31.1	144°27.2	-4°12.8	121°52.7	-12°57.9	71°39.9	-22°24.1	Adara	255°10.0	-28°59.7	
20	352°08.1	137°20.0	-12°32.2	159°28.2	-4°13.4	136°54.7	-12°58.1	86°42.1	-22°24.1	Procyon	244°56.4	5°10.8	
21	7°10.6	152°19.5	-12°33.2	174°29.3	-4°14.0	151°56.6	-12°58.2	101°44.3	-22°24.2	Pollux	243°23.9	27°58.8	
22	22°13.0	167°18.9	-12°34.3	189°30.3	-4°14.7	166°58.5	-12°58.4	116°46.5	-22°24.2	Avior	234°16.6	-59°33.8	
23	37°15.5	182°18.4	-12°35.4	204°31.3	-4°15.3	182°00.5	-12°58.6	131°48.7	-22°24.2	Suhail	222°50.2	-43°30.1	
Mer.pass.:20:31		v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.5		Miaplacidus		221°38.9	-69°47.1
										Alphard		217°53.2	-8°44.1
										Regulus		207°40.4	11°52.8
										Dubhe		193°48.4	61°39.1
										Denebola		182°30.8	14°28.4
										Gienah		175°49.4	-17°38.2
										Acruz		173°06.4	-63°11.5
										Gacrux		171°57.9	-57°12.4
										Alioth		166°18.7	55°51.8
										Spica		158°28.4	-11°15.0
										Alcaid		152°57.1	49°13.5
										Hadar		148°44.2	-60°27.2
										Menkent		148°04.4	-36°27.1
										Arcturus		145°53.2	19°05.9
										Rigel Kent.		139°48.3	-60°54.2
										Zubenelg.		137°02.5	-16°06.7
										Kochab		137°21.4	74°05.0
										Alphecca		126°08.9	26°39.6
										Antares		112°23.0	-26°28.0
										Atria		107°22.6	-69°03.4
										Sabik		102°09.5	-15°44.6
										Shaula		96°18.3	-37°06.8
										Rasalhague		96°04.0	12°33.2
										Etamin		90°45.2	51°29.6
										Kaus Aust.		83°40.2	-34°22.4
										Vega		80°37.3	38°48.3
										Nunki		75°54.9	-26°16.3
										Altair		62°05.6	8°55.1
										Peacock		53°14.8	-56°40.7
										Deneb		49°29.5	45°21.0
										Enif		33°44.2	9°57.6
										Alnair		27°40.0	-46°52.6
										Fomalhaut		15°20.7	-29°31.7
										Scheat		13°50.4	28°10.9
										Markab		13°35.3	15°18.2
										2017/11/		SHA	Mer.pass
										Venus		146°12.1	10:50
										Mars		167°49.2	09:23
										Jupiter		144°57.0	10:54
										Saturn		94°39.6	14:14
										2017/11/		SHA	Mer.pass
										Venus		144°59.9	10:51
										Mars		167°14.3	09:21
										Jupiter		144°44.5	10:50
										Saturn		94°32.9	14:11
										2017/11/		SHA	Mer.pass
										Venus		143°47.3	10:52
										Mars		166°39.4	09:20
										Jupiter		144°31.9	10:47
										Saturn		94°26.1	14:07
										Horizontal paralax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:20:23		v-0.6 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.5					

h		Sun		Moon				Twilight						
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
0	183°58.4	-17°40.8	254°52.9	10.7	11°10.1	-9.5	57.7	72	06:53	08:26	10:35	12:53	15:02	16:35
1	198°58.3	-17°41.5	269°22.6	10.8	11°00.6	-9.6	57.7	70	06:43	08:04	09:38	13:50	15:23	16:44
2	213°58.2	-17°42.2	283°52.4	10.8	10°51.0	-9.6	57.6	68	06:36	07:48	09:04	14:23	15:40	16:52
3	228°58.1	-17°42.9	298°22.3	10.9	10°41.3	-9.7	57.6	66	06:29	07:34	08:40	14:48	15:54	16:59
4	243°58.1	-17°43.5	312°52.2	11.0	10°31.6	-9.7	57.6	64	06:23	07:23	08:21	15:06	16:05	17:05
5	258°58.0	-17°44.2	327°22.2	11.0	10°21.9	-9.8	57.6	62	06:18	07:13	08:06	15:22	16:15	17:10
6	273°57.9	-17°44.9	341°52.3	11.1	10°12.1	-9.8	57.5	60	06:13	07:05	07:53	15:35	16:23	17:14
7	288°57.8	-17°45.6	356°22.4	11.1	10°02.3	-9.9	57.5	58	06:09	06:57	07:42	15:46	16:31	17:19
8	303°57.7	-17°46.2	10°52.6	11.2	9°52.4	-9.9	57.5	56	06:05	06:51	07:33	15:55	16:37	17:23
9	318°57.7	-17°46.9	25°22.8	11.3	9°42.5	-9.9	57.4	54	06:02	06:45	07:24	16:04	16:43	17:26
10	333°57.6	-17°47.6	39°53.1	11.3	9°32.5	-10.0	57.4	52	05:58	06:39	07:17	16:11	16:49	17:30
11	348°57.5	-17°48.3	54°23.5	11.4	9°22.5	-10.0	57.4	50	05:55	06:34	07:10	16:18	16:54	17:33
12	3°57.4	-17°48.9	68°53.9	11.4	9°12.5	-10.1	57.4	45	05:48	06:23	06:55	16:33	17:05	17:40
13	18°57.3	-17°49.6	83°24.4	11.5	9°02.4	-10.1	57.3	40	05:41	06:14	06:43	16:45	17:14	17:47
14	33°57.3	-17°50.3	97°54.9	11.6	8°52.3	-10.1	57.3	35	05:35	06:06	06:33	16:56	17:22	17:53
15	48°57.2	-17°50.9	112°25.5	11.6	8°42.2	-10.2	57.3	30	05:29	05:58	06:23	17:05	17:30	17:59
16	63°57.1	-17°51.6	126°56.1	11.7	8°32.0	-10.2	57.3	20	05:18	05:45	06:08	17:21	17:44	18:10
17	78°57.0	-17°52.3	141°26.8	11.7	8°21.7	-10.2	57.2	10	05:06	05:32	05:54	17:35	17:57	18:22
18	93°56.9	-17°52.9	155°57.6	11.8	8°11.5	-10.3	57.2	0	04:54	05:19	05:41	17:48	18:10	18:35
19	108°56.8	-17°53.6	170°28.4	11.8	8°01.2	-10.3	57.2	-10	04:39	05:05	05:28	18:01	18:23	18:49
20	123°56.7	-17°54.3	184°59.3	11.9	7°50.9	-10.3	57.2	-20	04:22	04:50	05:13	18:16	18:39	19:07
21	138°56.7	-17°54.9	199°30.2	11.9	7°40.5	-10.4	57.1	-30	03:60	04:31	04:57	18:32	18:58	19:29
22	153°56.6	-17°55.6	214°01.2	12.0	7°30.2	-10.4	57.1	-35	03:46	04:19	04:47	18:42	19:10	19:44
23	168°56.5	-17°56.3	228°32.2	12.0	7°19.7	-10.4	57.1	-40	03:29	04:06	04:36	18:53	19:23	20:01
SD.=16.2 d=-0.7 S.D.=15.7							-45	03:07	03:49	04:23	19:06	19:40	20:23	
							-50	02:38	03:29	04:07	19:22	20:01	20:52	
							-52	02:23	03:19	03:60	19:30	20:11	21:08	
							-54	02:05	03:07	03:51	19:38	20:23	21:26	
							-56	01:42	02:54	03:42	19:48	20:37	21:50	
							-58	01:10	02:38	03:31	19:59	20:53	22:24	
							-60	--	02:19	03:19	20:12	21:13	--	
							Moonrise			Moonset				
							Lat.	Sun	Mon	Tue	Sun	Mon	Tue	
							72	--	00:20	02:08	15:21	15:11	15:02	
							70	--	00:31	02:11	15:08	15:05	15:01	
							68	--	00:39	02:14	14:58	14:60	15:01	
							66	--	00:46	02:16	14:49	14:56	15:01	
							64	--	00:52	02:18	14:42	14:52	15:01	
							62	--	00:57	02:20	14:36	14:49	15:01	
							60	--	01:02	02:21	14:30	14:47	15:01	
							58	--	01:06	02:23	14:26	14:44	15:01	
							56	--	01:09	02:24	14:21	14:42	15:01	
							54	--	01:12	02:25	14:17	14:40	15:01	
							52	00:03	01:15	02:26	14:14	14:38	15:01	
							50	00:07	01:18	02:27	14:11	14:37	15:01	
							45	00:16	01:23	02:29	14:04	14:33	15:01	
							40	00:24	01:28	02:30	13:58	14:30	15:01	
							35	00:31	01:32	02:32	13:53	14:28	15:01	
							30	00:36	01:35	02:33	13:48	14:25	15:01	
							20	00:46	01:42	02:35	13:40	14:21	15:01	
							10	00:55	01:47	02:37	13:33	14:18	15:01	
							0	01:03	01:52	02:39	13:27	14:14	15:00	
							-10	01:11	01:57	02:40	13:20	14:11	15:00	
							-20	01:20	02:02	02:42	13:13	14:07	15:00	
							-30	01:30	02:08	02:44	13:05	14:03	14:60	
							-35	01:35	02:12	02:46	13:00	14:01	14:60	
							-40	01:42	02:16	02:47	12:55	13:58	14:60	
							-45	01:49	02:20	02:49	12:49	13:55	14:60	
							-50	01:58	02:26	02:50	12:41	13:51	14:59	
							-52	02:02	02:28	02:51	12:37	13:49	14:59	
							-54	02:07	02:31	02:52	12:34	13:47	14:59	
							-56	02:12	02:34	02:53	12:29	13:45	14:59	
							-58	02:17	02:37	02:55	12:25	13:43	14:59	
							-60	02:23	02:41	02:56	12:19	13:40	14:59	
							Sun			Moon				
							Day	Eqn.of Time	Mer.	Mer.Pass.	Age			
								00 ^h	12 ^h	Pass	Upper	Lower		
							12	15:54	15:50	11:44	07:15	19:39	24(33%)	
							13	15:46	15:41	11:44	08:03	20:26	25(23%)	
							14	15:37	15:32	11:44	08:49	21:12	26(15%)	
SD.=16.2 d=-0.7 S.D.=15.4														

November 15, 16, 17 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	54°16.2	196°50.7	-13°27.5	220°20.7	-4°45.5	198°35.6	-13°07.1	148°35.6	-22°24.8	Alpheratz	357°40.2	29°11.5
1	69°18.7	211°50.2	-13°28.5	235°21.7	-4°46.1	213°37.6	-13°07.3	163°37.8	-22°24.8	Ankaa	353°12.5	-42°12.7
2	84°21.2	226°49.6	-13°29.6	250°22.7	-4°46.7	228°39.5	-13°07.5	178°40.0	-22°24.8	Schedar	349°36.7	56°38.3
3	99°23.6	241°49.0	-13°30.6	265°23.7	-4°47.3	243°41.5	-13°07.7	193°42.1	-22°24.9	Diphda	348°52.6	-17°53.4
4	114°26.1	256°48.4	-13°31.7	280°24.7	-4°47.9	258°43.4	-13°07.8	208°44.3	-22°24.9	Achernar	335°24.1	-57°09.0
5	129°28.6	271°47.9	-13°32.7	295°25.7	-4°48.5	273°45.3	-13°08.0	223°46.5	-22°24.9	Hamal	327°57.1	23°32.8
6	144°31.0	286°47.3	-13°33.8	310°26.7	-4°49.1	288°47.3	-13°08.2	238°48.7	-22°24.9	Polaris	315°58.4	89°20.3
7	159°33.5	301°46.7	-13°34.8	325°27.8	-4°49.8	303°49.2	-13°08.3	253°50.8	-22°24.9	Akamar	315°15.7	-40°14.2
8	174°35.9	316°46.1	-13°35.9	340°28.8	-4°50.4	318°51.2	-13°08.5	268°53.0	-22°24.9	Menkar	314°11.6	4°09.5
9	189°38.4	331°45.6	-13°36.9	355°29.8	-4°51.0	333°53.1	-13°08.7	283°55.2	-22°24.9	Mirfak	308°35.6	49°55.3
10	204°40.9	346°45.0	-13°38.0	10°30.8	-4°51.6	348°55.0	-13°08.9	298°57.4	-22°24.9	Aldebaran	290°45.7	16°32.6
11	219°43.3	1°44.4	-13°39.0	25°31.8	-4°52.2	3°57.0	-13°09.0	313°59.6	-22°25.0	Rigel	281°08.9	-8°11.0
12	234°45.8	16°43.8	-13°40.0	40°32.8	-4°52.8	18°58.9	-13°09.2	329°01.7	-22°25.0	Capella	280°29.6	46°00.8
13	249°48.3	31°43.2	-13°41.1	55°33.8	-4°53.4	34°00.9	-13°09.4	344°03.9	-22°25.0	Bellatrix	278°28.5	6°21.8
14	264°50.7	46°42.7	-13°42.1	70°34.8	-4°54.1	49°02.8	-13°09.6	359°06.1	-22°25.0	Elnath	278°08.5	28°37.1
15	279°53.2	61°42.1	-13°43.2	85°35.8	-4°54.7	64°04.8	-13°09.7	14°08.3	-22°25.0	Alnilam	275°43.1	-1°11.6
16	294°55.7	76°41.5	-13°44.2	100°36.8	-4°55.3	79°06.7	-13°09.9	29°10.5	-22°25.0	Betelgeuse	270°57.8	7°24.5
17	309°58.1	91°40.9	-13°45.3	115°37.8	-4°55.9	94°08.6	-13°10.1	44°12.6	-22°25.0	Canopus	263°54.4	-52°42.3
18	325°00.6	106°40.3	-13°46.3	130°38.8	-4°56.5	109°10.6	-13°10.2	59°14.8	-22°25.0	Sirius	258°30.8	-16°44.3
19	340°03.1	121°39.7	-13°47.3	145°39.8	-4°57.1	124°12.5	-13°10.4	74°17.0	-22°25.1	Adara	255°09.9	-28°59.8
20	355°05.5	136°39.2	-13°48.4	160°40.8	-4°57.7	139°14.5	-13°10.6	89°19.2	-22°25.1	Procyon	244°56.4	5°10.8
21	10°08.0	151°38.6	-13°49.4	175°41.9	-4°58.4	154°16.4	-13°10.8	104°21.4	-22°25.1	Pollux	243°23.8	27°58.8
22	25°10.4	166°38.0	-13°50.4	190°42.9	-4°59.0	169°18.4	-13°10.9	119°23.5	-22°25.1	Avior	234°16.5	-59°33.8
23	40°12.9	181°37.4	-13°51.5	205°43.9	-4°59.6	184°20.3	-13°11.1	134°25.7	-22°25.1	Suhail	222°50.1	-43°30.1
Mer.pass.:20:19		v-0.6 d-1.0 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.5		Miaplacidus	221°38.8	-69°47.1
										Alphard	217°53.1	-8°44.1
										Regulus	207°40.4	11°52.8
										Dubhe	193°48.4	61°39.1
										Denebola	182°30.8	14°28.4
										Gienah	175°49.4	-17°38.2
										Acrux	173°06.4	-63°11.5
										Gacrux	171°57.9	-57°12.4
										Alioth	166°18.6	55°51.7
										Spica	158°28.4	-11°15.0
										Alcaid	152°57.0	49°13.5
										Hadar	148°44.2	-60°27.2
										Menkent	148°04.4	-36°27.1
										Arcturus	145°53.2	19°05.9
										Rigel Kent.	139°48.3	-60°54.2
										Zubenelg.	137°02.5	-16°06.7
										Kochab	137°21.4	74°05.0
										Alphecca	126°08.9	26°39.5
										Antares	112°23.0	-26°28.0
										Atria	107°22.6	-69°03.4
										Sabik	102°09.5	-15°44.6
										Shaula	96°18.3	-37°06.8
										Rasalhague	96°04.0	12°33.2
										Etamin	90°45.2	51°29.5
										Kaus Aust.	83°40.2	-34°22.4
										Vega	80°37.3	38°48.3
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°55.1
										Peacock	53°14.9	-56°40.7
										Deneb	49°29.6	45°21.0
										Enif	33°44.2	9°57.6
										Alnair	27°40.1	-46°52.6
										Fomalhaut	15°20.7	-29°31.8
										Scheat	13°50.4	28°10.9
										Markab	13°35.3	15°18.2
										2017/11/	SHA	Mer.pass
										Venus	142°34.5	10:53
										Mars	166°04.5	09:18
										Jupiter	144°19.4	10:44
										Saturn	94°19.4	14:04
										2017/11/	SHA	Mer.pass
										Venus	141°21.5	10:54
										Mars	165°29.5	09:16
										Jupiter	144°06.9	10:41
										Saturn	94°12.5	14:00
										2017/11/	SHA	Mer.pass
										Venus	140°08.1	10:55
										Mars	164°54.5	09:15
										Jupiter	143°54.4	10:38
										Saturn	94°05.6	13:57
										Horizontal paralax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:20:11		v-0.6 d-1.0 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.5				

h		Sun		Moon				Twilight									
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.			
0	183°51.8	-18°28.2	220°40.2	13.7	-1°26.9	-10.7	55.9	72	07:04	08:40	---	---	14:49	16:25			
1	198°51.7	-18°28.9	235°12.8	13.7	-1°37.7	-10.7	55.9	70	06:53	08:16	09:57	13:31	15:13	16:36			
2	213°51.6	-18°29.5	249°45.5	13.7	-1°48.4	-10.7	55.9	68	06:44	07:58	09:18	14:10	15:31	16:44			
3	228°51.5	-18°30.1	264°18.2	13.7	-1°59.1	-10.7	55.9	66	06:37	07:43	08:51	14:37	15:46	16:52			
4	243°51.4	-18°30.8	278°50.9	13.7	-2°09.8	-10.7	55.8	64	06:30	07:31	08:31	14:58	15:58	16:59			
5	258°51.3	-18°31.4	293°23.6	13.7	-2°20.5	-10.7	55.8	62	06:24	07:20	08:15	15:14	16:08	17:04			
6	273°51.2	-18°32.0	307°56.4	13.7	-2°31.1	-10.6	55.8	60	06:19	07:11	08:01	15:28	16:18	17:10			
7	288°51.1	-18°32.7	322°29.1	13.7	-2°41.8	-10.6	55.8	58	06:15	07:03	07:49	15:40	16:26	17:14			
8	303°51.0	-18°33.3	337°01.9	13.8	-2°52.4	-10.6	55.8	56	06:10	06:56	07:39	15:50	16:33	17:19			
9	318°50.9	-18°33.9	351°34.6	13.8	-3°03.0	-10.6	55.7	54	06:06	06:50	07:30	15:59	16:39	17:22			
10	333°50.7	-18°34.6	6°07.4	13.8	-3°13.6	-10.6	55.7	52	06:03	06:44	07:22	16:07	16:45	17:26			
11	348°50.6	-18°35.2	20°40.2	13.8	-3°24.1	-10.5	55.7	50	05:59	06:39	07:15	16:15	16:50	17:30			
12	3°50.5	-18°35.8	35°13.0	13.8	-3°34.7	-10.5	55.7	45	05:52	06:27	06:59	16:30	17:02	17:38			
13	18°50.4	-18°36.5	49°45.7	13.8	-3°45.2	-10.5	55.7	40	05:44	06:17	06:46	16:43	17:12	17:45			
14	33°50.3	-18°37.1	64°18.6	13.8	-3°55.7	-10.5	55.6	35	05:38	06:09	06:35	16:54	17:21	17:51			
15	48°50.2	-18°37.7	78°51.4	13.8	-4°06.1	-10.5	55.6	30	05:32	06:01	06:26	17:03	17:29	17:58			
16	63°50.1	-18°38.4	93°24.2	13.8	-4°16.6	-10.4	55.6	20	05:20	05:46	06:09	17:20	17:43	18:10			
17	78°50.0	-18°39.0	107°57.0	13.8	-4°27.0	-10.4	55.6	10	05:07	05:33	05:55	17:35	17:57	18:22			
18	93°49.9	-18°39.6	122°29.8	13.8	-4°37.4	-10.4	55.6	0	04:54	05:19	05:41	17:48	18:10	18:36			
19	108°49.8	-18°40.2	137°02.6	13.8	-4°47.8	-10.4	55.6	-10	04:39	05:05	05:27	18:02	18:25	18:51			
20	123°49.6	-18°40.9	151°35.5	13.8	-4°58.1	-10.3	55.5	-20	04:21	04:49	05:13	18:17	18:41	19:09			
21	138°49.5	-18°41.5	166°08.3	13.8	-5°08.4	-10.3	55.5	-30	03:58	04:29	04:55	18:35	19:01	19:32			
22	153°49.4	-18°42.1	180°41.1	13.8	-5°18.7	-10.3	55.5	-35	03:43	04:17	04:45	18:45	19:13	19:47			
23	168°49.3	-18°42.8	195°14.0	13.8	-5°28.9	-10.2	55.5	-40	03:25	04:03	04:34	18:57	19:27	20:05			
SD.=16.2 d=-0.6							S.D.=15.3										
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Wed	Thu	Fri	Wed	Thu	Fri			
0	183°49.2	-18°43.4	209°46.8	13.8	-5°39.2	-10.2	55.5	-45	03:03	03:46	04:20	19:10	19:45	20:28			
1	198°49.1	-18°44.0	224°19.7	13.8	-5°49.4	-10.2	55.4	-50	02:32	03:24	04:03	19:27	20:07	20:60			
2	213°49.0	-18°44.6	238°52.5	13.8	-5°59.5	-10.1	55.4	-52	02:16	03:13	03:55	19:35	20:18	21:16			
3	228°48.9	-18°45.2	253°25.3	13.8	-6°09.7	-10.1	55.4	-54	01:56	03:01	03:46	19:44	20:30	21:36			
4	243°48.7	-18°45.9	267°58.2	13.8	-6°19.8	-10.1	55.4	-56	01:30	02:47	03:36	19:55	20:45	22:03			
5	258°48.6	-18°46.5	282°31.0	13.8	-6°29.8	-10.0	55.4	-58	00:52	02:30	03:25	20:06	21:02	22:44			
6	273°48.5	-18°47.1	297°03.8	13.8	-6°39.8	-10.0	55.3	-60	---	02:09	03:12	20:20	21:23	---			
7	288°48.4	-18°47.7	311°36.7	13.8	-6°49.8	-10.0	55.3	Moonrise							Moonset		
8	303°48.3	-18°48.4	326°09.5	13.8	-6°59.8	-9.9	55.3	Lat.	Wed	Thu	Fri	Wed	Thu	Fri			
9	318°48.2	-18°49.0	340°42.3	13.8	-7°09.7	-9.9	55.3	72	03:52	05:36	07:21	14:52	14:42	14:31			
10	333°48.0	-18°49.6	355°15.1	13.8	-7°19.6	-9.9	55.3	70	03:49	05:26	07:03	14:58	14:54	14:50			
11	348°47.9	-18°50.2	9°47.9	13.8	-7°29.5	-9.8	55.3	68	03:46	05:18	06:48	15:03	15:04	15:06			
12	3°47.8	-18°50.8	24°20.7	13.8	-7°39.3	-9.8	55.2	66	03:44	05:11	06:37	15:06	15:12	15:19			
13	18°47.7	-18°51.4	38°53.6	13.8	-7°49.0	-9.8	55.2	64	03:42	05:05	06:27	15:10	15:19	15:30			
14	33°47.6	-18°52.1	53°26.3	13.8	-7°58.8	-9.7	55.2	62	03:41	05:00	06:19	15:13	15:25	15:39			
15	48°47.4	-18°52.7	67°59.1	13.8	-8°08.5	-9.7	55.2	60	03:39	04:56	06:11	15:15	15:30	15:47			
16	63°47.3	-18°53.3	82°31.9	13.8	-8°18.1	-9.6	55.2	58	03:38	04:52	06:05	15:18	15:35	15:54			
17	78°47.2	-18°53.9	97°04.7	13.8	-8°27.7	-9.6	55.2	56	03:37	04:49	05:50	15:20	15:39	15:60			
18	93°47.1	-18°54.5	111°37.5	13.8	-8°37.3	-9.5	55.1	54	03:36	04:46	05:55	15:21	15:43	16:05			
19	108°47.0	-18°55.1	126°10.2	13.8	-8°46.8	-9.5	55.1	52	03:35	04:43	05:50	15:23	15:46	16:10			
20	123°46.8	-18°55.8	140°43.0	13.7	-8°56.3	-9.5	55.1	50	03:34	04:41	05:46	15:25	15:49	16:15			
21	138°46.7	-18°56.4	155°15.7	13.7	-9°05.7	-9.4	55.1	45	03:33	04:36	05:38	15:28	15:56	16:25			
22	153°46.6	-18°57.0	169°48.4	13.7	-9°15.1	-9.4	55.1	40	03:31	04:31	05:30	15:31	16:01	16:33			
23	168°46.5	-18°57.6	184°21.2	13.7	-9°24.5	-9.3	55.1	35	03:30	04:27	05:24	15:33	16:06	16:40			
SD.=16.2 d=-0.6							S.D.=15.1										
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Sun	Mer.	Mer.Pass.	Age					
0	183°46.4	-18°58.2	198°53.9	13.7	-9°33.8	-9.3	55.0	72	15:27	15:22	11:44	09:34	21:57	27(9%)			
1	198°46.2	-18°58.8	213°26.6	13.7	-9°43.0	-9.2	55.0	70	15:17	15:11	11:44	10:19	22:42	28(4%)			
2	213°46.1	-18°59.4	227°59.3	13.7	-9°52.2	-9.2	55.0	68	15:06	15:00	11:45	11:04	23:27	29(1%)			
3	228°46.0	-19°00.0	242°31.9	13.7	-10°01.4	-9.1	55.0	66	Sun					Mer.			
4	243°45.9	-19°00.6	257°04.6	13.7	-10°10.5	-9.1	55.0	64	Eqn.of Time	12 ^h	Pass	Upper	Lower	Age			
5	258°45.7	-19°01.2	271°37.2	13.6	-10°19.5	-9.0	55.0	62	Moon					Age			
6	273°45.6	-19°01.9	286°09.9	13.6	-10°28.6	-9.0	54.9	60	Mer.					Age			
7	288°45.5	-19°02.5	300°42.5	13.6	-10°37.5	-8.9	54.9	58	Mer.Pass.					Age			
8	303°45.4	-19°03.1	315°15.1	13.6	-10°46.4	-8.9	54.9	56	Mer.					Age			
9	318°45.2	-19°03.7	329°47.7	13.6	-10°55.3	-8.8	54.9	54	Mer.					Age			
10	333°45.1	-19°04.3	344°20.3	13.6	-11°04.1	-8.8	54.9	52	Mer.					Age			
11	348°45.0	-19°04.9	358°52.9	13.6	-11°12.8	-8.7	54.9	50	Mer.					Age			
12	3°44.9	-19°05.5	13°25.4	13.5	-11°21.5	-8.7	54.9	48	Mer.					Age			
13	18°44.7	-19°06.1	27°58.0	13.5	-11°30.2	-8.6	54.8	46	Mer.					Age			
14	33°44.6	-19°06.7	42°30.5	13.5	-11°38.8	-8.6	54.8	44	Mer.					Age			
15	48°44.5	-19°07.3	57°03.0	13.5	-11°47.3	-8.5	54.8	42	Mer.					Age			
16	63°44.4	-19°07.9	71°35.5	13.5	-11°55.8	-8.4	54.8	40	Mer.					Age			
17	78°44.2	-19°08.5	86°08.0	13.5	-12°04.2	-8.4	54.8	38	Mer.					Age			
18	93°44.1	-19°09.1	100°40.5	13.5	-12°12.5	-8.3	54.8	36	Mer.					Age			
19	108°44.0	-19°09.7	115°12.9	13.4	-12°20.8	-8.3	54.8	34	Mer.					Age			
20	123°43.8	-19°10.3	129°45.3	13.4	-12°29.1	-8.2	54.7	32	Mer.					Age			
21	138°43.7	-19°10.9	144°17.7	13.4	-12°37.3	-8.2	54.7	30	Mer.					Age			
22	153°43.6	-19°11.5	158°50.1	13.4	-12°45.4	-8.1	54.7	28	Mer.					Age			
23	168°43.5	-19°12.1	173°22.5	13.4	-12°53.5	-8.0	54.7	26	Mer.					Age			
SD.=16.2 d=-0.6							S.D.=15.0										

November 18, 19 ,20 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass					
0	57°13.6	196°08.1	-14°41.5	221°33.1	-5°29.6	200°55.5	-13°19.5	151°12.4	-22°25.7	166°14.5	-22°25.7	181°16.7	-22°25.7	Alpheratz	357°40.2	29°11.5				
1	72°16.1	211°07.5	-14°42.5	236°34.2	-5°30.2	215°57.5	-13°19.7	166°14.5	-22°25.7	181°16.7	-22°25.7	196°18.9	-22°25.7	Ankaa	353°12.5	-42°12.8				
2	87°18.6	226°06.9	-14°43.5	251°35.2	-5°30.8	230°59.4	-13°19.9	166°14.5	-22°25.7	181°16.7	-22°25.7	211°21.1	-22°25.7	Schedar	349°36.7	56°38.3				
3	102°21.0	241°06.3	-14°44.5	266°36.2	-5°31.4	246°01.4	-13°20.0	166°14.5	-22°25.7	181°16.7	-22°25.7	226°23.2	-22°25.8	Diphda	348°52.6	-17°53.4				
4	117°23.5	256°05.7	-14°45.5	281°37.2	-5°32.0	261°03.3	-13°20.2	166°14.5	-22°25.7	181°16.7	-22°25.7	241°25.4	-22°25.8	Achernar	335°24.2	-57°09.0				
5	132°26.0	271°05.1	-14°46.5	296°38.2	-5°32.6	276°05.3	-13°20.4	166°14.5	-22°25.7	181°16.7	-22°25.7	256°27.6	-22°25.8	Hamal	327°57.1	23°32.8				
6	147°28.4	286°04.5	-14°47.6	311°39.2	-5°33.2	291°07.2	-13°20.5	166°14.5	-22°25.7	181°16.7	-22°25.7	271°29.8	-22°25.8	Polaris	315°58.4	89°20.3				
7	162°30.9	301°03.9	-14°48.6	326°40.2	-5°33.8	306°09.1	-13°20.7	166°14.5	-22°25.7	181°16.7	-22°25.7	286°31.9	-22°25.8	Akamar	315°15.7	-40°14.2				
8	177°33.4	316°03.3	-14°49.6	341°41.2	-5°34.4	321°11.1	-13°20.9	166°14.5	-22°25.7	181°16.7	-22°25.7	301°34.1	-22°25.8	Menkar	314°11.6	4°09.5				
9	192°35.8	331°02.6	-14°50.6	356°42.2	-5°35.0	336°13.0	-13°21.1	166°14.5	-22°25.7	181°16.7	-22°25.7	316°36.3	-22°25.8	Mirfak	308°35.5	49°55.3				
10	207°38.3	346°02.0	-14°51.6	11°43.2	-5°35.7	351°15.0	-13°21.2	166°14.5	-22°25.7	181°16.7	-22°25.7	331°38.5	-22°25.8	Aldebaran	290°45.6	16°32.6				
11	222°40.8	1°01.4	-14°52.6	26°44.2	-5°36.3	6°16.9	-13°21.4	166°14.5	-22°25.7	181°16.7	-22°25.7	346°40.6	-22°25.9	Rigel	281°08.9	-8°11.0				
12	237°43.2	16°00.8	-14°53.6	41°45.2	-5°36.9	21°18.9	-13°21.6	166°14.5	-22°25.7	181°16.7	-22°25.7	1°42.8	-22°25.9	Capella	280°29.6	46°00.8				
13	252°45.7	31°00.2	-14°54.6	56°46.2	-5°37.5	36°20.8	-13°21.7	166°14.5	-22°25.7	181°16.7	-22°25.7	16°45.0	-22°25.9	Bellatrix	278°28.5	6°21.8				
14	267°48.1	45°59.6	-14°55.5	71°47.2	-5°38.1	51°22.8	-13°21.9	166°14.5	-22°25.7	181°16.7	-22°25.7	31°47.2	-22°25.9	Elnath	278°08.5	28°37.1				
15	282°50.6	60°58.9	-14°56.5	86°48.2	-5°38.7	66°24.7	-13°22.1	166°14.5	-22°25.7	181°16.7	-22°25.7	46°49.3	-22°25.9	Alnilam	275°43.1	-1°11.6				
16	297°53.1	75°58.3	-14°57.5	101°49.2	-5°39.3	81°26.6	-13°22.2	166°14.5	-22°25.7	181°16.7	-22°25.7	61°51.5	-22°25.9	Betelgeuse	270°57.8	7°24.5				
17	312°55.5	90°57.7	-14°58.5	116°50.2	-5°39.9	96°28.6	-13°22.4	166°14.5	-22°25.7	181°16.7	-22°25.7	76°53.7	-22°25.9	Canopus	263°54.4	-52°42.3				
18	327°58.0	105°57.1	-14°59.5	131°51.2	-5°40.5	111°30.5	-13°22.6	166°14.5	-22°25.7	181°16.7	-22°25.7	91°55.8	-22°25.9	Sirius	258°30.8	-16°44.3				
19	343°00.5	120°56.5	-15°00.5	146°52.2	-5°41.1	126°32.5	-13°22.8	166°14.5	-22°25.7	181°16.7	-22°25.7	106°58.0	-22°25.9	Adara	255°09.9	-28°59.8				
20	358°02.9	135°55.9	-15°01.5	161°53.2	-5°41.7	141°34.4	-13°22.9	166°14.5	-22°25.7	181°16.7	-22°25.7	122°00.2	-22°26.0	Procyon	244°56.4	5°10.8				
21	13°05.4	150°55.2	-15°02.5	176°54.2	-5°42.4	156°36.4	-13°23.1	166°14.5	-22°25.7	181°16.7	-22°25.7	137°02.4	-22°26.0	Pollux	243°23.8	27°58.8				
22	28°07.9	165°54.6	-15°03.5	191°55.2	-5°43.0	171°38.3	-13°23.3	166°14.5	-22°25.7	181°16.7	-22°25.7	167°06.7	-22°26.0	Avior	234°16.5	-59°33.8				
23	43°10.3	180°54.0	-15°04.5	206°56.2	-5°43.6	186°40.3	-13°23.4	166°14.5	-22°25.7	181°16.7	-22°25.7	207°04.4	-22°26.0	Suhail	222°50.1	-43°30.1				
Mer.pass.:20:07			v-0.6 d-1.0 m-3.8			v1.0 d-0.6 m1.8			v1.9 d-0.2 m-1.5			v2.2 d-0.0 m0.5			Miaplacidus			221°38.8	-69°47.1	
															Alphard			217°53.1	-8°44.1	
															Regulus			207°40.4	11°52.8	
															Dubhe			193°48.4	61°39.1	
															Denebola			182°30.7	14°28.4	
															Gienah			175°49.4	-17°38.2	
															Acrux			173°06.3	-63°11.5	
															Gacrux			171°57.9	-57°12.4	
															Alioth			166°18.6	55°51.7	
															Spica			158°28.4	-11°15.0	
															Alcaid			152°57.0	49°13.5	
															Hadar			148°44.2	-60°27.2	
															Menkent			148°04.4	-36°27.1	
															Arcturus			145°53.2	19°05.8	
															Rigel Kent.			139°48.3	-60°54.2	
															Zubenelg.			137°02.5	-16°06.7	
															Kochab			137°21.4	74°05.0	
															Alphecca			126°08.9	26°39.5	
															Antares			112°23.0	-26°28.0	
															Atria			107°22.6	-69°03.4	
															Sabik			102°09.5	-15°44.6	
															Shaula			96°18.3	-37°06.8	
															Rasalhague			96°04.0	12°33.2	
															Etamin			90°45.2	51°29.5	
															Kaus Aust.			83°40.2	-34°22.4	
															Vega			80°37.3	38°48.3	
															Nunki			75°54.9	-26°16.3	
															Altair			62°05.6	8°55.1	
															Peacock			53°14.9	-56°40.7	
															Deneb			49°29.6	45°21.0	
															Enif			33°44.2	9°57.6	
															Alnair			27°40.1	-46°52.6	
															Fomalhaut			15°20.7	-29°31.8	
															Scheat			13°50.4	28°10.9	
															Markab			13°35.3	15°18.2	
															2017/11/			SHA	Mer.pass	
															Venus			138°54.5	10:56	
															Mars			164°19.5	09:13	
															Jupiter			143°41.9	10:35	
															Saturn			93°58.7	13:53	
															2017/11/			SHA	Mer.pass	
															Venus			137°40.6	10:57	
															Mars			163°44.5	09:12	
															Jupiter			143°29.4	10:32	
															Saturn			93°51.8	13:50	
															2017/11/			SHA	Mer.pass	
															Venus			136°26.4	10:58	
															Mars			163°09.4	09:10	
															Jupiter			143°17.0	10:29	
															Saturn			93°44.7	13:46	
															Horizontal parallax					
															Venus:			0.1		
															Mars:			0.1		
Mer.pass.:19:59			v-0.6 d-1.0 m-3.8			v1.0 d-0.6 m1.7			v1.9 d-0.2 m-1.5			v2.2 d-0.0 m0.5								

Sun								Moon								
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight				
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.			
0	183°43.3	-19°12.7	187°54.9	13.4	-13°01.5	-8.0	54.7	72	07:14	08:54	--	--	14:36	16:16		
1	198°43.2	-19°13.3	202°27.2	13.3	-13°09.4	-7.9	54.7	70	07:02	08:28	10:19	13:11	15:02	16:28		
2	213°43.1	-19°13.9	216°59.6	13.3	-13°17.3	-7.9	54.7	68	06:52	08:08	09:33	13:57	15:22	16:37		
3	228°42.9	-19°14.5	231°31.9	13.3	-13°25.1	-7.8	54.6	66	06:44	07:52	09:03	14:27	15:38	16:46		
4	243°42.8	-19°15.1	246°04.2	13.3	-13°32.9	-7.7	54.6	64	06:37	07:39	08:41	14:50	15:52	16:53		
5	258°42.7	-19°15.7	260°36.4	13.3	-13°40.6	-7.7	54.6	62	06:31	07:27	08:23	15:07	16:03	16:59		
6	273°42.5	-19°16.3	275°08.7	13.2	-13°48.2	-7.6	54.6	60	06:25	07:18	08:08	15:22	16:12	17:05		
7	288°42.4	-19°16.9	289°40.9	13.2	-13°55.8	-7.5	54.6	58	06:20	07:09	07:56	15:35	16:21	17:10		
8	303°42.3	-19°17.4	304°13.1	13.2	-14°03.3	-7.5	54.6	56	06:15	07:02	07:45	15:45	16:28	17:15		
9	318°42.1	-19°18.0	318°45.3	13.2	-14°10.7	-7.4	54.6	54	06:11	06:55	07:35	15:55	16:35	17:19		
10	333°42.0	-19°18.6	333°17.5	13.2	-14°18.1	-7.3	54.5	52	06:07	06:49	07:27	16:03	16:41	17:23		
11	348°41.9	-19°19.2	347°49.7	13.2	-14°25.4	-7.3	54.5	50	06:04	06:43	07:19	16:11	16:47	17:27		
12	3°41.7	-19°19.8	2°21.8	13.1	-14°32.6	-7.2	54.5	45	05:55	06:31	07:03	16:27	16:59	17:35		
13	18°41.6	-19°20.4	16°53.9	13.1	-14°39.8	-7.1	54.5	40	05:48	06:20	06:50	16:41	17:10	17:43		
14	33°41.5	-19°21.0	31°26.0	13.1	-14°46.9	-7.1	54.5	35	05:41	06:11	06:38	16:52	17:19	17:50		
15	48°41.3	-19°21.6	45°58.1	13.1	-14°53.9	-7.0	54.5	30	05:34	06:03	06:28	17:02	17:28	17:57		
16	63°41.2	-19°22.2	60°30.2	13.1	-15°00.9	-6.9	54.5	20	05:21	05:48	06:11	17:19	17:43	18:10		
17	78°41.0	-19°22.7	75°02.2	13.0	-15°07.8	-6.9	54.5	10	05:08	05:34	05:56	17:35	17:57	18:23		
18	93°40.9	-19°23.3	89°34.3	13.0	-15°14.6	-6.8	54.5	0	04:54	05:20	05:42	17:49	18:11	18:37		
19	108°40.8	-19°23.9	104°06.3	13.0	-15°21.3	-6.7	54.4	-10	04:39	05:05	05:27	18:04	18:26	18:52		
20	123°40.6	-19°24.5	118°38.3	13.0	-15°28.0	-6.6	54.4	-20	04:20	04:48	05:12	18:19	18:43	19:11		
21	138°40.5	-19°25.1	133°10.2	13.0	-15°34.6	-6.6	54.4	-30	03:56	04:28	04:54	18:37	19:04	19:35		
22	153°40.4	-19°25.7	147°42.2	12.9	-15°41.1	-6.5	54.4	-35	03:41	04:15	04:43	18:48	19:16	19:51		
23	168°40.2	-19°26.3	162°14.1	12.9	-15°47.6	-6.4	54.4	-40	03:22	04:01	04:31	19:00	19:31	20:09		
SD.=16.2 d=-0.6 S.D.=14.9								-45	02:58	03:43	04:17	19:14	19:49	20:34		
Sun								-50	02:26	03:20	03:59	19:32	20:12	21:07		
0	183°40.1	-19°26.8	176°46.0	12.9	-15°54.0	-6.3	54.4	-52	02:09	03:08	03:51	19:41	20:24	21:24		
1	198°39.9	-19°27.4	191°17.9	12.9	-16°00.3	-6.3	54.4	-54	01:47	02:55	03:42	19:50	20:37	21:46		
2	213°39.8	-19°28.0	205°49.8	12.9	-16°06.5	-6.2	54.4	-56	01:19	02:40	03:31	20:01	20:52	22:16		
3	228°39.7	-19°28.6	220°21.6	12.8	-16°12.7	-6.1	54.4	-58	00:30	02:22	03:19	20:13	21:11	23:11		
4	243°39.5	-19°29.2	234°53.5	12.8	-16°18.8	-6.1	54.3	-60	--	01:59	03:05	20:27	21:34	--		
5	258°39.4	-19°29.7	249°25.3	12.8	-16°24.8	-6.0	54.3	Moonrise						Moonset		
6	273°39.2	-19°30.3	263°57.1	12.8	-16°30.7	-5.9	54.3	Lat.	Sat	Sun	Mon	Sat	Sun	Mon		
7	288°39.1	-19°30.9	278°28.8	12.8	-16°36.6	-5.8	54.3	72	09:12	11:19	--	14:15	13:44	--		
8	303°38.9	-19°31.5	293°00.6	12.7	-16°42.4	-5.7	54.3	70	08:41	10:21	12:04	14:47	14:43	14:38		
9	318°38.8	-19°32.0	307°32.3	12.7	-16°48.1	-5.7	54.3	68	08:19	09:47	11:11	15:10	15:17	15:31		
10	333°38.7	-19°32.6	322°04.1	12.7	-16°53.7	-5.6	54.3	66	08:01	09:23	10:39	15:28	15:42	16:04		
11	348°38.5	-19°33.2	336°35.8	12.7	-16°59.3	-5.5	54.3	64	07:47	09:04	10:15	15:43	16:02	16:28		
12	3°38.4	-19°33.8	351°07.5	12.7	-17°04.7	-5.4	54.3	62	07:35	08:49	09:57	15:56	16:18	16:47		
13	18°38.2	-19°34.3	5°39.1	12.7	-17°10.1	-5.4	54.3	60	07:25	08:36	09:41	16:07	16:31	17:02		
14	33°38.1	-19°34.9	20°10.8	12.6	-17°15.4	-5.3	54.2	58	07:16	08:25	09:28	16:16	16:42	17:15		
15	48°37.9	-19°35.5	34°42.4	12.6	-17°20.7	-5.2	54.2	56	07:09	08:15	09:17	16:24	16:52	17:27		
16	63°37.8	-19°36.1	49°14.0	12.6	-17°25.8	-5.1	54.2	54	07:02	08:07	09:07	16:31	17:01	17:37		
17	78°37.7	-19°36.6	63°45.6	12.6	-17°30.9	-5.0	54.2	52	06:56	07:59	08:59	16:38	17:09	17:46		
18	93°37.5	-19°37.2	78°17.2	12.6	-17°35.9	-5.0	54.2	50	06:50	07:52	08:51	16:44	17:16	17:54		
19	108°37.4	-19°37.8	92°48.7	12.6	-17°40.8	-4.9	54.2	45	06:38	07:38	08:34	16:56	17:32	18:11		
20	123°37.2	-19°38.4	107°20.3	12.5	-17°45.6	-4.8	54.2	40	06:29	07:26	08:20	17:07	17:44	18:25		
21	138°37.1	-19°38.9	121°51.8	12.5	-17°50.4	-4.7	54.2	35	06:20	07:15	08:09	17:16	17:55	18:37		
22	153°36.9	-19°39.5	136°23.3	12.5	-17°55.0	-4.6	54.2	30	06:13	07:06	07:59	17:24	18:04	18:47		
23	168°36.8	-19°40.1	150°54.8	12.5	-17°59.6	-4.5	54.2	20	06:00	06:51	07:41	17:38	18:21	19:05		
SD.=16.2 d=-0.6 S.D.=14.8								10	05:49	06:38	07:26	17:50	18:35	19:21		
Mon								0	05:39	06:25	07:12	18:01	18:48	19:35		
0	183°36.6	-19°40.6	165°26.3	12.5	-18°04.1	-4.5	54.2	-10	05:29	06:13	06:58	18:13	19:01	19:50		
1	198°36.5	-19°41.2	179°57.8	12.5	-18°08.5	-4.4	54.2	-20	05:18	05:50	06:43	18:25	19:16	20:05		
2	213°36.3	-19°41.8	194°29.2	12.4	-18°12.9	-4.3	54.1	-30	05:06	05:45	06:26	18:39	19:32	20:23		
3	228°36.2	-19°42.3	209°00.6	12.4	-18°17.1	-4.2	54.1	-35	04:59	05:36	06:16	18:47	19:41	20:34		
4	243°36.0	-19°42.9	223°32.1	12.4	-18°21.3	-4.1	54.1	-40	04:51	05:26	06:05	18:56	19:52	20:46		
5	258°35.9	-19°43.5	238°03.5	12.4	-18°25.3	-4.0	54.1	-45	04:41	05:15	05:52	19:07	20:05	20:60		
6	273°35.7	-19°44.0	252°34.8	12.4	-18°29.3	-3.9	54.1	-50	04:30	05:01	05:36	19:20	20:21	21:17		
7	288°35.6	-19°44.6	267°06.2	12.4	-18°33.2	-3.9	54.1	-52	04:25	04:54	05:28	19:26	20:28	21:25		
8	303°35.4	-19°45.1	281°37.6	12.4	-18°37.1	-3.8	54.1	-54	04:19	04:47	05:20	19:33	20:36	21:34		
9	318°35.3	-19°45.7	296°08.9	12.3	-18°40.8	-3.7	54.1	-56	04:13	04:39	05:10	19:41	20:45	21:45		
10	333°35.1	-19°46.3	310°40.2	12.3	-18°44.4	-3.6	54.1	-58	04:06	04:30	04:60	19:49	20:56	21:56		
11	348°35.0	-19°46.8	325°11.6	12.3	-18°48.0	-3.5	54.1	-60	03:58	04:20	04:47	19:59	21:07	22:10		
12	3°34.8	-19°47.4	339°42.9	12.3	-18°51.5	-3.4	54.1	Sun						Moon		
13	18°34.7	-19°48.0	354°14.2	12.3	-18°54.9	-3.3	54.1	Day	Eqn.of Time	Mer.	Mer.Pass.	Age				
14	33°34.5	-19°48.5	8°45.4	12.3	-18°58.2	-3.3	54.1	00 ^h	12 ^h	Pass	Upper	Lower				
15	48°34.4	-19°49.1	23°16.7	12.3	-19°01.4	-3.2	54.1	18	14:53	14:47	11:45	11:50	00:13	0(0%)		
16	63°34.2	-19°49.6	37°48.0	12.3	-19°04.5	-3.1	54.1	19	14:40	14:34	11:45	12:36	00:13	1(1%)		
17	78°34.1	-19°50.2	52°19.2	12.2	-19°07.6	-3.0	54.1	20	14:27	14:19	11:45	13:23	01:00	2(4%)		
18	93°33.9	-19°50.7	66°50.4	12.2	-19°10.5	-2.9	54.0									
19	108°33.7	-19°51.3	81°21.7	12.2	-19°13.4	-2.8	54.0									
20	123°33.6	-19°51.9	95°52.9	12.2	-19°16.2	-2.7	54.0									
21	138°33.4	-19°52.4	110°24.1	12.2	-19°18.8	-2.6	54.0									
22	153°33.3	-19°53.0	124°55.3	12.2	-19°21.4	-2.6	54.0									
23	168°33.1	-19°53.5	139°26.5	12.2	-19°23.9	-2.5	54.0									
SD.=16.2 d=-0.6 S.D.=14.8																

November 21, 22, 23 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	60°11.1	195°23.0	-15°52.2	222°45.4	-6°13.3	203°15.6	-13°31.7	153°48.8	-22°26.5	Alpheratz	357°40.2	29°11.5
1	75°13.5	210°22.4	-15°53.2	237°46.4	-6°13.9	218°17.6	-13°31.9	168°50.9	-22°26.5	Ankaa	353°12.6	-42°12.8
2	90°16.0	225°21.7	-15°54.2	252°47.4	-6°14.5	233°19.5	-13°32.0	183°53.1	-22°26.6	Schedar	349°36.7	56°38.3
3	105°18.5	240°21.1	-15°55.1	267°48.4	-6°15.1	248°21.5	-13°32.2	198°55.3	-22°26.6	Diphda	348°52.6	-17°53.4
4	120°20.9	255°20.4	-15°56.1	282°49.4	-6°15.7	263°23.4	-13°32.4	213°57.4	-22°26.6	Achernar	335°24.2	-57°09.0
5	135°23.4	270°19.8	-15°57.0	297°50.4	-6°16.3	278°25.4	-13°32.5	228°59.6	-22°26.6	Hamal	327°57.1	23°32.8
6	150°25.9	285°19.1	-15°58.0	312°51.4	-6°16.9	293°27.3	-13°32.7	244°01.8	-22°26.6	Polaris	315°58.4	89°20.3
7	165°28.3	300°18.5	-15°58.9	327°52.4	-6°17.5	308°29.3	-13°32.9	259°03.9	-22°26.6	Akamar	315°15.7	-40°14.2
8	180°30.8	315°17.8	-15°59.9	342°53.4	-6°18.1	323°31.2	-13°33.0	274°06.1	-22°26.6	Menkar	314°11.6	4°09.5
9	195°33.2	330°17.2	-16°00.8	357°54.4	-6°18.7	338°33.1	-13°33.2	289°08.3	-22°26.6	Mirfak	308°35.5	49°55.4
10	210°35.7	345°16.5	-16°01.8	12°55.4	-6°19.3	353°35.1	-13°33.4	304°10.5	-22°26.6	Aldebaran	290°45.6	16°32.6
11	225°38.2	0°15.9	-16°02.7	27°56.4	-6°19.9	8°37.0	-13°33.5	319°12.6	-22°26.7	Rigel	281°08.9	-8°11.0
12	240°40.6	15°15.2	-16°03.7	42°57.4	-6°20.5	23°39.0	-13°33.7	334°14.8	-22°26.7	Capella	280°29.6	46°00.8
13	255°43.1	30°14.6	-16°04.6	57°58.4	-6°21.2	38°40.9	-13°33.9	349°17.0	-22°26.7	Bellatrix	278°28.5	6°21.8
14	270°45.6	45°13.9	-16°05.6	72°59.4	-6°21.8	53°42.9	-13°34.1	4°19.1	-22°26.7	Elnath	278°08.5	28°37.1
15	285°48.0	60°13.3	-16°06.5	88°00.4	-6°22.4	68°44.8	-13°34.2	19°21.3	-22°26.7	Alnilam	275°43.1	-1°11.6
16	300°50.5	75°12.6	-16°07.5	103°01.4	-6°23.0	83°46.8	-13°34.4	34°23.5	-22°26.7	Betelgeuse	270°57.8	7°24.5
17	315°53.0	90°12.0	-16°08.4	118°02.4	-6°23.6	98°48.7	-13°34.6	49°25.6	-22°26.7	Canopus	263°54.4	-52°42.3
18	330°55.4	105°11.3	-16°09.4	133°03.4	-6°24.2	113°50.7	-13°34.7	64°27.8	-22°26.7	Sirius	258°30.7	-16°44.3
19	345°57.9	120°10.7	-16°10.3	148°04.4	-6°24.8	128°52.6	-13°34.9	79°30.0	-22°26.7	Adara	255°09.9	-28°59.8
20	1°00.3	135°10.0	-16°11.2	163°05.4	-6°25.4	143°54.6	-13°35.1	94°32.1	-22°26.8	Procyon	244°56.3	5°10.8
21	16°02.8	150°09.3	-16°12.2	178°06.4	-6°26.0	158°56.5	-13°35.2	109°34.3	-22°26.8	Pollux	243°23.8	27°58.8
22	31°05.3	165°08.7	-16°13.1	193°07.4	-6°26.6	173°58.5	-13°35.4	124°36.5	-22°26.8	Avior	234°16.5	-59°33.8
23	46°07.7	180°08.0	-16°14.1	208°08.4	-6°27.2	189°00.4	-13°35.6	139°38.6	-22°26.8	Suhail	222°50.1	-43°30.1
Mer.pass.:19:55		v-0.6 d-1.0 m-3.8		v1.0 d-0.6 m1.7		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.5		Miaplacidus	221°38.7	-69°47.2
										Alphard	217°53.1	-8°44.1
										Regulus	207°40.3	11°52.8
										Dubhe	193°48.3	61°39.1
										Denebola	182°30.7	14°28.4
										Genah	175°49.4	-17°38.2
										Acrux	173°06.3	-63°11.5
										Gacrux	171°57.8	-57°12.4
										Alioth	166°18.6	55°51.7
										Spica	158°28.4	-11°15.0
										Alcaid	152°57.0	49°13.5
										Hadar	148°44.1	-60°27.2
										Menkent	148°04.4	-67°27.1
										Arcturus	145°53.2	19°05.8
										Rigel Kent.	139°48.2	-60°54.2
										Zubenelg.	137°02.4	-16°06.7
										Kochab	137°21.4	74°05.0
										Alphecca	126°08.9	26°39.5
										Antares	112°23.0	-26°28.0
										Atria	107°22.6	-69°03.4
										Sabik	102°09.5	-15°44.6
										Shaula	96°18.3	-37°06.8
										Rasalhague	96°04.0	12°33.1
										Etamin	90°45.2	51°29.5
										Kaus Aust.	83°40.2	-34°22.4
										Vega	80°37.3	38°48.3
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°55.1
										Peacock	53°14.9	-56°40.7
										Deneb	49°29.6	45°21.0
										Enif	33°44.3	9°57.6
										Alnair	27°40.1	-46°52.6
										Fomalhaut	15°20.7	-29°31.8
										Scheat	13°50.4	28°11.0
										Markab	13°35.3	15°18.2
										2017/11/	SHA	Mer.pass
										Venus	135°11.9	10:59
										Mars	162°34.3	09:08
										Jupiter	143°04.6	10:26
										Saturn	93°37.7	13:43
										2017/11/	SHA	Mer.pass
										Venus	133°57.2	10:60
										Mars	161°59.2	09:07
										Jupiter	142°52.2	10:22
										Saturn	93°30.6	13:39
										2017/11/	SHA	Mer.pass
										Venus	132°42.1	11:01
										Mars	161°24.0	09:05
										Jupiter	142°39.8	10:19
										Saturn	93°23.5	13:36
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:19:48		v-0.7 d-0.9 m-3.8		v1.0 d-0.6 m1.7		v1.9 d-0.2 m-1.5		v2.2 d-0.0 m0.5				

h		Sun			Moon									
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	183°33.0	-19°54.1	153°57.6	12.2	-19°26.4	-2.4	54.0	72	07:24	09:08	--	--	14:23	16:07
1	198°32.8	-19°54.6	168°28.8	12.2	-19°28.7	-2.3	54.0	70	07:11	08:39	10:47	12:45	14:52	16:20
2	213°32.7	-19°55.2	182°60.0	12.2	-19°30.9	-2.2	54.0	68	07:00	08:17	09:48	13:44	15:14	16:31
3	228°32.5	-19°55.7	197°31.1	12.1	-19°33.1	-2.1	54.0	66	06:51	08:00	09:14	14:17	15:31	16:40
4	243°32.3	-19°56.3	212°02.2	12.1	-19°35.1	-2.0	54.0	64	06:44	07:46	08:50	14:42	15:46	16:48
5	258°32.2	-19°56.8	226°33.4	12.1	-19°37.1	-1.9	54.0	62	06:37	07:34	08:31	15:01	15:57	16:55
6	273°32.0	-19°57.4	241°04.5	12.1	-19°39.0	-1.8	54.0	60	06:31	07:24	08:15	15:16	16:08	17:01
7	288°31.9	-19°57.9	255°35.6	12.1	-19°40.8	-1.7	54.0	58	06:25	07:15	08:02	15:30	16:17	17:06
8	303°31.7	-19°58.5	270°06.8	12.1	-19°42.5	-1.6	54.0	56	06:20	07:07	07:51	15:41	16:25	17:11
9	318°31.5	-19°59.0	284°37.9	12.1	-19°44.1	-1.5	54.0	54	06:16	06:60	07:41	15:51	16:32	17:16
10	333°31.4	-19°59.6	299°09.0	12.1	-19°45.6	-1.4	54.0	52	06:12	06:53	07:32	15:60	16:38	17:20
11	348°31.2	-20°00.1	313°40.1	12.1	-19°47.0	-1.3	54.0	50	06:08	06:48	07:24	16:08	16:44	17:24
12	3°31.1	-20°00.6	328°11.2	12.1	-19°48.4	-1.2	54.0	45	05:59	06:35	07:07	16:25	16:57	17:33
13	18°30.9	-20°01.2	342°42.3	12.1	-19°49.6	-1.1	54.0	40	05:51	06:24	06:53	16:39	17:08	17:42
14	33°30.7	-20°01.7	357°13.3	12.1	-19°50.8	-1.0	54.0	35	05:43	06:14	06:41	16:51	17:18	17:49
15	48°30.6	-20°02.3	11°44.4	12.1	-19°51.8	-0.9	54.0	30	05:36	06:05	06:31	17:01	17:27	17:56
16	63°30.4	-20°02.8	26°15.5	12.1	-19°52.8	-0.8	54.0	20	05:23	05:50	06:13	17:19	17:43	18:10
17	78°30.3	-20°03.4	40°46.6	12.1	-19°53.7	-0.7	54.0	10	05:09	05:35	05:57	17:35	17:57	18:23
18	93°30.1	-20°03.9	55°17.7	12.1	-19°54.5	-0.7	54.0	0	04:55	05:21	05:43	17:50	18:12	18:37
19	108°29.9	-20°04.4	69°48.7	12.1	-19°55.1	-0.6	54.0	-10	04:39	05:05	05:28	18:05	18:27	18:54
20	123°29.8	-20°05.0	84°19.8	12.1	-19°55.8	-0.5	54.0	-20	04:19	04:48	05:12	18:21	18:45	19:13
21	138°29.6	-20°05.5	98°50.9	12.1	-19°56.3	-0.4	54.0	-30	03:55	04:26	04:53	18:40	19:06	19:38
22	153°29.4	-20°06.1	113°21.9	12.1	-19°56.7	-0.3	54.0	-35	03:39	04:14	04:42	18:51	19:19	19:54
23	168°29.3	-20°06.6	127°53.0	12.1	-19°57.0	-0.3	54.0	-40	03:19	03:58	04:29	19:03	19:35	20:14
SD.=16.2 d=-0.6 S.D.=14.7								-45	02:55	03:40	04:15	19:19	19:54	20:39
								-50	02:20	03:16	03:56	19:37	20:18	21:13
								-52	02:02	03:04	03:47	19:46	20:30	21:32
								-54	01:39	02:50	03:38	19:56	20:44	21:56
								-56	01:06	02:34	03:27	20:07	20:60	22:30
								-58	--	02:15	03:14	20:20	21:20	--
								-60	--	01:50	02:59	20:35	21:45	--
								Moonrise			Moonset			
								Lat.	Tue	Wed	Thu	Tue	Wed	Thu
								72	--	--	--	--	--	--
								70	13:51	14:38	14:30	14:31	15:23	17:09
								68	12:23	13:12	13:39	15:59	16:49	18:01
								66	11:44	12:33	13:06	16:37	17:27	18:32
								64	11:17	12:06	12:42	17:04	17:54	18:56
								62	10:57	11:46	12:24	17:25	18:14	19:15
								60	10:40	11:29	12:08	17:42	18:31	19:30
								58	10:26	11:14	11:55	17:56	18:45	19:43
								56	10:13	11:02	11:43	18:08	18:58	19:54
								54	10:03	10:52	11:33	18:19	19:08	20:04
								52	09:53	10:42	11:25	18:29	19:18	20:12
								50	09:45	10:34	11:17	18:37	19:26	20:20
								45	09:27	10:16	10:59	18:55	19:44	20:37
								40	09:12	10:01	10:46	19:10	19:58	20:50
								35	09:00	09:49	10:34	19:22	20:11	21:02
								30	08:49	09:38	10:23	19:33	20:21	21:12
								20	08:31	09:19	10:05	19:52	20:40	21:29
								10	08:15	09:03	09:50	20:08	20:56	21:44
								0	07:60	08:48	09:35	20:23	21:11	21:58
								-10	07:45	08:33	09:21	20:38	21:26	22:12
								-20	07:29	08:16	09:05	20:54	21:42	22:27
								-30	07:11	07:58	08:47	21:13	21:60	22:44
								-35	07:00	07:47	08:37	21:24	22:11	22:54
								-40	06:48	07:35	08:25	21:36	22:23	23:05
								-45	06:34	07:20	08:11	21:51	22:37	23:18
								-50	06:16	07:02	07:54	22:09	22:54	23:35
								-52	06:08	06:54	07:46	22:17	23:03	23:42
								-54	05:59	06:44	07:37	22:27	23:12	23:50
								-56	05:48	06:34	07:27	22:37	23:22	23:60
								-58	05:36	06:22	07:15	22:49	23:34	--
								-60	05:23	06:07	07:01	23:03	23:48	--
								Sun			Moon			
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age		
									00 ^h	12 ^h	Pass	Upper	Lower	
								21	14:12	14:04	11:45	14:11	01:47	3(8%)
								22	13:57	13:49	11:46	14:59	02:35	4(14%)
								23	13:40	13:32	11:46	15:46	03:23	5(21%)
SD.=16.2 d=-0.5 S.D.=14.8														

November 24, 25, 26 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	63°08.5	194°35.2	-16°59.3	223°57.3	-6°56.6	205°35.9	-13°43.7	156°24.8	-22°27.3	Alpheratz	357°40.2	29°11.5	
1	78°10.9	209°34.6	-17°00.2	238°58.3	-6°57.2	220°37.9	-13°43.9	171°27.0	-22°27.3	Ankaa	353°12.6	-42°12.8	
2	93°13.4	224°33.9	-17°01.1	253°59.3	-6°57.8	235°39.8	-13°44.0	186°29.1	-22°27.3	Schedar	349°36.7	56°38.3	
3	108°15.9	239°33.2	-17°02.0	269°00.3	-6°58.4	250°41.8	-13°44.2	201°31.3	-22°27.4	Diphda	348°52.6	-17°53.5	
4	123°18.3	254°32.5	-17°02.9	284°01.3	-6°59.0	265°43.7	-13°44.3	216°33.5	-22°27.4	Achernar	335°24.2	-57°09.1	
5	138°20.8	269°31.8	-17°03.8	299°02.3	-6°59.6	280°45.7	-13°44.5	231°35.6	-22°27.4	Hamal	327°57.1	23°32.8	
6	153°23.3	284°31.1	-17°04.7	314°03.3	-7°00.2	295°47.6	-13°44.7	246°37.8	-22°27.4	Polaris	315°58.6	89°20.4	
7	168°25.7	299°30.5	-17°05.6	329°04.3	-7°00.8	310°49.6	-13°44.8	261°40.0	-22°27.4	Akamar	315°15.7	-40°14.2	
8	183°28.2	314°29.8	-17°06.5	344°05.3	-7°01.4	325°51.5	-13°45.0	276°42.1	-22°27.4	Menkar	314°11.6	4°09.5	
9	198°30.7	329°29.1	-17°07.4	359°06.3	-7°02.0	340°53.5	-13°45.2	291°44.3	-22°27.4	Mirfak	308°35.5	49°55.4	
10	213°33.1	344°28.4	-17°08.3	14°07.3	-7°02.6	355°55.4	-13°45.3	306°46.5	-22°27.4	Aldebaran	290°45.6	16°32.6	
11	228°35.6	359°27.7	-17°09.2	29°08.3	-7°03.2	10°57.4	-13°45.5	321°48.6	-22°27.4	Rigel	281°08.9	-8°11.0	
12	243°38.1	14°27.0	-17°10.1	44°09.3	-7°03.8	25°59.3	-13°45.7	336°50.8	-22°27.4	Capella	280°29.6	46°00.8	
13	258°40.5	29°26.3	-17°10.9	59°10.3	-7°04.4	41°01.3	-13°45.8	351°53.0	-22°27.5	Bellatrix	278°28.5	6°21.8	
14	273°43.0	44°25.6	-17°11.8	74°11.3	-7°05.0	56°03.2	-13°46.0	6°55.1	-22°27.5	Elnath	278°08.5	28°37.2	
15	288°45.4	59°25.0	-17°12.7	89°12.3	-7°05.6	71°05.2	-13°46.2	21°57.3	-22°27.5	Alnilam	275°43.0	-1°11.6	
16	303°47.9	74°24.3	-17°13.6	104°13.3	-7°06.2	86°07.1	-13°46.3	36°59.4	-22°27.5	Betelgeuse	270°57.8	7°24.5	
17	318°50.4	89°23.6	-17°14.5	119°14.3	-7°06.8	101°09.1	-13°46.5	52°01.6	-22°27.5	Canopus	263°54.3	-52°42.3	
18	333°52.8	104°22.9	-17°15.4	134°15.3	-7°07.4	116°11.0	-13°46.6	67°03.8	-22°27.5	Sirius	258°30.7	-16°44.3	
19	348°55.3	119°22.2	-17°16.3	149°16.3	-7°08.0	131°13.0	-13°46.8	82°05.9	-22°27.5	Adara	255°09.9	-28°59.8	
20	3°57.8	134°21.5	-17°17.2	164°17.3	-7°08.6	146°14.9	-13°47.0	97°08.1	-22°27.5	Procyon	244°56.3	5°10.8	
21	19°00.2	149°20.8	-17°18.1	179°18.3	-7°09.2	161°16.9	-13°47.1	112°10.3	-22°27.5	Pollux	243°23.8	27°58.8	
22	34°02.7	164°20.1	-17°19.0	194°19.3	-7°09.8	176°18.8	-13°47.3	127°12.4	-22°27.5	Avior	234°16.4	-59°33.8	
23	49°05.2	179°19.4	-17°19.8	209°20.3	-7°10.4	191°20.8	-13°47.5	142°14.6	-22°27.6	Suhail	222°50.1	-43°30.1	
Mer.pass.:19:44		v-0.7 d-0.9 m-3.8		v1.0 d-0.6 m1.7		v2.0 d-0.2 m-1.5		v2.2 d-0.0 m0.5		Miaplacidus		221°38.7	-69°47.2
										Alphard		217°53.1	-8°44.1
										Regulus		207°40.3	11°52.8
										Dubhe		193°48.3	61°39.0
										Denebola		182°30.7	14°28.4
										Gienah		175°49.4	-17°38.2
										Acruz		173°06.3	-63°11.5
										Gacrux		171°57.8	-57°12.4
										Alioth		166°18.6	55°51.7
										Spica		158°28.3	-11°15.0
										Alcaid		152°57.0	49°13.5
										Hadar		148°44.1	-60°27.2
										Menkent		148°04.4	-36°27.1
										Arcturus		145°53.2	19°05.8
										Rigel Kent.		139°48.2	-60°54.2
										Zubenelg.		137°02.4	-16°06.7
										Kochab		137°21.4	74°05.0
										Alphecca		126°08.9	26°39.5
										Antares		112°23.0	-26°28.0
										Atria		107°22.6	-69°03.4
										Sabik		102°09.5	-15°44.6
										Shaula		96°18.3	-37°06.8
										Rasalhague		96°04.0	12°33.1
										Etamin		90°45.2	51°29.5
										Kaus Aust.		83°40.2	-34°22.4
										Vega		80°37.3	38°48.3
										Nunki		75°54.9	-26°16.3
										Altair		62°05.6	8°55.1
										Peacock		53°14.9	-56°40.7
										Deneb		49°29.6	45°21.0
										Enif		33°44.3	9°57.6
										Alnair		27°40.1	-46°52.6
										Fomalhaut		15°20.7	-29°31.8
										Scheat		13°50.4	28°11.0
										Markab		13°35.3	15°18.2
										2017/11/		SHA	Mer.pass
										Venus		131°26.8	11:02
										Mars		160°48.9	09:04
										Jupiter		142°27.4	10:16
										Saturn		93°16.3	13:32
										2017/11/		SHA	Mer.pass
										Venus		130°11.1	11:03
										Mars		160°13.7	09:02
										Jupiter		142°15.1	10:13
										Saturn		93°09.1	13:29
										2017/11/		SHA	Mer.pass
										Venus		128°55.2	11:04
										Mars		159°38.4	09:00
										Jupiter		142°02.8	10:10
										Saturn		93°01.9	13:25
										Horizontal paralax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:19:36		v-0.7 d-0.9 m-3.8		v1.0 d-0.6 m1.7		v2.0 d-0.2 m-1.6		v2.2 d-0.0 m0.5					

h Sun								Moon							
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
0	183°20.8	-20°32.2	119°21.8	12.4	-18°22.2	4.1	54.3	72	Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
1	198°20.6	-20°32.7	133°53.2	12.4	-18°18.1	4.2	54.3	70	07:20	08:50	11:42	11:51	14:43	16:14	
2	213°20.5	-20°33.2	148°24.7	12.5	-18°13.9	4.3	54.3	68	07:08	08:27	10:03	13:30	15:07	16:25	
3	228°20.3	-20°33.7	162°56.2	12.5	-18°09.5	4.4	54.4	66	06:58	08:08	09:26	14:08	15:25	16:35	
4	243°20.1	-20°34.2	177°27.6	12.5	-18°05.2	4.4	54.4	64	06:50	07:53	08:59	14:34	15:40	16:43	
5	258°19.9	-20°34.7	191°59.1	12.5	-18°00.7	4.5	54.4	62	06:43	07:41	08:39	14:55	15:53	16:51	
6	273°19.7	-20°35.2	206°30.6	12.5	-17°56.1	4.6	54.4	60	06:36	07:30	08:22	15:11	16:04	16:57	
7	288°19.6	-20°35.7	221°02.1	12.5	-17°51.5	4.7	54.4	58	06:30	07:21	08:08	15:25	16:13	17:03	
8	303°19.4	-20°36.2	235°33.7	12.5	-17°46.7	4.8	54.4	56	06:25	07:12	07:56	15:37	16:21	17:09	
9	318°19.2	-20°36.7	250°05.2	12.5	-17°41.9	4.9	54.4	54	06:20	07:05	07:46	15:48	16:29	17:13	
10	333°19.0	-20°37.2	264°36.8	12.6	-17°37.0	4.9	54.5	52	06:16	06:58	07:37	15:57	16:36	17:18	
11	348°18.8	-20°37.7	279°08.3	12.6	-17°32.0	5.0	54.5	50	06:11	06:52	07:28	16:05	16:42	17:22	
12	3°18.6	-20°38.2	293°39.9	12.6	-17°27.0	5.1	54.5	45	06:02	06:38	07:11	16:23	16:56	17:32	
13	18°18.4	-20°38.7	308°11.5	12.6	-17°21.8	5.2	54.5	40	05:53	06:27	06:56	16:37	17:07	17:40	
14	33°18.3	-20°39.2	322°43.1	12.6	-17°16.6	5.3	54.5	35	05:46	06:17	06:44	16:50	17:17	17:48	
15	48°18.1	-20°39.7	337°14.7	12.6	-17°11.3	5.3	54.5	30	05:38	06:08	06:33	17:00	17:26	17:56	
16	63°17.9	-20°40.2	351°46.4	12.6	-17°05.9	5.4	54.5	20	05:24	05:51	06:15	17:19	17:43	18:10	
17	78°17.7	-20°40.7	6°18.0	12.7	-17°00.5	5.5	54.6	10	05:10	05:36	05:59	17:35	17:58	18:24	
18	93°17.5	-20°41.2	20°49.7	12.7	-16°54.9	5.6	54.6	0	04:56	05:21	05:43	17:51	18:13	18:39	
19	108°17.3	-20°41.7	35°21.3	12.7	-16°49.3	5.7	54.6	-10	04:39	05:05	05:28	18:06	18:29	18:55	
20	123°17.1	-20°42.2	49°53.0	12.7	-16°43.6	5.7	54.6	-20	04:19	04:47	05:11	18:23	18:47	19:15	
21	138°17.0	-20°42.7	64°24.7	12.7	-16°37.8	5.8	54.6	-30	03:53	04:25	04:52	18:42	19:09	19:41	
22	153°16.8	-20°43.1	78°56.4	12.7	-16°31.9	5.9	54.7	-35	03:37	04:12	04:41	18:54	19:22	19:58	
23	168°16.6	-20°43.6	93°28.2	12.7	-16°26.0	6.0	54.7	-40	03:17	03:56	04:28	19:07	19:38	20:18	
SD.=16.2 d=-0.5 S.D.=14.8								-45	02:51	03:37	04:12	19:22	19:58	20:44	
								-50	02:15	03:12	03:53	19:42	20:23	21:20	
								-52	01:56	02:60	03:44	19:51	20:36	21:40	
								-54	01:31	02:45	03:34	20:01	20:50	22:06	
								-56	00:53	02:28	03:22	20:13	21:07	22:46	
								-58	--	02:08	03:09	20:26	21:29	--	
								-60	--	01:41	02:53	20:43	21:56	--	
								Moonrise			Moonset				
								Lat.	Fri	Sat	Sun	Fri	Sat	Sun	
								72	15:23	14:53	14:38	17:55	20:02	21:54	
								70	14:26	14:22	14:18	18:51	20:32	22:12	
								68	13:52	13:59	14:03	19:25	20:54	22:26	
								66	13:27	13:41	13:50	19:49	21:11	22:38	
								64	13:08	13:26	13:40	20:08	21:25	22:47	
								62	12:52	13:14	13:31	20:23	21:37	22:55	
								60	12:39	13:03	13:23	20:36	21:47	23:02	
								58	12:28	12:54	13:16	20:47	21:56	23:08	
								56	12:18	12:46	13:10	20:56	22:03	23:14	
								54	12:09	12:39	13:05	21:05	22:10	23:18	
								52	12:01	12:32	12:60	21:12	22:16	23:23	
								50	11:54	12:26	12:55	21:19	22:21	23:27	
								45	11:39	12:14	12:46	21:34	22:33	23:35	
								40	11:26	12:03	12:38	21:45	22:43	23:42	
								35	11:15	11:54	12:31	21:56	22:51	23:48	
								30	11:06	11:46	12:25	22:04	22:58	23:53	
								20	10:50	11:33	12:14	22:20	23:11	--	
								10	10:36	11:21	12:05	22:33	23:22	--	
								0	10:23	11:09	11:56	22:45	23:32	--	
								-10	10:09	10:58	11:47	22:58	23:42	--	
								-20	09:55	10:46	11:38	23:11	23:53	--	
								-30	09:39	10:32	11:27	23:26	--	00:05	
								-35	09:30	10:24	11:21	23:34	--	00:12	
								-40	09:19	10:15	11:13	23:44	--	00:20	
								-45	09:06	10:04	11:05	23:55	--	00:29	
								-50	08:51	09:51	10:55	--	00:09	00:40	
								-52	08:43	09:45	10:50	--	00:16	00:45	
								-54	08:35	09:38	10:45	--	00:23	00:51	
								-56	08:26	09:31	10:40	--	00:31	00:57	
								-58	08:16	09:22	10:33	00:10	00:40	01:04	
								-60	08:04	09:13	10:26	00:23	00:50	01:12	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age			
									00 ^h	12 ^h	Pass	Upper	Lower		
								24	13:23	13:15	11:46	16:33	04:10	6(29%)	
								25	13:06	12:57	11:47	17:20	04:57	7(38%)	
								26	12:47	12:38	11:47	18:06	05:43	8(48%)	
SD.=16.2 d=-0.5 S.D.=15.1															

