

| | 0° | 1° | 2° | 3° | 4° | 5° | 6° | 7° | 8° | 9° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .0000 | .0001 | .0003 | .0007 | .0012 | .0019 | .0027 | .0037 | .0049 | .0062 | 60' |
| 2' | .0000 | .0001 | .0003 | .0007 | .0012 | .0019 | .0028 | .0038 | .0049 | .0062 | 58' |
| 4' | .0000 | .0001 | .0003 | .0007 | .0013 | .0020 | .0028 | .0038 | .0049 | .0062 | 56' |
| 6' | .0000 | .0001 | .0003 | .0007 | .0013 | .0020 | .0028 | .0038 | .0050 | .0063 | 54' |
| 8' | .0000 | .0001 | .0003 | .0007 | .0013 | .0020 | .0029 | .0039 | .0050 | .0063 | 52' |
| 10' | .0000 | .0001 | .0004 | .0008 | .0013 | .0020 | .0029 | .0039 | .0051 | .0064 | 50' |
| 12' | .0000 | .0001 | .0004 | .0008 | .0013 | .0021 | .0029 | .0039 | .0051 | .0064 | 48' |
| 14' | .0000 | .0001 | .0004 | .0008 | .0014 | .0021 | .0030 | .0040 | .0052 | .0065 | 46' |
| 16' | .0000 | .0001 | .0004 | .0008 | .0014 | .0021 | .0030 | .0040 | .0052 | .0065 | 44' |
| 18' | .0000 | .0001 | .0004 | .0008 | .0014 | .0021 | .0030 | .0041 | .0052 | .0066 | 42' |
| 20' | .0000 | .0001 | .0004 | .0008 | .0014 | .0022 | .0031 | .0041 | .0053 | .0066 | 40' |
| 22' | .0000 | .0001 | .0004 | .0009 | .0015 | .0022 | .0031 | .0041 | .0053 | .0067 | 38' |
| 24' | .0000 | .0001 | .0004 | .0009 | .0015 | .0022 | .0031 | .0042 | .0054 | .0067 | 36' |
| 26' | .0000 | .0002 | .0005 | .0009 | .0015 | .0022 | .0031 | .0042 | .0054 | .0068 | 34' |
| 28' | .0000 | .0002 | .0005 | .0009 | .0015 | .0023 | .0032 | .0042 | .0054 | .0068 | 32' |
| 30' | .0000 | .0002 | .0005 | .0009 | .0015 | .0023 | .0032 | .0043 | .0055 | .0069 | 30' |
| 32' | .0000 | .0002 | .0005 | .0010 | .0016 | .0023 | .0032 | .0043 | .0055 | .0069 | 28' |
| 34' | .0000 | .0002 | .0005 | .0010 | .0016 | .0024 | .0033 | .0044 | .0056 | .0070 | 26' |
| 36' | .0000 | .0002 | .0005 | .0010 | .0016 | .0024 | .0033 | .0044 | .0056 | .0070 | 24' |
| 38' | .0000 | .0002 | .0005 | .0010 | .0016 | .0024 | .0033 | .0044 | .0057 | .0071 | 22' |
| 40' | .0000 | .0002 | .0005 | .0010 | .0017 | .0024 | .0034 | .0045 | .0057 | .0071 | 20' |
| 42' | .0000 | .0002 | .0006 | .0010 | .0017 | .0025 | .0034 | .0045 | .0058 | .0071 | 18' |
| 44' | .0000 | .0002 | .0006 | .0011 | .0017 | .0025 | .0034 | .0045 | .0058 | .0072 | 16' |
| 46' | .0000 | .0002 | .0006 | .0011 | .0017 | .0025 | .0035 | .0046 | .0058 | .0072 | 14' |
| 48' | .0000 | .0002 | .0006 | .0011 | .0018 | .0026 | .0035 | .0046 | .0059 | .0073 | 12' |
| 50' | .0001 | .0003 | .0006 | .0011 | .0018 | .0026 | .0036 | .0047 | .0059 | .0073 | 10' |
| 52' | .0001 | .0003 | .0006 | .0011 | .0018 | .0026 | .0036 | .0047 | .0060 | .0074 | 8' |
| 54' | .0001 | .0003 | .0006 | .0012 | .0018 | .0026 | .0036 | .0047 | .0060 | .0074 | 6' |
| 56' | .0001 | .0003 | .0007 | .0012 | .0019 | .0027 | .0037 | .0048 | .0061 | .0075 | 4' |
| 58' | .0001 | .0003 | .0007 | .0012 | .0019 | .0027 | .0037 | .0048 | .0061 | .0075 | 2' |
| 60' | .0001 | .0003 | .0007 | .0012 | .0019 | .0027 | .0037 | .0049 | .0062 | .0076 | 0' |
| | 359° | 358° | 357° | 356° | 355° | 354° | 353° | 352° | 351° | 350° | |

| | 10° | 11° | 12° | 13° | 14° | 15° | 16° | 17° | 18° | 19° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | ,0076 | ,0092 | ,0109 | ,0128 | ,0149 | ,0170 | ,0194 | ,0218 | ,0245 | ,0272 | 60' |
| 2' | ,0076 | ,0092 | ,0110 | ,0129 | ,0149 | ,0171 | ,0194 | ,0219 | ,0246 | ,0273 | 58' |
| 4' | ,0077 | ,0093 | ,0110 | ,0129 | ,0150 | ,0172 | ,0195 | ,0220 | ,0247 | ,0274 | 56' |
| 6' | ,0077 | ,0094 | ,0111 | ,0130 | ,0151 | ,0173 | ,0196 | ,0221 | ,0247 | ,0275 | 54' |
| 8' | ,0078 | ,0094 | ,0112 | ,0131 | ,0151 | ,0173 | ,0197 | ,0222 | ,0248 | ,0276 | 52' |
| 10' | ,0079 | ,0095 | ,0112 | ,0131 | ,0152 | ,0174 | ,0198 | ,0223 | ,0249 | ,0277 | 50' |
| 12' | ,0079 | ,0095 | ,0113 | ,0132 | ,0153 | ,0175 | ,0199 | ,0224 | ,0250 | ,0278 | 48' |
| 14' | ,0080 | ,0096 | ,0114 | ,0133 | ,0153 | ,0176 | ,0199 | ,0224 | ,0251 | ,0279 | 46' |
| 16' | ,0080 | ,0096 | ,0114 | ,0133 | ,0154 | ,0176 | ,0200 | ,0225 | ,0252 | ,0280 | 44' |
| 18' | ,0081 | ,0097 | ,0115 | ,0134 | ,0155 | ,0177 | ,0201 | ,0226 | ,0253 | ,0281 | 42' |
| 20' | ,0081 | ,0097 | ,0115 | ,0135 | ,0156 | ,0178 | ,0202 | ,0227 | ,0254 | ,0282 | 40' |
| 22' | ,0082 | ,0098 | ,0116 | ,0135 | ,0156 | ,0179 | ,0203 | ,0228 | ,0255 | ,0283 | 38' |
| 24' | ,0082 | ,0099 | ,0117 | ,0136 | ,0157 | ,0180 | ,0203 | ,0229 | ,0256 | ,0284 | 36' |
| 26' | ,0083 | ,0099 | ,0117 | ,0137 | ,0158 | ,0180 | ,0204 | ,0230 | ,0257 | ,0285 | 34' |
| 28' | ,0083 | ,0100 | ,0118 | ,0137 | ,0159 | ,0181 | ,0205 | ,0231 | ,0257 | ,0286 | 32' |
| 30' | ,0084 | ,0100 | ,0119 | ,0138 | ,0159 | ,0182 | ,0206 | ,0231 | ,0258 | ,0287 | 30' |
| 32' | ,0084 | ,0101 | ,0119 | ,0139 | ,0160 | ,0183 | ,0207 | ,0232 | ,0259 | ,0288 | 28' |
| 34' | ,0085 | ,0102 | ,0120 | ,0140 | ,0161 | ,0183 | ,0208 | ,0233 | ,0260 | ,0289 | 26' |
| 36' | ,0085 | ,0102 | ,0120 | ,0140 | ,0161 | ,0184 | ,0208 | ,0234 | ,0261 | ,0290 | 24' |
| 38' | ,0086 | ,0103 | ,0121 | ,0141 | ,0162 | ,0185 | ,0209 | ,0235 | ,0262 | ,0291 | 22' |
| 40' | ,0086 | ,0103 | ,0122 | ,0142 | ,0163 | ,0186 | ,0210 | ,0236 | ,0263 | ,0292 | 20' |
| 42' | ,0087 | ,0104 | ,0122 | ,0142 | ,0164 | ,0187 | ,0211 | ,0237 | ,0264 | ,0293 | 18' |
| 44' | ,0087 | ,0104 | ,0123 | ,0143 | ,0164 | ,0187 | ,0212 | ,0238 | ,0265 | ,0294 | 16' |
| 46' | ,0088 | ,0105 | ,0124 | ,0144 | ,0165 | ,0188 | ,0213 | ,0238 | ,0266 | ,0295 | 14' |
| 48' | ,0089 | ,0106 | ,0124 | ,0144 | ,0166 | ,0189 | ,0213 | ,0239 | ,0267 | ,0296 | 12' |
| 50' | ,0089 | ,0106 | ,0125 | ,0145 | ,0167 | ,0190 | ,0214 | ,0240 | ,0268 | ,0297 | 10' |
| 52' | ,0090 | ,0107 | ,0126 | ,0146 | ,0167 | ,0190 | ,0215 | ,0241 | ,0269 | ,0298 | 8' |
| 54' | ,0090 | ,0107 | ,0126 | ,0146 | ,0168 | ,0191 | ,0216 | ,0242 | ,0270 | ,0299 | 6' |
| 56' | ,0091 | ,0108 | ,0127 | ,0147 | ,0169 | ,0192 | ,0217 | ,0243 | ,0271 | ,0300 | 4' |
| 58' | ,0091 | ,0109 | ,0127 | ,0148 | ,0170 | ,0193 | ,0218 | ,0244 | ,0271 | ,0301 | 2' |
| 60' | ,0092 | ,0109 | ,0128 | ,0149 | ,0170 | ,0194 | ,0218 | ,0245 | ,0272 | ,0302 | 0' |
| | 349° | 348° | 347° | 346° | 345° | 344° | 343° | 342° | 341° | 340° | |

| | 20° | 21° | 22° | 23° | 24° | 25° | 26° | 27° | 28° | 29° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .0302 | .0332 | .0364 | .0397 | .0432 | .0468 | .0506 | .0545 | .0585 | .0627 | 60' |
| 2' | .0303 | .0333 | .0365 | .0399 | .0433 | .0470 | .0507 | .0546 | .0587 | .0628 | 58' |
| 4' | .0304 | .0334 | .0366 | .0400 | .0435 | .0471 | .0509 | .0548 | .0588 | .0630 | 56' |
| 6' | .0305 | .0335 | .0367 | .0401 | .0436 | .0472 | .0510 | .0549 | .0589 | .0631 | 54' |
| 8' | .0306 | .0336 | .0368 | .0402 | .0437 | .0473 | .0511 | .0550 | .0591 | .0633 | 52' |
| 10' | .0307 | .0337 | .0370 | .0403 | .0438 | .0475 | .0512 | .0552 | .0592 | .0634 | 50' |
| 12' | .0308 | .0338 | .0371 | .0404 | .0439 | .0476 | .0514 | .0553 | .0593 | .0635 | 48' |
| 14' | .0309 | .0339 | .0372 | .0405 | .0441 | .0477 | .0515 | .0554 | .0595 | .0637 | 46' |
| 16' | .0310 | .0340 | .0373 | .0407 | .0442 | .0478 | .0516 | .0556 | .0596 | .0638 | 44' |
| 18' | .0311 | .0342 | .0374 | .0408 | .0443 | .0480 | .0518 | .0557 | .0598 | .0640 | 42' |
| 20' | .0312 | .0343 | .0375 | .0409 | .0444 | .0481 | .0519 | .0558 | .0599 | .0641 | 40' |
| 22' | .0313 | .0344 | .0376 | .0410 | .0445 | .0482 | .0520 | .0560 | .0600 | .0643 | 38' |
| 24' | .0314 | .0345 | .0377 | .0411 | .0447 | .0483 | .0521 | .0561 | .0602 | .0644 | 36' |
| 26' | .0315 | .0346 | .0378 | .0412 | .0448 | .0485 | .0523 | .0562 | .0603 | .0645 | 34' |
| 28' | .0316 | .0347 | .0379 | .0414 | .0449 | .0486 | .0524 | .0564 | .0605 | .0647 | 32' |
| 30' | .0317 | .0348 | .0381 | .0415 | .0450 | .0487 | .0525 | .0565 | .0606 | .0648 | 30' |
| 32' | .0318 | .0349 | .0382 | .0416 | .0451 | .0488 | .0527 | .0566 | .0607 | .0650 | 28' |
| 34' | .0319 | .0350 | .0383 | .0417 | .0453 | .0490 | .0528 | .0568 | .0609 | .0651 | 26' |
| 36' | .0320 | .0351 | .0384 | .0418 | .0454 | .0491 | .0529 | .0569 | .0610 | .0653 | 24' |