November 27, 28 ,29 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars					
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec				
0	66°05.9	193°44.8	-18°02.2	225°09.0	-7°39.5	207°56.5	-13°55.4	159°00.5	-22°28.0	Alpheratz	357°40.2	29°11.5			
1	81°08.4	208°44.1	-18°03.1	240°10.0	-7°40.1	222°58.4	-13°55.6	174°02.7	-22°28.1	Ankaa	353°12.6	-42°12.8			
2	96°10.8	223°43.4	-18°03.9	255°11.0	-7°40.7	238°00.4	-13°55.8	189°04.9	-22°28.1	Schedar	349°36.7	56°38.3			
3	111°13.3	238°42.6	-18°04.8	270°12.0	-7°41.3	253°02.3	-13°55.9	204°07.0	-22°28.1	Diphda	348°52.6	-17°53.5			
4	126°15.8	253°41.9	-18°05.6	285°13.0	-7°41.9	268°04.3	-13°56.1	219°09.2	-22°28.1	Achernar	335°24.2	-57°09.1			
5	141°18.2	268°41.2	-18°06.5	300°14.0	-7°42.5	283°06.3	-13°56.3	234°11.4	-22°28.1	Hamal	327°57.1	23°32.8			
6	156°20.7	283°40.5	-18°07.3	315°15.0	-7°43.1	298°08.2	-13°56.4	249°13.5	-22°28.1	Polaris	315°59.0	89°20.4			
7	171°23.2	298°39.8	-18°08.1	330°16.0	-7°43.7	313°10.2	-13°56.6	264°15.7	-22°28.1	Akamar	315°15.7	-40°14.2			
8	186°25.6	313°39.0	-18°09.0	345°17.0	-7°44.3	328°12.1	-13°56.7	279°17.8	-22°28.1	Menkar	314°11.6	4°09.5			
9	201°28.1	328°38.3	-18°09.8	0°18.0	-7°44.9	343°14.1	-13°56.9	294°20.0	-22°28.1	Mirfak	308°35.5	49°55.4			
10	216°30.5	343°37.6	-18°10.7	15°19.0	-7°45.4	358°16.0	-13°57.1	309°22.2	-22°28.1	Aldebaran	290°45.6	16°32.6			
11	231°33.0	358°36.9	-18°11.5	30°20.0	-7°46.0	13°18.0	-13°57.2	324°24.3	-22°28.2	Rigel	281°08.9	-8°11.0			
12	246°35.5	13°36.1	-18°12.3	45°21.0	-7°46.6	28°19.9	-13°57.4	339°26.5	-22°28.2	Capella	280°29.6	46°00.8			
13	261°37.9	28°35.4	-18°13.2	60°22.0	-7°47.2	43°21.9	-13°57.5	354°28.6	-22°28.2	Bellatrix	278°28.5	6°21.8			
14	276°40.4	43°34.7	-18°14.0	75°23.0	-7°47.8	58°23.8	-13°57.7	9°30.8	-22°28.2	Elnath	278°08.5	28°37.2			
15	291°42.9	58°34.0	-18°14.8	90°23.9	-7°48.4	73°25.8	-13°57.9	24°33.0	-22°28.2	Alnilam	275°43.0	-1°11.6			
16	306°45.3	73°33.2	-18°15.7	105°24.9	-7°49.0	88°27.8	-13°58.0	39°35.1	-22°28.2	Betelgeuse	270°57.8	7°24.4			
17	321°47.8	88°32.5	-18°16.5	120°25.9	-7°49.6	103°29.7	-13°58.2	54°37.3	-22°28.2	Canopus	263°54.3	-52°42.3			
18	336°50.3	103°31.8	-18°17.3	135°26.9	-7°50.2	118°31.7	-13°58.4	69°39.4	-22°28.2	Sirius	258°30.7	-16°44.3			
19	351°52.7	118°31.0	-18°18.2	150°27.9	-7°50.8	133°33.6	-13°58.5	84°41.6	-22°28.2	Adara	255°09.9	-18°59.8			
20	6°55.2	133°30.3	-18°19.0	165°28.9	-7°51.4	148°35.6	-13°58.7	99°43.8	-22°28.2	Procyon	244°56.3	5°10.8			
21	21°57.6	148°29.6	-18°19.8	180°29.9	-7°51.9	163°37.5	-13°58.8	114°45.9	-22°28.3	Pollux	243°23.8	27°58.8			
22	37°00.1	163°28.9	-18°20.6	195°30.9	-7°52.5	178°39.5	-13°59.0	129°48.1	-22°28.3	Avior	234°16.4	-59°33.8			
23	52°02.6	178°28.1	-18°21.5	210°31.9	-7°53.1	193°41.4	-13°59.2	144°50.2	-22°28.3	Suhail	222°50.0	-43°30.1			
Mer.pass.:19:32											Miaplacidus	221°38.6	-69°47.2		
											Alphard	217°53.0	-8°44.1		
											Regulus	207°40.3	11°52.7		
											Dubhe	193°48.2	61°39.0		
											Denebola	182°30.7	14°28.4		
											Gienah	175°49.3	-17°38.2		
											Acrux	173°06.2	-63°11.5		
											Gacrux	171°57.8	-57°12.4		
											Alioth	166°18.5	55°51.7		
											Spica	158°28.3	-11°15.0		
											Alcaid	152°57.0	49°13.5		
											Hadar	148°44.1	-60°27.2		
											Menkent	148°04.4	-36°27.1		
											Arcturus	145°53.2	19°05.8		
											Rigel Kent.	139°48.2	-60°54.2		
											Zubenelg.	137°02.4	-16°06.7		
											Kochab	137°21.3	74°05.0		
											Alphecca	126°08.9	26°39.5		
											Antares	112°22.9	-26°28.0		
											Atria	107°22.6	-69°03.3		
											Sabik	102°09.5	-15°44.6		
											Shaula	96°18.3	-37°06.8		
											Rasalhague	96°04.0	12°33.1		
											Etamin	90°45.3	51°29.5		
											Kaus Aust.	83°40.2	-34°22.4		
											Vega	80°37.3	38°48.3		
											Nunki	75°54.9	-26°16.3		
											Altair	62°05.6	8°55.1		
											Peacock	53°14.9	-56°40.7		
											Deneb	49°29.6	45°21.0		
											Enif	33°44.3	9°57.6		
											Alnair	27°40.1	-46°52.6		
											Fomalhaut	15°20.7	-29°31.8		
											Scheat	13°50.4	28°10.9		
											Markab	13°35.3	15°18.2		
											2017/11/	SHA	Mer.pass		
											Venus	127°38.9	11:06		
											Mars	159°03.1	08:59		
											Jupiter	141°50.6	10:07		
											Saturn	92°54.6	13:22		
											2017/11/	SHA	Mer.pass		
											Venus	126°22.4	11:07		
											Mars	158°27.8	08:57		
											Jupiter	141°38.4	10:04		
											Saturn	92°47.4	13:19		
											2017/11/	SHA	Mer.pass		
											Venus	125°05.5	11:08		
											Mars	157°52.5	08:56		
											Jupiter	141°26.2	10:01		
											Saturn	92°40.0	13:15		
											Horizontal paralax				
											Venus:	0.1			
											Mars:	0.1			
Mer.pass.:19:24											v-0.7 d-0.8 m-3.8		v1.0 d-0.6 m1.7	v2.0 d-0.2 m-1.6	v2.2 d-0.0 m0.5

h		Sun		Moon				Twilight									
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.			
0	183°07.0	-21°06.9	85°32.1	13.0	-10°06.4	9.3	55.9	72	07:43	09:37	--	--	13:58	15:52			
1	198°06.8	-21°07.3	100°04.0	13.0	-9°57.0	9.4	56.0	70	07:28	09:01	--	--	14:34	16:08			
2	213°06.6	-21°07.8	114°36.0	12.9	-9°47.6	9.5	56.0	68	07:15	08:36	10:20	13:16	14:60	16:20			
3	228°06.4	-21°08.2	129°07.9	12.9	-9°38.1	9.5	56.0	66	07:05	08:16	09:37	13:59	15:19	16:31			
4	243°06.2	-21°08.7	143°39.9	12.9	-9°28.6	9.6	56.1	64	06:56	08:00	09:08	14:27	15:35	16:40			
5	258°06.0	-21°09.1	158°11.8	12.9	-9°19.0	9.6	56.1	62	06:48	07:47	08:46	14:49	15:49	16:47			
6	273°05.8	-21°09.6	172°43.7	12.9	-9°09.3	9.7	56.1	60	06:41	07:36	08:29	15:07	15:60	16:54			
7	288°05.6	-21°10.0	187°15.6	12.9	-8°59.6	9.7	56.2	58	06:35	07:26	08:14	15:21	16:10	17:00			
8	303°05.4	-21°10.5	201°47.5	12.9	-8°49.8	9.8	56.2	56	06:29	07:17	08:02	15:34	16:19	17:06			
9	318°05.1	-21°10.9	216°19.4	12.9	-8°40.0	9.8	56.2	54	06:24	07:09	07:51	15:45	16:26	17:11			
10	333°04.9	-21°11.4	230°51.3	12.9	-8°30.1	9.9	56.3	52	06:20	07:02	07:41	15:54	16:34	17:16			
11	348°04.7	-21°11.8	245°23.2	12.9	-8°20.2	9.9	56.3	50	06:15	06:56	07:33	16:03	16:40	17:21			
12	3°04.5	-21°12.3	259°55.0	12.8	-8°10.3	10.0	56.3	45	06:05	06:42	07:15	16:21	16:54	17:31			
13	18°04.3	-21°12.7	274°26.9	12.8	-8°00.2	10.0	56.4	40	05:56	06:30	06:60	16:36	17:06	17:39			
14	33°04.1	-21°13.2	288°58.7	12.8	-7°50.2	10.1	56.4	35	05:48	06:19	06:47	16:49	17:16	17:48			
15	48°03.9	-21°13.6	303°30.5	12.8	-7°40.0	10.1	56.4	30	05:41	06:10	06:36	16:60	17:26	17:55			
16	63°03.7	-21°14.1	318°02.3	12.8	-7°29.9	10.2	56.5	20	05:26	05:53	06:17	17:19	17:43	18:10			
17	78°03.5	-21°14.5	332°34.1	12.8	-7°19.6	10.2	56.5	10	05:12	05:38	06:00	17:36	17:58	18:24			
18	93°03.3	-21°15.0	347°05.9	12.8	-7°09.4	10.3	56.6	0	04:56	05:22	05:44	17:52	18:14	18:40			
19	108°03.1	-21°15.4	1°37.6	12.7	-6°59.1	10.3	56.6	-10	04:39	05:06	05:28	18:08	18:30	18:57			
20	123°02.9	-21°15.9	16°09.3	12.7	-6°48.7	10.4	56.6	-20	04:19	04:47	05:11	18:25	18:49	19:18			
21	138°02.6	-21°16.3	30°41.1	12.7	-6°38.3	10.4	56.7	-30	03:52	04:25	04:52	18:45	19:12	19:44			
22	153°02.4	-21°16.8	45°12.7	12.7	-6°27.8	10.5	56.7	-35	03:36	04:11	04:40	18:57	19:25	20:01			
23	168°02.2	-21°17.2	59°44.4	12.7	-6°17.3	10.5	56.7	-40	03:15	03:55	04:26	19:10	19:42	20:22			
SD.=16.2 d=-0.5 S.D.=15.3																	
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Mon	Tue	Wed	Mon	Tue	Wed			
0	183°02.0	-21°17.6	74°16.1	12.6	-6°06.8	10.6	56.8	-52	01:50	02:56	03:41	19:56	20:41	21:48			
1	198°01.8	-21°18.1	88°47.7	12.6	-5°56.2	10.6	56.8	-54	01:22	02:41	03:31	20:06	20:56	22:16			
2	213°01.6	-21°18.5	103°19.3	12.6	-5°45.6	10.7	56.8	-56	00:37	02:23	03:19	20:19	21:14	23:05			
3	228°01.4	-21°19.0	117°50.9	12.6	-5°34.9	10.7	56.9	-58	--	02:01	03:05	20:33	21:37	--			
4	243°01.2	-21°19.4	132°22.5	12.6	-5°24.2	10.7	56.9	-60	--	01:31	02:48	20:50	22:08	--			
5	258°01.0	-21°19.8	146°54.0	12.5	-5°13.4	10.8	57.0	Moonrise							Moonset		
6	273°00.7	-21°20.3	161°25.5	12.5	-5°02.6	10.8	57.0	72	14:26	14:16	14:06	23:43	--	01:33			
7	288°00.5	-21°20.7	175°57.0	12.5	-4°51.8	10.9	57.0	70	14:14	14:11	14:07	23:53	--	01:35			
8	303°00.3	-21°21.1	190°28.5	12.4	-4°40.9	10.9	57.1	68	14:05	14:07	14:08	--	00:00	01:37			
9	318°00.1	-21°21.6	204°59.9	12.4	-4°30.0	10.9	57.1	66	13:57	14:03	14:09	--	00:06	01:38			
10	332°59.9	-21°22.0	219°31.3	12.4	-4°19.0	11.0	57.2	64	13:51	14:00	14:09	--	00:12	01:39			
11	347°59.7	-21°22.4	234°02.7	12.4	-4°08.1	11.0	57.2	62	13:45	13:58	14:10	--	00:16	01:41			
12	2°59.5	-21°22.9	248°34.0	12.3	-3°57.0	11.0	57.2	60	13:40	13:55	14:11	--	00:20	01:41			
13	17°59.3	-21°23.3	263°05.3	12.3	-3°46.0	11.1	57.3	58	13:36	13:53	14:11	--	00:24	01:42			
14	32°59.0	-21°23.7	277°36.6	12.3	-3°34.9	11.1	57.3	56	13:32	13:52	14:12	--	00:27	01:43			
15	47°58.8	-21°24.2	292°07.9	12.2	-3°23.7	11.1	57.3	54	13:28	13:50	14:12	--	00:30	01:44			
16	62°58.6	-21°24.6	306°39.1	12.2	-3°12.6	11.2	57.4	52	13:25	13:49	14:12	--	00:32	01:44			
17	77°58.4	-21°25.0	321°10.3	12.2	-3°01.4	11.2	57.4	50	13:22	13:47	14:13	--	00:34	01:45			
18	92°58.2	-21°25.4	335°41.4	12.1	-2°50.2	11.2	57.5	45	13:16	13:44	14:13	--	00:39	01:46			
19	107°58.0	-21°25.9	350°12.6	12.1	-2°38.9	11.3	57.5	40	13:10	13:42	14:14	--	00:43	01:47			
20	122°57.7	-21°26.3	4°43.6	12.1	-2°27.6	11.3	57.5	35	13:06	13:40	14:15	--	00:47	01:48			
21	137°57.5	-21°26.7	19°14.7	12.0	-2°16.3	11.3	57.6	30	13:01	13:38	14:15	--	00:50	01:49			
22	152°57.3	-21°27.2	33°45.7	12.0	-2°05.0	11.4	57.6	20	12:54	13:35	14:16	00:03	00:55	01:50			
23	167°57.1	-21°27.6	48°16.7	11.9	-1°53.6	11.4	57.7	10	12:48	13:32	14:17	00:11	01:00	01:51			
SD.=16.2 d=-0.4 S.D.=15.5																	
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun	Mer.	Moon	Moon		Age			
0	182°56.9	-21°28.0	62°47.6	11.9	-1°42.2	11.4	57.7	-10	12:36	13:26	14:18	00:25	01:09	01:53			
1	197°56.7	-21°28.4	77°18.5	11.9	-1°30.8	11.4	57.7	-20	12:30	13:24	14:19	00:33	01:13	01:54			
2	212°56.4	-21°28.8	91°49.3	11.8	-1°19.3	11.5	57.8	-30	12:23	13:20	14:20	00:42	01:18	01:55			
3	227°56.2	-21°29.3	106°20.1	11.8	-1°07.9	11.5	57.8	-35	12:19	13:18	14:21	00:47	01:21	01:56			
4	242°56.0	-21°29.7	120°50.9	11.7	-0°56.4	11.5	57.9	-40	12:14	13:16	14:21	00:53	01:25	01:56			
5	257°55.8	-21°30.1	135°21.6	11.7	-0°44.9	11.5	57.9	-45	12:08	13:14	14:22	00:59	01:29	01:57			
6	272°55.6	-21°30.5	149°52.3	11.7	-0°33.3	11.5	58.0	-50	12:02	13:11	14:23	01:07	01:33	01:58			
7	287°55.3	-21°31.0	164°22.9	11.6	-0°21.8	11.6	58.0	-52	11:59	13:10	14:23	01:11	01:35	01:59			
8	302°55.1	-21°31.4	178°53.5	11.6	-0°10.2	11.6	58.0	-54	11:55	13:08	14:24	01:15	01:37	01:59			
9	317°54.9	-21°31.8	193°24.1	11.5	0°01.4	11.6	58.1	-56	11:52	13:06	14:24	01:19	01:40	01:60			
10	332°54.7	-21°32.2	207°54.6	11.5	0°13.0	11.6	58.1	-58	11:47	13:05	14:25	01:24	01:43	02:00			
11	347°54.5	-21°32.6	222°25.0	11.4	0°24.6	11.6	58.2	-60	11:43	13:03	14:26	01:30	01:46	02:01			
12	2°54.2	-21°33.0	236°55.4	11.4	0°36.3	11.6	58.2	Sun							Moon		
13	17°54.0	-21°33.4	251°25.7	11.3	0°47.9	11.7	58.2	27	Eqn.of Time	Mer.	Mer.Pass.	Upper	Lower	Age			
14	32°53.8	-21°33.9	265°56.0	11.3	0°59.6	11.7	58.3	28	00 ^h	12 ^h	Pass						
15	47°53.6	-21°34.3	280°26.3	11.2	1°11.3	11.7	58.3	29	12:28	12:18	11:47	18:53	06:30	9(58%)			
16	62°53.4	-21°34.7	294°56.5	11.2	1°23.0	11.7	58.4		12:08	11:58	11:48	19:40	07:16	10(68%)			
17	77°53.1	-21°35.1	309°26.6	11.1	1°34.7	11.7	58.4		11:48	11:37	11:48	20:29	08:04	11(78%)			
18	92°52.9	-21°35.5	323°56.7	11.1	1°46.4	11.7	58.4										
19	107°52.7	-21°35.9	338°26.7	11.0	1°58.1	11.7	58.5										
20	122°52.5	-21°36.3	352°56.7	10.9	2°09.8	11.7	58.5										
21	137°52.2	-21°36.7	7°26.6	10.9	2°21.6	11.7	58.6										
22	152°52.0	-21°37.1	21°56.5	10.8	2°33.3	11.7	58.6										
23	167°51.8	-21°37.6	36°26.3	10.8	2°45.0	11.7	58.6										
SD.=16.2 d=-0.4 S.D.=15.7																	

November 30, 01 ,02 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	69°03.3	192°51.7	-19°00.8	226°20.4	-8°21.9	210°17.3	-14°07.0	161°36.0	-22°28.7	Alpheratz	357°40.2	29°11.5
1	84°05.8	207°50.9	-19°01.6	241°21.4	-8°22.5	225°19.3	-14°07.1	176°38.2	-22°28.7	Ankaa	353°12.6	-42°12.8
2	99°08.2	222°50.2	-19°02.4	256°22.4	-8°23.1	240°21.3	-14°07.3	191°40.3	-22°28.7	Schedar	349°36.7	56°38.3
3	114°10.7	237°49.4	-19°03.2	271°23.4	-8°23.7	255°23.2	-14°07.5	206°42.5	-22°28.7	Diphda	348°52.6	-17°53.5
4	129°13.2	252°48.7	-19°04.0	286°24.4	-8°24.3	270°25.2	-14°07.6	221°44.6	-22°28.8	Achernar	335°24.2	-57°09.1
5	144°15.6	267°47.9	-19°04.7	301°25.4	-8°24.9	285°27.1	-14°07.8	236°46.8	-22°28.8	Hamal	327°57.1	23°32.8
6	159°18.1	282°47.1	-19°05.5	316°26.4	-8°25.4	300°29.1	-14°07.9	251°48.9	-22°28.8	Polaris	315°59.4	89°20.4
7	174°20.6	297°46.4	-19°06.3	331°27.4	-8°26.0	315°31.1	-14°08.1	266°51.1	-22°28.8	Akamar	315°15.7	-40°14.2
8	189°23.0	312°45.6	-19°07.1	346°28.3	-8°26.6	330°33.0	-14°08.2	281°53.3	-22°28.8	Menkar	314°11.6	4°09.5
9	204°25.5	327°44.9	-19°07.8	1°29.3	-8°27.2	345°35.0	-14°08.4	296°55.4	-22°28.8	Mirfak	308°35.5	49°55.4
10	219°28.0	342°44.1	-19°08.6	16°30.3	-8°27.8	0°36.9	-14°08.6	311°57.6	-22°28.8	Aldebaran	290°45.6	16°32.6
11	234°30.4	357°43.3	-19°09.4	31°31.3	-8°28.4	15°38.9	-14°08.7	326°59.7	-22°28.8	Rigel	281°08.8	-8°11.0
12	249°32.9	12°42.6	-19°10.2	46°32.3	-8°29.0	30°40.8	-14°08.9	342°01.9	-22°28.8	Capella	280°29.6	46°00.8
13	264°35.3	27°41.8	-19°10.9	61°33.3	-8°29.5	45°42.8	-14°09.0	357°04.0	-22°28.8	Bellatrix	278°28.5	6°21.8
14	279°37.8	42°41.0	-19°11.7	76°34.3	-8°30.1	60°44.8	-14°09.2	12°06.2	-22°28.8	Elnath	278°08.5	28°37.2
15	294°40.3	57°40.3	-19°12.5	91°35.3	-8°30.7	75°46.7	-14°09.3	27°08.4	-22°28.9	Alnilam	275°43.0	-1°11.6
16	309°42.7	72°39.5	-19°13.2	106°36.3	-8°31.3	90°48.7	-14°09.5	42°10.5	-22°28.9	Betelgeuse	270°57.7	7°24.4
17	324°45.2	87°38.7	-19°14.0	121°37.2	-8°31.9	105°50.6	-14°09.7	57°12.7	-22°28.9	Canopus	263°54.3	-52°42.3
18	339°47.7	102°38.0	-19°14.8	136°38.2	-8°32.5	120°52.6	-14°09.8	72°14.8	-22°28.9	Sirius	258°30.7	-16°44.3
19	354°50.1	117°37.2	-19°15.5	151°39.2	-8°33.0	135°54.6	-14°10.0	87°17.0	-22°28.9	Adara	255°09.8	-28°59.8
20	9°52.6	132°36.5	-19°16.3	166°40.2	-8°33.6	150°56.5	-14°10.1	102°19.1	-22°28.9	Procyon	244°56.3	5°10.8
21	24°55.1	147°35.7	-19°17.1	181°41.2	-8°34.2	165°58.5	-14°10.3	117°21.3	-22°28.9	Pollux	243°23.7	27°58.8
22	39°57.5	162°34.9	-19°17.8	196°42.2	-8°34.8	181°00.4	-14°10.5	132°23.5	-22°28.9	Avior	234°16.4	-59°33.8
23	54°60.0	177°34.1	-19°18.6	211°43.2	-8°35.4	196°02.4	-14°10.6	147°25.6	-22°28.9	Suhail	222°50.0	-43°30.1
Mer.pass.:19:20		v-0.8 d-0.8 m-3.8		v1.0 d-0.6 m1.7		v2.0 d-0.2 m-1.6		v2.2 d-0.0 m0.5		Miaplacidus	221°38.6	-69°47.2
										Alphard	217°53.0	-8°44.1
										Regulus	207°40.3	11°52.7
										Dubhe	193°48.2	61°39.0
										Denebola	182°30.7	14°28.4
										Gienah	175°49.3	-17°38.2
										Acrux	173°06.2	-63°11.5
										Gacrux	171°57.8	-57°12.4
										Alioth	166°18.5	55°51.7
										Spica	158°28.3	-11°15.0
										Alcaid	152°57.0	49°13.4
										Hadar	148°44.1	-60°27.2
										Menkent	148°04.3	-36°27.1
										Arcturus	145°53.2	19°05.8
										Rigel Kent.	139°48.2	-60°54.2
										Zubenelg.	137°02.4	-16°06.7
										Kochab	137°21.3	74°04.9
										Alphecca	126°08.9	26°39.5
										Antares	112°22.9	-26°28.0
										Atria	107°22.6	-69°03.3
										Sabik	102°09.5	-15°44.6
										Shaula	96°18.3	-37°06.8
										Rasalhague	96°04.0	12°33.1
										Etamin	90°45.3	51°29.5
										Kaus Aust.	83°40.2	-34°22.4
										Vega	80°37.3	38°48.3
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°55.1
										Peacock	53°14.9	-56°40.7
										Deneb	49°29.7	45°21.0
										Enif	33°44.3	9°57.6
										Alnair	27°40.1	-46°52.6
										Fomalhaut	15°20.8	-29°31.8
										Scheat	13°50.5	28°10.9
										Markab	13°35.3	15°18.2
										2017/11/	SHA	Mer.pass
										Venus	123°48.4	11:09
										Mars	157°17.1	08:54
										Jupiter	141°14.0	09:58
										Saturn	92°32.7	13:12
										2017/12/	SHA	Mer.pass
										Venus	122°30.9	11:10
										Mars	156°41.7	08:52
										Jupiter	141°01.9	09:54
										Saturn	92°25.3	13:08
										2017/12/	SHA	Mer.pass
										Venus	121°13.2	11:12
										Mars	156°06.3	08:51
										Jupiter	140°49.8	09:51
										Saturn	92°17.9	13:05
										Horizontal paralax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:19:12		v-0.8 d-0.7 m-3.8		v1.0 d-0.6 m1.7		v2.0 d-0.2 m-1.6		v2.2 d-0.0 m0.5				

Sun				Moon			
h	GHA	Dec	ν	Dec	d	HP	
0	182°51.6	-21°38.0	50°56.0	10.7	2°56.8	11.7	58.7
1	197°51.3	-21°38.4	65°25.7	10.7	3°08.5	11.7	58.7
2	212°51.1	-21°38.8	79°55.4	10.6	3°20.3	11.7	58.8
3	227°50.9	-21°39.2	94°24.9	10.5	3°32.0	11.7	58.8
4	242°50.7	-21°39.6	108°54.4	10.5	3°43.8	11.7	58.8
5	257°50.4	-21°40.0	123°23.9	10.4	3°55.5	11.7	58.9
6	272°50.2	-21°40.4	137°53.2	10.3	4°07.2	11.7	58.9
7	287°50.0	-21°40.8	152°22.6	10.3	4°19.0	11.7	59.0
8	302°49.8	-21°41.2	166°51.8	10.2	4°30.7	11.7	59.0
9	317°49.5	-21°41.6	181°21.0	10.2	4°42.4	11.7	59.0
10	332°49.3	-21°42.0	195°50.1	10.1	4°54.1	11.7	59.1
11	347°49.1	-21°42.4	210°19.2	10.0	5°05.8	11.7	59.1
12	2°48.9	-21°42.8	224°48.2	10.0	5°17.5	11.7	59.2
13	17°48.6	-21°43.2	239°17.1	9.9	5°29.1	11.7	59.2
14	32°48.4	-21°43.6	253°45.9	9.8	5°40.8	11.6	59.2
15	47°48.2	-21°44.0	268°14.7	9.7	5°52.4	11.6	59.3
16	62°47.9	-21°44.4	282°43.4	9.7	6°04.1	11.6	59.3
17	77°47.7	-21°44.8	297°12.0	9.6	6°15.7	11.6	59.4
18	92°47.5	-21°45.2	311°40.6	9.5	6°27.2	11.6	59.4
19	107°47.3	-21°45.6	326°09.1	9.5	6°38.8	11.6	59.4
20	122°47.0	-21°45.9	340°37.5	9.4	6°50.3	11.5	59.5
21	137°46.8	-21°46.3	355°05.9	9.3	7°01.9	11.5	59.5
22	152°46.6	-21°46.7	9°34.1	9.2	7°13.4	11.5	59.6
23	167°46.3	-21°47.1	24°02.3	9.2	7°24.8	11.4	59.6
	SD.=16.2	d=-0.4			S.D.=16.0		

Fri	GHA	Dec	ν	Dec	d	HP	
0	182°46.1	-21°47.5	38°30.5	9.1	7°36.3	11.4	59.6
1	197°45.9	-21°47.9	52°58.5	9.0	7°47.7	11.4	59.7
2	212°45.6	-21°48.3	67°26.5	8.9	7°59.0	11.4	59.7
3	227°45.4	-21°48.7	81°54.4	8.9	8°10.4	11.3	59.7
4	242°45.2	-21°49.1	96°22.2	8.8	8°21.7	11.3	59.8
5	257°44.9	-21°49.4	110°49.9	8.7	8°33.0	11.3	59.8
6	272°44.7	-21°49.8	125°17.6	8.6	8°44.2	11.2	59.8
7	287°44.5	-21°50.2	139°45.2	8.5	8°55.4	11.2	59.9
8	302°44.2	-21°50.6	154°12.7	8.5	9°06.5	11.1	59.9
9	317°44.0	-21°51.0	168°40.1	8.4	9°17.7	11.1	60.0
10	332°43.8	-21°51.4	183°07.4	8.3	9°28.7	11.0	60.0
11	347°43.5	-21°51.7	197°34.7	8.2	9°39.8	11.0	60.0
12	2°43.3	-21°52.1	212°01.9	8.1	9°50.7	11.0	60.1
13	17°43.1	-21°52.5	226°29.0	8.1	10°01.7	10.9	60.1
14	32°42.8	-21°52.9	240°56.0	8.0	10°12.6	10.9	60.1
15	47°42.6	-21°53.3	255°22.9	7.9	10°23.4	10.8	60.2
16	62°42.4	-21°53.6	269°49.8	7.8	10°34.2	10.8	60.2
17	77°42.1	-21°54.0	284°16.6	7.7	10°44.9	10.7	60.2
18	92°41.9	-21°54.4	298°43.3	7.6	10°55.6	10.6	60.3
19	107°41.7	-21°54.8	313°09.9	7.6	11°06.2	10.6	60.3
20	122°41.4	-21°55.2	327°36.4	7.5	11°16.7	10.5	60.3
21	137°41.2	-21°55.5	342°02.8	7.4	11°27.2	10.5	60.3
22	152°40.9	-21°55.9	356°29.2	7.3	11°37.7	10.4	60.4
23	167°40.7	-21°56.3	10°55.5	7.2	11°48.0	10.3	60.4
	SD.=16.2	d=-0.4			S.D.=16.3		

Sat	GHA	Dec	ν	Dec	d	HP	
0	182°40.5	-21°56.6	25°21.7	7.1	11°58.3	10.3	60.4
1	197°40.2	-21°57.0	39°47.8	7.1	12°08.6	10.2	60.5
2	212°40.0	-21°57.4	54°13.8	7.0	12°18.7	10.1	60.5
3	227°39.8	-21°57.8	68°39.7	6.9	12°28.8	10.1	60.5
4	242°39.5	-21°58.1	83°05.6	6.8	12°38.9	10.0	60.6
5	257°39.3	-21°58.5	97°31.4	6.7	12°48.8	9.9	60.6
6	272°39.0	-21°58.9	111°57.0	6.6	12°58.7	9.8	60.6
7	287°38.8	-21°59.2	126°22.6	6.6	13°08.5	9.8	60.6
8	302°38.6	-21°59.6	140°48.2	6.5	13°18.2	9.7	60.7
9	317°38.3	-21°60.0	155°13.6	6.4	13°27.9	9.6	60.7
10	332°38.1	-22°00.3	169°39.0	6.3	13°37.4	9.5	60.7
11	347°37.8	-22°00.7	184°04.2	6.2	13°46.9	9.4	60.7
12	2°37.6	-22°01.0	198°29.4	6.2	13°56.3	9.4	60.8
13	17°37.4	-22°01.4	212°54.5	6.1	14°05.6	9.3	60.8
14	32°37.1	-22°01.8	227°19.6	6.0	14°14.8	9.2	60.8
15	47°36.9	-22°02.1	241°44.5	5.9	14°24.0	9.1	60.8
16	62°36.6	-22°02.5	256°09.4	5.8	14°33.0	9.0	60.9
17	77°36.4	-22°02.9	270°34.2	5.7	14°42.0	8.9	60.9
18	92°36.1	-22°03.2	284°58.9	5.7	14°50.8	8.8	60.9
19	107°35.9	-22°03.6	299°23.5	5.6	14°59.6	8.7	60.9
20	122°35.7	-22°03.9	313°48.1	5.5	15°08.2	8.6	60.9
21	137°35.4	-22°04.3	328°12.5	5.4	15°16.8	8.5	61.0
22	152°35.2	-22°04.6	342°36.9	5.4	15°25.3	8.4	61.0
23	167°34.9	-22°05.0	357°01.3	5.3	15°33.6	8.3	61.0
	SD.=16.2	d=-0.4			S.D.=16.5		

Twilight				Twilight			
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
72	07:51	09:51	--	--	13:47	15:46	
70	07:35	09:11	--	--	14:26	16:02	
68	07:22	08:44	10:37	13:01	14:53	16:16	
66	07:11	08:23	09:47	13:50	15:14	16:27	
64	07:01	08:07	09:16	14:21	15:31	16:36	
62	06:53	07:53	08:54	14:44	15:45	16:44	
60	06:46	07:41	08:35	15:03	15:57	16:52	
58	06:40	07:31	08:20	15:18	16:07	16:58	
56	06:34	07:22	08:07	15:31	16:16	17:04	
54	06:28	07:13	07:56	15:42	16:24	17:10	
52	06:23	07:06	07:46	15:52	16:32	17:15	
50	06:19	06:59	07:37	16:01	16:38	17:19	
45	06:08	06:45	07:18	16:20	16:53	17:30	
40	05:59	06:33	07:03	16:35	17:05	17:39	
35	05:51	06:22	06:50	16:48	17:16	17:47	
30	05:43	06:12	06:38	16:60	17:26	17:55	
20	05:28	05:55	06:19	17:19	17:43	18:10	
10	05:13	05:39	06:02	17:37	17:59	18:25	
0	04:57	05:23	05:45	17:53	18:15	18:41	
-10	04:40	05:06	05:29	18:09	18:32	18:59	
-20	04:19	04:47	05:12	18:27	18:51	19:20	
-30	03:52	04:24	04:51	18:47	19:14	19:47	
-35	03:35	04:10	04:39	18:59	19:28	20:04	
-40	03:13	03:54	04:25	19:13	19:45	20:26	
-45	02:46	03:33	04:09	19:30	20:06	20:53	
-50	02:07	03:06	03:49	19:50	20:33	21:33	
-52	01:44	02:53	03:39	20:00	20:46	21:56	
-54	01:14	02:37	03:28	20:11	21:02	22:27	
-56	00:16	02:19	03:15	20:24	21:21	23:35	
-58	--	01:55	03:01	20:39	21:45	--	
-60	--	01:22	02:43	20:56	22:19	--	

Moonrise				Moonset		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	13:56	13:44	13:29	03:26	05:27	07:38
70	14:03	13:60	13:57	03:21	05:13	07:13
68	14:10	14:12	14:17	03:17	05:02	06:53
66	14:15	14:23	14:34	03:14	04:54	06:38
64	14:19	14:31	14:48	03:11	04:46	06:25
62	14:23	14:39	14:59	03:08	04:40	06:14
60	14:27	14:46	15:09	03:06	04:34	06:05
58	14:30	14:51	15:18	03:04	04:29	05:57
56	14:33	14:57	15:25	03:02	04:25	05:50
54	14:35	15:01	15:32	03:01	04:21	05:44
52	14:37	15:05	15:38	02:60	04:18	05:39
50	14:39	15:09	15:44	02:58	04:15	05:33
45	14:44	15:18	15:56	02:55	04:08	05:23
40	14:48	15:25	16:06	02:53	04:02	05:14
35	14:51	15:31	16:15	02:51	03:57	05:06
30	14:54	15:36	16:22	02:49	03:53	04:59
20	14:59	15:45	16:36	02:46	03:46	04:48
10	15:04	15:54	16:47	02:44	03:39	04:38
0	15:08	16:01	16:58	02:41	03:33	04:28
-10	15:12	16:09	17:09	02:39	03:27	04:19
-20	15:17	16:18	17:21	02:36	03:20	04:08
-30	15:22	16:27	17:35	02:33	03:13	03:57
-35	15:25	16:33	17:43	02:31	03:09	03:50
-40	15:29	16:39	17:52	02:29	03:04	03:43
-45	15:33	16:47	18:03	02:27	02:58	03:34
-50	15:38	16:56	18:16	02:24	02:52	03:24
-52	15:40	17:00	18:22	02:23	02:49	03:19
-54	15:43	17:05	18:29	02:21	02:45	03:13
-56	15:46	17:10	18:36	02:20	02:42	03:08
-58	15:49	17:16	18:45	02:18	02:38	03:01
-60	15:52	17:22	18:54	02:16	02:33	02:54

Day	Sun			Moon	
	Eqn. of Time 00 ^h	12 ^h	Mer. Pass	Mer. Pass. Upper Lower	Age
30	11:26	11:16	11:48	21:20 08:54	12(86%)
1	11:05	10:53	11:49	22:14 09:47	13(93%)
2	10:42	10:31	11:49	23:12 10:43	14(98%)

December 03, 04 ,05 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	72°00.7	191°55.9	-19°54.7	227°31.5	-9°03.8	212°38.5	-14°18.3	164°11.2	-22°29.3	Alpheratz	357°40.3	29°11.5
1	87°03.2	206°55.1	-19°55.4	242°32.5	-9°04.4	227°40.5	-14°18.4	179°13.4	-22°29.3	Ankaa	353°12.6	-42°12.8
2	102°05.7	221°54.3	-19°56.1	257°33.5	-9°05.0	242°42.5	-14°18.6	194°15.5	-22°29.3	Schedar	349°36.7	56°38.3
3	117°08.1	236°53.5	-19°56.8	272°34.4	-9°05.5	257°44.4	-14°18.7	209°17.7	-22°29.4	Diphda	348°52.6	-17°53.5
4	132°10.6	251°52.7	-19°57.5	287°35.4	-9°06.1	272°46.4	-14°18.9	224°19.8	-22°29.4	Achernar	335°24.2	-57°09.1
5	147°13.1	266°51.9	-19°58.3	302°36.4	-9°06.7	287°48.3	-14°19.0	239°22.0	-22°29.4	Hamal	327°57.1	23°32.8
6	162°15.5	281°51.1	-19°59.0	317°37.4	-9°07.3	302°50.3	-14°19.2	254°24.1	-22°29.4	Polaris	315°59.6	89°20.4
7	177°18.0	296°50.3	-19°59.7	332°38.4	-9°07.9	317°52.3	-14°19.3	269°26.3	-22°29.4	Akamar	315°15.7	-40°14.2
8	192°20.4	311°49.5	-20°00.4	347°39.4	-9°08.4	332°54.2	-14°19.5	284°28.4	-22°29.4	Menkar	314°11.6	4°09.5
9	207°22.9	326°48.7	-20°01.1	2°40.3	-9°09.0	347°56.2	-14°19.7	299°30.6	-22°29.4	Mirfak	308°35.5	49°55.4
10	222°25.4	341°47.9	-20°01.8	17°41.3	-9°09.6	2°58.2	-14°19.8	314°32.8	-22°29.4	Aldebaran	290°45.6	16°32.6
11	237°27.8	356°47.1	-20°02.5	32°42.3	-9°10.2	18°00.1	-14°20.0	329°34.9	-22°29.4	Rigel	281°08.8	-8°11.0
12	252°30.3	1°46.3	-20°03.2	47°43.3	-9°10.7	33°02.1	-14°20.1	344°37.1	-22°29.4	Capella	280°29.5	46°00.8
13	267°32.8	26°45.5	-20°03.9	62°44.3	-9°11.3	48°04.1	-14°20.3	359°39.2	-22°29.4	Bellatrix	278°28.5	6°21.8
14	282°35.2	41°44.7	-20°04.6	77°45.3	-9°11.9	63°06.0	-14°20.4	14°41.4	-22°29.4	Elnath	278°08.5	28°37.2
15	297°37.7	56°43.9	-20°05.3	92°46.2	-9°12.5	78°08.0	-14°20.6	29°43.5	-22°29.4	Alnilam	275°43.0	-1°11.6
16	312°40.2	71°43.1	-20°06.0	107°47.2	-9°13.0	93°10.0	-14°20.7	44°45.7	-22°29.5	Betelgeuse	270°57.7	7°24.4
17	327°42.6	86°42.3	-20°06.7	122°48.2	-9°13.6	108°11.9	-14°20.9	59°47.8	-22°29.5	Canopus	263°54.3	-52°42.4
18	342°45.1	101°41.5	-20°07.4	137°49.2	-9°14.2	123°13.9	-14°21.0	74°50.0	-22°29.5	Sirius	258°30.7	-16°44.4
19	357°47.6	116°40.7	-20°08.1	152°50.2	-9°14.8	138°15.8	-14°21.2	89°52.1	-22°29.5	Adara	255°09.8	-28°59.8
20	12°50.0	131°39.9	-20°08.8	167°51.2	-9°15.4	153°17.8	-14°21.4	104°54.3	-22°29.5	Procyon	244°56.3	5°10.8
21	27°52.5	146°39.1	-20°09.5	182°52.1	-9°15.9	168°19.8	-14°21.5	119°56.4	-22°29.5	Pollux	243°23.7	27°58.8
22	42°54.9	161°38.3	-20°10.2	197°53.1	-9°16.5	183°21.7	-14°21.7	134°58.6	-22°29.5	Avior	234°16.3	-59°33.9
23	57°57.4	176°37.5	-20°10.9	212°54.1	-9°17.1	198°23.7	-14°21.8	150°00.8	-22°29.5	Suhail	222°50.0	-43°30.1
Mer.pass.:19:08		v-0.8 d-0.7 m-3.8		v1.0 d-0.6 m1.7		v2.0 d-0.2 m-1.6		v2.2 d-0.0 m0.5		Miaplacidus	221°38.5	-69°47.2
										Alphard	217°53.0	-8°44.1
										Regulus	207°40.2	11°52.7
										Dubhe	193°48.2	61°39.0
										Denebola	182°30.6	14°28.4
										Gienah	175°49.3	-17°38.3
										Acrux	173°06.1	-63°11.5
										Gacrux	171°57.7	-57°12.4
										Alioth	166°18.5	55°51.6
										Spica	158°28.3	-11°15.0
										Alcaid	152°56.9	49°13.4
										Hadar	148°44.0	-60°27.2
										Menkent	148°04.3	-36°27.1
										Arcturus	145°53.1	19°05.8
										Rigel Kent.	139°48.1	-60°54.1
										Zubenelg.	137°02.4	-16°06.7
										Kochab	137°21.3	74°04.9
										Alphecca	126°08.9	26°39.5
										Antares	112°22.9	-26°28.0
										Atria	107°22.6	-69°03.3
										Sabik	102°09.4	-15°44.6
										Shaula	96°18.3	-37°06.8
										Rasalhague	96°04.0	12°33.1
										Etamin	90°45.3	51°29.5
										Kaus Aust.	83°40.2	-34°22.4
										Vega	80°37.3	38°48.3
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°55.1
										Peacock	53°15.0	-56°40.7
										Deneb	49°29.7	45°21.0
										Enif	33°44.3	9°57.6
										Alnair	27°40.2	-46°52.6
										Fomalhaut	15°20.8	-29°31.8
										Scheat	13°50.5	28°10.9
										Markab	13°35.3	15°18.2
										2017/12/	SHA	Mer.pass
										Venus	119°55.2	11:13
										Mars	155°30.8	08:49
										Jupiter	140°37.8	09:48
										Saturn	92°10.5	13:01
										2017/12/	SHA	Mer.pass
										Venus	118°36.8	11:14
										Mars	154°55.2	08:48
										Jupiter	140°25.8	09:45
										Saturn	92°03.0	12:58
										2017/12/	SHA	Mer.pass
										Venus	117°18.2	11:15
										Mars	154°19.6	08:46
										Jupiter	140°13.8	09:42
										Saturn	91°55.6	12:55
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:19:00		v-0.8 d-0.7 m-3.8		v1.0 d-0.6 m1.7		v2.0 d-0.2 m-1.6		v2.2 d-0.0 m0.5				

Sun				Moon			
h	GHA	Dec	ν	GHA	Dec	d	HP
0	182°34.7	-22°05.4	11°25.5	5.2	15°41.9	8.2	61.0
1	197°34.4	-22°05.7	25°49.7	5.1	15°50.0	8.1	61.0
2	212°34.2	-22°06.1	40°13.8	5.1	15°58.1	8.0	61.1
3	227°34.0	-22°06.4	54°37.8	5.0	16°06.0	7.9	61.1
4	242°33.7	-22°06.8	69°01.7	4.9	16°13.8	7.8	61.1
5	257°33.5	-22°07.1	83°25.6	4.8	16°21.5	7.7	61.1
6	272°33.2	-22°07.5	97°49.4	4.8	16°29.1	7.5	61.1
7	287°33.0	-22°07.8	112°13.1	4.7	16°36.6	7.4	61.1
8	302°32.7	-22°08.2	126°36.8	4.6	16°44.0	7.3	61.2
9	317°32.5	-22°08.5	141°00.4	4.6	16°51.2	7.2	61.2
10	332°32.2	-22°08.9	155°23.9	4.5	16°58.4	7.1	61.2
11	347°32.0	-22°09.2	169°47.4	4.4	17°05.4	7.0	61.2
12	2°31.7	-22°09.5	184°10.8	4.4	17°12.3	6.8	61.2
13	17°31.5	-22°09.9	198°34.1	4.3	17°19.0	6.7	61.2
14	32°31.2	-22°10.2	212°57.4	4.2	17°25.7	6.6	61.2
15	47°31.0	-22°10.6	227°20.6	4.2	17°32.2	6.5	61.2
16	62°30.7	-22°10.9	241°43.7	4.1	17°38.6	6.3	61.3
17	77°30.5	-22°11.3	256°06.8	4.1	17°44.9	6.2	61.3
18	92°30.3	-22°11.6	270°29.8	4.0	17°51.0	6.1	61.3
19	107°30.0	-22°11.9	284°52.8	4.0	17°57.0	5.9	61.3
20	122°29.8	-22°12.3	299°15.7	3.9	18°02.9	5.8	61.3
21	137°29.5	-22°12.6	313°38.6	3.8	18°08.6	5.7	61.3
22	152°29.3	-22°13.0	328°01.4	3.8	18°14.3	5.5	61.3
23	167°29.0	-22°13.3	342°24.2	3.7	18°19.7	5.4	61.3
SD.=16.2 d=-0.4				S.D.=16.6			

Mon	GHA	Dec	ν	GHA	Dec	d	HP
0	182°28.8	-22°13.6	356°46.9	3.7	18°25.1	5.3	61.3
1	197°28.5	-22°14.0	11°09.6	3.7	18°30.3	5.1	61.3
2	212°28.3	-22°14.3	25°32.2	3.6	18°35.3	5.0	61.3
3	227°28.0	-22°14.6	39°54.8	3.6	18°40.3	4.9	61.3
4	242°27.8	-22°15.0	54°17.4	3.5	18°45.1	4.7	61.3
5	257°27.5	-22°15.3	68°39.9	3.5	18°49.7	4.6	61.3
6	272°27.2	-22°15.6	83°02.3	3.4	18°54.2	4.4	61.3
7	287°27.0	-22°16.0	97°24.8	3.4	18°58.6	4.3	61.3
8	302°26.7	-22°16.3	111°47.1	3.4	19°02.8	4.2	61.3
9	317°26.5	-22°16.6	126°09.5	3.3	19°06.9	4.0	61.3
10	332°26.2	-22°17.0	140°31.8	3.3	19°10.8	3.9	61.3
11	347°26.0	-22°17.3	154°54.1	3.3	19°14.6	3.7	61.3
12	2°25.7	-22°17.6	169°16.4	3.3	19°18.2	3.6	61.3
13	17°25.5	-22°17.9	183°38.7	3.2	19°21.7	3.4	61.3
14	32°25.2	-22°18.3	198°00.9	3.2	19°25.1	3.3	61.3
15	47°25.0	-22°18.6	212°23.1	3.2	19°28.3	3.1	61.3
16	62°24.7	-22°18.9	226°45.3	3.2	19°31.3	3.0	61.3
17	77°24.5	-22°19.2	241°07.4	3.2	19°34.3	2.8	61.3
18	92°24.2	-22°19.6	255°29.6	3.1	19°37.0	2.7	61.3
19	107°24.0	-22°19.9	269°51.7	3.1	19°39.6	2.5	61.3
20	122°23.7	-22°20.2	284°13.8	3.1	19°42.1	2.4	61.3
21	137°23.4	-22°20.5	298°35.9	3.1	19°44.4	2.2	61.3
22	152°23.2	-22°20.8	312°58.0	3.1	19°46.5	2.1	61.3
23	167°22.9	-22°21.2	327°20.1	3.1	19°48.5	1.9	61.3
SD.=16.2 d=-0.3				S.D.=16.7			

Tue	GHA	Dec	ν	GHA	Dec	d	HP
0	182°22.7	-22°21.5	341°42.2	3.1	19°50.4	1.8	61.3
1	197°22.4	-22°21.8	356°04.3	3.1	19°52.1	1.6	61.3
2	212°22.2	-22°22.1	10°26.4	3.1	19°53.6	1.5	61.2
3	227°21.9	-22°22.4	24°48.5	3.1	19°55.0	1.3	61.2
4	242°21.6	-22°22.8	39°10.6	3.1	19°56.3	1.2	61.2
5	257°21.4	-22°23.1	53°32.7	3.1	19°57.4	1.0	61.2
6	272°21.1	-22°23.4	67°54.8	3.1	19°58.3	0.9	61.2
7	287°20.9	-22°23.7	82°17.0	3.1	19°59.1	0.7	61.2
8	302°20.6	-22°24.0	96°39.1	3.1	19°59.7	0.6	61.2
9	317°20.4	-22°24.3	111°01.3	3.2	20°00.2	0.4	61.2
10	332°20.1	-22°24.6	125°23.4	3.2	20°00.5	0.3	61.2
11	347°19.8	-22°24.9	139°45.6	3.2	20°00.7	0.1	61.1
12	2°19.6	-22°25.3	154°07.8	3.2	20°00.8	-0.0	61.1
13	17°19.3	-22°25.6	168°30.1	3.2	20°00.6	-0.2	61.1
14	32°19.1	-22°25.9	182°52.3	3.3	20°00.4	-0.3	61.1
15	47°18.8	-22°26.2	197°14.6	3.3	19°59.9	-0.5	61.1
16	62°18.5	-22°26.5	211°36.9	3.3	19°59.4	-0.6	61.1
17	77°18.3	-22°26.8	225°59.2	3.4	19°58.6	-0.8	61.0
18	92°18.0	-22°27.1	240°21.6	3.4	19°57.8	-0.9	61.0
19	107°17.8	-22°27.4	254°44.0	3.4	19°56.8	-1.1	61.0
20	122°17.5	-22°27.7	269°06.5	3.5	19°55.6	-1.2	61.0
21	137°17.2	-22°28.0	283°29.0	3.5	19°54.3	-1.4	61.0
22	152°17.0	-22°28.3	297°51.5	3.5	19°52.8	-1.5	60.9
23	167°16.7	-22°28.6	312°14.0	3.6	19°51.2	-1.7	60.9
SD.=16.2 d=-0.3				S.D.=16.7			

Lat.	Twilight			Twilight		
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:59	10:05	--	--	13:35	15:41
70	07:42	09:21	--	--	14:19	15:58
68	07:28	08:52	10:56	12:44	14:48	16:12
66	07:16	08:30	09:58	13:42	15:10	16:24
64	07:07	08:13	09:24	14:16	15:27	16:34
62	06:58	07:58	09:00	14:40	15:42	16:42
60	06:50	07:46	08:41	14:59	15:54	16:50
58	06:44	07:35	08:25	15:15	16:05	16:56
56	06:38	07:26	08:12	15:28	16:14	17:03
54	06:32	07:17	08:00	15:40	16:23	17:08
52	06:27	07:10	07:50	15:50	16:30	17:13
50	06:22	07:03	07:41	15:50	16:37	17:18
45	06:11	06:48	07:21	16:19	16:52	17:29
40	06:02	06:35	07:06	16:35	17:05	17:39
35	05:53	06:24	06:52	16:48	17:16	17:47
30	05:45	06:15	06:41	16:60	17:26	17:56
20	05:30	05:57	06:21	17:20	17:44	18:11
10	05:14	05:40	06:03	17:37	18:00	18:26
0	04:58	05:24	05:47	17:54	18:16	18:42
-10	04:40	05:07	05:30	18:11	18:34	19:00
-20	04:19	04:48	05:12	18:29	18:53	19:22
-30	03:51	04:24	04:51	18:50	19:17	19:50
-35	03:34	04:10	04:39	19:02	19:31	20:07
-40	03:12	03:53	04:25	19:16	19:48	20:29
-45	02:44	03:32	04:08	19:33	20:10	20:58
-50	02:03	03:04	03:47	19:54	20:37	21:39
-52	01:40	02:50	03:37	20:04	20:51	22:03
-54	01:07	02:34	03:26	20:16	21:08	22:36
-56	--	02:14	03:13	20:29	21:27	--
-58	--	01:50	02:57	20:44	21:53	--
-60	--	01:14	02:39	21:03	22:29	--

Lat.	Moonrise			Moonset		
	Sun	Mon	Tue	Sun	Mon	Tue
72	12:59	--	--	10:13	--	--
70	13:54	13:54	14:20	09:19	11:30	13:16
68	14:28	14:50	15:40	08:46	10:34	11:56
66	14:52	15:24	16:18	08:23	10:01	11:18
64	15:11	15:49	16:45	08:04	09:36	10:51
62	15:27	16:08	17:06	07:49	09:17	10:31
60	15:41	16:24	17:23	07:36	09:01	10:14
58	15:52	16:38	17:37	07:25	08:48	09:59
56	16:02	16:49	17:49	07:16	08:36	09:47
54	16:11	16:60	17:60	07:07	08:26	09:36
52	16:19	17:09	18:09	06:60	08:17	09:27
50	16:26	17:17	18:18	06:53	08:09	09:18
45	16:41	17:35	18:36	06:38	07:52	09:00
40	16:54	17:49	18:51	06:27	07:38	08:45
35	17:05	18:01	19:03	06:16	07:26	08:33
30	17:14	18:12	19:14	06:08	07:16	08:22
20	17:31	18:30	19:33	05:52	06:58	08:03
10	17:45	18:46	19:49	05:39	06:43	07:47
0	17:59	19:01	20:04	05:27	06:28	07:31
-10	18:12	19:16	20:20	05:14	06:14	07:16
-20	18:27	19:33	20:36	05:01	05:58	06:60
-30	18:44	19:51	20:55	04:46	05:41	06:41
-40	18:54	20:02	21:06	04:37	05:30	06:30
-45	19:05	20:15	21:19	04:27	05:19	06:17
-50	19:18	20:29	21:33	04:16	05:05	06:02
-52	19:34	20:48	21:52	04:02	04:48	05:44
-54	19:42	20:56	22:00	03:55	04:40	05:35
-56	19:50	21:06	22:10	03:48	04:31	05:25
-58	19:60	21:17	22:21	03:40	04:21	05:15
-60	20:11	21:29	22:33	03:31	04:10	05:02
	20:23	21:43	22:47	03:20	03:57	04:48

Day	Sun			Moon		
	Eqn. of Time	Mer. Pass	Mer. Pass.	Upper	Lower	Age
3	10:19	10:07	11:49	00:13	11:42	15(100%)
4	09:55	09:43	11:50	00:13	12:44	16(99%)
5	09:31	09:18	11:50	01:16	13:48	17(95%)

December 06, 07 ,08 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	74°58.2	190°57.5	-20°43.5	228°42.2	-9°45.1	215°00.1	-14°29.3	166°46.2	-22°29.9	Alpheratz	357°40.3	29°11.5
1	90°00.6	205°56.7	-20°44.1	243°43.1	-9°45.7	230°02.1	-14°29.5	181°48.4	-22°29.9	Ankaa	353°12.6	-42°12.8
2	105°03.1	220°55.9	-20°44.8	258°44.1	-9°46.3	245°04.0	-14°29.6	196°50.5	-22°29.9	Schedar	349°36.7	56°38.3
3	120°05.5	235°55.0	-20°45.4	273°45.1	-9°46.8	260°06.0	-14°29.8	211°52.7	-22°29.9	Diphda	348°52.6	-17°53.5
4	135°08.0	250°54.2	-20°46.1	288°46.1	-9°47.4	275°08.0	-14°29.9	226°54.8	-22°29.9	Achernar	335°24.2	-57°09.1
5	150°10.5	265°53.4	-20°46.7	303°47.1	-9°48.0	290°09.9	-14°30.1	241°57.0	-22°29.9	Hamal	327°57.1	23°32.8
6	165°12.9	280°52.5	-20°47.3	318°48.0	-9°48.6	305°11.9	-14°30.2	256°59.1	-22°29.9	Polaris	315°59.9	89°20.4
7	180°15.4	295°51.7	-20°48.0	333°49.0	-9°49.1	320°13.9	-14°30.4	272°01.3	-22°29.9	Akamar	315°15.7	-40°14.3
8	195°17.9	310°50.9	-20°48.6	348°50.0	-9°49.7	335°15.8	-14°30.5	287°03.4	-22°29.9	Menkar	314°11.6	4°09.5
9	210°20.3	325°50.0	-20°49.2	3°51.0	-9°50.3	350°17.8	-14°30.7	302°05.6	-22°29.9	Mirfak	308°35.5	49°55.4
10	225°22.8	340°49.2	-20°49.9	18°51.9	-9°50.8	5°19.8	-14°30.8	317°07.7	-22°29.9	Aldebaran	290°45.6	16°32.6
11	240°25.3	355°48.4	-20°50.5	33°52.9	-9°51.4	20°21.7	-14°31.0	332°09.9	-22°30.0	Rigel	281°08.8	-8°11.0
12	255°27.7	10°47.5	-20°51.1	48°53.9	-9°52.0	35°23.7	-14°31.1	347°12.0	-22°30.0	Capella	280°29.5	46°00.8
13	270°30.2	25°46.7	-20°51.8	63°54.9	-9°52.5	50°25.7	-14°31.3	2°14.2	-22°30.0	Bellatrix	278°28.4	6°21.8
14	285°32.7	40°45.9	-20°52.4	78°55.9	-9°53.1	65°27.7	-14°31.4	17°16.3	-22°30.0	Elnath	278°08.4	28°37.2
15	300°35.1	55°45.0	-20°53.0	93°56.8	-9°53.7	80°29.6	-14°31.6	32°18.5	-22°30.0	Alnilam	275°43.0	-1°11.6
16	315°37.6	70°44.2	-20°53.6	108°57.8	-9°54.2	95°31.6	-14°31.7	47°20.6	-22°30.0	Betelgeuse	270°57.7	7°24.4
17	330°40.0	85°43.4	-20°54.3	123°58.8	-9°54.8	110°33.6	-14°31.9	62°22.8	-22°30.0	Canopus	263°54.3	-52°42.4
18	345°42.5	100°42.5	-20°54.9	138°59.8	-9°55.4	125°35.5	-14°32.0	77°24.9	-22°30.0	Sirius	258°30.7	-16°44.4
19	0°45.0	115°41.7	-20°55.5	154°00.7	-9°55.9	140°37.5	-14°32.2	92°27.1	-22°30.0	Adara	255°09.8	-28°59.9
20	15°47.4	130°40.9	-20°56.1	169°01.7	-9°56.5	155°39.5	-14°32.3	107°29.2	-22°30.0	Procyon	244°56.2	5°10.8
21	30°49.9	145°40.0	-20°56.7	184°02.7	-9°57.1	170°41.4	-14°32.5	122°31.4	-22°30.0	Pollux	243°23.7	27°58.8
22	45°52.4	160°39.2	-20°57.4	199°03.7	-9°57.6	185°43.4	-14°32.6	137°33.5	-22°30.0	Avior	234°16.3	-59°33.9
23	60°54.8	175°38.3	-20°58.0	214°04.7	-9°58.2	200°45.4	-14°32.8	152°35.7	-22°30.0	Suhail	222°50.0	-43°30.1
Mer.pass.:18:57		v-0.8 d-0.6 m-3.8		v1.0 d-0.6 m1.7		v2.0 d-0.2 m-1.6		v2.2 d-0.0 m0.5		Miaplacidus	221°38.5	-69°47.2
										Alphard	217°53.0	-8°44.2
										Regulus	207°40.2	11°52.7
										Dubhe	193°48.1	61°39.0
										Denebola	182°30.6	14°28.3
										Gienah	175°49.3	-17°38.3
										Acrux	173°06.1	-63°11.5
										Gacrux	171°57.7	-57°12.4
										Alioth	166°18.4	55°51.6
										Spica	158°28.3	-11°15.0
										Alcaid	152°56.9	49°13.4
										Hadar	148°44.0	-60°27.2
										Menkent	148°04.3	-36°27.1
										Arcturus	145°53.1	19°05.8
										Rigel Kent.	139°48.1	-60°54.1
										Zubenelg.	137°02.4	-16°06.7
										Kochab	137°21.3	74°04.9
										Alphecca	126°08.8	26°39.4
										Antares	112°22.9	-26°28.0
										Atria	107°22.6	-69°03.3
										Sabik	102°09.4	-15°44.6
										Shaula	96°18.3	-37°06.8
										Rasalhague	96°04.0	12°33.1
										Etamin	90°45.3	51°29.4
										Kaus Aust.	83°40.2	-34°22.4
										Vega	80°37.3	38°48.3
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°55.1
										Peacock	53°15.0	-56°40.7
										Deneb	49°29.7	45°21.0
										Enif	33°44.3	9°57.6
										Alnair	27°40.2	-46°52.6
										Fomalhaut	15°20.8	-29°31.8
										Scheat	13°50.5	28°10.9
										Markab	13°35.3	15°18.2
										2017/12/	SHA	Mer.pass
										Venus	115°59.4	11:17
										Mars	153°44.0	08:45
										Jupiter	140°01.9	09:39
										Saturn	91°48.1	12:51
										2017/12/	SHA	Mer.pass
										Venus	114°40.2	11:18
										Mars	153°08.3	08:43
										Jupiter	139°50.1	09:36
										Saturn	91°40.5	12:48
										2017/12/	SHA	Mer.pass
										Venus	113°20.8	11:19
										Mars	152°32.6	08:41
										Jupiter	139°38.2	09:32
										Saturn	91°33.0	12:44
										Horizontal parallax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:18:49		v-0.9 d-0.6 m-3.8		v1.0 d-0.6 m1.6		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5				

h		Sun				Moon										
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight				
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.			
0	182° 16.5	-22° 28.9	326° 36.6	3.6	19° 49.4	-1.8	60.9	72	08:06	10:18	--	--	13:25	15:36		
1	197° 16.2	-22° 29.2	340° 59.3	3.7	19° 47.5	-2.0	60.9	70	07:48	09:30	--	--	14:13	15:55		
2	212° 15.9	-22° 29.5	355° 22.0	3.7	19° 45.5	-2.1	60.9	68	07:34	08:59	11:20	12:22	14:44	16:09		
3	227° 15.7	-22° 29.8	9° 44.7	3.8	19° 43.3	-2.3	60.8	66	07:21	08:36	10:07	13:36	15:07	16:21		
4	242° 15.4	-22° 30.1	24° 07.5	3.8	19° 41.0	-2.4	60.8	64	07:11	08:18	09:32	14:11	15:25	16:31		
5	257° 15.1	-22° 30.4	38° 30.4	3.9	19° 38.5	-2.5	60.8	62	07:02	08:03	09:06	14:37	15:40	16:40		
6	272° 14.9	-22° 30.7	52° 53.3	3.9	19° 35.9	-2.7	60.8	60	06:54	07:50	08:46	14:57	15:52	16:48		
7	287° 14.6	-22° 31.0	67° 16.3	4.0	19° 33.1	-2.8	60.8	58	06:47	07:39	08:30	15:13	16:03	16:55		
8	302° 14.4	-22° 31.3	81° 39.3	4.0	19° 30.2	-3.0	60.7	56	06:41	07:30	08:16	15:27	16:13	17:02		
9	317° 14.1	-22° 31.6	96° 02.3	4.1	19° 27.2	-3.1	60.7	54	06:35	07:21	08:04	15:39	16:22	17:07		
10	332° 13.8	-22° 31.9	110° 25.5	4.2	19° 24.0	-3.2	60.7	52	06:30	07:13	07:54	15:49	16:29	17:13		
11	347° 13.6	-22° 32.2	124° 48.7	4.2	19° 20.7	-3.4	60.7	50	06:25	07:06	07:44	15:59	16:37	17:18		
12	2° 13.3	-22° 32.5	139° 11.9	4.3	19° 17.2	-3.5	60.6	45	06:14	06:51	07:24	16:18	16:52	17:29		
13	17° 13.0	-22° 32.7	153° 35.3	4.4	19° 13.6	-3.7	60.6	40	06:04	06:38	07:08	16:35	17:05	17:39		
14	32° 12.8	-22° 33.0	167° 58.6	4.4	19° 09.9	-3.8	60.6	35	05:55	06:27	06:55	16:48	17:16	17:48		
15	47° 12.5	-22° 33.3	182° 22.1	4.5	19° 06.0	-3.9	60.5	30	05:47	06:17	06:43	17:00	17:26	17:56		
16	62° 12.2	-22° 33.6	196° 45.6	4.6	19° 02.1	-4.1	60.5	20	05:31	05:59	06:22	17:21	17:44	18:12		
17	77° 12.0	-22° 33.9	211° 09.2	4.6	18° 57.9	-4.2	60.5	10	05:16	05:42	06:05	17:38	18:01	18:27		
18	92° 11.7	-22° 34.2	225° 32.9	4.7	18° 53.7	-4.3	60.5	0	04:59	05:25	05:48	17:55	18:18	18:44		
19	107° 11.4	-22° 34.5	239° 56.6	4.8	18° 49.3	-4.4	60.4	-10	04:41	05:08	05:31	18:12	18:35	19:02		
20	122° 11.2	-22° 34.8	254° 20.4	4.8	18° 44.8	-4.6	60.4	-20	04:19	04:48	05:13	18:31	18:55	19:24		
21	137° 10.9	-22° 35.0	268° 44.3	4.9	18° 40.2	-4.7	60.4	-30	03:51	04:24	04:51	18:52	19:19	19:52		
22	152° 10.6	-22° 35.3	283° 08.3	5.0	18° 35.4	-4.8	60.3	-35	03:33	04:10	04:39	19:04	19:34	20:10		
23	167° 10.4	-22° 35.6	297° 32.3	5.1	18° 30.5	-4.9	60.3	-40	03:11	03:52	04:24	19:19	19:51	20:32		
SD.=16.2 d=-0.3 S.D.=16.6								-45	02:42	03:31	04:07	19:36	20:13	21:02		
								-50	02:00	03:02	03:46	19:58	20:41	21:44		
								-52	01:35	02:48	03:35	20:08	20:56	22:09		
								-54	00:60	02:31	03:24	20:20	21:13	22:46		
								-56	--	02:11	03:10	20:33	21:33	--		
								-58	--	01:45	02:55	20:49	21:60	--		
								-60	--	01:06	02:36	21:08	22:40	--		
								Moonrise			Moonset					
								Lat.	Wed	Thu	Fri	Wed	Thu	Fri		
								72	--	17:30	19:52	--	14:21	13:55		
								70	16:15	18:19	20:17	13:32	13:31	13:29		
								68	17:06	18:50	20:36	12:40	12:60	13:08		
								66	17:38	19:13	20:51	12:08	12:36	12:52		
								64	18:02	19:31	21:04	11:44	12:17	12:39		
								62	18:21	19:46	21:14	11:25	12:02	12:27		
								60	18:36	19:58	21:23	11:09	11:49	12:18		
								58	18:49	20:09	21:31	10:56	11:38	12:09		
								56	19:00	20:18	21:38	10:44	11:28	12:02		
								54	19:10	20:26	21:44	10:34	11:20	11:55		
								52	19:19	20:33	21:49	10:25	11:12	11:49		
								50	19:27	20:40	21:54	10:17	11:05	11:44		
								45	19:44	20:54	22:05	09:60	10:50	11:32		
								40	19:57	21:06	22:14	09:46	10:37	11:22		
								35	20:09	21:16	22:21	09:33	10:27	11:13		
								30	20:19	21:24	22:28	09:23	10:18	11:06		
								20	20:37	21:39	22:39	09:05	10:02	10:53		
								10	20:52	21:52	22:49	08:49	09:47	10:41		
								0	21:06	22:04	22:59	08:34	09:34	10:31		
								-10	21:20	22:16	23:08	08:19	09:21	10:20		
								-20	21:35	22:29	23:18	08:03	09:07	10:08		
								-30	21:53	22:44	23:29	07:45	08:50	09:55		
								-35	22:03	22:53	23:36	07:34	08:41	09:47		
								-40	22:14	23:02	23:43	07:22	08:30	09:38		
								-45	22:28	23:14	23:52	07:07	08:17	09:28		
								-50	22:45	23:27	--	06:49	08:01	09:15		
								-52	22:52	23:34	--	06:41	07:53	09:09		
								-54	23:01	23:41	--	06:31	07:45	09:03		
								-56	23:11	23:49	--	06:20	07:36	08:55		
								-58	23:22	23:57	--	06:08	07:25	08:47		
								-60	23:34	--	00:07	05:54	07:13	08:38		
								Sun			Moon					
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age				
									00 ^h	12 ^h	Pass	Upper	Lower			
								6	09:06	08:53	11:51	02:19	14:50	18(88%)		
								7	08:41	08:28	11:51	03:20	15:49	19(80%)		
								8	08:15	08:01	11:51	04:17	16:44	20(70%)		
SD.=16.2 d=-0.3 S.D.=16.2																