| 38' | .0321 | .0352 | .0385 | .0419 | .0455 | .0492 | .0531 | .0570 | .0611 | .0654 | 22' |
| 40' | .0322 | .0353 | .0386 | .0421 | .0456 | .0493 | .0532 | .0572 | .0613 | .0655 | 20' |
| 42' | .0323 | .0354 | .0387 | .0422 | .0457 | .0495 | .0533 | .0573 | .0614 | .0657 | 18' |
| 44' | .0324 | .0355 | .0388 | .0423 | .0459 | .0496 | .0534 | .0574 | .0616 | .0658 | 16' |
| 46' | .0325 | .0356 | .0390 | .0424 | .0460 | .0497 | .0536 | .0576 | .0617 | .0660 | 14' |
| 48' | .0326 | .0358 | .0391 | .0425 | .0461 | .0498 | .0537 | .0577 | .0618 | .0661 | 12' |
| 50' | .0327 | .0359 | .0392 | .0426 | .0462 | .0500 | .0538 | .0578 | .0620 | .0663 | 10' |
| 52' | .0328 | .0360 | .0393 | .0428 | .0464 | .0501 | .0540 | .0580 | .0621 | .0664 | 8' |
| 54' | .0329 | .0361 | .0394 | .0429 | .0465 | .0502 | .0541 | .0581 | .0623 | .0666 | 6' |
| 56' | .0330 | .0362 | .0395 | .0430 | .0466 | .0503 | .0542 | .0583 | .0624 | .0667 | 4' |
| 58' | .0331 | .0363 | .0396 | .0431 | .0467 | .0505 | .0544 | .0584 | .0625 | .0668 | 2' |
| 60' | .0332 | .0364 | .0397 | .0432 | .0468 | .0506 | .0545 | .0585 | .0627 | .0670 | 0' |
| | 339° | 338° | 337° | 336° | 335° | 334° | 333° | 332° | 331° | 330° | |

| | 30° | 31° | 32° | 33° | 34° | 35° | 36° | 37° | 38° | 39° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .0670 | .0714 | .0760 | .0807 | .0855 | .0904 | .0955 | .1007 | .1060 | .1114 | 60' |
| 2' | .0671 | .0716 | .0761 | .0808 | .0856 | .0906 | .0957 | .1009 | .1062 | .1116 | 58' |
| 4' | .0673 | .0717 | .0763 | .0810 | .0858 | .0908 | .0958 | .1010 | .1064 | .1118 | 56' |
| 6' | .0674 | .0719 | .0764 | .0811 | .0860 | .0909 | .0960 | .1012 | .1065 | .1120 | 54' |
| 8' | .0676 | .0720 | .0766 | .0813 | .0861 | .0911 | .0962 | .1014 | .1067 | .1122 | 52' |
| 10' | .0677 | .0722 | .0767 | .0815 | .0863 | .0913 | .0963 | .1016 | .1069 | .1123 | 50' |
| 12' | .0679 | .0723 | .0769 | .0816 | .0865 | .0914 | .0965 | .1017 | .1071 | .1125 | 48' |
| 14' | .0680 | .0725 | .0771 | .0818 | .0866 | .0916 | .0967 | .1019 | .1073 | .1127 | 46' |
| 16' | .0682 | .0726 | .0772 | .0819 | .0868 | .0918 | .0969 | .1021 | .1074 | .1129 | 44' |
| 18' | .0683 | .0728 | .0774 | .0821 | .0870 | .0919 | .0970 | .1023 | .1076 | .1131 | 42' |
| 20' | .0684 | .0729 | .0775 | .0823 | .0871 | .0921 | .0972 | .1024 | .1078 | .1133 | 40' |
| 22' | .0686 | .0731 | .0777 | .0824 | .0873 | .0923 | .0974 | .1026 | .1080 | .1134 | 38' |
| 24' | .0687 | .0732 | .0778 | .0826 | .0874 | .0924 | .0976 | .1028 | .1082 | .1136 | 36' |
| 26' | .0689 | .0734 | .0780 | .0827 | .0876 | .0926 | .0977 | .1030 | .1083 | .1138 | 34' |
| 28' | .0690 | .0735 | .0781 | .0829 | .0878 | .0928 | .0979 | .1031 | .1085 | .1140 | 32' |
| 30' | .0692 | .0737 | .0783 | .0831 | .0879 | .0929 | .0981 | .1033 | .1087 | .1142 | 30' |
| 32' | .0693 | .0738 | .0785 | .0832 | .0881 | .0931 | .0982 | .1035 | .1089 | .1144 | 28' |
| 34' | .0695 | .0740 | .0786 | .0834 | .0883 | .0933 | .0984 | .1037 | .1091 | .1146 | 26' |
| 36' | .0696 | .0741 | .0788 | .0835 | .0884 | .0934 | .0986 | .1039 | .1092 | .1147 | 24' |
| 38' | .0698 | .0743 | .0789 | .0837 | .0886 | .0936 | .0988 | .1040 | .1094 | .1149 | 22' |
| 40' | .0699 | .0744 | .0791 | .0839 | .0888 | .0938 | .0989 | .1042 | .1096 | .1151 | 20' |
| 42' | .0701 | .0746 | .0792 | .0840 | .0889 | .0940 | .0991 | .1044 | .1098 | .1153 | 18' |
| 44' | .0702 | .0747 | .0794 | .0842 | .0891 | .0941 | .0993 | .1046 | .1100 | .1155 | 16' |
| 46' | .0704 | .0749 | .0796 | .0843 | .0893 | .0943 | .0995 | .1047 | .1101 | .1157 | 14' |
| 48' | .0705 | .0751 | .0797 | .0845 | .0894 | .0945 | .0996 | .1049 | .1103 | .1159 | 12' |
| 50' | .0707 | .0752 | .0799 | .0847 | .0896 | .0946 | .0998 | .1051 | .1105 | .1160 | 10' |
| 52' | .0708 | .0754 | .0800 | .0848 | .0898 | .0948 | .1000 | .1053 | .1107 | .1162 | 8' |
| 54' | .0710 | .0755 | .0802 | .0850 | .0899 | .0950 | .1002 | .1055 | .1109 | .1164 | 6' |
| 56' | .0711 | .0757 | .0803 | .0852 | .0901 | .0951 | .1003 | .1056 | .1111 | .1166 | 4' |
| 58' | .0713 | .0758 | .0805 | .0853 | .0903 | .0953 | .1005 | .1058 | .1112 | .1168 | 2' |
| 60' | .0714 | .0760 | .0807 | .0855 | .0904 | .0955 | .1007 | .1060 | .1114 | .1170 | 0' |
| | 329° | 328° | 327° | 326° | 325° | 324° | 323° | 322° | 321° | 320° | |

| | 40° | 41° | 42° | 43° | 44° | 45° | 46° | 47° | 48° | 49° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .1170 | .1226 | .1284 | .1343 | .1403 | .1464 | .1527 | .1590 | .1654 | .1720 | 60' |
| 2' | .1172 | .1228 | .1286 | .1345 | .1405 | .1467 | .1529 | .1592 | .1657 | .1722 | 58' |
| 4' | .1174 | .1230 | .1288 | .1347 | .1407 | .1469 | .1531 | .1594 | .1659 | .1724 | 56' |
| 6' | .1175 | .1232 | .1290 | .1349 | .1409 | .1471 | .1533 | .1596 | .1661 | .1726 | 54' |
| 8' | .1177 | .1234 | .1292 | .1351 | .1411 | .1473 | .1535 | .1599 | .1663 | .1728 | 52' |
| 10' | .1179 | .1236 | .1294 | .1353 | .1413 | .1475 | .1537 | .1601 | .1665 | .1731 | 50' |
| 12' | .1181 | .1238 | .1296 | .1355 | .1415 | .1477 | .1539 | .1603 | .1667 | .1733 | 48' |
| 14' | .1183 | .1240 | .1298 | .1357 | .1417 | .1479 | .1541 | .1605 | .1670 | .1735 | 46' |
| 16' | .1185 | .1242 | .1300 | .1359 | .1420 | .1481 | .1543 | .1607 | .1672 | .1737 | 44' |
| 18' | .1187 | .1244 | .1302 | .1361 | .1422 | .1483 | .1546 | .1609 | .1674 | .1740 | 42' |
| 20' | .1189 | .1246 | .1304 | .1363 | .1424 | .1485 | .1548 | .1611 | .1676 | .1742 | 40' |
| 22' | .1190 | .1248 | .1306 | .1365 | .1426 | .1487 | .1550 | .1613 | .1678 | .1744 | 38' |
| 24' | .1192 | .1249 | .1308 | .1367 | .1428 | .1489 | .1552 | .1616 | .1680 | .1746 | 36' |
| 26' | .1194 | .1251 | .1310 | .1369 | .1430 | .1491 | .1554 | .1618 | .1683 | .1748 | 34' |
| 28' | .1196 | .1253 | .1312 | .1371 | .1432 | .1493 | .1556 | .1620 | .1685 | .1751 | 32' |
| 30' | .1198 | .1255 | .1314 | .1373 | .1434 | .1495 | .1558 | .1622 | .1687 | .1753 | 30' |
| 32' | .1200 | .1257 | .1316 | .1375 | .1436 | .1498 | .1560 | .1624 | .1689 | .1755 | 28' |
| 34' | .1202 | .1259 | .1318 | .1377 | .1438 | .1500 | .1562 | .1626 | .1691 | .1757 | 26' |
| 36' | .1204 | .1261 | .1320 | .1379 | .1440 | .1502 | .1565 | .1628 | .1693 | .1759 | 24' |
| 38' | .1206 | .1263 | .1321 | .1381 | .1442 | .1504 | .1567 | .1631 | .1696 | .1762 | 22' |
| 40' | .1207 | .1265 | .1323 | .1383 | .1444 | .1506 | .1569 | .1633 | .1698 | .1764 | 20' |
| 42' | .1209 | .1267 | .1325 | .1385 | .1446 | .1508 | .1571 | .1635 | .1700 | .1766 | 18' |
| 44' | .1211 | .1269 | .1327 | .1387 | .1448 | .1510 | .1573 | .1637 | .1702 | .1768 | 16' |
| 46' | .1213 | .1271 | .1329 | .1389 | .1450 | .1512 | .1575 | .1639 | .1704 | .1770 | 14' |
| 48' | .1215 | .1273 | .1331 | .1391 | .1452 | .1514 | .1577 | .1641 | .1707 | .1773 | 12' |
| 50' | .1217 | .1275 | .1333 | .1393 | .1454 | .1516 | .1579 | .1644 | .1709 | .1775 | 10' |
| 52' | .1219 | .1277 | .1335 | .1395 | .1456 | .1518 | .1582 | .1646 | .1711 | .1777 | 8' |
| 54' | .1221 | .1278 | .1337 | .1397 | .1458 | .1520 | .1584 | .1648 | .1713 | .1779 | 6' |
| 56' | .1223 | .1280 | .1339 | .1399 | .1460 | .1523 | .1586 | .1650 | .1715 | .1782 | 4' |
| 58' | .1225 | .1282 | .1341 | .1401 | .1462 | .1525 | .1588 | .1652 | .1718 | .1784 | 2' |
| 60' | .1226 | .1284 | .1343 | .1403 | .1464 | .1527 | .1590 | .1654 | .1720 | .1786 | 0' |
| | 319° | 318° | 317° | 316° | 315° | 314° | 313° | 312° | 311° | 310° | |

| | 50° | 51° | 52° | 53° | 54° | 55° | 56° | 57° | 58° | 59° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .1786 | .1853 | .1922 | .1991 | .2061 | .2132 | .2204 | .2277 | .2350 | .2425 | 60' |
| 2' | .1788 | .1856 | .1924 | .1993 | .2063 | .2135 | .2206 | .2279 | .2353 | .2427 | 58' |
| 4' | .1791 | .1858 | .1926 | .1996 | .2066 | .2137 | .2209 | .2282 | .2355 | .2430 | 56' |
| 6' | .1793 | .1860 | .1929 | .1998 | .2068 | .2139 | .2211 | .2284 | .2358 | .2432 | 54' |
| 8' | .1795 | .1862 | .1931 | .2000 | .2070 | .2142 | .2214 | .2287 | .2360 | .2435 | 52' |
| 10' | .1797 | .1865 | .1933 | .2003 | .2073 | .2144 | .2216 | .2289 | .2363 | .2437 | 50' |
| 12' | .1799 | .1867 | .1935 | .2005 | .2075 | .2146 | .2219 | .2291 | .2365 | .2440 | 48' |