December 09, 10 ,11 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	Mer.pass		
0	77°55.6	-21°27.0	189°56.7	-21°27.0	229°52.4	-10°25.9	217°22.0	-14°40.1	169°21.0	-22°30.4	184°23.2	-22°30.4	Alpheratz	357°40.3	29°11.5		
1	92°58.0	-21°27.5	204°55.8	-21°27.5	244°53.4	-10°26.4	232°24.0	-14°40.2	184°23.2	-22°30.4	199°25.3	-22°30.4	Ankaa	353°12.6	-42°12.8		
2	108°00.5	-21°28.1	219°54.9	-21°28.1	259°54.4	-10°27.0	247°26.0	-14°40.4	199°25.3	-22°30.4	214°27.5	-22°30.4	Schedar	349°36.8	56°38.3		
3	123°03.0	-21°28.7	234°54.1	-21°28.7	274°55.3	-10°27.6	262°28.0	-14°40.5	214°27.5	-22°30.4	229°29.6	-22°30.4	Diphda	348°52.6	-17°53.5		
4	138°05.4	-21°29.2	249°53.2	-21°29.2	289°56.3	-10°28.1	277°29.9	-14°40.7	229°29.6	-22°30.4	244°31.8	-22°30.4	Achernar	335°24.3	-57°09.1		
5	153°07.9	-21°29.8	264°52.3	-21°29.8	304°57.3	-10°28.7	292°31.9	-14°40.8	244°31.8	-22°30.4	274°36.1	-22°30.4	Hamal	327°57.1	23°32.8		
6	168°10.4	-21°30.3	279°51.5	-21°30.3	319°58.3	-10°29.2	307°33.9	-14°41.0	259°33.9	-22°30.4	307°37.9	-14°41.3	Polaris	316°00.6	89°20.4		
7	183°12.8	-21°30.9	294°50.6	-21°30.9	334°59.2	-10°29.8	322°35.9	-14°41.1	274°36.1	-22°30.4	322°35.9	-14°41.1	Akamar	315°15.7	-40°14.3		
8	198°15.3	-21°31.5	309°49.8	-21°31.5	350°00.2	-10°30.4	337°37.9	-14°41.3	289°38.2	-22°30.4	337°37.9	-14°41.3	Menkar	314°11.6	4°09.5		
9	213°17.8	-21°32.0	324°48.9	-21°32.0	5°01.2	-10°30.9	352°39.8	-14°41.4	304°40.4	-22°30.4	352°39.8	-14°41.4	Mirfak	308°35.5	49°55.4		
10	228°20.2	-21°32.6	339°48.0	-21°32.6	20°02.2	-10°31.5	7°41.8	-14°41.6	319°42.5	-22°30.4	7°41.8	-14°41.6	Aldebaran	290°45.6	16°32.6		
11	243°22.7	-21°33.1	354°47.2	-21°33.1	35°03.1	-10°32.0	22°43.8	-14°41.7	334°44.7	-22°30.4	22°43.8	-14°41.7	Rigel	281°08.8	-8°11.0		
12	258°25.1	-21°33.7	9°46.3	-21°33.7	50°04.1	-10°32.6	37°45.8	-14°41.9	349°46.8	-22°30.4	37°45.8	-14°41.9	Capella	280°29.5	46°00.8		
13	273°27.6	-21°34.2	24°45.4	-21°34.2	65°05.1	-10°33.2	52°47.7	-14°42.0	4°49.0	-22°30.4	52°47.7	-14°42.0	Bellatrix	278°28.4	6°21.8		
14	288°30.1	-21°34.8	39°44.6	-21°34.8	80°06.0	-10°33.7	67°49.7	-14°42.1	19°51.1	-22°30.5	67°49.7	-14°42.1	Elnath	278°08.4	28°37.2		
15	303°32.5	-21°35.3	54°43.7	-21°35.3	95°07.0	-10°34.3	82°51.7	-14°42.3	34°53.3	-22°30.5	82°51.7	-14°42.3	Alnilam	275°43.0	-1°11.6		
16	318°35.0	-21°35.9	69°42.8	-21°35.9	110°08.0	-10°34.8	97°53.7	-14°42.4	49°55.4	-22°30.5	97°53.7	-14°42.4	Betelgeuse	270°57.7	7°24.4		
17	333°37.5	-21°36.4	84°41.9	-21°36.4	125°09.0	-10°35.4	112°55.6	-14°42.6	64°57.6	-22°30.5	112°55.6	-14°42.6	Canopus	263°54.3	-52°42.4		
18	348°39.9	-21°37.0	99°41.1	-21°37.0	140°09.9	-10°36.0	127°57.6	-14°42.7	79°59.7	-22°30.5	127°57.6	-14°42.7	Sirius	258°30.6	-16°44.4		
19	3°42.4	-21°37.5	114°40.2	-21°37.5	155°10.9	-10°36.5	142°59.6	-14°42.9	95°01.9	-22°30.5	142°59.6	-14°42.9	Adara	255°09.8	-28°59.9		
20	18°44.9	-21°38.1	129°39.3	-21°38.1	170°11.9	-10°37.1	158°01.6	-14°43.0	110°04.0	-22°30.5	158°01.6	-14°43.0	Procyon	244°56.2	5°10.7		
21	33°47.3	-21°38.6	144°38.5	-21°38.6	185°12.8	-10°37.6	173°03.5	-14°43.2	125°06.2	-22°30.5	173°03.5	-14°43.2	Pollux	243°23.7	27°58.8		
22	48°49.8	-21°39.1	159°37.6	-21°39.1	200°13.8	-10°38.2	188°05.5	-14°43.3	140°08.3	-22°30.5	188°05.5	-14°43.3	Avior	234°16.3	-59°33.9		
23	63°52.3	-21°39.7	174°36.7	-21°39.7	215°14.8	-10°38.7	203°07.5	-14°43.5	155°10.5	-22°30.5	203°07.5	-14°43.5	Suhail	222°49.9	-43°30.1		
Mer.pass.:18:45			v-0.9 d-0.6 m-3.8			v1.0 d-0.6 m1.6			v2.0 d-0.1 m-1.6			v2.1 d-0.0 m0.5			Miaplacidus		
															221°38.4		
															Alphard		
															217°53.0		
															Regulus		
															207°40.2		
															Dubhe		
															193°48.1		
															Denebola		
															182°30.6		
															Gienah		
															175°49.2		
															Acrux		
															173°06.0		
															Gacrux		
															171°57.6		
															Alioth		
															166°18.4		
															Spica		
															158°28.2		
															Alcaid		
															152°56.9		
															Hadar		
															148°44.0		
															Menkent		
															148°04.3		
															Arcturus		
															145°53.1		
															Rigel Kent.		
															139°48.1		
															Zubenelg.		
															137°02.4		
															Kochab		
															137°21.2		
															Alphecca		
															126°08.8		
															Antares		
															112°22.9		
															Atria		
															107°22.5		
															Sabik		
															102°09.4		
															Shaula		
															96°18.2		
															Rasalhague		
															96°04.0		
															Etamin		
															90°45.3		
															Kaus Aust.		
															83°40.2		
															Vega		
															80°37.4		
															Nunki		
															75°54.9		
															Altair		
															62°05.6		
															Peacock		
															53°15.0		
															Deneb		
															49°29.7		
															Enif		
															33°44.3		
															Alnair		
															27°40.2		
															Fomalhaut		
															15°20.8		
															Scheat		
															13°50.5		
															Markab		
															13°35.3		
															2017/12/		
															SHA		
															Mer.pass		
															Venus		
															112°01.1		
															Mars		
															151°56.9		
															Jupiter		
															139°26.5		
															Saturn		
															91°25.5		
															2017/12/		
															SHA		
															Mer.pass		
															Venus		
															110°41.1		
															Mars		
															151°21.0		
															Jupiter		
															139°14.8		
															Saturn		
															91°17.9		
															2017/12/		
															SHA		
															Mer.pass		
															Venus		
															109°20.9		
															Mars		
															150°45.2		
															Jupiter		
															139°03.1		
															Saturn		
															91°10.3		
															Horizontal parallax		
															Venus:		
															0.1		
															Mars:		
															0.1		
Mer.pass.:18:37			v-0.9 d-0.5 m-3.8			v1.0 d-0.6 m1.6			v2.0 d-0.1 m-1.6			v2.1 d-0.0 m0.5					

h Sun								Moon							
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	181°57.0	-22°48.5	284°55.9	9.4	12°25.3	-9.4	58.6	72	08:12	10:30	--	--	13:15	15:33	
1	196°56.7	-22°48.8	299°24.3	9.5	12°15.9	-9.5	58.6	70	07:53	09:38	--	--	14:08	15:52	
2	211°56.5	-22°49.0	313°52.8	9.5	12°06.4	-9.5	58.6	68	07:38	09:05	--	--	14:40	16:07	
3	226°56.2	-22°49.3	328°21.4	9.6	11°56.8	-9.6	58.5	66	07:26	08:42	10:16	13:30	15:04	16:19	
4	241°55.9	-22°49.5	342°50.1	9.7	11°47.2	-9.6	58.5	64	07:15	08:23	09:38	14:08	15:23	16:30	
5	256°55.6	-22°49.7	357°18.8	9.8	11°37.5	-9.7	58.4	62	07:06	08:07	09:11	14:34	15:38	16:39	
6	271°55.3	-22°50.0	11°47.7	9.9	11°27.8	-9.7	58.4	60	06:58	07:54	08:51	14:55	15:51	16:47	
7	286°55.1	-22°50.2	26°16.6	10.0	11°18.0	-9.8	58.4	58	06:51	07:43	08:34	15:11	16:02	16:55	
8	301°54.8	-22°50.5	40°45.6	10.0	11°08.2	-9.8	58.3	56	06:44	07:33	08:20	15:26	16:12	17:01	
9	316°54.5	-22°50.7	55°14.7	10.1	10°58.3	-9.9	58.3	54	06:38	07:24	08:08	15:38	16:21	17:07	
10	331°54.2	-22°50.9	69°43.8	10.2	10°48.4	-9.9	58.3	52	06:33	07:16	07:57	15:49	16:29	17:12	
11	346°53.9	-22°51.2	84°13.1	10.3	10°38.4	-10.0	58.2	50	06:28	07:09	07:47	15:58	16:36	17:18	
12	1°53.7	-22°51.4	98°42.4	10.4	10°28.4	-10.0	58.2	45	06:17	06:54	07:27	16:18	16:52	17:29	
13	16°53.4	-22°51.6	113°11.8	10.4	10°18.4	-10.1	58.1	40	06:07	06:41	07:11	16:35	17:05	17:39	
14	31°53.1	-22°51.9	127°41.3	10.5	10°08.3	-10.1	58.1	35	05:57	06:29	06:57	16:49	17:17	17:48	
15	46°52.8	-22°52.1	142°10.8	10.6	9°58.1	-10.2	58.1	30	05:49	06:19	06:45	17:01	17:27	17:57	
16	61°52.5	-22°52.3	156°40.5	10.7	9°48.0	-10.2	58.0	20	05:33	06:00	06:24	17:21	17:45	18:13	
17	76°52.3	-22°52.6	171°10.2	10.7	9°37.7	-10.2	58.0	10	05:17	05:43	06:06	17:40	18:02	18:29	
18	91°52.0	-22°52.8	185°40.0	10.8	9°27.5	-10.3	58.0	0	05:01	05:27	05:49	17:57	18:19	18:45	
19	106°51.7	-22°53.0	200°09.8	10.9	9°17.2	-10.3	57.9	-10	04:42	05:09	05:32	18:14	18:37	19:04	
20	121°51.4	-22°53.3	214°39.8	11.0	9°06.8	-10.3	57.9	-20	04:20	04:49	05:13	18:32	18:57	19:26	
21	136°51.1	-22°53.5	229°09.8	11.0	8°56.5	-10.4	57.9	-30	03:51	04:25	04:52	18:54	19:21	19:54	
22	151°50.9	-22°53.7	243°39.8	11.1	8°46.1	-10.4	57.8	-35	03:33	04:10	04:39	19:07	19:36	20:13	
23	166°50.6	-22°53.9	258°10.0	11.2	8°35.6	-10.4	57.8	-40	03:11	03:52	04:25	19:21	19:54	20:35	
SD.=16.2 d=-0.2 S.D.=16.0								-45	02:41	03:30	04:07	19:39	20:16	21:05	
								-50	01:58	03:01	03:45	20:01	20:45	21:49	
								-52	01:32	02:47	03:35	20:12	20:60	22:15	
								-54	00:53	02:30	03:23	20:24	21:17	22:55	
								-56	--	02:09	03:09	20:37	21:38	--	
								-58	--	01:41	02:53	20:53	22:06	--	
								-60	--	00:59	02:34	21:13	22:49	--	
								Moonrise			Moonset				
								Lat.	Sat	Sun	Mon	Sat	Sun	Mon	
								72	21:53	23:45	--	13:41	13:30	13:20	
								70	22:07	23:51	--	13:25	13:22	13:18	
								68	22:18	23:56	--	13:13	13:15	13:16	
								66	22:27	23:60	--	13:02	13:09	13:15	
								64	22:35	--	00:03	12:53	13:04	13:13	
								62	22:41	--	00:06	12:46	13:00	13:12	
								60	22:47	--	00:08	12:39	12:56	13:11	
								58	22:52	--	00:11	12:33	12:53	13:10	
								56	22:56	--	00:13	12:28	12:50	13:10	
								54	23:00	--	00:14	12:24	12:48	13:09	
								52	23:04	--	00:16	12:19	12:45	13:08	
								50	23:07	--	00:18	12:16	12:43	13:08	
								45	23:14	--	00:21	12:07	12:38	13:06	
								40	23:20	--	00:23	12:00	12:34	13:05	
								35	23:25	--	00:26	11:54	12:31	13:04	
								30	23:29	--	00:28	11:49	12:28	13:04	
								20	23:37	--	00:31	11:39	12:22	13:02	
								10	23:43	--	00:34	11:31	12:17	13:01	
								0	23:50	--	00:37	11:23	12:13	12:60	
								-10	23:56	--	00:40	11:16	12:08	12:58	
								-20	--	00:02	00:43	11:07	12:03	12:57	
								-30	--	00:10	00:47	10:57	11:58	12:55	
								-35	--	00:14	00:49	10:52	11:54	12:54	
								-40	--	00:19	00:51	10:45	11:50	12:53	
								-45	--	00:25	00:54	10:38	11:46	12:52	
								-50	00:02	00:31	00:57	10:29	11:41	12:51	
								-52	00:07	00:34	00:59	10:25	11:38	12:50	
								-54	00:12	00:38	01:00	10:20	11:36	12:49	
								-56	00:18	00:42	01:02	10:15	11:33	12:48	
								-58	00:24	00:46	01:04	10:09	11:30	12:47	
								-60	00:32	00:50	01:06	10:03	11:26	12:46	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age		
									00 ^h	12 ^h	Pass	Upper	Lower		
								9	07:48	07:35	11:52	05:11	17:36	21(59%)	
								10	07:21	07:08	11:52	06:01	18:25	22(48%)	
								11	06:54	06:40	11:53	06:48	19:11	23(38%)	
SD.=16.2 d=-0.2 S.D.=15.5															

December 12, 13, 14 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	80°53.0	188°53.5	-22°04.8	231°02.3	-11°06.0	219°44.5	-14°50.6	171°55.7	-22°30.8	Alpheratz	357°40.3	29°11.5
1	95°55.5	203°52.6	-22°05.3	246°03.2	-11°06.5	234°46.4	-14°50.7	186°57.8	-22°30.8	Ankaa	353°12.6	-42°12.8
2	110°57.9	218°51.7	-22°05.8	261°04.2	-11°07.1	249°48.4	-14°50.9	201°60.0	-22°30.8	Schedar	349°36.8	56°38.3
3	126°00.4	233°50.8	-22°06.2	276°05.2	-11°07.6	264°50.4	-14°51.0	217°02.1	-22°30.8	Diphda	348°52.7	-17°53.5
4	141°02.8	248°49.9	-22°06.7	291°06.1	-11°08.2	279°52.4	-14°51.2	232°04.3	-22°30.8	Achernar	335°24.3	-57°09.1
5	156°05.3	263°49.0	-22°07.2	306°07.1	-11°08.7	294°54.4	-14°51.3	247°06.4	-22°30.8	Hamal	327°57.1	23°32.8
6	171°07.8	278°48.2	-22°07.7	321°08.1	-11°09.3	309°56.4	-14°51.5	262°08.6	-22°30.8	Polaris	316°01.3	89°20.5
7	186°10.2	293°47.3	-22°08.2	336°09.0	-11°09.8	324°58.3	-14°51.6	277°10.7	-22°30.8	Akamar	315°15.7	-40°14.3
8	201°12.7	308°46.4	-22°08.6	351°10.0	-11°10.4	340°00.3	-14°51.7	292°12.9	-22°30.8	Menkar	314°11.6	4°09.5
9	216°15.2	323°45.5	-22°09.1	6°11.0	-11°10.9	355°02.3	-14°51.9	307°15.0	-22°30.8	Mirfak	308°35.5	49°55.4
10	231°17.6	338°44.6	-22°09.6	21°11.9	-11°11.5	10°04.3	-14°52.0	322°17.2	-22°30.8	Aldebaran	290°45.6	16°32.6
11	246°20.1	353°43.7	-22°10.1	36°12.9	-11°12.0	25°06.3	-14°52.2	337°19.3	-22°30.8	Rigel	281°08.8	-8°11.0
12	261°22.6	8°42.8	-22°10.5	51°13.9	-11°12.6	40°08.2	-14°52.3	352°21.5	-22°30.8	Capella	280°29.5	46°00.8
13	276°25.0	23°41.9	-22°11.0	66°14.8	-11°13.1	55°10.2	-14°52.5	7°23.6	-22°30.9	Bellatrix	278°28.4	6°21.8
14	291°27.5	38°41.0	-22°11.5	81°15.8	-11°13.7	70°12.2	-14°52.6	22°25.8	-22°30.9	Elnath	278°08.4	28°37.2
15	306°30.0	53°40.1	-22°11.9	96°16.8	-11°14.2	85°14.2	-14°52.7	37°27.9	-22°30.9	Alnilam	275°43.0	-1°11.6
16	321°32.4	68°39.2	-22°12.4	111°17.7	-11°14.8	100°16.2	-14°52.9	52°30.0	-22°30.9	Betelgeuse	270°57.7	7°24.4
17	336°34.9	83°38.3	-22°12.9	126°18.7	-11°15.3	115°18.2	-14°53.0	67°32.2	-22°30.9	Canopus	263°54.3	-52°42.4
18	351°37.3	98°37.4	-22°13.3	141°19.7	-11°15.9	130°20.1	-14°53.2	82°34.3	-22°30.9	Sirius	258°30.6	-16°44.4
19	6°39.8	113°36.5	-22°13.8	156°20.6	-11°16.4	145°22.1	-14°53.3	97°36.5	-22°30.9	Adara	255°09.8	-16°59.9
20	21°42.3	128°35.6	-22°14.3	171°21.6	-11°17.0	160°24.1	-14°53.5	112°38.6	-22°30.9	Procyon	244°56.2	5°10.7
21	36°44.7	143°34.7	-22°14.7	186°22.6	-11°17.5	175°26.1	-14°53.6	127°40.8	-22°30.9	Pollux	243°23.6	27°58.8
22	51°47.2	158°33.8	-22°15.2	201°23.5	-11°18.1	190°28.1	-14°53.7	142°42.9	-22°30.9	Avior	234°16.3	-59°33.9
23	66°49.7	173°32.9	-22°15.6	216°24.5	-11°18.6	205°30.1	-14°53.9	157°45.1	-22°30.9	Suhail	222°49.9	-43°30.2
Mer.pass.:18:33		v-0.9 d-0.5 m-3.8		v1.0 d-0.6 m1.6		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5		Miaplacidus	221°38.4	-69°47.2
										Alphard	217°52.9	-8°44.2
										Regulus	207°40.2	11°52.7
										Dubhe	193°48.0	61°39.0
										Denebola	182°30.6	14°28.3
										Gienah	175°49.2	-17°38.3
										Acrux	173°06.0	-63°11.5
										Gacrux	171°57.6	-57°12.4
										Alioth	166°18.4	55°51.6
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.9	49°13.4
										Hadar	148°43.9	-60°27.1
										Menkent	148°04.3	-36°27.1
										Arcturus	145°53.1	19°05.7
										Rigel Kent.	139°48.0	-60°54.1
										Zubenelg.	137°02.3	-16°06.7
										Kochab	137°21.2	74°04.9
										Alphecca	126°08.8	26°39.4
										Antares	112°22.9	-26°28.0
										Atria	107°22.5	-69°03.3
										Sabik	102°09.4	-15°44.6
										Shaula	96°18.2	-37°06.8
										Rasalhague	96°04.0	12°33.1
										Etamin	90°45.3	51°29.4
										Kaus Aust.	83°40.2	-34°22.4
										Vega	80°37.4	38°48.2
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°55.1
										Peacock	53°15.0	-56°40.7
										Deneb	49°29.7	45°20.9
										Enif	33°44.3	9°57.6
										Alnair	27°40.2	-46°52.6
										Fomalhaut	15°20.8	-29°31.8
										Scheat	13°50.5	28°10.9
										Markab	13°35.4	15°18.2
										2017/12/	SHA	Mer.pass
										Venus	108°00.5	11:25
										Mars	150°09.3	08:35
										Jupiter	138°51.5	09:20
										Saturn	91°02.7	12:30
										2017/12/	SHA	Mer.pass
										Venus	106°39.9	11:27
										Mars	149°33.3	08:34
										Jupiter	138°39.9	09:17
										Saturn	90°55.1	12:27
										2017/12/	SHA	Mer.pass
										Venus	105°19.0	11:28
										Mars	148°57.3	08:32
										Jupiter	138°28.4	09:13
										Saturn	90°47.5	12:24
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:18:25		v-0.9 d-0.4 m-3.8		v1.0 d-0.5 m1.6		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5				

h Sun								Moon							
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight			
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	181°36.5	-23°04.1	249°56.4	13.6	-0°15.3	-10.9	56.2	72	08:17	10:41	--	--	13:07	15:31	
1	196°36.2	-23°04.3	264°29.0	13.6	-0°26.2	-10.9	56.2	70	07:58	09:44	--	--	14:04	15:50	
2	211°35.9	-23°04.5	279°01.6	13.6	-0°37.1	-10.8	56.1	68	07:43	09:11	--	--	14:38	16:06	
3	226°35.7	-23°04.7	293°34.3	13.7	-0°47.9	-10.8	56.1	66	07:30	08:46	10:23	13:25	15:02	16:19	
4	241°35.4	-23°04.9	308°07.0	13.7	-0°58.7	-10.8	56.1	64	07:19	08:27	09:43	14:05	15:21	16:29	
5	256°35.1	-23°05.0	322°39.7	13.7	-1°09.5	-10.8	56.0	62	07:10	08:11	09:16	14:32	15:37	16:39	
6	271°34.8	-23°05.2	337°12.4	13.7	-1°20.3	-10.8	56.0	60	07:01	07:58	08:55	14:53	15:51	16:47	
7	286°34.5	-23°05.4	351°45.2	13.8	-1°31.1	-10.8	56.0	58	06:54	07:46	08:38	15:11	16:02	16:54	
8	301°34.2	-23°05.6	6°18.0	13.8	-1°41.9	-10.8	56.0	56	06:47	07:36	08:23	15:25	16:12	17:01	
9	316°33.9	-23°05.8	20°50.8	13.8	-1°52.6	-10.7	55.9	54	06:41	07:27	08:11	15:37	16:21	17:07	
10	331°33.6	-23°05.9	35°23.6	13.8	-2°03.4	-10.7	55.9	52	06:36	07:19	08:00	15:48	16:29	17:13	
11	346°33.3	-23°06.1	49°56.4	13.8	-2°14.1	-10.7	55.9	50	06:31	07:12	07:50	15:58	16:36	17:18	
12	1°33.0	-23°06.3	64°29.3	13.9	-2°24.8	-10.7	55.9	48	06:19	06:56	07:30	16:19	16:52	17:29	
13	16°32.7	-23°06.5	79°02.1	13.9	-2°35.5	-10.7	55.8	46	06:09	06:43	07:13	16:35	17:06	17:40	
14	31°32.4	-23°06.7	93°35.0	13.9	-2°46.1	-10.6	55.8	45	05:56	06:31	06:59	16:49	17:17	17:49	
15	46°32.1	-23°06.8	108°07.9	13.9	-2°56.7	-10.6	55.8	44	05:51	06:21	06:47	17:01	17:28	17:58	
16	61°31.9	-23°07.0	122°40.9	13.9	-3°07.4	-10.6	55.8	43	05:35	06:02	06:26	17:22	17:46	18:14	
17	76°31.6	-23°07.2	137°13.8	13.9	-3°17.9	-10.6	55.7	42	05:19	05:45	06:08	17:41	18:04	18:30	
18	91°31.3	-23°07.4	151°46.8	14.0	-3°28.5	-10.6	55.7	41	05:02	05:28	05:51	17:58	18:21	18:47	
19	106°31.0	-23°07.5	166°19.7	14.0	-3°39.1	-10.5	55.7	-10	04:43	05:10	05:33	18:15	18:38	19:05	
20	121°30.7	-23°07.7	180°52.7	14.0	-3°49.6	-10.5	55.7	-20	04:21	04:50	05:14	18:34	18:59	19:28	
21	136°30.4	-23°07.9	195°25.7	14.0	-4°00.1	-10.5	55.6	-30	03:52	04:25	04:53	18:56	19:23	19:57	
22	151°30.1	-23°08.1	209°58.7	14.0	-4°10.5	-10.5	55.6	-35	03:34	04:10	04:40	19:09	19:39	20:15	
23	166°29.8	-23°08.2	224°31.7	14.0	-4°21.0	-10.4	55.6	-40	03:11	03:52	04:25	19:24	19:57	20:38	
SD.=16.2 d=-0.2								S.D.=15.3							
Wed								Moonrise							
0	181°29.5	-23°08.4	239°04.7	14.0	-4°31.4	-10.4	55.6	72	01:31	03:14	04:58	13:10	13:00	12:49	
1	196°29.2	-23°08.6	253°37.8	14.0	-4°41.8	-10.4	55.5	70	01:30	03:07	04:43	13:14	13:10	13:06	
2	211°28.9	-23°08.7	268°10.8	14.0	-4°52.1	-10.3	55.5	68	01:29	03:01	04:31	13:17	13:18	13:19	
3	226°28.6	-23°08.9	282°43.9	14.1	-5°02.5	-10.3	55.5	66	01:29	02:56	04:21	13:20	13:25	13:31	
4	241°28.3	-23°09.1	297°16.9	14.1	-5°12.7	-10.3	55.5	64	01:28	02:51	04:13	13:22	13:30	13:40	
5	256°28.0	-23°09.2	311°50.0	14.1	-5°23.0	-10.3	55.4	62	01:28	02:48	04:06	13:24	13:35	13:48	
6	271°27.7	-23°09.4	326°23.0	14.1	-5°33.3	-10.2	55.4	60	01:27	02:44	03:60	13:25	13:39	13:55	
7	286°27.4	-23°09.6	340°56.1	14.1	-5°43.5	-10.2	55.4	58	01:27	02:41	03:54	13:27	13:43	14:01	
8	301°27.1	-23°09.7	355°29.2	14.1	-5°53.6	-10.2	55.4	56	01:27	02:39	03:50	13:28	13:47	14:06	
9	316°26.8	-23°09.9	10°02.3	14.1	-6°03.8	-10.1	55.4	54	01:26	02:37	03:45	13:29	13:50	14:11	
10	331°26.5	-23°10.0	24°35.3	14.1	-6°13.9	-10.1	55.3	52	01:26	02:35	03:41	13:30	13:52	14:16	
11	346°26.2	-23°10.2	39°08.4	14.1	-6°24.0	-10.1	55.3	50	01:26	02:33	03:38	13:31	13:55	14:20	
12	1°26.0	-23°10.4	53°41.5	14.1	-6°34.0	-10.0	55.3	48	01:26	02:29	03:30	13:33	14:00	14:28	
13	16°25.7	-23°10.5	68°14.6	14.1	-6°44.0	-10.0	55.3	46	01:25	02:25	03:24	13:35	14:05	14:36	
14	31°25.4	-23°10.7	82°47.7	14.1	-6°54.0	-9.9	55.2	45	01:25	02:22	03:19	13:37	14:09	14:42	
15	46°25.1	-23°10.8	97°20.8	14.1	-7°03.9	-9.9	55.2	44	01:25	02:20	03:14	13:38	14:13	14:48	
16	61°24.8	-23°11.0	111°53.9	14.1	-7°13.8	-9.9	55.2	43	01:24	02:15	03:06	13:41	14:19	14:57	
17	76°24.5	-23°11.1	126°26.9	14.1	-7°23.6	-9.8	55.2	42	01:24	02:12	02:59	13:43	14:24	15:06	
18	91°24.2	-23°11.3	141°00.0	14.1	-7°33.5	-9.8	55.2	41	01:23	02:08	02:52	13:45	14:29	15:14	
19	106°23.9	-23°11.5	155°33.1	14.1	-7°43.2	-9.8	55.1	-10	01:23	02:04	02:46	13:47	14:34	15:22	
20	121°23.6	-23°11.6	170°06.2	14.1	-7°53.0	-9.7	55.1	-20	01:22	02:01	02:39	13:49	14:40	15:30	
21	136°23.3	-23°11.8	184°39.2	14.1	-8°02.7	-9.7	55.1	-30	01:22	01:56	02:31	13:51	14:46	15:40	
22	151°23.0	-23°11.9	199°12.3	14.1	-8°12.3	-9.6	55.1	-40	01:22	01:54	02:26	13:53	14:50	15:46	
23	166°22.7	-23°12.1	213°45.4	14.1	-8°21.9	-9.6	55.1	-35	01:22	01:51	02:21	13:54	14:54	15:52	
SD.=16.2 d=-0.2								S.D.=15.2							
Thu								Moonset							
0	181°22.4	-23°12.2	228°18.4	14.0	-8°31.5	-9.6	55.0	72	01:21	01:48	02:15	13:56	14:58	15:60	
1	196°22.1	-23°12.4	242°51.5	14.0	-8°41.1	-9.5	55.0	-50	01:21	01:44	02:08	13:58	15:04	16:09	
2	211°21.8	-23°12.5	257°24.5	14.0	-8°50.5	-9.5	55.0	-52	01:21	01:43	02:05	13:59	15:07	16:13	
3	226°21.5	-23°12.7	271°57.5	14.0	-9°00.0	-9.4	55.0	-54	01:21	01:41	02:02	14:00	15:10	16:18	
4	241°21.2	-23°12.8	286°30.5	14.0	-9°09.4	-9.4	55.0	-56	01:21	01:39	01:58	14:01	15:13	16:23	
5	256°20.9	-23°13.0	301°03.6	14.0	-9°18.7	-9.3	54.9	-58	01:20	01:36	01:53	14:03	15:16	16:29	
6	271°20.6	-23°13.1	315°36.6	14.0	-9°28.1	-9.3	54.9	-60	01:20	01:34	01:49	14:04	15:20	16:35	
7	286°20.3	-23°13.2	330°09.6	14.0	-9°37.3	-9.2	54.9								
8	301°20.0	-23°13.4	344°42.5	14.0	-9°46.5	-9.2	54.9								
9	316°19.7	-23°13.5	359°15.5	14.0	-9°55.7	-9.1	54.9								
10	331°19.4	-23°13.7	13°48.5	14.0	-10°04.8	-9.1	54.9								
11	346°19.1	-23°13.8	28°21.4	13.9	-10°13.9	-9.1	54.8								
12	1°18.8	-23°14.0	42°54.4	13.9	-10°22.9	-9.0	54.8								
13	16°18.5	-23°14.1	57°27.3	13.9	-10°31.9	-9.0	54.8								
14	31°18.2	-23°14.2	72°00.2	13.9	-10°40.8	-8.9	54.8								
15	46°17.9	-23°14.4	86°33.1	13.9	-10°49.7	-8.9	54.8								
16	61°17.6	-23°14.5	101°06.0	13.9	-10°58.5	-8.8	54.8								
17	76°17.3	-23°14.6	115°38.9	13.9	-11°07.3	-8.7	54.7								
18	91°17.0	-23°14.8	130°11.7	13.9	-11°16.0	-8.7	54.7								
19	106°16.7	-23°14.9	144°44.6	13.8	-11°24.7	-8.6	54.7								
20	121°16.4	-23°15.1	159°17.4	13.8	-11°33.3	-8.6	54.7								
21	136°16.1	-23°15.2	173°50.2	13.8	-11°41.9	-8.5	54.7								
22	151°15.8	-23°15.3	188°23.0	13.8	-11°50.4	-8.5	54.7								
23	166°15.5	-23°15.4	202°55.8	13.8	-11°58.8	-8.4	54.6								
SD.=16.2 d=-0.1								S.D.=15.0							
								Day							
								Sun			Mer.		Moon		Age
								Eqn.of Time			Pass		Mer.Pass.		
								00 ^h 12 ^h			Upper		Lower		
								12			11:53		07:34 19:56		24(28%)
								13			11:54		08:18 20:40		25(20%)
								14			11:54		09:03 21:25		26(13%)

December 15, 16, 17 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	83°50.4	187°48.3	-22°36.7	232°11.7	-11°45.4	222°07.4	-15°00.8	174°30.2	-22°31.1	Alpheratz	357°40.3	29°11.5
1	98°52.9	202°47.4	-22°37.1	247°12.6	-11°45.9	237°09.4	-15°01.0	189°32.4	-22°31.1	Ankaa	353°12.7	-42°12.8
2	113°55.3	217°46.5	-22°37.5	262°13.6	-11°46.4	252°11.4	-15°01.1	204°34.5	-22°31.1	Schedar	349°36.8	56°38.3
3	128°57.8	232°45.6	-22°37.9	277°14.6	-11°47.0	267°13.3	-15°01.2	219°36.7	-22°31.1	Diphda	348°52.7	-17°53.5
4	144°00.3	247°44.6	-22°38.3	292°15.5	-11°47.5	282°15.3	-15°01.4	234°38.8	-22°31.2	Achernar	335°24.3	-57°09.1
5	159°02.7	262°43.7	-22°38.7	307°16.5	-11°48.1	297°17.3	-15°01.5	249°41.0	-22°31.2	Hamal	327°57.1	23°32.8
6	174°05.2	277°42.8	-22°39.1	322°17.4	-11°48.6	312°19.3	-15°01.7	264°43.1	-22°31.2	Polaris	316°01.9	89°20.5
7	189°07.7	292°41.9	-22°39.5	337°18.4	-11°49.2	327°21.3	-15°01.8	279°45.3	-22°31.2	Akamar	315°15.7	-40°14.3
8	204°10.1	307°41.0	-22°39.9	352°19.4	-11°49.7	342°23.3	-15°01.9	294°47.4	-22°31.2	Menkar	314°11.6	4°09.4
9	219°12.6	322°40.0	-22°40.3	7°20.3	-11°50.2	357°25.3	-15°02.1	309°49.5	-22°31.2	Mirfak	308°35.5	49°55.4
10	234°15.0	337°39.1	-22°40.7	22°21.3	-11°50.8	12°27.3	-15°02.2	324°51.7	-22°31.2	Aldebaran	290°45.6	16°32.6
11	249°17.5	352°38.2	-22°41.1	37°22.3	-11°51.3	27°29.3	-15°02.4	339°53.8	-22°31.2	Rigel	281°08.8	-8°11.1
12	264°20.0	7°37.3	-22°41.5	52°23.2	-11°51.9	42°31.2	-15°02.5	354°56.0	-22°31.2	Capella	280°29.5	46°00.8
13	279°22.4	22°36.3	-22°41.8	67°24.2	-11°52.4	57°33.2	-15°02.6	9°58.1	-22°31.2	Bellatrix	278°28.4	6°21.8
14	294°24.9	37°35.4	-22°42.2	82°25.1	-11°52.9	72°35.2	-15°02.8	25°00.3	-22°31.2	Elnath	278°08.4	28°37.2
15	309°27.4	52°34.5	-22°42.6	97°26.1	-11°53.5	87°37.2	-15°02.9	40°02.4	-22°31.2	Alnilam	275°43.0	-1°11.6
16	324°29.8	67°33.6	-22°43.0	112°27.0	-11°54.0	102°39.2	-15°03.1	55°04.6	-22°31.2	Betelgeuse	270°57.7	7°24.4
17	339°32.3	82°32.7	-22°43.4	127°28.0	-11°54.6	117°41.2	-15°03.2	70°06.7	-22°31.2	Canopus	263°54.3	-52°42.4
18	354°34.8	97°31.7	-22°43.8	142°29.0	-11°55.1	132°43.2	-15°03.3	85°08.9	-22°31.2	Sirius	258°30.6	-16°44.4
19	9°37.2	112°30.8	-22°44.1	157°29.9	-11°55.6	147°45.2	-15°03.5	100°11.0	-22°31.2	Adara	255°09.8	-28°59.9
20	24°39.7	127°29.9	-22°44.5	172°30.9	-11°56.2	162°47.2	-15°03.6	115°13.1	-22°31.2	Procyon	244°56.2	5°10.7
21	39°42.2	142°29.0	-22°44.9	187°31.8	-11°56.7	177°49.2	-15°03.8	130°15.3	-22°31.2	Pollux	243°23.6	27°58.7
22	54°44.6	157°28.0	-22°45.3	202°32.8	-11°57.3	192°51.1	-15°03.9	145°17.4	-22°31.2	Avior	234°16.2	-59°33.9
23	69°47.1	172°27.1	-22°45.7	217°33.8	-11°57.8	207°53.1	-15°04.0	160°19.6	-22°31.2	Suhail	222°49.9	-43°30.2
Mer.pass.:18:21		v-0.9 d-0.4 m-3.8		v1.0 d-0.5 m1.6		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5		Miaplacidus	221°38.4	-69°47.2
										Alphard	217°52.9	-8°44.2
										Regulus	207°40.1	11°52.7
										Dubhe	193°48.0	61°39.0
										Denebola	182°30.5	14°28.3
										Gienah	175°49.2	-17°38.3
										Acrux	173°06.0	-63°11.5
										Gacrux	171°57.6	-57°12.4
										Alioth	166°18.3	55°51.6
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.8	49°13.4
										Hadar	148°43.9	-60°27.1
										Menkent	148°04.2	-36°27.1
										Arcturus	145°53.1	19°05.7
										Rigel Kent.	139°48.0	-60°54.1
										Zubenelg.	137°02.3	-16°06.7
										Kochab	137°21.2	74°04.9
										Alphecca	126°08.8	26°39.4
										Antares	112°22.9	-26°28.0
										Atria	107°22.5	-69°03.3
										Sabik	102°09.4	-15°44.6
										Shaula	96°18.2	-37°06.8
										Rasalhague	96°04.0	12°33.1
										Etamin	90°45.3	51°29.4
										Kaus Aust.	83°40.2	-34°22.4
										Vega	80°37.4	38°48.2
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°55.1
										Peacock	53°15.0	-56°40.7
										Deneb	49°29.7	45°20.9
										Enif	33°44.3	9°57.5
										Alnair	27°40.2	-46°52.6
										Fomalhaut	15°20.8	-29°31.8
										Scheat	13°50.5	28°10.9
										Markab	13°35.4	15°18.2
										2017/12/	SHA	Mer.pass
										Venus	103°57.9	11:29
										Mars	148°21.3	08:31
										Jupiter	138°17.0	09:10
										Saturn	90°39.8	12:20
										2017/12/	SHA	Mer.pass
										Venus	102°36.6	11:31
										Mars	147°45.2	08:29
										Jupiter	138°05.6	09:07
										Saturn	90°32.2	12:17
										2017/12/	SHA	Mer.pass
										Venus	101°15.2	11:32
										Mars	147°09.0	08:28
										Jupiter	137°54.3	09:04
										Saturn	90°24.5	12:13
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:18:13		v-0.9 d-0.3 m-3.8		v1.0 d-0.5 m1.6		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5				

Sun				Moon										
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	181°15.2	-23°15.6	217°28.6	13.8	-12°07.2	-8.4	54.6	72	08:22	10:50	--	--	13:01	15:30
1	196°14.9	-23°15.7	232°01.3	13.7	-12°15.6	-8.3	54.6	70	08:02	09:49	--	--	14:02	15:50
2	211°14.6	-23°15.8	246°34.0	13.7	-12°23.9	-8.3	54.6	68	07:46	09:15	--	--	14:37	16:05
3	226°14.3	-23°16.0	261°06.7	13.7	-12°32.1	-8.2	54.6	66	07:33	08:50	10:29	13:22	15:02	16:18
4	241°14.0	-23°16.1	275°39.4	13.7	-12°40.3	-8.1	54.6	64	07:22	08:30	09:48	14:04	15:21	16:29
5	256°13.7	-23°16.2	290°12.1	13.7	-12°48.4	-8.1	54.6	62	07:12	08:14	09:20	14:32	15:37	16:39
6	271°13.4	-23°16.3	304°44.8	13.6	-12°56.4	-8.0	54.5	60	07:04	08:01	08:58	14:53	15:51	16:47
7	286°13.1	-23°16.5	319°17.4	13.6	-13°04.4	-8.0	54.5	58	06:57	07:49	08:41	15:10	16:02	16:55
8	301°12.8	-23°16.6	333°50.0	13.6	-13°12.3	-7.9	54.5	56	06:50	07:39	08:26	15:25	16:12	17:01
9	316°12.5	-23°16.7	348°22.6	13.6	-13°20.2	-7.8	54.5	54	06:44	07:30	08:14	15:38	16:21	17:08
10	331°12.2	-23°16.8	2°55.2	13.6	-13°28.0	-7.8	54.5	52	06:38	07:22	08:03	15:49	16:30	17:13
11	346°11.9	-23°17.0	17°27.7	13.5	-13°35.8	-7.7	54.5	50	06:33	07:14	07:53	15:59	16:37	17:19
12	1°11.6	-23°17.1	32°00.3	13.5	-13°43.4	-7.7	54.5	45	06:21	06:58	07:32	16:19	16:53	17:30
13	16°11.3	-23°17.2	46°32.8	13.5	-13°51.1	-7.6	54.5	40	06:11	06:45	07:15	16:36	17:07	17:41
14	31°11.0	-23°17.3	61°05.3	13.5	-13°58.6	-7.5	54.4	35	06:01	06:33	07:01	16:50	17:18	17:50
15	46°10.7	-23°17.4	75°37.7	13.5	-14°06.1	-7.5	54.4	30	05:53	06:23	06:49	17:02	17:29	17:59
16	61°10.4	-23°17.6	90°10.2	13.4	-14°13.6	-7.4	54.4	20	05:36	06:04	06:28	17:24	17:48	18:15
17	76°10.1	-23°17.7	104°42.6	13.4	-14°20.9	-7.3	54.4	10	05:20	05:47	06:09	17:42	18:05	18:31
18	91°09.8	-23°17.8	119°15.0	13.4	-14°28.2	-7.3	54.4	0	05:03	05:29	05:52	17:59	18:22	18:48
19	106°09.5	-23°17.9	133°47.4	13.4	-14°35.5	-7.2	54.4	-10	04:44	05:11	05:34	18:17	18:40	19:07
20	121°09.1	-23°18.0	148°19.8	13.4	-14°42.6	-7.1	54.4	-20	04:22	04:51	05:16	18:36	19:00	19:30
21	136°08.8	-23°18.1	162°52.1	13.3	-14°49.7	-7.1	54.4	-30	03:53	04:26	04:54	18:58	19:25	19:59
22	151°08.5	-23°18.3	177°24.4	13.3	-14°56.8	-7.0	54.3	-35	03:34	04:11	04:41	19:11	19:41	20:17
23	166°08.2	-23°18.4	191°56.7	13.3	-15°03.7	-6.9	54.3	-40	03:11	03:53	04:26	19:26	19:59	20:40
SD.=16.2 d=-0.1 S.D.=14.9							-45	02:41	03:30	04:08	19:44	20:21	21:11	
							-50	01:56	03:01	03:45	20:06	20:51	21:56	
							-52	01:28	02:46	03:34	20:17	21:06	22:24	
							-54	00:44	02:28	03:22	20:29	21:24	23:09	
							-56	--	02:06	03:08	20:44	21:46	--	
							-58	--	01:37	02:51	21:00	22:15	--	
							-60	--	00:48	02:31	21:21	23:05	--	
								Moonrise			Moonset			
								Lat.	Fri	Sat	Sun	Fri	Sat	Sun
								72	06:46	08:45	--	12:35	12:11	--
								70	06:20	07:60	09:42	13:02	12:57	12:52
								68	06:01	07:30	08:57	13:22	13:27	13:37
								66	05:46	07:08	08:27	13:38	13:50	14:07
								64	05:33	06:51	08:05	13:52	14:08	14:30
								62	05:22	06:37	07:47	14:03	14:22	14:48
								60	05:13	06:25	07:33	14:13	14:35	15:03
								58	05:06	06:15	07:20	14:21	14:46	15:16
								56	04:59	06:06	07:09	14:29	14:55	15:27
								54	04:52	05:58	06:60	14:35	15:03	15:37
								52	04:47	05:51	06:52	14:41	15:11	15:45
								50	04:42	05:44	06:44	14:47	15:18	15:53
								45	04:31	05:31	06:28	14:59	15:32	16:10
								40	04:22	05:19	06:15	15:08	15:44	16:23
								35	04:15	05:10	06:04	15:17	15:54	16:35
								30	04:08	05:01	05:54	15:24	16:03	16:45
								20	03:56	04:47	05:37	15:37	16:19	17:02
								10	03:46	04:34	05:23	15:48	16:32	17:18
								0	03:37	04:23	05:09	15:59	16:45	17:32
								-10	03:28	04:11	04:55	16:09	16:58	17:46
								-20	03:18	03:58	04:41	16:21	17:11	18:01
								-30	03:07	03:44	04:25	16:34	17:27	18:19
								-35	03:00	03:36	04:15	16:41	17:36	18:29
								-40	02:53	03:27	04:04	16:50	17:46	18:41
								-45	02:44	03:16	03:51	16:60	17:58	18:54
								-50	02:34	03:03	03:36	17:12	18:13	19:11
								-52	02:30	02:57	03:29	17:18	18:20	19:19
								-54	02:24	02:50	03:21	17:24	18:28	19:28
								-56	02:19	02:43	03:12	17:31	18:37	19:38
								-58	02:12	02:34	03:02	17:39	18:46	19:49
								-60	02:05	02:25	02:50	17:48	18:58	20:02
								Sun			Moon			
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age		
									00 ^h	12 ^h	Pass	Upper	Lower	
								15	05:01	04:46	11:55	09:47	22:10	27(7%)
								16	04:32	04:17	11:55	10:33	22:56	28(3%)
								17	04:03	03:48	11:56	11:20	23:44	29(1%)
SD.=16.3 d=-0.1 S.D.=14.8														

December 18, 19, 20 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	86°47.8	186°41.4	-23°02.6	233°20.7	-12°24.0	224°30.8	-15°10.8	177°04.7	-22°31.4	Alpheratz	357°40.3	29°11.5
1	101°50.3	201°40.4	-23°02.9	248°21.6	-12°24.6	239°32.8	-15°10.9	192°06.8	-22°31.4	Ankaa	353°12.7	-42°12.8
2	116°52.8	216°39.5	-23°03.2	263°22.6	-12°25.1	254°34.8	-15°11.0	207°09.0	-22°31.4	Schedar	349°36.8	56°38.3
3	131°55.2	231°38.6	-23°03.5	278°23.5	-12°25.6	269°36.8	-15°11.2	222°11.1	-22°31.4	Diphda	348°52.7	-17°53.5
4	146°57.7	246°37.6	-23°03.8	293°24.5	-12°26.2	284°38.8	-15°11.3	237°13.3	-22°31.4	Achernar	335°24.3	-57°09.1
5	162°00.1	261°36.7	-23°04.1	308°25.4	-12°26.7	299°40.8	-15°11.4	252°15.4	-22°31.4	Hamal	327°57.1	23°32.8
6	177°02.6	276°35.7	-23°04.4	323°26.4	-12°27.2	314°42.8	-15°11.6	267°17.6	-22°31.4	Polaris	316°02.5	89°20.5
7	192°05.1	291°34.8	-23°04.7	338°27.3	-12°27.8	329°44.8	-15°11.7	282°19.7	-22°31.4	Akamar	315°15.7	-40°14.3
8	207°07.5	306°33.8	-23°05.0	353°28.3	-12°28.3	344°46.8	-15°11.9	297°21.9	-22°31.4	Menkar	314°11.6	4°09.4
9	222°10.0	321°32.9	-23°05.3	8°29.3	-12°28.8	359°48.8	-15°12.0	312°24.0	-22°31.5	Mirfak	308°35.5	49°55.4
10	237°12.5	336°32.0	-23°05.6	23°30.2	-12°29.4	14°50.8	-15°12.1	327°26.1	-22°31.5	Aldebaran	290°45.6	16°32.6
11	252°14.9	351°31.0	-23°05.9	38°31.2	-12°29.9	29°52.8	-15°12.3	342°28.3	-22°31.5	Rigel	281°08.8	-8°11.1
12	267°17.4	6°30.1	-23°06.2	53°32.1	-12°30.4	44°54.8	-15°12.4	357°30.4	-22°31.5	Capella	280°29.5	46°00.8
13	282°19.9	21°29.1	-23°06.5	68°33.1	-12°30.9	59°56.8	-15°12.5	12°32.6	-22°31.5	Bellatrix	278°28.4	6°21.8
14	297°22.3	36°28.2	-23°06.8	83°34.0	-12°31.5	74°58.8	-15°12.7	27°34.7	-22°31.5	Elnath	278°08.4	28°37.2
15	312°24.8	51°27.2	-23°07.1	98°35.0	-12°32.0	90°00.8	-15°12.8	42°36.9	-22°31.5	Alnilam	275°43.0	-1°11.6
16	327°27.3	66°26.3	-23°07.4	113°35.9	-12°32.5	105°02.8	-15°12.9	57°39.0	-22°31.5	Betelgeuse	270°57.7	7°24.4
17	342°29.7	81°25.4	-23°07.7	128°36.9	-12°33.1	120°04.8	-15°13.1	72°41.2	-22°31.5	Canopus	263°54.2	-52°42.4
18	357°32.2	96°24.4	-23°08.0	143°37.8	-12°33.6	135°06.8	-15°13.2	87°43.3	-22°31.5	Sirius	258°30.6	-16°44.4
19	12°34.6	111°23.5	-23°08.3	158°38.8	-12°34.1	150°08.8	-15°13.3	102°45.4	-22°31.5	Adara	255°09.8	-28°59.9
20	27°37.1	126°22.5	-23°08.6	173°39.7	-12°34.6	165°10.8	-15°13.5	117°47.6	-22°31.5	Procyon	244°56.2	5°10.7
21	42°39.6	141°21.6	-23°08.9	188°40.7	-12°35.2	180°12.8	-15°13.6	132°49.7	-22°31.5	Pollux	243°23.6	27°58.7
22	57°42.0	156°20.6	-23°09.2	203°41.7	-12°35.7	195°14.8	-15°13.7	147°51.9	-22°31.5	Avior	234°16.2	-59°33.9
23	72°44.5	171°19.7	-23°09.5	218°42.6	-12°36.2	210°16.8	-15°13.9	162°54.0	-22°31.5	Suhail	222°49.9	-43°30.2
Mer.pass.:18:09		v-0.9 d-0.3 m-3.8		v1.0 d-0.5 m1.6		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5		Miaplacidus	221°38.3	-69°47.3
										Alphard	217°52.9	-8°44.2
										Regulus	207°40.1	11°52.7
										Dubhe	193°47.9	61°39.0
										Denebola	182°30.5	14°28.3
										Genah	175°49.2	-17°38.3
										Acrux	173°05.9	-63°11.5
										Gacrux	171°57.5	-57°12.4
										Alioth	166°18.3	55°51.6
										Spica	158°28.2	-11°15.1
										Alcaid	152°56.8	49°13.4
										Hadar	148°43.8	-60°27.1
										Menkent	148°04.2	-36°27.1
										Arcturus	145°53.0	19°05.7
										Rigel Kent.	139°48.0	-60°54.1
										Zubenelg.	137°02.3	-16°06.7
										Kochab	137°21.1	74°04.8
										Alphecca	126°08.8	26°39.4
										Antares	112°22.9	-26°28.0
										Atria	107°22.5	-69°03.3
										Sabik	102°09.4	-15°44.6
										Shaula	96°18.2	-37°06.7
										Rasalhague	96°04.0	12°33.1
										Etamin	90°45.3	51°29.4
										Kaus Aust.	83°40.2	-34°22.4
										Vega	80°37.4	38°48.2
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°55.1
										Peacock	53°15.0	-56°40.7
										Deneb	49°29.7	45°20.9
										Enif	33°44.3	9°57.5
										Alnair	27°40.2	-46°52.6
										Fomalhaut	15°20.8	-29°31.8
										Scheat	13°50.5	28°10.9
										Markab	13°35.4	15°18.2
										2017/12/	SHA	Mer.pass
										Venus	99°53.5	11:34
										Mars	146°32.8	08:26
										Jupiter	137°43.0	09:01
										Saturn	90°16.9	12:10
										2017/12/	SHA	Mer.pass
										Venus	98°31.8	11:35
										Mars	145°56.6	08:25
										Jupiter	137°31.8	08:58
										Saturn	90°09.2	12:07
										2017/12/	SHA	Mer.pass
										Venus	97°09.8	11:37
										Mars	145°20.3	08:23
										Jupiter	137°20.7	08:54
										Saturn	90°01.5	12:03
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:18:01		v-1.0 d-0.3 m-3.8		v1.0 d-0.5 m1.6		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5				

h		Sun						Moon						
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	180°53.2	-23°22.9	183°52.1	12.3	-19°12.2	-3.0	54.0	72	08:24	10:56	--	--	12:59	15:30
1	195°52.9	-23°23.0	198°23.3	12.2	-19°15.2	-3.0	54.0	70	08:04	09:53	--	--	14:01	15:50
2	210°52.6	-23°23.0	212°54.6	12.2	-19°18.1	-2.9	54.0	68	07:48	09:18	--	--	14:37	16:06
3	225°52.3	-23°23.1	227°25.8	12.2	-19°20.9	-2.8	54.0	66	07:35	08:52	10:33	13:21	15:02	16:19
4	240°52.0	-23°23.2	241°57.0	12.2	-19°23.7	-2.7	54.0	64	07:24	08:33	09:51	14:04	15:22	16:30
5	255°51.7	-23°23.2	256°28.2	12.2	-19°26.3	-2.6	54.0	62	07:15	08:17	09:22	14:32	15:38	16:40
6	270°51.4	-23°23.3	270°59.4	12.2	-19°28.9	-2.5	54.0	60	07:06	08:03	09:01	14:54	15:51	16:48
7	285°51.1	-23°23.4	285°30.5	12.2	-19°31.4	-2.4	54.0	58	06:59	07:51	08:43	15:11	16:03	16:56
8	300°50.8	-23°23.4	300°01.7	12.2	-19°33.7	-2.3	53.9	56	06:52	07:41	08:29	15:26	16:13	17:02
9	315°50.5	-23°23.5	314°32.8	12.1	-19°36.0	-2.2	53.9	54	06:46	07:32	08:16	15:39	16:22	17:09
10	330°50.2	-23°23.6	329°04.0	12.1	-19°38.2	-2.2	53.9	52	06:40	07:24	08:05	15:50	16:31	17:14
11	345°49.9	-23°23.6	343°35.1	12.1	-19°40.4	-2.1	53.9	50	06:35	07:16	07:55	15:60	16:38	17:20
12	0°49.5	-23°23.7	358°06.2	12.1	-19°42.4	-2.0	53.9	45	06:23	07:00	07:34	16:20	16:54	17:31
13	15°49.2	-23°23.8	12°37.3	12.1	-19°44.3	-1.9	53.9	40	06:13	06:47	07:17	16:37	17:08	17:42
14	30°48.9	-23°23.8	27°08.4	12.1	-19°46.1	-1.8	53.9	35	06:03	06:35	07:03	16:51	17:19	17:51
15	45°48.6	-23°23.9	41°39.5	12.1	-19°47.9	-1.7	53.9	30	05:54	06:24	06:51	17:04	17:30	17:60
16	60°48.3	-23°23.9	56°10.5	12.1	-19°49.6	-1.6	53.9	20	05:38	06:05	06:29	17:25	17:49	18:16
17	75°48.0	-23°24.0	70°41.6	12.1	-19°51.1	-1.5	53.9	10	05:22	05:48	06:11	17:43	18:06	18:33
18	90°47.7	-23°24.1	85°12.7	12.1	-19°52.6	-1.4	53.9	0	05:05	05:31	05:53	18:01	18:23	18:50
19	105°47.4	-23°24.1	99°43.7	12.0	-19°54.0	-1.3	53.9	-10	04:46	05:13	05:36	18:19	18:42	19:09
20	120°47.1	-23°24.2	114°14.8	12.0	-19°55.3	-1.2	53.9	-20	04:23	04:52	05:17	18:38	19:02	19:31
21	135°46.8	-23°24.2	128°45.8	12.0	-19°56.5	-1.2	53.9	-30	03:54	04:27	04:55	18:60	19:27	20:00
22	150°46.5	-23°24.3	143°16.8	12.0	-19°57.6	-1.1	53.9	-35	03:35	04:12	04:42	19:13	19:42	20:19
23	165°46.2	-23°24.3	157°47.8	12.0	-19°58.6	-1.0	53.9	-40	03:12	03:54	04:27	19:28	20:01	20:42
SD.=16.3 d=-0.1 S.D.=14.7								-45	02:42	03:31	04:09	19:46	20:23	21:13
								-50	01:56	03:02	03:46	20:08	20:53	21:59
								-52	01:28	02:46	03:35	20:19	21:08	22:27
								-54	00:41	02:28	03:23	20:32	21:26	23:13
								-56	--	02:06	03:09	20:46	21:48	--
								-58	--	01:36	02:52	21:03	22:18	--
								-60	--	00:46	02:31	21:23	23:09	--
								Moonrise			Moonset			
								Lat.	Mon	Tue	Wed	Mon	Tue	Wed
								72	--	--	--	--	--	--
								70	11:31	--	12:53	12:42	--	14:39
								68	10:15	11:13	11:48	13:58	14:39	15:44
								66	09:37	10:33	11:12	14:35	15:19	16:19
								64	09:11	10:05	10:46	15:02	15:46	16:44
								62	08:51	09:44	10:26	15:22	16:08	17:04
								60	08:34	09:27	10:10	15:39	16:25	17:20
								58	08:20	09:12	09:56	15:53	16:39	17:34
								56	08:08	09:00	09:44	16:05	16:52	17:46
								54	07:58	08:49	09:34	16:16	17:03	17:56
								52	07:48	08:40	09:25	16:25	17:12	18:05
								50	07:40	08:31	09:16	16:34	17:21	18:13
								45	07:22	08:13	08:59	16:52	17:39	18:31
								40	07:08	07:58	08:44	17:06	17:54	18:45
								35	06:56	07:45	08:32	17:19	18:06	18:57
								30	06:45	07:35	08:21	17:30	18:17	19:07
								20	06:27	07:16	08:03	17:48	18:36	19:25
								10	06:11	06:59	07:47	18:04	18:52	19:41
								0	05:56	06:44	07:32	18:19	19:07	19:55
								-10	05:42	06:29	07:17	18:35	19:23	20:10
								-20	05:26	06:13	07:01	18:51	19:39	20:25
								-30	05:08	05:54	06:43	19:09	19:57	20:43
								-35	04:57	05:43	06:32	19:20	20:08	20:53
								-40	04:45	05:31	06:20	19:32	20:21	21:05
								-45	04:31	05:16	06:05	19:47	20:35	21:19
								-50	04:14	04:58	05:48	20:05	20:53	21:35
								-52	04:06	04:49	05:39	20:13	21:02	21:43
								-54	03:57	04:40	05:30	20:23	21:11	21:52
								-56	03:47	04:29	05:19	20:33	21:22	22:02
								-58	03:35	04:17	05:07	20:46	21:34	22:13
								-60	03:22	04:03	04:53	20:60	21:48	22:26
								Sun			Moon			
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age		
									00 ^h	12 ^h	Pass	Upper	Lower	
								18	03:33	03:18	11:56	12:07	00:31	0(0%)
								19	03:03	02:49	11:57	12:55	00:31	1(1%)
								20	02:34	02:19	11:57	13:43	01:19	2(4%)
SD.=16.3 d=-0.0 S.D.=14.7														

December 21, 22 ,23 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	89°45.2	185°33.0	-23°22.1	234°29.2	-13°01.9	226°54.9	-15°20.4	179°39.1	-22°31.6	Alpheratz	357°40.3	29°11.5
1	104°47.7	200°32.1	-23°22.3	249°30.2	-13°02.5	241°56.9	-15°20.5	194°41.3	-22°31.6	Ankaa	353°12.7	-42°12.8
2	119°50.2	215°31.1	-23°22.5	264°31.1	-13°03.0	256°58.9	-15°20.7	209°43.4	-22°31.6	Schedar	349°36.8	56°38.3
3	134°52.6	230°30.2	-23°22.7	279°32.1	-13°03.5	272°00.9	-15°20.8	224°45.5	-22°31.6	Diphda	348°52.7	-17°53.5
4	149°55.1	245°29.2	-23°23.0	294°33.0	-13°04.0	287°02.9	-15°20.9	239°47.7	-22°31.6	Achernar	335°24.3	-57°09.1
5	164°57.6	260°28.3	-23°23.2	309°33.9	-13°04.6	302°04.9	-15°21.1	254°49.8	-22°31.7	Hamal	327°57.1	23°32.8
6	180°00.0	275°27.3	-23°23.4	324°34.9	-13°05.1	317°06.9	-15°21.2	269°52.0	-22°31.7	Polaris	316°03.3	89°20.5
7	195°02.5	290°26.3	-23°23.6	339°35.8	-13°05.6	332°08.9	-15°21.3	284°54.1	-22°31.7	Akamar	315°15.7	-40°14.3
8	210°05.0	305°25.4	-23°23.8	354°36.8	-13°06.1	347°10.9	-15°21.5	299°56.3	-22°31.7	Menkar	314°11.6	4°09.4
9	225°07.4	320°24.4	-23°24.1	9°37.7	-13°06.6	2°12.9	-15°21.6	314°58.4	-22°31.7	Mirfak	308°35.5	49°55.4
10	240°09.9	335°23.5	-23°24.3	24°38.7	-13°07.2	17°14.9	-15°21.7	330°00.6	-22°31.7	Aldebaran	290°45.6	16°32.6
11	255°12.4	350°22.5	-23°24.5	39°39.6	-13°07.7	32°16.9	-15°21.9	345°02.7	-22°31.7	Rigel	281°08.8	-8°11.1
12	270°14.8	5°21.6	-23°24.7	54°40.6	-13°08.2	47°19.0	-15°22.0	0°04.8	-22°31.7	Capella	280°29.5	46°00.8
13	285°17.3	20°20.6	-23°24.9	69°41.5	-13°08.7	62°21.0	-15°22.1	15°07.0	-22°31.7	Bellatrix	278°28.4	6°21.7
14	300°19.7	35°19.6	-23°25.1	84°42.5	-13°09.2	77°23.0	-15°22.2	30°09.1	-22°31.7	Elnath	278°08.4	28°37.2
15	315°22.2	50°18.7	-23°25.3	99°43.4	-13°09.7	92°25.0	-15°22.4	45°11.3	-22°31.7	Alnilam	275°42.9	-1°11.6
16	330°24.7	65°17.7	-23°25.5	114°44.4	-13°10.3	107°27.0	-15°22.5	60°13.4	-22°31.7	Betelgeuse	270°57.7	7°24.4
17	345°27.1	80°16.8	-23°25.7	129°45.3	-13°10.8	122°29.0	-15°22.6	75°15.6	-22°31.7	Canopus	263°54.2	-52°42.5
18	0°29.6	95°15.8	-23°26.0	144°46.3	-13°11.3	137°31.0	-15°22.8	90°17.7	-22°31.7	Sirius	258°30.6	-16°44.4
19	15°32.1	110°14.8	-23°26.2	159°47.2	-13°11.8	152°33.0	-15°22.9	105°19.9	-22°31.7	Adara	255°09.7	-28°59.9
20	30°34.5	125°13.9	-23°26.4	174°48.2	-13°12.3	167°35.0	-15°23.0	120°22.0	-22°31.7	Procyon	244°56.2	5°10.7
21	45°37.0	140°12.9	-23°26.6	189°49.1	-13°12.9	182°37.0	-15°23.2	135°24.1	-22°31.7	Pollux	243°23.6	27°58.7
22	60°39.5	155°12.0	-23°26.8	204°50.1	-13°13.4	197°39.0	-15°23.3	150°26.3	-22°31.7	Avior	234°16.2	-59°33.9
23	75°41.9	170°11.0	-23°27.0	219°51.0	-13°13.9	212°41.0	-15°23.4	165°28.4	-22°31.7	Suhail	222°49.8	-43°30.2
Mer.pass.:17:58		v-1.0 d-0.2 m-3.8		v0.9 d-0.5 m1.6		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5		Miaplacidus	221°38.3	-69°47.3
										Alphard	217°52.9	-8°44.2
										Regulus	207°40.1	11°52.7
										Dubhe	193°47.9	61°39.0
										Denebola	182°30.5	14°28.3
										Gienah	175°49.1	-17°38.3
										Acrux	173°05.9	-63°11.5
										Gacrux	171°57.5	-57°12.4
										Alioth	166°18.3	55°51.6
										Spica	158°28.1	-11°15.1
										Alcaid	152°56.8	49°13.3
										Hadar	148°43.8	-60°27.1
										Menkent	148°04.2	-36°27.2
										Arcturus	145°53.0	19°05.7
										Rigel Kent.	139°47.9	-60°54.1
										Zubenelg.	137°02.3	-16°06.7
										Kochab	137°21.1	74°04.8
										Alphecca	126°08.8	26°39.4
										Antares	112°22.8	-26°28.0
										Atria	107°22.4	-69°03.2
										Sabik	102°09.4	-15°44.6
										Shaula	96°18.2	-37°06.7
										Rasalhague	96°04.0	12°33.0
										Etamin	90°45.3	51°29.4
										Kaus Aust.	83°40.2	-34°22.4
										Vega	80°37.4	38°48.2
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°55.1
										Peacock	53°15.0	-56°40.7
										Deneb	49°29.7	45°20.9
										Enif	33°44.3	9°57.5
										Alnair	27°40.2	-46°52.6
										Fomalhaut	15°20.8	-29°31.8
										Scheat	13°50.5	28°10.9
										Markab	13°35.4	15°18.2
										2017/12/	SHA	Mer.pass
										Venus	95°47.8	11:39
										Mars	144°44.0	08:22
										Jupiter	137°09.6	08:51
										Saturn	89°53.9	11:60
										2017/12/	SHA	Mer.pass
										Venus	94°25.6	11:40
										Mars	144°07.6	08:20
										Jupiter	136°58.7	08:48
										Saturn	89°46.2	11:56
										2017/12/	SHA	Mer.pass
										Venus	93°03.4	11:42
										Mars	143°31.1	08:18
										Jupiter	136°47.7	08:45
										Saturn	89°38.5	11:53
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:17:50		v-1.0 d-0.2 m-3.8		v0.9 d-0.5 m1.6		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5				

h		Sun			Moon									
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
									Naut.	Civil	Sunrise	Sunset	Civil	Naut.
0	180° 30.9	-23° 26.0	149° 10.6	12.3	-18° 56.0	3.5	54.1	72	08:26	10:58	--	--	12:59	15:31
1	195° 30.6	-23° 26.0	163° 41.9	12.3	-18° 52.4	3.6	54.1	70	08:06	09:55	--	--	14:02	15:51
2	210° 30.3	-23° 26.0	178° 13.3	12.3	-18° 48.8	3.7	54.1	68	07:50	09:20	--	--	14:38	16:07
3	225° 30.0	-23° 26.0	192° 44.6	12.4	-18° 45.1	3.7	54.1	66	07:37	08:54	10:35	13:22	15:03	16:20
4	240° 29.7	-23° 26.0	207° 16.0	12.4	-18° 41.3	3.8	54.1	64	07:26	08:34	09:53	14:05	15:23	16:31
5	255° 29.4	-23° 26.0	221° 47.4	12.4	-18° 37.4	3.9	54.1	62	07:16	08:18	09:24	14:33	15:39	16:41
6	270° 29.1	-23° 26.0	236° 18.7	12.4	-18° 33.5	4.0	54.1	60	07:08	08:05	09:02	14:55	15:53	16:50
7	285° 28.8	-23° 26.0	250° 50.2	12.4	-18° 29.4	4.1	54.2	58	07:00	07:53	08:45	15:12	16:04	16:57
8	300° 28.5	-23° 26.1	265° 21.6	12.4	-18° 25.3	4.2	54.2	56	06:54	07:43	08:30	15:27	16:15	17:04
9	315° 28.1	-23° 26.1	279° 53.0	12.5	-18° 21.1	4.3	54.2	54	06:47	07:34	08:17	15:40	16:24	17:10
10	330° 27.8	-23° 26.1	294° 24.5	12.5	-18° 16.8	4.3	54.2	52	06:42	07:25	08:06	15:51	16:32	17:16
11	345° 27.5	-23° 26.1	308° 56.0	12.5	-18° 12.4	4.4	54.2	50	06:36	07:18	07:56	16:01	16:39	17:21
12	0° 27.2	-23° 26.1	323° 27.5	12.5	-18° 07.9	4.5	54.2	45	06:25	07:02	07:36	16:22	16:56	17:33
13	15° 26.9	-23° 26.1	337° 59.0	12.5	-18° 03.4	4.6	54.2	40	06:14	06:48	07:19	16:39	17:09	17:43
14	30° 26.6	-23° 26.1	352° 30.5	12.5	-17° 58.7	4.7	54.2	35	06:05	06:36	07:05	16:53	17:21	17:53
15	45° 26.3	-23° 26.1	7° 02.1	12.6	-17° 54.0	4.8	54.2	30	05:56	06:26	06:52	17:05	17:32	18:01
16	60° 26.0	-23° 26.1	21° 33.7	12.6	-17° 49.2	4.8	54.2	20	05:39	06:07	06:31	17:26	17:50	18:18
17	75° 25.6	-23° 26.1	36° 05.2	12.6	-17° 44.3	4.9	54.3	10	05:23	05:50	06:12	17:45	18:08	18:34
18	90° 25.3	-23° 26.1	50° 36.8	12.6	-17° 39.3	5.0	54.3	0	05:06	05:32	05:55	18:02	18:25	18:51
19	105° 25.0	-23° 26.1	65° 08.5	12.6	-17° 34.3	5.1	54.3	-10	04:47	05:14	05:37	18:20	18:43	19:10
20	120° 24.7	-23° 26.1	79° 40.1	12.7	-17° 29.2	5.2	54.3	-20	04:25	04:54	05:18	18:39	19:04	19:33
21	135° 24.4	-23° 26.1	94° 11.8	12.7	-17° 24.0	5.2	54.3	-30	03:55	04:29	04:56	19:01	19:29	20:02
22	150° 24.1	-23° 26.1	108° 43.5	12.7	-17° 18.7	5.3	54.3	-35	03:37	04:13	04:43	19:14	19:44	20:21
23	165° 23.8	-23° 26.1	123° 15.2	12.7	-17° 13.3	5.4	54.3	-40	03:13	03:55	04:28	19:29	20:02	20:44
SD.=16.3 d=0.0 S.D.=14.8								-45	02:43	03:33	04:10	19:47	20:25	21:15
								-50	01:57	03:03	03:47	20:10	20:55	22:00
								-52	01:29	02:48	03:37	20:21	21:10	22:28
								-54	00:42	02:30	03:24	20:33	21:28	23:15
								-56	--	02:07	03:10	20:47	21:50	--
								-58	--	01:37	02:53	21:04	22:20	--
								-60	--	00:46	02:33	21:25	23:11	--
								Moonrise			Moonset			
								Lat.	Thu	Fri	Sat	Thu	Fri	Sat
								72	--	13:19	12:59	--	17:29	19:24
								70	12:45	12:40	12:35	16:25	18:07	19:46
								68	12:04	12:13	12:17	17:05	18:33	20:03
								66	11:37	11:52	12:02	17:32	18:53	20:17
								64	11:15	11:36	11:50	17:53	19:09	20:28
								62	10:58	11:22	11:40	18:10	19:22	20:38
								60	10:44	11:10	11:31	18:24	19:33	20:46
								58	10:32	10:60	11:23	18:36	19:43	20:53
								56	10:21	10:51	11:16	18:46	19:51	20:60
								54	10:12	10:43	11:10	18:55	19:59	21:05
								52	10:03	10:36	11:05	19:03	20:05	21:10
								50	09:56	10:30	10:60	19:11	20:11	21:15
								45	09:40	10:16	10:49	19:26	20:24	21:25
								40	09:26	10:05	10:39	19:39	20:35	21:33
								35	09:15	09:55	10:32	19:49	20:44	21:40
								30	09:05	09:46	10:25	19:59	20:52	21:46
								20	08:48	09:31	10:13	20:15	21:06	21:57
								10	08:33	09:19	10:02	20:29	21:18	22:06
								0	08:20	09:06	09:52	20:42	21:29	22:14
								-10	08:06	08:54	09:43	20:55	21:40	22:23
								-20	07:51	08:41	09:32	21:09	21:51	22:32
								-30	07:34	08:26	09:20	21:25	22:05	22:42
								-35	07:24	08:18	09:13	21:34	22:13	22:48
								-40	07:12	08:08	09:05	21:45	22:21	22:55
								-45	06:59	07:56	08:55	21:57	22:31	23:03
								-50	06:43	07:42	08:44	22:12	22:44	23:12
								-52	06:35	07:35	08:39	22:19	22:49	23:16
								-54	06:26	07:28	08:33	22:27	22:56	23:21
								-56	06:17	07:20	08:27	22:35	23:03	23:26
								-58	06:06	07:10	08:19	22:45	23:10	23:32
								-60	05:53	06:60	08:11	22:56	23:19	23:38
								Sun			Moon			
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age		
									00 ^h	12 ^h	Pass	Upper	Lower	
								21	02:04	01:49	11:58	14:30	02:07	3(9%)
								22	01:34	01:19	11:58	15:17	02:54	4(15%)
								23	01:04	00:49	11:59	16:03	03:40	5(23%)
SD.=16.3 d=0.0 S.D.=14.9														

December 24, 25, 26 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	92°42.7	184°23.7	-23°35.2	235°37.3	-13°39.0	229°19.6	-15°29.7	182°13.5	-22°31.8	Alpheratz	357°40.3	29°11.5
1	107°45.1	199°22.8	-23°35.3	250°38.2	-13°39.6	244°21.6	-15°29.9	197°15.7	-22°31.8	Ankaa	353°12.7	-42°12.8
2	122°47.6	214°21.8	-23°35.4	265°39.2	-13°40.1	259°23.6	-15°30.0	212°17.8	-22°31.8	Schedar	349°36.9	56°38.3
3	137°50.1	229°20.8	-23°35.6	280°40.1	-13°40.6	274°25.6	-15°30.1	227°19.9	-22°31.8	Diphda	348°52.7	-17°53.5
4	152°52.5	244°19.8	-23°35.7	295°41.1	-13°41.1	289°27.6	-15°30.3	242°22.1	-22°31.8	Achernar	335°24.4	-57°09.1
5	167°55.0	259°18.9	-23°35.8	310°42.0	-13°41.6	304°29.7	-15°30.4	257°24.2	-22°31.8	Hamal	327°57.1	23°32.8
6	182°57.4	274°17.9	-23°35.9	325°43.0	-13°42.1	319°31.7	-15°30.5	272°26.4	-22°31.8	Polaris	316°04.3	89°20.5
7	197°59.9	289°16.9	-23°36.1	340°43.9	-13°42.6	334°33.7	-15°30.6	287°28.5	-22°31.8	Akamar	315°15.8	-40°14.3
8	213°02.4	304°16.0	-23°36.2	355°44.8	-13°43.1	349°35.7	-15°30.8	302°30.7	-22°31.8	Menkar	314°11.6	4°09.4
9	228°04.8	319°15.0	-23°36.3	10°45.8	-13°43.6	4°37.7	-15°30.9	317°32.8	-22°31.8	Mirfak	308°35.5	49°55.4
10	243°07.3	334°14.0	-23°36.5	25°46.7	-13°44.1	19°39.7	-15°31.0	332°35.0	-22°31.8	Aldebaran	290°45.6	16°32.6
11	258°09.8	349°13.1	-23°36.6	40°47.7	-13°44.6	34°41.7	-15°31.1	347°37.1	-22°31.8	Rigel	281°08.8	-8°11.1
12	273°12.2	4°12.1	-23°36.7	55°48.6	-13°45.1	49°43.8	-15°31.3	2°39.2	-22°31.8	Capella	280°29.5	46°00.9
13	288°14.7	19°11.1	-23°36.8	70°49.6	-13°45.7	64°45.8	-15°31.4	17°41.4	-22°31.8	Bellatrix	278°28.4	6°21.7
14	303°17.2	34°10.2	-23°36.9	85°50.5	-13°46.2	79°47.8	-15°31.5	32°43.5	-22°31.8	Elnath	278°08.4	28°37.2
15	318°19.6	49°09.2	-23°37.1	100°51.4	-13°46.7	94°49.8	-15°31.7	47°45.7	-22°31.8	Alnilam	275°42.9	-1°11.6
16	333°22.1	64°08.2	-23°37.2	115°52.4	-13°47.2	109°51.8	-15°31.8	62°47.8	-22°31.8	Betelgeuse	270°57.7	7°24.4
17	348°24.6	79°07.2	-23°37.3	130°53.3	-13°47.7	124°53.8	-15°31.9	77°50.0	-22°31.8	Canopus	263°54.2	-52°42.5
18	3°27.0	94°06.3	-23°37.4	145°54.3	-13°48.2	139°55.9	-15°32.0	92°52.1	-22°31.8	Sirius	258°30.6	-16°44.4
19	18°29.5	109°05.3	-23°37.5	160°55.2	-13°48.7	154°57.9	-15°32.2	107°54.3	-22°31.8	Adara	255°09.7	-16°59.9
20	33°31.9	124°04.3	-23°37.6	175°56.1	-13°49.2	169°59.9	-15°32.3	122°56.4	-22°31.8	Procyon	244°56.1	5°10.7
21	48°34.4	139°03.4	-23°37.7	190°57.1	-13°49.7	185°01.9	-15°32.4	137°58.5	-22°31.8	Pollux	243°23.6	27°58.7
22	63°36.9	154°02.4	-23°37.8	205°58.0	-13°50.2	200°03.9	-15°32.5	153°00.7	-22°31.8	Avior	234°16.2	-59°34.0
23	78°39.3	169°01.4	-23°38.0	220°59.0	-13°50.7	215°05.9	-15°32.7	168°02.8	-22°31.8	Suhail	222°49.8	-43°30.2
Mer.pass.:17:46		v-1.0 d-0.1 m-3.8		v0.9 d-0.5 m1.6		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5		Miaplacidus	221°38.3	-69°47.3
										Alphard	217°52.9	-8°44.2
										Regulus	207°40.1	11°52.7
										Dubhe	193°47.8	61°39.0
										Denebola	182°30.5	14°28.3
										Gienah	175°49.1	-17°38.3
										Acrux	173°05.8	-63°11.5
										Gacrux	171°57.5	-57°12.4
										Alioth	166°18.2	55°51.6
										Spica	158°28.1	-11°15.1
										Alcaid	152°56.7	49°13.3
										Hadar	148°43.8	-60°27.1
										Menkent	148°04.1	-36°27.2
										Arcturus	145°53.0	19°05.7
										Rigel Kent.	139°47.9	-60°54.1
										Zubenelg.	137°02.3	-16°06.7
										Kochab	137°21.0	74°04.8
										Alphecca	126°08.7	26°39.4
										Antares	112°22.8	-26°28.0
										Atria	107°22.4	-69°03.2
										Sabik	102°09.4	-15°44.6
										Shaula	96°18.2	-37°06.7
										Rasalhague	96°04.0	12°33.0
										Etamin	90°45.3	51°29.3
										Kaus Aust.	83°40.2	-34°22.4
										Vega	80°37.4	38°48.2
										Nunki	75°54.9	-26°16.3
										Altair	62°05.6	8°55.1
										Peacock	53°15.0	-56°40.7
										Deneb	49°29.7	45°20.9
										Enif	33°44.3	9°57.5
										Alnair	27°40.2	-46°52.6
										Fomalhaut	15°20.8	-29°31.8
										Scheat	13°50.5	28°10.9
										Markab	13°35.4	15°18.2
										2017/12/	SHA	Mer.pass
										Venus	91°41.1	11:43
										Mars	142°54.6	08:17
										Jupiter	136°36.9	08:42
										Saturn	89°30.8	11:49
										2017/12/	SHA	Mer.pass
										Venus	90°18.7	11:45
										Mars	142°18.1	08:15
										Jupiter	136°26.2	08:38
										Saturn	89°23.2	11:46
										2017/12/	SHA	Mer.pass
										Venus	88°56.2	11:46
										Mars	141°41.5	08:14
										Jupiter	136°15.5	08:35
										Saturn	89°15.5	11:43
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:17:38		v-1.0 d-0.1 m-3.8		v0.9 d-0.5 m1.5		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5				