| 14' | .1802 | .1869 | .1938 | .2007 | .2078 | .2149 | .2221 | .2294 | .2368 | .2442 | 46' |
| 16' | .1804 | .1872 | .1940 | .2010 | .2080 | .2151 | .2223 | .2296 | .2370 | .2445 | 44' |
| 18' | .1806 | .1874 | .1942 | .2012 | .2082 | .2154 | .2226 | .2299 | .2373 | .2447 | 42' |
| 20' | .1808 | .1876 | .1945 | .2014 | .2085 | .2156 | .2228 | .2301 | .2375 | .2450 | 40' |
| 22' | .1811 | .1878 | .1947 | .2017 | .2087 | .2158 | .2231 | .2304 | .2378 | .2452 | 38' |
| 24' | .1813 | .1881 | .1949 | .2019 | .2089 | .2161 | .2233 | .2306 | .2380 | .2455 | 36' |
| 26' | .1815 | .1883 | .1952 | .2021 | .2092 | .2163 | .2235 | .2309 | .2383 | .2457 | 34' |
| 28' | .1817 | .1885 | .1954 | .2024 | .2094 | .2166 | .2238 | .2311 | .2385 | .2460 | 32' |
| 30' | .1820 | .1887 | .1956 | .2026 | .2096 | .2168 | .2240 | .2314 | .2388 | .2462 | 30' |
| 32' | .1822 | .1890 | .1959 | .2028 | .2099 | .2170 | .2243 | .2316 | .2390 | .2465 | 28' |
| 34' | .1824 | .1892 | .1961 | .2031 | .2101 | .2173 | .2245 | .2318 | .2392 | .2467 | 26' |
| 36' | .1826 | .1894 | .1963 | .2033 | .2104 | .2175 | .2248 | .2321 | .2395 | .2470 | 24' |
| 38' | .1829 | .1897 | .1965 | .2035 | .2106 | .2178 | .2250 | .2323 | .2397 | .2472 | 22' |
| 40' | .1831 | .1899 | .1968 | .2038 | .2108 | .2180 | .2252 | .2326 | .2400 | .2475 | 20' |
| 42' | .1833 | .1901 | .1970 | .2040 | .2111 | .2182 | .2255 | .2328 | .2402 | .2477 | 18' |
| 44' | .1835 | .1903 | .1972 | .2042 | .2113 | .2185 | .2257 | .2331 | .2405 | .2480 | 16' |
| 46' | .1838 | .1906 | .1975 | .2045 | .2115 | .2187 | .2260 | .2333 | .2407 | .2482 | 14' |
| 48' | .1840 | .1908 | .1977 | .2047 | .2118 | .2190 | .2262 | .2336 | .2410 | .2485 | 12' |
| 50' | .1842 | .1910 | .1979 | .2049 | .2120 | .2192 | .2265 | .2338 | .2412 | .2487 | 10' |
| 52' | .1844 | .1913 | .1982 | .2052 | .2123 | .2194 | .2267 | .2341 | .2415 | .2490 | 8' |
| 54' | .1847 | .1915 | .1984 | .2054 | .2125 | .2197 | .2269 | .2343 | .2417 | .2492 | 6' |
| 56' | .1849 | .1917 | .1986 | .2056 | .2127 | .2199 | .2272 | .2345 | .2420 | .2495 | 4' |
| 58' | .1851 | .1919 | .1989 | .2059 | .2130 | .2202 | .2274 | .2348 | .2422 | .2497 | 2' |
| 60' | .1853 | .1922 | .1991 | .2061 | .2132 | .2204 | .2277 | .2350 | .2425 | .2500 | 0' |
| | 309° | 308° | 307° | 306° | 305° | 304° | 303° | 302° | 301° | 300° | |

| | 60° | 61° | 62° | 63° | 64° | 65° | 66° | 67° | 68° | 69° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .2500 | .2576 | .2653 | .2730 | .2808 | .2887 | .2966 | .3046 | .3127 | .3208 | 60' |
| 2' | .2503 | .2578 | .2655 | .2733 | .2811 | .2890 | .2969 | .3049 | .3130 | .3211 | 58' |
| 4' | .2505 | .2581 | .2658 | .2735 | .2813 | .2892 | .2972 | .3052 | .3132 | .3214 | 56' |
| 6' | .2508 | .2584 | .2660 | .2738 | .2816 | .2895 | .2974 | .3054 | .3135 | .3216 | 54' |
| 8' | .2510 | .2586 | .2663 | .2740 | .2819 | .2897 | .2977 | .3057 | .3138 | .3219 | 52' |
| 10' | .2513 | .2589 | .2665 | .2743 | .2821 | .2900 | .2980 | .3060 | .3140 | .3222 | 50' |
| 12' | .2515 | .2591 | .2668 | .2746 | .2824 | .2903 | .2982 | .3062 | .3143 | .3224 | 48' |
| 14' | .2518 | .2594 | .2671 | .2748 | .2826 | .2905 | .2985 | .3065 | .3146 | .3227 | 46' |
| 16' | .2520 | .2596 | .2673 | .2751 | .2829 | .2908 | .2988 | .3068 | .3149 | .3230 | 44' |
| 18' | .2523 | .2599 | .2676 | .2753 | .2832 | .2911 | .2990 | .3070 | .3151 | .3233 | 42' |
| 20' | .2525 | .2601 | .2678 | .2756 | .2834 | .2913 | .2993 | .3073 | .3154 | .3235 | 40' |
| 22' | .2528 | .2604 | .2681 | .2759 | .2837 | .2916 | .2996 | .3076 | .3157 | .3238 | 38' |
| 24' | .2530 | .2607 | .2684 | .2761 | .2840 | .2919 | .2998 | .3079 | .3159 | .3241 | 36' |
| 26' | .2533 | .2609 | .2686 | .2764 | .2842 | .2921 | .3001 | .3081 | .3162 | .3244 | 34' |
| 28' | .2535 | .2612 | .2689 | .2766 | .2845 | .2924 | .3004 | .3084 | .3165 | .3246 | 32' |
| 30' | .2538 | .2614 | .2691 | .2769 | .2847 | .2927 | .3006 | .3087 | .3167 | .3249 | 30' |
| 32' | .2540 | .2617 | .2694 | .2772 | .2850 | .2929 | .3009 | .3089 | .3170 | .3252 | 28' |
| 34' | .2543 | .2619 | .2696 | .2774 | .2853 | .2932 | .3012 | .3092 | .3173 | .3254 | 26' |
| 36' | .2545 | .2622 | .2699 | .2777 | .2855 | .2934 | .3014 | .3095 | .3176 | .3257 | 24' |
| 38' | .2548 | .2624 | .2702 | .2779 | .2858 | .2937 | .3017 | .3097 | .3178 | .3260 | 22' |
| 40' | .2551 | .2627 | .2704 | .2782 | .2861 | .2940 | .3020 | .3100 | .3181 | .3263 | 20' |
| 42' | .2553 | .2630 | .2707 | .2785 | .2863 | .2942 | .3022 | .3103 | .3184 | .3265 | 18' |
| 44' | .2556 | .2632 | .2709 | .2787 | .2866 | .2945 | .3025 | .3105 | .3186 | .3268 | 16' |
| 46' | .2558 | .2635 | .2712 | .2790 | .2868 | .2948 | .3028 | .3108 | .3189 | .3271 | 14' |
| 48' | .2561 | .2637 | .2715 | .2792 | .2871 | .2950 | .3030 | .3111 | .3192 | .3274 | 12' |
| 50' | .2563 | .2640 | .2717 | .2795 | .2874 | .2953 | .3033 | .3113 | .3195 | .3276 | 10' |
| 52' | .2566 | .2642 | .2720 | .2798 | .2876 | .2956 | .3036 | .3116 | .3197 | .3279 | 8' |
| 54' | .2568 | .2645 | .2722 | .2800 | .2879 | .2958 | .3038 | .3119 | .3200 | .3282 | 6' |
| 56' | .2571 | .2648 | .2725 | .2803 | .2882 | .2961 | .3041 | .3122 | .3203 | .3284 | 4' |
| 58' | .2573 | .2650 | .2727 | .2806 | .2884 | .2964 | .3044 | .3124 | .3205 | .3287 | 2' |
| 60' | .2576 | .2653 | .2730 | .2808 | .2887 | .2966 | .3046 | .3127 | .3208 | .3290 | 0' |
| | 299° | 298° | 297° | 296° | 295° | 294° | 293° | 292° | 291° | 290° | |

| | 70° | 71° | 72° | 73° | 74° | 75° | 76° | 77° | 78° | 79° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .3290 | .3372 | .3455 | .3538 | .3622 | .3706 | .3790 | .3875 | .3960 | .4046 | 60' |
| 2' | .3293 | .3375 | .3458 | .3541 | .3625 | .3709 | .3793 | .3878 | .3963 | .4049 | 58' |
| 4' | .3295 | .3378 | .3460 | .3544 | .3627 | .3712 | .3796 | .3881 | .3966 | .4052 | 56' |
| 6' | .3298 | .3380 | .3463 | .3546 | .3630 | .3714 | .3799 | .3884 | .3969 | .4055 | 54' |
| 8' | .3301 | .3383 | .3466 | .3549 | .3633 | .3717 | .3802 | .3887 | .3972 | .4057 | 52' |
| 10' | .3304 | .3386 | .3469 | .3552 | .3636 | .3720 | .3805 | .3889 | .3975 | .4060 | 50' |
| 12' | .3306 | .3389 | .3472 | .3555 | .3639 | .3723 | .3807 | .3892 | .3978 | .4063 | 48' |
| 14' | .3309 | .3391 | .3474 | .3558 | .3641 | .3726 | .3810 | .3895 | .3980 | .4066 | 46' |
| 16' | .3312 | .3394 | .3477 | .3560 | .3644 | .3728 | .3813 | .3898 | .3983 | .4069 | 44' |
| 18' | .3315 | .3397 | .3480 | .3563 | .3647 | .3731 | .3816 | .3901 | .3986 | .4072 | 42' |
| 20' | .3317 | .3400 | .3483 | .3566 | .3650 | .3734 | .3819 | .3904 | .3989 | .4075 | 40' |
| 22' | .3320 | .3402 | .3485 | .3569 | .3653 | .3737 | .3821 | .3906 | .3992 | .4077 | 38' |
| 24' | .3323 | .3405 | .3488 | .3572 | .3655 | .3740 | .3824 | .3909 | .3995 | .4080 | 36' |
| 26' | .3325 | .3408 | .3491 | .3574 | .3658 | .3742 | .3827 | .3912 | .3997 | .4083 | 34' |
| 28' | .3328 | .3411 | .3494 | .3577 | .3661 | .3745 | .3830 | .3915 | .4000 | .4086 | 32' |
| 30' | .3331 | .3413 | .3496 | .3580 | .3664 | .3748 | .3833 | .3918 | .4003 | .4089 | 30' |
| 32' | .3334 | .3416 | .3499 | .3583 | .3667 | .3751 | .3836 | .3921 | .4006 | .4092 | 28' |
| 34' | .3336 | .3419 | .3502 | .3586 | .3669 | .3754 | .3838 | .3923 | .4009 | .4095 | 26' |
| 36' | .3339 | .3422 | .3505 | .3588 | .3672 | .3757 | .3841 | .3926 | .4012 | .4097 | 24' |
| 38' | .3342 | .3425 | .3508 | .3591 | .3675 | .3759 | .3844 | .3929 | .4015 | .4100 | 22' |
| 40' | .3345 | .3427 | .3510 | .3594 | .3678 | .3762 | .3847 | .3932 | .4017 | .4103 | 20' |
| 42' | .3347 | .3430 | .3513 | .3597 | .3681 | .3765 | .3850 | .3935 | .4020 | .4106 | 18' |
| 44' | .3350 | .3433 | .3516 | .3599 | .3683 | .3768 | .3853 | .3938 | .4023 | .4109 | 16' |
| 46' | .3353 | .3436 | .3519 | .3602 | .3686 | .3771 | .3855 | .3941 | .4026 | .4112 | 14' |
| 48' | .3356 | .3438 | .3521 | .3605 | .3689 | .3773 | .3858 | .3943 | .4029 | .4115 | 12' |
| 50' | .3358 | .3441 | .3524 | .3608 | .3692 | .3776 | .3861 | .3946 | .4032 | .4117 | 10' |
| 52' | .3361 | .3444 | .3527 | .3611 | .3695 | .3779 | .3864 | .3949 | .4035 | .4120 | 8' |
| 54' | .3364 | .3447 | .3530 | .3613 | .3697 | .3782 | .3867 | .3952 | .4037 | .4123 | 6' |