Sun		Moon						Twilight							
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	180°08.5	-23°24.8	115°30.2	13.5	-11°21.3	8.8	55.2	72	08:27	10:57	--	--	13:04	15:34	
1	195°08.2	-23°24.8	130°02.6	13.5	-11°12.5	8.8	55.2	70	08:07	09:55	--	--	14:05	15:54	
2	210°07.9	-23°24.7	144°35.1	13.5	-11°03.7	8.9	55.2	68	07:51	09:20	--	--	14:40	16:09	
3	225°07.6	-23°24.7	159°07.6	13.5	-10°54.7	8.9	55.2	66	07:38	08:55	10:35	13:25	15:05	16:22	
4	240°07.3	-23°24.6	173°40.1	13.5	-10°45.8	9.0	55.3	64	07:27	08:35	09:53	14:07	15:25	16:34	
5	255°07.0	-23°24.6	188°12.7	13.5	-10°36.7	9.1	55.3	62	07:17	08:19	09:25	14:36	15:41	16:43	
6	270°06.7	-23°24.5	202°45.2	13.5	-10°27.7	9.1	55.3	60	07:09	08:06	09:03	14:57	15:55	16:52	
7	285°06.3	-23°24.5	217°17.7	13.5	-10°18.5	9.2	55.3	58	07:01	07:54	08:46	15:15	16:06	16:59	
8	300°06.0	-23°24.4	231°50.2	13.5	-10°09.3	9.2	55.4	56	06:55	07:44	08:31	15:29	16:17	17:06	
9	315°05.7	-23°24.4	246°22.7	13.5	-10°00.1	9.3	55.4	54	06:49	07:35	08:19	15:42	16:26	17:12	
10	330°05.4	-23°24.3	260°55.3	13.5	-9°50.8	9.3	55.4	52	06:43	07:27	08:07	15:53	16:34	17:18	
11	345°05.1	-23°24.3	275°27.8	13.5	-9°41.5	9.4	55.4	50	06:38	07:19	07:58	16:03	16:41	17:23	
12	0°04.8	-23°24.2	290°00.4	13.5	-9°32.1	9.4	55.5	48	06:26	07:03	07:37	16:24	16:57	17:35	
13	15°04.5	-23°24.2	304°32.9	13.5	-9°22.6	9.5	55.5	45	06:15	06:50	07:20	16:40	17:11	17:45	
14	30°04.2	-23°24.1	319°05.4	13.5	-9°13.1	9.5	55.5	40	06:06	06:38	07:06	16:54	17:23	17:54	
15	45°03.9	-23°24.1	333°38.0	13.5	-9°03.6	9.6	55.5	35	05:57	06:27	06:54	17:07	17:33	18:03	
16	60°03.5	-23°24.0	348°10.5	13.5	-8°54.0	9.6	55.6	30	05:41	06:08	06:32	17:28	17:52	18:20	
17	75°03.2	-23°23.9	2°43.1	13.5	-8°44.3	9.7	55.6	20	05:25	05:51	06:14	17:47	18:09	18:36	
18	90°02.9	-23°23.9	17°15.6	13.5	-8°34.6	9.7	55.6	10	05:08	05:34	05:56	18:04	18:26	18:53	
19	105°02.6	-23°23.8	31°48.1	13.5	-8°24.9	9.8	55.7	-10	04:49	05:16	05:39	18:21	18:45	19:12	
20	120°02.3	-23°23.8	46°20.7	13.5	-8°15.1	9.8	55.7	-20	04:26	04:55	05:20	18:40	19:05	19:34	
21	135°02.0	-23°23.7	60°53.2	13.5	-8°05.3	9.9	55.7	-30	03:57	04:30	04:58	19:02	19:30	20:03	
22	150°01.7	-23°23.6	75°25.7	13.5	-7°55.4	9.9	55.7	-35	03:38	04:15	04:45	19:15	19:45	20:22	
23	165°01.4	-23°23.6	89°58.3	13.5	-7°45.5	9.9	55.8	-40	03:15	03:57	04:30	19:30	20:03	20:45	
SD.=16.3 d=0.0			S.D.=15.1						-45	02:45	03:34	04:12	19:48	20:26	21:16
									-50	01:59	03:05	03:49	20:11	20:56	22:01
									-52	01:31	02:50	03:38	20:22	21:11	22:29
									-54	00:45	02:32	03:26	20:34	21:28	23:14
									-56	--	02:09	03:12	20:48	21:51	--
									-58	--	01:40	02:55	21:05	22:20	--
									-60	--	00:49	02:35	21:25	23:10	--
								Moonrise			Moonset				
								Lat.	Sun	Mon	Tue	Sun	Mon	Tue	
								72	12:46	12:35	12:25	21:12	22:58	--	
								70	12:31	12:27	12:23	21:25	23:03	--	
								68	12:19	12:21	12:22	21:35	23:08	--	
								66	12:10	12:16	12:21	21:43	23:11	--	
								64	12:02	12:11	12:20	21:50	23:14	--	
								62	11:55	12:07	12:19	21:56	23:17	--	
								60	11:48	12:04	12:18	22:02	23:19	--	
								58	11:43	12:01	12:17	22:06	23:21	--	
								56	11:38	11:58	12:17	22:10	23:23	--	
								54	11:34	11:55	12:16	22:14	23:25	--	
								52	11:30	11:53	12:16	22:17	23:26	--	
								50	11:26	11:51	12:15	22:20	23:28	--	
								45	11:18	11:47	12:14	22:27	23:31	--	
								40	11:12	11:43	12:14	22:32	23:33	--	
								35	11:06	11:40	12:13	22:37	23:35	--	
								30	11:01	11:37	12:12	22:41	23:37	--	
								20	10:53	11:32	12:11	22:48	23:40	--	
								10	10:45	11:27	12:10	22:54	23:43	--	
								0	10:38	11:23	12:09	22:60	23:45	--	
								-10	10:31	11:19	12:08	23:05	23:48	--	
								-20	10:23	11:15	12:08	23:11	23:50	--	
								-30	10:14	11:10	12:07	23:18	23:53	--	
								-35	10:09	11:07	12:06	23:22	23:55	--	
								-40	10:04	11:04	12:05	23:26	23:57	--	
								-45	09:57	11:00	12:05	23:31	23:59	--	
								-50	09:49	10:55	12:04	23:37	--	00:02	
								-52	09:45	10:53	12:03	23:40	--	00:03	
								-54	09:41	10:51	12:03	23:43	--	00:04	
								-56	09:36	10:48	12:02	23:47	--	00:06	
								-58	09:31	10:45	12:02	23:50	--	00:07	
								-60	09:25	10:42	12:01	23:54	--	00:09	
								Sun			Moon				
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age			
									00 ^h	12 ^h	Upper	Lower			
								24	00:34	00:19	11:59	16:48	04:26	6(31%)	
								25	00:04	00:11	12:00	17:34	05:11	7(41%)	
								26	00:25	00:40	12:00	18:20	05:57	8(51%)	
SD.=16.3 d=0.1			S.D.=15.4												

December 27, 28 ,29 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	95°40.1	183°13.8	-23°41.7	236°45.0	-14°15.3	231°45.0	-15°38.8	184°47.9	-22°31.9	Alpheratz	357°40.3	29°11.5
1	110°42.5	198°12.8	-23°41.7	251°45.9	-14°15.8	246°47.0	-15°38.9	199°50.1	-22°31.9	Ankaa	353°12.7	-42°12.8
2	125°45.0	213°11.9	-23°41.8	266°46.8	-14°16.3	261°49.0	-15°39.0	214°52.2	-22°31.9	Schedar	349°36.9	56°38.3
3	140°47.5	228°10.9	-23°41.8	281°47.8	-14°16.8	276°51.0	-15°39.1	229°54.4	-22°31.9	Diphda	348°52.7	-17°53.5
4	155°49.9	243°09.9	-23°41.8	296°48.7	-14°17.3	291°53.1	-15°39.3	244°56.5	-22°31.9	Achernar	335°24.4	-57°09.1
5	170°52.4	258°08.9	-23°41.9	311°49.6	-14°17.8	306°55.1	-15°39.4	259°58.7	-22°31.9	Hamal	327°57.1	23°32.8
6	185°54.9	273°08.0	-23°41.9	326°50.6	-14°18.3	321°57.1	-15°39.5	275°00.8	-22°31.9	Polaris	316°05.3	89°20.5
7	200°57.3	288°07.0	-23°42.0	341°51.5	-14°18.8	336°59.1	-15°39.6	290°03.0	-22°31.9	Akamar	315°15.8	-40°14.3
8	215°59.8	303°06.0	-23°42.0	356°52.5	-14°19.3	352°01.2	-15°39.7	305°05.1	-22°31.9	Menkar	314°11.6	4°09.4
9	231°02.3	318°05.0	-23°42.0	11°53.4	-14°19.8	7°03.2	-15°39.9	320°07.2	-22°31.9	Mirfak	308°35.5	49°55.5
10	246°04.7	333°04.1	-23°42.1	26°54.3	-14°20.3	22°05.2	-15°40.0	335°09.4	-22°31.9	Aldebaran	290°45.6	16°32.6
11	261°07.2	348°03.1	-23°42.1	41°55.3	-14°20.8	37°07.2	-15°40.1	350°11.5	-22°31.9	Rigel	281°08.8	-8°11.1
12	276°09.6	3°02.1	-23°42.1	56°56.2	-14°21.3	52°09.3	-15°40.2	5°13.7	-22°31.9	Capella	280°29.5	46°00.9
13	291°12.1	18°01.1	-23°42.2	71°57.1	-14°21.7	67°11.3	-15°40.4	20°15.8	-22°31.9	Bellatrix	278°28.4	6°21.7
14	306°14.6	33°00.2	-23°42.2	86°58.1	-14°22.2	82°13.3	-15°40.5	35°18.0	-22°31.9	Elnath	278°08.4	28°37.2
15	321°17.0	47°59.2	-23°42.2	101°59.0	-14°22.7	97°15.4	-15°40.6	50°20.1	-22°31.9	Alnilam	275°42.9	-1°11.7
16	336°19.5	62°58.2	-23°42.2	116°59.9	-14°23.2	112°17.4	-15°40.7	65°22.3	-22°31.9	Betelgeuse	270°57.7	7°24.4
17	351°22.0	77°57.3	-23°42.3	132°00.9	-14°23.7	127°19.4	-15°40.8	80°24.4	-22°31.9	Canopus	263°54.2	-52°42.5
18	6°24.4	92°56.3	-23°42.3	147°01.8	-14°24.2	142°21.4	-15°41.0	95°26.6	-22°31.9	Sirius	258°30.6	-16°44.4
19	21°26.9	107°55.3	-23°42.3	162°02.7	-14°24.7	157°23.5	-15°41.1	110°28.7	-22°31.9	Adara	255°09.7	-16°59.9
20	36°29.4	122°54.3	-23°42.3	177°03.7	-14°25.2	172°25.5	-15°41.2	125°30.8	-22°31.9	Procyon	244°56.1	5°10.7
21	51°31.8	137°53.4	-23°42.3	192°04.6	-14°25.7	187°27.5	-15°41.3	140°33.0	-22°31.9	Pollux	243°23.6	27°58.7
22	66°34.3	152°52.4	-23°42.4	207°05.5	-14°26.2	202°29.5	-15°41.5	155°35.1	-22°31.9	Avior	234°16.2	-59°34.0
23	81°36.8	167°51.4	-23°42.4	222°06.5	-14°26.7	217°31.6	-15°41.6	170°37.3	-22°31.9	Suhail	222°49.8	-43°30.2
Mer.pass.:17:34		v-1.0 d-0.0 m-3.8		v0.9 d-0.5 m1.5		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5		Miaplacidus	221°38.2	-69°47.3
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	96°39.2	182°50.4	-23°42.4	237°07.4	-14°27.2	232°33.6	-15°41.7	185°39.4	-22°31.9	Dubhe	193°47.8	61°39.0
1	111°41.7	197°49.5	-23°42.4	252°08.3	-14°27.7	247°35.6	-15°41.8	200°41.6	-22°31.9	Denebola	182°30.4	14°28.3
2	126°44.1	212°48.5	-23°42.4	267°09.3	-14°28.2	262°37.7	-15°41.9	215°43.7	-22°31.9	Gienah	175°49.1	-17°38.3
3	141°46.6	227°47.5	-23°42.4	282°10.2	-14°28.7	277°39.7	-15°42.1	230°45.9	-22°31.9	Acrux	173°05.8	-63°11.5
4	156°49.1	242°46.5	-23°42.4	297°11.1	-14°29.2	292°41.7	-15°42.2	245°48.0	-22°31.9	Gacrux	171°57.4	-57°12.5
5	171°51.5	257°45.6	-23°42.4	312°12.1	-14°29.6	307°43.7	-15°42.3	260°50.2	-22°31.9	Alioth	166°18.2	55°51.6
6	186°54.0	272°44.6	-23°42.4	327°13.0	-14°30.1	322°45.8	-15°42.4	275°52.3	-22°31.9	Spica	158°28.1	-11°15.1
7	201°56.5	287°43.6	-23°42.5	342°13.9	-14°30.6	337°47.8	-15°42.5	290°54.4	-22°31.9	Alcaid	152°56.7	49°13.3
8	216°58.9	302°42.7	-23°42.5	357°14.9	-14°31.1	352°49.8	-15°42.7	305°56.6	-22°31.9	Hadar	148°43.7	-60°27.1
9	232°01.4	317°41.7	-23°42.5	12°15.8	-14°31.6	7°51.9	-15°42.8	320°58.7	-22°31.9	Menkent	148°04.1	-36°27.2
10	247°03.9	332°40.7	-23°42.5	27°16.8	-14°32.1	22°53.9	-15°42.9	336°00.9	-22°31.9	Arcturus	145°53.0	19°05.7
11	262°06.3	347°39.7	-23°42.5	42°17.7	-14°32.6	37°55.9	-15°43.0	351°03.0	-22°31.9	Rigel Kent.	139°47.9	-60°54.1
12	277°08.8	2°38.8	-23°42.5	57°18.6	-14°33.1	52°57.9	-15°43.1	6°05.2	-22°31.9	Zubenelg.	137°02.2	-16°06.7
13	292°11.3	17°37.8	-23°42.5	72°19.6	-14°33.6	67°60.0	-15°43.3	21°07.3	-22°31.9	Kochab	137°21.0	74°04.8
14	307°13.7	32°36.8	-23°42.5	87°20.5	-14°34.1	83°02.0	-15°43.4	36°09.5	-22°31.9	Alphecca	126°08.7	26°39.3
15	322°16.2	47°35.8	-23°42.5	102°21.4	-14°34.6	98°04.0	-15°43.5	51°11.6	-22°31.9	Antares	112°22.8	-26°28.0
16	337°18.6	62°34.9	-23°42.4	117°22.3	-14°35.0	113°06.1	-15°43.6	66°13.8	-22°31.9	Atria	107°22.4	-69°03.2
17	352°21.1	77°33.9	-23°42.4	132°23.3	-14°35.5	128°08.1	-15°43.8	81°15.9	-22°31.9	Sabik	102°09.4	-15°44.6
18	7°23.6	92°32.9	-23°42.4	147°24.2	-14°36.0	143°10.1	-15°43.9	96°18.0	-22°31.9	Shaula	96°18.2	-37°06.7
19	22°26.0	107°31.9	-23°42.4	162°25.1	-14°36.5	158°12.2	-15°44.0	111°20.2	-22°31.9	Rasalhague	96°04.0	12°33.0
20	37°28.5	122°31.0	-23°42.4	177°26.1	-14°37.0	173°14.2	-15°44.1	126°22.3	-22°31.9	Etamin	90°45.3	51°29.3
21	52°31.0	137°30.0	-23°42.4	192°27.0	-14°37.5	188°16.2	-15°44.2	141°24.5	-22°31.9	Kaus Aust.	83°40.2	-34°22.4
22	67°33.4	152°29.0	-23°42.4	207°27.9	-14°38.0	203°18.2	-15°44.4	156°26.6	-22°31.9	Vega	80°37.3	38°48.1
23	82°35.9	167°28.0	-23°42.4	222°28.9	-14°38.5	218°20.3	-15°44.5	171°28.8	-22°31.9	Nunki	75°54.9	-26°16.3
Mer.pass.:17:30		v-1.0 d-0.0 m-3.8		v0.9 d-0.5 m1.5		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5		Altair	62°05.6	8°55.0
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	97°38.4	182°27.1	-23°42.4	237°29.8	-14°39.0	233°22.3	-15°44.6	186°30.9	-22°31.9	Peacock	53°15.0	-56°40.6
1	112°40.8	197°26.1	-23°42.3	252°30.7	-14°39.5	248°24.3	-15°44.7	201°33.1	-22°31.9	Deneb	49°29.8	45°20.9
2	127°43.3	212°25.1	-23°42.3	267°31.7	-14°39.9	263°26.4	-15°44.8	216°35.2	-22°31.9	Enif	33°44.3	9°57.5
3	142°45.7	227°24.2	-23°42.3	282°32.6	-14°40.4	278°28.4	-15°45.0	231°37.4	-22°31.9	Alnair	27°40.3	-46°52.6
4	157°48.2	242°23.2	-23°42.3	297°33.5	-14°40.9	293°30.4	-15°45.1	246°39.5	-22°31.9	Fomalhaut	15°20.9	-29°31.8
5	172°50.7	257°22.2	-23°42.3	312°34.5	-14°41.4	308°32.5	-15°45.2	261°41.6	-22°31.9	Scheat	13°50.5	28°10.9
6	187°53.1	272°21.2	-23°42.2	327°35.4	-14°41.9	323°34.5	-15°45.3	276°43.8	-22°31.9	Markab	13°35.4	15°18.2
7	202°55.6	287°20.3	-23°42.2	342°36.3	-14°42.4	338°36.5	-15°45.4	291°45.9	-22°31.9	2017/12/ Mer.pass		
8	217°58.1	302°19.3	-23°42.2	357°37.3	-14°42.9	353°38.6	-15°45.5	306°48.1	-22°31.9	Venus	87°33.7	11:48
9	233°00.5	317°18.3	-23°42.2	12°38.2	-14°43.4	8°40.6	-15°45.7	321°50.2	-22°31.9	Mars	141°04.9	08:12
10	248°03.0	332°17.3	-23°42.1	27°39.1	-14°43.8	23°42.6	-15°45.8	336°52.4	-22°31.9	Jupiter	136°04.9	08:32
11	263°05.5	347°16.4	-23°42.1	42°40.1	-14°44.3	38°44.7	-15°45.9	351°54.5	-22°31.9	Saturn	89°07.9	11:39
12	278°07.9	2°15.4	-23°42.1	57°41.0	-14°44.8	53°46.7	-15°46.0	6°56.7	-22°31.9	2017/12/ Mer.pass		
13	293°10.4	17°14.4	-23°42.0	72°41.9	-14°45.3	68°48.7	-15°46.1	21°58.8	-22°31.9	Venus	86°11.2	11:49
14	308°12.9	32°13.5	-23°42.0	87°42.9	-14°45.8	83°50.8	-15°46.3	37°01.0	-22°31.9	Mars	140°28.2	08:11
15	323°15.3	47°12.5	-23°42.0	102°43.8	-14°46.3	98°52.8	-15°46.4	52°03.1	-22°31.9	Jupiter	135°54.4	08:29
16	338°17.8	62°11.5	-23°41.9	117°44.7	-14°46.8	113°54.8	-15°46.5	67°05.3	-22°31.9	Saturn	89°00.2	11:36
17	353°20.2	77°10.5	-23°41.9	132°45.6	-14°47.3	128°56.9	-15°46.6	82°07.4	-22°31.9	2017/12/ Mer.pass		
18	8°22.7	92°09.6	-23°41.9	147°46.6	-14°47.7	143°58.9	-15°46.7	97°09.5	-22°31.9	Venus	84°48.7	11:51
19	23°25.2	107°08.6	-23°41.8	162°47.5	-14°48.2	159°00.9	-15°46.9	112°11.7	-22°31.9	Mars	139°51.5	08:10
20	38°27.6	122°07.6	-23°41.8	177°48.4	-14°48.7	174°03.0	-15°47.0	127°13.8	-22°31.9	Jupiter	135°44.0	08:25
21	53°30.1	137°06.6	-23°41.7	192°49.4	-14°49.2	189°05.0	-15°47.1	142°16.0	-22°31.9	Saturn	88°52.6	11:32
22	68°32.6	152°05.7	-23°41.7	207°50.3	-14°49.7	204°07.0	-15°47.2	157°18.1	-22°31.9	Horizontal parallax		
23	83°35.0	167°04.7	-23°41.6	222°51.2	-14°50.2	219°09.1	-15°47.3	172°20.3	-22°31.9	Venus:	0.1	
Mer.pass.:17:26		v-1.0 d0.0 m-3.8		v0.9 d-0.5 m1.5		v2.0 d-0.1 m-1.6		v2.1 d-0.0 m0.5		Mars:	0.1	

h		Sun				Moon				Twilight						
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	179°46.2	-23°19.5	82°10.6	12.3	1°02.6	11.3	57.4	72	08:26	10:52	--	--	13:11	15:37		
1	194°45.9	-23°19.4	96°41.9	12.3	1°14.0	11.3	57.4	70	08:07	09:54	--	--	14:10	15:57		
2	209°45.6	-23°19.2	111°13.2	12.2	1°25.3	11.4	57.5	68	07:51	09:20	--	--	14:44	16:12		
3	224°45.3	-23°19.1	125°44.4	12.2	1°36.7	11.4	57.5	66	07:38	08:55	10:33	13:30	15:09	16:25		
4	239°45.0	-23°19.0	140°15.6	12.1	1°48.0	11.4	57.6	64	07:27	08:35	09:52	14:11	15:28	16:36		
5	254°44.7	-23°18.9	154°46.7	12.1	1°59.4	11.4	57.6	62	07:18	08:20	09:25	14:39	15:44	16:46		
6	269°44.4	-23°18.8	169°17.8	12.0	2°10.8	11.4	57.6	60	07:09	08:06	09:03	15:00	15:57	16:54		
7	284°44.1	-23°18.7	183°48.8	12.0	2°22.2	11.4	57.7	58	07:02	07:55	08:46	15:17	16:09	17:01		
8	299°43.8	-23°18.6	198°19.7	11.9	2°33.6	11.4	57.7	56	06:55	07:44	08:32	15:32	16:19	17:08		
9	314°43.5	-23°18.5	212°50.6	11.9	2°44.9	11.4	57.7	54	06:49	07:35	08:19	15:44	16:28	17:14		
10	329°43.2	-23°18.4	227°21.5	11.8	2°56.3	11.4	57.8	52	06:44	07:27	08:08	15:55	16:36	17:20		
11	344°42.9	-23°18.3	241°52.3	11.8	3°07.7	11.4	57.8	50	06:38	07:20	07:58	16:05	16:43	17:25		
12	359°42.6	-23°18.1	256°23.0	11.7	3°19.1	11.4	57.9	45	06:27	07:04	07:38	16:26	16:59	17:37		
13	14°42.3	-23°18.0	270°53.7	11.7	3°30.5	11.4	57.9	40	06:17	06:51	07:21	16:42	17:13	17:47		
14	29°41.9	-23°17.9	285°24.4	11.6	3°41.9	11.4	57.9	35	06:07	06:39	07:07	16:56	17:24	17:56		
15	44°41.6	-23°17.8	299°55.0	11.5	3°53.3	11.4	58.0	30	05:59	06:28	06:55	17:09	17:35	18:05		
16	59°41.3	-23°17.7	314°25.5	11.5	4°04.6	11.4	58.0	20	05:42	06:10	06:34	17:30	17:54	18:21		
17	74°41.0	-23°17.6	328°55.9	11.4	4°16.0	11.4	58.1	10	05:26	05:52	06:15	17:48	18:11	18:37		
18	89°40.7	-23°17.5	343°26.3	11.4	4°27.4	11.4	58.1	0	05:09	05:35	05:58	18:05	18:28	18:54		
19	104°40.4	-23°17.3	357°56.7	11.3	4°38.8	11.4	58.1	-10	04:50	05:17	05:40	18:23	18:46	19:13		
20	119°40.1	-23°17.2	12°26.9	11.2	4°50.1	11.3	58.2	-20	04:28	04:57	05:22	18:42	19:06	19:35		
21	134°39.8	-23°17.1	26°57.1	11.2	5°01.4	11.3	58.2	-30	03:59	04:32	04:60	19:04	19:31	20:04		
22	149°39.5	-23°17.0	41°27.3	11.1	5°12.8	11.3	58.3	-35	03:40	04:17	04:47	19:16	19:46	20:23		
23	164°39.2	-23°16.8	55°57.4	11.0	5°24.1	11.3	58.3	-40	03:17	03:59	04:32	19:31	20:04	20:46		
SD.=16.3 d=0.1 S.D.=15.7								-45	02:47	03:37	04:14	19:49	20:26	21:16		
								-50	02:02	03:07	03:52	20:12	20:56	22:01		
								-52	01:35	02:52	03:41	20:22	21:11	22:28		
								-54	00:51	02:34	03:29	20:34	21:28	23:11		
								-56	--	02:12	03:14	20:48	21:50	--		
								-58	--	01:43	02:58	21:05	22:19	--		
								-60	--	00:55	02:38	21:25	23:06	--		
								Moonrise			Moonset					
								Lat.	Wed	Thu	Fri	Wed	Thu	Fri		
								72	12:15	12:04	11:52	00:46	02:38	04:39		
								70	12:19	12:16	12:12	00:44	02:29	04:21		
								68	12:23	12:25	12:28	00:43	02:22	04:06		
								66	12:26	12:32	12:41	00:42	02:16	03:55		
								64	12:29	12:39	12:52	00:41	02:11	03:45		
								62	12:31	12:44	13:01	00:40	02:07	03:37		
								60	12:33	12:49	13:09	00:40	02:03	03:30		
								58	12:35	12:54	13:16	00:39	01:60	03:23		
								56	12:36	12:57	13:22	00:39	01:57	03:18		
								54	12:38	13:01	13:28	00:38	01:54	03:13		
								52	12:39	13:04	13:33	00:38	01:52	03:08		
								50	12:40	13:07	13:38	00:37	01:49	03:04		
								45	12:43	13:13	13:48	00:36	01:45	02:56		
								40	12:45	13:19	13:56	00:36	01:41	02:49		
								35	12:47	13:23	14:03	00:35	01:37	02:42		
								30	12:49	13:27	14:10	00:34	01:34	02:37		
								20	12:52	13:35	14:21	00:33	01:29	02:28		
								10	12:54	13:41	14:31	00:33	01:25	02:19		
								0	12:57	13:47	14:40	00:32	01:20	02:12		
								-10	12:59	13:53	14:49	00:31	01:16	02:04		
								-20	13:02	13:59	14:59	00:30	01:11	01:56		
								-30	13:05	14:07	15:11	00:29	01:06	01:47		
								-35	13:07	14:11	15:18	00:28	01:03	01:41		
								-40	13:09	14:16	15:25	00:28	01:00	01:35		
								-45	13:12	14:22	15:34	00:27	00:56	01:28		
								-50	13:15	14:29	15:45	00:26	00:51	01:20		
								-52	13:16	14:32	15:50	00:26	00:49	01:16		
								-54	13:18	14:35	15:56	00:25	00:47	01:12		
								-56	13:19	14:39	16:02	00:25	00:44	01:07		
								-58	13:21	14:43	16:09	00:24	00:42	01:02		
								-60	13:23	14:48	16:17	00:23	00:38	00:56		
								Sun			Moon					
								Day	Eqn.of Time	Mer.	Mer.Pass.	Age				
									00 ^h	12 ^h	Pass	Upper	Lower			
								27	00:55	01:10	12:01	19:08	06:44	9(62%)		
								28	01:24	01:39	12:01	19:59	07:33	10(72%)		
								29	01:54	02:08	12:02	20:53	08:25	11(82%)		
SD.=16.3 d=0.1 S.D.=16.2																

December 30, 31 ,01 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec				
0	98°37.5	182°03.7	-23°41.6	237°52.2	-14°50.7	234°11.1	-15°47.5	187°22.4	-22°31.9	187°22.4	-22°31.9	187°22.4	-22°31.9	Alpheratz	357°40.3	29°11.5				
1	113°40.0	197°02.8	-23°41.5	252°53.1	-14°51.1	249°13.1	-15°47.6	202°24.6	-22°31.9	202°24.6	-22°31.9	202°24.6	-22°31.9	Ankaa	353°12.7	-42°12.8				
2	128°42.4	212°01.8	-23°41.5	267°54.0	-14°51.6	264°15.2	-15°47.7	217°26.7	-22°31.9	217°26.7	-22°31.9	217°26.7	-22°31.9	Schedar	349°36.9	56°38.3				
3	143°44.9	227°00.8	-23°41.4	282°54.9	-14°52.1	279°17.2	-15°47.8	232°28.9	-22°31.9	232°28.9	-22°31.9	232°28.9	-22°31.9	Diphda	348°52.7	-17°53.5				
4	158°47.4	241°59.8	-23°41.4	297°55.9	-14°52.6	294°19.2	-15°47.9	247°31.0	-22°31.9	247°31.0	-22°31.9	247°31.0	-22°31.9	Achernar	335°24.4	-57°09.2				
5	173°49.8	256°58.9	-23°41.3	312°56.8	-14°53.1	309°21.3	-15°48.0	262°33.2	-22°31.9	262°33.2	-22°31.9	262°33.2	-22°31.9	Hamal	327°57.1	23°32.8				
6	188°52.3	271°57.9	-23°41.3	327°57.7	-14°53.6	324°23.3	-15°48.2	277°35.3	-22°31.9	277°35.3	-22°31.9	277°35.3	-22°31.9	Polaris	316°06.2	89°20.5				
7	203°54.7	286°56.9	-23°41.2	342°58.7	-14°54.0	339°25.4	-15°48.3	292°37.4	-22°31.9	292°37.4	-22°31.9	292°37.4	-22°31.9	Akamar	315°15.8	-40°14.3				
8	218°57.2	301°55.9	-23°41.2	357°59.6	-14°54.5	354°27.4	-15°48.4	307°39.6	-22°31.9	307°39.6	-22°31.9	307°39.6	-22°31.9	Menkar	314°11.6	4°09.4				
9	233°59.7	316°55.0	-23°41.1	13°00.5	-14°55.0	9°29.4	-15°48.5	322°41.7	-22°31.9	322°41.7	-22°31.9	322°41.7	-22°31.9	Mirfak	308°35.5	49°55.5				
10	249°02.1	331°54.0	-23°41.1	28°01.5	-14°55.5	24°31.5	-15°48.6	337°43.9	-22°31.9	337°43.9	-22°31.9	337°43.9	-22°31.9	Aldebaran	290°45.6	16°32.6				
11	264°04.6	346°53.0	-23°41.0	43°02.4	-14°56.0	39°33.5	-15°48.8	352°46.0	-22°31.9	352°46.0	-22°31.9	352°46.0	-22°31.9	Rigel	281°08.8	-8°11.1				
12	279°07.1	1°52.1	-23°40.9	58°03.3	-14°56.5	54°35.5	-15°48.9	7°48.2	-22°31.9	7°48.2	-22°31.9	7°48.2	-22°31.9	Capella	280°29.5	46°00.9				
13	294°09.5	16°51.1	-23°40.9	73°04.2	-14°56.9	69°37.6	-15°49.0	22°50.3	-22°31.9	22°50.3	-22°31.9	22°50.3	-22°31.9	Bellatrix	278°28.4	6°21.7				
14	309°12.0	31°50.1	-23°40.8	88°05.2	-14°57.4	84°39.6	-15°49.1	37°52.5	-22°31.9	37°52.5	-22°31.9	37°52.5	-22°31.9	Elnath	278°08.4	28°37.2				
15	324°14.5	46°49.1	-23°40.7	103°06.1	-14°57.9	99°41.6	-15°49.2	52°54.6	-22°31.9	52°54.6	-22°31.9	52°54.6	-22°31.9	Alnilam	275°42.9	-1°11.7				
16	339°16.9	61°48.2	-23°40.7	118°07.0	-14°58.4	114°43.7	-15°49.3	67°56.8	-22°31.9	67°56.8	-22°31.9	67°56.8	-22°31.9	Betelgeuse	270°57.6	7°24.4				
17	354°19.4	76°47.2	-23°40.6	133°08.0	-14°58.9	129°45.7	-15°49.5	82°58.9	-22°31.9	82°58.9	-22°31.9	82°58.9	-22°31.9	Canopus	263°54.2	-52°42.5				
18	9°21.9	91°46.2	-23°40.5	148°08.9	-14°59.3	144°47.8	-15°49.6	98°01.1	-22°31.9	98°01.1	-22°31.9	98°01.1	-22°31.9	Sirius	258°30.6	-16°44.5				
19	24°24.3	106°45.3	-23°40.5	163°09.8	-14°59.8	159°49.8	-15°49.7	113°03.2	-22°31.9	113°03.2	-22°31.9	113°03.2	-22°31.9	Adara	255°09.7	-28°60.0				
20	39°26.8	121°44.3	-23°40.4	178°10.7	-15°00.3	174°51.8	-15°49.8	128°05.4	-22°31.9	128°05.4	-22°31.9	128°05.4	-22°31.9	Procyon	244°56.1	5°10.7				
21	54°29.2	136°43.3	-23°40.3	193°11.7	-15°00.8	189°53.9	-15°49.9	143°07.5	-22°31.9	143°07.5	-22°31.9	143°07.5	-22°31.9	Pollux	243°23.5	27°58.7				
22	69°31.7	151°42.3	-23°40.2	208°12.6	-15°01.3	204°55.9	-15°50.0	158°09.6	-22°31.9	158°09.6	-22°31.9	158°09.6	-22°31.9	Avior	234°16.1	-59°34.0				
23	84°34.2	166°41.4	-23°40.2	223°13.5	-15°01.8	219°57.9	-15°50.2	173°11.8	-22°31.9	173°11.8	-22°31.9	173°11.8	-22°31.9	Suhail	222°49.8	-43°30.3				
Mer.pass.:17:22			v-1.0 d0.0 m-3.8			v0.9 d-0.5 m1.5			v2.0 d-0.1 m-1.6			v2.1 d0.0 m0.5			Miaplacidus			221°38.2	-69°47.3	
															Alphard			217°52.8	-8°44.2	
															Regulus			207°40.0	11°52.6	
															Dubhe			193°47.8	61°39.0	
															Denebola			182°30.4	14°28.3	
															Gienah			175°49.1	-17°38.3	
															Acrux			173°05.7	-63°11.5	
															Gacrux			171°57.4	-57°12.5	
															Alioth			166°18.2	55°51.5	
															Spica			158°28.1	-11°15.1	
															Alcaid			152°56.7	49°13.3	
															Hadar			148°43.7	-60°27.1	
															Menkent			148°04.1	-36°27.2	
															Arcturus			145°53.0	19°05.7	
															Rigel Kent.			139°47.8	-60°54.1	
															Zubenelg.			137°02.2	-16°06.7	
															Kochab			137°20.9	74°04.8	
															Alphecca			126°08.7	26°39.3	
															Antares			112°22.8	-26°28.0	
															Atria			107°22.3	-69°03.2	
															Sabik			102°09.3	-15°44.6	
															Shaula			96°18.2	-37°06.7	
															Rasalhague			96°04.0	12°33.0	
															Etamin			90°45.2	51°29.3	
															Kaus Aust.			83°40.1	-34°22.4	
															Vega			80°37.3	38°48.1	
															Nunki			75°54.9	-26°16.3	
															Altair			62°05.6	8°55.0	
															Peacock			53°15.0	-56°40.6	
															Deneb			49°29.8	45°20.9	
															Enif			33°44.4	9°57.5	
															Alnair			27°40.3	-46°52.6	
															Fomalhaut			15°20.9	-29°31.8	
															Scheat			13°50.6	28°10.9	
															Markab			13°35.4	15°18.2	
															2017/12/			SHA	Mer.pass	
															Venus			83°26.2	11:53	
															Mars			139°14.7	08:08	
															Jupiter			135°33.6	08:22	
															Saturn			88°44.9	11:29	
															2017/12/			SHA	Mer.pass	
															Venus			82°03.8	11:54	
															Mars			138°37.8	08:07	
															Jupiter			135°23.4	08:19	
															Saturn			88°37.3	11:25	
															2018/1/1			SHA	Mer.pass	
															Venus			80°41.3	11:56	
															Mars			138°00.9	08:05	
															Jupiter			135°13.2	08:16	
															Saturn			88°29.7	11:22	
															Horizontal parallax					
															Venus:			0.1		
															Mars:			0.1		
Mer.pass.:17:14			v-1.0 d0.1 m-3.8			v0.9 d-0.5 m1.5			v2.0 d-0.1 m-1.7			v2.1 d0.0 m0.5								

h		Sun				Moon								
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight			Twilight		
								Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
0	179°24.3	-23°09.9	44°56.0	7.0	13°59.1	9.2	60.2	72	08:25	10:45	--	--	13:21	15:42
1	194°24.0	-23°09.7	59°22.0	6.9	14°08.2	9.1	60.2	70	08:06	09:51	--	--	14:16	16:01
2	209°23.7	-23°09.5	73°47.8	6.8	14°17.3	9.0	60.2	68	07:50	09:18	--	--	14:49	16:16
3	224°23.4	-23°09.4	88°13.6	6.7	14°26.2	8.9	60.3	66	07:38	08:54	10:29	13:37	15:13	16:29
4	239°23.1	-23°09.2	102°39.3	6.6	14°35.1	8.8	60.3	64	07:27	08:35	09:50	14:16	15:32	16:40
5	254°22.8	-23°09.0	117°04.8	6.5	14°43.9	8.7	60.3	62	07:18	08:19	09:23	14:43	15:47	16:49
6	269°22.5	-23°08.9	131°30.3	6.4	14°52.6	8.6	60.4	60	07:09	08:06	09:03	15:04	16:01	16:57
7	284°22.2	-23°08.7	145°55.7	6.4	15°01.2	8.6	60.4	58	07:02	07:54	08:46	15:21	16:12	17:04
8	299°21.9	-23°08.5	160°21.0	6.3	15°09.7	8.5	60.4	56	06:56	07:44	08:31	15:35	16:22	17:11
9	314°21.6	-23°08.4	174°46.3	6.2	15°18.1	8.4	60.5	54	06:50	07:36	08:19	15:47	16:31	17:17
10	329°21.3	-23°08.2	189°11.4	6.1	15°26.4	8.3	60.5	52	06:44	07:28	08:08	15:58	16:39	17:22
11	344°21.0	-23°08.0	203°36.4	6.0	15°34.7	8.2	60.5	50	06:39	07:20	07:59	16:08	16:46	17:27
12	359°20.7	-23°07.9	218°01.4	5.9	15°42.8	8.1	60.6	45	06:27	07:05	07:38	16:28	17:02	17:39
13	14°20.4	-23°07.7	232°26.2	5.8	15°50.9	8.0	60.6	40	06:17	06:51	07:22	16:45	17:15	17:49
14	29°20.1	-23°07.5	246°51.0	5.7	15°58.8	7.9	60.6	35	06:08	06:40	07:08	16:59	17:27	17:58
15	44°19.8	-23°07.3	261°15.7	5.6	16°06.6	7.8	60.6	30	05:60	06:29	06:56	17:11	17:37	18:07
16	59°19.5	-23°07.2	275°40.2	5.5	16°14.4	7.7	60.7	20	05:43	06:11	06:35	17:31	17:55	18:23
17	74°19.2	-23°07.0	290°04.7	5.5	16°22.0	7.6	60.7	10	05:27	05:54	06:17	17:50	18:12	18:39
18	89°18.9	-23°06.8	304°29.2	5.4	16°29.5	7.5	60.7	0	05:11	05:37	05:59	18:07	18:29	18:55
19	104°18.6	-23°06.6	318°53.5	5.3	16°37.0	7.4	60.8	-10	04:52	05:19	05:42	18:24	18:47	19:14
20	119°18.3	-23°06.5	333°17.7	5.2	16°44.3	7.3	60.8	-20	04:30	04:59	05:23	18:43	19:07	19:36
21	134°18.0	-23°06.3	347°41.9	5.1	16°51.5	7.1	60.8	-30	04:01	04:34	05:02	19:04	19:32	20:05
22	149°17.7	-23°06.1	2°06.0	5.0	16°58.6	7.0	60.8	-35	03:43	04:19	04:49	19:17	19:47	20:23
23	164°17.5	-23°05.9	16°29.9	4.9	17°05.5	6.9	60.9	-40	03:20	04:01	04:34	19:32	20:05	20:46
SD.=16.3 d=0.2 S.D.=16.4								-45	02:50	03:39	04:16	19:50	20:27	21:16
								-50	02:06	03:10	03:54	20:12	20:56	21:60
								-52	01:39	02:55	03:44	20:22	21:10	22:26
								-54	00:58	02:38	03:32	20:34	21:28	23:06
								-56	--	02:16	03:18	20:48	21:49	--
								-58	--	01:48	03:01	21:04	22:17	--
								-60	--	01:03	02:41	21:24	23:01	--
								Moonrise			Moonset			
								Lat.	Sat	Sun	Mon	Sat	Sun	Mon
								72	11:33	--	--	06:55	--	--
								70	12:09	12:06	12:08	06:20	08:28	10:38
								68	12:34	12:48	13:19	05:56	07:47	09:27
								66	12:54	13:16	13:56	05:37	07:19	08:50
								64	13:10	13:38	14:22	05:22	06:58	08:24
								62	13:23	13:56	14:43	05:09	06:41	08:04
								60	13:35	14:10	14:60	04:58	06:26	07:47
								58	13:45	14:23	15:14	04:49	06:14	07:33
								56	13:53	14:33	15:26	04:41	06:04	07:21
								54	14:01	14:43	15:37	04:34	05:55	07:10
								52	14:08	14:52	15:46	04:27	05:46	07:01
								50	14:14	14:59	15:55	04:22	05:39	06:53
								45	14:28	15:16	16:13	04:09	05:23	06:35
								40	14:39	15:29	16:27	03:59	05:10	06:20
								35	14:49	15:41	16:40	03:50	04:59	06:08
								30	14:57	15:51	16:51	03:42	04:50	05:57
								20	15:12	16:08	17:10	03:29	04:33	05:39
								10	15:25	16:24	17:26	03:18	04:19	05:23
								0	15:37	16:38	17:41	03:07	04:06	05:08
								-10	15:49	16:52	17:57	02:56	03:52	04:53
								-20	16:03	17:08	18:13	02:44	03:38	04:37
								-30	16:18	17:26	18:32	02:31	03:22	04:18
								-35	16:26	17:36	18:43	02:24	03:12	04:07
								-40	16:37	17:48	18:56	02:15	03:01	03:55
								-45	16:48	18:02	19:11	02:05	02:49	03:41
								-50	17:03	18:19	19:29	01:53	02:33	03:23
								-52	17:10	18:27	19:38	01:47	02:26	03:15
								-54	17:17	18:36	19:48	01:41	02:18	03:05
								-56	17:26	18:47	19:59	01:34	02:09	02:55
								-58	17:35	18:58	20:11	01:27	01:59	02:43
								-60	17:46	19:12	20:26	01:18	01:47	02:29
								Sun			Moon			
								Day	Eqn.of Time	Mer.	Mer.Pass.		Age	
									00 ^h	12 ^h	Pass	Upper	Lower	
								30	02:23	02:37	12:02	21:51	09:21	12(90%)
								31	02:51	03:06	12:03	22:52	10:21	13(96%)
								1	03:20	03:34	12:03	23:56	11:24	14(99%)
SD.=16.3 d=0.2 S.D.=16.7														

Increments and Corrections

m 0	Sun Plan.	Aries	Moon	v and d corr			m 1	Sun Plan.	Aries	Moon	v and d corr			m 2	Sun Plan.	Aries	Moon	v and d corr		
0	0°00.0	0°00.0	0°00.0	0.0 - 0.0	6.0 - 0.1	12.0 - 0.1	0	0°15.0	0°15.0	0°14.3	0.0 - 0.0	6.0 - 0.2	12.0 - 0.3	0	0°30.0	0°30.1	0°28.6	0.0 - 0.0	6.0 - 0.3	12.0 - 0.5
1	0°00.2	0°00.3	0°00.2	0.1 - 0.0	6.1 - 0.1	12.1 - 0.1	1	0°15.2	0°15.3	0°14.6	0.1 - 0.0	6.1 - 0.2	12.1 - 0.3	1	0°30.2	0°30.3	0°28.9	0.1 - 0.0	6.1 - 0.3	12.1 - 0.5
2	0°00.5	0°00.5	0°00.5	0.2 - 0.0	6.2 - 0.1	12.2 - 0.1	2	0°15.5	0°15.5	0°14.8	0.2 - 0.0	6.2 - 0.2	12.2 - 0.3	2	0°30.5	0°30.6	0°29.1	0.2 - 0.0	6.2 - 0.3	12.2 - 0.5
3	0°00.8	0°00.8	0°00.7	0.3 - 0.0	6.3 - 0.1	12.3 - 0.1	3	0°15.8	0°15.8	0°15.0	0.3 - 0.0	6.3 - 0.2	12.3 - 0.3	3	0°30.7	0°30.8	0°29.3	0.3 - 0.0	6.3 - 0.3	12.3 - 0.5
4	0°01.0	0°01.0	0°01.0	0.4 - 0.0	6.4 - 0.1	12.4 - 0.1	4	0°16.0	0°16.0	0°15.3	0.4 - 0.0	6.4 - 0.2	12.4 - 0.3	4	0°31.0	0°31.1	0°29.6	0.4 - 0.0	6.4 - 0.3	12.4 - 0.5
5	0°01.2	0°01.3	0°01.2	0.5 - 0.0	6.5 - 0.1	12.5 - 0.1	5	0°16.2	0°16.3	0°15.5	0.5 - 0.0	6.5 - 0.2	12.5 - 0.3	5	0°31.3	0°31.3	0°29.8	0.5 - 0.0	6.5 - 0.3	12.5 - 0.5
6	0°01.5	0°01.5	0°01.4	0.6 - 0.0	6.6 - 0.1	12.6 - 0.1	6	0°16.5	0°16.5	0°15.7	0.6 - 0.0	6.6 - 0.2	12.6 - 0.3	6	0°31.5	0°31.6	0°30.1	0.6 - 0.0	6.6 - 0.3	12.6 - 0.5
7	0°01.8	0°01.8	0°01.7	0.7 - 0.0	6.7 - 0.1	12.7 - 0.1	7	0°16.8	0°16.8	0°16.0	0.7 - 0.0	6.7 - 0.2	12.7 - 0.3	7	0°31.8	0°31.8	0°30.3	0.7 - 0.0	6.7 - 0.3	12.7 - 0.5
8	0°02.0	0°02.0	0°01.9	0.8 - 0.0	6.8 - 0.1	12.8 - 0.1	8	0°17.0	0°17.0	0°16.2	0.8 - 0.0	6.8 - 0.2	12.8 - 0.3	8	0°32.0	0°32.1	0°30.5	0.8 - 0.0	6.8 - 0.3	12.8 - 0.5
9	0°02.2	0°02.3	0°02.1	0.9 - 0.0	6.9 - 0.1	12.9 - 0.1	9	0°17.2	0°17.3	0°16.5	0.9 - 0.0	6.9 - 0.2	12.9 - 0.3	9	0°32.2	0°32.3	0°30.8	0.9 - 0.0	6.9 - 0.3	12.9 - 0.5
10	0°02.5	0°02.5	0°02.4	1.0 - 0.0	7.0 - 0.1	13.0 - 0.1	10	0°17.5	0°17.5	0°16.7	1.0 - 0.0	7.0 - 0.2	13.0 - 0.3	10	0°32.5	0°32.6	0°31.0	1.0 - 0.0	7.0 - 0.3	13.0 - 0.5
11	0°02.8	0°02.8	0°02.6	1.1 - 0.0	7.1 - 0.1	13.1 - 0.1	11	0°17.8	0°17.8	0°16.9	1.1 - 0.0	7.1 - 0.2	13.1 - 0.3	11	0°32.8	0°32.8	0°31.3	1.1 - 0.0	7.1 - 0.3	13.1 - 0.5
12	0°03.0	0°03.0	0°02.9	1.2 - 0.0	7.2 - 0.1	13.2 - 0.1	12	0°18.0	0°18.0	0°17.2	1.2 - 0.0	7.2 - 0.2	13.2 - 0.3	12	0°33.0	0°33.1	0°31.5	1.2 - 0.1	7.2 - 0.3	13.2 - 0.5
13	0°03.2	0°03.3	0°03.1	1.3 - 0.0	7.3 - 0.1	13.3 - 0.1	13	0°18.2	0°18.3	0°17.4	1.3 - 0.0	7.3 - 0.2	13.3 - 0.3	13	0°33.2	0°33.3	0°31.7	1.3 - 0.1	7.3 - 0.3	13.3 - 0.6
14	0°03.5	0°03.5	0°03.3	1.4 - 0.0	7.4 - 0.1	13.4 - 0.1	14	0°18.5	0°18.6	0°17.7	1.4 - 0.0	7.4 - 0.2	13.4 - 0.3	14	0°33.5	0°33.6	0°32.0	1.4 - 0.1	7.4 - 0.3	13.4 - 0.6
15	0°03.8	0°03.8	0°03.6	1.5 - 0.0	7.5 - 0.1	13.5 - 0.1	15	0°18.8	0°18.8	0°17.9	1.5 - 0.0	7.5 - 0.2	13.5 - 0.3	15	0°33.8	0°33.8	0°32.2	1.5 - 0.1	7.5 - 0.3	13.5 - 0.6
16	0°04.0	0°04.0	0°03.8	1.6 - 0.0	7.6 - 0.1	13.6 - 0.1	16	0°19.0	0°19.1	0°18.1	1.6 - 0.0	7.6 - 0.2	13.6 - 0.3	16	0°34.0	0°34.1	0°32.5	1.6 - 0.1	7.6 - 0.3	13.6 - 0.6
17	0°04.2	0°04.3	0°04.1	1.7 - 0.0	7.7 - 0.1	13.7 - 0.1	17	0°19.2	0°19.3	0°18.4	1.7 - 0.0	7.7 - 0.2	13.7 - 0.3	17	0°34.2	0°34.3	0°32.7	1.7 - 0.1	7.7 - 0.3	13.7 - 0.6
18	0°04.5	0°04.5	0°04.3	1.8 - 0.0	7.8 - 0.1	13.8 - 0.1	18	0°19.5	0°19.6	0°18.6	1.8 - 0.0	7.8 - 0.2	13.8 - 0.3	18	0°34.5	0°34.6	0°32.9	1.8 - 0.1	7.8 - 0.3	13.8 - 0.6
19	0°04.8	0°04.8	0°04.5	1.9 - 0.0	7.9 - 0.1	13.9 - 0.1	19	0°19.8	0°19.8	0°18.9	1.9 - 0.0	7.9 - 0.2	13.9 - 0.3	19	0°34.8	0°34.8	0°33.2	1.9 - 0.1	7.9 - 0.3	13.9 - 0.6
20	0°05.0	0°05.0	0°04.8	2.0 - 0.0	8.0 - 0.1	14.0 - 0.1	20	0°20.0	0°20.1	0°19.1	2.0 - 0.1	8.0 - 0.2	14.0 - 0.4	20	0°35.0	0°35.1	0°33.4	2.0 - 0.1	8.0 - 0.3	14.0 - 0.6
21	0°05.2	0°05.3	0°05.0	2.1 - 0.0	8.1 - 0.1	14.1 - 0.1	21	0°20.2	0°20.3	0°19.3	2.1 - 0.1	8.1 - 0.2	14.1 - 0.4	21	0°35.2	0°35.3	0°33.6	2.1 - 0.1	8.1 - 0.3	14.1 - 0.6
22	0°05.5	0°05.5	0°05.2	2.2 - 0.0	8.2 - 0.1	14.2 - 0.1	22	0°20.5	0°20.6	0°19.6	2.2 - 0.1	8.2 - 0.2	14.2 - 0.4	22	0°35.5	0°35.6	0°33.9	2.2 - 0.1	8.2 - 0.3	14.2 - 0.6
23	0°05.8	0°05.8	0°05.5	2.3 - 0.0	8.3 - 0.1	14.3 - 0.1	23	0°20.8	0°20.8	0°19.8	2.3 - 0.1	8.3 - 0.2	14.3 - 0.4	23	0°35.8	0°35.8	0°34.1	2.3 - 0.1	8.3 - 0.3	14.3 - 0.6
24	0°06.0	0°06.0	0°05.7	2.4 - 0.0	8.4 - 0.1	14.4 - 0.1	24	0°21.0	0°21.1	0°20.0	2.4 - 0.1	8.4 - 0.2	14.4 - 0.4	24	0°36.0	0°36.1	0°34.4	2.4 - 0.1	8.4 - 0.4	14.4 - 0.6
25	0°06.2	0°06.3	0°06.0	2.5 - 0.0	8.5 - 0.1	14.5 - 0.1	25	0°21.2	0°21.3	0°20.3	2.5 - 0.1	8.5 - 0.2	14.5 - 0.4	25	0°36.2	0°36.3	0°34.6	2.5 - 0.1	8.5 - 0.4	14.5 - 0.6
26	0°06.5	0°06.5	0°06.2	2.6 - 0.0	8.6 - 0.1	14.6 - 0.1	26	0°21.5	0°21.6	0°20.5	2.6 - 0.1	8.6 - 0.2	14.6 - 0.4	26	0°36.5	0°36.6	0°34.8	2.6 - 0.1	8.6 - 0.4	14.6 - 0.6
27	0°06.8	0°06.8	0°06.4	2.7 - 0.0	8.7 - 0.1	14.7 - 0.1	27	0°21.8	0°21.8	0°20.8	2.7 - 0.1	8.7 - 0.2	14.7 - 0.4	27	0°36.8	0°36.9	0°35.1	2.7 - 0.1	8.7 - 0.4	14.7 - 0.6
28	0°07.0	0°07.0	0°06.7	2.8 - 0.0	8.8 - 0.1	14.8 - 0.1	28	0°22.0	0°22.1	0°21.0	2.8 - 0.1	8.8 - 0.2	14.8 - 0.4	28	0°37.0	0°37.1	0°35.3	2.8 - 0.1	8.8 - 0.4	14.8 - 0.6
29	0°07.2	0°07.3	0°06.9	2.9 - 0.0	8.9 - 0.1	14.9 - 0.1	29	0°22.2	0°22.3	0°21.2	2.9 - 0.1	8.9 - 0.2	14.9 - 0.4	29	0°37.2	0°37.4	0°35.6	2.9 - 0.1	8.9 - 0.4	14.9 - 0.6
30	0°07.5	0°07.5	0°07.2	3.0 - 0.0	9.0 - 0.1	15.0 - 0.1	30	0°22.5	0°22.6	0°21.5	3.0 - 0.1	9.0 - 0.2	15.0 - 0.4	30	0°37.5	0°37.6	0°35.8	3.0 - 0.1	9.0 - 0.4	15.0 - 0.6
31	0°07.8	0°07.8	0°07.4	3.1 - 0.0	9.1 - 0.1	15.1 - 0.1	31	0°22.8	0°22.8	0°21.7	3.1 - 0.1	9.1 - 0.2	15.1 - 0.4	31	0°37.8	0°37.9	0°36.0	3.1 - 0.1	9.1 - 0.4	15.1 - 0.6
32	0°08.0	0°08.0	0°07.6	3.2 - 0.0	9.2 - 0.1	15.2 - 0.1	32	0°23.0	0°23.1	0°22.0	3.2 - 0.1	9.2 - 0.2	15.2 - 0.4	32	0°38.0	0°38.1	0°36.3	3.2 - 0.1	9.2 - 0.4	15.2 - 0.6
33	0°08.2	0°08.3	0°07.9	3.3 - 0.0	9.3 - 0.1	15.3 - 0.1	33	0°23.2	0°23.3	0°22.2	3.3 - 0.1	9.3 - 0.2	15.3 - 0.4	33	0°38.2	0°38.4	0°36.5	3.3 - 0.1	9.3 - 0.4	15.3 - 0.6
34	0°08.5	0°08.5	0°08.1	3.4 - 0.0	9.4 - 0.1	15.4 - 0.1	34	0°23.5	0°23.6	0°22.4	3.4 - 0.1	9.4 - 0.2	15.4 - 0.4	34	0°38.5	0°38.6	0°36.7	3.4 - 0.1	9.4 - 0.4	15.4 - 0.6
35	0°08.8	0°08.8	0°08.4	3.5 - 0.0	9.5 - 0.1	15.5 - 0.1	35	0°23.8	0°23.8	0°22.7	3.5 - 0.1	9.5 - 0.2	15.5 - 0.4	35	0°38.8	0°38.9	0°37.0	3.5 - 0.1	9.5 - 0.4	15.5 - 0.6
36	0°09.0	0°09.0	0°08.6	3.6 - 0.0	9.6 - 0.1	15.6 - 0.1	36	0°24.0	0°24.1	0°22.9	3.6 - 0.1	9.6 - 0.2	15.6 - 0.4	36	0°39.0	0°39.1	0°37.2	3.6 - 0.2	9.6 - 0.4	15.6 - 0.6
37	0°09.2	0°09.3	0°08.8	3.7 - 0.0	9.7 - 0.1	15.7 - 0.1	37	0°24.2	0°24.3	0°23.1	3.7 - 0.1	9.7 - 0.2	15.7 - 0.4	37	0°39.2	0°39.4	0°37.5	3.7 - 0.2	9.7 - 0.4	15.7 - 0.7
38	0°09.5	0°09.5	0°09.1	3.8 - 0.0	9.8 - 0.1	15.8 - 0.1	38	0°24.5	0°24.6	0°23.4	3.8 - 0.1	9.8 - 0.2	15.8 - 0.4	38	0°39.5	0°39.6	0°37.7	3.8 - 0.2	9.8 - 0.4	15.8 - 0.7
39	0°09.8	0°09.8	0°09.3	3.9 - 0.0	9.9 - 0.1	15.9 - 0.1	39	0°24.8	0°24.8	0°23.6	3.9 - 0.1	9.9 - 0.2	15.9 - 0.4	39	0°39.8	0°39.9	0°37.9	3.9 - 0.2	9.9 - 0.4	15.9 - 0.7
40	0°10.0	0°10.0	0°09.5	4.0 - 0.0	10.0 - 0.1	16.0 - 0.1	40	0°25.0	0°25.1	0°23.9	4.0 - 0.1	10.0 - 0.3	16.0 - 0.4	40	0°40.0	0°40.1	0°38.2	4.0 - 0.2	10.0 - 0.4	16.0 - 0.7
41	0°10.2	0°10.3	0°09.8	4.1 - 0.0	10.1 - 0.1	16.1 - 0.1	41	0°25.2	0°25.3	0°24.1	4.1 - 0.1	10.1 - 0.3	16.1 - 0.4	41	0°40.2	0°40.4	0°38.4	4.1 - 0.2	10.1 - 0.4	16.1 - 0.7
42	0°10.5	0°10.5	0°10.0	4.2 - 0.0	10.2 - 0.1	16.2 - 0.1	42	0°25.5	0°25.6	0°24.3	4.2 - 0.1	10.2 - 0.3	16.2 - 0.4	42	0°40.5	0°40.6	0°38.7	4.2 - 0.2	10.2 - 0.4	16.2 - 0.7
43	0°10.8	0°10.8	0°10.3	4.3 - 0.0	10.3 - 0.1	16.3 - 0.1	43	0°25.8	0°25.8	0°24.6	4.3 - 0.1	10.3 - 0.3	16.3 - 0.4	43	0°40.8	0°40.9	0°38.9	4.3 - 0.2	10.3 - 0.4	16.3 - 0.7
44	0°11.0	0°11.0	0°10.5	4.4 - 0.0	10.4 - 0.1	16.4 - 0.1	44	0°26.0	0°26.1	0°24.8	4.4 - 0.1	10.4 - 0.3	16.4 - 0.4	44	0°41.0	0°41.1	0°39.1	4.4 - 0.2	10.4 - 0.4	16.4 - 0.7
45	0°11.2	0°11.3	0°10.7	4.5 - 0.0	10.5 - 0.1	16.5 - 0.1	45	0°26.2	0°26.3	0°25.1	4.5 - 0.1	10.5 - 0.3	16.5 - 0.4	45	0°41.2	0°41.4	0°39.4	4.5 - 0.2	10.5 - 0.4	16.5 - 0.7
46	0°11.5	0°11.5	0°11.0	4.6 - 0.0	10.6 - 0.1	16.6 - 0.1	46	0°26.5	0°26.6	0°25.3	4.6 - 0.1	10.6 - 0.3	16.6 - 0.4	46	0°41.5	0°41.6	0°39.6	4.6 - 0.2	10.6 - 0.4	16.6 - 0.7
47	0°11.8	0°11.8	0°11.2	4.7 - 0.0	10.7 - 0.1	16.7 - 0.1	47	0°26.8	0°26.8	0°25.5	4.7 - 0.1	10.7 - 0.3	16.7 - 0.4	47	0°41.8	0°41.9	0°39.8	4.7 - 0.2	10.7 - 0.4	16.7 - 0.7
48	0°12.0	0°12.0	0°11.5	4.8 - 0.0	10.8 - 0.1	16.8 - 0.1	48	0°27.0	0°27.1	0°25.8	4.8 - 0.1	10.8 - 0.3	16.8 - 0.4	48	0°42.0	0°42.1	0°40.1	4.8 - 0.2	10.8 - 0.5	16.8 - 0.7
49	0°12.2	0°12.3	0°11.7	4.9 - 0.0	10.9 - 0.1	16.9 - 0.1	49	0°27.2	0°27.3	0°26.0	4.9 - 0.1	10.9 -								

Increments and Corrections

m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr		
3	Plan.						4	Plan.						5	Plan.					
0	0°45.0	0°45.1	0°43.0	0.0 - 0.0	6.0 - 0.4	12.0 - 0.7	0	1°00.0	1°00.2	0°57.3	0.0 - 0.0	6.0 - 0.5	12.0 - 0.9	0	1°15.0	1°15.2	1°11.6	0.0 - 0.0	6.0 - 0.5	12.0 - 1.1
1	0°45.2	0°45.4	0°43.2	0.1 - 0.0	6.1 - 0.4	12.1 - 0.7	1	1°00.2	1°00.4	0°57.5	0.1 - 0.0	6.1 - 0.5	12.1 - 0.9	1	1°15.2	1°15.5	1°11.8	0.1 - 0.0	6.1 - 0.6	12.1 - 1.1
2	0°45.5	0°45.6	0°43.4	0.2 - 0.0	6.2 - 0.4	12.2 - 0.7	2	1°00.5	1°00.7	0°57.7	0.2 - 0.0	6.2 - 0.5	12.2 - 0.9	2	1°15.5	1°15.7	1°12.1	0.2 - 0.0	6.2 - 0.6	12.2 - 1.1
3	0°45.8	0°45.9	0°43.7	0.3 - 0.0	6.3 - 0.4	12.3 - 0.7	3	1°00.7	1°00.9	0°58.0	0.3 - 0.0	6.3 - 0.5	12.3 - 0.9	3	1°15.7	1°16.0	1°12.3	0.3 - 0.0	6.3 - 0.6	12.3 - 1.1
4	0°46.0	0°46.1	0°43.9	0.4 - 0.0	6.4 - 0.4	12.4 - 0.7	4	1°01.0	1°01.2	0°58.2	0.4 - 0.0	6.4 - 0.5	12.4 - 0.9	4	1°16.0	1°16.2	1°12.5	0.4 - 0.0	6.4 - 0.6	12.4 - 1.1
5	0°46.2	0°46.4	0°44.1	0.5 - 0.0	6.5 - 0.4	12.5 - 0.7	5	1°01.2	1°01.4	0°58.5	0.5 - 0.0	6.5 - 0.5	12.5 - 0.9	5	1°16.2	1°16.5	1°12.8	0.5 - 0.0	6.5 - 0.6	12.5 - 1.1
6	0°46.5	0°46.6	0°44.4	0.6 - 0.0	6.6 - 0.4	12.6 - 0.7	6	1°01.5	1°01.7	0°58.7	0.6 - 0.0	6.6 - 0.5	12.6 - 0.9	6	1°16.5	1°16.7	1°13.0	0.6 - 0.1	6.6 - 0.6	12.6 - 1.2
7	0°46.8	0°46.9	0°44.6	0.7 - 0.0	6.7 - 0.4	12.7 - 0.7	7	1°01.7	1°01.9	0°58.9	0.7 - 0.1	6.7 - 0.5	12.7 - 1.0	7	1°16.7	1°17.0	1°13.3	0.7 - 0.1	6.7 - 0.6	12.7 - 1.2
8	0°47.0	0°47.1	0°44.9	0.8 - 0.0	6.8 - 0.4	12.8 - 0.7	8	1°02.0	1°02.2	0°59.2	0.8 - 0.1	6.8 - 0.5	12.8 - 1.0	8	1°17.0	1°17.2	1°13.5	0.8 - 0.1	6.8 - 0.6	12.8 - 1.2
9	0°47.2	0°47.4	0°45.1	0.9 - 0.1	6.9 - 0.4	12.9 - 0.8	9	1°02.3	1°02.4	0°59.4	0.9 - 0.1	6.9 - 0.5	12.9 - 1.0	9	1°17.3	1°17.5	1°13.7	0.9 - 0.1	6.9 - 0.6	12.9 - 1.2
10	0°47.5	0°47.6	0°45.3	1.0 - 0.1	7.0 - 0.4	13.0 - 0.8	10	1°02.5	1°02.7	0°59.7	1.0 - 0.1	7.0 - 0.5	13.0 - 1.0	10	1°17.5	1°17.7	1°14.0	1.0 - 0.1	7.0 - 0.6	13.0 - 1.2
11	0°47.8	0°47.9	0°45.6	1.1 - 0.1	7.1 - 0.4	13.1 - 0.8	11	1°02.8	1°02.9	0°59.9	1.1 - 0.1	7.1 - 0.5	13.1 - 1.0	11	1°17.8	1°18.0	1°14.2	1.1 - 0.1	7.1 - 0.7	13.1 - 1.2
12	0°48.0	0°48.1	0°45.8	1.2 - 0.1	7.2 - 0.4	13.2 - 0.8	12	1°03.0	1°03.2	1°00.1	1.2 - 0.1	7.2 - 0.5	13.2 - 1.0	12	1°18.0	1°18.2	1°14.4	1.2 - 0.1	7.2 - 0.7	13.2 - 1.2
13	0°48.2	0°48.4	0°46.1	1.3 - 0.1	7.3 - 0.4	13.3 - 0.8	13	1°03.3	1°03.4	1°00.4	1.3 - 0.1	7.3 - 0.5	13.3 - 1.0	13	1°18.2	1°18.5	1°14.7	1.3 - 0.1	7.3 - 0.7	13.3 - 1.2
14	0°48.5	0°48.6	0°46.3	1.4 - 0.1	7.4 - 0.4	13.4 - 0.8	14	1°03.5	1°03.7	1°00.6	1.4 - 0.1	7.4 - 0.6	13.4 - 1.0	14	1°18.5	1°18.7	1°14.9	1.4 - 0.1	7.4 - 0.7	13.4 - 1.2
15	0°48.8	0°48.9	0°46.5	1.5 - 0.1	7.5 - 0.4	13.5 - 0.8	15	1°03.8	1°03.9	1°00.8	1.5 - 0.1	7.5 - 0.6	13.5 - 1.0	15	1°18.8	1°19.0	1°15.2	1.5 - 0.1	7.5 - 0.7	13.5 - 1.2
16	0°49.0	0°49.1	0°46.8	1.6 - 0.1	7.6 - 0.4	13.6 - 0.8	16	1°04.0	1°04.2	1°01.1	1.6 - 0.1	7.6 - 0.6	13.6 - 1.0	16	1°19.0	1°19.2	1°15.4	1.6 - 0.1	7.6 - 0.7	13.6 - 1.2
17	0°49.2	0°49.4	0°47.0	1.7 - 0.1	7.7 - 0.4	13.7 - 0.8	17	1°04.2	1°04.4	1°01.3	1.7 - 0.1	7.7 - 0.6	13.7 - 1.0	17	1°19.2	1°19.5	1°15.6	1.7 - 0.2	7.7 - 0.7	13.7 - 1.3
18	0°49.5	0°49.6	0°47.2	1.8 - 0.1	7.8 - 0.5	13.8 - 0.8	18	1°04.5	1°04.7	1°01.6	1.8 - 0.1	7.8 - 0.6	13.8 - 1.0	18	1°19.5	1°19.7	1°15.9	1.8 - 0.2	7.8 - 0.7	13.8 - 1.3
19	0°49.8	0°49.9	0°47.5	1.9 - 0.1	7.9 - 0.5	13.9 - 0.8	19	1°04.7	1°04.9	1°01.8	1.9 - 0.1	7.9 - 0.6	13.9 - 1.0	19	1°19.7	1°20.0	1°16.1	1.9 - 0.2	7.9 - 0.7	13.9 - 1.3
20	0°50.0	0°50.1	0°47.7	2.0 - 0.1	8.0 - 0.5	14.0 - 0.8	20	1°05.0	1°05.2	1°02.0	2.0 - 0.2	8.0 - 0.6	14.0 - 1.1	20	1°20.0	1°20.2	1°16.4	2.0 - 0.2	8.0 - 0.7	14.0 - 1.3
21	0°50.2	0°50.4	0°48.0	2.1 - 0.1	8.1 - 0.5	14.1 - 0.8	21	1°05.2	1°05.4	1°02.3	2.1 - 0.2	8.1 - 0.6	14.1 - 1.1	21	1°20.2	1°20.5	1°16.6	2.1 - 0.2	8.1 - 0.7	14.1 - 1.3
22	0°50.5	0°50.6	0°48.2	2.2 - 0.1	8.2 - 0.5	14.2 - 0.8	22	1°05.5	1°05.7	1°02.5	2.2 - 0.2	8.2 - 0.6	14.2 - 1.1	22	1°20.5	1°20.7	1°16.8	2.2 - 0.2	8.2 - 0.8	14.2 - 1.3
23	0°50.8	0°50.9	0°48.4	2.3 - 0.1	8.3 - 0.5	14.3 - 0.8	23	1°05.8	1°05.9	1°02.8	2.3 - 0.2	8.3 - 0.6	14.3 - 1.1	23	1°20.8	1°21.0	1°17.1	2.3 - 0.2	8.3 - 0.8	14.3 - 1.3
24	0°51.0	0°51.1	0°48.7	2.4 - 0.1	8.4 - 0.5	14.4 - 0.8	24	1°06.0	1°06.2	1°03.0	2.4 - 0.2	8.4 - 0.6	14.4 - 1.1	24	1°21.0	1°21.2	1°17.3	2.4 - 0.2	8.4 - 0.8	14.4 - 1.3
25	0°51.2	0°51.4	0°48.9	2.5 - 0.1	8.5 - 0.5	14.5 - 0.8	25	1°06.3	1°06.4	1°03.2	2.5 - 0.2	8.5 - 0.6	14.5 - 1.1	25	1°21.3	1°21.5	1°17.5	2.5 - 0.2	8.5 - 0.8	14.5 - 1.3
26	0°51.5	0°51.6	0°49.2	2.6 - 0.2	8.6 - 0.5	14.6 - 0.9	26	1°06.5	1°06.7	1°03.5	2.6 - 0.2	8.6 - 0.6	14.6 - 1.1	26	1°21.5	1°21.7	1°17.8	2.6 - 0.2	8.6 - 0.8	14.6 - 1.3
27	0°51.8	0°51.9	0°49.4	2.7 - 0.2	8.7 - 0.5	14.7 - 0.9	27	1°06.8	1°06.9	1°03.7	2.7 - 0.2	8.7 - 0.7	14.7 - 1.1	27	1°21.8	1°22.0	1°18.0	2.7 - 0.2	8.7 - 0.8	14.7 - 1.3
28	0°52.0	0°52.1	0°49.6	2.8 - 0.2	8.8 - 0.5	14.8 - 0.9	28	1°07.0	1°07.2	1°03.9	2.8 - 0.2	8.8 - 0.7	14.8 - 1.1	28	1°22.0	1°22.2	1°18.3	2.8 - 0.3	8.8 - 0.8	14.8 - 1.4
29	0°52.2	0°52.4	0°49.9	2.9 - 0.2	8.9 - 0.5	14.9 - 0.9	29	1°07.3	1°07.4	1°04.2	2.9 - 0.2	8.9 - 0.7	14.9 - 1.1	29	1°22.2	1°22.5	1°18.5	2.9 - 0.3	8.9 - 0.8	14.9 - 1.4
30	0°52.5	0°52.6	0°50.1	3.0 - 0.2	9.0 - 0.5	15.0 - 0.9	30	1°07.5	1°07.7	1°04.4	3.0 - 0.2	9.0 - 0.7	15.0 - 1.1	30	1°22.5	1°22.7	1°18.7	3.0 - 0.3	9.0 - 0.8	15.0 - 1.4
31	0°52.8	0°52.9	0°50.3	3.1 - 0.2	9.1 - 0.5	15.1 - 0.9	31	1°07.7	1°07.9	1°04.7	3.1 - 0.2	9.1 - 0.7	15.1 - 1.1	31	1°22.8	1°23.0	1°19.0	3.1 - 0.3	9.1 - 0.8	15.1 - 1.4
32	0°53.0	0°53.1	0°50.6	3.2 - 0.2	9.2 - 0.5	15.2 - 0.9	32	1°08.0	1°08.2	1°04.9	3.2 - 0.2	9.2 - 0.7	15.2 - 1.1	32	1°23.0	1°23.2	1°19.2	3.2 - 0.3	9.2 - 0.8	15.2 - 1.4
33	0°53.2	0°53.4	0°50.8	3.3 - 0.2	9.3 - 0.5	15.3 - 0.9	33	1°08.2	1°08.4	1°05.1	3.3 - 0.2	9.3 - 0.7	15.3 - 1.1	33	1°23.2	1°23.5	1°19.5	3.3 - 0.3	9.3 - 0.9	15.3 - 1.4
34	0°53.5	0°53.6	0°51.1	3.4 - 0.2	9.4 - 0.5	15.4 - 0.9	34	1°08.5	1°08.7	1°05.4	3.4 - 0.3	9.4 - 0.7	15.4 - 1.2	34	1°23.5	1°23.7	1°19.7	3.4 - 0.3	9.4 - 0.9	15.4 - 1.4
35	0°53.8	0°53.9	0°51.3	3.5 - 0.2	9.5 - 0.6	15.5 - 0.9	35	1°08.7	1°08.9	1°05.6	3.5 - 0.3	9.5 - 0.7	15.5 - 1.2	35	1°23.7	1°24.0	1°19.9	3.5 - 0.3	9.5 - 0.9	15.5 - 1.4
36	0°54.0	0°54.1	0°51.5	3.6 - 0.2	9.6 - 0.6	15.6 - 0.9	36	1°09.0	1°09.2	1°05.9	3.6 - 0.3	9.6 - 0.7	15.6 - 1.2	36	1°24.0	1°24.2	1°20.2	3.6 - 0.3	9.6 - 0.9	15.6 - 1.4
37	0°54.2	0°54.4	0°51.8	3.7 - 0.2	9.7 - 0.6	15.7 - 0.9	37	1°09.3	1°09.4	1°06.1	3.7 - 0.3	9.7 - 0.7	15.7 - 1.2	37	1°24.3	1°24.5	1°20.4	3.7 - 0.3	9.7 - 0.9	15.7 - 1.4
38	0°54.5	0°54.6	0°52.0	3.8 - 0.2	9.8 - 0.6	15.8 - 0.9	38	1°09.5	1°09.7	1°06.3	3.8 - 0.3	9.8 - 0.7	15.8 - 1.2	38	1°24.5	1°24.7	1°20.7	3.8 - 0.3	9.8 - 0.9	15.8 - 1.4
39	0°54.8	0°54.9	0°52.3	3.9 - 0.2	9.9 - 0.6	15.9 - 0.9	39	1°09.8	1°09.9	1°06.6	3.9 - 0.3	9.9 - 0.7	15.9 - 1.2	39	1°24.8	1°25.0	1°20.9	3.9 - 0.4	9.9 - 0.9	15.9 - 1.5
40	0°55.0	0°55.2	0°52.5	4.0 - 0.2	10.0 - 0.6	16.0 - 0.9	40	1°10.0	1°10.2	1°06.8	4.0 - 0.3	10.0 - 0.8	16.0 - 1.2	40	1°25.0	1°25.2	1°21.1	4.0 - 0.4	10.0 - 0.9	16.0 - 1.5
41	0°55.2	0°55.4	0°52.7	4.1 - 0.2	10.1 - 0.6	16.1 - 0.9	41	1°10.3	1°10.4	1°07.0	4.1 - 0.3	10.1 - 0.8	16.1 - 1.2	41	1°25.3	1°25.5	1°21.4	4.1 - 0.4	10.1 - 0.9	16.1 - 1.5
42	0°55.5	0°55.7	0°53.0	4.2 - 0.2	10.2 - 0.6	16.2 - 0.9	42	1°10.5	1°10.7	1°07.3	4.2 - 0.3	10.2 - 0.8	16.2 - 1.2	42	1°25.5	1°25.7	1°21.6	4.2 - 0.4	10.2 - 0.9	16.2 - 1.5
43	0°55.8	0°55.9	0°53.2	4.3 - 0.3	10.3 - 0.6	16.3 - 1.0	43	1°10.8	1°10.9	1°07.5	4.3 - 0.3	10.3 - 0.8	16.3 - 1.2	43	1°25.8	1°26.0	1°21.8	4.3 - 0.4	10.3 - 0.9	16.3 - 1.5
44	0°56.0	0°56.2	0°53.4	4.4 - 0.3	10.4 - 0.6	16.4 - 1.0	44	1°11.0	1°11.2	1°07.8	4.4 - 0.3	10.4 - 0.8	16.4 - 1.2	44	1°26.0	1°26.2	1°22.1	4.4 - 0.4	10.4 - 1.0	16.4 - 1.5
45	0°56.2	0°56.4	0°53.7	4.5 - 0.3	10.5 - 0.6	16.5 - 1.0	45	1°11.2	1°11.4	1°08.0	4.5 - 0.3	10.5 - 0.8	16.5 - 1.2	45	1°26.2	1°26.5	1°22.3	4.5 - 0.4	10.5 - 1.0	16.5 - 1.5
46	0°56.5	0°56.7	0°53.9	4.6 - 0.3	10.6 - 0.6	16.6 - 1.0	46	1°11.5	1°11.7	1°08.2	4.6 - 0.3	10.6 - 0.8	16.6 - 1.2	46	1°26.5	1°26.7	1°22.6	4.6 - 0.4	10.6 - 1.0	16.6 - 1.5
47	0°56.8	0°56.9	0°54.2	4.7 - 0.3	10.7 - 0.6	16.7 - 1.0	47	1°11.7	1°11.9	1°08.5	4.7 - 0.4	10.7 - 0.8	16.7 - 1.3	47	1°26.8	1°27.0	1°22.8	4.7 - 0.4	10.7 - 1.0	16.7 - 1.5
48	0°57.0	0°57.2	0°54.4	4.8 - 0.3	10.8 - 0.6	16.8 - 1.0	48	1°12.0	1°12.2	1°08.7	4.8 - 0.4	10.8 - 0.8	16.8 - 1.3	48	1°27.0	1°27.2	1°23.0	4.8 - 0.4	10.8 - 1.0	16.8 - 1.5
49	0°57.2	0°57.4	0°54																	