| 56' | .3367 | .3449 | .3533 | .3616 | .3700 | .3785 | .3870 | .3955 | .4040 | .4126 | 4' |
| 58' | .3369 | .3452 | .3535 | .3619 | .3703 | .3788 | .3872 | .3958 | .4043 | .4129 | 2' |
| 60' | .3372 | .3455 | .3538 | .3622 | .3706 | .3790 | .3875 | .3960 | .4046 | .4132 | 0' |
| | 289° | 288° | 287° | 286° | 285° | 284° | 283° | 282° | 281° | 280° | |

| | 80° | 81° | 82° | 83° | 84° | 85° | 86° | 87° | 88° | 89° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .4132 | .4218 | .4304 | .4391 | .4477 | .4564 | .4651 | .4738 | .4826 | .4913 | 60' |
| 2' | .4135 | .4221 | .4307 | .4394 | .4480 | .4567 | .4654 | .4741 | .4828 | .4916 | 58' |
| 4' | .4137 | .4224 | .4310 | .4396 | .4483 | .4570 | .4657 | .4744 | .4831 | .4919 | 56' |
| 6' | .4140 | .4226 | .4313 | .4399 | .4486 | .4573 | .4660 | .4747 | .4834 | .4921 | 54' |
| 8' | .4143 | .4229 | .4316 | .4402 | .4489 | .4576 | .4663 | .4750 | .4837 | .4924 | 52' |
| 10' | .4146 | .4232 | .4319 | .4405 | .4492 | .4579 | .4666 | .4753 | .4840 | .4927 | 50' |
| 12' | .4149 | .4235 | .4321 | .4408 | .4495 | .4582 | .4669 | .4756 | .4843 | .4930 | 48' |
| 14' | .4152 | .4238 | .4324 | .4411 | .4498 | .4585 | .4672 | .4759 | .4846 | .4933 | 46' |
| 16' | .4155 | .4241 | .4327 | .4414 | .4501 | .4587 | .4674 | .4762 | .4849 | .4936 | 44' |
| 18' | .4158 | .4244 | .4330 | .4417 | .4503 | .4590 | .4677 | .4764 | .4852 | .4939 | 42' |
| 20' | .4160 | .4247 | .4333 | .4420 | .4506 | .4593 | .4680 | .4767 | .4855 | .4942 | 40' |
| 22' | .4163 | .4249 | .4336 | .4422 | .4509 | .4596 | .4683 | .4770 | .4857 | .4945 | 38' |
| 24' | .4166 | .4252 | .4339 | .4425 | .4512 | .4599 | .4686 | .4773 | .4860 | .4948 | 36' |
| 26' | .4169 | .4255 | .4342 | .4428 | .4515 | .4602 | .4689 | .4776 | .4863 | .4951 | 34' |
| 28' | .4172 | .4258 | .4344 | .4431 | .4518 | .4605 | .4692 | .4779 | .4866 | .4953 | 32' |
| 30' | .4175 | .4261 | .4347 | .4434 | .4521 | .4608 | .4695 | .4782 | .4869 | .4956 | 30' |
| 32' | .4178 | .4264 | .4350 | .4437 | .4524 | .4611 | .4698 | .4785 | .4872 | .4959 | 28' |
| 34' | .4181 | .4267 | .4353 | .4440 | .4527 | .4614 | .4701 | .4788 | .4875 | .4962 | 26' |
| 36' | .4183 | .4270 | .4356 | .4443 | .4529 | .4616 | .4703 | .4791 | .4878 | .4965 | 24' |
| 38' | .4186 | .4272 | .4359 | .4446 | .4532 | .4619 | .4706 | .4794 | .4881 | .4968 | 22' |
| 40' | .4189 | .4275 | .4362 | .4448 | .4535 | .4622 | .4709 | .4796 | .4884 | .4971 | 20' |
| 42' | .4192 | .4278 | .4365 | .4451 | .4538 | .4625 | .4712 | .4799 | .4887 | .4974 | 18' |
| 44' | .4195 | .4281 | .4368 | .4454 | .4541 | .4628 | .4715 | .4802 | .4889 | .4977 | 16' |
| 46' | .4198 | .4284 | .4370 | .4457 | .4544 | .4631 | .4718 | .4805 | .4892 | .4980 | 14' |
| 48' | .4201 | .4287 | .4373 | .4460 | .4547 | .4634 | .4721 | .4808 | .4895 | .4983 | 12' |
| 50' | .4203 | .4290 | .4376 | .4463 | .4550 | .4637 | .4724 | .4811 | .4898 | .4985 | 10' |
| 52' | .4206 | .4293 | .4379 | .4466 | .4553 | .4640 | .4727 | .4814 | .4901 | .4988 | 8' |
| 54' | .4209 | .4295 | .4382 | .4469 | .4556 | .4643 | .4730 | .4817 | .4904 | .4991 | 6' |
| 56' | .4212 | .4298 | .4385 | .4472 | .4558 | .4645 | .4733 | .4820 | .4907 | .4994 | 4' |
| 58' | .4215 | .4301 | .4388 | .4474 | .4561 | .4648 | .4735 | .4823 | .4910 | .4997 | 2' |
| 60' | .4218 | .4304 | .4391 | .4477 | .4564 | .4651 | .4738 | .4826 | .4913 | .5000 | 0' |
| | 279° | 278° | 277° | 276° | 275° | 274° | 273° | 272° | 271° | 270° | |

| | 90° | 91° | 92° | 93° | 94° | 95° | 96° | 97° | 98° | 99° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .5000 | .5087 | .5174 | .5262 | .5349 | .5436 | .5523 | .5609 | .5696 | .5782 | 60' |
| 2' | .5003 | .5090 | .5177 | .5265 | .5352 | .5439 | .5526 | .5612 | .5699 | .5785 | 58' |
| 4' | .5006 | .5093 | .5180 | .5267 | .5355 | .5442 | .5528 | .5615 | .5702 | .5788 | 56' |
| 6' | .5009 | .5096 | .5183 | .5270 | .5357 | .5444 | .5531 | .5618 | .5705 | .5791 | 54' |
| 8' | .5012 | .5099 | .5186 | .5273 | .5360 | .5447 | .5534 | .5621 | .5707 | .5794 | 52' |