Increments and Corrections

m 6	Sun Plan.	Aries	Moon	v and d corr			m 7	Sun Plan.	Aries	Moon	v and d corr			m 8	Sun Plan.	Aries	Moon	v and d corr		
0	1°30.0	1°30.2	1°25.9	0.0 - 0.0	6.0 - 0.7	12.0 - 1.3	0	1°45.0	1°45.3	1°40.2	0.0 - 0.0	6.0 - 0.8	12.0 - 1.5	0	2°00.0	2°00.3	1°54.5	0.0 - 0.0	6.0 - 0.9	12.0 - 1.7
1	1°30.2	1°30.5	1°26.1	0.1 - 0.0	6.1 - 0.7	12.1 - 1.3	1	1°45.2	1°45.5	1°40.5	0.1 - 0.0	6.1 - 0.8	12.1 - 1.5	1	2°00.3	2°00.6	1°54.8	0.1 - 0.0	6.1 - 0.9	12.1 - 1.7
2	1°30.5	1°30.7	1°26.4	0.2 - 0.0	6.2 - 0.7	12.2 - 1.3	2	1°45.5	1°45.8	1°40.7	0.2 - 0.0	6.2 - 0.8	12.2 - 1.5	2	2°00.5	2°00.8	1°55.0	0.2 - 0.0	6.2 - 0.9	12.2 - 1.7
3	1°30.7	1°31.0	1°26.6	0.3 - 0.0	6.3 - 0.7	12.3 - 1.3	3	1°45.8	1°46.0	1°40.9	0.3 - 0.0	6.3 - 0.8	12.3 - 1.5	3	2°00.8	2°01.1	1°55.2	0.3 - 0.0	6.3 - 0.9	12.3 - 1.7
4	1°31.0	1°31.2	1°26.9	0.4 - 0.0	6.4 - 0.7	12.4 - 1.3	4	1°46.0	1°46.3	1°41.2	0.4 - 0.1	6.4 - 0.8	12.4 - 1.6	4	2°01.0	2°01.3	1°55.5	0.4 - 0.1	6.4 - 0.9	12.4 - 1.8
5	1°31.2	1°31.5	1°27.1	0.5 - 0.1	6.5 - 0.7	12.5 - 1.4	5	1°46.2	1°46.5	1°41.4	0.5 - 0.1	6.5 - 0.8	12.5 - 1.6	5	2°01.3	2°01.6	1°55.7	0.5 - 0.1	6.5 - 0.9	12.5 - 1.8
6	1°31.5	1°31.8	1°27.3	0.6 - 0.1	6.6 - 0.7	12.6 - 1.4	6	1°46.5	1°46.8	1°41.6	0.6 - 0.1	6.6 - 0.8	12.6 - 1.6	6	2°01.5	2°01.8	1°56.0	0.6 - 0.1	6.6 - 0.9	12.6 - 1.8
7	1°31.7	1°32.0	1°27.6	0.7 - 0.1	6.7 - 0.7	12.7 - 1.4	7	1°46.7	1°47.0	1°41.9	0.7 - 0.1	6.7 - 0.8	12.7 - 1.6	7	2°01.8	2°02.1	1°56.2	0.7 - 0.1	6.7 - 0.9	12.7 - 1.8
8	1°32.0	1°32.3	1°27.8	0.8 - 0.1	6.8 - 0.7	12.8 - 1.4	8	1°47.0	1°47.3	1°42.1	0.8 - 0.1	6.8 - 0.9	12.8 - 1.6	8	2°02.0	2°02.3	1°56.4	0.8 - 0.1	6.8 - 1.0	12.8 - 1.8
9	1°32.3	1°32.5	1°28.0	0.9 - 0.1	6.9 - 0.7	12.9 - 1.4	9	1°47.3	1°47.5	1°42.4	0.9 - 0.1	6.9 - 0.9	12.9 - 1.6	9	2°02.3	2°02.6	1°56.7	0.9 - 0.1	6.9 - 1.0	12.9 - 1.8
10	1°32.5	1°32.8	1°28.3	1.0 - 0.1	7.0 - 0.8	13.0 - 1.4	10	1°47.5	1°47.8	1°42.6	1.0 - 0.1	7.0 - 0.9	13.0 - 1.6	10	2°02.5	2°02.8	1°56.9	1.0 - 0.1	7.0 - 1.0	13.0 - 1.8
11	1°32.8	1°33.0	1°28.5	1.1 - 0.1	7.1 - 0.8	13.1 - 1.4	11	1°47.8	1°48.0	1°42.8	1.1 - 0.1	7.1 - 0.9	13.1 - 1.6	11	2°02.8	2°03.1	1°57.2	1.1 - 0.2	7.1 - 1.0	13.1 - 1.9
12	1°33.0	1°33.3	1°28.8	1.2 - 0.1	7.2 - 0.8	13.2 - 1.4	12	1°48.0	1°48.3	1°43.1	1.2 - 0.2	7.2 - 0.9	13.2 - 1.7	12	2°03.0	2°03.3	1°57.4	1.2 - 0.2	7.2 - 1.0	13.2 - 1.9
13	1°33.2	1°33.5	1°29.0	1.3 - 0.1	7.3 - 0.8	13.3 - 1.4	13	1°48.2	1°48.5	1°43.3	1.3 - 0.2	7.3 - 0.9	13.3 - 1.7	13	2°03.3	2°03.6	1°57.6	1.3 - 0.2	7.3 - 1.0	13.3 - 1.9
14	1°33.5	1°33.8	1°29.2	1.4 - 0.2	7.4 - 0.8	13.4 - 1.5	14	1°48.5	1°48.8	1°43.6	1.4 - 0.2	7.4 - 0.9	13.4 - 1.7	14	2°03.5	2°03.8	1°57.9	1.4 - 0.2	7.4 - 1.0	13.4 - 1.9
15	1°33.8	1°34.0	1°29.5	1.5 - 0.2	7.5 - 0.8	13.5 - 1.5	15	1°48.8	1°49.0	1°43.8	1.5 - 0.2	7.5 - 0.9	13.5 - 1.7	15	2°03.8	2°04.1	1°58.1	1.5 - 0.2	7.5 - 1.1	13.5 - 1.9
16	1°34.0	1°34.3	1°29.7	1.6 - 0.2	7.6 - 0.8	13.6 - 1.5	16	1°49.0	1°49.3	1°44.0	1.6 - 0.2	7.6 - 1.0	13.6 - 1.7	16	2°04.0	2°04.3	1°58.4	1.6 - 0.2	7.6 - 1.1	13.6 - 1.9
17	1°34.2	1°34.5	1°30.0	1.7 - 0.2	7.7 - 0.8	13.7 - 1.5	17	1°49.2	1°49.5	1°44.3	1.7 - 0.2	7.7 - 1.0	13.7 - 1.7	17	2°04.2	2°04.6	1°58.6	1.7 - 0.2	7.7 - 1.1	13.7 - 1.9
18	1°34.5	1°34.8	1°30.2	1.8 - 0.2	7.8 - 0.8	13.8 - 1.5	18	1°49.5	1°49.8	1°44.5	1.8 - 0.2	7.8 - 1.0	13.8 - 1.7	18	2°04.5	2°04.8	1°58.8	1.8 - 0.3	7.8 - 1.1	13.8 - 2.0
19	1°34.8	1°35.0	1°30.4	1.9 - 0.2	7.9 - 0.9	13.9 - 1.5	19	1°49.8	1°50.0	1°44.8	1.9 - 0.2	7.9 - 1.0	13.9 - 1.7	19	2°04.7	2°05.1	1°59.1	1.9 - 0.3	7.9 - 1.1	13.9 - 2.0
20	1°35.0	1°35.3	1°30.7	2.0 - 0.2	8.0 - 0.9	14.0 - 1.5	20	1°50.0	1°50.3	1°45.0	2.0 - 0.3	8.0 - 1.0	14.0 - 1.8	20	2°05.0	2°05.3	1°59.3	2.0 - 0.3	8.0 - 1.1	14.0 - 2.0
21	1°35.2	1°35.5	1°30.9	2.1 - 0.2	8.1 - 0.9	14.1 - 1.5	21	1°50.2	1°50.6	1°45.2	2.1 - 0.3	8.1 - 1.0	14.1 - 1.8	21	2°05.2	2°05.6	1°59.5	2.1 - 0.3	8.1 - 1.1	14.1 - 2.0
22	1°35.5	1°35.8	1°31.1	2.2 - 0.2	8.2 - 0.9	14.2 - 1.5	22	1°50.5	1°50.8	1°45.5	2.2 - 0.3	8.2 - 1.0	14.2 - 1.8	22	2°05.5	2°05.8	1°59.8	2.2 - 0.3	8.2 - 1.2	14.2 - 2.0
23	1°35.8	1°36.0	1°31.4	2.3 - 0.2	8.3 - 0.9	14.3 - 1.5	23	1°50.8	1°51.1	1°45.7	2.3 - 0.3	8.3 - 1.0	14.3 - 1.8	23	2°05.7	2°06.1	2°00.0	2.3 - 0.3	8.3 - 1.2	14.3 - 2.0
24	1°36.0	1°36.3	1°31.6	2.4 - 0.3	8.4 - 0.9	14.4 - 1.6	24	1°51.0	1°51.3	1°45.9	2.4 - 0.3	8.4 - 1.1	14.4 - 1.8	24	2°06.0	2°06.3	2°00.3	2.4 - 0.3	8.4 - 1.2	14.4 - 2.0
25	1°36.3	1°36.5	1°31.9	2.5 - 0.3	8.5 - 0.9	14.5 - 1.6	25	1°51.3	1°51.6	1°46.2	2.5 - 0.3	8.5 - 1.1	14.5 - 1.8	25	2°06.2	2°06.6	2°00.5	2.5 - 0.4	8.5 - 1.2	14.5 - 2.1
26	1°36.5	1°36.8	1°32.1	2.6 - 0.3	8.6 - 0.9	14.6 - 1.6	26	1°51.5	1°51.8	1°46.4	2.6 - 0.3	8.6 - 1.1	14.6 - 1.8	26	2°06.5	2°06.8	2°00.7	2.6 - 0.4	8.6 - 1.2	14.6 - 2.1
27	1°36.8	1°37.0	1°32.3	2.7 - 0.3	8.7 - 0.9	14.7 - 1.6	27	1°51.8	1°52.1	1°46.7	2.7 - 0.3	8.7 - 1.1	14.7 - 1.8	27	2°06.7	2°07.1	2°01.0	2.7 - 0.4	8.7 - 1.2	14.7 - 2.1
28	1°37.0	1°37.3	1°32.6	2.8 - 0.3	8.8 - 1.0	14.8 - 1.6	28	1°52.0	1°52.3	1°46.9	2.8 - 0.4	8.8 - 1.1	14.8 - 1.9	28	2°07.0	2°07.3	2°01.2	2.8 - 0.4	8.8 - 1.2	14.8 - 2.1
29	1°37.2	1°37.5	1°32.8	2.9 - 0.3	8.9 - 1.0	14.9 - 1.6	29	1°52.2	1°52.6	1°47.1	2.9 - 0.4	8.9 - 1.1	14.9 - 1.9	29	2°07.2	2°07.6	2°01.5	2.9 - 0.4	8.9 - 1.3	14.9 - 2.1
30	1°37.5	1°37.8	1°33.1	3.0 - 0.3	9.0 - 1.0	15.0 - 1.6	30	1°52.5	1°52.8	1°47.4	3.0 - 0.4	9.0 - 1.1	15.0 - 1.9	30	2°07.5	2°07.8	2°01.7	3.0 - 0.4	9.0 - 1.3	15.0 - 2.1
31	1°37.8	1°38.0	1°33.3	3.1 - 0.3	9.1 - 1.0	15.1 - 1.6	31	1°52.7	1°53.1	1°47.6	3.1 - 0.4	9.1 - 1.1	15.1 - 1.9	31	2°07.8	2°08.1	2°01.9	3.1 - 0.4	9.1 - 1.3	15.1 - 2.1
32	1°38.0	1°38.3	1°33.5	3.2 - 0.3	9.2 - 1.0	15.2 - 1.6	32	1°53.0	1°53.3	1°47.9	3.2 - 0.4	9.2 - 1.2	15.2 - 1.9	32	2°08.0	2°08.3	2°02.2	3.2 - 0.5	9.2 - 1.3	15.2 - 2.2
33	1°38.2	1°38.5	1°33.8	3.3 - 0.4	9.3 - 1.0	15.3 - 1.7	33	1°53.2	1°53.6	1°48.1	3.3 - 0.4	9.3 - 1.2	15.3 - 1.9	33	2°08.3	2°08.6	2°02.4	3.3 - 0.5	9.3 - 1.3	15.3 - 2.2
34	1°38.5	1°38.8	1°34.0	3.4 - 0.4	9.4 - 1.0	15.4 - 1.7	34	1°53.5	1°53.8	1°48.3	3.4 - 0.4	9.4 - 1.2	15.4 - 1.9	34	2°08.5	2°08.9	2°02.6	3.4 - 0.5	9.4 - 1.3	15.4 - 2.2
35	1°38.7	1°39.0	1°34.3	3.5 - 0.4	9.5 - 1.0	15.5 - 1.7	35	1°53.7	1°54.1	1°48.6	3.5 - 0.4	9.5 - 1.2	15.5 - 1.9	35	2°08.8	2°09.1	2°02.9	3.5 - 0.5	9.5 - 1.3	15.5 - 2.2
36	1°39.0	1°39.3	1°34.5	3.6 - 0.4	9.6 - 1.0	15.6 - 1.7	36	1°54.0	1°54.3	1°48.8	3.6 - 0.5	9.6 - 1.2	15.6 - 2.0	36	2°09.0	2°09.4	2°03.1	3.6 - 0.5	9.6 - 1.4	15.6 - 2.2
37	1°39.3	1°39.5	1°34.7	3.7 - 0.4	9.7 - 1.1	15.7 - 1.7	37	1°54.2	1°54.6	1°49.0	3.7 - 0.5	9.7 - 1.2	15.7 - 2.0	37	2°09.3	2°09.6	2°03.4	3.7 - 0.5	9.7 - 1.4	15.7 - 2.2
38	1°39.5	1°39.8	1°35.0	3.8 - 0.4	9.8 - 1.1	15.8 - 1.7	38	1°54.5	1°54.8	1°49.3	3.8 - 0.5	9.8 - 1.2	15.8 - 2.0	38	2°09.5	2°09.9	2°03.6	3.8 - 0.5	9.8 - 1.4	15.8 - 2.2
39	1°39.8	1°40.0	1°35.2	3.9 - 0.4	9.9 - 1.1	15.9 - 1.7	39	1°54.8	1°55.1	1°49.5	3.9 - 0.5	9.9 - 1.2	15.9 - 2.0	39	2°09.8	2°10.1	2°03.8	3.9 - 0.6	9.9 - 1.4	15.9 - 2.3
40	1°40.0	1°40.3	1°35.4	4.0 - 0.4	10.0 - 1.1	16.0 - 1.7	40	1°55.0	1°55.3	1°49.8	4.0 - 0.5	10.0 - 1.3	16.0 - 2.0	40	2°10.0	2°10.4	2°04.1	4.0 - 0.6	10.0 - 1.4	16.0 - 2.3
41	1°40.2	1°40.5	1°35.7	4.1 - 0.4	10.1 - 1.1	16.1 - 1.7	41	1°55.2	1°55.6	1°50.0	4.1 - 0.5	10.1 - 1.3	16.1 - 2.0	41	2°10.3	2°10.6	2°04.3	4.1 - 0.6	10.1 - 1.4	16.1 - 2.3
42	1°40.5	1°40.8	1°35.9	4.2 - 0.5	10.2 - 1.1	16.2 - 1.8	42	1°55.5	1°55.8	1°50.2	4.2 - 0.5	10.2 - 1.3	16.2 - 2.0	42	2°10.5	2°10.9	2°04.6	4.2 - 0.6	10.2 - 1.4	16.2 - 2.3
43	1°40.8	1°41.0	1°36.2	4.3 - 0.5	10.3 - 1.1	16.3 - 1.8	43	1°55.8	1°56.1	1°50.5	4.3 - 0.5	10.3 - 1.3	16.3 - 2.0	43	2°10.8	2°11.1	2°04.8	4.3 - 0.6	10.3 - 1.5	16.3 - 2.3
44	1°41.0	1°41.3	1°36.4	4.4 - 0.5	10.4 - 1.1	16.4 - 1.8	44	1°56.0	1°56.3	1°50.7	4.4 - 0.6	10.4 - 1.3	16.4 - 2.1	44	2°11.0	2°11.4	2°05.0	4.4 - 0.6	10.4 - 1.5	16.4 - 2.3
45	1°41.2	1°41.5	1°36.6	4.5 - 0.5	10.5 - 1.1	16.5 - 1.8	45	1°56.3	1°56.6	1°51.0	4.5 - 0.6	10.5 - 1.3	16.5 - 2.1	45	2°11.2	2°11.6	2°05.3	4.5 - 0.6	10.5 - 1.5	16.5 - 2.3
46	1°41.5	1°41.8	1°36.9	4.6 - 0.5	10.6 - 1.1	16.6 - 1.8	46	1°56.5	1°56.8	1°51.2	4.6 - 0.6	10.6 - 1.3	16.6 - 2.1	46	2°11.5	2°11.9	2°05.5	4.6 - 0.7	10.6 - 1.5	16.6 - 2.4
47	1°41.8	1°42.0	1°37.1	4.7 - 0.5	10.7 - 1.2	16.7 - 1.8	47	1°56.7	1°57.1	1°51.4	4.7 - 0.6	10.7 - 1.3	16.7 - 2.1	47	2°11.7	2°12.1	2°05.7	4.7 - 0.7	10.7 - 1.5	16.7 - 2.4
48	1°42.0	1°42.3	1°37.4	4.8 - 0.5	10.8 - 1.2	16.8 - 1.8	48	1°57.0	1°57.3	1°51.7	4.8 - 0.6	10.8 - 1.4	16.8 - 2.1	48	2°12.0	2°12.4	2°06.0	4.8 - 0.7	10.8 - 1.5	16.8 - 2.4
49	1°42.2	1°42.5	1°37.6	4.9 - 0.5	10.9 - 1.2	16.9 - 1.8	49	1°57.2	1°57.6	1°51.9	4.9 - 0.6	10.9 -								

Increments and Corrections

m 9	Sun Plan.	Aries	Moon	v and d corr			m 10	Sun Plan.	Aries	Moon	v and d corr			m 11	Sun Plan.	Aries	Moon	v and d corr		
0	2°15.0	2°15.4	2°08.8	0.0 - 0.0	6.0 - 1.0	12.0 - 1.9	0	2°30.0	2°30.4	2°23.2	0.0 - 0.0	6.0 - 1.0	12.0 - 2.1	0	2°45.0	2°45.5	2°37.5	0.0 - 0.0	6.0 - 1.2	12.0 - 2.3
1	2°15.3	2°15.6	2°09.1	0.1 - 0.0	6.1 - 1.0	12.1 - 1.9	1	2°30.3	2°30.7	2°23.4	0.1 - 0.0	6.1 - 1.1	12.1 - 2.1	1	2°45.3	2°45.7	2°37.7	0.1 - 0.0	6.1 - 1.2	12.1 - 2.3
2	2°15.5	2°15.9	2°09.3	0.2 - 0.0	6.2 - 1.0	12.2 - 1.9	2	2°30.5	2°30.9	2°23.6	0.2 - 0.0	6.2 - 1.1	12.2 - 2.1	2	2°45.5	2°46.0	2°38.0	0.2 - 0.0	6.2 - 1.2	12.2 - 2.3
3	2°15.8	2°16.1	2°09.6	0.3 - 0.0	6.3 - 1.0	12.3 - 1.9	3	2°30.8	2°31.2	2°23.9	0.3 - 0.1	6.3 - 1.1	12.3 - 2.2	3	2°45.8	2°46.2	2°38.2	0.3 - 0.1	6.3 - 1.2	12.3 - 2.4
4	2°16.0	2°16.4	2°09.8	0.4 - 0.1	6.4 - 1.0	12.4 - 2.0	4	2°31.0	2°31.4	2°24.1	0.4 - 0.1	6.4 - 1.1	12.4 - 2.2	4	2°46.0	2°46.5	2°38.4	0.4 - 0.1	6.4 - 1.2	12.4 - 2.4
5	2°16.3	2°16.6	2°10.0	0.5 - 0.1	6.5 - 1.0	12.5 - 2.0	5	2°31.3	2°31.7	2°24.4	0.5 - 0.1	6.5 - 1.1	12.5 - 2.2	5	2°46.3	2°46.7	2°38.7	0.5 - 0.1	6.5 - 1.2	12.5 - 2.4
6	2°16.5	2°16.9	2°10.3	0.6 - 0.1	6.6 - 1.0	12.6 - 2.0	6	2°31.5	2°31.9	2°24.6	0.6 - 0.1	6.6 - 1.2	12.6 - 2.2	6	2°46.5	2°47.0	2°38.9	0.6 - 0.1	6.6 - 1.3	12.6 - 2.4
7	2°16.8	2°17.1	2°10.5	0.7 - 0.1	6.7 - 1.1	12.7 - 2.0	7	2°31.8	2°32.2	2°24.8	0.7 - 0.1	6.7 - 1.2	12.7 - 2.2	7	2°46.8	2°47.2	2°39.2	0.7 - 0.1	6.7 - 1.3	12.7 - 2.4
8	2°17.0	2°17.4	2°10.8	0.8 - 0.1	6.8 - 1.1	12.8 - 2.0	8	2°32.0	2°32.4	2°25.1	0.8 - 0.1	6.8 - 1.2	12.8 - 2.2	8	2°47.0	2°47.5	2°39.4	0.8 - 0.2	6.8 - 1.3	12.8 - 2.5
9	2°17.3	2°17.6	2°11.0	0.9 - 0.1	6.9 - 1.1	12.9 - 2.0	9	2°32.3	2°32.7	2°25.3	0.9 - 0.2	6.9 - 1.2	12.9 - 2.3	9	2°47.3	2°47.7	2°39.6	0.9 - 0.2	6.9 - 1.3	12.9 - 2.5
10	2°17.5	2°17.9	2°11.2	1.0 - 0.2	7.0 - 1.1	13.0 - 2.1	10	2°32.5	2°32.9	2°25.6	1.0 - 0.2	7.0 - 1.2	13.0 - 2.3	10	2°47.5	2°48.0	2°39.9	1.0 - 0.2	7.0 - 1.3	13.0 - 2.5
11	2°17.8	2°18.1	2°11.5	1.1 - 0.2	7.1 - 1.1	13.1 - 2.1	11	2°32.8	2°33.2	2°25.8	1.1 - 0.2	7.1 - 1.2	13.1 - 2.3	11	2°47.8	2°48.2	2°40.1	1.1 - 0.2	7.1 - 1.4	13.1 - 2.5
12	2°18.0	2°18.4	2°11.7	1.2 - 0.2	7.2 - 1.1	13.2 - 2.1	12	2°33.0	2°33.4	2°26.0	1.2 - 0.2	7.2 - 1.3	13.2 - 2.3	12	2°48.0	2°48.5	2°40.3	1.2 - 0.2	7.2 - 1.4	13.2 - 2.5
13	2°18.2	2°18.6	2°12.0	1.3 - 0.2	7.3 - 1.2	13.3 - 2.1	13	2°33.2	2°33.7	2°26.3	1.3 - 0.2	7.3 - 1.3	13.3 - 2.3	13	2°48.2	2°48.7	2°40.6	1.3 - 0.2	7.3 - 1.4	13.3 - 2.5
14	2°18.5	2°18.9	2°12.2	1.4 - 0.2	7.4 - 1.2	13.4 - 2.1	14	2°33.5	2°33.9	2°26.5	1.4 - 0.2	7.4 - 1.3	13.4 - 2.3	14	2°48.5	2°49.0	2°40.8	1.4 - 0.3	7.4 - 1.4	13.4 - 2.6
15	2°18.8	2°19.1	2°12.4	1.5 - 0.2	7.5 - 1.2	13.5 - 2.1	15	2°33.8	2°34.2	2°26.7	1.5 - 0.3	7.5 - 1.3	13.5 - 2.4	15	2°48.8	2°49.2	2°41.1	1.5 - 0.3	7.5 - 1.4	13.5 - 2.6
16	2°19.0	2°19.4	2°12.7	1.6 - 0.3	7.6 - 1.2	13.6 - 2.2	16	2°34.0	2°34.4	2°27.0	1.6 - 0.3	7.6 - 1.3	13.6 - 2.4	16	2°49.0	2°49.5	2°41.3	1.6 - 0.3	7.6 - 1.5	13.6 - 2.6
17	2°19.2	2°19.6	2°12.9	1.7 - 0.3	7.7 - 1.2	13.7 - 2.2	17	2°34.2	2°34.7	2°27.2	1.7 - 0.3	7.7 - 1.3	13.7 - 2.4	17	2°49.2	2°49.7	2°41.5	1.7 - 0.3	7.7 - 1.5	13.7 - 2.6
18	2°19.5	2°19.9	2°13.1	1.8 - 0.3	7.8 - 1.2	13.8 - 2.2	18	2°34.5	2°34.9	2°27.5	1.8 - 0.3	7.8 - 1.4	13.8 - 2.4	18	2°49.5	2°50.0	2°41.8	1.8 - 0.3	7.8 - 1.5	13.8 - 2.6
19	2°19.7	2°20.1	2°13.4	1.9 - 0.3	7.9 - 1.3	13.9 - 2.2	19	2°34.8	2°35.2	2°27.7	1.9 - 0.3	7.9 - 1.4	13.9 - 2.4	19	2°49.8	2°50.2	2°42.0	1.9 - 0.4	7.9 - 1.5	13.9 - 2.7
20	2°20.0	2°20.4	2°13.6	2.0 - 0.3	8.0 - 1.3	14.0 - 2.2	20	2°35.0	2°35.4	2°27.9	2.0 - 0.4	8.0 - 1.4	14.0 - 2.4	20	2°50.0	2°50.5	2°42.3	2.0 - 0.4	8.0 - 1.5	14.0 - 2.7
21	2°20.2	2°20.6	2°13.9	2.1 - 0.3	8.1 - 1.3	14.1 - 2.2	21	2°35.2	2°35.7	2°28.2	2.1 - 0.4	8.1 - 1.4	14.1 - 2.5	21	2°50.2	2°50.7	2°42.5	2.1 - 0.4	8.1 - 1.6	14.1 - 2.7
22	2°20.5	2°20.9	2°14.1	2.2 - 0.3	8.2 - 1.3	14.2 - 2.2	22	2°35.5	2°35.9	2°28.4	2.2 - 0.4	8.2 - 1.4	14.2 - 2.5	22	2°50.5	2°51.0	2°42.7	2.2 - 0.4	8.2 - 1.6	14.2 - 2.7
23	2°20.7	2°21.1	2°14.3	2.3 - 0.4	8.3 - 1.3	14.3 - 2.3	23	2°35.7	2°36.2	2°28.7	2.3 - 0.4	8.3 - 1.5	14.3 - 2.5	23	2°50.7	2°51.2	2°43.0	2.3 - 0.4	8.3 - 1.6	14.3 - 2.7
24	2°21.0	2°21.4	2°14.6	2.4 - 0.4	8.4 - 1.3	14.4 - 2.3	24	2°36.0	2°36.4	2°28.9	2.4 - 0.4	8.4 - 1.5	14.4 - 2.5	24	2°51.0	2°51.5	2°43.2	2.4 - 0.5	8.4 - 1.6	14.4 - 2.8
25	2°21.2	2°21.6	2°14.8	2.5 - 0.4	8.5 - 1.3	14.5 - 2.3	25	2°36.2	2°36.7	2°29.1	2.5 - 0.4	8.5 - 1.5	14.5 - 2.5	25	2°51.2	2°51.7	2°43.4	2.5 - 0.5	8.5 - 1.6	14.5 - 2.8
26	2°21.5	2°21.9	2°15.1	2.6 - 0.4	8.6 - 1.4	14.6 - 2.3	26	2°36.5	2°36.9	2°29.4	2.6 - 0.5	8.6 - 1.5	14.6 - 2.6	26	2°51.5	2°52.0	2°43.7	2.6 - 0.5	8.6 - 1.6	14.6 - 2.8
27	2°21.7	2°22.1	2°15.3	2.7 - 0.4	8.7 - 1.4	14.7 - 2.3	27	2°36.7	2°37.2	2°29.6	2.7 - 0.5	8.7 - 1.5	14.7 - 2.6	27	2°51.7	2°52.2	2°43.9	2.7 - 0.5	8.7 - 1.7	14.7 - 2.8
28	2°22.0	2°22.4	2°15.5	2.8 - 0.4	8.8 - 1.4	14.8 - 2.3	28	2°37.0	2°37.4	2°29.8	2.8 - 0.5	8.8 - 1.5	14.8 - 2.6	28	2°52.0	2°52.5	2°44.2	2.8 - 0.5	8.8 - 1.7	14.8 - 2.8
29	2°22.2	2°22.6	2°15.8	2.9 - 0.5	8.9 - 1.4	14.9 - 2.4	29	2°37.2	2°37.7	2°30.1	2.9 - 0.5	8.9 - 1.6	14.9 - 2.6	29	2°52.2	2°52.7	2°44.4	2.9 - 0.6	8.9 - 1.7	14.9 - 2.9
30	2°22.5	2°22.9	2°16.0	3.0 - 0.5	9.0 - 1.4	15.0 - 2.4	30	2°37.5	2°37.9	2°30.3	3.0 - 0.5	9.0 - 1.6	15.0 - 2.6	30	2°52.5	2°53.0	2°44.6	3.0 - 0.6	9.0 - 1.7	15.0 - 2.9
31	2°22.8	2°23.1	2°16.2	3.1 - 0.5	9.1 - 1.4	15.1 - 2.4	31	2°37.8	2°38.2	2°30.6	3.1 - 0.5	9.1 - 1.6	15.1 - 2.6	31	2°52.8	2°53.2	2°44.9	3.1 - 0.6	9.1 - 1.7	15.1 - 2.9
32	2°23.0	2°23.4	2°16.5	3.2 - 0.5	9.2 - 1.5	15.2 - 2.4	32	2°38.0	2°38.4	2°30.8	3.2 - 0.6	9.2 - 1.6	15.2 - 2.7	32	2°53.0	2°53.5	2°45.1	3.2 - 0.6	9.2 - 1.8	15.2 - 2.9
33	2°23.3	2°23.6	2°16.7	3.3 - 0.5	9.3 - 1.5	15.3 - 2.4	33	2°38.3	2°38.7	2°31.0	3.3 - 0.6	9.3 - 1.6	15.3 - 2.7	33	2°53.3	2°53.7	2°45.4	3.3 - 0.6	9.3 - 1.8	15.3 - 2.9
34	2°23.5	2°23.9	2°17.0	3.4 - 0.5	9.4 - 1.5	15.4 - 2.4	34	2°38.5	2°38.9	2°31.3	3.4 - 0.6	9.4 - 1.6	15.4 - 2.7	34	2°53.5	2°54.0	2°45.6	3.4 - 0.7	9.4 - 1.8	15.4 - 3.0
35	2°23.8	2°24.1	2°17.2	3.5 - 0.6	9.5 - 1.5	15.5 - 2.5	35	2°38.8	2°39.2	2°31.5	3.5 - 0.6	9.5 - 1.7	15.5 - 2.7	35	2°53.8	2°54.2	2°45.8	3.5 - 0.7	9.5 - 1.8	15.5 - 3.0
36	2°24.0	2°24.4	2°17.4	3.6 - 0.6	9.6 - 1.5	15.6 - 2.5	36	2°39.0	2°39.4	2°31.8	3.6 - 0.6	9.6 - 1.7	15.6 - 2.7	36	2°54.0	2°54.5	2°46.1	3.6 - 0.7	9.6 - 1.8	15.6 - 3.0
37	2°24.3	2°24.6	2°17.7	3.7 - 0.6	9.7 - 1.5	15.7 - 2.5	37	2°39.3	2°39.7	2°32.0	3.7 - 0.6	9.7 - 1.7	15.7 - 2.7	37	2°54.3	2°54.7	2°46.3	3.7 - 0.7	9.7 - 1.9	15.7 - 3.0
38	2°24.5	2°24.9	2°17.9	3.8 - 0.6	9.8 - 1.6	15.8 - 2.5	38	2°39.5	2°39.9	2°32.2	3.8 - 0.7	9.8 - 1.7	15.8 - 2.8	38	2°54.5	2°55.0	2°46.6	3.8 - 0.7	9.8 - 1.9	15.8 - 3.0
39	2°24.8	2°25.1	2°18.2	3.9 - 0.6	9.9 - 1.6	15.9 - 2.5	39	2°39.8	2°40.2	2°32.5	3.9 - 0.7	9.9 - 1.7	15.9 - 2.8	39	2°54.8	2°55.2	2°46.8	3.9 - 0.7	9.9 - 1.9	15.9 - 3.0
40	2°25.0	2°25.4	2°18.4	4.0 - 0.6	10.0 - 1.6	16.0 - 2.5	40	2°40.0	2°40.4	2°32.7	4.0 - 0.7	10.0 - 1.8	16.0 - 2.8	40	2°55.0	2°55.5	2°47.0	4.0 - 0.8	10.0 - 1.9	16.0 - 3.1
41	2°25.3	2°25.6	2°18.6	4.1 - 0.6	10.1 - 1.6	16.1 - 2.5	41	2°40.2	2°40.7	2°32.9	4.1 - 0.7	10.1 - 1.8	16.1 - 2.8	41	2°55.2	2°55.7	2°47.3	4.1 - 0.8	10.1 - 1.9	16.1 - 3.1
42	2°25.5	2°25.9	2°18.9	4.2 - 0.7	10.2 - 1.6	16.2 - 2.6	42	2°40.5	2°40.9	2°33.2	4.2 - 0.7	10.2 - 1.8	16.2 - 2.8	42	2°55.5	2°56.0	2°47.5	4.2 - 0.8	10.2 - 2.0	16.2 - 3.1
43	2°25.8	2°26.1	2°19.1	4.3 - 0.7	10.3 - 1.6	16.3 - 2.6	43	2°40.8	2°41.2	2°33.4	4.3 - 0.8	10.3 - 1.8	16.3 - 2.9	43	2°55.8	2°56.2	2°47.7	4.3 - 0.8	10.3 - 2.0	16.3 - 3.1
44	2°26.0	2°26.4	2°19.3	4.4 - 0.7	10.4 - 1.6	16.4 - 2.6	44	2°41.0	2°41.4	2°33.7	4.4 - 0.8	10.4 - 1.8	16.4 - 2.9	44	2°56.0	2°56.5	2°48.0	4.4 - 0.8	10.4 - 2.0	16.4 - 3.1
45	2°26.2	2°26.6	2°19.6	4.5 - 0.7	10.5 - 1.7	16.5 - 2.6	45	2°41.2	2°41.7	2°33.9	4.5 - 0.8	10.5 - 1.8	16.5 - 2.9	45	2°56.2	2°56.7	2°48.2	4.5 - 0.9	10.5 - 2.0	16.5 - 3.2
46	2°26.5	2°26.9	2°19.8	4.6 - 0.7	10.6 - 1.7	16.6 - 2.6	46	2°41.5	2°41.9	2°34.1	4.6 - 0.8	10.6 - 1.9	16.6 - 2.9	46	2°56.5	2°57.0	2°48.5	4.6 - 0.9	10.6 - 2.0	16.6 - 3.2
47	2°26.8	2°27.2	2°20.1	4.7 - 0.7	10.7 - 1.7	16.7 - 2.6	47	2°41.8	2°42.2	2°34.4	4.7 - 0.8	10.7 - 1.9	16.7 - 2.9	47	2°56.8	2°57.2	2°48.7	4.7 - 0.9	10.7 - 2.1	16.7 - 3.2
48	2°27.0	2°27.4	2°20.3	4.8 - 0.8	10.8 - 1.7	16.8 - 2.7	48	2°42.0	2°42.4	2°34.6	4.8 - 0.8	10.8 - 1.9	16.8 - 2.9	48	2°57.0	2°57.5	2°48.9	4.8 - 0.9	10.8 - 2.1	16.8 - 3.2
49	2°27.2	2°27.7	2°20.5	4.9 - 0.8	10.9 - 1.7	16.9 - 2.7	49	2°42.2	2°42.7	2°34.9	4.									

Increments and Corrections

m 12	Sun Plan.	Aries	Moon	v and d corr			m 13	Sun Plan.	Aries	Moon	v and d corr			m 14	Sun Plan.	Aries	Moon	v and d corr		
0	3°00.0	3°00.5	2°51.8	0.0 - 0.0	6.0 - 1.3	12.0 - 2.5	0	3°15.0	3°15.5	3°06.1	0.0 - 0.0	6.0 - 1.4	12.0 - 2.7	0	3°30.0	3°30.6	3°20.4	0.0 - 0.0	6.0 - 1.5	12.0 - 2.9
1	3°00.3	3°00.7	2°52.0	0.1 - 0.0	6.1 - 1.3	12.1 - 2.5	1	3°15.3	3°15.8	3°06.4	0.1 - 0.0	6.1 - 1.4	12.1 - 2.7	1	3°30.3	3°30.8	3°20.7	0.1 - 0.0	6.1 - 1.5	12.1 - 2.9
2	3°00.5	3°01.0	2°52.3	0.2 - 0.0	6.2 - 1.3	12.2 - 2.5	2	3°15.5	3°16.0	3°06.6	0.2 - 0.0	6.2 - 1.4	12.2 - 2.7	2	3°30.5	3°31.1	3°20.9	0.2 - 0.0	6.2 - 1.5	12.2 - 2.9
3	3°00.8	3°01.2	2°52.5	0.3 - 0.1	6.3 - 1.3	12.3 - 2.6	3	3°15.8	3°16.3	3°06.8	0.3 - 0.1	6.3 - 1.4	12.3 - 2.8	3	3°30.8	3°31.3	3°21.1	0.3 - 0.1	6.3 - 1.5	12.3 - 3.0
4	3°01.0	3°01.5	2°52.8	0.4 - 0.1	6.4 - 1.3	12.4 - 2.6	4	3°16.0	3°16.5	3°07.1	0.4 - 0.1	6.4 - 1.4	12.4 - 2.8	4	3°31.0	3°31.6	3°21.4	0.4 - 0.1	6.4 - 1.5	12.4 - 3.0
5	3°01.3	3°01.7	2°53.0	0.5 - 0.1	6.5 - 1.4	12.5 - 2.6	5	3°16.3	3°16.8	3°07.3	0.5 - 0.1	6.5 - 1.5	12.5 - 2.8	5	3°31.3	3°31.8	3°21.6	0.5 - 0.1	6.5 - 1.6	12.5 - 3.0
6	3°01.5	3°02.0	2°53.2	0.6 - 0.1	6.6 - 1.4	12.6 - 2.6	6	3°16.5	3°17.0	3°07.5	0.6 - 0.1	6.6 - 1.5	12.6 - 2.8	6	3°31.5	3°32.1	3°21.9	0.6 - 0.1	6.6 - 1.6	12.6 - 3.0
7	3°01.8	3°02.2	2°53.5	0.7 - 0.1	6.7 - 1.4	12.7 - 2.6	7	3°16.8	3°17.3	3°07.8	0.7 - 0.2	6.7 - 1.5	12.7 - 2.9	7	3°31.8	3°32.3	3°22.1	0.7 - 0.2	6.7 - 1.6	12.7 - 3.1
8	3°02.0	3°02.5	2°53.7	0.8 - 0.2	6.8 - 1.4	12.8 - 2.7	8	3°17.0	3°17.5	3°08.0	0.8 - 0.2	6.8 - 1.5	12.8 - 2.9	8	3°32.0	3°32.6	3°22.3	0.8 - 0.2	6.8 - 1.6	12.8 - 3.1
9	3°02.3	3°02.7	2°53.9	0.9 - 0.2	6.9 - 1.4	12.9 - 2.7	9	3°17.3	3°17.8	3°08.3	0.9 - 0.2	6.9 - 1.6	12.9 - 2.9	9	3°32.3	3°32.8	3°22.6	0.9 - 0.2	6.9 - 1.7	12.9 - 3.1
10	3°02.5	3°03.0	2°54.2	1.0 - 0.2	7.0 - 1.5	13.0 - 2.7	10	3°17.5	3°18.0	3°08.5	1.0 - 0.2	7.0 - 1.6	13.0 - 2.9	10	3°32.5	3°33.1	3°22.8	1.0 - 0.2	7.0 - 1.7	13.0 - 3.1
11	3°02.8	3°03.2	2°54.4	1.1 - 0.2	7.1 - 1.5	13.1 - 2.7	11	3°17.8	3°18.3	3°08.7	1.1 - 0.2	7.1 - 1.6	13.1 - 2.9	11	3°32.8	3°33.3	3°23.1	1.1 - 0.3	7.1 - 1.7	13.1 - 3.2
12	3°03.0	3°03.5	2°54.7	1.2 - 0.3	7.2 - 1.5	13.2 - 2.8	12	3°18.0	3°18.5	3°09.0	1.2 - 0.3	7.2 - 1.6	13.2 - 3.0	12	3°33.0	3°33.6	3°23.3	1.2 - 0.3	7.2 - 1.7	13.2 - 3.2
13	3°03.3	3°03.8	2°54.9	1.3 - 0.3	7.3 - 1.5	13.3 - 2.8	13	3°18.2	3°18.8	3°09.2	1.3 - 0.3	7.3 - 1.6	13.3 - 3.0	13	3°33.2	3°33.8	3°23.5	1.3 - 0.3	7.3 - 1.8	13.3 - 3.2
14	3°03.5	3°04.0	2°55.1	1.4 - 0.3	7.4 - 1.5	13.4 - 2.8	14	3°18.5	3°19.0	3°09.5	1.4 - 0.3	7.4 - 1.7	13.4 - 3.0	14	3°33.5	3°34.1	3°23.8	1.4 - 0.3	7.4 - 1.8	13.4 - 3.2
15	3°03.8	3°04.3	2°55.4	1.5 - 0.3	7.5 - 1.6	13.5 - 2.8	15	3°18.8	3°19.3	3°09.7	1.5 - 0.3	7.5 - 1.7	13.5 - 3.0	15	3°33.8	3°34.3	3°24.0	1.5 - 0.4	7.5 - 1.8	13.5 - 3.3
16	3°04.0	3°04.5	2°55.6	1.6 - 0.3	7.6 - 1.6	13.6 - 2.8	16	3°19.0	3°19.5	3°09.9	1.6 - 0.4	7.6 - 1.7	13.6 - 3.1	16	3°34.0	3°34.6	3°24.3	1.6 - 0.4	7.6 - 1.8	13.6 - 3.3
17	3°04.2	3°04.8	2°55.9	1.7 - 0.4	7.7 - 1.6	13.7 - 2.9	17	3°19.2	3°19.8	3°10.2	1.7 - 0.4	7.7 - 1.7	13.7 - 3.1	17	3°34.2	3°34.8	3°24.5	1.7 - 0.4	7.7 - 1.9	13.7 - 3.3
18	3°04.5	3°05.0	2°56.1	1.8 - 0.4	7.8 - 1.6	13.8 - 2.9	18	3°19.5	3°20.0	3°10.4	1.8 - 0.4	7.8 - 1.8	13.8 - 3.1	18	3°34.5	3°35.1	3°24.7	1.8 - 0.4	7.8 - 1.9	13.8 - 3.3
19	3°04.7	3°05.3	2°56.3	1.9 - 0.4	7.9 - 1.6	13.9 - 2.9	19	3°19.7	3°20.3	3°10.7	1.9 - 0.4	7.9 - 1.8	13.9 - 3.1	19	3°34.8	3°35.3	3°25.0	1.9 - 0.5	7.9 - 1.9	13.9 - 3.4
20	3°05.0	3°05.5	2°56.6	2.0 - 0.4	8.0 - 1.7	14.0 - 2.9	20	3°20.0	3°20.5	3°10.9	2.0 - 0.5	8.0 - 1.8	14.0 - 3.2	20	3°35.0	3°35.6	3°25.2	2.0 - 0.5	8.0 - 1.9	14.0 - 3.4
21	3°05.2	3°05.8	2°56.8	2.1 - 0.4	8.1 - 1.7	14.1 - 2.9	21	3°20.2	3°20.8	3°11.1	2.1 - 0.5	8.1 - 1.8	14.1 - 3.2	21	3°35.2	3°35.8	3°25.4	2.1 - 0.5	8.1 - 2.0	14.1 - 3.4
22	3°05.5	3°06.0	2°57.0	2.2 - 0.5	8.2 - 1.7	14.2 - 3.0	22	3°20.5	3°21.0	3°11.4	2.2 - 0.5	8.2 - 1.8	14.2 - 3.2	22	3°35.5	3°36.1	3°25.7	2.2 - 0.5	8.2 - 2.0	14.2 - 3.4
23	3°05.7	3°06.3	2°57.3	2.3 - 0.5	8.3 - 1.7	14.3 - 3.0	23	3°20.7	3°21.3	3°11.6	2.3 - 0.5	8.3 - 1.9	14.3 - 3.2	23	3°35.7	3°36.3	3°25.9	2.3 - 0.6	8.3 - 2.0	14.3 - 3.5
24	3°06.0	3°06.5	2°57.5	2.4 - 0.5	8.4 - 1.8	14.4 - 3.0	24	3°21.0	3°21.5	3°11.8	2.4 - 0.5	8.4 - 1.9	14.4 - 3.2	24	3°36.0	3°36.6	3°26.2	2.4 - 0.6	8.4 - 2.0	14.4 - 3.5
25	3°06.2	3°06.8	2°57.8	2.5 - 0.5	8.5 - 1.8	14.5 - 3.0	25	3°21.2	3°21.8	3°12.1	2.5 - 0.6	8.5 - 1.9	14.5 - 3.3	25	3°36.2	3°36.8	3°26.4	2.5 - 0.6	8.5 - 2.1	14.5 - 3.5
26	3°06.5	3°07.0	2°58.0	2.6 - 0.5	8.6 - 1.8	14.6 - 3.0	26	3°21.5	3°22.1	3°12.3	2.6 - 0.6	8.6 - 1.9	14.6 - 3.3	26	3°36.5	3°37.1	3°26.6	2.6 - 0.6	8.6 - 2.1	14.6 - 3.5
27	3°06.7	3°07.3	2°58.2	2.7 - 0.6	8.7 - 1.8	14.7 - 3.1	27	3°21.7	3°22.3	3°12.6	2.7 - 0.6	8.7 - 2.0	14.7 - 3.3	27	3°36.7	3°37.3	3°26.9	2.7 - 0.7	8.7 - 2.1	14.7 - 3.6
28	3°07.0	3°07.5	2°58.5	2.8 - 0.6	8.8 - 1.8	14.8 - 3.1	28	3°22.0	3°22.6	3°12.8	2.8 - 0.6	8.8 - 2.0	14.8 - 3.3	28	3°37.0	3°37.6	3°27.1	2.8 - 0.7	8.8 - 2.1	14.8 - 3.6
29	3°07.2	3°07.8	2°58.7	2.9 - 0.6	8.9 - 1.9	14.9 - 3.1	29	3°22.2	3°22.8	3°13.0	2.9 - 0.7	8.9 - 2.0	14.9 - 3.4	29	3°37.2	3°37.8	3°27.4	2.9 - 0.7	8.9 - 2.2	14.9 - 3.6
30	3°07.5	3°08.0	2°59.0	3.0 - 0.6	9.0 - 1.9	15.0 - 3.1	30	3°22.5	3°23.1	3°13.3	3.0 - 0.7	9.0 - 2.0	15.0 - 3.4	30	3°37.5	3°38.1	3°27.6	3.0 - 0.7	9.0 - 2.2	15.0 - 3.6
31	3°07.8	3°08.3	2°59.2	3.1 - 0.6	9.1 - 1.9	15.1 - 3.1	31	3°22.8	3°23.3	3°13.5	3.1 - 0.7	9.1 - 2.0	15.1 - 3.4	31	3°37.8	3°38.3	3°27.8	3.1 - 0.7	9.1 - 2.2	15.1 - 3.6
32	3°08.0	3°08.5	2°59.4	3.2 - 0.7	9.2 - 1.9	15.2 - 3.2	32	3°23.0	3°23.6	3°13.8	3.2 - 0.7	9.2 - 2.1	15.2 - 3.4	32	3°38.0	3°38.6	3°28.1	3.2 - 0.8	9.2 - 2.2	15.2 - 3.7
33	3°08.3	3°08.8	2°59.7	3.3 - 0.7	9.3 - 1.9	15.3 - 3.2	33	3°23.3	3°23.8	3°14.0	3.3 - 0.7	9.3 - 2.1	15.3 - 3.4	33	3°38.3	3°38.8	3°28.3	3.3 - 0.8	9.3 - 2.2	15.3 - 3.7
34	3°08.5	3°09.0	2°59.9	3.4 - 0.7	9.4 - 2.0	15.4 - 3.2	34	3°23.5	3°24.1	3°14.2	3.4 - 0.8	9.4 - 2.1	15.4 - 3.5	34	3°38.5	3°39.1	3°28.5	3.4 - 0.8	9.4 - 2.3	15.4 - 3.7
35	3°08.8	3°09.3	3°00.2	3.5 - 0.7	9.5 - 2.0	15.5 - 3.2	35	3°23.8	3°24.3	3°14.5	3.5 - 0.8	9.5 - 2.1	15.5 - 3.5	35	3°38.8	3°39.3	3°28.8	3.5 - 0.8	9.5 - 2.3	15.5 - 3.7
36	3°09.0	3°09.5	3°00.4	3.6 - 0.8	9.6 - 2.0	15.6 - 3.3	36	3°24.0	3°24.6	3°14.7	3.6 - 0.8	9.6 - 2.2	15.6 - 3.5	36	3°39.0	3°39.6	3°29.0	3.6 - 0.9	9.6 - 2.3	15.6 - 3.8
37	3°09.3	3°09.8	3°00.6	3.7 - 0.8	9.7 - 2.0	15.7 - 3.3	37	3°24.3	3°24.8	3°14.9	3.7 - 0.8	9.7 - 2.2	15.7 - 3.5	37	3°39.3	3°39.8	3°29.3	3.7 - 0.9	9.7 - 2.3	15.7 - 3.8
38	3°09.5	3°10.0	3°00.9	3.8 - 0.8	9.8 - 2.0	15.8 - 3.3	38	3°24.5	3°25.1	3°15.2	3.8 - 0.9	9.8 - 2.2	15.8 - 3.6	38	3°39.5	3°40.1	3°29.5	3.8 - 0.9	9.8 - 2.4	15.8 - 3.8
39	3°09.8	3°10.3	3°01.1	3.9 - 0.8	9.9 - 2.1	15.9 - 3.3	39	3°24.8	3°25.3	3°15.4	3.9 - 0.9	9.9 - 2.2	15.9 - 3.6	39	3°39.8	3°40.4	3°29.7	3.9 - 0.9	9.9 - 2.4	15.9 - 3.8
40	3°10.0	3°10.5	3°01.3	4.0 - 0.8	10.0 - 2.1	16.0 - 3.3	40	3°25.0	3°25.6	3°15.7	4.0 - 0.9	10.0 - 2.3	16.0 - 3.6	40	3°40.0	3°40.6	3°30.0	4.0 - 1.0	10.0 - 2.4	16.0 - 3.9
41	3°10.3	3°10.8	3°01.6	4.1 - 0.9	10.1 - 2.1	16.1 - 3.4	41	3°25.3	3°25.8	3°15.9	4.1 - 0.9	10.1 - 2.3	16.1 - 3.6	41	3°40.2	3°40.9	3°30.2	4.1 - 1.0	10.1 - 2.4	16.1 - 3.9
42	3°10.5	3°11.0	3°01.8	4.2 - 0.9	10.2 - 2.1	16.2 - 3.4	42	3°25.5	3°26.1	3°16.1	4.2 - 0.9	10.2 - 2.3	16.2 - 3.6	42	3°40.5	3°41.1	3°30.5	4.2 - 1.0	10.2 - 2.5	16.2 - 3.9
43	3°10.8	3°11.3	3°02.1	4.3 - 0.9	10.3 - 2.1	16.3 - 3.4	43	3°25.8	3°26.3	3°16.4	4.3 - 1.0	10.3 - 2.3	16.3 - 3.7	43	3°40.8	3°41.4	3°30.7	4.3 - 1.0	10.3 - 2.5	16.3 - 3.9
44	3°11.0	3°11.5	3°02.3	4.4 - 0.9	10.4 - 2.2	16.4 - 3.4	44	3°26.0	3°26.6	3°16.6	4.4 - 1.0	10.4 - 2.3	16.4 - 3.7	44	3°41.0	3°41.6	3°30.9	4.4 - 1.1	10.4 - 2.5	16.4 - 4.0
45	3°11.2	3°11.8	3°02.5	4.5 - 0.9	10.5 - 2.2	16.5 - 3.4	45	3°26.2	3°26.8	3°16.9	4.5 - 1.0	10.5 - 2.4	16.5 - 3.7	45	3°41.2	3°41.9	3°31.2	4.5 - 1.1	10.5 - 2.5	16.5 - 4.0
46	3°11.5	3°12.0	3°02.8	4.6 - 1.0	10.6 - 2.2	16.6 - 3.5	46	3°26.5	3°27.1	3°17.1	4.6 - 1.0	10.6 - 2.4	16.6 - 3.7	46	3°41.5	3°42.1	3°31.4	4.6 - 1.1	10.6 - 2.6	16.6 - 4.0
47	3°11.7	3°12.3	3°03.0	4.7 - 1.0	10.7 - 2.2	16.7 - 3.5	47	3°26.8	3°27.3	3°17.3	4.7 - 1.1	10.7 - 2.4	16.7 - 3.8	47	3°41.8	3°42.4	3°31.6	4.7 - 1.1	10.7 - 2.6	16.7 - 4.0
48	3°12.0	3°12.5	3°03.3	4.8 - 1.0	10.8 - 2.3	16.8 - 3.5	48	3°27.0	3°27.6	3°17.6	4.8 - 1.1	10.8 - 2.4	16.8 - 3.8	48	3°42.0	3°42.6	3°31.9	4.8 - 1.2	10.8 - 2.6	16.8 - 4.1
49	3°12.2	3°12.8	3°03.5	4.9 - 1.0	10.9 - 2.3	16.9 - 3.5	49	3°27.2	3°27.8	3°17.8	4.9 - 1.1	10								

Increments and Corrections

m 15	Sun Plan.	Aries	Moon	v and d corr			m 16	Sun Plan.	Aries	Moon	v and d corr			m 17	Sun Plan.	Aries	Moon	v and d corr		
0	3°45.0	3°45.6	3°34.8	0.0 - 0.0	6.0 - 1.6	12.0 - 3.1	0	4°00.0	4°00.7	3°49.1	0.0 - 0.0	6.0 - 1.7	12.0 - 3.3	0	4°15.0	4°15.7	4°03.4	0.0 - 0.0	6.0 - 1.8	12.0 - 3.5
1	3°45.2	3°45.9	3°35.0	0.1 - 0.0	6.1 - 1.6	12.1 - 3.1	1	4°00.2	4°00.9	3°49.3	0.1 - 0.0	6.1 - 1.7	12.1 - 3.3	1	4°15.2	4°15.9	4°03.6	0.1 - 0.0	6.1 - 1.8	12.1 - 3.5
2	3°45.5	3°46.1	3°35.2	0.2 - 0.1	6.2 - 1.6	12.2 - 3.2	2	4°00.5	4°01.2	3°49.5	0.2 - 0.1	6.2 - 1.7	12.2 - 3.4	2	4°15.5	4°16.2	4°03.9	0.2 - 0.1	6.2 - 1.8	12.2 - 3.6
3	3°45.8	3°46.4	3°35.5	0.3 - 0.1	6.3 - 1.6	12.3 - 3.2	3	4°00.8	4°01.4	3°49.8	0.3 - 0.1	6.3 - 1.7	12.3 - 3.4	3	4°15.8	4°16.4	4°04.1	0.3 - 0.1	6.3 - 1.8	12.3 - 3.6
4	3°46.0	3°46.6	3°35.7	0.4 - 0.1	6.4 - 1.7	12.4 - 3.2	4	4°01.0	4°01.7	3°50.0	0.4 - 0.1	6.4 - 1.8	12.4 - 3.4	4	4°16.0	4°16.7	4°04.3	0.4 - 0.1	6.4 - 1.9	12.4 - 3.6
5	3°46.2	3°46.9	3°35.9	0.5 - 0.1	6.5 - 1.7	12.5 - 3.2	5	4°01.2	4°01.9	3°50.3	0.5 - 0.1	6.5 - 1.8	12.5 - 3.4	5	4°16.2	4°17.0	4°04.6	0.5 - 0.1	6.5 - 1.9	12.5 - 3.6
6	3°46.5	3°47.1	3°36.2	0.6 - 0.2	6.6 - 1.7	12.6 - 3.3	6	4°01.5	4°02.2	3°50.5	0.6 - 0.2	6.6 - 1.8	12.6 - 3.5	6	4°16.5	4°17.2	4°04.8	0.6 - 0.2	6.6 - 1.9	12.6 - 3.7
7	3°46.8	3°47.4	3°36.4	0.7 - 0.2	6.7 - 1.7	12.7 - 3.3	7	4°01.8	4°02.4	3°50.7	0.7 - 0.2	6.7 - 1.8	12.7 - 3.5	7	4°16.8	4°17.5	4°05.1	0.7 - 0.2	6.7 - 2.0	12.7 - 3.7
8	3°47.0	3°47.6	3°36.7	0.8 - 0.2	6.8 - 1.8	12.8 - 3.3	8	4°02.0	4°02.7	3°51.0	0.8 - 0.2	6.8 - 1.9	12.8 - 3.5	8	4°17.0	4°17.7	4°05.3	0.8 - 0.2	6.8 - 2.0	12.8 - 3.7
9	3°47.3	3°47.9	3°36.9	0.9 - 0.2	6.9 - 1.8	12.9 - 3.3	9	4°02.2	4°02.9	3°51.2	0.9 - 0.2	6.9 - 1.9	12.9 - 3.5	9	4°17.2	4°18.0	4°05.5	0.9 - 0.3	6.9 - 2.0	12.9 - 3.8
10	3°47.5	3°48.1	3°37.1	1.0 - 0.3	7.0 - 1.8	13.0 - 3.4	10	4°02.5	4°03.2	3°51.5	1.0 - 0.3	7.0 - 1.9	13.0 - 3.6	10	4°17.5	4°18.2	4°05.8	1.0 - 0.3	7.0 - 2.0	13.0 - 3.8
11	3°47.7	3°48.4	3°37.4	1.1 - 0.3	7.1 - 1.8	13.1 - 3.4	11	4°02.8	4°03.4	3°51.7	1.1 - 0.3	7.1 - 2.0	13.1 - 3.6	11	4°17.8	4°18.5	4°06.0	1.1 - 0.3	7.1 - 2.1	13.1 - 3.8
12	3°48.0	3°48.6	3°37.6	1.2 - 0.3	7.2 - 1.9	13.2 - 3.4	12	4°03.0	4°03.7	3°51.9	1.2 - 0.3	7.2 - 2.0	13.2 - 3.6	12	4°18.0	4°18.7	4°06.2	1.2 - 0.4	7.2 - 2.1	13.2 - 3.9
13	3°48.2	3°48.9	3°37.9	1.3 - 0.3	7.3 - 1.9	13.3 - 3.4	13	4°03.2	4°03.9	3°52.2	1.3 - 0.4	7.3 - 2.0	13.3 - 3.7	13	4°18.2	4°19.0	4°06.5	1.3 - 0.4	7.3 - 2.1	13.3 - 3.9
14	3°48.5	3°49.1	3°38.1	1.4 - 0.4	7.4 - 1.9	13.4 - 3.5	14	4°03.5	4°04.2	3°52.4	1.4 - 0.4	7.4 - 2.0	13.4 - 3.7	14	4°18.5	4°19.2	4°06.7	1.4 - 0.4	7.4 - 2.2	13.4 - 3.9
15	3°48.8	3°49.4	3°38.3	1.5 - 0.4	7.5 - 1.9	13.5 - 3.5	15	4°03.8	4°04.4	3°52.6	1.5 - 0.4	7.5 - 2.1	13.5 - 3.7	15	4°18.8	4°19.5	4°07.0	1.5 - 0.4	7.5 - 2.2	13.5 - 3.9
16	3°49.0	3°49.6	3°38.6	1.6 - 0.4	7.6 - 2.0	13.6 - 3.5	16	4°04.0	4°04.7	3°52.9	1.6 - 0.4	7.6 - 2.1	13.6 - 3.7	16	4°19.0	4°19.7	4°07.2	1.6 - 0.5	7.6 - 2.2	13.6 - 4.0
17	3°49.3	3°49.9	3°38.8	1.7 - 0.4	7.7 - 2.0	13.7 - 3.5	17	4°04.3	4°04.9	3°53.1	1.7 - 0.5	7.7 - 2.1	13.7 - 3.8	17	4°19.3	4°20.0	4°07.4	1.7 - 0.5	7.7 - 2.2	13.7 - 4.0
18	3°49.5	3°50.1	3°39.0	1.8 - 0.5	7.8 - 2.0	13.8 - 3.6	18	4°04.5	4°05.2	3°53.4	1.8 - 0.5	7.8 - 2.1	13.8 - 3.8	18	4°19.5	4°20.2	4°07.7	1.8 - 0.5	7.8 - 2.3	13.8 - 4.0
19	3°49.8	3°50.4	3°39.3	1.9 - 0.5	7.9 - 2.0	13.9 - 3.6	19	4°04.7	4°05.4	3°53.6	1.9 - 0.5	7.9 - 2.2	13.9 - 3.8	19	4°19.7	4°20.5	4°07.9	1.9 - 0.6	7.9 - 2.3	13.9 - 4.1
20	3°50.0	3°50.6	3°39.5	2.0 - 0.5	8.0 - 2.1	14.0 - 3.6	20	4°05.0	4°05.7	3°53.8	2.0 - 0.6	8.0 - 2.2	14.0 - 3.9	20	4°20.0	4°20.7	4°08.2	2.0 - 0.6	8.0 - 2.3	14.0 - 4.1
21	3°50.2	3°50.9	3°39.8	2.1 - 0.5	8.1 - 2.1	14.1 - 3.6	21	4°05.3	4°05.9	3°54.1	2.1 - 0.6	8.1 - 2.2	14.1 - 3.9	21	4°20.3	4°21.0	4°08.4	2.1 - 0.6	8.1 - 2.4	14.1 - 4.1
22	3°50.5	3°51.1	3°40.0	2.2 - 0.6	8.2 - 2.1	14.2 - 3.7	22	4°05.5	4°06.2	3°54.3	2.2 - 0.6	8.2 - 2.2	14.2 - 3.9	22	4°20.5	4°21.2	4°08.6	2.2 - 0.6	8.2 - 2.4	14.2 - 4.1
23	3°50.7	3°51.4	3°40.2	2.3 - 0.6	8.3 - 2.1	14.3 - 3.7	23	4°05.7	4°06.4	3°54.6	2.3 - 0.6	8.3 - 2.3	14.3 - 3.9	23	4°20.7	4°21.5	4°08.9	2.3 - 0.7	8.3 - 2.4	14.3 - 4.2
24	3°51.0	3°51.6	3°40.5	2.4 - 0.6	8.4 - 2.2	14.4 - 3.7	24	4°06.0	4°06.7	3°54.8	2.4 - 0.7	8.4 - 2.3	14.4 - 4.0	24	4°21.0	4°21.7	4°09.1	2.4 - 0.7	8.4 - 2.5	14.4 - 4.2
25	3°51.2	3°51.9	3°40.7	2.5 - 0.6	8.5 - 2.2	14.5 - 3.7	25	4°06.3	4°06.9	3°55.0	2.5 - 0.7	8.5 - 2.3	14.5 - 4.0	25	4°21.3	4°22.0	4°09.3	2.5 - 0.7	8.5 - 2.5	14.5 - 4.2
26	3°51.5	3°52.1	3°41.0	2.6 - 0.7	8.6 - 2.2	14.6 - 3.8	26	4°06.5	4°07.2	3°55.3	2.6 - 0.7	8.6 - 2.4	14.6 - 4.0	26	4°21.5	4°22.2	4°09.6	2.6 - 0.8	8.6 - 2.5	14.6 - 4.3
27	3°51.8	3°52.4	3°41.2	2.7 - 0.7	8.7 - 2.2	14.7 - 3.8	27	4°06.7	4°07.4	3°55.5	2.7 - 0.7	8.7 - 2.4	14.7 - 4.0	27	4°21.7	4°22.5	4°09.8	2.7 - 0.8	8.7 - 2.5	14.7 - 4.3
28	3°52.0	3°52.6	3°41.4	2.8 - 0.7	8.8 - 2.3	14.8 - 3.8	28	4°07.0	4°07.7	3°55.7	2.8 - 0.8	8.8 - 2.4	14.8 - 4.1	28	4°22.0	4°22.7	4°10.1	2.8 - 0.8	8.8 - 2.6	14.8 - 4.3
29	3°52.2	3°52.9	3°41.7	2.9 - 0.7	8.9 - 2.3	14.9 - 3.8	29	4°07.3	4°07.9	3°56.0	2.9 - 0.8	8.9 - 2.4	14.9 - 4.1	29	4°22.3	4°23.0	4°10.3	2.9 - 0.8	8.9 - 2.6	14.9 - 4.3
30	3°52.5	3°53.1	3°41.9	3.0 - 0.8	9.0 - 2.3	15.0 - 3.9	30	4°07.5	4°08.2	3°56.2	3.0 - 0.8	9.0 - 2.5	15.0 - 4.1	30	4°22.5	4°23.2	4°10.5	3.0 - 0.9	9.0 - 2.6	15.0 - 4.4
31	3°52.8	3°53.4	3°42.1	3.1 - 0.8	9.1 - 2.4	15.1 - 3.9	31	4°07.7	4°08.4	3°56.5	3.1 - 0.9	9.1 - 2.5	15.1 - 4.2	31	4°22.7	4°23.5	4°10.8	3.1 - 0.9	9.1 - 2.7	15.1 - 4.4
32	3°53.0	3°53.6	3°42.4	3.2 - 0.8	9.2 - 2.4	15.2 - 3.9	32	4°08.0	4°08.7	3°56.7	3.2 - 0.9	9.2 - 2.5	15.2 - 4.2	32	4°23.0	4°23.7	4°11.0	3.2 - 0.9	9.2 - 2.7	15.2 - 4.4
33	3°53.2	3°53.9	3°42.6	3.3 - 0.9	9.3 - 2.4	15.3 - 4.0	33	4°08.3	4°08.9	3°56.9	3.3 - 0.9	9.3 - 2.6	15.3 - 4.2	33	4°23.3	4°24.0	4°11.3	3.3 - 1.0	9.3 - 2.7	15.3 - 4.5
34	3°53.5	3°54.1	3°42.9	3.4 - 0.9	9.4 - 2.4	15.4 - 4.0	34	4°08.5	4°09.2	3°57.2	3.4 - 0.9	9.4 - 2.6	15.4 - 4.2	34	4°23.5	4°24.2	4°11.5	3.4 - 1.0	9.4 - 2.7	15.4 - 4.5
35	3°53.8	3°54.4	3°43.1	3.5 - 0.9	9.5 - 2.5	15.5 - 4.0	35	4°08.7	4°09.4	3°57.4	3.5 - 1.0	9.5 - 2.6	15.5 - 4.3	35	4°23.7	4°24.5	4°11.7	3.5 - 1.0	9.5 - 2.8	15.5 - 4.5
36	3°54.0	3°54.6	3°43.3	3.6 - 0.9	9.6 - 2.5	15.6 - 4.0	36	4°09.0	4°09.7	3°57.7	3.6 - 1.0	9.6 - 2.6	15.6 - 4.3	36	4°24.0	4°24.7	4°12.0	3.6 - 1.1	9.6 - 2.8	15.6 - 4.6
37	3°54.3	3°54.9	3°43.6	3.7 - 1.0	9.7 - 2.5	15.7 - 4.1	37	4°09.3	4°09.9	3°57.9	3.7 - 1.0	9.7 - 2.7	15.7 - 4.3	37	4°24.3	4°25.0	4°12.2	3.7 - 1.1	9.7 - 2.8	15.7 - 4.6
38	3°54.5	3°55.1	3°43.8	3.8 - 1.0	9.8 - 2.5	15.8 - 4.1	38	4°09.5	4°10.2	3°58.1	3.8 - 1.0	9.8 - 2.7	15.8 - 4.3	38	4°24.5	4°25.2	4°12.5	3.8 - 1.1	9.8 - 2.9	15.8 - 4.6
39	3°54.8	3°55.4	3°44.1	3.9 - 1.0	9.9 - 2.6	15.9 - 4.1	39	4°09.7	4°10.4	3°58.4	3.9 - 1.1	9.9 - 2.7	15.9 - 4.4	39	4°24.7	4°25.5	4°12.7	3.9 - 1.1	9.9 - 2.9	15.9 - 4.6
40	3°55.0	3°55.6	3°44.3	4.0 - 1.0	10.0 - 2.6	16.0 - 4.1	40	4°10.0	4°10.7	3°58.6	4.0 - 1.1	10.0 - 2.8	16.0 - 4.4	40	4°25.0	4°25.7	4°12.9	4.0 - 1.2	10.0 - 2.9	16.0 - 4.7
41	3°55.2	3°55.9	3°44.5	4.1 - 1.1	10.1 - 2.6	16.1 - 4.2	41	4°10.3	4°10.9	3°58.8	4.1 - 1.1	10.1 - 2.8	16.1 - 4.4	41	4°25.3	4°26.0	4°13.2	4.1 - 1.2	10.1 - 2.9	16.1 - 4.7
42	3°55.5	3°56.1	3°44.8	4.2 - 1.1	10.2 - 2.6	16.2 - 4.2	42	4°10.5	4°11.2	3°59.1	4.2 - 1.2	10.2 - 2.8	16.2 - 4.5	42	4°25.5	4°26.2	4°13.4	4.2 - 1.2	10.2 - 3.0	16.2 - 4.7
43	3°55.7	3°56.4	3°45.0	4.3 - 1.1	10.3 - 2.7	16.3 - 4.2	43	4°10.7	4°11.4	3°59.3	4.3 - 1.2	10.3 - 2.8	16.3 - 4.5	43	4°25.7	4°26.5	4°13.6	4.3 - 1.3	10.3 - 3.0	16.3 - 4.8
44	3°56.0	3°56.6	3°45.2	4.4 - 1.1	10.4 - 2.7	16.4 - 4.2	44	4°11.0	4°11.7	3°59.6	4.4 - 1.2	10.4 - 2.9	16.4 - 4.5	44	4°26.0	4°26.7	4°13.9	4.4 - 1.3	10.4 - 3.0	16.4 - 4.8
45	3°56.2	3°56.9	3°45.5	4.5 - 1.2	10.5 - 2.7	16.5 - 4.3	45	4°11.2	4°11.9	3°59.8	4.5 - 1.2	10.5 - 2.9	16.5 - 4.5	45	4°26.2	4°27.0	4°14.1	4.5 - 1.3	10.5 - 3.1	16.5 - 4.8
46	3°56.5	3°57.1	3°45.7	4.6 - 1.2	10.6 - 2.7	16.6 - 4.3	46	4°11.5	4°12.2	4°00.0	4.6 - 1.3	10.6 - 2.9	16.6 - 4.6	46	4°26.5	4°27.2	4°14.4	4.6 - 1.3	10.6 - 3.1	16.6 - 4.8
47	3°56.8	3°57.4	3°46.0	4.7 - 1.2	10.7 - 2.8	16.7 - 4.3	47	4°11.8	4°12.4	4°00.3	4.7 - 1.3	10.7 - 2.9	16.7 - 4.6	47	4°26.8	4°27.5	4°14.6	4.7 - 1.4	10.7 - 3.1	16.7 - 4.9
48	3°57.0	3°57.6	3°46.2	4.8 - 1.2	10.8 - 2.8	16.8 - 4.3	48	4°12.0	4°12.7	4°00.5	4.8 - 1.3	10.8 - 3.0	16.8 - 4.6	48	4°27.0	4°27.7	4°14.8	4.8 - 1.4	10.8 - 3.2	16.8 - 4.9
49	3°57.3	3°57.																		

Increments and Corrections

m 18	Sun Plan.	Aries	Moon	v and d corr			m 19	Sun Plan.	Aries	Moon	v and d corr			m 20	Sun Plan.	Aries	Moon	v and d corr		
0	4°30.0	4°30.7	4°17.7	0.0 - 0.0	6.0 - 1.9	12.0 - 3.7	0	4°45.0	4°45.8	4°32.0	0.0 - 0.0	6.0 - 2.0	12.0 - 3.9	0	5°00.0	5°00.8	4°46.3	0.0 - 0.0	6.0 - 2.1	12.0 - 4.1
1	4°30.2	4°31.0	4°17.9	0.1 - 0.0	6.1 - 1.9	12.1 - 3.7	1	4°45.2	4°46.0	4°32.3	0.1 - 0.0	6.1 - 2.0	12.1 - 3.9	1	5°00.2	5°01.1	4°46.6	0.1 - 0.0	6.1 - 2.1	12.1 - 4.1
2	4°30.5	4°31.2	4°18.2	0.2 - 0.1	6.2 - 1.9	12.2 - 3.8	2	4°45.5	4°46.3	4°32.5	0.2 - 0.1	6.2 - 2.0	12.2 - 4.0	2	5°00.5	5°01.3	4°46.8	0.2 - 0.1	6.2 - 2.1	12.2 - 4.2
3	4°30.8	4°31.5	4°18.4	0.3 - 0.1	6.3 - 1.9	12.3 - 3.8	3	4°45.8	4°46.5	4°32.7	0.3 - 0.1	6.3 - 2.0	12.3 - 4.0	3	5°00.8	5°01.6	4°47.0	0.3 - 0.1	6.3 - 2.2	12.3 - 4.2
4	4°31.0	4°31.7	4°18.7	0.4 - 0.1	6.4 - 2.0	12.4 - 3.8	4	4°46.0	4°46.8	4°33.0	0.4 - 0.1	6.4 - 2.1	12.4 - 4.0	4	5°01.0	5°01.8	4°47.3	0.4 - 0.1	6.4 - 2.2	12.4 - 4.2
5	4°31.2	4°32.0	4°18.9	0.5 - 0.2	6.5 - 2.0	12.5 - 3.9	5	4°46.2	4°47.0	4°33.2	0.5 - 0.2	6.5 - 2.1	12.5 - 4.1	5	5°01.2	5°02.1	4°47.5	0.5 - 0.2	6.5 - 2.2	12.5 - 4.3
6	4°31.5	4°32.2	4°19.1	0.6 - 0.2	6.6 - 2.0	12.6 - 3.9	6	4°46.5	4°47.3	4°33.4	0.6 - 0.2	6.6 - 2.1	12.6 - 4.1	6	5°01.5	5°02.3	4°47.8	0.6 - 0.2	6.6 - 2.3	12.6 - 4.3
7	4°31.8	4°32.5	4°19.4	0.7 - 0.2	6.7 - 2.1	12.7 - 3.9	7	4°46.8	4°47.5	4°33.7	0.7 - 0.2	6.7 - 2.2	12.7 - 4.1	7	5°01.8	5°02.6	4°48.0	0.7 - 0.2	6.7 - 2.3	12.7 - 4.3
8	4°32.0	4°32.7	4°19.6	0.8 - 0.2	6.8 - 2.1	12.8 - 3.9	8	4°47.0	4°47.8	4°33.9	0.8 - 0.3	6.8 - 2.2	12.8 - 4.2	8	5°02.0	5°02.8	4°48.2	0.8 - 0.3	6.8 - 2.3	12.8 - 4.4
9	4°32.2	4°33.0	4°19.8	0.9 - 0.3	6.9 - 2.1	12.9 - 4.0	9	4°47.2	4°48.0	4°34.2	0.9 - 0.3	6.9 - 2.2	12.9 - 4.2	9	5°02.2	5°03.1	4°48.5	0.9 - 0.3	6.9 - 2.4	12.9 - 4.4
10	4°32.5	4°33.2	4°20.1	1.0 - 0.3	7.0 - 2.2	13.0 - 4.0	10	4°47.5	4°48.3	4°34.4	1.0 - 0.3	7.0 - 2.3	13.0 - 4.2	10	5°02.5	5°03.3	4°48.7	1.0 - 0.3	7.0 - 2.4	13.0 - 4.4
11	4°32.8	4°33.5	4°20.3	1.1 - 0.3	7.1 - 2.2	13.1 - 4.0	11	4°47.8	4°48.5	4°34.6	1.1 - 0.4	7.1 - 2.3	13.1 - 4.3	11	5°02.8	5°03.6	4°49.0	1.1 - 0.4	7.1 - 2.4	13.1 - 4.5
12	4°33.0	4°33.7	4°20.6	1.2 - 0.4	7.2 - 2.2	13.2 - 4.1	12	4°48.0	4°48.8	4°34.9	1.2 - 0.4	7.2 - 2.3	13.2 - 4.3	12	5°03.0	5°03.8	4°49.2	1.2 - 0.4	7.2 - 2.5	13.2 - 4.5
13	4°33.2	4°34.0	4°20.8	1.3 - 0.4	7.3 - 2.3	13.3 - 4.1	13	4°48.2	4°49.0	4°35.1	1.3 - 0.4	7.3 - 2.4	13.3 - 4.3	13	5°03.2	5°04.1	4°49.4	1.3 - 0.4	7.3 - 2.5	13.3 - 4.5
14	4°33.5	4°34.2	4°21.0	1.4 - 0.4	7.4 - 2.3	13.4 - 4.1	14	4°48.5	4°49.3	4°35.4	1.4 - 0.5	7.4 - 2.4	13.4 - 4.4	14	5°03.5	5°04.3	4°49.7	1.4 - 0.5	7.4 - 2.5	13.4 - 4.6
15	4°33.8	4°34.5	4°21.3	1.5 - 0.5	7.5 - 2.3	13.5 - 4.2	15	4°48.8	4°49.5	4°35.6	1.5 - 0.5	7.5 - 2.4	13.5 - 4.4	15	5°03.8	5°04.6	4°49.9	1.5 - 0.5	7.5 - 2.6	13.5 - 4.6
16	4°34.0	4°34.7	4°21.5	1.6 - 0.5	7.6 - 2.3	13.6 - 4.2	16	4°49.0	4°49.8	4°35.8	1.6 - 0.5	7.6 - 2.5	13.6 - 4.4	16	5°04.0	5°04.8	4°50.2	1.6 - 0.5	7.6 - 2.6	13.6 - 4.6
17	4°34.3	4°35.0	4°21.8	1.7 - 0.5	7.7 - 2.4	13.7 - 4.2	17	4°49.3	4°50.0	4°36.1	1.7 - 0.6	7.7 - 2.5	13.7 - 4.5	17	5°04.3	5°05.1	4°50.4	1.7 - 0.6	7.7 - 2.6	13.7 - 4.7
18	4°34.5	4°35.3	4°22.0	1.8 - 0.6	7.8 - 2.4	13.8 - 4.3	18	4°49.5	4°50.3	4°36.3	1.8 - 0.6	7.8 - 2.5	13.8 - 4.5	18	5°04.5	5°05.3	4°50.6	1.8 - 0.6	7.8 - 2.7	13.8 - 4.7
19	4°34.8	4°35.5	4°22.2	1.9 - 0.6	7.9 - 2.4	13.9 - 4.3	19	4°49.8	4°50.5	4°36.6	1.9 - 0.6	7.9 - 2.6	13.9 - 4.5	19	5°04.7	5°05.6	4°50.9	1.9 - 0.6	7.9 - 2.7	13.9 - 4.7
20	4°35.0	4°35.8	4°22.5	2.0 - 0.6	8.0 - 2.5	14.0 - 4.3	20	4°50.0	4°50.8	4°36.8	2.0 - 0.7	8.0 - 2.6	14.0 - 4.6	20	5°05.0	5°05.8	4°51.1	2.0 - 0.7	8.0 - 2.7	14.0 - 4.8
21	4°35.3	4°36.0	4°22.7	2.1 - 0.6	8.1 - 2.5	14.1 - 4.3	21	4°50.3	4°51.0	4°37.0	2.1 - 0.7	8.1 - 2.6	14.1 - 4.6	21	5°05.3	5°06.1	4°51.3	2.1 - 0.7	8.1 - 2.8	14.1 - 4.8
22	4°35.5	4°36.3	4°22.9	2.2 - 0.7	8.2 - 2.5	14.2 - 4.4	22	4°50.5	4°51.3	4°37.3	2.2 - 0.7	8.2 - 2.7	14.2 - 4.6	22	5°05.5	5°06.3	4°51.6	2.2 - 0.8	8.2 - 2.8	14.2 - 4.9
23	4°35.7	4°36.5	4°23.2	2.3 - 0.7	8.3 - 2.6	14.3 - 4.4	23	4°50.7	4°51.5	4°37.5	2.3 - 0.7	8.3 - 2.7	14.3 - 4.6	23	5°05.7	5°06.6	4°51.8	2.3 - 0.8	8.3 - 2.8	14.3 - 4.9
24	4°36.0	4°36.8	4°23.4	2.4 - 0.7	8.4 - 2.6	14.4 - 4.4	24	4°51.0	4°51.8	4°37.7	2.4 - 0.8	8.4 - 2.7	14.4 - 4.7	24	5°06.0	5°06.8	4°52.1	2.4 - 0.8	8.4 - 2.9	14.4 - 4.9
25	4°36.3	4°37.0	4°23.7	2.5 - 0.8	8.5 - 2.6	14.5 - 4.5	25	4°51.3	4°52.0	4°38.0	2.5 - 0.8	8.5 - 2.8	14.5 - 4.7	25	5°06.3	5°07.1	4°52.3	2.5 - 0.9	8.5 - 2.9	14.5 - 5.0
26	4°36.5	4°37.3	4°23.9	2.6 - 0.8	8.6 - 2.7	14.6 - 4.5	26	4°51.5	4°52.3	4°38.2	2.6 - 0.8	8.6 - 2.8	14.6 - 4.7	26	5°06.5	5°07.3	4°52.5	2.6 - 0.9	8.6 - 2.9	14.6 - 5.0
27	4°36.7	4°37.5	4°24.1	2.7 - 0.8	8.7 - 2.7	14.7 - 4.5	27	4°51.7	4°52.5	4°38.5	2.7 - 0.9	8.7 - 2.8	14.7 - 4.8	27	5°06.7	5°07.6	4°52.8	2.7 - 0.9	8.7 - 3.0	14.7 - 5.0
28	4°37.0	4°37.8	4°24.4	2.8 - 0.9	8.8 - 2.7	14.8 - 4.6	28	4°52.0	4°52.8	4°38.7	2.8 - 0.9	8.8 - 2.9	14.8 - 4.8	28	5°07.0	5°07.8	4°53.0	2.8 - 1.0	8.8 - 3.0	14.8 - 5.1
29	4°37.3	4°38.0	4°24.6	2.9 - 0.9	8.9 - 2.7	14.9 - 4.6	29	4°52.3	4°53.0	4°38.9	2.9 - 0.9	8.9 - 2.9	14.9 - 4.8	29	5°07.3	5°08.1	4°53.3	2.9 - 1.0	8.9 - 3.0	14.9 - 5.1
30	4°37.5	4°38.3	4°24.9	3.0 - 0.9	9.0 - 2.8	15.0 - 4.6	30	4°52.5	4°53.3	4°39.2	3.0 - 1.0	9.0 - 2.9	15.0 - 4.9	30	5°07.5	5°08.3	4°53.5	3.0 - 1.0	9.0 - 3.1	15.0 - 5.1
31	4°37.7	4°38.5	4°25.1	3.1 - 1.0	9.1 - 2.8	15.1 - 4.7	31	4°52.7	4°53.6	4°39.4	3.1 - 1.0	9.1 - 3.0	15.1 - 4.9	31	5°07.7	5°08.6	4°53.7	3.1 - 1.1	9.1 - 3.1	15.1 - 5.2
32	4°38.0	4°38.8	4°25.3	3.2 - 1.0	9.2 - 2.8	15.2 - 4.7	32	4°53.0	4°53.8	4°39.7	3.2 - 1.0	9.2 - 3.0	15.2 - 4.9	32	5°08.0	5°08.8	4°54.0	3.2 - 1.1	9.2 - 3.1	15.2 - 5.2
33	4°38.3	4°39.0	4°25.6	3.3 - 1.0	9.3 - 2.9	15.3 - 4.7	33	4°53.3	4°54.1	4°39.9	3.3 - 1.1	9.3 - 3.0	15.3 - 5.0	33	5°08.3	5°09.1	4°54.2	3.3 - 1.1	9.3 - 3.2	15.3 - 5.2
34	4°38.5	4°39.3	4°25.8	3.4 - 1.0	9.4 - 2.9	15.4 - 4.7	34	4°53.5	4°54.3	4°40.1	3.4 - 1.1	9.4 - 3.1	15.4 - 5.0	34	5°08.5	5°09.3	4°54.4	3.4 - 1.2	9.4 - 3.2	15.4 - 5.3
35	4°38.7	4°39.5	4°26.1	3.5 - 1.1	9.5 - 2.9	15.5 - 4.8	35	4°53.7	4°54.6	4°40.4	3.5 - 1.1	9.5 - 3.1	15.5 - 5.0	35	5°08.7	5°09.6	4°54.7	3.5 - 1.2	9.5 - 3.2	15.5 - 5.3
36	4°39.0	4°39.8	4°26.3	3.6 - 1.1	9.6 - 3.0	15.6 - 4.8	36	4°54.0	4°54.8	4°40.6	3.6 - 1.2	9.6 - 3.1	15.6 - 5.1	36	5°09.0	5°09.8	4°54.9	3.6 - 1.2	9.6 - 3.3	15.6 - 5.3
37	4°39.3	4°40.0	4°26.5	3.7 - 1.1	9.7 - 3.0	15.7 - 4.8	37	4°54.3	4°55.1	4°40.8	3.7 - 1.2	9.7 - 3.2	15.7 - 5.1	37	5°09.3	5°10.1	4°55.2	3.7 - 1.3	9.7 - 3.3	15.7 - 5.4
38	4°39.5	4°40.3	4°26.8	3.8 - 1.2	9.8 - 3.0	15.8 - 4.9	38	4°54.5	4°55.3	4°41.1	3.8 - 1.2	9.8 - 3.2	15.8 - 5.1	38	5°09.5	5°10.3	4°55.4	3.8 - 1.3	9.8 - 3.3	15.8 - 5.4
39	4°39.7	4°40.5	4°27.0	3.9 - 1.2	9.9 - 3.1	15.9 - 4.9	39	4°54.7	4°55.6	4°41.3	3.9 - 1.3	9.9 - 3.2	15.9 - 5.2	39	5°09.7	5°10.6	4°55.6	3.9 - 1.3	9.9 - 3.4	15.9 - 5.4
40	4°40.0	4°40.8	4°27.2	4.0 - 1.2	10.0 - 3.1	16.0 - 4.9	40	4°55.0	4°55.8	4°41.6	4.0 - 1.3	10.0 - 3.3	16.0 - 5.2	40	5°10.0	5°10.8	4°55.9	4.0 - 1.4	10.0 - 3.4	16.0 - 5.5
41	4°40.2	4°41.0	4°27.5	4.1 - 1.3	10.1 - 3.1	16.1 - 5.0	41	4°55.2	4°56.1	4°41.8	4.1 - 1.3	10.1 - 3.3	16.1 - 5.2	41	5°10.3	5°11.1	4°56.1	4.1 - 1.4	10.1 - 3.5	16.1 - 5.5
42	4°40.5	4°41.3	4°27.7	4.2 - 1.3	10.2 - 3.1	16.2 - 5.0	42	4°55.5	4°56.3	4°42.0	4.2 - 1.4	10.2 - 3.3	16.2 - 5.3	42	5°10.5	5°11.3	4°56.4	4.2 - 1.4	10.2 - 3.5	16.2 - 5.5
43	4°40.7	4°41.5	4°28.0	4.3 - 1.3	10.3 - 3.2	16.3 - 5.0	43	4°55.7	4°56.6	4°42.3	4.3 - 1.4	10.3 - 3.3	16.3 - 5.3	43	5°10.7	5°11.6	4°56.6	4.3 - 1.5	10.3 - 3.5	16.3 - 5.6
44	4°41.0	4°41.8	4°28.2	4.4 - 1.4	10.4 - 3.2	16.4 - 5.1	44	4°56.0	4°56.8	4°42.5	4.4 - 1.4	10.4 - 3.4	16.4 - 5.3	44	5°11.0	5°11.9	4°56.8	4.4 - 1.5	10.4 - 3.6	16.4 - 5.6
45	4°41.2	4°42.0	4°28.4	4.5 - 1.4	10.5 - 3.2	16.5 - 5.1	45	4°56.2	4°57.1	4°42.8	4.5 - 1.5	10.5 - 3.4	16.5 - 5.4	45	5°11.2	5°12.1	4°57.1	4.5 - 1.5	10.5 - 3.6	16.5 - 5.6
46	4°41.5	4°42.3	4°28.7	4.6 - 1.4	10.6 - 3.3	16.6 - 5.1	46	4°56.5	4°57.3	4°43.0	4.6 - 1.5	10.6 - 3.4	16.6 - 5.4	46	5°11.5	5°12.4	4°57.3	4.6 - 1.6	10.6 - 3.6	16.6 - 5.7
47	4°41.8	4°42.5	4°28.9	4.7 - 1.4	10.7 - 3.3	16.7 - 5.1	47	4°56.8	4°57.6	4°43.2	4.7 - 1.5	10.7 - 3.5	16.7 - 5.4	47	5°11.8	5°12.6	4°57.5	4.7 - 1.6	10.7 - 3.7	16.7 - 5.7
48	4°42.0	4°42.8	4°29.2	4.8 - 1.5	10.8 - 3.3	16.8 - 5.2	48	4°57.0	4°57.8	4°43.5	4.8 - 1.6	10.8 - 3.5	16.8 - 5.5	48	5°12.0	5°12.9	4°57.8	4.8 - 1.6	10.8 - 3.7	16.8 - 5.7
49	4°42.2	4°43.																		

Increments and Corrections

m 21	Sun Plan.	Aries	Moon	v and d corr			m 22	Sun Plan.	Aries	Moon	v and d corr			m 23	Sun Plan.	Aries	Moon	v and d corr		
0	5°15.0	5°15.9	5°00.6	0.0 - 0.0	6.0 - 2.2	12.0 - 4.3	0	5°30.0	5°30.9	5°15.0	0.0 - 0.0	6.0 - 2.3	12.0 - 4.5	0	5°45.0	5°45.9	5°29.3	0.0 - 0.0	6.0 - 2.4	12.0 - 4.7
1	5°15.2	5°16.1	5°00.9	0.1 - 0.0	6.1 - 2.2	12.1 - 4.3	1	5°30.2	5°31.2	5°15.2	0.1 - 0.0	6.1 - 2.3	12.1 - 4.5	1	5°45.2	5°46.2	5°29.5	0.1 - 0.0	6.1 - 2.4	12.1 - 4.7
2	5°15.5	5°16.4	5°01.1	0.2 - 0.1	6.2 - 2.2	12.2 - 4.4	2	5°30.5	5°31.4	5°15.4	0.2 - 0.1	6.2 - 2.3	12.2 - 4.6	2	5°45.5	5°46.4	5°29.8	0.2 - 0.1	6.2 - 2.4	12.2 - 4.8
3	5°15.8	5°16.6	5°01.4	0.3 - 0.1	6.3 - 2.3	12.3 - 4.4	3	5°30.8	5°31.7	5°15.7	0.3 - 0.1	6.3 - 2.4	12.3 - 4.6	3	5°45.8	5°46.7	5°30.0	0.3 - 0.1	6.3 - 2.5	12.3 - 4.8
4	5°16.0	5°16.9	5°01.6	0.4 - 0.1	6.4 - 2.3	12.4 - 4.4	4	5°31.0	5°31.9	5°15.9	0.4 - 0.2	6.4 - 2.4	12.4 - 4.7	4	5°46.0	5°46.9	5°30.2	0.4 - 0.2	6.4 - 2.5	12.4 - 4.9
5	5°16.2	5°17.1	5°01.8	0.5 - 0.2	6.5 - 2.3	12.5 - 4.5	5	5°31.2	5°32.2	5°16.2	0.5 - 0.2	6.5 - 2.4	12.5 - 4.7	5	5°46.2	5°47.2	5°30.5	0.5 - 0.2	6.5 - 2.5	12.5 - 4.9
6	5°16.5	5°17.4	5°02.1	0.6 - 0.2	6.6 - 2.4	12.6 - 4.5	6	5°31.5	5°32.4	5°16.4	0.6 - 0.2	6.6 - 2.5	12.6 - 4.7	6	5°46.5	5°47.4	5°30.7	0.6 - 0.2	6.6 - 2.6	12.6 - 4.9
7	5°16.8	5°17.6	5°02.3	0.7 - 0.3	6.7 - 2.4	12.7 - 4.6	7	5°31.8	5°32.7	5°16.6	0.7 - 0.3	6.7 - 2.5	12.7 - 4.8	7	5°46.8	5°47.7	5°31.0	0.7 - 0.3	6.7 - 2.6	12.7 - 5.0
8	5°17.0	5°17.9	5°02.6	0.8 - 0.3	6.8 - 2.4	12.8 - 4.6	8	5°32.0	5°32.9	5°16.9	0.8 - 0.3	6.8 - 2.6	12.8 - 4.8	8	5°47.0	5°47.9	5°31.2	0.8 - 0.3	6.8 - 2.7	12.8 - 5.0
9	5°17.2	5°18.1	5°02.8	0.9 - 0.3	6.9 - 2.5	12.9 - 4.6	9	5°32.2	5°33.2	5°17.1	0.9 - 0.3	6.9 - 2.6	12.9 - 4.8	9	5°47.2	5°48.2	5°31.4	0.9 - 0.4	6.9 - 2.7	12.9 - 5.1
10	5°17.5	5°18.4	5°03.0	1.0 - 0.4	7.0 - 2.5	13.0 - 4.7	10	5°32.5	5°33.4	5°17.4	1.0 - 0.4	7.0 - 2.6	13.0 - 4.9	10	5°47.5	5°48.4	5°31.7	1.0 - 0.4	7.0 - 2.7	13.0 - 5.1
11	5°17.8	5°18.6	5°03.3	1.1 - 0.4	7.1 - 2.5	13.1 - 4.7	11	5°32.8	5°33.7	5°17.6	1.1 - 0.4	7.1 - 2.7	13.1 - 4.9	11	5°47.8	5°48.7	5°31.9	1.1 - 0.4	7.1 - 2.8	13.1 - 5.1
12	5°18.0	5°18.9	5°03.5	1.2 - 0.4	7.2 - 2.6	13.2 - 4.7	12	5°33.0	5°33.9	5°17.8	1.2 - 0.5	7.2 - 2.7	13.2 - 4.9	12	5°48.0	5°49.0	5°32.1	1.2 - 0.5	7.2 - 2.8	13.2 - 5.2
13	5°18.2	5°19.1	5°03.8	1.3 - 0.5	7.3 - 2.6	13.3 - 4.8	13	5°33.2	5°34.2	5°18.1	1.3 - 0.5	7.3 - 2.7	13.3 - 5.0	13	5°48.2	5°49.2	5°32.4	1.3 - 0.5	7.3 - 2.9	13.3 - 5.2
14	5°18.5	5°19.4	5°04.0	1.4 - 0.5	7.4 - 2.7	13.4 - 4.8	14	5°33.5	5°34.4	5°18.3	1.4 - 0.5	7.4 - 2.8	13.4 - 5.0	14	5°48.5	5°49.5	5°32.6	1.4 - 0.5	7.4 - 2.9	13.4 - 5.2
15	5°18.8	5°19.6	5°04.2	1.5 - 0.5	7.5 - 2.7	13.5 - 4.8	15	5°33.8	5°34.7	5°18.5	1.5 - 0.6	7.5 - 2.8	13.5 - 5.1	15	5°48.8	5°49.7	5°32.9	1.5 - 0.6	7.5 - 2.9	13.5 - 5.3
16	5°19.0	5°19.9	5°04.5	1.6 - 0.6	7.6 - 2.7	13.6 - 4.9	16	5°34.0	5°34.9	5°18.8	1.6 - 0.6	7.6 - 2.8	13.6 - 5.1	16	5°49.0	5°50.0	5°33.1	1.6 - 0.6	7.6 - 3.0	13.6 - 5.3
17	5°19.3	5°20.1	5°04.7	1.7 - 0.6	7.7 - 2.8	13.7 - 4.9	17	5°34.3	5°35.2	5°19.0	1.7 - 0.6	7.7 - 2.9	13.7 - 5.1	17	5°49.3	5°50.2	5°33.3	1.7 - 0.7	7.7 - 3.0	13.7 - 5.4
18	5°19.5	5°20.4	5°04.9	1.8 - 0.6	7.8 - 2.8	13.8 - 4.9	18	5°34.5	5°35.4	5°19.3	1.8 - 0.7	7.8 - 2.9	13.8 - 5.2	18	5°49.5	5°50.5	5°33.6	1.8 - 0.7	7.8 - 3.1	13.8 - 5.4
19	5°19.7	5°20.6	5°05.2	1.9 - 0.7	7.9 - 2.8	13.9 - 5.0	19	5°34.8	5°35.7	5°19.5	1.9 - 0.7	7.9 - 3.0	13.9 - 5.2	19	5°49.8	5°50.7	5°33.8	1.9 - 0.7	7.9 - 3.1	13.9 - 5.4
20	5°20.0	5°20.9	5°05.4	2.0 - 0.7	8.0 - 2.9	14.0 - 5.0	20	5°35.0	5°35.9	5°19.7	2.0 - 0.8	8.0 - 3.0	14.0 - 5.3	20	5°50.0	5°51.0	5°34.1	2.0 - 0.8	8.0 - 3.1	14.0 - 5.5
21	5°20.3	5°21.1	5°05.7	2.1 - 0.8	8.1 - 2.9	14.1 - 5.1	21	5°35.3	5°36.2	5°20.0	2.1 - 0.8	8.1 - 3.0	14.1 - 5.3	21	5°50.3	5°51.2	5°34.3	2.1 - 0.8	8.1 - 3.2	14.1 - 5.5
22	5°20.5	5°21.4	5°05.9	2.2 - 0.8	8.2 - 2.9	14.2 - 5.1	22	5°35.5	5°36.4	5°20.2	2.2 - 0.8	8.2 - 3.1	14.2 - 5.3	22	5°50.5	5°51.5	5°34.5	2.2 - 0.9	8.2 - 3.2	14.2 - 5.6
23	5°20.7	5°21.6	5°06.1	2.3 - 0.8	8.3 - 3.0	14.3 - 5.1	23	5°35.7	5°36.7	5°20.5	2.3 - 0.9	8.3 - 3.1	14.3 - 5.4	23	5°50.7	5°51.7	5°34.8	2.3 - 0.9	8.3 - 3.3	14.3 - 5.6
24	5°21.0	5°21.9	5°06.4	2.4 - 0.9	8.4 - 3.0	14.4 - 5.2	24	5°36.0	5°36.9	5°20.7	2.4 - 0.9	8.4 - 3.2	14.4 - 5.4	24	5°51.0	5°52.0	5°35.0	2.4 - 0.9	8.4 - 3.3	14.4 - 5.6
25	5°21.3	5°22.1	5°06.6	2.5 - 0.9	8.5 - 3.0	14.5 - 5.2	25	5°36.3	5°37.2	5°20.9	2.5 - 0.9	8.5 - 3.2	14.5 - 5.4	25	5°51.3	5°52.2	5°35.2	2.5 - 1.0	8.5 - 3.3	14.5 - 5.7
26	5°21.5	5°22.4	5°06.9	2.6 - 0.9	8.6 - 3.1	14.6 - 5.2	26	5°36.5	5°37.4	5°21.2	2.6 - 1.0	8.6 - 3.2	14.6 - 5.5	26	5°51.5	5°52.5	5°35.5	2.6 - 1.0	8.6 - 3.4	14.6 - 5.7
27	5°21.7	5°22.6	5°07.1	2.7 - 1.0	8.7 - 3.1	14.7 - 5.3	27	5°36.7	5°37.7	5°21.4	2.7 - 1.0	8.7 - 3.3	14.7 - 5.5	27	5°51.7	5°52.7	5°35.7	2.7 - 1.1	8.7 - 3.4	14.7 - 5.8
28	5°22.0	5°22.9	5°07.3	2.8 - 1.0	8.8 - 3.2	14.8 - 5.3	28	5°37.0	5°37.9	5°21.6	2.8 - 1.1	8.8 - 3.3	14.8 - 5.6	28	5°52.0	5°53.0	5°36.0	2.8 - 1.1	8.8 - 3.4	14.8 - 5.8
29	5°22.3	5°23.1	5°07.6	2.9 - 1.0	8.9 - 3.2	14.9 - 5.3	29	5°37.3	5°38.2	5°21.9	2.9 - 1.1	8.9 - 3.3	14.9 - 5.6	29	5°52.3	5°53.2	5°36.2	2.9 - 1.1	8.9 - 3.5	14.9 - 5.8
30	5°22.5	5°23.4	5°07.8	3.0 - 1.1	9.0 - 3.2	15.0 - 5.4	30	5°37.5	5°38.4	5°22.1	3.0 - 1.1	9.0 - 3.4	15.0 - 5.6	30	5°52.5	5°53.5	5°36.4	3.0 - 1.2	9.0 - 3.5	15.0 - 5.9
31	5°22.7	5°23.6	5°08.0	3.1 - 1.1	9.1 - 3.3	15.1 - 5.4	31	5°37.7	5°38.7	5°22.4	3.1 - 1.2	9.1 - 3.4	15.1 - 5.7	31	5°52.7	5°53.7	5°36.7	3.1 - 1.2	9.1 - 3.6	15.1 - 5.9
32	5°23.0	5°23.9	5°08.3	3.2 - 1.1	9.2 - 3.3	15.2 - 5.4	32	5°38.0	5°38.9	5°22.6	3.2 - 1.2	9.2 - 3.5	15.2 - 5.7	32	5°53.0	5°54.0	5°36.9	3.2 - 1.3	9.2 - 3.6	15.2 - 6.0
33	5°23.3	5°24.1	5°08.5	3.3 - 1.2	9.3 - 3.3	15.3 - 5.5	33	5°38.3	5°39.2	5°22.8	3.3 - 1.2	9.3 - 3.5	15.3 - 5.7	33	5°53.3	5°54.2	5°37.2	3.3 - 1.3	9.3 - 3.6	15.3 - 6.0
34	5°23.5	5°24.4	5°08.8	3.4 - 1.2	9.4 - 3.4	15.4 - 5.5	34	5°38.5	5°39.4	5°23.1	3.4 - 1.3	9.4 - 3.5	15.4 - 5.8	34	5°53.5	5°54.5	5°37.4	3.4 - 1.3	9.4 - 3.7	15.4 - 6.0
35	5°23.7	5°24.6	5°09.0	3.5 - 1.3	9.5 - 3.4	15.5 - 5.6	35	5°38.7	5°39.7	5°23.3	3.5 - 1.3	9.5 - 3.6	15.5 - 5.8	35	5°53.7	5°54.7	5°37.6	3.5 - 1.4	9.5 - 3.7	15.5 - 6.1
36	5°24.0	5°24.9	5°09.2	3.6 - 1.3	9.6 - 3.4	15.6 - 5.6	36	5°39.0	5°39.9	5°23.6	3.6 - 1.4	9.6 - 3.6	15.6 - 5.9	36	5°54.0	5°55.0	5°37.9	3.6 - 1.4	9.6 - 3.8	15.6 - 6.1
37	5°24.3	5°25.1	5°09.5	3.7 - 1.3	9.7 - 3.5	15.7 - 5.6	37	5°39.3	5°40.2	5°23.8	3.7 - 1.4	9.7 - 3.6	15.7 - 5.9	37	5°54.3	5°55.2	5°38.1	3.7 - 1.4	9.7 - 3.8	15.7 - 6.1
38	5°24.5	5°25.4	5°09.7	3.8 - 1.4	9.8 - 3.5	15.8 - 5.7	38	5°39.5	5°40.4	5°24.0	3.8 - 1.4	9.8 - 3.7	15.8 - 5.9	38	5°54.5	5°55.5	5°38.4	3.8 - 1.5	9.8 - 3.8	15.8 - 6.2
39	5°24.7	5°25.6	5°10.0	3.9 - 1.4	9.9 - 3.5	15.9 - 5.7	39	5°39.7	5°40.7	5°24.3	3.9 - 1.5	9.9 - 3.7	15.9 - 6.0	39	5°54.7	5°55.7	5°38.6	3.9 - 1.5	9.9 - 3.9	15.9 - 6.2
40	5°25.0	5°25.9	5°10.2	4.0 - 1.4	10.0 - 3.6	16.0 - 5.7	40	5°40.0	5°40.9	5°24.5	4.0 - 1.5	10.0 - 3.8	16.0 - 6.0	40	5°55.0	5°56.0	5°38.8	4.0 - 1.6	10.0 - 3.9	16.0 - 6.3
41	5°25.3	5°26.1	5°10.4	4.1 - 1.5	10.1 - 3.6	16.1 - 5.8	41	5°40.2	5°41.2	5°24.7	4.1 - 1.5	10.1 - 3.8	16.1 - 6.0	41	5°55.2	5°56.2	5°39.1	4.1 - 1.6	10.1 - 4.0	16.1 - 6.3
42	5°25.5	5°26.4	5°10.7	4.2 - 1.5	10.2 - 3.7	16.2 - 5.8	42	5°40.5	5°41.4	5°25.0	4.2 - 1.6	10.2 - 3.8	16.2 - 6.1	42	5°55.5	5°56.5	5°39.3	4.2 - 1.6	10.2 - 4.0	16.2 - 6.3
43	5°25.7	5°26.6	5°10.9	4.3 - 1.5	10.3 - 3.7	16.3 - 5.8	43	5°40.7	5°41.7	5°25.2	4.3 - 1.6	10.3 - 3.9	16.3 - 6.1	43	5°55.7	5°56.7	5°39.5	4.3 - 1.7	10.3 - 4.0	16.3 - 6.4
44	5°26.0	5°26.9	5°11.1	4.4 - 1.6	10.4 - 3.7	16.4 - 5.9	44	5°41.0	5°41.9	5°25.5	4.4 - 1.7	10.4 - 3.9	16.4 - 6.1	44	5°56.0	5°57.0	5°39.8	4.4 - 1.7	10.4 - 4.1	16.4 - 6.4
45	5°26.2	5°27.1	5°11.4	4.5 - 1.6	10.5 - 3.8	16.5 - 5.9	45	5°41.2	5°42.2	5°25.7	4.5 - 1.7	10.5 - 3.9	16.5 - 6.2	45	5°56.2	5°57.2	5°40.0	4.5 - 1.8	10.5 - 4.1	16.5 - 6.5
46	5°26.5	5°27.4	5°11.6	4.6 - 1.6	10.6 - 3.8	16.6 - 5.9	46	5°41.5	5°42.4	5°25.9	4.6 - 1.7	10.6 - 4.0	16.6 - 6.2	46	5°56.5	5°57.5	5°40.3	4.6 - 1.8	10.6 - 4.2	16.6 - 6.5
47	5°26.8	5°27.6	5°11.9	4.7 - 1.7	10.7 - 3.8	16.7 - 6.0	47	5°41.8	5°42.7	5°26.2	4.7 - 1.8	10.7 - 4.0	16.7 - 6.3	47	5°56.8	5°57.7	5°40.5	4.7 - 1.8	10.7 - 4.2	16.7 - 6.5
48	5°27.0	5°27.9	5°12.1	4.8 - 1.7	10.8 - 3.9	16.8 - 6.0	48	5°42.0	5°42.9	5°26.4	4.8 - 1.8	10.8 - 4.1	16.8 - 6.3	48	5°57.0	5°58.0	5°40.7	4.8 - 1.9	10.8 - 4.2	16.8 - 6.6
49	5°27.2	5°28.																		

Increments and Corrections

m 24	Sun Plan.	Aries	Moon	v and d corr			m 25	Sun Plan.	Aries	Moon	v and d corr			m 26	Sun Plan.	Aries	Moon	v and d corr		
0	6°00.0	6°01.0	5°43.6	0.0 - 0.0	6.0 - 2.5	12.0 - 4.9	0	6°15.0	6°16.0	5°57.9	0.0 - 0.0	6.0 - 2.6	12.0 - 5.1	0	6°30.0	6°31.1	6°12.2	0.0 - 0.0	6.0 - 2.7	12.0 - 5.3
1	6°00.2	6°01.2	5°43.8	0.1 - 0.0	6.1 - 2.5	12.1 - 4.9	1	6°15.2	6°16.3	5°58.2	0.1 - 0.0	6.1 - 2.6	12.1 - 5.1	1	6°30.2	6°31.3	6°12.5	0.1 - 0.0	6.1 - 2.7	12.1 - 5.3
2	6°00.5	6°01.5	5°44.1	0.2 - 0.1	6.2 - 2.5	12.2 - 5.0	2	6°15.5	6°16.5	5°58.4	0.2 - 0.1	6.2 - 2.6	12.2 - 5.2	2	6°30.5	6°31.6	6°12.7	0.2 - 0.1	6.2 - 2.7	12.2 - 5.4
3	6°00.8	6°01.7	5°44.3	0.3 - 0.1	6.3 - 2.6	12.3 - 5.0	3	6°15.8	6°16.8	5°58.6	0.3 - 0.1	6.3 - 2.7	12.3 - 5.2	3	6°30.8	6°31.8	6°12.9	0.3 - 0.1	6.3 - 2.8	12.3 - 5.4
4	6°01.0	6°02.0	5°44.6	0.4 - 0.2	6.4 - 2.6	12.4 - 5.1	4	6°16.0	6°17.0	5°58.9	0.4 - 0.2	6.4 - 2.7	12.4 - 5.3	4	6°31.0	6°32.1	6°13.2	0.4 - 0.2	6.4 - 2.8	12.4 - 5.5
5	6°01.2	6°02.2	5°44.8	0.5 - 0.2	6.5 - 2.7	12.5 - 5.1	5	6°16.2	6°17.3	5°59.1	0.5 - 0.2	6.5 - 2.8	12.5 - 5.3	5	6°31.2	6°32.3	6°13.4	0.5 - 0.2	6.5 - 2.9	12.5 - 5.5
6	6°01.5	6°02.5	5°45.0	0.6 - 0.2	6.6 - 2.7	12.6 - 5.1	6	6°16.5	6°17.5	5°59.3	0.6 - 0.3	6.6 - 2.8	12.6 - 5.4	6	6°31.5	6°32.6	6°13.7	0.6 - 0.3	6.6 - 2.9	12.6 - 5.6
7	6°01.8	6°02.7	5°45.3	0.7 - 0.3	6.7 - 2.7	12.7 - 5.2	7	6°16.8	6°17.8	5°59.6	0.7 - 0.3	6.7 - 2.8	12.7 - 5.4	7	6°31.8	6°32.8	6°13.9	0.7 - 0.3	6.7 - 3.0	12.7 - 5.6
8	6°02.0	6°03.0	5°45.5	0.8 - 0.3	6.8 - 2.8	12.8 - 5.2	8	6°17.0	6°18.0	5°59.8	0.8 - 0.3	6.8 - 2.9	12.8 - 5.4	8	6°32.0	6°33.1	6°14.1	0.8 - 0.4	6.8 - 3.0	12.8 - 5.7
9	6°02.2	6°03.2	5°45.7	0.9 - 0.4	6.9 - 2.8	12.9 - 5.3	9	6°17.2	6°18.3	6°00.1	0.9 - 0.4	6.9 - 2.9	12.9 - 5.5	9	6°32.2	6°33.3	6°14.4	0.9 - 0.4	6.9 - 3.0	12.9 - 5.7
10	6°02.5	6°03.5	5°46.0	1.0 - 0.4	7.0 - 2.9	13.0 - 5.3	10	6°17.5	6°18.5	6°00.3	1.0 - 0.4	7.0 - 3.0	13.0 - 5.5	10	6°32.5	6°33.6	6°14.6	1.0 - 0.4	7.0 - 3.1	13.0 - 5.7
11	6°02.8	6°03.7	5°46.2	1.1 - 0.4	7.1 - 2.9	13.1 - 5.3	11	6°17.8	6°18.8	6°00.5	1.1 - 0.5	7.1 - 3.0	13.1 - 5.6	11	6°32.8	6°33.8	6°14.9	1.1 - 0.5	7.1 - 3.1	13.1 - 5.8
12	6°03.0	6°04.0	5°46.5	1.2 - 0.5	7.2 - 2.9	13.2 - 5.4	12	6°18.0	6°19.0	6°00.8	1.2 - 0.5	7.2 - 3.1	13.2 - 5.6	12	6°33.0	6°34.1	6°15.1	1.2 - 0.5	7.2 - 3.2	13.2 - 5.8
13	6°03.2	6°04.2	5°46.7	1.3 - 0.5	7.3 - 3.0	13.3 - 5.4	13	6°18.2	6°19.3	6°01.0	1.3 - 0.6	7.3 - 3.1	13.3 - 5.7	13	6°33.2	6°34.3	6°15.3	1.3 - 0.6	7.3 - 3.2	13.3 - 5.9
14	6°03.5	6°04.5	5°46.9	1.4 - 0.6	7.4 - 3.0	13.4 - 5.5	14	6°18.5	6°19.5	6°01.3	1.4 - 0.6	7.4 - 3.1	13.4 - 5.7	14	6°33.5	6°34.6	6°15.6	1.4 - 0.6	7.4 - 3.3	13.4 - 5.9
15	6°03.8	6°04.7	5°47.2	1.5 - 0.6	7.5 - 3.1	13.5 - 5.5	15	6°18.8	6°19.8	6°01.5	1.5 - 0.6	7.5 - 3.2	13.5 - 5.7	15	6°33.8	6°34.8	6°15.8	1.5 - 0.7	7.5 - 3.3	13.5 - 6.0
16	6°04.0	6°05.0	5°47.4	1.6 - 0.7	7.6 - 3.1	13.6 - 5.6	16	6°19.0	6°20.0	6°01.7	1.6 - 0.7	7.6 - 3.2	13.6 - 5.8	16	6°34.0	6°35.1	6°16.1	1.6 - 0.7	7.6 - 3.4	13.6 - 6.0
17	6°04.3	6°05.2	5°47.7	1.7 - 0.7	7.7 - 3.1	13.7 - 5.6	17	6°19.3	6°20.3	6°02.0	1.7 - 0.7	7.7 - 3.3	13.7 - 5.8	17	6°34.3	6°35.3	6°16.3	1.7 - 0.8	7.7 - 3.4	13.7 - 6.1
18	6°04.5	6°05.5	5°47.9	1.8 - 0.7	7.8 - 3.2	13.8 - 5.6	18	6°19.5	6°20.5	6°02.2	1.8 - 0.8	7.8 - 3.3	13.8 - 5.9	18	6°34.5	6°35.6	6°16.5	1.8 - 0.8	7.8 - 3.4	13.8 - 6.1
19	6°04.7	6°05.7	5°48.1	1.9 - 0.8	7.9 - 3.2	13.9 - 5.7	19	6°19.7	6°20.8	6°02.5	1.9 - 0.8	7.9 - 3.4	13.9 - 5.9	19	6°34.8	6°35.8	6°16.8	1.9 - 0.8	7.9 - 3.5	13.9 - 6.1
20	6°05.0	6°06.0	5°48.4	2.0 - 0.8	8.0 - 3.3	14.0 - 5.7	20	6°20.0	6°21.0	6°02.7	2.0 - 0.9	8.0 - 3.4	14.0 - 6.0	20	6°35.0	6°36.1	6°17.0	2.0 - 0.9	8.0 - 3.5	14.0 - 6.2
21	6°05.3	6°06.2	5°48.6	2.1 - 0.9	8.1 - 3.3	14.1 - 5.8	21	6°20.3	6°21.3	6°02.9	2.1 - 0.9	8.1 - 3.4	14.1 - 6.0	21	6°35.3	6°36.3	6°17.2	2.1 - 0.9	8.1 - 3.6	14.1 - 6.2
22	6°05.5	6°06.5	5°48.8	2.2 - 0.9	8.2 - 3.3	14.2 - 5.8	22	6°20.5	6°21.5	6°03.2	2.2 - 0.9	8.2 - 3.5	14.2 - 6.0	22	6°35.5	6°36.6	6°17.5	2.2 - 1.0	8.2 - 3.6	14.2 - 6.3
23	6°05.7	6°06.7	5°49.1	2.3 - 0.9	8.3 - 3.4	14.3 - 5.8	23	6°20.7	6°21.8	6°03.4	2.3 - 1.0	8.3 - 3.5	14.3 - 6.1	23	6°35.7	6°36.8	6°17.7	2.3 - 1.0	8.3 - 3.7	14.3 - 6.3
24	6°06.0	6°07.0	5°49.3	2.4 - 1.0	8.4 - 3.4	14.4 - 5.9	24	6°21.0	6°22.0	6°03.6	2.4 - 1.0	8.4 - 3.6	14.4 - 6.1	24	6°36.0	6°37.1	6°18.0	2.4 - 1.1	8.4 - 3.7	14.4 - 6.4
25	6°06.3	6°07.3	5°49.6	2.5 - 1.0	8.5 - 3.5	14.5 - 5.9	25	6°21.3	6°22.3	6°03.9	2.5 - 1.1	8.5 - 3.6	14.5 - 6.2	25	6°36.3	6°37.3	6°18.2	2.5 - 1.1	8.5 - 3.8	14.5 - 6.4
26	6°06.5	6°07.5	5°49.8	2.6 - 1.1	8.6 - 3.5	14.6 - 6.0	26	6°21.5	6°22.5	6°04.1	2.6 - 1.1	8.6 - 3.7	14.6 - 6.2	26	6°36.5	6°37.6	6°18.4	2.6 - 1.1	8.6 - 3.8	14.6 - 6.4
27	6°06.7	6°07.8	5°50.0	2.7 - 1.1	8.7 - 3.6	14.7 - 6.0	27	6°21.7	6°22.8	6°04.4	2.7 - 1.1	8.7 - 3.7	14.7 - 6.2	27	6°36.7	6°37.8	6°18.7	2.7 - 1.2	8.7 - 3.8	14.7 - 6.5
28	6°07.0	6°08.0	5°50.3	2.8 - 1.1	8.8 - 3.6	14.8 - 6.0	28	6°22.0	6°23.0	6°04.6	2.8 - 1.2	8.8 - 3.7	14.8 - 6.3	28	6°37.0	6°38.1	6°18.9	2.8 - 1.2	8.8 - 3.9	14.8 - 6.5
29	6°07.3	6°08.3	5°50.5	2.9 - 1.2	8.9 - 3.6	14.9 - 6.1	29	6°22.3	6°23.3	6°04.8	2.9 - 1.2	8.9 - 3.8	14.9 - 6.3	29	6°37.3	6°38.3	6°19.2	2.9 - 1.3	8.9 - 3.9	14.9 - 6.6
30	6°07.5	6°08.5	5°50.8	3.0 - 1.2	9.0 - 3.7	15.0 - 6.1	30	6°22.5	6°23.5	6°05.1	3.0 - 1.3	9.0 - 3.8	15.0 - 6.4	30	6°37.5	6°38.6	6°19.4	3.0 - 1.3	9.0 - 4.0	15.0 - 6.6
31	6°07.7	6°08.8	5°51.0	3.1 - 1.3	9.1 - 3.7	15.1 - 6.2	31	6°22.7	6°23.8	6°05.3	3.1 - 1.3	9.1 - 3.9	15.1 - 6.4	31	6°37.7	6°38.8	6°19.6	3.1 - 1.4	9.1 - 4.0	15.1 - 6.7
32	6°08.0	6°09.0	5°51.2	3.2 - 1.3	9.2 - 3.8	15.2 - 6.2	32	6°23.0	6°24.0	6°05.6	3.2 - 1.4	9.2 - 3.9	15.2 - 6.5	32	6°38.0	6°39.1	6°19.9	3.2 - 1.4	9.2 - 4.1	15.2 - 6.7
33	6°08.3	6°09.3	5°51.5	3.3 - 1.3	9.3 - 3.8	15.3 - 6.2	33	6°23.3	6°24.3	6°05.8	3.3 - 1.4	9.3 - 4.0	15.3 - 6.5	33	6°38.3	6°39.3	6°20.1	3.3 - 1.5	9.3 - 4.1	15.3 - 6.8
34	6°08.5	6°09.5	5°51.7	3.4 - 1.4	9.4 - 3.8	15.4 - 6.3	34	6°23.5	6°24.5	6°06.0	3.4 - 1.4	9.4 - 4.0	15.4 - 6.5	34	6°38.5	6°39.6	6°20.3	3.4 - 1.5	9.4 - 4.2	15.4 - 6.8
35	6°08.7	6°09.8	5°52.0	3.5 - 1.4	9.5 - 3.9	15.5 - 6.3	35	6°23.7	6°24.8	6°06.3	3.5 - 1.5	9.5 - 4.0	15.5 - 6.6	35	6°38.7	6°39.8	6°20.6	3.5 - 1.5	9.5 - 4.2	15.5 - 6.8
36	6°09.0	6°10.0	5°52.2	3.6 - 1.5	9.6 - 3.9	15.6 - 6.4	36	6°24.0	6°25.0	6°06.5	3.6 - 1.5	9.6 - 4.1	15.6 - 6.6	36	6°39.0	6°40.1	6°20.8	3.6 - 1.6	9.6 - 4.2	15.6 - 6.9
37	6°09.3	6°10.3	5°52.4	3.7 - 1.5	9.7 - 4.0	15.7 - 6.4	37	6°24.3	6°25.3	6°06.7	3.7 - 1.6	9.7 - 4.1	15.7 - 6.7	37	6°39.3	6°40.3	6°21.1	3.7 - 1.6	9.7 - 4.3	15.7 - 6.9
38	6°09.5	6°10.5	5°52.7	3.8 - 1.6	9.8 - 4.0	15.8 - 6.5	38	6°24.5	6°25.6	6°07.0	3.8 - 1.6	9.8 - 4.2	15.8 - 6.7	38	6°39.5	6°40.6	6°21.3	3.8 - 1.7	9.8 - 4.3	15.8 - 7.0
39	6°09.7	6°10.8	5°52.9	3.9 - 1.6	9.9 - 4.0	15.9 - 6.5	39	6°24.7	6°25.8	6°07.2	3.9 - 1.7	9.9 - 4.2	15.9 - 6.8	39	6°39.7	6°40.8	6°21.5	3.9 - 1.7	9.9 - 4.4	15.9 - 7.0
40	6°10.0	6°11.0	5°53.1	4.0 - 1.6	10.0 - 4.1	16.0 - 6.5	40	6°25.0	6°26.1	6°07.5	4.0 - 1.7	10.0 - 4.3	16.0 - 6.8	40	6°40.0	6°41.1	6°21.8	4.0 - 1.8	10.0 - 4.4	16.0 - 7.1
41	6°10.3	6°11.3	5°53.4	4.1 - 1.7	10.1 - 4.1	16.1 - 6.6	41	6°25.3	6°26.3	6°07.7	4.1 - 1.7	10.1 - 4.3	16.1 - 6.8	41	6°40.2	6°41.3	6°22.0	4.1 - 1.8	10.1 - 4.5	16.1 - 7.1
42	6°10.5	6°11.5	5°53.6	4.2 - 1.7	10.2 - 4.2	16.2 - 6.6	42	6°25.5	6°26.6	6°07.9	4.2 - 1.8	10.2 - 4.3	16.2 - 6.9	42	6°40.5	6°41.6	6°22.3	4.2 - 1.9	10.2 - 4.5	16.2 - 7.2
43	6°10.7	6°11.8	5°53.9	4.3 - 1.8	10.3 - 4.2	16.3 - 6.7	43	6°25.7	6°26.8	6°08.2	4.3 - 1.8	10.3 - 4.4	16.3 - 6.9	43	6°40.7	6°41.8	6°22.5	4.3 - 1.9	10.3 - 4.5	16.3 - 7.2
44	6°11.0	6°12.0	5°54.1	4.4 - 1.8	10.4 - 4.2	16.4 - 6.7	44	6°26.0	6°27.1	6°08.4	4.4 - 1.9	10.4 - 4.4	16.4 - 7.0	44	6°41.0	6°42.1	6°22.7	4.4 - 1.9	10.4 - 4.6	16.4 - 7.2
45	6°11.2	6°12.3	5°54.3	4.5 - 1.8	10.5 - 4.3	16.5 - 6.7	45	6°26.2	6°27.3	6°08.7	4.5 - 1.9	10.5 - 4.5	16.5 - 7.0	45	6°41.2	6°42.3	6°23.0	4.5 - 2.0	10.5 - 4.6	16.5 - 7.3
46	6°11.5	6°12.5	5°54.6	4.6 - 1.9	10.6 - 4.3	16.6 - 6.8	46	6°26.5	6°27.6	6°08.9	4.6 - 2.0	10.6 - 4.5	16.6 - 7.1	46	6°41.5	6°42.6	6°23.2	4.6 - 2.0	10.6 - 4.7	16.6 - 7.3
47	6°11.8	6°12.8	5°54.8	4.7 - 1.9	10.7 - 4.4	16.7 - 6.8	47	6°26.8	6°27.8	6°09.1	4.7 - 2.0	10.7 - 4.5	16.7 - 7.1	47	6°41.8	6°42.8	6°23.4	4.7 - 2.1	10.7 - 4.7	16.7 - 7.4
48	6°12.0	6°13.0	5°55.1	4.8 - 2.0	10.8 - 4.4	16.8 - 6.9	48	6°27.0	6°28.1	6°09.4	4.8 - 2.0	10.8 - 4.6	16.8 - 7.1	48	6°42.0	6°43.1	6°23.7	4.8 - 2.1	10.8 - 4.8	16.8 - 7.4
49	6°12.2	6°13.3	5°55.3	4.9 - 2.0	10.9 - 4.5	16.9 - 6.9	49	6°27.2	6°28.3	6°09.6	4.9 - 2.1	10								

Increments and Corrections

m 27	Sun Plan.	Aries	Moon	v and d corr			m 28	Sun Plan.	Aries	Moon	v and d corr			m 29	Sun Plan.	Aries	Moon	v and d corr		
0	6°45.0	6°46.1	6°26.5	0.0 - 0.0	6.0 - 2.8	12.0 - 5.5	0	7°00.0	7°01.1	6°40.9	0.0 - 0.0	6.0 - 2.8	12.0 - 5.7	0	7°15.0	7°16.2	6°55.2	0.0 - 0.0	6.0 - 2.9	12.0 - 5.9
1	6°45.2	6°46.4	6°26.8	0.1 - 0.0	6.1 - 2.8	12.1 - 5.5	1	7°00.2	7°01.4	6°41.1	0.1 - 0.0	6.1 - 2.9	12.1 - 5.7	1	7°15.2	7°16.4	6°55.4	0.1 - 0.0	6.1 - 3.0	12.1 - 5.9
2	6°45.5	6°46.6	6°27.0	0.2 - 0.1	6.2 - 2.8	12.2 - 5.6	2	7°00.5	7°01.6	6°41.3	0.2 - 0.1	6.2 - 2.9	12.2 - 5.8	2	7°15.5	7°16.7	6°55.7	0.2 - 0.1	6.2 - 3.0	12.2 - 6.0
3	6°45.8	6°46.9	6°27.3	0.3 - 0.1	6.3 - 2.9	12.3 - 5.6	3	7°00.8	7°01.9	6°41.6	0.3 - 0.1	6.3 - 3.0	12.3 - 5.8	3	7°15.8	7°16.9	6°55.9	0.3 - 0.1	6.3 - 3.1	12.3 - 6.0
4	6°46.0	6°47.1	6°27.5	0.4 - 0.2	6.4 - 2.9	12.4 - 5.7	4	7°01.0	7°02.2	6°41.8	0.4 - 0.2	6.4 - 3.0	12.4 - 5.9	4	7°16.0	7°17.2	6°56.1	0.4 - 0.2	6.4 - 3.1	12.4 - 6.1
5	6°46.2	6°47.4	6°27.7	0.5 - 0.2	6.5 - 3.0	12.5 - 5.7	5	7°01.2	7°02.4	6°42.1	0.5 - 0.2	6.5 - 3.1	12.5 - 5.9	5	7°16.2	7°17.4	6°56.4	0.5 - 0.2	6.5 - 3.2	12.5 - 6.1
6	6°46.5	6°47.6	6°28.0	0.6 - 0.3	6.6 - 3.0	12.6 - 5.8	6	7°01.5	7°02.7	6°42.3	0.6 - 0.3	6.6 - 3.1	12.6 - 6.0	6	7°16.5	7°17.7	6°56.6	0.6 - 0.3	6.6 - 3.2	12.6 - 6.2
7	6°46.8	6°47.9	6°28.2	0.7 - 0.3	6.7 - 3.1	12.7 - 5.8	7	7°01.8	7°02.9	6°42.5	0.7 - 0.3	6.7 - 3.2	12.7 - 6.0	7	7°16.8	7°17.9	6°56.9	0.7 - 0.3	6.7 - 3.3	12.7 - 6.2
8	6°47.0	6°48.1	6°28.5	0.8 - 0.4	6.8 - 3.1	12.8 - 5.9	8	7°02.0	7°03.2	6°42.8	0.8 - 0.4	6.8 - 3.2	12.8 - 6.1	8	7°17.0	7°18.2	6°57.1	0.8 - 0.4	6.8 - 3.3	12.8 - 6.3
9	6°47.2	6°48.4	6°28.7	0.9 - 0.4	6.9 - 3.2	12.9 - 5.9	9	7°02.2	7°03.4	6°43.0	0.9 - 0.4	6.9 - 3.3	12.9 - 6.1	9	7°17.2	7°18.4	6°57.3	0.9 - 0.4	6.9 - 3.4	12.9 - 6.3
10	6°47.5	6°48.6	6°28.9	1.0 - 0.5	7.0 - 3.2	13.0 - 6.0	10	7°02.5	7°03.7	6°43.3	1.0 - 0.5	7.0 - 3.3	13.0 - 6.2	10	7°17.5	7°18.7	6°57.6	1.0 - 0.5	7.0 - 3.4	13.0 - 6.4
11	6°47.8	6°48.9	6°29.2	1.1 - 0.5	7.1 - 3.3	13.1 - 6.0	11	7°02.8	7°03.9	6°43.5	1.1 - 0.5	7.1 - 3.4	13.1 - 6.2	11	7°17.8	7°18.9	6°57.8	1.1 - 0.5	7.1 - 3.5	13.1 - 6.4
12	6°48.0	6°49.1	6°29.4	1.2 - 0.6	7.2 - 3.3	13.2 - 6.1	12	7°03.0	7°04.2	6°43.7	1.2 - 0.6	7.2 - 3.4	13.2 - 6.3	12	7°18.0	7°19.2	6°58.0	1.2 - 0.6	7.2 - 3.5	13.2 - 6.5
13	6°48.2	6°49.4	6°29.7	1.3 - 0.6	7.3 - 3.3	13.3 - 6.1	13	7°03.2	7°04.4	6°44.0	1.3 - 0.6	7.3 - 3.5	13.3 - 6.3	13	7°18.2	7°19.4	6°58.3	1.3 - 0.6	7.3 - 3.6	13.3 - 6.5
14	6°48.5	6°49.6	6°29.9	1.4 - 0.6	7.4 - 3.4	13.4 - 6.1	14	7°03.5	7°04.7	6°44.2	1.4 - 0.7	7.4 - 3.5	13.4 - 6.4	14	7°18.5	7°19.7	6°58.5	1.4 - 0.7	7.4 - 3.6	13.4 - 6.6
15	6°48.8	6°49.9	6°30.1	1.5 - 0.7	7.5 - 3.4	13.5 - 6.2	15	7°03.8	7°04.9	6°44.4	1.5 - 0.7	7.5 - 3.6	13.5 - 6.4	15	7°18.8	7°19.9	6°58.8	1.5 - 0.7	7.5 - 3.7	13.5 - 6.6
16	6°49.0	6°50.1	6°30.4	1.6 - 0.7	7.6 - 3.5	13.6 - 6.2	16	7°04.0	7°05.2	6°44.7	1.6 - 0.8	7.6 - 3.6	13.6 - 6.5	16	7°19.0	7°20.2	6°59.0	1.6 - 0.8	7.6 - 3.7	13.6 - 6.7
17	6°49.3	6°50.4	6°30.6	1.7 - 0.8	7.7 - 3.5	13.7 - 6.3	17	7°04.3	7°05.4	6°44.9	1.7 - 0.8	7.7 - 3.7	13.7 - 6.5	17	7°19.3	7°20.5	6°59.2	1.7 - 0.8	7.7 - 3.8	13.7 - 6.7
18	6°49.5	6°50.6	6°30.8	1.8 - 0.8	7.8 - 3.6	13.8 - 6.3	18	7°04.5	7°05.7	6°45.2	1.8 - 0.9	7.8 - 3.7	13.8 - 6.6	18	7°19.5	7°20.7	6°59.5	1.8 - 0.9	7.8 - 3.8	13.8 - 6.8
19	6°49.8	6°50.9	6°31.1	1.9 - 0.9	7.9 - 3.6	13.9 - 6.4	19	7°04.7	7°05.9	6°45.4	1.9 - 0.9	7.9 - 3.8	13.9 - 6.6	19	7°19.7	7°21.0	6°59.7	1.9 - 0.9	7.9 - 3.9	13.9 - 6.8
20	6°50.0	6°51.1	6°31.3	2.0 - 0.9	8.0 - 3.7	14.0 - 6.4	20	7°05.0	7°06.2	6°45.6	2.0 - 1.0	8.0 - 3.8	14.0 - 6.7	20	7°20.0	7°21.2	6°60.0	2.0 - 1.0	8.0 - 3.9	14.0 - 6.9
21	6°50.3	6°51.4	6°31.6	2.1 - 1.0	8.1 - 3.7	14.1 - 6.5	21	7°05.3	7°06.4	6°45.9	2.1 - 1.0	8.1 - 3.8	14.1 - 6.7	21	7°20.3	7°21.5	7°00.2	2.1 - 1.0	8.1 - 4.0	14.1 - 6.9
22	6°50.5	6°51.6	6°31.8	2.2 - 1.0	8.2 - 3.8	14.2 - 6.5	22	7°05.5	7°06.7	6°46.1	2.2 - 1.0	8.2 - 3.9	14.2 - 6.7	22	7°20.5	7°21.7	7°00.4	2.2 - 1.1	8.2 - 4.0	14.2 - 7.0
23	6°50.7	6°51.9	6°32.0	2.3 - 1.1	8.3 - 3.8	14.3 - 6.6	23	7°05.7	7°06.9	6°46.4	2.3 - 1.1	8.3 - 3.9	14.3 - 6.8	23	7°20.7	7°22.0	7°00.7	2.3 - 1.1	8.3 - 4.1	14.3 - 7.0
24	6°51.0	6°52.1	6°32.3	2.4 - 1.1	8.4 - 3.9	14.4 - 6.6	24	7°06.0	7°07.2	6°46.6	2.4 - 1.1	8.4 - 4.0	14.4 - 6.8	24	7°21.0	7°22.2	7°00.9	2.4 - 1.2	8.4 - 4.1	14.4 - 7.1
25	6°51.3	6°52.4	6°32.5	2.5 - 1.1	8.5 - 3.9	14.5 - 6.6	25	7°06.3	7°07.4	6°46.8	2.5 - 1.2	8.5 - 4.0	14.5 - 6.9	25	7°21.3	7°22.5	7°01.1	2.5 - 1.2	8.5 - 4.2	14.5 - 7.1
26	6°51.5	6°52.6	6°32.8	2.6 - 1.2	8.6 - 3.9	14.6 - 6.7	26	7°06.5	7°07.7	6°47.1	2.6 - 1.2	8.6 - 4.1	14.6 - 6.9	26	7°21.5	7°22.7	7°01.4	2.6 - 1.3	8.6 - 4.2	14.6 - 7.2
27	6°51.7	6°52.9	6°33.0	2.7 - 1.2	8.7 - 4.0	14.7 - 6.7	27	7°06.7	7°07.9	6°47.3	2.7 - 1.3	8.7 - 4.1	14.7 - 7.0	27	7°21.7	7°23.0	7°01.6	2.7 - 1.3	8.7 - 4.3	14.7 - 7.2
28	6°52.0	6°53.1	6°33.2	2.8 - 1.3	8.8 - 4.0	14.8 - 6.8	28	7°07.0	7°08.2	6°47.5	2.8 - 1.3	8.8 - 4.2	14.8 - 7.0	28	7°22.0	7°23.2	7°01.9	2.8 - 1.4	8.8 - 4.3	14.8 - 7.3
29	6°52.3	6°53.4	6°33.5	2.9 - 1.3	8.9 - 4.1	14.9 - 6.8	29	7°07.3	7°08.4	6°47.8	2.9 - 1.4	8.9 - 4.2	14.9 - 7.1	29	7°22.3	7°23.5	7°02.1	2.9 - 1.4	8.9 - 4.4	14.9 - 7.3
30	6°52.5	6°53.6	6°33.7	3.0 - 1.4	9.0 - 4.1	15.0 - 6.9	30	7°07.5	7°08.7	6°48.0	3.0 - 1.4	9.0 - 4.3	15.0 - 7.1	30	7°22.5	7°23.7	7°02.3	3.0 - 1.5	9.0 - 4.4	15.0 - 7.4
31	6°52.7	6°53.9	6°33.9	3.1 - 1.4	9.1 - 4.2	15.1 - 6.9	31	7°07.7	7°08.9	6°48.3	3.1 - 1.5	9.1 - 4.3	15.1 - 7.2	31	7°22.7	7°24.0	7°02.6	3.1 - 1.5	9.1 - 4.5	15.1 - 7.4
32	6°53.0	6°54.1	6°34.2	3.2 - 1.5	9.2 - 4.2	15.2 - 7.0	32	7°08.0	7°09.2	6°48.5	3.2 - 1.5	9.2 - 4.4	15.2 - 7.2	32	7°23.0	7°24.2	7°02.8	3.2 - 1.6	9.2 - 4.5	15.2 - 7.5
33	6°53.3	6°54.4	6°34.4	3.3 - 1.5	9.3 - 4.3	15.3 - 7.0	33	7°08.3	7°09.4	6°48.7	3.3 - 1.6	9.3 - 4.4	15.3 - 7.3	33	7°23.3	7°24.5	7°03.1	3.3 - 1.6	9.3 - 4.6	15.3 - 7.5
34	6°53.5	6°54.6	6°34.7	3.4 - 1.6	9.4 - 4.3	15.4 - 7.1	34	7°08.5	7°09.7	6°49.0	3.4 - 1.6	9.4 - 4.5	15.4 - 7.3	34	7°23.5	7°24.7	7°03.3	3.4 - 1.7	9.4 - 4.6	15.4 - 7.6
35	6°53.7	6°54.9	6°34.9	3.5 - 1.6	9.5 - 4.4	15.5 - 7.1	35	7°08.7	7°09.9	6°49.2	3.5 - 1.7	9.5 - 4.5	15.5 - 7.4	35	7°23.7	7°25.0	7°03.5	3.5 - 1.7	9.5 - 4.7	15.5 - 7.6
36	6°54.0	6°55.1	6°35.1	3.6 - 1.7	9.6 - 4.4	15.6 - 7.2	36	7°09.0	7°10.2	6°49.5	3.6 - 1.7	9.6 - 4.6	15.6 - 7.4	36	7°24.0	7°25.2	7°03.8	3.6 - 1.8	9.6 - 4.7	15.6 - 7.7
37	6°54.3	6°55.4	6°35.4	3.7 - 1.7	9.7 - 4.4	15.7 - 7.2	37	7°09.3	7°10.4	6°49.7	3.7 - 1.8	9.7 - 4.6	15.7 - 7.5	37	7°24.3	7°25.5	7°04.0	3.7 - 1.8	9.7 - 4.8	15.7 - 7.7
38	6°54.5	6°55.6	6°35.6	3.8 - 1.7	9.8 - 4.5	15.8 - 7.2	38	7°09.5	7°10.7	6°49.9	3.8 - 1.8	9.8 - 4.7	15.8 - 7.5	38	7°24.5	7°25.7	7°04.3	3.8 - 1.9	9.8 - 4.8	15.8 - 7.8
39	6°54.7	6°55.9	6°35.9	3.9 - 1.8	9.9 - 4.5	15.9 - 7.3	39	7°09.7	7°10.9	6°50.2	3.9 - 1.9	9.9 - 4.7	15.9 - 7.6	39	7°24.7	7°26.0	7°04.5	3.9 - 1.9	9.9 - 4.9	15.9 - 7.9
40	6°55.0	6°56.1	6°36.1	4.0 - 1.8	10.0 - 4.6	16.0 - 7.3	40	7°10.0	7°11.2	6°50.4	4.0 - 1.9	10.0 - 4.8	16.0 - 7.6	40	7°25.0	7°26.2	7°04.7	4.0 - 2.0	10.0 - 4.9	16.0 - 7.8
41	6°55.2	6°56.4	6°36.3	4.1 - 1.9	10.1 - 4.6	16.1 - 7.4	41	7°10.3	7°11.4	6°50.6	4.1 - 1.9	10.1 - 4.8	16.1 - 7.6	41	7°25.3	7°26.5	7°05.0	4.1 - 2.0	10.1 - 5.0	16.1 - 7.9
42	6°55.5	6°56.6	6°36.6	4.2 - 1.9	10.2 - 4.7	16.2 - 7.4	42	7°10.5	7°11.7	6°50.9	4.2 - 2.0	10.2 - 4.8	16.2 - 7.7	42	7°25.5	7°26.7	7°05.2	4.2 - 2.1	10.2 - 5.0	16.2 - 8.0
43	6°55.7	6°56.9	6°36.8	4.3 - 2.0	10.3 - 4.7	16.3 - 7.5	43	7°10.7	7°11.9	6°51.1	4.3 - 2.0	10.3 - 4.9	16.3 - 7.7	43	7°25.7	7°27.0	7°05.4	4.3 - 2.1	10.3 - 5.1	16.3 - 8.0
44	6°56.0	6°57.1	6°37.0	4.4 - 2.0	10.4 - 4.8	16.4 - 7.5	44	7°11.0	7°12.2	6°51.4	4.4 - 2.1	10.4 - 4.9	16.4 - 7.8	44	7°26.0	7°27.2	7°05.7	4.4 - 2.2	10.4 - 5.1	16.4 - 8.1
45	6°56.2	6°57.4	6°37.3	4.5 - 2.1	10.5 - 4.8	16.5 - 7.6	45	7°11.2	7°12.4	6°51.6	4.5 - 2.1	10.5 - 5.0	16.5 - 7.8	45	7°26.2	7°27.5	7°05.9	4.5 - 2.2	10.5 - 5.2	16.5 - 8.1
46	6°56.5	6°57.6	6°37.5	4.6 - 2.1	10.6 - 4.9	16.6 - 7.6	46	7°11.5	7°12.7	6°51.8	4.6 - 2.2	10.6 - 5.0	16.6 - 7.9	46	7°26.5	7°27.7	7°06.2	4.6 - 2.3	10.6 - 5.2	16.6 - 8.2
47	6°56.8	6°57.9	6°37.8	4.7 - 2.2	10.7 - 4.9	16.7 - 7.7	47	7°11.8	7°12.9	6°52.1	4.7 - 2.2	10.7 - 5.1	16.7 - 7.9	47	7°26.8	7°28.0	7°06.4	4.7 - 2.3	10.7 - 5.3	16.7 - 8.2
48	6°57.0	6°58.1	6°38.0	4.8 - 2.2	10.8 - 5.0	16.8 - 7.7	48	7°12.0	7°13.2	6°52.3	4.8 - 2.3	10.8 - 5.1	16.8 - 8.0	48	7°27.0	7°28.2	7°06.6	4.8 - 2.4	10.8 - 5.3	16.8 - 8.3
49	6°57.2	6°58.																		

Increments and Corrections

m	Sun Plan.	Aries	Moon	v and d corr			m	Sun Plan.	Aries	Moon	v and d corr			m	Sun Plan.	Aries	Moon	v and d corr		
0	7°30.0	7°31.2	7°09.5	0.0 - 0.0	6.0 - 3.1	12.0 - 6.1	0	7°45.0	7°46.3	7°23.8	0.0 - 0.0	6.0 - 3.2	12.0 - 6.3	0	8°00.0	8°01.3	7°38.1	0.0 - 0.0	6.0 - 3.3	12.0 - 6.5
1	7°30.2	7°31.5	7°09.7	0.1 - 0.1	6.1 - 3.1	12.1 - 6.2	1	7°45.2	7°46.5	7°24.1	0.1 - 0.1	6.1 - 3.2	12.1 - 6.4	1	8°00.2	8°01.6	7°38.4	0.1 - 0.1	6.1 - 3.3	12.1 - 6.6
2	7°30.5	7°31.7	7°10.0	0.2 - 0.1	6.2 - 3.2	12.2 - 6.2	2	7°45.5	7°46.8	7°24.3	0.2 - 0.1	6.2 - 3.3	12.2 - 6.4	2	8°00.5	8°01.8	7°38.6	0.2 - 0.1	6.2 - 3.4	12.2 - 6.6
3	7°30.8	7°32.0	7°10.2	0.3 - 0.2	6.3 - 3.2	12.3 - 6.3	3	7°45.7	7°47.0	7°24.5	0.3 - 0.2	6.3 - 3.3	12.3 - 6.5	3	8°00.7	8°02.1	7°38.8	0.3 - 0.2	6.3 - 3.4	12.3 - 6.7
4	7°31.0	7°32.2	7°10.5	0.4 - 0.2	6.4 - 3.3	12.4 - 6.3	4	7°46.0	7°47.3	7°24.8	0.4 - 0.2	6.4 - 3.4	12.4 - 6.5	4	8°01.0	8°02.3	7°39.1	0.4 - 0.2	6.4 - 3.5	12.4 - 6.7
5	7°31.2	7°32.5	7°10.7	0.5 - 0.3	6.5 - 3.3	12.5 - 6.4	5	7°46.2	7°47.5	7°25.0	0.5 - 0.3	6.5 - 3.4	12.5 - 6.6	5	8°01.3	8°02.6	7°39.3	0.5 - 0.3	6.5 - 3.5	12.5 - 6.8
6	7°31.5	7°32.7	7°10.9	0.6 - 0.3	6.6 - 3.4	12.6 - 6.4	6	7°46.5	7°47.8	7°25.2	0.6 - 0.3	6.6 - 3.5	12.6 - 6.6	6	8°01.5	8°02.8	7°39.6	0.6 - 0.3	6.6 - 3.6	12.6 - 6.8
7	7°31.7	7°33.0	7°11.2	0.7 - 0.4	6.7 - 3.4	12.7 - 6.5	7	7°46.8	7°48.0	7°25.5	0.7 - 0.4	6.7 - 3.5	12.7 - 6.7	7	8°01.8	8°03.1	7°39.8	0.7 - 0.4	6.7 - 3.6	12.7 - 6.9
8	7°32.0	7°33.2	7°11.4	0.8 - 0.4	6.8 - 3.5	12.8 - 6.5	8	7°47.0	7°48.3	7°25.7	0.8 - 0.4	6.8 - 3.6	12.8 - 6.7	8	8°02.0	8°03.3	7°40.0	0.8 - 0.4	6.8 - 3.7	12.8 - 6.9
9	7°32.2	7°33.5	7°11.6	0.9 - 0.5	6.9 - 3.5	12.9 - 6.6	9	7°47.2	7°48.5	7°26.0	0.9 - 0.5	6.9 - 3.6	12.9 - 6.8	9	8°02.2	8°03.6	7°40.3	0.9 - 0.5	6.9 - 3.7	12.9 - 7.0
10	7°32.5	7°33.7	7°11.9	1.0 - 0.5	7.0 - 3.6	13.0 - 6.6	10	7°47.5	7°48.8	7°26.2	1.0 - 0.5	7.0 - 3.7	13.0 - 6.8	10	8°02.5	8°03.8	7°40.5	1.0 - 0.5	7.0 - 3.8	13.0 - 7.0
11	7°32.8	7°34.0	7°12.1	1.1 - 0.6	7.1 - 3.6	13.1 - 6.7	11	7°47.7	7°49.0	7°26.4	1.1 - 0.6	7.1 - 3.7	13.1 - 6.9	11	8°02.7	8°04.1	7°40.8	1.1 - 0.6	7.1 - 3.8	13.1 - 7.1
12	7°33.0	7°34.2	7°12.4	1.2 - 0.6	7.2 - 3.7	13.2 - 6.7	12	7°48.0	7°49.3	7°26.7	1.2 - 0.6	7.2 - 3.8	13.2 - 6.9	12	8°03.0	8°04.3	7°41.0	1.2 - 0.7	7.2 - 3.9	13.2 - 7.2
13	7°33.3	7°34.5	7°12.6	1.3 - 0.7	7.3 - 3.7	13.3 - 6.8	13	7°48.2	7°49.5	7°26.9	1.3 - 0.7	7.3 - 3.8	13.3 - 7.0	13	8°03.3	8°04.6	7°41.2	1.3 - 0.7	7.3 - 4.0	13.3 - 7.2
14	7°33.5	7°34.7	7°12.8	1.4 - 0.7	7.4 - 3.8	13.4 - 6.8	14	7°48.5	7°49.8	7°27.2	1.4 - 0.7	7.4 - 3.9	13.4 - 7.0	14	8°03.5	8°04.8	7°41.5	1.4 - 0.8	7.4 - 4.0	13.4 - 7.3
15	7°33.8	7°35.0	7°13.1	1.5 - 0.8	7.5 - 3.8	13.5 - 6.9	15	7°48.8	7°50.0	7°27.4	1.5 - 0.8	7.5 - 3.9	13.5 - 7.1	15	8°03.8	8°05.1	7°41.7	1.5 - 0.8	7.5 - 4.1	13.5 - 7.3
16	7°34.0	7°35.2	7°13.3	1.6 - 0.8	7.6 - 3.9	13.6 - 6.9	16	7°49.0	7°50.3	7°27.6	1.6 - 0.8	7.6 - 4.0	13.6 - 7.1	16	8°04.0	8°05.3	7°42.0	1.6 - 0.9	7.6 - 4.1	13.6 - 7.4
17	7°34.3	7°35.5	7°13.6	1.7 - 0.9	7.7 - 3.9	13.7 - 7.0	17	7°49.3	7°50.5	7°27.9	1.7 - 0.9	7.7 - 4.0	13.7 - 7.2	17	8°04.2	8°05.6	7°42.2	1.7 - 0.9	7.7 - 4.2	13.7 - 7.4
18	7°34.5	7°35.7	7°13.8	1.8 - 0.9	7.8 - 4.0	13.8 - 7.0	18	7°49.5	7°50.8	7°28.1	1.8 - 0.9	7.8 - 4.1	13.8 - 7.2	18	8°04.5	8°05.8	7°42.4	1.8 - 1.0	7.8 - 4.2	13.8 - 7.5
19	7°34.8	7°36.0	7°14.0	1.9 - 1.0	7.9 - 4.0	13.9 - 7.1	19	7°49.8	7°51.0	7°28.4	1.9 - 1.0	7.9 - 4.1	13.9 - 7.3	19	8°04.8	8°06.1	7°42.7	1.9 - 1.0	7.9 - 4.3	13.9 - 7.5
20	7°35.0	7°36.2	7°14.3	2.0 - 1.0	8.0 - 4.1	14.0 - 7.1	20	7°50.0	7°51.3	7°28.6	2.0 - 1.1	8.0 - 4.2	14.0 - 7.4	20	8°05.0	8°06.3	7°42.9	2.0 - 1.1	8.0 - 4.3	14.0 - 7.6
21	7°35.3	7°36.5	7°14.5	2.1 - 1.1	8.1 - 4.1	14.1 - 7.2	21	7°50.3	7°51.5	7°28.8	2.1 - 1.1	8.1 - 4.3	14.1 - 7.4	21	8°05.3	8°06.6	7°43.1	2.1 - 1.1	8.1 - 4.4	14.1 - 7.6
22	7°35.5	7°36.7	7°14.7	2.2 - 1.1	8.2 - 4.2	14.2 - 7.2	22	7°50.5	7°51.8	7°29.1	2.2 - 1.2	8.2 - 4.3	14.2 - 7.5	22	8°05.5	8°06.8	7°43.4	2.2 - 1.2	8.2 - 4.4	14.2 - 7.7
23	7°35.7	7°37.0	7°15.0	2.3 - 1.2	8.3 - 4.2	14.3 - 7.3	23	7°50.7	7°52.0	7°29.3	2.3 - 1.2	8.3 - 4.4	14.3 - 7.5	23	8°05.7	8°07.1	7°43.6	2.3 - 1.2	8.3 - 4.5	14.3 - 7.7
24	7°36.0	7°37.2	7°15.2	2.4 - 1.2	8.4 - 4.3	14.4 - 7.3	24	7°51.0	7°52.3	7°29.5	2.4 - 1.3	8.4 - 4.4	14.4 - 7.6	24	8°06.0	8°07.3	7°43.9	2.4 - 1.3	8.4 - 4.6	14.4 - 7.8
25	7°36.2	7°37.5	7°15.5	2.5 - 1.3	8.5 - 4.3	14.5 - 7.4	25	7°51.3	7°52.5	7°29.8	2.5 - 1.3	8.5 - 4.5	14.5 - 7.6	25	8°06.2	8°07.6	7°44.1	2.5 - 1.4	8.5 - 4.6	14.5 - 7.9
26	7°36.5	7°37.7	7°15.7	2.6 - 1.3	8.6 - 4.4	14.6 - 7.4	26	7°51.5	7°52.8	7°30.0	2.6 - 1.4	8.6 - 4.5	14.6 - 7.7	26	8°06.5	8°07.8	7°44.3	2.6 - 1.4	8.6 - 4.7	14.6 - 7.9
27	7°36.7	7°38.0	7°15.9	2.7 - 1.4	8.7 - 4.4	14.7 - 7.5	27	7°51.7	7°53.0	7°30.3	2.7 - 1.4	8.7 - 4.6	14.7 - 7.7	27	8°06.8	8°08.1	7°44.6	2.7 - 1.5	8.7 - 4.7	14.7 - 8.0
28	7°37.0	7°38.2	7°16.2	2.8 - 1.4	8.8 - 4.5	14.8 - 7.5	28	7°52.0	7°53.3	7°30.5	2.8 - 1.5	8.8 - 4.6	14.8 - 7.8	28	8°07.0	8°08.3	7°44.8	2.8 - 1.5	8.8 - 4.8	14.8 - 8.0
29	7°37.3	7°38.5	7°16.4	2.9 - 1.5	8.9 - 4.5	14.9 - 7.6	29	7°52.2	7°53.5	7°30.7	2.9 - 1.5	8.9 - 4.7	14.9 - 7.8	29	8°07.3	8°08.6	7°45.1	2.9 - 1.6	8.9 - 4.8	14.9 - 8.1
30	7°37.5	7°38.8	7°16.7	3.0 - 1.5	9.0 - 4.6	15.0 - 7.6	30	7°52.5	7°53.8	7°31.0	3.0 - 1.6	9.0 - 4.7	15.0 - 7.9	30	8°07.5	8°08.8	7°45.3	3.0 - 1.6	9.0 - 4.9	15.0 - 8.1
31	7°37.7	7°39.0	7°16.9	3.1 - 1.6	9.1 - 4.6	15.1 - 7.7	31	7°52.7	7°54.0	7°31.2	3.1 - 1.6	9.1 - 4.8	15.1 - 7.9	31	8°07.7	8°09.1	7°45.5	3.1 - 1.7	9.1 - 4.9	15.1 - 8.2
32	7°38.0	7°39.3	7°17.1	3.2 - 1.6	9.2 - 4.7	15.2 - 7.7	32	7°53.0	7°54.3	7°31.5	3.2 - 1.7	9.2 - 4.8	15.2 - 8.0	32	8°08.0	8°09.3	7°45.8	3.2 - 1.7	9.2 - 5.0	15.2 - 8.2
33	7°38.3	7°39.5	7°17.4	3.3 - 1.7	9.3 - 4.7	15.3 - 7.8	33	7°53.3	7°54.5	7°31.7	3.3 - 1.7	9.3 - 4.9	15.3 - 8.0	33	8°08.2	8°09.6	7°46.0	3.3 - 1.8	9.3 - 5.0	15.3 - 8.3
34	7°38.5	7°39.8	7°17.6	3.4 - 1.7	9.4 - 4.8	15.4 - 7.8	34	7°53.5	7°54.8	7°31.9	3.4 - 1.8	9.4 - 4.9	15.4 - 8.1	34	8°08.5	8°09.8	7°46.2	3.4 - 1.8	9.4 - 5.1	15.4 - 8.3
35	7°38.7	7°40.0	7°17.9	3.5 - 1.8	9.5 - 4.8	15.5 - 7.9	35	7°53.8	7°55.0	7°32.2	3.5 - 1.8	9.5 - 5.0	15.5 - 8.1	35	8°08.8	8°10.1	7°46.5	3.5 - 1.9	9.5 - 5.1	15.5 - 8.4
36	7°39.0	7°40.3	7°18.1	3.6 - 1.8	9.6 - 4.9	15.6 - 7.9	36	7°54.0	7°55.3	7°32.4	3.6 - 1.9	9.6 - 5.0	15.6 - 8.2	36	8°09.0	8°10.3	7°46.7	3.6 - 2.0	9.6 - 5.2	15.6 - 8.5
37	7°39.3	7°40.5	7°18.3	3.7 - 1.9	9.7 - 4.9	15.7 - 8.0	37	7°54.3	7°55.5	7°32.6	3.7 - 1.9	9.7 - 5.1	15.7 - 8.2	37	8°09.3	8°10.6	7°47.0	3.7 - 2.0	9.7 - 5.3	15.7 - 8.5
38	7°39.5	7°40.8	7°18.6	3.8 - 1.9	9.8 - 5.0	15.8 - 8.0	38	7°54.5	7°55.8	7°32.9	3.8 - 2.0	9.8 - 5.1	15.8 - 8.3	38	8°09.5	8°10.8	7°47.2	3.8 - 2.1	9.8 - 5.3	15.8 - 8.6
39	7°39.8	7°41.0	7°18.8	3.9 - 2.0	9.9 - 5.0	15.9 - 8.1	39	7°54.7	7°56.0	7°33.1	3.9 - 2.0	9.9 - 5.2	15.9 - 8.3	39	8°09.7	8°11.1	7°47.4	3.9 - 2.1	9.9 - 5.4	15.9 - 8.6
40	7°40.0	7°41.3	7°19.0	4.0 - 2.0	10.0 - 5.1	16.0 - 8.1	40	7°55.0	7°56.3	7°33.4	4.0 - 2.1	10.0 - 5.3	16.0 - 8.4	40	8°10.0	8°11.3	7°47.7	4.0 - 2.2	10.0 - 5.4	16.0 - 8.7
41	7°40.2	7°41.5	7°19.3	4.1 - 2.1	10.1 - 5.1	16.1 - 8.2	41	7°55.3	7°56.5	7°33.6	4.1 - 2.2	10.1 - 5.3	16.1 - 8.5	41	8°10.2	8°11.6	7°47.9	4.1 - 2.2	10.1 - 5.5	16.1 - 8.7
42	7°40.5	7°41.8	7°19.5	4.2 - 2.1	10.2 - 5.2	16.2 - 8.2	42	7°55.5	7°56.8	7°33.8	4.2 - 2.2	10.2 - 5.4	16.2 - 8.5	42	8°10.5	8°11.8	7°48.2	4.2 - 2.3	10.2 - 5.5	16.2 - 8.8
43	7°40.7	7°42.0	7°19.8	4.3 - 2.2	10.3 - 5.2	16.3 - 8.3	43	7°55.7	7°57.1	7°34.1	4.3 - 2.3	10.3 - 5.4	16.3 - 8.6	43	8°10.8	8°12.1	7°48.4	4.3 - 2.3	10.3 - 5.6	16.3 - 8.8
44	7°41.0	7°42.3	7°20.0	4.4 - 2.2	10.4 - 5.3	16.4 - 8.3	44	7°56.0	7°57.3	7°34.3	4.4 - 2.3	10.4 - 5.5	16.4 - 8.6	44	8°11.0	8°12.3	7°48.6	4.4 - 2.4	10.4 - 5.6	16.4 - 8.9
45	7°41.2	7°42.5	7°20.2	4.5 - 2.3	10.5 - 5.3	16.5 - 8.4	45	7°56.2	7°57.6	7°34.6	4.5 - 2.4	10.5 - 5.5	16.5 - 8.7	45	8°11.2	8°12.6	7°48.9	4.5 - 2.4	10.5 - 5.7	16.5 - 8.9
46	7°41.5	7°42.8	7°20.5	4.6 - 2.3	10.6 - 5.4	16.6 - 8.4	46	7°56.5	7°57.8	7°34.8	4.6 - 2.4	10.6 - 5.6	16.6 - 8.7	46	8°11.5	8°12.8	7°49.1	4.6 - 2.5	10.6 - 5.7	16.6 - 9.0
47	7°41.8	7°43.0	7°20.7	4.7 - 2.4	10.7 - 5.4	16.7 - 8.5	47	7°56.7	7°58.1	7°35.0	4.7 - 2.5	10.7 - 5.6	16.7 - 8.8	47	8°11.7	8°13.1	7°49.3	4.7 - 2.5	10.7 - 5.8	16.7 - 9.0
48	7°42.0	7°43.3	7°21.0	4.8 - 2.4	10.8 - 5.5	16.8 - 8.5	48	7°57.0	7°58.3	7°35.3	4.8 - 2.5	10.8 - 5.7	16.8 - 8.8	48	8°12.0	8°13.3	7°49.6	4.8 - 2.6	10.8 - 5.9	16.8 - 9.1
49	7°42.2	7°43.5																		

Increments and Corrections

m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr		
33	Plan.						34	Plan.						35	Plan.					
0	8°15.0	8°16.4	7°52.5	0.0 - 0.0	6.0 - 3.4	12.0 - 6.7	0	8°30.0	8°31.4	8°06.8	0.0 - 0.0	6.0 - 3.5	12.0 - 6.9	0	8°45.0	8°46.4	8°21.1	0.0 - 0.0	6.0 - 3.6	12.0 - 7.1
1	8°15.2	8°16.6	7°52.7	0.1 - 0.1	6.1 - 3.4	12.1 - 6.8	1	8°30.2	8°31.6	8°07.0	0.1 - 0.1	6.1 - 3.5	12.1 - 7.0	1	8°45.2	8°46.7	8°21.3	0.1 - 0.1	6.1 - 3.6	12.1 - 7.2
2	8°15.5	8°16.9	7°52.9	0.2 - 0.1	6.2 - 3.5	12.2 - 6.8	2	8°30.5	8°31.9	8°07.2	0.2 - 0.1	6.2 - 3.6	12.2 - 7.0	2	8°45.5	8°46.9	8°21.6	0.2 - 0.1	6.2 - 3.7	12.2 - 7.2
3	8°15.7	8°17.1	7°53.2	0.3 - 0.2	6.3 - 3.5	12.3 - 6.9	3	8°30.7	8°32.1	8°07.5	0.3 - 0.2	6.3 - 3.6	12.3 - 7.1	3	8°45.7	8°47.2	8°21.8	0.3 - 0.2	6.3 - 3.7	12.3 - 7.3
4	8°16.0	8°17.4	7°53.4	0.4 - 0.2	6.4 - 3.6	12.4 - 6.9	4	8°31.0	8°32.4	8°07.7	0.4 - 0.2	6.4 - 3.7	12.4 - 7.1	4	8°46.0	8°47.4	8°22.0	0.4 - 0.2	6.4 - 3.8	12.4 - 7.3
5	8°16.3	8°17.6	7°53.6	0.5 - 0.3	6.5 - 3.6	12.5 - 7.0	5	8°31.3	8°32.6	8°08.0	0.5 - 0.3	6.5 - 3.7	12.5 - 7.2	5	8°46.3	8°47.7	8°22.3	0.5 - 0.3	6.5 - 3.8	12.5 - 7.4
6	8°16.5	8°17.9	7°53.9	0.6 - 0.3	6.6 - 3.7	12.6 - 7.0	6	8°31.5	8°32.9	8°08.2	0.6 - 0.3	6.6 - 3.8	12.6 - 7.2	6	8°46.5	8°47.9	8°22.5	0.6 - 0.4	6.6 - 3.9	12.6 - 7.5
7	8°16.8	8°18.1	7°54.1	0.7 - 0.4	6.7 - 3.7	12.7 - 7.1	7	8°31.8	8°33.1	8°08.4	0.7 - 0.4	6.7 - 3.9	12.7 - 7.3	7	8°46.8	8°48.2	8°22.8	0.7 - 0.4	6.7 - 4.0	12.7 - 7.5
8	8°17.0	8°18.4	7°54.4	0.8 - 0.4	6.8 - 3.8	12.8 - 7.1	8	8°32.0	8°33.4	8°08.7	0.8 - 0.5	6.8 - 3.9	12.8 - 7.4	8	8°47.0	8°48.4	8°23.0	0.8 - 0.5	6.8 - 4.0	12.8 - 7.6
9	8°17.2	8°18.6	7°54.6	0.9 - 0.5	6.9 - 3.9	12.9 - 7.2	9	8°32.2	8°33.7	8°08.9	0.9 - 0.5	6.9 - 4.0	12.9 - 7.4	9	8°47.2	8°48.7	8°23.2	0.9 - 0.5	6.9 - 4.1	12.9 - 7.6
10	8°17.5	8°18.9	7°54.8	1.0 - 0.6	7.0 - 3.9	13.0 - 7.3	10	8°32.5	8°33.9	8°09.2	1.0 - 0.6	7.0 - 4.0	13.0 - 7.5	10	8°47.5	8°48.9	8°23.5	1.0 - 0.6	7.0 - 4.1	13.0 - 7.7
11	8°17.7	8°19.1	7°55.1	1.1 - 0.6	7.1 - 4.0	13.1 - 7.3	11	8°32.7	8°34.2	8°09.4	1.1 - 0.6	7.1 - 4.1	13.1 - 7.5	11	8°47.7	8°49.2	8°23.7	1.1 - 0.7	7.1 - 4.2	13.1 - 7.8
12	8°18.0	8°19.4	7°55.3	1.2 - 0.7	7.2 - 4.0	13.2 - 7.4	12	8°33.0	8°34.4	8°09.6	1.2 - 0.7	7.2 - 4.1	13.2 - 7.6	12	8°48.0	8°49.4	8°23.9	1.2 - 0.7	7.2 - 4.3	13.2 - 7.8
13	8°18.3	8°19.6	7°55.6	1.3 - 0.7	7.3 - 4.1	13.3 - 7.4	13	8°33.3	8°34.7	8°09.9	1.3 - 0.7	7.3 - 4.2	13.3 - 7.6	13	8°48.3	8°49.7	8°24.2	1.3 - 0.8	7.3 - 4.3	13.3 - 7.9
14	8°18.5	8°19.9	7°55.8	1.4 - 0.8	7.4 - 4.1	13.4 - 7.5	14	8°33.5	8°34.9	8°10.1	1.4 - 0.8	7.4 - 4.3	13.4 - 7.7	14	8°48.5	8°49.9	8°24.4	1.4 - 0.8	7.4 - 4.4	13.4 - 7.9
15	8°18.8	8°20.1	7°56.0	1.5 - 0.8	7.5 - 4.2	13.5 - 7.5	15	8°33.8	8°35.2	8°10.3	1.5 - 0.9	7.5 - 4.3	13.5 - 7.8	15	8°48.8	8°50.2	8°24.7	1.5 - 0.9	7.5 - 4.4	13.5 - 8.0
16	8°19.0	8°20.4	7°56.3	1.6 - 0.9	7.6 - 4.2	13.6 - 7.6	16	8°34.0	8°35.4	8°10.6	1.6 - 0.9	7.6 - 4.4	13.6 - 7.8	16	8°49.0	8°50.4	8°24.9	1.6 - 0.9	7.6 - 4.5	13.6 - 8.0
17	8°19.2	8°20.6	7°56.5	1.7 - 0.9	7.7 - 4.3	13.7 - 7.6	17	8°34.2	8°35.7	8°10.8	1.7 - 1.0	7.7 - 4.4	13.7 - 7.9	17	8°49.2	8°50.7	8°25.1	1.7 - 1.0	7.7 - 4.6	13.7 - 8.1
18	8°19.5	8°20.9	7°56.7	1.8 - 1.0	7.8 - 4.4	13.8 - 7.7	18	8°34.5	8°35.9	8°11.1	1.8 - 1.0	7.8 - 4.5	13.8 - 7.9	18	8°49.5	8°50.9	8°25.4	1.8 - 1.1	7.8 - 4.6	13.8 - 8.2
19	8°19.8	8°21.1	7°57.0	1.9 - 1.1	7.9 - 4.4	13.9 - 7.8	19	8°34.8	8°36.2	8°11.3	1.9 - 1.1	7.9 - 4.5	13.9 - 8.0	19	8°49.8	8°51.2	8°25.6	1.9 - 1.1	7.9 - 4.7	13.9 - 8.2
20	8°20.0	8°21.4	7°57.2	2.0 - 1.1	8.0 - 4.5	14.0 - 7.8	20	8°35.0	8°36.4	8°11.5	2.0 - 1.2	8.0 - 4.6	14.0 - 8.0	20	8°50.0	8°51.4	8°25.9	2.0 - 1.2	8.0 - 4.7	14.0 - 8.3
21	8°20.3	8°21.6	7°57.5	2.1 - 1.2	8.1 - 4.5	14.1 - 7.9	21	8°35.3	8°36.7	8°11.8	2.1 - 1.2	8.1 - 4.7	14.1 - 8.1	21	8°50.3	8°51.7	8°26.1	2.1 - 1.2	8.1 - 4.8	14.1 - 8.3
22	8°20.5	8°21.9	7°57.7	2.2 - 1.2	8.2 - 4.6	14.2 - 7.9	22	8°35.5	8°36.9	8°12.0	2.2 - 1.3	8.2 - 4.7	14.2 - 8.2	22	8°50.5	8°52.0	8°26.3	2.2 - 1.3	8.2 - 4.9	14.2 - 8.4
23	8°20.7	8°22.1	7°57.9	2.3 - 1.3	8.3 - 4.6	14.3 - 8.0	23	8°35.7	8°37.2	8°12.3	2.3 - 1.3	8.3 - 4.8	14.3 - 8.2	23	8°50.7	8°52.2	8°26.6	2.3 - 1.4	8.3 - 4.9	14.3 - 8.5
24	8°21.0	8°22.4	7°58.2	2.4 - 1.3	8.4 - 4.7	14.4 - 8.0	24	8°36.0	8°37.4	8°12.5	2.4 - 1.4	8.4 - 4.8	14.4 - 8.3	24	8°51.0	8°52.5	8°26.8	2.4 - 1.4	8.4 - 5.0	14.4 - 8.5
25	8°21.2	8°22.6	7°58.4	2.5 - 1.4	8.5 - 4.7	14.5 - 8.1	25	8°36.2	8°37.7	8°12.7	2.5 - 1.4	8.5 - 4.9	14.5 - 8.3	25	8°51.2	8°52.7	8°27.0	2.5 - 1.5	8.5 - 5.0	14.5 - 8.6
26	8°21.5	8°22.9	7°58.7	2.6 - 1.5	8.6 - 4.8	14.6 - 8.2	26	8°36.5	8°37.9	8°13.0	2.6 - 1.5	8.6 - 4.9	14.6 - 8.4	26	8°51.5	8°53.0	8°27.3	2.6 - 1.5	8.6 - 5.1	14.6 - 8.6
27	8°21.8	8°23.1	7°58.9	2.7 - 1.5	8.7 - 4.9	14.7 - 8.2	27	8°36.8	8°38.2	8°13.2	2.7 - 1.6	8.7 - 5.0	14.7 - 8.5	27	8°51.8	8°53.2	8°27.5	2.7 - 1.6	8.7 - 5.1	14.7 - 8.7
28	8°22.0	8°23.4	7°59.1	2.8 - 1.6	8.8 - 4.9	14.8 - 8.3	28	8°37.0	8°38.4	8°13.4	2.8 - 1.6	8.8 - 5.1	14.8 - 8.5	28	8°52.0	8°53.5	8°27.8	2.8 - 1.7	8.8 - 5.2	14.8 - 8.8
29	8°22.3	8°23.6	7°59.4	2.9 - 1.6	8.9 - 5.0	14.9 - 8.3	29	8°37.3	8°38.7	8°13.7	2.9 - 1.7	8.9 - 5.1	14.9 - 8.6	29	8°52.3	8°53.7	8°28.0	2.9 - 1.7	8.9 - 5.3	14.9 - 8.8
30	8°22.5	8°23.9	7°59.6	3.0 - 1.7	9.0 - 5.0	15.0 - 8.4	30	8°37.5	8°38.9	8°13.9	3.0 - 1.7	9.0 - 5.2	15.0 - 8.6	30	8°52.5	8°54.0	8°28.2	3.0 - 1.8	9.0 - 5.3	15.0 - 8.9
31	8°22.7	8°24.1	7°59.8	3.1 - 1.7	9.1 - 5.1	15.1 - 8.4	31	8°37.7	8°39.2	8°14.2	3.1 - 1.8	9.1 - 5.2	15.1 - 8.7	31	8°52.7	8°54.2	8°28.5	3.1 - 1.8	9.1 - 5.4	15.1 - 8.9
32	8°23.0	8°24.4	8°00.1	3.2 - 1.8	9.2 - 5.1	15.2 - 8.5	32	8°38.0	8°39.4	8°14.4	3.2 - 1.8	9.2 - 5.3	15.2 - 8.7	32	8°53.0	8°54.5	8°28.7	3.2 - 1.9	9.2 - 5.4	15.2 - 9.0
33	8°23.2	8°24.6	8°00.3	3.3 - 1.8	9.3 - 5.2	15.3 - 8.5	33	8°38.2	8°39.7	8°14.6	3.3 - 1.9	9.3 - 5.3	15.3 - 8.8	33	8°53.2	8°54.7	8°29.0	3.3 - 2.0	9.3 - 5.5	15.3 - 9.1
34	8°23.5	8°24.9	8°00.6	3.4 - 1.9	9.4 - 5.2	15.4 - 8.6	34	8°38.5	8°39.9	8°14.9	3.4 - 2.0	9.4 - 5.4	15.4 - 8.9	34	8°53.5	8°55.0	8°29.2	3.4 - 2.0	9.4 - 5.6	15.4 - 9.1
35	8°23.8	8°25.1	8°00.8	3.5 - 2.0	9.5 - 5.3	15.5 - 8.7	35	8°38.8	8°40.2	8°15.1	3.5 - 2.0	9.5 - 5.5	15.5 - 8.9	35	8°53.8	8°55.2	8°29.4	3.5 - 2.1	9.5 - 5.6	15.5 - 9.2
36	8°24.0	8°25.4	8°01.0	3.6 - 2.0	9.6 - 5.4	15.6 - 8.7	36	8°39.0	8°40.4	8°15.4	3.6 - 2.1	9.6 - 5.5	15.6 - 9.0	36	8°54.0	8°55.5	8°29.7	3.6 - 2.1	9.6 - 5.7	15.6 - 9.2
37	8°24.3	8°25.6	8°01.3	3.7 - 2.1	9.7 - 5.4	15.7 - 8.8	37	8°39.3	8°40.7	8°15.6	3.7 - 2.1	9.7 - 5.6	15.7 - 9.0	37	8°54.3	8°55.7	8°29.9	3.7 - 2.2	9.7 - 5.7	15.7 - 9.3
38	8°24.5	8°25.9	8°01.5	3.8 - 2.1	9.8 - 5.5	15.8 - 8.8	38	8°39.5	8°40.9	8°15.8	3.8 - 2.2	9.8 - 5.6	15.8 - 9.1	38	8°54.5	8°56.0	8°30.2	3.8 - 2.2	9.8 - 5.8	15.8 - 9.3
39	8°24.7	8°26.1	8°01.8	3.9 - 2.2	9.9 - 5.5	15.9 - 8.9	39	8°39.7	8°41.2	8°16.1	3.9 - 2.2	9.9 - 5.7	15.9 - 9.1	39	8°54.7	8°56.2	8°30.4	3.9 - 2.3	9.9 - 5.9	15.9 - 9.4
40	8°25.0	8°26.4	8°02.0	4.0 - 2.2	10.0 - 5.6	16.0 - 8.9	40	8°40.0	8°41.4	8°16.3	4.0 - 2.3	10.0 - 5.8	16.0 - 9.2	40	8°55.0	8°56.5	8°30.6	4.0 - 2.4	10.0 - 5.9	16.0 - 9.5
41	8°25.2	8°26.6	8°02.2	4.1 - 2.3	10.1 - 5.6	16.1 - 9.0	41	8°40.2	8°41.7	8°16.5	4.1 - 2.4	10.1 - 5.8	16.1 - 9.3	41	8°55.2	8°56.7	8°30.9	4.1 - 2.4	10.1 - 6.0	16.1 - 9.5
42	8°25.5	8°26.9	8°02.5	4.2 - 2.3	10.2 - 5.7	16.2 - 9.0	42	8°40.5	8°41.9	8°16.8	4.2 - 2.4	10.2 - 5.9	16.2 - 9.3	42	8°55.5	8°57.0	8°31.1	4.2 - 2.5	10.2 - 6.0	16.2 - 9.6
43	8°25.8	8°27.1	8°02.7	4.3 - 2.4	10.3 - 5.8	16.3 - 9.1	43	8°40.8	8°42.2	8°17.0	4.3 - 2.5	10.3 - 5.9	16.3 - 9.4	43	8°55.8	8°57.2	8°31.3	4.3 - 2.5	10.3 - 6.1	16.3 - 9.6
44	8°26.0	8°27.4	8°02.9	4.4 - 2.5	10.4 - 5.8	16.4 - 9.2	44	8°41.0	8°42.4	8°17.3	4.4 - 2.5	10.4 - 6.0	16.4 - 9.4	44	8°56.0	8°57.5	8°31.6	4.4 - 2.6	10.4 - 6.2	16.4 - 9.7
45	8°26.2	8°27.6	8°03.2	4.5 - 2.5	10.5 - 5.9	16.5 - 9.2	45	8°41.2	8°42.7	8°17.5	4.5 - 2.6	10.5 - 6.0	16.5 - 9.5	45	8°56.2	8°57.7	8°31.8	4.5 - 2.7	10.5 - 6.2	16.5 - 9.8
46	8°26.5	8°27.9	8°03.4	4.6 - 2.6	10.6 - 5.9	16.6 - 9.3	46	8°41.5	8°42.9	8°17.7	4.6 - 2.6	10.6 - 6.1	16.6 - 9.5	46	8°56.5	8°58.0	8°32.1	4.6 - 2.7	10.6 - 6.3	16.6 - 9.8
47	8°26.7	8°28.1	8°03.7	4.7 - 2.6	10.7 - 6.0	16.7 - 9.3	47	8°41.7	8°43.2	8°18.0	4.7 - 2.7	10.7 - 6.2	16.7 - 9.6	47	8°56.7	8°58.2	8°32.3	4.7 - 2.8	10.7 - 6.3	16.7 - 9.9
48	8°27.0	8°28.4	8°03.9	4.8 - 2.7	10.8 - 6.0	16.8 - 9.4	48	8°42.0	8°43.4	8°18.2	4.8 - 2.8	10.8 - 6.2	16.8 -							

Increments and Corrections

m	Sun Plan.	Aries	Moon	v and d corr			m	Sun Plan.	Aries	Moon	v and d corr			m	Sun Plan.	Aries	Moon	v and d corr		
0	9°00.0	9°01.5	8°35.4	0.0 - 0.0	6.0 - 3.6	12.0 - 7.3	0	9°15.0	9°16.5	8°49.7	0.0 - 0.0	6.0 - 3.8	12.0 - 7.5	0	9°30.0	9°31.6	9°04.0	0.0 - 0.0	6.0 - 3.9	12.0 - 7.7
1	9°00.2	9°01.7	8°35.6	0.1 - 0.1	6.1 - 3.7	12.1 - 7.4	1	9°15.2	9°16.8	8°50.0	0.1 - 0.1	6.1 - 3.8	12.1 - 7.6	1	9°30.2	9°31.8	9°04.3	0.1 - 0.1	6.1 - 3.9	12.1 - 7.8
2	9°00.5	9°02.0	8°35.9	0.2 - 0.1	6.2 - 3.8	12.2 - 7.4	2	9°15.5	9°17.0	8°50.2	0.2 - 0.1	6.2 - 3.9	12.2 - 7.6	2	9°30.5	9°32.1	9°04.5	0.2 - 0.1	6.2 - 4.0	12.2 - 7.8
3	9°00.7	9°02.2	8°36.1	0.3 - 0.2	6.3 - 3.8	12.3 - 7.5	3	9°15.7	9°17.3	8°50.4	0.3 - 0.2	6.3 - 3.9	12.3 - 7.7	3	9°30.7	9°32.3	9°04.7	0.3 - 0.2	6.3 - 4.0	12.3 - 7.9
4	9°01.0	9°02.5	8°36.4	0.4 - 0.2	6.4 - 3.9	12.4 - 7.5	4	9°16.0	9°17.5	8°50.7	0.4 - 0.3	6.4 - 4.0	12.4 - 7.8	4	9°31.0	9°32.6	9°05.0	0.4 - 0.3	6.4 - 4.1	12.4 - 8.0
5	9°01.3	9°02.7	8°36.6	0.5 - 0.3	6.5 - 4.0	12.5 - 7.6	5	9°16.3	9°17.8	8°50.9	0.5 - 0.3	6.5 - 4.1	12.5 - 7.8	5	9°31.3	9°32.8	9°05.2	0.5 - 0.3	6.5 - 4.2	12.5 - 8.0
6	9°01.5	9°03.0	8°36.8	0.6 - 0.4	6.6 - 4.0	12.6 - 7.7	6	9°16.5	9°18.0	8°51.1	0.6 - 0.4	6.6 - 4.1	12.6 - 7.9	6	9°31.5	9°33.1	9°05.5	0.6 - 0.4	6.6 - 4.2	12.6 - 8.1
7	9°01.8	9°03.2	8°37.1	0.7 - 0.4	6.7 - 4.1	12.7 - 7.7	7	9°16.8	9°18.3	8°51.4	0.7 - 0.4	6.7 - 4.2	12.7 - 7.9	7	9°31.8	9°33.3	9°05.7	0.7 - 0.4	6.7 - 4.3	12.7 - 8.1
8	9°02.0	9°03.5	8°37.3	0.8 - 0.5	6.8 - 4.1	12.8 - 7.8	8	9°17.0	9°18.5	8°51.6	0.8 - 0.5	6.8 - 4.3	12.8 - 8.0	8	9°32.0	9°33.6	9°05.9	0.8 - 0.5	6.8 - 4.4	12.8 - 8.2
9	9°02.2	9°03.7	8°37.5	0.9 - 0.5	6.9 - 4.2	12.9 - 7.8	9	9°17.2	9°18.8	8°51.9	0.9 - 0.6	6.9 - 4.3	12.9 - 8.1	9	9°32.2	9°33.8	9°06.2	0.9 - 0.6	6.9 - 4.4	12.9 - 8.3
10	9°02.5	9°04.0	8°37.8	1.0 - 0.6	7.0 - 4.3	13.0 - 7.9	10	9°17.5	9°19.0	8°52.1	1.0 - 0.6	7.0 - 4.4	13.0 - 8.1	10	9°32.5	9°34.1	9°06.4	1.0 - 0.6	7.0 - 4.5	13.0 - 8.3
11	9°02.7	9°04.2	8°38.0	1.1 - 0.7	7.1 - 4.3	13.1 - 8.0	11	9°17.7	9°19.3	8°52.3	1.1 - 0.7	7.1 - 4.4	13.1 - 8.2	11	9°32.7	9°34.3	9°06.7	1.1 - 0.7	7.1 - 4.6	13.1 - 8.4
12	9°03.0	9°04.5	8°38.3	1.2 - 0.7	7.2 - 4.4	13.2 - 8.0	12	9°18.0	9°19.5	8°52.6	1.2 - 0.8	7.2 - 4.5	13.2 - 8.3	12	9°33.0	9°34.6	9°06.9	1.2 - 0.8	7.2 - 4.6	13.2 - 8.5
13	9°03.3	9°04.7	8°38.5	1.3 - 0.8	7.3 - 4.4	13.3 - 8.1	13	9°18.3	9°19.8	8°52.8	1.3 - 0.8	7.3 - 4.6	13.3 - 8.3	13	9°33.3	9°34.8	9°07.1	1.3 - 0.8	7.3 - 4.7	13.3 - 8.5
14	9°03.5	9°05.0	8°38.7	1.4 - 0.9	7.4 - 4.5	13.4 - 8.2	14	9°18.5	9°20.0	8°53.1	1.4 - 0.9	7.4 - 4.6	13.4 - 8.4	14	9°33.5	9°35.1	9°07.4	1.4 - 0.9	7.4 - 4.7	13.4 - 8.6
15	9°03.8	9°05.2	8°39.0	1.5 - 0.9	7.5 - 4.6	13.5 - 8.2	15	9°18.8	9°20.3	8°53.3	1.5 - 0.9	7.5 - 4.7	13.5 - 8.4	15	9°33.8	9°35.3	9°07.6	1.5 - 1.0	7.5 - 4.8	13.5 - 8.7
16	9°04.0	9°05.5	8°39.2	1.6 - 1.0	7.6 - 4.6	13.6 - 8.3	16	9°19.0	9°20.5	8°53.5	1.6 - 1.0	7.6 - 4.8	13.6 - 8.5	16	9°34.0	9°35.6	9°07.9	1.6 - 1.0	7.6 - 4.9	13.6 - 8.7
17	9°04.2	9°05.7	8°39.5	1.7 - 1.0	7.7 - 4.7	13.7 - 8.3	17	9°19.2	9°20.8	8°53.8	1.7 - 1.1	7.7 - 4.8	13.7 - 8.6	17	9°34.2	9°35.8	9°08.1	1.7 - 1.1	7.7 - 4.9	13.7 - 8.8
18	9°04.5	9°06.0	8°39.7	1.8 - 1.1	7.8 - 4.7	13.8 - 8.4	18	9°19.5	9°21.0	8°54.0	1.8 - 1.1	7.8 - 4.9	13.8 - 8.6	18	9°34.5	9°36.1	9°08.3	1.8 - 1.2	7.8 - 5.0	13.8 - 8.9
19	9°04.8	9°06.2	8°39.9	1.9 - 1.2	7.9 - 4.8	13.9 - 8.5	19	9°19.8	9°21.3	8°54.3	1.9 - 1.2	7.9 - 4.9	13.9 - 8.7	19	9°34.8	9°36.3	9°08.6	1.9 - 1.2	7.9 - 5.1	13.9 - 8.9
20	9°05.0	9°06.5	8°40.2	2.0 - 1.2	8.0 - 4.9	14.0 - 8.5	20	9°20.0	9°21.5	8°54.5	2.0 - 1.3	8.0 - 5.0	14.0 - 8.8	20	9°35.0	9°36.6	9°08.8	2.0 - 1.3	8.0 - 5.1	14.0 - 9.0
21	9°05.3	9°06.7	8°40.4	2.1 - 1.3	8.1 - 4.9	14.1 - 8.6	21	9°20.3	9°21.8	8°54.7	2.1 - 1.3	8.1 - 5.1	14.1 - 8.8	21	9°35.3	9°36.8	9°09.0	2.1 - 1.3	8.1 - 5.2	14.1 - 9.1
22	9°05.5	9°07.0	8°40.6	2.2 - 1.3	8.2 - 5.0	14.2 - 8.6	22	9°20.5	9°22.0	8°55.0	2.2 - 1.4	8.2 - 5.1	14.2 - 8.9	22	9°35.5	9°37.1	9°09.3	2.2 - 1.4	8.2 - 5.3	14.2 - 9.0
23	9°05.7	9°07.2	8°40.9	2.3 - 1.4	8.3 - 5.0	14.3 - 8.7	23	9°20.7	9°22.3	8°55.2	2.3 - 1.4	8.3 - 5.2	14.3 - 8.9	23	9°35.7	9°37.3	9°09.5	2.3 - 1.5	8.3 - 5.3	14.3 - 9.2
24	9°06.0	9°07.5	8°41.1	2.4 - 1.5	8.4 - 5.1	14.4 - 8.8	24	9°21.0	9°22.5	8°55.4	2.4 - 1.5	8.4 - 5.3	14.4 - 9.0	24	9°36.0	9°37.6	9°09.8	2.4 - 1.5	8.4 - 5.4	14.4 - 9.2
25	9°06.2	9°07.7	8°41.4	2.5 - 1.5	8.5 - 5.2	14.5 - 8.8	25	9°21.2	9°22.8	8°55.7	2.5 - 1.6	8.5 - 5.3	14.5 - 9.1	25	9°36.2	9°37.8	9°10.0	2.5 - 1.6	8.5 - 5.5	14.5 - 9.3
26	9°06.5	9°08.0	8°41.6	2.6 - 1.6	8.6 - 5.2	14.6 - 8.9	26	9°21.5	9°23.0	8°55.9	2.6 - 1.6	8.6 - 5.4	14.6 - 9.1	26	9°36.5	9°38.1	9°10.2	2.6 - 1.7	8.6 - 5.5	14.6 - 9.4
27	9°06.8	9°08.2	8°41.8	2.7 - 1.6	8.7 - 5.3	14.7 - 8.9	27	9°21.8	9°23.3	8°56.2	2.7 - 1.7	8.7 - 5.4	14.7 - 9.2	27	9°36.8	9°38.3	9°10.5	2.7 - 1.7	8.7 - 5.6	14.7 - 9.4
28	9°07.0	9°08.5	8°42.1	2.8 - 1.7	8.8 - 5.4	14.8 - 9.0	28	9°22.0	9°23.5	8°56.4	2.8 - 1.8	8.8 - 5.5	14.8 - 9.3	28	9°37.0	9°38.6	9°10.7	2.8 - 1.8	8.8 - 5.6	14.8 - 9.5
29	9°07.3	9°08.7	8°42.3	2.9 - 1.8	8.9 - 5.4	14.9 - 9.1	29	9°22.3	9°23.8	8°56.6	2.9 - 1.8	8.9 - 5.6	14.9 - 9.3	29	9°37.3	9°38.8	9°11.0	2.9 - 1.9	8.9 - 5.7	14.9 - 9.6
30	9°07.5	9°09.0	8°42.6	3.0 - 1.8	9.0 - 5.5	15.0 - 9.1	30	9°22.5	9°24.0	8°56.9	3.0 - 1.9	9.0 - 5.6	15.0 - 9.4	30	9°37.5	9°39.1	9°11.2	3.0 - 1.9	9.0 - 5.8	15.0 - 9.6
31	9°07.7	9°09.2	8°42.8	3.1 - 1.9	9.1 - 5.5	15.1 - 9.2	31	9°22.7	9°24.3	8°57.1	3.1 - 1.9	9.1 - 5.7	15.1 - 9.4	31	9°37.7	9°39.3	9°11.4	3.1 - 2.0	9.1 - 5.8	15.1 - 9.7
32	9°08.0	9°09.5	8°43.0	3.2 - 1.9	9.2 - 5.6	15.2 - 9.2	32	9°23.0	9°24.5	8°57.4	3.2 - 2.0	9.2 - 5.8	15.2 - 9.5	32	9°38.0	9°39.6	9°11.7	3.2 - 2.1	9.2 - 5.9	15.2 - 9.8
33	9°08.2	9°09.7	8°43.3	3.3 - 2.0	9.3 - 5.7	15.3 - 9.3	33	9°23.2	9°24.8	8°57.6	3.3 - 2.1	9.3 - 5.8	15.3 - 9.6	33	9°38.2	9°39.8	9°11.9	3.3 - 2.1	9.3 - 6.0	15.3 - 9.8
34	9°08.5	9°10.0	8°43.5	3.4 - 2.1	9.4 - 5.7	15.4 - 9.4	34	9°23.5	9°25.0	8°57.8	3.4 - 2.1	9.4 - 5.9	15.4 - 9.6	34	9°38.5	9°40.1	9°12.1	3.4 - 2.2	9.4 - 6.0	15.4 - 9.9
35	9°08.8	9°10.2	8°43.8	3.5 - 2.1	9.5 - 5.8	15.5 - 9.4	35	9°23.8	9°25.3	8°58.1	3.5 - 2.2	9.5 - 5.9	15.5 - 9.7	35	9°38.8	9°40.3	9°12.4	3.5 - 2.2	9.5 - 6.1	15.5 - 9.9
36	9°09.0	9°10.5	8°44.0	3.6 - 2.2	9.6 - 5.8	15.6 - 9.5	36	9°24.0	9°25.5	8°58.3	3.6 - 2.3	9.6 - 6.0	15.6 - 9.8	36	9°39.0	9°40.6	9°12.6	3.6 - 2.3	9.6 - 6.2	15.6 - 10.0
37	9°09.3	9°10.8	8°44.2	3.7 - 2.3	9.7 - 5.9	15.7 - 9.6	37	9°24.3	9°25.8	8°58.5	3.7 - 2.3	9.7 - 6.1	15.7 - 9.8	37	9°39.3	9°40.8	9°12.9	3.7 - 2.4	9.7 - 6.2	15.7 - 10.1
38	9°09.5	9°11.0	8°44.5	3.8 - 2.3	9.8 - 6.0	15.8 - 9.6	38	9°24.5	9°26.0	8°58.8	3.8 - 2.4	9.8 - 6.1	15.8 - 9.9	38	9°39.5	9°41.1	9°13.1	3.8 - 2.4	9.8 - 6.3	15.8 - 10.1
39	9°09.7	9°11.3	8°44.7	3.9 - 2.4	9.9 - 6.0	15.9 - 9.7	39	9°24.7	9°26.3	8°59.0	3.9 - 2.4	9.9 - 6.2	15.9 - 9.9	39	9°39.7	9°41.3	9°13.3	3.9 - 2.5	9.9 - 6.4	15.9 - 10.2
40	9°10.0	9°11.5	8°44.9	4.0 - 2.4	10.0 - 6.1	16.0 - 9.7	40	9°25.0	9°26.5	8°59.3	4.0 - 2.5	10.0 - 6.3	16.0 - 10.0	40	9°40.0	9°41.6	9°13.6	4.0 - 2.6	10.0 - 6.4	16.0 - 10.3
41	9°10.2	9°11.8	8°45.2	4.1 - 2.5	10.1 - 6.1	16.1 - 9.8	41	9°25.2	9°26.8	8°59.5	4.1 - 2.6	10.1 - 6.3	16.1 - 10.1	41	9°40.2	9°41.8	9°13.8	4.1 - 2.6	10.1 - 6.5	16.1 - 10.3
42	9°10.5	9°12.0	8°45.4	4.2 - 2.6	10.2 - 6.2	16.2 - 9.9	42	9°25.5	9°27.0	8°59.7	4.2 - 2.6	10.2 - 6.4	16.2 - 10.1	42	9°40.5	9°42.1	9°14.1	4.2 - 2.7	10.2 - 6.5	16.2 - 10.4
43	9°10.8	9°12.3	8°45.7	4.3 - 2.6	10.3 - 6.3	16.3 - 9.9	43	9°25.8	9°27.3	8°60.0	4.3 - 2.7	10.3 - 6.4	16.3 - 10.2	43	9°40.8	9°42.3	9°14.3	4.3 - 2.8	10.3 - 6.6	16.3 - 10.5
44	9°11.0	9°12.5	8°45.9	4.4 - 2.7	10.4 - 6.3	16.4 - 10.0	44	9°26.0	9°27.5	9°00.2	4.4 - 2.8	10.4 - 6.5	16.4 - 10.3	44	9°41.0	9°42.6	9°14.5	4.4 - 2.8	10.4 - 6.7	16.4 - 10.5
45	9°11.2	9°12.8	8°46.1	4.5 - 2.7	10.5 - 6.4	16.5 - 10.0	45	9°26.2	9°27.8	9°00.5	4.5 - 2.8	10.5 - 6.6	16.5 - 10.3	45	9°41.2	9°42.8	9°14.8	4.5 - 2.9	10.5 - 6.7	16.5 - 10.6
46	9°11.5	9°13.0	8°46.4	4.6 - 2.8	10.6 - 6.4	16.6 - 10.1	46	9°26.5	9°28.0	9°00.7	4.6 - 2.9	10.6 - 6.6	16.6 - 10.4	46	9°41.5	9°43.1	9°15.0	4.6 - 3.0	10.6 - 6.8	16.6 - 10.7
47	9°11.7	9°13.3	8°46.6	4.7 - 2.9	10.7 - 6.5	16.7 - 10.2	47	9°26.7	9°28.3	9°00.9	4.7 - 2.9	10.7 - 6.7	16.7 - 10.4	47	9°41.7	9°43.3	9°15.2	4.7 - 3.0	10.7 - 6.9	16.7 - 10.7
48	9°12.0	9°13.5	8°46.9	4.8 - 2.9	10.8 - 6.6	16.8 - 10.2	48	9°27.0	9°28.5	9°01.2	4.8 - 3.0	10.8 - 6.8	16.8 - 10.5	48	9°42.0	9°43.6	9°15.5	4.8 - 3.1	10.8 - 6.9	16.8 - 10.8

Increments and Corrections

m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr		
39	Plan.						40	Plan.					41	Plan.						
0	9°45.0	9°46.6	9°18.4	0.0 - 0.0	6.0 - 4.0	12.0 - 7.9	0	10°00.0	10°01.6	9°32.7	0.0 - 0.0	6.0 - 4.1	12.0 - 8.1	0	10°15.0	10°16.7	9°47.0	0.0 - 0.0	6.0 - 4.2	12.0 - 8.3
1	9°45.2	9°46.8	9°18.6	0.1 - 0.1	6.1 - 4.0	12.1 - 8.0	1	10°00.2	10°01.9	9°32.9	0.1 - 0.1	6.1 - 4.1	12.1 - 8.2	1	10°15.2	10°16.9	9°47.2	0.1 - 0.1	6.1 - 4.2	12.1 - 8.4
2	9°45.5	9°47.1	9°18.8	0.2 - 0.1	6.2 - 4.1	12.2 - 8.0	2	10°00.5	10°02.1	9°33.1	0.2 - 0.1	6.2 - 4.2	12.2 - 8.2	2	10°15.5	10°17.2	9°47.5	0.2 - 0.1	6.2 - 4.3	12.2 - 8.4
3	9°45.7	9°47.4	9°19.1	0.3 - 0.2	6.3 - 4.1	12.3 - 8.1	3	10°00.7	10°02.4	9°33.4	0.3 - 0.2	6.3 - 4.3	12.3 - 8.3	3	10°15.7	10°17.4	9°47.7	0.3 - 0.2	6.3 - 4.4	12.3 - 8.5
4	9°46.0	9°47.6	9°19.3	0.4 - 0.3	6.4 - 4.2	12.4 - 8.2	4	10°01.0	10°02.6	9°33.6	0.4 - 0.3	6.4 - 4.3	12.4 - 8.4	4	10°16.0	10°17.7	9°47.9	0.4 - 0.3	6.4 - 4.4	12.4 - 8.6
5	9°46.3	9°47.9	9°19.5	0.5 - 0.3	6.5 - 4.3	12.5 - 8.2	5	10°01.3	10°02.9	9°33.9	0.5 - 0.3	6.5 - 4.4	12.5 - 8.4	5	10°16.3	10°17.9	9°48.2	0.5 - 0.3	6.5 - 4.5	12.5 - 8.6
6	9°46.5	9°48.1	9°19.8	0.6 - 0.4	6.6 - 4.3	12.6 - 8.3	6	10°01.5	10°03.1	9°34.1	0.6 - 0.4	6.6 - 4.5	12.6 - 8.5	6	10°16.5	10°18.2	9°48.4	0.6 - 0.4	6.6 - 4.6	12.6 - 8.7
7	9°46.8	9°48.4	9°20.0	0.7 - 0.5	6.7 - 4.4	12.7 - 8.4	7	10°01.8	10°03.4	9°34.3	0.7 - 0.5	6.7 - 4.5	12.7 - 8.6	7	10°16.8	10°18.4	9°48.7	0.7 - 0.5	6.7 - 4.6	12.7 - 8.8
8	9°47.0	9°48.6	9°20.3	0.8 - 0.5	6.8 - 4.5	12.8 - 8.4	8	10°02.0	10°03.6	9°34.6	0.8 - 0.5	6.8 - 4.6	12.8 - 8.6	8	10°17.0	10°18.7	9°48.9	0.8 - 0.6	6.8 - 4.7	12.8 - 8.9
9	9°47.2	9°48.9	9°20.5	0.9 - 0.6	6.9 - 4.5	12.9 - 8.5	9	10°02.2	10°03.9	9°34.8	0.9 - 0.6	6.9 - 4.7	12.9 - 8.7	9	10°17.2	10°18.9	9°49.1	0.9 - 0.6	6.9 - 4.8	12.9 - 8.9
10	9°47.5	9°49.1	9°20.7	1.0 - 0.7	7.0 - 4.6	13.0 - 8.6	10	10°02.5	10°04.1	9°35.1	1.0 - 0.7	7.0 - 4.7	13.0 - 8.8	10	10°17.5	10°19.2	9°49.4	1.0 - 0.7	7.0 - 4.8	13.0 - 9.0
11	9°47.7	9°49.4	9°21.0	1.1 - 0.7	7.1 - 4.7	13.1 - 8.6	11	10°02.7	10°04.4	9°35.3	1.1 - 0.7	7.1 - 4.8	13.1 - 8.8	11	10°17.7	10°19.4	9°49.6	1.1 - 0.8	7.1 - 4.9	13.1 - 9.1
12	9°48.0	9°49.6	9°21.2	1.2 - 0.8	7.2 - 4.7	13.2 - 8.7	12	10°03.0	10°04.6	9°35.5	1.2 - 0.8	7.2 - 4.9	13.2 - 8.9	12	10°18.0	10°19.7	9°49.8	1.2 - 0.8	7.2 - 5.0	13.2 - 9.1
13	9°48.3	9°49.9	9°21.5	1.3 - 0.9	7.3 - 4.8	13.3 - 8.8	13	10°03.3	10°04.9	9°35.8	1.3 - 0.9	7.3 - 4.9	13.3 - 9.0	13	10°18.3	10°19.9	9°50.1	1.3 - 0.9	7.3 - 5.0	13.3 - 9.2
14	9°48.5	9°50.1	9°21.7	1.4 - 0.9	7.4 - 4.9	13.4 - 8.8	14	10°03.5	10°05.1	9°36.0	1.4 - 0.9	7.4 - 5.0	13.4 - 9.0	14	10°18.5	10°20.2	9°50.3	1.4 - 1.0	7.4 - 5.1	13.4 - 9.3
15	9°48.8	9°50.4	9°21.9	1.5 - 1.0	7.5 - 4.9	13.5 - 8.9	15	10°03.8	10°05.4	9°36.2	1.5 - 1.0	7.5 - 5.1	13.5 - 9.1	15	10°18.8	10°20.4	9°50.6	1.5 - 1.0	7.5 - 5.2	13.5 - 9.3
16	9°49.0	9°50.6	9°22.2	1.6 - 1.1	7.6 - 5.0	13.6 - 9.0	16	10°04.0	10°05.7	9°36.5	1.6 - 1.1	7.6 - 5.1	13.6 - 9.2	16	10°19.0	10°20.7	9°50.8	1.6 - 1.1	7.6 - 5.3	13.6 - 9.4
17	9°49.2	9°50.9	9°22.4	1.7 - 1.1	7.7 - 5.1	13.7 - 9.0	17	10°04.2	10°05.9	9°36.7	1.7 - 1.1	7.7 - 5.2	13.7 - 9.2	17	10°19.2	10°20.9	9°51.0	1.7 - 1.2	7.7 - 5.3	13.7 - 9.5
18	9°49.5	9°51.1	9°22.6	1.8 - 1.2	7.8 - 5.1	13.8 - 9.1	18	10°04.5	10°06.2	9°37.0	1.8 - 1.2	7.8 - 5.3	13.8 - 9.3	18	10°19.5	10°21.2	9°51.3	1.8 - 1.2	7.8 - 5.4	13.8 - 9.5
19	9°49.8	9°51.4	9°22.9	1.9 - 1.3	7.9 - 5.2	13.9 - 9.2	19	10°04.8	10°06.4	9°37.2	1.9 - 1.3	7.9 - 5.3	13.9 - 9.4	19	10°19.8	10°21.4	9°51.5	1.9 - 1.3	7.9 - 5.5	13.9 - 9.6
20	9°50.0	9°51.6	9°23.1	2.0 - 1.3	8.0 - 5.3	14.0 - 9.2	20	10°05.0	10°06.7	9°37.4	2.0 - 1.4	8.0 - 5.4	14.0 - 9.5	20	10°20.0	10°21.7	9°51.8	2.0 - 1.4	8.0 - 5.5	14.0 - 9.7
21	9°50.3	9°51.9	9°23.4	2.1 - 1.4	8.1 - 5.3	14.1 - 9.3	21	10°05.3	10°06.9	9°37.7	2.1 - 1.4	8.1 - 5.5	14.1 - 9.5	21	10°20.3	10°21.9	9°52.0	2.1 - 1.5	8.1 - 5.6	14.1 - 9.8
22	9°50.5	9°52.1	9°23.6	2.2 - 1.4	8.2 - 5.4	14.2 - 9.3	22	10°05.5	10°07.2	9°37.9	2.2 - 1.5	8.2 - 5.5	14.2 - 9.6	22	10°20.5	10°22.2	9°52.2	2.2 - 1.5	8.2 - 5.7	14.2 - 9.8
23	9°50.7	9°52.4	9°23.8	2.3 - 1.5	8.3 - 5.5	14.3 - 9.4	23	10°05.7	10°07.4	9°38.2	2.3 - 1.6	8.3 - 5.6	14.3 - 9.7	23	10°20.7	10°22.4	9°52.5	2.3 - 1.6	8.3 - 5.7	14.3 - 9.9
24	9°51.0	9°52.6	9°24.1	2.4 - 1.6	8.4 - 5.5	14.4 - 9.5	24	10°06.0	10°07.7	9°38.4	2.4 - 1.6	8.4 - 5.7	14.4 - 9.7	24	10°21.0	10°22.7	9°52.7	2.4 - 1.7	8.4 - 5.8	14.4 - 10.0
25	9°51.2	9°52.9	9°24.3	2.5 - 1.6	8.5 - 5.6	14.5 - 9.5	25	10°06.2	10°07.9	9°38.6	2.5 - 1.7	8.5 - 5.7	14.5 - 9.8	25	10°21.2	10°22.9	9°52.9	2.5 - 1.7	8.5 - 5.9	14.5 - 10.0
26	9°51.5	9°53.1	9°24.6	2.6 - 1.7	8.6 - 5.7	14.6 - 9.6	26	10°06.5	10°08.2	9°38.9	2.6 - 1.8	8.6 - 5.8	14.6 - 9.9	26	10°21.5	10°23.2	9°53.2	2.6 - 1.8	8.6 - 5.9	14.6 - 10.1
27	9°51.8	9°53.4	9°24.8	2.7 - 1.8	8.7 - 5.7	14.7 - 9.7	27	10°06.8	10°08.4	9°39.1	2.7 - 1.8	8.7 - 5.9	14.7 - 9.9	27	10°21.8	10°23.4	9°53.4	2.7 - 1.9	8.7 - 6.0	14.7 - 10.2
28	9°52.0	9°53.6	9°25.0	2.8 - 1.8	8.8 - 5.8	14.8 - 9.7	28	10°07.0	10°08.7	9°39.3	2.8 - 1.9	8.8 - 5.9	14.8 - 10.0	28	10°22.0	10°23.7	9°53.7	2.8 - 1.9	8.8 - 6.1	14.8 - 10.2
29	9°52.3	9°53.9	9°25.3	2.9 - 1.9	8.9 - 5.9	14.9 - 9.8	29	10°07.3	10°08.9	9°39.6	2.9 - 2.0	8.9 - 6.0	14.9 - 10.1	29	10°22.3	10°24.0	9°53.9	2.9 - 2.0	8.9 - 6.2	14.9 - 10.3
30	9°52.5	9°54.1	9°25.5	3.0 - 2.0	9.0 - 5.9	15.0 - 9.9	30	10°07.5	10°09.2	9°39.8	3.0 - 2.0	9.0 - 6.1	15.0 - 10.1	30	10°22.5	10°24.2	9°54.1	3.0 - 2.1	9.0 - 6.2	15.0 - 10.4
31	9°52.7	9°54.4	9°25.7	3.1 - 2.0	9.1 - 6.0	15.1 - 9.9	31	10°07.7	10°09.4	9°40.1	3.1 - 2.1	9.1 - 6.1	15.1 - 10.2	31	10°22.7	10°24.5	9°54.4	3.1 - 2.1	9.1 - 6.3	15.1 - 10.4
32	9°53.0	9°54.6	9°26.0	3.2 - 2.1	9.2 - 6.1	15.2 - 10.0	32	10°08.0	10°09.7	9°40.3	3.2 - 2.2	9.2 - 6.2	15.2 - 10.3	32	10°23.0	10°24.7	9°54.6	3.2 - 2.2	9.2 - 6.4	15.2 - 10.5
33	9°53.2	9°54.9	9°26.2	3.3 - 2.2	9.3 - 6.1	15.3 - 10.1	33	10°08.2	10°09.9	9°40.5	3.3 - 2.2	9.3 - 6.3	15.3 - 10.3	33	10°23.2	10°25.0	9°54.9	3.3 - 2.3	9.3 - 6.4	15.3 - 10.6
34	9°53.5	9°55.1	9°26.5	3.4 - 2.2	9.4 - 6.2	15.4 - 10.1	34	10°08.5	10°10.2	9°40.8	3.4 - 2.3	9.4 - 6.3	15.4 - 10.4	34	10°23.5	10°25.2	9°55.1	3.4 - 2.4	9.4 - 6.5	15.4 - 10.7
35	9°53.8	9°55.4	9°26.7	3.5 - 2.3	9.5 - 6.3	15.5 - 10.2	35	10°08.8	10°10.4	9°41.0	3.5 - 2.4	9.5 - 6.4	15.5 - 10.5	35	10°23.8	10°25.5	9°55.3	3.5 - 2.4	9.5 - 6.6	15.5 - 10.7
36	9°54.0	9°55.6	9°26.9	3.6 - 2.4	9.6 - 6.3	15.6 - 10.3	36	10°09.0	10°10.7	9°41.3	3.6 - 2.4	9.6 - 6.5	15.6 - 10.5	36	10°24.0	10°25.7	9°55.6	3.6 - 2.5	9.6 - 6.6	15.6 - 10.8
37	9°54.3	9°55.9	9°27.2	3.7 - 2.4	9.7 - 6.4	15.7 - 10.3	37	10°09.3	10°10.9	9°41.5	3.7 - 2.5	9.7 - 6.5	15.7 - 10.6	37	10°24.3	10°26.0	9°55.8	3.7 - 2.6	9.7 - 6.7	15.7 - 10.9
38	9°54.5	9°56.1	9°27.4	3.8 - 2.5	9.8 - 6.5	15.8 - 10.4	38	10°09.5	10°11.2	9°41.7	3.8 - 2.6	9.8 - 6.6	15.8 - 10.7	38	10°24.5	10°26.2	9°56.1	3.8 - 2.6	9.8 - 6.8	15.8 - 10.9
39	9°54.7	9°56.4	9°27.7	3.9 - 2.6	9.9 - 6.5	15.9 - 10.5	39	10°09.7	10°11.4	9°42.0	3.9 - 2.6	9.9 - 6.7	15.9 - 10.7	39	10°24.7	10°26.5	9°56.3	3.9 - 2.7	9.9 - 6.8	15.9 - 11.0
40	9°55.0	9°56.6	9°27.9	4.0 - 2.6	10.0 - 6.6	16.0 - 10.5	40	10°10.0	10°11.7	9°42.2	4.0 - 2.7	10.0 - 6.8	16.0 - 10.8	40	10°25.0	10°26.7	9°56.5	4.0 - 2.8	10.0 - 6.9	16.0 - 11.1
41	9°55.2	9°56.9	9°28.1	4.1 - 2.7	10.1 - 6.6	16.1 - 10.6	41	10°10.2	10°11.9	9°42.4	4.1 - 2.8	10.1 - 6.8	16.1 - 10.9	41	10°25.2	10°27.0	9°56.8	4.1 - 2.8	10.1 - 7.0	16.1 - 11.1
42	9°55.5	9°57.1	9°28.4	4.2 - 2.8	10.2 - 6.7	16.2 - 10.7	42	10°10.5	10°12.2	9°42.7	4.2 - 2.8	10.2 - 6.9	16.2 - 10.9	42	10°25.5	10°27.2	9°57.0	4.2 - 2.9	10.2 - 7.1	16.2 - 11.2
43	9°55.8	9°57.4	9°28.6	4.3 - 2.8	10.3 - 6.8	16.3 - 10.7	43	10°10.8	10°12.4	9°42.9	4.3 - 2.9	10.3 - 7.0	16.3 - 11.0	43	10°25.8	10°27.5	9°57.2	4.3 - 3.0	10.3 - 7.1	16.3 - 11.3
44	9°56.0	9°57.6	9°28.8	4.4 - 2.9	10.4 - 6.8	16.4 - 10.8	44	10°11.0	10°12.7	9°43.2	4.4 - 3.0	10.4 - 7.0	16.4 - 11.1	44	10°26.0	10°27.7	9°57.5	4.4 - 3.0	10.4 - 7.2	16.4 - 11.3
45	9°56.2	9°57.9	9°29.1	4.5 - 3.0	10.5 - 6.9	16.5 - 10.9	45	10°11.2	10°12.9	9°43.4	4.5 - 3.0	10.5 - 7.1	16.5 - 11.1	45	10°26.2	10°28.0	9°57.7	4.5 - 3.1	10.5 - 7.3	16.5 - 11.4
46	9°56.5	9°58.1	9°29.3	4.6 - 3.0	10.6 - 7.0	16.6 - 10.9	46	10°11.5	10°13.2	9°43.6	4.6 - 3.1	10.6 - 7.2	16.6 - 11.2	46	10°26.5	10°28.2	9°58.0	4.6 - 3.2	10.6 - 7.3	16.6 - 11.5
47	9°56.7	9°58.4	9°29.6	4.7 - 3.1	10.7 - 7.0	16.7 - 11.0	47	10°11.7	10°13.4	9°43.9	4.7 - 3.2	10.7 - 7.2	16.7 - 11.3	47	10°26.7	10°28.5	9°58.2	4.7 - 3.3	10.7 - 7.4	16.7 - 11.6
48	9°57.0	9°58.6	9°29.8	4.8 - 3.2	10.8 - 7.1															

Increments and Corrections

m	Sun Plan.	Aries	Moon	v and d corr			m	Sun Plan.	Aries	Moon	v and d corr			m	Sun Plan.	Aries	Moon	v and d corr		
0	11°15.0	11°16.8	10°44.3	0.0 - 0.0	6.0 - 4.6	12.0 - 9.1	0	11°30.0	11°31.9	10°58.6	0.0 - 0.0	6.0 - 4.7	12.0 - 9.3	0	11°45.0	11°46.9	11°12.9	0.0 - 0.0	6.0 - 4.8	12.0 - 9.5
1	11°15.2	11°17.1	10°44.5	0.1 - 0.1	6.1 - 4.6	12.1 - 9.2	1	11°30.2	11°32.1	10°58.8	0.1 - 0.1	6.1 - 4.7	12.1 - 9.4	1	11°45.2	11°47.2	11°13.1	0.1 - 0.1	6.1 - 4.8	12.1 - 9.6
2	11°15.5	11°17.3	10°44.7	0.2 - 0.2	6.2 - 4.7	12.2 - 9.3	2	11°30.5	11°32.4	10°59.0	0.2 - 0.2	6.2 - 4.8	12.2 - 9.5	2	11°45.5	11°47.4	11°13.4	0.2 - 0.2	6.2 - 4.9	12.2 - 9.7
3	11°15.7	11°17.6	10°45.0	0.3 - 0.2	6.3 - 4.8	12.3 - 9.3	3	11°30.7	11°32.6	10°59.3	0.3 - 0.2	6.3 - 4.9	12.3 - 9.5	3	11°45.7	11°47.7	11°13.6	0.3 - 0.2	6.3 - 5.0	12.3 - 9.7
4	11°16.0	11°17.8	10°45.2	0.4 - 0.3	6.4 - 4.9	12.4 - 9.4	4	11°31.0	11°32.9	10°59.5	0.4 - 0.3	6.4 - 5.0	12.4 - 9.6	4	11°46.0	11°47.9	11°13.8	0.4 - 0.3	6.4 - 5.1	12.4 - 9.8
5	11°16.3	11°18.1	10°45.4	0.5 - 0.4	6.5 - 4.9	12.5 - 9.5	5	11°31.3	11°33.1	10°59.8	0.5 - 0.4	6.5 - 5.0	12.5 - 9.7	5	11°46.3	11°48.2	11°14.1	0.5 - 0.4	6.5 - 5.1	12.5 - 9.9
6	11°16.5	11°18.3	10°45.7	0.6 - 0.5	6.6 - 5.0	12.6 - 9.6	6	11°31.5	11°33.4	10°60.0	0.6 - 0.5	6.6 - 5.1	12.6 - 9.8	6	11°46.5	11°48.4	11°14.3	0.6 - 0.5	6.6 - 5.2	12.6 - 10.0
7	11°16.8	11°18.6	10°45.9	0.7 - 0.5	6.7 - 5.1	12.7 - 9.6	7	11°31.8	11°33.6	11°00.2	0.7 - 0.5	6.7 - 5.2	12.7 - 9.8	7	11°46.8	11°48.7	11°14.6	0.7 - 0.6	6.7 - 5.3	12.7 - 10.1
8	11°17.0	11°18.9	10°46.2	0.8 - 0.6	6.8 - 5.2	12.8 - 9.7	8	11°32.0	11°33.9	11°00.5	0.8 - 0.6	6.8 - 5.3	12.8 - 9.9	8	11°47.0	11°48.9	11°14.8	0.8 - 0.6	6.8 - 5.4	12.8 - 10.1
9	11°17.2	11°19.1	10°46.4	0.9 - 0.7	6.9 - 5.2	12.9 - 9.8	9	11°32.2	11°34.1	11°00.7	0.9 - 0.7	6.9 - 5.3	12.9 - 10.0	9	11°47.2	11°49.2	11°15.0	0.9 - 0.7	6.9 - 5.5	12.9 - 10.2
10	11°17.5	11°19.4	10°46.6	1.0 - 0.8	7.0 - 5.3	13.0 - 9.9	10	11°32.5	11°34.4	11°01.0	1.0 - 0.8	7.0 - 5.4	13.0 - 10.1	10	11°47.5	11°49.4	11°15.3	1.0 - 0.8	7.0 - 5.5	13.0 - 10.3
11	11°17.7	11°19.6	10°46.9	1.1 - 0.8	7.1 - 5.4	13.1 - 9.9	11	11°32.7	11°34.6	11°01.2	1.1 - 0.9	7.1 - 5.5	13.1 - 10.2	11	11°47.7	11°49.7	11°15.5	1.1 - 0.9	7.1 - 5.6	13.1 - 10.4
12	11°18.0	11°19.9	10°47.1	1.2 - 0.9	7.2 - 5.5	13.2 - 10.0	12	11°33.0	11°34.9	11°01.4	1.2 - 0.9	7.2 - 5.6	13.2 - 10.2	12	11°48.0	11°49.9	11°15.7	1.2 - 1.0	7.2 - 5.7	13.2 - 10.5
13	11°18.3	11°20.1	10°47.4	1.3 - 1.0	7.3 - 5.5	13.3 - 10.1	13	11°33.3	11°35.1	11°01.7	1.3 - 1.0	7.3 - 5.7	13.3 - 10.3	13	11°48.3	11°50.2	11°16.0	1.3 - 1.0	7.3 - 5.8	13.3 - 10.5
14	11°18.5	11°20.4	10°47.6	1.4 - 1.1	7.4 - 5.6	13.4 - 10.2	14	11°33.5	11°35.4	11°01.9	1.4 - 1.1	7.4 - 5.7	13.4 - 10.4	14	11°48.5	11°50.4	11°16.2	1.4 - 1.1	7.4 - 5.9	13.4 - 10.6
15	11°18.8	11°20.6	10°47.8	1.5 - 1.1	7.5 - 5.7	13.5 - 10.2	15	11°33.8	11°35.6	11°02.1	1.5 - 1.2	7.5 - 5.8	13.5 - 10.5	15	11°48.8	11°50.7	11°16.5	1.5 - 1.2	7.5 - 5.9	13.5 - 10.7
16	11°19.0	11°20.9	10°48.1	1.6 - 1.2	7.6 - 5.8	13.6 - 10.3	16	11°34.0	11°35.9	11°02.4	1.6 - 1.2	7.6 - 5.9	13.6 - 10.5	16	11°49.0	11°50.9	11°16.7	1.6 - 1.3	7.6 - 6.0	13.6 - 10.8
17	11°19.2	11°21.1	10°48.3	1.7 - 1.3	7.7 - 5.8	13.7 - 10.4	17	11°34.2	11°36.1	11°02.6	1.7 - 1.3	7.7 - 6.0	13.7 - 10.6	17	11°49.2	11°51.2	11°16.9	1.7 - 1.3	7.7 - 6.1	13.7 - 10.8
18	11°19.5	11°21.4	10°48.5	1.8 - 1.4	7.8 - 5.9	13.8 - 10.5	18	11°34.5	11°36.4	11°02.9	1.8 - 1.4	7.8 - 6.0	13.8 - 10.7	18	11°49.5	11°51.4	11°17.2	1.8 - 1.4	7.8 - 6.2	13.8 - 10.9
19	11°19.8	11°21.6	10°48.8	1.9 - 1.4	7.9 - 6.0	13.9 - 10.5	19	11°34.8	11°36.6	11°03.1	1.9 - 1.5	7.9 - 6.1	13.9 - 10.8	19	11°49.8	11°51.7	11°17.4	1.9 - 1.5	7.9 - 6.3	13.9 - 11.0
20	11°20.0	11°21.9	10°49.0	2.0 - 1.5	8.0 - 6.1	14.0 - 10.6	20	11°35.0	11°36.9	11°03.3	2.0 - 1.6	8.0 - 6.2	14.0 - 10.9	20	11°50.0	11°51.9	11°17.7	2.0 - 1.6	8.0 - 6.3	14.0 - 11.1
21	11°20.3	11°22.1	10°49.3	2.1 - 1.6	8.1 - 6.1	14.1 - 10.7	21	11°35.3	11°37.2	11°03.6	2.1 - 1.6	8.1 - 6.3	14.1 - 10.9	21	11°50.3	11°52.2	11°17.9	2.1 - 1.7	8.1 - 6.4	14.1 - 11.2
22	11°20.5	11°22.4	10°49.5	2.2 - 1.7	8.2 - 6.2	14.2 - 10.8	22	11°35.5	11°37.4	11°03.8	2.2 - 1.7	8.2 - 6.4	14.2 - 11.0	22	11°50.5	11°52.4	11°18.1	2.2 - 1.7	8.2 - 6.5	14.2 - 11.2
23	11°20.7	11°22.6	10°49.7	2.3 - 1.7	8.3 - 6.3	14.3 - 10.8	23	11°35.7	11°37.7	11°04.1	2.3 - 1.8	8.3 - 6.4	14.3 - 11.1	23	11°50.7	11°52.7	11°18.4	2.3 - 1.8	8.3 - 6.6	14.3 - 11.3
24	11°21.0	11°22.9	10°50.0	2.4 - 1.8	8.4 - 6.4	14.4 - 10.9	24	11°36.0	11°37.9	11°04.3	2.4 - 1.9	8.4 - 6.5	14.4 - 11.2	24	11°51.0	11°52.9	11°18.6	2.4 - 1.9	8.4 - 6.7	14.4 - 11.4
25	11°21.2	11°23.1	10°50.2	2.5 - 1.9	8.5 - 6.4	14.5 - 11.0	25	11°36.2	11°38.2	11°04.5	2.5 - 1.9	8.5 - 6.6	14.5 - 11.2	25	11°51.2	11°53.2	11°18.8	2.5 - 2.0	8.5 - 6.7	14.5 - 11.5
26	11°21.5	11°23.4	10°50.5	2.6 - 2.0	8.6 - 6.5	14.6 - 11.1	26	11°36.5	11°38.4	11°04.8	2.6 - 2.0	8.6 - 6.7	14.6 - 11.3	26	11°51.5	11°53.4	11°19.1	2.6 - 2.1	8.6 - 6.8	14.6 - 11.6
27	11°21.8	11°23.6	10°50.7	2.7 - 2.0	8.7 - 6.6	14.7 - 11.1	27	11°36.8	11°38.7	11°05.0	2.7 - 2.1	8.7 - 6.7	14.7 - 11.4	27	11°51.8	11°53.7	11°19.3	2.7 - 2.1	8.7 - 6.9	14.7 - 11.6
28	11°22.0	11°23.9	10°50.9	2.8 - 2.1	8.8 - 6.7	14.8 - 11.2	28	11°37.0	11°38.9	11°05.2	2.8 - 2.2	8.8 - 6.8	14.8 - 11.5	28	11°52.0	11°53.9	11°19.6	2.8 - 2.2	8.8 - 7.0	14.8 - 11.7
29	11°22.3	11°24.1	10°51.2	2.9 - 2.2	8.9 - 6.7	14.9 - 11.3	29	11°37.3	11°39.2	11°05.5	2.9 - 2.2	8.9 - 6.9	14.9 - 11.5	29	11°52.3	11°54.2	11°19.8	2.9 - 2.3	8.9 - 7.0	14.9 - 11.8
30	11°22.5	11°24.4	10°51.4	3.0 - 2.3	9.0 - 6.8	15.0 - 11.4	30	11°37.5	11°39.4	11°05.7	3.0 - 2.3	9.0 - 7.0	15.0 - 11.6	30	11°52.5	11°54.4	11°20.0	3.0 - 2.4	9.0 - 7.1	15.0 - 11.9
31	11°22.7	11°24.6	10°51.6	3.1 - 2.4	9.1 - 6.9	15.1 - 11.5	31	11°37.7	11°39.7	11°06.0	3.1 - 2.4	9.1 - 7.1	15.1 - 11.7	31	11°52.7	11°54.7	11°20.3	3.1 - 2.5	9.1 - 7.2	15.1 - 12.0
32	11°23.0	11°24.9	10°51.9	3.2 - 2.4	9.2 - 7.0	15.2 - 11.5	32	11°38.0	11°39.9	11°06.2	3.2 - 2.5	9.2 - 7.1	15.2 - 11.8	32	11°53.0	11°54.9	11°20.5	3.2 - 2.5	9.2 - 7.3	15.2 - 12.0
33	11°23.2	11°25.1	10°52.1	3.3 - 2.5	9.3 - 7.1	15.3 - 11.6	33	11°38.2	11°40.2	11°06.4	3.3 - 2.6	9.3 - 7.2	15.3 - 11.9	33	11°53.2	11°55.2	11°20.8	3.3 - 2.6	9.3 - 7.4	15.3 - 12.1
34	11°23.5	11°25.4	10°52.4	3.4 - 2.6	9.4 - 7.1	15.4 - 11.7	34	11°38.5	11°40.4	11°06.7	3.4 - 2.6	9.4 - 7.3	15.4 - 11.9	34	11°53.5	11°55.5	11°21.0	3.4 - 2.7	9.4 - 7.4	15.4 - 12.2
35	11°23.8	11°25.6	10°52.6	3.5 - 2.7	9.5 - 7.2	15.5 - 11.8	35	11°38.8	11°40.7	11°06.9	3.5 - 2.7	9.5 - 7.4	15.5 - 12.0	35	11°53.8	11°55.7	11°21.2	3.5 - 2.8	9.5 - 7.5	15.5 - 12.3
36	11°24.0	11°25.9	10°52.8	3.6 - 2.7	9.6 - 7.3	15.6 - 11.8	36	11°39.0	11°40.9	11°07.2	3.6 - 2.8	9.6 - 7.4	15.6 - 12.1	36	11°54.0	11°56.0	11°21.5	3.6 - 2.9	9.6 - 7.6	15.6 - 12.4
37	11°24.3	11°26.1	10°53.1	3.7 - 2.8	9.7 - 7.4	15.7 - 11.9	37	11°39.3	11°41.2	11°07.4	3.7 - 2.9	9.7 - 7.5	15.7 - 12.2	37	11°54.3	11°56.2	11°21.7	3.7 - 2.9	9.7 - 7.7	15.7 - 12.4
38	11°24.5	11°26.4	10°53.3	3.8 - 2.9	9.8 - 7.4	15.8 - 12.0	38	11°39.5	11°41.4	11°07.6	3.8 - 2.9	9.8 - 7.6	15.8 - 12.2	38	11°54.5	11°56.5	11°22.0	3.8 - 3.0	9.8 - 7.8	15.8 - 12.5
39	11°24.7	11°26.6	10°53.6	3.9 - 3.0	9.9 - 7.5	15.9 - 12.1	39	11°39.7	11°41.7	11°07.9	3.9 - 3.0	9.9 - 7.7	15.9 - 12.3	39	11°54.7	11°56.7	11°22.2	3.9 - 3.1	9.9 - 7.8	15.9 - 12.6
40	11°25.0	11°26.9	10°53.8	4.0 - 3.0	10.0 - 7.6	16.0 - 12.1	40	11°40.0	11°41.9	11°08.1	4.0 - 3.1	10.0 - 7.8	16.0 - 12.4	40	11°55.0	11°57.0	11°22.4	4.0 - 3.2	10.0 - 7.9	16.0 - 12.7
41	11°25.2	11°27.1	10°54.0	4.1 - 3.1	10.1 - 7.7	16.1 - 12.2	41	11°40.2	11°42.2	11°08.3	4.1 - 3.2	10.1 - 7.8	16.1 - 12.5	41	11°55.2	11°57.2	11°22.7	4.1 - 3.2	10.1 - 8.0	16.1 - 12.7
42	11°25.5	11°27.4	10°54.3	4.2 - 3.2	10.2 - 7.7	16.2 - 12.3	42	11°40.5	11°42.4	11°08.6	4.2 - 3.3	10.2 - 7.9	16.2 - 12.6	42	11°55.5	11°57.5	11°22.9	4.2 - 3.3	10.2 - 8.1	16.2 - 12.8
43	11°25.8	11°27.6	10°54.5	4.3 - 3.3	10.3 - 7.8	16.3 - 12.4	43	11°40.8	11°42.7	11°08.8	4.3 - 3.3	10.3 - 8.0	16.3 - 12.6	43	11°55.8	11°57.7	11°23.1	4.3 - 3.4	10.3 - 8.2	16.3 - 12.9
44	11°26.0	11°27.9	10°54.7	4.4 - 3.3	10.4 - 7.9	16.4 - 12.4	44	11°41.0	11°42.9	11°09.1	4.4 - 3.4	10.4 - 8.1	16.4 - 12.7	44	11°56.0	11°58.0	11°23.4	4.4 - 3.5	10.4 - 8.2	16.4 - 13.0
45	11°26.2	11°28.1	10°55.0	4.5 - 3.4	10.5 - 8.0	16.5 - 12.5	45	11°41.2	11°43.2	11°09.3	4.5 - 3.5	10.5 - 8.1	16.5 - 12.8	45	11°56.2	11°58.2	11°23.6	4.5 - 3.6	10.5 - 8.3	16.5 - 13.1
46	11°26.5	11°28.4	10°55.2	4.6 - 3.5	10.6 - 8.0	16.6 - 12.6	46	11°41.5	11°43.4	11°09.5	4.6 - 3.6	10.6 - 8.2	16.6 - 12.9	46	11°56.5	11°58.5	11°23.9	4.6 - 3.6	10.6 - 8.4	16.6 - 13.1
47	11°26.7	11°28.6	10°55.5	4.7 - 3.6	10.7 - 8.1	16.7 - 12.7	47	11°41.7	11°43.7											

Increments and Corrections

m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr		
48	Plan.						49	Plan.					50	Plan.						
0	12°00.0	12°02.0	11°27.2	0.0 - 0.0	6.0 - 4.9	12.0 - 9.7	0	12°15.0	12°17.0	11°41.5	0.0 - 0.0	6.0 - 4.9	12.0 - 9.9	0	12°30.0	12°32.1	11°55.8	0.0 - 0.0	6.0 - 5.1	12.0 - 10.1
1	12°00.2	12°02.2	11°27.4	0.1 - 0.1	6.1 - 4.9	12.1 - 9.8	1	12°15.2	12°17.3	11°41.8	0.1 - 0.1	6.1 - 5.0	12.1 - 10.0	1	12°30.2	12°32.3	11°56.1	0.1 - 0.1	6.1 - 5.1	12.1 - 10.2
2	12°00.5	12°02.5	11°27.7	0.2 - 0.2	6.2 - 5.0	12.2 - 9.9	2	12°15.5	12°17.5	11°42.0	0.2 - 0.2	6.2 - 5.1	12.2 - 10.1	2	12°30.5	12°32.6	11°56.3	0.2 - 0.2	6.2 - 5.2	12.2 - 10.3
3	12°00.7	12°02.7	11°27.9	0.3 - 0.2	6.3 - 5.1	12.3 - 9.9	3	12°15.7	12°17.8	11°42.2	0.3 - 0.2	6.3 - 5.2	12.3 - 10.1	3	12°30.7	12°32.8	11°56.5	0.3 - 0.3	6.3 - 5.3	12.3 - 10.4
4	12°01.0	12°03.0	11°28.2	0.4 - 0.3	6.4 - 5.2	12.4 - 10.0	4	12°16.0	12°18.0	11°42.5	0.4 - 0.3	6.4 - 5.3	12.4 - 10.2	4	12°31.0	12°33.1	11°56.8	0.4 - 0.3	6.4 - 5.4	12.4 - 10.4
5	12°01.3	12°03.2	11°28.4	0.5 - 0.4	6.5 - 5.3	12.5 - 10.1	5	12°16.3	12°18.3	11°42.7	0.5 - 0.4	6.5 - 5.4	12.5 - 10.3	5	12°31.3	12°33.3	11°57.0	0.5 - 0.4	6.5 - 5.5	12.5 - 10.5
6	12°01.5	12°03.5	11°28.6	0.6 - 0.5	6.6 - 5.3	12.6 - 10.2	6	12°16.5	12°18.5	11°42.9	0.6 - 0.5	6.6 - 5.4	12.6 - 10.4	6	12°31.5	12°33.6	11°57.3	0.6 - 0.5	6.6 - 5.6	12.6 - 10.6
7	12°01.8	12°03.7	11°28.9	0.7 - 0.6	6.7 - 5.4	12.7 - 10.3	7	12°16.8	12°18.8	11°43.2	0.7 - 0.6	6.7 - 5.5	12.7 - 10.5	7	12°31.8	12°33.8	11°57.5	0.7 - 0.6	6.7 - 5.6	12.7 - 10.7
8	12°02.0	12°04.0	11°29.1	0.8 - 0.6	6.8 - 5.5	12.8 - 10.3	8	12°17.0	12°19.0	11°43.4	0.8 - 0.7	6.8 - 5.6	12.8 - 10.6	8	12°32.0	12°34.1	11°57.7	0.8 - 0.7	6.8 - 5.7	12.8 - 10.8
9	12°02.2	12°04.2	11°29.3	0.9 - 0.7	6.9 - 5.6	12.9 - 10.4	9	12°17.2	12°19.3	11°43.7	0.9 - 0.7	6.9 - 5.7	12.9 - 10.6	9	12°32.2	12°34.3	11°58.0	0.9 - 0.8	6.9 - 5.8	12.9 - 10.9
10	12°02.5	12°04.5	11°29.6	1.0 - 0.8	7.0 - 5.7	13.0 - 10.5	10	12°17.5	12°19.5	11°43.9	1.0 - 0.8	7.0 - 5.8	13.0 - 10.7	10	12°32.5	12°34.6	11°58.2	1.0 - 0.8	7.0 - 5.9	13.0 - 10.9
11	12°02.7	12°04.7	11°29.8	1.1 - 0.9	7.1 - 5.7	13.1 - 10.6	11	12°17.7	12°19.8	11°44.1	1.1 - 0.9	7.1 - 5.9	13.1 - 10.8	11	12°32.7	12°34.8	11°58.5	1.1 - 0.9	7.1 - 6.0	13.1 - 11.0
12	12°03.0	12°05.0	11°30.1	1.2 - 1.0	7.2 - 5.8	13.2 - 10.7	12	12°18.0	12°20.0	11°44.4	1.2 - 1.0	7.2 - 5.9	13.2 - 10.9	12	12°33.0	12°35.1	11°58.7	1.2 - 1.0	7.2 - 6.1	13.2 - 11.1
13	12°03.3	12°05.2	11°30.3	1.3 - 1.1	7.3 - 5.9	13.3 - 10.8	13	12°18.3	12°20.3	11°44.6	1.3 - 1.1	7.3 - 6.0	13.3 - 11.0	13	12°33.3	12°35.3	11°58.9	1.3 - 1.1	7.3 - 6.1	13.3 - 11.2
14	12°03.5	12°05.5	11°30.5	1.4 - 1.1	7.4 - 6.0	13.4 - 10.8	14	12°18.5	12°20.5	11°44.9	1.4 - 1.2	7.4 - 6.1	13.4 - 11.1	14	12°33.5	12°35.6	11°59.2	1.4 - 1.2	7.4 - 6.2	13.4 - 11.3
15	12°03.8	12°05.7	11°30.8	1.5 - 1.2	7.5 - 6.1	13.5 - 10.9	15	12°18.8	12°20.8	11°45.1	1.5 - 1.2	7.5 - 6.2	13.5 - 11.1	15	12°33.8	12°35.8	11°59.4	1.5 - 1.3	7.5 - 6.3	13.5 - 11.4
16	12°04.0	12°06.0	11°31.0	1.6 - 1.3	7.6 - 6.1	13.6 - 11.0	16	12°19.0	12°21.0	11°45.3	1.6 - 1.3	7.6 - 6.3	13.6 - 11.2	16	12°34.0	12°36.1	11°59.7	1.6 - 1.3	7.6 - 6.4	13.6 - 11.4
17	12°04.2	12°06.2	11°31.3	1.7 - 1.4	7.7 - 6.2	13.7 - 11.1	17	12°19.2	12°21.3	11°45.6	1.7 - 1.4	7.7 - 6.4	13.7 - 11.3	17	12°34.2	12°36.3	11°59.9	1.7 - 1.4	7.7 - 6.5	13.7 - 11.5
18	12°04.5	12°06.5	11°31.5	1.8 - 1.5	7.8 - 6.3	13.8 - 11.2	18	12°19.5	12°21.5	11°45.8	1.8 - 1.5	7.8 - 6.4	13.8 - 11.4	18	12°34.5	12°36.6	12°00.1	1.8 - 1.5	7.8 - 6.6	13.8 - 11.6
19	12°04.8	12°06.7	11°31.7	1.9 - 1.5	7.9 - 6.4	13.9 - 11.2	19	12°19.8	12°21.8	11°46.1	1.9 - 1.6	7.9 - 6.5	13.9 - 11.5	19	12°34.8	12°36.8	12°00.4	1.9 - 1.6	7.9 - 6.6	13.9 - 11.7
20	12°05.0	12°07.0	11°32.0	2.0 - 1.6	8.0 - 6.5	14.0 - 11.3	20	12°20.0	12°22.0	11°46.3	2.0 - 1.7	8.0 - 6.6	14.0 - 11.5	20	12°35.0	12°37.1	12°00.6	2.0 - 1.7	8.0 - 6.7	14.0 - 11.8
21	12°05.3	12°07.2	11°32.2	2.1 - 1.7	8.1 - 6.5	14.1 - 11.4	21	12°20.3	12°22.3	11°46.5	2.1 - 1.7	8.1 - 6.7	14.1 - 11.6	21	12°35.3	12°37.3	12°00.8	2.1 - 1.8	8.1 - 6.8	14.1 - 11.9
22	12°05.5	12°07.5	11°32.4	2.2 - 1.8	8.2 - 6.6	14.2 - 11.5	22	12°20.5	12°22.5	11°46.8	2.2 - 1.8	8.2 - 6.8	14.2 - 11.7	22	12°35.5	12°37.6	12°01.1	2.2 - 1.9	8.2 - 6.9	14.2 - 12.0
23	12°05.7	12°07.7	11°32.7	2.3 - 1.9	8.3 - 6.7	14.3 - 11.6	23	12°20.7	12°22.8	11°47.0	2.3 - 1.9	8.3 - 6.8	14.3 - 11.8	23	12°35.7	12°37.8	12°01.3	2.3 - 1.9	8.3 - 7.0	14.3 - 12.0
24	12°06.0	12°08.0	11°32.9	2.4 - 1.9	8.4 - 6.8	14.4 - 11.6	24	12°21.0	12°23.0	11°47.2	2.4 - 2.0	8.4 - 6.9	14.4 - 11.9	24	12°36.0	12°38.1	12°01.6	2.4 - 2.0	8.4 - 7.1	14.4 - 12.1
25	12°06.2	12°08.2	11°33.2	2.5 - 2.0	8.5 - 6.9	14.5 - 11.7	25	12°21.2	12°23.3	11°47.5	2.5 - 2.1	8.5 - 7.0	14.5 - 12.0	25	12°36.2	12°38.3	12°01.8	2.5 - 2.1	8.5 - 7.2	14.5 - 12.2
26	12°06.5	12°08.5	11°33.4	2.6 - 2.1	8.6 - 7.0	14.6 - 11.8	26	12°21.5	12°23.5	11°47.7	2.6 - 2.1	8.6 - 7.1	14.6 - 12.0	26	12°36.5	12°38.6	12°02.0	2.6 - 2.2	8.6 - 7.2	14.6 - 12.3
27	12°06.8	12°08.7	11°33.6	2.7 - 2.2	8.7 - 7.0	14.7 - 11.9	27	12°21.8	12°23.8	11°48.0	2.7 - 2.2	8.7 - 7.2	14.7 - 12.1	27	12°36.8	12°38.8	12°02.3	2.7 - 2.3	8.7 - 7.3	14.7 - 12.4
28	12°07.0	12°09.0	11°33.9	2.8 - 2.3	8.8 - 7.1	14.8 - 12.0	28	12°22.0	12°24.0	11°48.2	2.8 - 2.3	8.8 - 7.3	14.8 - 12.2	28	12°37.0	12°39.1	12°02.5	2.8 - 2.4	8.8 - 7.4	14.8 - 12.5
29	12°07.3	12°09.2	11°34.1	2.9 - 2.3	8.9 - 7.2	14.9 - 12.0	29	12°22.3	12°24.3	11°48.4	2.9 - 2.4	8.9 - 7.3	14.9 - 12.3	29	12°37.3	12°39.3	12°02.8	2.9 - 2.4	8.9 - 7.5	14.9 - 12.5
30	12°07.5	12°09.5	11°34.4	3.0 - 2.4	9.0 - 7.3	15.0 - 12.1	30	12°22.5	12°24.5	11°48.7	3.0 - 2.5	9.0 - 7.4	15.0 - 12.4	30	12°37.5	12°39.6	12°03.0	3.0 - 2.5	9.0 - 7.6	15.0 - 12.6
31	12°07.7	12°09.7	11°34.6	3.1 - 2.5	9.1 - 7.4	15.1 - 12.2	31	12°22.7	12°24.8	11°48.9	3.1 - 2.6	9.1 - 7.5	15.1 - 12.5	31	12°37.7	12°39.8	12°03.2	3.1 - 2.6	9.1 - 7.7	15.1 - 12.7
32	12°08.0	12°10.0	11°34.8	3.2 - 2.6	9.2 - 7.4	15.2 - 12.3	32	12°23.0	12°25.0	11°49.2	3.2 - 2.6	9.2 - 7.6	15.2 - 12.5	32	12°38.0	12°40.1	12°03.5	3.2 - 2.7	9.2 - 7.7	15.2 - 12.8
33	12°08.2	12°10.2	11°35.1	3.3 - 2.7	9.3 - 7.5	15.3 - 12.4	33	12°23.2	12°25.3	11°49.4	3.3 - 2.7	9.3 - 7.7	15.3 - 12.6	33	12°38.2	12°40.3	12°03.7	3.3 - 2.8	9.3 - 7.8	15.3 - 12.9
34	12°08.5	12°10.5	11°35.3	3.4 - 2.7	9.4 - 7.6	15.4 - 12.4	34	12°23.5	12°25.5	11°49.6	3.4 - 2.8	9.4 - 7.8	15.4 - 12.7	34	12°38.5	12°40.6	12°03.9	3.4 - 2.9	9.4 - 7.9	15.4 - 13.0
35	12°08.8	12°10.7	11°35.6	3.5 - 2.8	9.5 - 7.7	15.5 - 12.5	35	12°23.8	12°25.8	11°49.9	3.5 - 2.9	9.5 - 7.8	15.5 - 12.8	35	12°38.8	12°40.8	12°04.2	3.5 - 2.9	9.5 - 8.0	15.5 - 13.0
36	12°09.0	12°11.0	11°35.8	3.6 - 2.9	9.6 - 7.8	15.6 - 12.6	36	12°24.0	12°26.0	11°50.1	3.6 - 3.0	9.6 - 7.9	15.6 - 12.9	36	12°39.0	12°41.1	12°04.4	3.6 - 3.0	9.6 - 8.1	15.6 - 13.1
37	12°09.3	12°11.2	11°36.0	3.7 - 3.0	9.7 - 7.8	15.7 - 12.7	37	12°24.3	12°26.3	11°50.3	3.7 - 3.1	9.7 - 8.0	15.7 - 13.0	37	12°39.3	12°41.3	12°04.7	3.7 - 3.1	9.7 - 8.2	15.7 - 13.2
38	12°09.5	12°11.5	11°36.3	3.8 - 3.1	9.8 - 7.9	15.8 - 12.8	38	12°24.5	12°26.5	11°50.6	3.8 - 3.1	9.8 - 8.1	15.8 - 13.0	38	12°39.5	12°41.6	12°04.9	3.8 - 3.2	9.8 - 8.2	15.8 - 13.3
39	12°09.7	12°11.7	11°36.5	3.9 - 3.2	9.9 - 8.0	15.9 - 12.9	39	12°24.7	12°26.8	11°50.8	3.9 - 3.2	9.9 - 8.2	15.9 - 13.1	39	12°39.7	12°41.8	12°05.1	3.9 - 3.3	9.9 - 8.3	15.9 - 13.4
40	12°10.0	12°12.0	11°36.7	4.0 - 3.2	10.0 - 8.1	16.0 - 12.9	40	12°25.0	12°27.0	11°51.1	4.0 - 3.3	10.0 - 8.3	16.0 - 13.2	40	12°40.0	12°42.1	12°05.4	4.0 - 3.4	10.0 - 8.4	16.0 - 13.5
41	12°10.2	12°12.2	11°37.0	4.1 - 3.3	10.1 - 8.2	16.1 - 13.0	41	12°25.2	12°27.3	11°51.3	4.1 - 3.4	10.1 - 8.3	16.1 - 13.3	41	12°40.2	12°42.3	12°05.6	4.1 - 3.5	10.1 - 8.5	16.1 - 13.6
42	12°10.5	12°12.5	11°37.2	4.2 - 3.4	10.2 - 8.2	16.2 - 13.1	42	12°25.5	12°27.5	11°51.5	4.2 - 3.5	10.2 - 8.4	16.2 - 13.4	42	12°40.5	12°42.6	12°05.9	4.2 - 3.5	10.2 - 8.6	16.2 - 13.6
43	12°10.8	12°12.7	11°37.5	4.3 - 3.5	10.3 - 8.3	16.3 - 13.2	43	12°25.8	12°27.8	11°51.8	4.3 - 3.5	10.3 - 8.5	16.3 - 13.4	43	12°40.8	12°42.8	12°06.1	4.3 - 3.6	10.3 - 8.7	16.3 - 13.7
44	12°11.0	12°13.0	11°37.7	4.4 - 3.6	10.4 - 8.4	16.4 - 13.3	44	12°26.0	12°28.0	11°52.0	4.4 - 3.6	10.4 - 8.6	16.4 - 13.5	44	12°41.0	12°43.1	12°06.3	4.4 - 3.7	10.4 - 8.8	16.4 - 13.8
45	12°11.2	12°13.2	11°37.9	4.5 - 3.6	10.5 - 8.5	16.5 - 13.3	45	12°26.2	12°28.3	11°52.3	4.5 - 3.7	10.5 - 8.7	16.5 - 13.6	45	12°41.2	12°43.3	12°06.6	4.5 - 3.8	10.5 - 8.8	16.5 - 13.9
46	12°11.5	12°13.5	11°38.2	4.6 - 3.7	10.6 - 8.6	16.6 - 13.4	46	12°26.5	12°28.5	11°52.5	4.6 - 3.8	10.6 - 8.7	16.6 - 13.7	46	12°41.5	12°43.6	12°06.8	4.6 - 3.9	10.6 - 8.9	16.6 - 14.0
47																				

Increments and Corrections

m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr		
51	Plan.						52	Plan.						53	Plan.					
0	12°45.0	12°47.1	12°10.1	0.0 - 0.0	6.0 - 5.1	12.0 - 10.3	0	13°00.0	13°02.1	12°24.5	0.0 - 0.0	6.0 - 5.3	12.0 - 10.5	0	13°15.0	13°17.2	12°38.8	0.0 - 0.0	6.0 - 5.4	12.0 - 10.7
1	12°45.2	12°47.3	12°10.4	0.1 - 0.1	6.1 - 5.2	12.1 - 10.4	1	13°00.2	13°02.4	12°24.7	0.1 - 0.1	6.1 - 5.3	12.1 - 10.6	1	13°15.2	13°17.4	12°39.0	0.1 - 0.1	6.1 - 5.4	12.1 - 10.8
2	12°45.5	12°47.6	12°10.6	0.2 - 0.2	6.2 - 5.3	12.2 - 10.5	2	13°00.5	13°02.6	12°24.9	0.2 - 0.2	6.2 - 5.4	12.2 - 10.7	2	13°15.5	13°17.7	12°39.3	0.2 - 0.2	6.2 - 5.5	12.2 - 10.9
3	12°45.7	12°47.8	12°10.9	0.3 - 0.3	6.3 - 5.4	12.3 - 10.6	3	13°00.7	13°02.9	12°25.2	0.3 - 0.3	6.3 - 5.5	12.3 - 10.8	3	13°15.7	13°17.9	12°39.5	0.3 - 0.3	6.3 - 5.6	12.3 - 11.0
4	12°46.0	12°48.1	12°11.1	0.4 - 0.3	6.4 - 5.5	12.4 - 10.6	4	13°01.0	13°03.1	12°25.4	0.4 - 0.4	6.4 - 5.6	12.4 - 10.9	4	13°16.0	13°18.2	12°39.7	0.4 - 0.4	6.4 - 5.7	12.4 - 11.1
5	12°46.3	12°48.3	12°11.3	0.5 - 0.4	6.5 - 5.6	12.5 - 10.7	5	13°01.3	13°03.4	12°25.7	0.5 - 0.4	6.5 - 5.7	12.5 - 10.9	5	13°16.3	13°18.4	12°40.0	0.5 - 0.4	6.5 - 5.8	12.5 - 11.1
6	12°46.5	12°48.6	12°11.6	0.6 - 0.5	6.6 - 5.7	12.6 - 10.8	6	13°01.5	13°03.6	12°25.9	0.6 - 0.5	6.6 - 5.8	12.6 - 11.0	6	13°16.5	13°18.7	12°40.2	0.6 - 0.5	6.6 - 5.9	12.6 - 11.2
7	12°46.8	12°48.8	12°11.8	0.7 - 0.6	6.7 - 5.8	12.7 - 10.9	7	13°01.8	13°03.9	12°26.1	0.7 - 0.6	6.7 - 5.9	12.7 - 11.1	7	13°16.8	13°18.9	12°40.5	0.7 - 0.6	6.7 - 6.0	12.7 - 11.3
8	12°47.0	12°49.1	12°12.1	0.8 - 0.7	6.8 - 5.8	12.8 - 11.0	8	13°02.0	13°04.1	12°26.4	0.8 - 0.7	6.8 - 6.0	12.8 - 11.2	8	13°17.0	13°19.2	12°40.7	0.8 - 0.7	6.8 - 6.1	12.8 - 11.4
9	12°47.2	12°49.3	12°12.3	0.9 - 0.8	6.9 - 5.9	12.9 - 11.1	9	13°02.2	13°04.4	12°26.6	0.9 - 0.8	6.9 - 6.0	12.9 - 11.3	9	13°17.2	13°19.4	12°40.9	0.9 - 0.8	6.9 - 6.2	12.9 - 11.5
10	12°47.5	12°49.6	12°12.5	1.0 - 0.9	7.0 - 6.0	13.0 - 11.2	10	13°02.5	13°04.6	12°26.9	1.0 - 0.9	7.0 - 6.1	13.0 - 11.4	10	13°17.5	13°19.7	12°41.2	1.0 - 0.9	7.0 - 6.2	13.0 - 11.6
11	12°47.7	12°49.8	12°12.8	1.1 - 0.9	7.1 - 6.1	13.1 - 11.2	11	13°02.7	13°04.9	12°27.1	1.1 - 1.0	7.1 - 6.2	13.1 - 11.5	11	13°17.7	13°19.9	12°41.4	1.1 - 1.0	7.1 - 6.3	13.1 - 11.7
12	12°48.0	12°50.1	12°13.0	1.2 - 1.0	7.2 - 6.2	13.2 - 11.3	12	13°03.0	13°05.1	12°27.3	1.2 - 1.1	7.2 - 6.3	13.2 - 11.5	12	13°18.0	13°20.2	12°41.6	1.2 - 1.1	7.2 - 6.4	13.2 - 11.8
13	12°48.3	12°50.3	12°13.3	1.3 - 1.1	7.3 - 6.3	13.3 - 11.4	13	13°03.3	13°05.4	12°27.6	1.3 - 1.1	7.3 - 6.4	13.3 - 11.6	13	13°18.3	13°20.4	12°41.9	1.3 - 1.2	7.3 - 6.5	13.3 - 11.9
14	12°48.5	12°50.6	12°13.5	1.4 - 1.2	7.4 - 6.4	13.4 - 11.5	14	13°03.5	13°05.6	12°27.8	1.4 - 1.2	7.4 - 6.5	13.4 - 11.7	14	13°18.5	13°20.7	12°42.1	1.4 - 1.2	7.4 - 6.6	13.4 - 11.9
15	12°48.8	12°50.9	12°13.7	1.5 - 1.3	7.5 - 6.4	13.5 - 11.6	15	13°03.8	13°05.9	12°28.0	1.5 - 1.3	7.5 - 6.6	13.5 - 11.8	15	13°18.8	13°20.9	12°42.4	1.5 - 1.3	7.5 - 6.7	13.5 - 12.0
16	12°49.0	12°51.1	12°14.0	1.6 - 1.4	7.6 - 6.5	13.6 - 11.7	16	13°04.0	13°06.1	12°28.3	1.6 - 1.4	7.6 - 6.7	13.6 - 11.9	16	13°19.0	13°21.2	12°42.6	1.6 - 1.4	7.6 - 6.8	13.6 - 12.1
17	12°49.2	12°51.4	12°14.2	1.7 - 1.5	7.7 - 6.6	13.7 - 11.8	17	13°04.2	13°06.4	12°28.5	1.7 - 1.5	7.7 - 6.7	13.7 - 12.0	17	13°19.2	13°21.4	12°42.8	1.7 - 1.5	7.7 - 6.9	13.7 - 12.2
18	12°49.5	12°51.6	12°14.4	1.8 - 1.5	7.8 - 6.7	13.8 - 11.8	18	13°04.5	13°06.6	12°28.8	1.8 - 1.6	7.8 - 6.8	13.8 - 12.1	18	13°19.5	13°21.7	12°43.1	1.8 - 1.6	7.8 - 7.0	13.8 - 12.3
19	12°49.8	12°51.9	12°14.7	1.9 - 1.6	7.9 - 6.8	13.9 - 11.9	19	13°04.8	13°06.9	12°29.0	1.9 - 1.7	7.9 - 6.9	13.9 - 12.2	19	13°19.8	13°21.9	12°43.3	1.9 - 1.7	7.9 - 7.0	13.9 - 12.4
20	12°50.0	12°52.1	12°14.9	2.0 - 1.7	8.0 - 6.9	14.0 - 12.0	20	13°05.0	13°07.1	12°29.2	2.0 - 1.8	8.0 - 7.0	14.0 - 12.3	20	13°20.0	13°22.2	12°43.6	2.0 - 1.8	8.0 - 7.1	14.0 - 12.5
21	12°50.3	12°52.4	12°15.2	2.1 - 1.8	8.1 - 7.0	14.1 - 12.1	21	13°05.3	13°07.4	12°29.5	2.1 - 1.8	8.1 - 7.1	14.1 - 12.3	21	13°20.3	13°22.4	12°43.8	2.1 - 1.9	8.1 - 7.2	14.1 - 12.6
22	12°50.5	12°52.6	12°15.4	2.2 - 1.9	8.2 - 7.0	14.2 - 12.2	22	13°05.5	13°07.6	12°29.7	2.2 - 1.9	8.2 - 7.2	14.2 - 12.4	22	13°20.5	13°22.7	12°44.0	2.2 - 2.0	8.2 - 7.3	14.2 - 12.7
23	12°50.7	12°52.9	12°15.6	2.3 - 2.0	8.3 - 7.1	14.3 - 12.3	23	13°05.7	13°07.9	12°30.0	2.3 - 2.0	8.3 - 7.3	14.3 - 12.5	23	13°20.7	13°22.9	12°44.3	2.3 - 2.1	8.3 - 7.4	14.3 - 12.8
24	12°51.0	12°53.1	12°15.9	2.4 - 2.1	8.4 - 7.2	14.4 - 12.4	24	13°06.0	13°08.1	12°30.2	2.4 - 2.1	8.4 - 7.4	14.4 - 12.6	24	13°21.0	13°23.2	12°44.5	2.4 - 2.1	8.4 - 7.5	14.4 - 12.8
25	12°51.2	12°53.4	12°16.1	2.5 - 2.1	8.5 - 7.3	14.5 - 12.4	25	13°06.2	13°08.4	12°30.4	2.5 - 2.2	8.5 - 7.4	14.5 - 12.7	25	13°21.2	13°23.4	12°44.7	2.5 - 2.2	8.5 - 7.6	14.5 - 12.9
26	12°51.5	12°53.6	12°16.4	2.6 - 2.2	8.6 - 7.4	14.6 - 12.5	26	13°06.5	13°08.6	12°30.7	2.6 - 2.3	8.6 - 7.5	14.6 - 12.8	26	13°21.5	13°23.7	12°45.0	2.6 - 2.3	8.6 - 7.7	14.6 - 13.0
27	12°51.8	12°53.9	12°16.6	2.7 - 2.3	8.7 - 7.5	14.7 - 12.6	27	13°06.8	13°08.9	12°30.9	2.7 - 2.4	8.7 - 7.6	14.7 - 12.9	27	13°21.8	13°23.9	12°45.2	2.7 - 2.4	8.7 - 7.8	14.7 - 13.1
28	12°52.0	12°54.1	12°16.8	2.8 - 2.4	8.8 - 7.6	14.8 - 12.7	28	13°07.0	13°09.2	12°31.1	2.8 - 2.5	8.8 - 7.7	14.8 - 13.0	28	13°22.0	13°24.2	12°45.5	2.8 - 2.5	8.8 - 7.8	14.8 - 13.2
29	12°52.3	12°54.4	12°17.1	2.9 - 2.5	8.9 - 7.6	14.9 - 12.8	29	13°07.3	13°09.4	12°31.4	2.9 - 2.5	8.9 - 7.8	14.9 - 13.0	29	13°22.3	13°24.4	12°45.7	2.9 - 2.6	8.9 - 7.9	14.9 - 13.3
30	12°52.5	12°54.6	12°17.3	3.0 - 2.6	9.0 - 7.7	15.0 - 12.9	30	13°07.5	13°09.7	12°31.6	3.0 - 2.6	9.0 - 7.9	15.0 - 13.1	30	13°22.5	13°24.7	12°45.9	3.0 - 2.7	9.0 - 8.0	15.0 - 13.4
31	12°52.7	12°54.9	12°17.5	3.1 - 2.7	9.1 - 7.8	15.1 - 13.0	31	13°07.7	13°09.9	12°31.9	3.1 - 2.7	9.1 - 8.0	15.1 - 13.2	31	13°22.7	13°24.9	12°46.2	3.1 - 2.8	9.1 - 8.1	15.1 - 13.5
32	12°53.0	12°55.1	12°17.8	3.2 - 2.7	9.2 - 7.9	15.2 - 13.0	32	13°08.0	13°10.2	12°32.1	3.2 - 2.8	9.2 - 8.0	15.2 - 13.3	32	13°23.0	13°25.2	12°46.4	3.2 - 2.9	9.2 - 8.2	15.2 - 13.6
33	12°53.2	12°55.4	12°18.0	3.3 - 2.8	9.3 - 8.0	15.3 - 13.1	33	13°08.2	13°10.4	12°32.3	3.3 - 2.9	9.3 - 8.1	15.3 - 13.4	33	13°23.2	13°25.4	12°46.7	3.3 - 2.9	9.3 - 8.3	15.3 - 13.7
34	12°53.5	12°55.6	12°18.3	3.4 - 2.9	9.4 - 8.1	15.4 - 13.2	34	13°08.5	13°10.7	12°32.6	3.4 - 3.0	9.4 - 8.2	15.4 - 13.5	34	13°23.5	13°25.7	12°46.9	3.4 - 3.0	9.4 - 8.4	15.4 - 13.8
35	12°53.8	12°55.9	12°18.5	3.5 - 3.0	9.5 - 8.2	15.5 - 13.3	35	13°08.8	13°10.9	12°32.8	3.5 - 3.1	9.5 - 8.3	15.5 - 13.6	35	13°23.8	13°25.9	12°47.1	3.5 - 3.1	9.5 - 8.5	15.5 - 13.8
36	12°54.0	12°56.1	12°18.7	3.6 - 3.1	9.6 - 8.2	15.6 - 13.4	36	13°09.0	13°11.2	12°33.1	3.6 - 3.2	9.6 - 8.4	15.6 - 13.7	36	13°24.0	13°26.2	12°47.4	3.6 - 3.2	9.6 - 8.6	15.6 - 13.9
37	12°54.3	12°56.4	12°19.0	3.7 - 3.2	9.7 - 8.3	15.7 - 13.5	37	13°09.3	13°11.4	12°33.3	3.7 - 3.2	9.7 - 8.5	15.7 - 13.7	37	13°24.3	13°26.4	12°47.6	3.7 - 3.3	9.7 - 8.6	15.7 - 14.0
38	12°54.5	12°56.6	12°19.2	3.8 - 3.3	9.8 - 8.4	15.8 - 13.6	38	13°09.5	13°11.7	12°33.5	3.8 - 3.3	9.8 - 8.6	15.8 - 13.8	38	13°24.5	13°26.7	12°47.9	3.8 - 3.4	9.8 - 8.7	15.8 - 14.1
39	12°54.7	12°56.9	12°19.5	3.9 - 3.3	9.9 - 8.5	15.9 - 13.6	39	13°09.7	13°11.9	12°33.8	3.9 - 3.4	9.9 - 8.7	15.9 - 13.9	39	13°24.7	13°26.9	12°48.1	3.9 - 3.5	9.9 - 8.8	15.9 - 14.2
40	12°55.0	12°57.1	12°19.7	4.0 - 3.4	10.0 - 8.6	16.0 - 13.7	40	13°10.0	13°12.2	12°34.0	4.0 - 3.5	10.0 - 8.8	16.0 - 14.0	40	13°25.0	13°27.2	12°48.3	4.0 - 3.6	10.0 - 8.9	16.0 - 14.3
41	12°55.2	12°57.4	12°19.9	4.1 - 3.5	10.1 - 8.7	16.1 - 13.8	41	13°10.2	13°12.4	12°34.2	4.1 - 3.6	10.1 - 8.8	16.1 - 14.1	41	13°25.2	13°27.5	12°48.6	4.1 - 3.7	10.1 - 9.0	16.1 - 14.4
42	12°55.5	12°57.6	12°20.2	4.2 - 3.6	10.2 - 8.8	16.2 - 13.9	42	13°10.5	13°12.7	12°34.5	4.2 - 3.7	10.2 - 8.9	16.2 - 14.2	42	13°25.5	13°27.7	12°48.8	4.2 - 3.7	10.2 - 9.1	16.2 - 14.4
43	12°55.8	12°57.9	12°20.4	4.3 - 3.7	10.3 - 8.8	16.3 - 14.0	43	13°10.8	13°12.9	12°34.7	4.3 - 3.8	10.3 - 9.0	16.3 - 14.3	43	13°25.8	13°28.0	12°49.0	4.3 - 3.8	10.3 - 9.2	16.3 - 14.5
44	12°56.0	12°58.1	12°20.6	4.4 - 3.8	10.4 - 8.9	16.4 - 14.1	44	13°11.0	13°13.2	12°35.0	4.4 - 3.9	10.4 - 9.1	16.4 - 14.3	44	13°26.0	13°28.2	12°49.3	4.4 - 3.9	10.4 - 9.3	16.4 - 14.6
45	12°56.2	12°58.4	12°20.9	4.5 - 3.9	10.5 - 9.0	16.5 - 14.2	45	13°11.2	13°13.4	12°35.2	4.5 - 3.9	10.5 - 9.2	16.5 - 14.4	45	13°26.2	13°28.5	12°49.5	4.5 - 4.0	10.5 - 9.4	16.5 - 14.7
46	12°56.5	12°58.6	12°21.1	4.6 - 3.9	10.6 - 9.1	16.6 - 14.2	46	13°11.5	13°13.7	12°35.4	4.6 - 4.0	10.6 - 9.3	16.6 - 14.5	46	13°26.5	13°28.7	12°49.8	4.6 - 4.1	10.6 - 9.5	16.6 -

Increments and Corrections

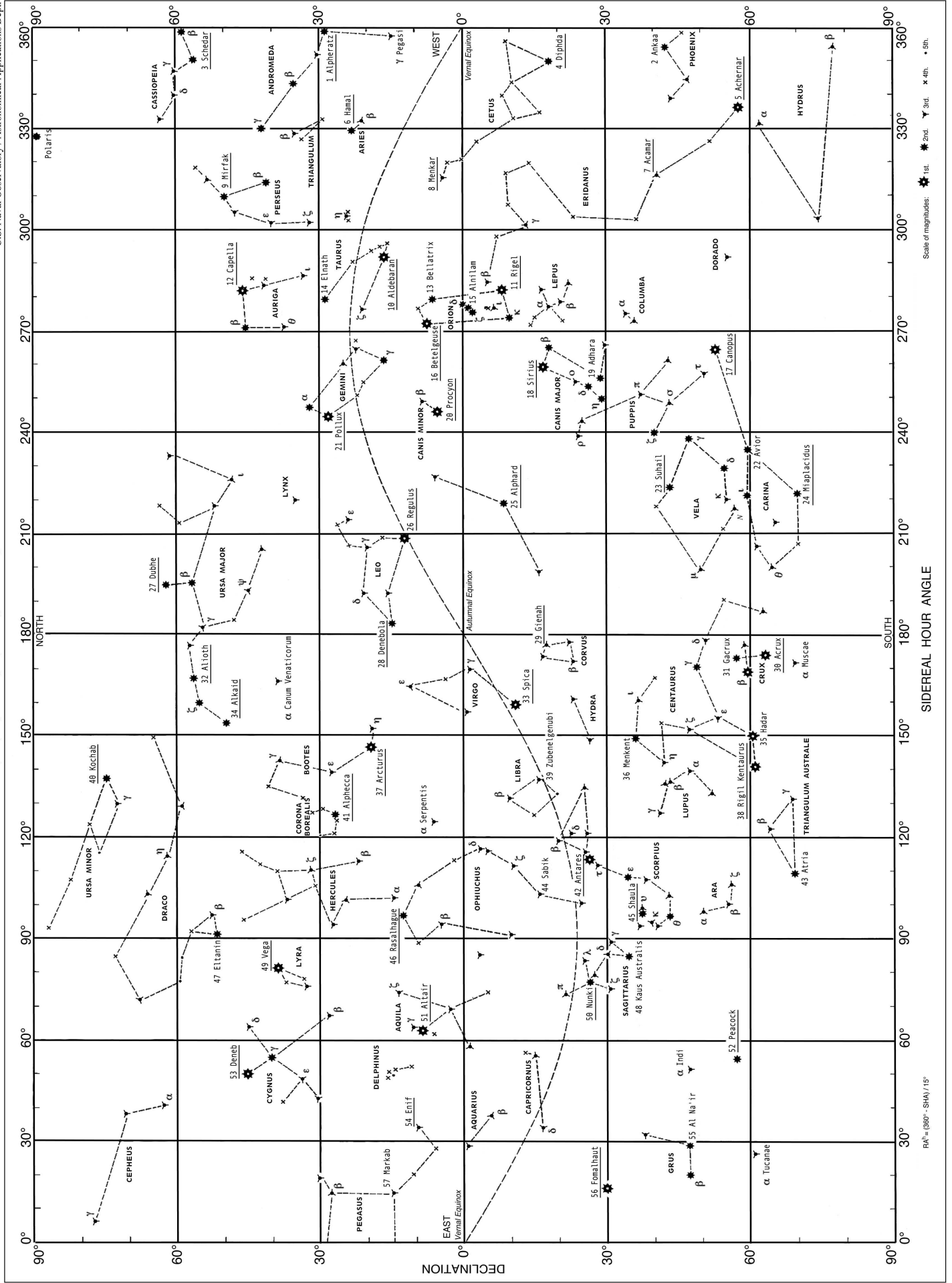
m 54	Sun Plan.	Aries	Moon	v and d corr			m 55	Sun Plan.	Aries	Moon	v and d corr			m 56	Sun Plan.	Aries	Moon	v and d corr		
0	13°30.0	13°32.2	12°53.1	0.0 - 0.0	6.0 - 5.5	12.0 - 10.9	0	13°45.0	13°47.3	13°07.4	0.0 - 0.0	6.0 - 5.6	12.0 - 11.1	0	14°00.0	14°02.3	13°21.7	0.0 - 0.0	6.0 - 5.7	12.0 - 11.3
1	13°30.2	13°32.5	12°53.3	0.1 - 0.1	6.1 - 5.5	12.1 - 11.0	1	13°45.2	13°47.5	13°07.7	0.1 - 0.1	6.1 - 5.6	12.1 - 11.2	1	14°00.2	14°02.5	13°22.0	0.1 - 0.1	6.1 - 5.7	12.1 - 11.4
2	13°30.5	13°32.7	12°53.6	0.2 - 0.2	6.2 - 5.6	12.2 - 11.1	2	13°45.5	13°47.8	13°07.9	0.2 - 0.2	6.2 - 5.7	12.2 - 11.3	2	14°00.5	14°02.8	13°22.2	0.2 - 0.2	6.2 - 5.8	12.2 - 11.5
3	13°30.7	13°33.0	12°53.8	0.3 - 0.3	6.3 - 5.7	12.3 - 11.2	3	13°45.7	13°48.0	13°08.1	0.3 - 0.3	6.3 - 5.8	12.3 - 11.4	3	14°00.7	14°03.0	13°22.4	0.3 - 0.3	6.3 - 5.9	12.3 - 11.6
4	13°31.0	13°33.2	12°54.1	0.4 - 0.4	6.4 - 5.8	12.4 - 11.3	4	13°46.0	13°48.3	13°08.4	0.4 - 0.4	6.4 - 5.9	12.4 - 11.5	4	14°01.0	14°03.3	13°22.7	0.4 - 0.4	6.4 - 6.0	12.4 - 11.7
5	13°31.3	13°33.5	12°54.3	0.5 - 0.5	6.5 - 5.9	12.5 - 11.4	5	13°46.3	13°48.5	13°08.6	0.5 - 0.5	6.5 - 6.0	12.5 - 11.6	5	14°01.3	14°03.5	13°22.9	0.5 - 0.5	6.5 - 6.1	12.5 - 11.8
6	13°31.5	13°33.7	12°54.5	0.6 - 0.5	6.6 - 6.0	12.6 - 11.4	6	13°46.5	13°48.8	13°08.8	0.6 - 0.6	6.6 - 6.1	12.6 - 11.7	6	14°01.5	14°03.8	13°23.2	0.6 - 0.6	6.6 - 6.2	12.6 - 11.9
7	13°31.8	13°34.0	12°54.8	0.7 - 0.6	6.7 - 6.1	12.7 - 11.5	7	13°46.8	13°49.0	13°09.1	0.7 - 0.6	6.7 - 6.2	12.7 - 11.7	7	14°01.8	14°04.1	13°23.4	0.7 - 0.7	6.7 - 6.3	12.7 - 12.0
8	13°32.0	13°34.2	12°55.0	0.8 - 0.7	6.8 - 6.2	12.8 - 11.6	8	13°47.0	13°49.3	13°09.3	0.8 - 0.7	6.8 - 6.3	12.8 - 11.8	8	14°02.0	14°04.3	13°23.6	0.8 - 0.8	6.8 - 6.4	12.8 - 12.1
9	13°32.2	13°34.5	12°55.2	0.9 - 0.8	6.9 - 6.3	12.9 - 11.7	9	13°47.2	13°49.5	13°09.6	0.9 - 0.8	6.9 - 6.4	12.9 - 11.9	9	14°02.2	14°04.6	13°23.9	0.9 - 0.8	6.9 - 6.5	12.9 - 12.1
10	13°32.5	13°34.7	12°55.5	1.0 - 0.9	7.0 - 6.4	13.0 - 11.8	10	13°47.5	13°49.8	13°09.8	1.0 - 0.9	7.0 - 6.5	13.0 - 12.0	10	14°02.5	14°04.8	13°24.1	1.0 - 0.9	7.0 - 6.6	13.0 - 12.2
11	13°32.7	13°35.0	12°55.7	1.1 - 1.0	7.1 - 6.4	13.1 - 11.9	11	13°47.7	13°50.0	13°10.0	1.1 - 1.0	7.1 - 6.6	13.1 - 12.1	11	14°02.7	14°05.1	13°24.4	1.1 - 1.0	7.1 - 6.7	13.1 - 12.3
12	13°33.0	13°35.2	12°56.0	1.2 - 1.1	7.2 - 6.5	13.2 - 12.0	12	13°48.0	13°50.3	13°10.3	1.2 - 1.1	7.2 - 6.7	13.2 - 12.2	12	14°03.0	14°05.3	13°24.6	1.2 - 1.1	7.2 - 6.8	13.2 - 12.4
13	13°33.3	13°35.5	12°56.2	1.3 - 1.2	7.3 - 6.6	13.3 - 12.1	13	13°48.3	13°50.5	13°10.5	1.3 - 1.2	7.3 - 6.8	13.3 - 12.3	13	14°03.3	14°05.6	13°24.8	1.3 - 1.2	7.3 - 6.9	13.3 - 12.5
14	13°33.5	13°35.7	12°56.4	1.4 - 1.3	7.4 - 6.7	13.4 - 12.2	14	13°48.5	13°50.8	13°10.8	1.4 - 1.3	7.4 - 6.8	13.4 - 12.4	14	14°03.5	14°05.8	13°25.1	1.4 - 1.3	7.4 - 7.0	13.4 - 12.6
15	13°33.8	13°36.0	12°56.7	1.5 - 1.4	7.5 - 6.8	13.5 - 12.3	15	13°48.8	13°51.0	13°11.0	1.5 - 1.4	7.5 - 6.9	13.5 - 12.5	15	14°03.8	14°06.1	13°25.3	1.5 - 1.4	7.5 - 7.1	13.5 - 12.7
16	13°34.0	13°36.2	12°56.9	1.6 - 1.5	7.6 - 6.9	13.6 - 12.4	16	13°49.0	13°51.3	13°11.2	1.6 - 1.5	7.6 - 7.0	13.6 - 12.6	16	14°04.0	14°06.3	13°25.6	1.6 - 1.5	7.6 - 7.2	13.6 - 12.8
17	13°34.2	13°36.5	12°57.2	1.7 - 1.5	7.7 - 7.0	13.7 - 12.4	17	13°49.2	13°51.5	13°11.5	1.7 - 1.6	7.7 - 7.1	13.7 - 12.7	17	14°04.2	14°06.6	13°25.8	1.7 - 1.6	7.7 - 7.3	13.7 - 12.9
18	13°34.5	13°36.7	12°57.4	1.8 - 1.6	7.8 - 7.1	13.8 - 12.5	18	13°49.5	13°51.8	13°11.7	1.8 - 1.7	7.8 - 7.2	13.8 - 12.8	18	14°04.5	14°06.8	13°26.0	1.8 - 1.7	7.8 - 7.3	13.8 - 13.0
19	13°34.8	13°37.0	12°57.6	1.9 - 1.7	7.9 - 7.2	13.9 - 12.6	19	13°49.8	13°52.0	13°12.0	1.9 - 1.8	7.9 - 7.3	13.9 - 12.9	19	14°04.8	14°07.1	13°26.3	1.9 - 1.8	7.9 - 7.4	13.9 - 13.1
20	13°35.0	13°37.2	12°57.9	2.0 - 1.8	8.0 - 7.3	14.0 - 12.7	20	13°50.0	13°52.3	13°12.2	2.0 - 1.9	8.0 - 7.4	14.0 - 13.0	20	14°05.0	14°07.3	13°26.5	2.0 - 1.9	8.0 - 7.5	14.0 - 13.2
21	13°35.3	13°37.5	12°58.1	2.1 - 1.9	8.1 - 7.4	14.1 - 12.8	21	13°50.3	13°52.5	13°12.4	2.1 - 1.9	8.1 - 7.5	14.1 - 13.0	21	14°05.3	14°07.6	13°26.7	2.1 - 2.0	8.1 - 7.6	14.1 - 13.3
22	13°35.5	13°37.7	12°58.3	2.2 - 2.0	8.2 - 7.4	14.2 - 12.9	22	13°50.5	13°52.8	13°12.7	2.2 - 2.0	8.2 - 7.6	14.2 - 13.1	22	14°05.5	14°07.8	13°27.0	2.2 - 2.1	8.2 - 7.7	14.2 - 13.4
23	13°35.7	13°38.0	12°58.6	2.3 - 2.1	8.3 - 7.5	14.3 - 13.0	23	13°50.7	13°53.0	13°12.9	2.3 - 2.1	8.3 - 7.7	14.3 - 13.2	23	14°05.7	14°08.1	13°27.2	2.3 - 2.2	8.3 - 7.8	14.3 - 13.5
24	13°36.0	13°38.2	12°58.8	2.4 - 2.2	8.4 - 7.6	14.4 - 13.1	24	13°51.0	13°53.3	13°13.1	2.4 - 2.2	8.4 - 7.8	14.4 - 13.3	24	14°06.0	14°08.3	13°27.5	2.4 - 2.3	8.4 - 7.9	14.4 - 13.6
25	13°36.2	13°38.5	12°59.1	2.5 - 2.3	8.5 - 7.7	14.5 - 13.2	25	13°51.2	13°53.5	13°13.4	2.5 - 2.3	8.5 - 7.9	14.5 - 13.4	25	14°06.2	14°08.6	13°27.7	2.5 - 2.4	8.5 - 8.0	14.5 - 13.7
26	13°36.5	13°38.7	12°59.3	2.6 - 2.4	8.6 - 7.8	14.6 - 13.3	26	13°51.5	13°53.8	13°13.6	2.6 - 2.4	8.6 - 8.0	14.6 - 13.5	26	14°06.5	14°08.8	13°27.9	2.6 - 2.4	8.6 - 8.1	14.6 - 13.7
27	13°36.8	13°39.0	12°59.5	2.7 - 2.5	8.7 - 7.9	14.7 - 13.4	27	13°51.8	13°54.0	13°13.9	2.7 - 2.5	8.7 - 8.0	14.7 - 13.6	27	14°06.8	14°09.1	13°28.2	2.7 - 2.5	8.7 - 8.2	14.7 - 13.8
28	13°37.0	13°39.2	12°59.8	2.8 - 2.5	8.8 - 8.0	14.8 - 13.4	28	13°52.0	13°54.3	13°14.1	2.8 - 2.6	8.8 - 8.1	14.8 - 13.7	28	14°07.0	14°09.3	13°28.4	2.8 - 2.6	8.8 - 8.3	14.8 - 13.9
29	13°37.3	13°39.5	13°00.0	2.9 - 2.6	8.9 - 8.1	14.9 - 13.5	29	13°52.3	13°54.5	13°14.3	2.9 - 2.7	8.9 - 8.2	14.9 - 13.8	29	14°07.3	14°09.6	13°28.7	2.9 - 2.7	8.9 - 8.4	14.9 - 14.0
30	13°37.5	13°39.7	13°00.3	3.0 - 2.7	9.0 - 8.2	15.0 - 13.6	30	13°52.5	13°54.8	13°14.6	3.0 - 2.8	9.0 - 8.3	15.0 - 13.9	30	14°07.5	14°09.8	13°28.9	3.0 - 2.8	9.0 - 8.5	15.0 - 14.1
31	13°37.7	13°40.0	13°00.5	3.1 - 2.8	9.1 - 8.3	15.1 - 13.7	31	13°52.7	13°55.0	13°14.8	3.1 - 2.9	9.1 - 8.4	15.1 - 14.0	31	14°07.7	14°10.1	13°29.1	3.1 - 2.9	9.1 - 8.6	15.1 - 14.2
32	13°38.0	13°40.2	13°00.7	3.2 - 2.9	9.2 - 8.4	15.2 - 13.8	32	13°53.0	13°55.3	13°15.1	3.2 - 3.0	9.2 - 8.5	15.2 - 14.1	32	14°08.0	14°10.3	13°29.4	3.2 - 3.0	9.2 - 8.7	15.2 - 14.3
33	13°38.2	13°40.5	13°01.0	3.3 - 3.0	9.3 - 8.4	15.3 - 13.9	33	13°53.2	13°55.5	13°15.3	3.3 - 3.1	9.3 - 8.6	15.3 - 14.2	33	14°08.2	14°10.6	13°29.6	3.3 - 3.1	9.3 - 8.8	15.3 - 14.4
34	13°38.5	13°40.7	13°01.2	3.4 - 3.1	9.4 - 8.5	15.4 - 14.0	34	13°53.5	13°55.8	13°15.5	3.4 - 3.1	9.4 - 8.7	15.4 - 14.2	34	14°08.5	14°10.8	13°29.8	3.4 - 3.2	9.4 - 8.9	15.4 - 14.5
35	13°38.8	13°41.0	13°01.5	3.5 - 3.2	9.5 - 8.6	15.5 - 14.1	35	13°53.8	13°56.0	13°15.8	3.5 - 3.2	9.5 - 8.8	15.5 - 14.3	35	14°08.8	14°11.1	13°30.1	3.5 - 3.3	9.5 - 8.9	15.5 - 14.6
36	13°39.0	13°41.2	13°01.7	3.6 - 3.3	9.6 - 8.7	15.6 - 14.2	36	13°54.0	13°56.3	13°16.0	3.6 - 3.3	9.6 - 8.9	15.6 - 14.4	36	14°09.0	14°11.3	13°30.3	3.6 - 3.4	9.6 - 9.0	15.6 - 14.7
37	13°39.3	13°41.5	13°01.9	3.7 - 3.4	9.7 - 8.8	15.7 - 14.3	37	13°54.3	13°56.5	13°16.2	3.7 - 3.4	9.7 - 9.0	15.7 - 14.5	37	14°09.3	14°11.6	13°30.6	3.7 - 3.5	9.7 - 9.1	15.7 - 14.8
38	13°39.5	13°41.7	13°02.2	3.8 - 3.5	9.8 - 8.9	15.8 - 14.4	38	13°54.5	13°56.8	13°16.5	3.8 - 3.5	9.8 - 9.1	15.8 - 14.6	38	14°09.5	14°11.8	13°30.8	3.8 - 3.6	9.8 - 9.2	15.8 - 14.9
39	13°39.7	13°42.0	13°02.4	3.9 - 3.5	9.9 - 9.0	15.9 - 14.4	39	13°54.7	13°57.0	13°16.7	3.9 - 3.6	9.9 - 9.2	15.9 - 14.7	39	14°09.7	14°12.1	13°31.0	3.9 - 3.7	9.9 - 9.3	15.9 - 15.0
40	13°40.0	13°42.2	13°02.6	4.0 - 3.6	10.0 - 9.1	16.0 - 14.5	40	13°55.0	13°57.3	13°17.0	4.0 - 3.7	10.0 - 9.3	16.0 - 14.8	40	14°10.0	14°12.3	13°31.3	4.0 - 3.8	10.0 - 9.4	16.0 - 15.1
41	13°40.2	13°42.5	13°02.9	4.1 - 3.7	10.1 - 9.2	16.1 - 14.6	41	13°55.2	13°57.5	13°17.2	4.1 - 3.8	10.1 - 9.3	16.1 - 14.9	41	14°10.2	14°12.6	13°31.5	4.1 - 3.9	10.1 - 9.5	16.1 - 15.2
42	13°40.5	13°42.7	13°03.1	4.2 - 3.8	10.2 - 9.3	16.2 - 14.7	42	13°55.5	13°57.8	13°17.4	4.2 - 3.9	10.2 - 9.4	16.2 - 15.0	42	14°10.5	14°12.8	13°31.8	4.2 - 4.0	10.2 - 9.6	16.2 - 15.3
43	13°40.8	13°43.0	13°03.4	4.3 - 3.9	10.3 - 9.4	16.3 - 14.8	43	13°55.8	13°58.0	13°17.7	4.3 - 4.0	10.3 - 9.5	16.3 - 15.1	43	14°10.8	14°13.1	13°32.0	4.3 - 4.0	10.3 - 9.7	16.3 - 15.3
44	13°41.0	13°43.2	13°03.6	4.4 - 4.0	10.4 - 9.4	16.4 - 14.9	44	13°56.0	13°58.3	13°17.9	4.4 - 4.1	10.4 - 9.6	16.4 - 15.2	44	14°11.0	14°13.3	13°32.2	4.4 - 4.1	10.4 - 9.8	16.4 - 15.4
45	13°41.2	13°43.5	13°03.8	4.5 - 4.1	10.5 - 9.5	16.5 - 15.0	45	13°56.2	13°58.5	13°18.2	4.5 - 4.2	10.5 - 9.7	16.5 - 15.3	45	14°11.2	14°13.6	13°32.5	4.5 - 4.2	10.5 - 9.9	16.5 - 15.5
46	13°41.5	13°43.7	13°04.1	4.6 - 4.2	10.6 - 9.6	16.6 - 15.1	46	13°56.5	13°58.8	13°18.4	4.6 - 4.3	10.6 - 9.8	16.6 - 15.4	46	14°11.5	14°13.8	13°32.7	4.		

Increments and Corrections

m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr		
57	Plan.						58	Plan.						59	Plan.					
0	14°15.0	14°17.3	13°36.0	0.0 - 0.0	6.0 - 5.8	12.0 - 11.5	0	14°30.0	14°32.4	13°50.4	0.0 - 0.0	6.0 - 5.9	12.0 - 11.7	0	14°45.0	14°47.4	14°04.7	0.0 - 0.0	6.0 - 6.0	12.0 - 11.9
1	14°15.2	14°17.6	13°36.3	0.1 - 0.1	6.1 - 5.8	12.1 - 11.6	1	14°30.2	14°32.6	13°50.6	0.1 - 0.1	6.1 - 5.9	12.1 - 11.8	1	14°45.2	14°47.7	14°04.9	0.1 - 0.1	6.1 - 6.0	12.1 - 12.0
2	14°15.5	14°17.8	13°36.5	0.2 - 0.2	6.2 - 5.9	12.2 - 11.7	2	14°30.5	14°32.9	13°50.8	0.2 - 0.2	6.2 - 6.0	12.2 - 11.9	2	14°45.5	14°47.9	14°05.2	0.2 - 0.2	6.2 - 6.1	12.2 - 12.1
3	14°15.7	14°18.1	13°36.8	0.3 - 0.3	6.3 - 6.0	12.3 - 11.8	3	14°30.7	14°33.1	13°51.1	0.3 - 0.3	6.3 - 6.1	12.3 - 12.0	3	14°45.7	14°48.2	14°05.4	0.3 - 0.3	6.3 - 6.2	12.3 - 12.2
4	14°16.0	14°18.3	13°37.0	0.4 - 0.4	6.4 - 6.1	12.4 - 11.9	4	14°31.0	14°33.4	13°51.3	0.4 - 0.4	6.4 - 6.2	12.4 - 12.1	4	14°46.0	14°48.4	14°05.6	0.4 - 0.4	6.4 - 6.3	12.4 - 12.3
5	14°16.3	14°18.6	13°37.2	0.5 - 0.5	6.5 - 6.2	12.5 - 12.0	5	14°31.3	14°33.6	13°51.6	0.5 - 0.5	6.5 - 6.3	12.5 - 12.2	5	14°46.3	14°48.7	14°05.9	0.5 - 0.5	6.5 - 6.4	12.5 - 12.4
6	14°16.5	14°18.8	13°37.5	0.6 - 0.6	6.6 - 6.3	12.6 - 12.1	6	14°31.5	14°33.9	13°51.8	0.6 - 0.6	6.6 - 6.4	12.6 - 12.3	6	14°46.5	14°48.9	14°06.1	0.6 - 0.6	6.6 - 6.5	12.6 - 12.5
7	14°16.8	14°19.1	13°37.7	0.7 - 0.7	6.7 - 6.4	12.7 - 12.2	7	14°31.8	14°34.1	13°52.0	0.7 - 0.7	6.7 - 6.5	12.7 - 12.4	7	14°46.8	14°49.2	14°06.4	0.7 - 0.7	6.7 - 6.6	12.7 - 12.6
8	14°17.0	14°19.3	13°38.0	0.8 - 0.8	6.8 - 6.5	12.8 - 12.3	8	14°32.0	14°34.4	13°52.3	0.8 - 0.8	6.8 - 6.6	12.8 - 12.5	8	14°47.0	14°49.4	14°06.6	0.8 - 0.8	6.8 - 6.7	12.8 - 12.7
9	14°17.2	14°19.6	13°38.2	0.9 - 0.9	6.9 - 6.6	12.9 - 12.4	9	14°32.2	14°34.6	13°52.5	0.9 - 0.9	6.9 - 6.7	12.9 - 12.6	9	14°47.2	14°49.7	14°06.8	0.9 - 0.9	6.9 - 6.8	12.9 - 12.8
10	14°17.5	14°19.8	13°38.4	1.0 - 1.0	7.0 - 6.7	13.0 - 12.5	10	14°32.5	14°34.9	13°52.8	1.0 - 1.0	7.0 - 6.8	13.0 - 12.7	10	14°47.5	14°49.9	14°07.1	1.0 - 1.0	7.0 - 6.9	13.0 - 12.9
11	14°17.7	14°20.1	13°38.7	1.1 - 1.1	7.1 - 6.8	13.1 - 12.6	11	14°32.7	14°35.1	13°53.0	1.1 - 1.1	7.1 - 6.9	13.1 - 12.8	11	14°47.7	14°50.2	14°07.3	1.1 - 1.1	7.1 - 7.0	13.1 - 13.0
12	14°18.0	14°20.3	13°38.9	1.2 - 1.2	7.2 - 6.9	13.2 - 12.7	12	14°33.0	14°35.4	13°53.2	1.2 - 1.2	7.2 - 7.0	13.2 - 12.9	12	14°48.0	14°50.4	14°07.5	1.2 - 1.2	7.2 - 7.1	13.2 - 13.1
13	14°18.3	14°20.6	13°39.2	1.3 - 1.2	7.3 - 7.0	13.3 - 12.7	13	14°33.3	14°35.6	13°53.5	1.3 - 1.3	7.3 - 7.1	13.3 - 13.0	13	14°48.3	14°50.7	14°07.8	1.3 - 1.3	7.3 - 7.2	13.3 - 13.2
14	14°18.5	14°20.8	13°39.4	1.4 - 1.3	7.4 - 7.1	13.4 - 12.8	14	14°33.5	14°35.9	13°53.7	1.4 - 1.4	7.4 - 7.2	13.4 - 13.1	14	14°48.5	14°50.9	14°08.0	1.4 - 1.4	7.4 - 7.3	13.4 - 13.3
15	14°18.8	14°21.1	13°39.6	1.5 - 1.4	7.5 - 7.2	13.5 - 12.9	15	14°33.8	14°36.1	13°53.9	1.5 - 1.5	7.5 - 7.3	13.5 - 13.2	15	14°48.8	14°51.2	14°08.3	1.5 - 1.5	7.5 - 7.4	13.5 - 13.4
16	14°19.0	14°21.3	13°39.9	1.6 - 1.5	7.6 - 7.3	13.6 - 13.0	16	14°34.0	14°36.4	13°54.2	1.6 - 1.6	7.6 - 7.4	13.6 - 13.3	16	14°49.0	14°51.4	14°08.5	1.6 - 1.6	7.6 - 7.5	13.6 - 13.5
17	14°19.2	14°21.6	13°40.1	1.7 - 1.6	7.7 - 7.4	13.7 - 13.1	17	14°34.2	14°36.6	13°54.4	1.7 - 1.7	7.7 - 7.5	13.7 - 13.4	17	14°49.2	14°51.7	14°08.7	1.7 - 1.7	7.7 - 7.6	13.7 - 13.6
18	14°19.5	14°21.8	13°40.3	1.8 - 1.7	7.8 - 7.5	13.8 - 13.2	18	14°34.5	14°36.9	13°54.7	1.8 - 1.8	7.8 - 7.6	13.8 - 13.5	18	14°49.5	14°51.9	14°09.0	1.8 - 1.8	7.8 - 7.7	13.8 - 13.7
19	14°19.8	14°22.1	13°40.6	1.9 - 1.8	7.9 - 7.6	13.9 - 13.3	19	14°34.8	14°37.1	13°54.9	1.9 - 1.9	7.9 - 7.7	13.9 - 13.6	19	14°49.8	14°52.2	14°09.2	1.9 - 1.9	7.9 - 7.8	13.9 - 13.8
20	14°20.0	14°22.4	13°40.8	2.0 - 1.9	8.0 - 7.7	14.0 - 13.4	20	14°35.0	14°37.4	13°55.1	2.0 - 2.0	8.0 - 7.8	14.0 - 13.7	20	14°50.0	14°52.4	14°09.5	2.0 - 2.0	8.0 - 7.9	14.0 - 13.9
21	14°20.3	14°22.6	13°41.1	2.1 - 2.0	8.1 - 7.8	14.1 - 13.5	21	14°35.3	14°37.6	13°55.4	2.1 - 2.0	8.1 - 7.9	14.1 - 13.7	21	14°50.3	14°52.7	14°09.7	2.1 - 2.1	8.1 - 8.0	14.1 - 14.0
22	14°20.5	14°22.9	13°41.3	2.2 - 2.1	8.2 - 7.9	14.2 - 13.6	22	14°35.5	14°37.9	13°55.6	2.2 - 2.1	8.2 - 8.0	14.2 - 13.8	22	14°50.5	14°52.9	14°09.9	2.2 - 2.2	8.2 - 8.1	14.2 - 14.1
23	14°20.7	14°23.1	13°41.5	2.3 - 2.2	8.3 - 8.0	14.3 - 13.7	23	14°35.7	14°38.1	13°55.9	2.3 - 2.2	8.3 - 8.1	14.3 - 13.9	23	14°50.7	14°53.2	14°10.2	2.3 - 2.3	8.3 - 8.2	14.3 - 14.2
24	14°21.0	14°23.4	13°41.8	2.4 - 2.3	8.4 - 8.1	14.4 - 13.8	24	14°36.0	14°38.4	13°56.1	2.4 - 2.3	8.4 - 8.2	14.4 - 14.0	24	14°51.0	14°53.4	14°10.4	2.4 - 2.4	8.4 - 8.3	14.4 - 14.3
25	14°21.2	14°23.6	13°42.0	2.5 - 2.4	8.5 - 8.1	14.5 - 13.9	25	14°36.2	14°38.6	13°56.3	2.5 - 2.4	8.5 - 8.3	14.5 - 14.1	25	14°51.2	14°53.7	14°10.6	2.5 - 2.5	8.5 - 8.4	14.5 - 14.4
26	14°21.5	14°23.9	13°42.3	2.6 - 2.5	8.6 - 8.2	14.6 - 14.0	26	14°36.5	14°38.9	13°56.6	2.6 - 2.5	8.6 - 8.4	14.6 - 14.2	26	14°51.5	14°53.9	14°10.9	2.6 - 2.6	8.6 - 8.5	14.6 - 14.5
27	14°21.8	14°24.1	13°42.5	2.7 - 2.6	8.7 - 8.3	14.7 - 14.1	27	14°36.8	14°39.1	13°56.8	2.7 - 2.6	8.7 - 8.5	14.7 - 14.3	27	14°51.8	14°54.2	14°11.1	2.7 - 2.7	8.7 - 8.6	14.7 - 14.6
28	14°22.0	14°24.4	13°42.7	2.8 - 2.7	8.8 - 8.4	14.8 - 14.2	28	14°37.0	14°39.4	13°57.0	2.8 - 2.7	8.8 - 8.6	14.8 - 14.4	28	14°52.0	14°54.4	14°11.4	2.8 - 2.8	8.8 - 8.7	14.8 - 14.7
29	14°22.3	14°24.6	13°43.0	2.9 - 2.8	8.9 - 8.5	14.9 - 14.3	29	14°37.3	14°39.6	13°57.3	2.9 - 2.8	8.9 - 8.7	14.9 - 14.5	29	14°52.3	14°54.7	14°11.6	2.9 - 2.9	8.9 - 8.8	14.9 - 14.8
30	14°22.5	14°24.9	13°43.2	3.0 - 2.9	9.0 - 8.6	15.0 - 14.4	30	14°37.5	14°39.9	13°57.5	3.0 - 2.9	9.0 - 8.8	15.0 - 14.6	30	14°52.5	14°54.9	14°11.8	3.0 - 3.0	9.0 - 8.9	15.0 - 14.9
31	14°22.7	14°25.1	13°43.4	3.1 - 3.0	9.1 - 8.7	15.1 - 14.5	31	14°37.7	14°40.1	13°57.8	3.1 - 3.0	9.1 - 8.9	15.1 - 14.7	31	14°52.7	14°55.2	14°12.1	3.1 - 3.1	9.1 - 9.0	15.1 - 15.0
32	14°23.0	14°25.4	13°43.7	3.2 - 3.1	9.2 - 8.8	15.2 - 14.6	32	14°38.0	14°40.4	13°58.0	3.2 - 3.1	9.2 - 9.0	15.2 - 14.8	32	14°53.0	14°55.4	14°12.3	3.2 - 3.2	9.2 - 9.1	15.2 - 15.1
33	14°23.2	14°25.6	13°43.9	3.3 - 3.2	9.3 - 8.9	15.3 - 14.7	33	14°38.2	14°40.7	13°58.2	3.3 - 3.2	9.3 - 9.1	15.3 - 14.9	33	14°53.2	14°55.7	14°12.6	3.3 - 3.3	9.3 - 9.2	15.3 - 15.2
34	14°23.5	14°25.9	13°44.2	3.4 - 3.3	9.4 - 9.0	15.4 - 14.8	34	14°38.5	14°40.9	13°58.5	3.4 - 3.3	9.4 - 9.2	15.4 - 15.0	34	14°53.5	14°55.9	14°12.8	3.4 - 3.4	9.4 - 9.3	15.4 - 15.3
35	14°23.8	14°26.1	13°44.4	3.5 - 3.4	9.5 - 9.1	15.5 - 14.9	35	14°38.8	14°41.2	13°58.7	3.5 - 3.4	9.5 - 9.3	15.5 - 15.1	35	14°53.8	14°56.2	14°13.0	3.5 - 3.5	9.5 - 9.4	15.5 - 15.4
36	14°24.0	14°26.4	13°44.6	3.6 - 3.5	9.6 - 9.2	15.6 - 15.0	36	14°39.0	14°41.4	13°59.0	3.6 - 3.5	9.6 - 9.4	15.6 - 15.2	36	14°54.0	14°56.4	14°13.3	3.6 - 3.6	9.6 - 9.5	15.6 - 15.5
37	14°24.3	14°26.6	13°44.9	3.7 - 3.5	9.7 - 9.3	15.7 - 15.0	37	14°39.3	14°41.7	13°59.2	3.7 - 3.6	9.7 - 9.5	15.7 - 15.3	37	14°54.3	14°56.7	14°13.5	3.7 - 3.7	9.7 - 9.6	15.7 - 15.6
38	14°24.5	14°26.9	13°45.1	3.8 - 3.6	9.8 - 9.4	15.8 - 15.1	38	14°39.5	14°41.9	13°59.4	3.8 - 3.7	9.8 - 9.6	15.8 - 15.4	38	14°54.5	14°56.9	14°13.8	3.8 - 3.8	9.8 - 9.7	15.8 - 15.7
39	14°24.7	14°27.1	13°45.4	3.9 - 3.7	9.9 - 9.5	15.9 - 15.2	39	14°39.7	14°42.2	13°59.7	3.9 - 3.8	9.9 - 9.7	15.9 - 15.5	39	14°54.7	14°57.2	14°14.0	3.9 - 3.9	9.9 - 9.8	15.9 - 15.8
40	14°25.0	14°27.4	13°45.6	4.0 - 3.8	10.0 - 9.6	16.0 - 15.3	40	14°40.0	14°42.4	13°59.9	4.0 - 3.9	10.0 - 9.8	16.0 - 15.6	40	14°55.0	14°57.4	14°14.2	4.0 - 4.0	10.0 - 9.9	16.0 - 15.9
41	14°25.2	14°27.6	13°45.8	4.1 - 3.9	10.1 - 9.7	16.1 - 15.4	41	14°40.2	14°42.7	14°00.1	4.1 - 4.0	10.1 - 9.8	16.1 - 15.7	41	14°55.2	14°57.7	14°14.5	4.1 - 4.1	10.1 - 10.0	16.1 - 16.0
42	14°25.5	14°27.9	13°46.1	4.2 - 4.0	10.2 - 9.8	16.2 - 15.5	42	14°40.5	14°42.9	14°00.4	4.2 - 4.1	10.2 - 9.9	16.2 - 15.8	42	14°55.5	14°57.9	14°14.7	4.2 - 4.2	10.2 - 10.1	16.2 - 16.1
43	14°25.8	14°28.1	13°46.3	4.3 - 4.1	10.3 - 9.9	16.3 - 15.6	43	14°40.8	14°43.2	14°00.6	4.3 - 4.2	10.3 - 10.0	16.3 - 15.9	43	14°55.8	14°58.2	14°14.9	4.3 - 4.3	10.3 - 10.2	16.3 - 16.2
44	14°26.0	14°28.4	13°46.5	4.4 - 4.2	10.4 - 10.0	16.4 - 15.7	44	14°41.0	14°43.4	14°00.9	4.4 - 4.3	10.4 - 10.1	16.4 - 16.0	44	14°56.0	14°58.4	14°15.2	4.4 - 4.4	10.4 - 10.3	16.4 - 16.3
45	14°26.2	14°28.6	13°46.8	4.5 - 4.3	10.5 - 10.1	16.5 - 15.8	45	14°41.2	14°43.7	14°01.1	4.5 - 4.4	10.5 - 10.2	16.5 - 16.1	45	14°56.2	14°58.7	14°15.4	4.5 - 4.5	10.5 - 10.4	16.5 - 16.4
46	14°26.5	14°28.9	13°47.0	4.6 - 4.4	10.6 - 10.2	16.6 - 15.9	46	14°41.5	14°43.9	14°01.3	4.6 - 4.5	10.6 - 10.3	16.6 - 16.2	46	14°56.5	14°59.0	14°15.7	4.6 - 4.6	10.6 - 10	

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RA⁰ = (G00° - SHA) / 15°