| 10' | .5015 | .5102 | .5189 | .5276 | .5363 | .5450 | .5537 | .5624 | .5710 | .5797 | 50' |
| 12' | .5017 | .5105 | .5192 | .5279 | .5366 | .5453 | .5540 | .5627 | .5713 | .5799 | 48' |
| 14' | .5020 | .5108 | .5195 | .5282 | .5369 | .5456 | .5543 | .5630 | .5716 | .5802 | 46' |
| 16' | .5023 | .5111 | .5198 | .5285 | .5372 | .5459 | .5546 | .5632 | .5719 | .5805 | 44' |
| 18' | .5026 | .5113 | .5201 | .5288 | .5375 | .5462 | .5549 | .5635 | .5722 | .5808 | 42' |
| 20' | .5029 | .5116 | .5204 | .5291 | .5378 | .5465 | .5552 | .5638 | .5725 | .5811 | 40' |
| 22' | .5032 | .5119 | .5206 | .5294 | .5381 | .5468 | .5554 | .5641 | .5728 | .5814 | 38' |
| 24' | .5035 | .5122 | .5209 | .5297 | .5384 | .5471 | .5557 | .5644 | .5730 | .5817 | 36' |
| 26' | .5038 | .5125 | .5212 | .5299 | .5386 | .5473 | .5560 | .5647 | .5733 | .5819 | 34' |
| 28' | .5041 | .5128 | .5215 | .5302 | .5389 | .5476 | .5563 | .5650 | .5736 | .5822 | 32' |
| 30' | .5044 | .5131 | .5218 | .5305 | .5392 | .5479 | .5566 | .5653 | .5739 | .5825 | 30' |
| 32' | .5047 | .5134 | .5221 | .5308 | .5395 | .5482 | .5569 | .5656 | .5742 | .5828 | 28' |
| 34' | .5049 | .5137 | .5224 | .5311 | .5398 | .5485 | .5572 | .5658 | .5745 | .5831 | 26' |
| 36' | .5052 | .5140 | .5227 | .5314 | .5401 | .5488 | .5575 | .5661 | .5748 | .5834 | 24' |
| 38' | .5055 | .5143 | .5230 | .5317 | .5404 | .5491 | .5578 | .5664 | .5751 | .5837 | 22' |
| 40' | .5058 | .5145 | .5233 | .5320 | .5407 | .5494 | .5580 | .5667 | .5753 | .5840 | 20' |
| 42' | .5061 | .5148 | .5236 | .5323 | .5410 | .5497 | .5583 | .5670 | .5756 | .5842 | 18' |
| 44' | .5064 | .5151 | .5238 | .5326 | .5413 | .5499 | .5586 | .5673 | .5759 | .5845 | 16' |
| 46' | .5067 | .5154 | .5241 | .5328 | .5415 | .5502 | .5589 | .5676 | .5762 | .5848 | 14' |
| 48' | .5070 | .5157 | .5244 | .5331 | .5418 | .5505 | .5592 | .5679 | .5765 | .5851 | 12' |
| 50' | .5073 | .5160 | .5247 | .5334 | .5421 | .5508 | .5595 | .5681 | .5768 | .5854 | 10' |
| 52' | .5076 | .5163 | .5250 | .5337 | .5424 | .5511 | .5598 | .5684 | .5771 | .5857 | 8' |
| 54' | .5079 | .5166 | .5253 | .5340 | .5427 | .5514 | .5601 | .5687 | .5774 | .5860 | 6' |
| 56' | .5081 | .5169 | .5256 | .5343 | .5430 | .5517 | .5604 | .5690 | .5776 | .5863 | 4' |
| 58' | .5084 | .5172 | .5259 | .5346 | .5433 | .5520 | .5606 | .5693 | .5779 | .5865 | 2' |
| 60' | .5087 | .5174 | .5262 | .5349 | .5436 | .5523 | .5609 | .5696 | .5782 | .5868 | 0' |
| | 269° | 268° | 267° | 266° | 265° | 264° | 263° | 262° | 261° | 260° | |

| | 100° | 101° | 102° | 103° | 104° | 105° | 106° | 107° | 108° | 109° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .5868 | .5954 | .6040 | .6125 | .6210 | .6294 | .6378 | .6462 | .6545 | .6628 | 60' |
| 2' | .5871 | .5957 | .6042 | .6128 | .6212 | .6297 | .6381 | .6465 | .6548 | .6631 | 58' |
| 4' | .5874 | .5960 | .6045 | .6130 | .6215 | .6300 | .6384 | .6467 | .6551 | .6633 | 56' |
| 6' | .5877 | .5963 | .6048 | .6133 | .6218 | .6303 | .6387 | .6470 | .6553 | .6636 | 54' |
| 8' | .5880 | .5965 | .6051 | .6136 | .6221 | .6305 | .6389 | .6473 | .6556 | .6639 | 52' |
| 10' | .5883 | .5968 | .6054 | .6139 | .6224 | .6308 | .6392 | .6476 | .6559 | .6642 | 50' |
| 12' | .5885 | .5971 | .6057 | .6142 | .6227 | .6311 | .6395 | .6479 | .6562 | .6644 | 48' |
| 14' | .5888 | .5974 | .6059 | .6145 | .6229 | .6314 | .6398 | .6481 | .6564 | .6647 | 46' |
| 16' | .5891 | .5977 | .6062 | .6147 | .6232 | .6317 | .6401 | .6484 | .6567 | .6650 | 44' |
| 18' | .5894 | .5980 | .6065 | .6150 | .6235 | .6319 | .6403 | .6487 | .6570 | .6653 | 42' |
| 20' | .5897 | .5983 | .6068 | .6153 | .6238 | .6322 | .6406 | .6490 | .6573 | .6655 | 40' |
| 22' | .5900 | .5985 | .6071 | .6156 | .6241 | .6325 | .6409 | .6492 | .6575 | .6658 | 38' |
| 24' | .5903 | .5988 | .6074 | .6159 | .6243 | .6328 | .6412 | .6495 | .6578 | .6661 | 36' |
| 26' | .5905 | .5991 | .6077 | .6162 | .6246 | .6331 | .6414 | .6498 | .6581 | .6664 | 34' |
| 28' | .5908 | .5994 | .6079 | .6164 | .6249 | .6333 | .6417 | .6501 | .6584 | .6666 | 32' |
| 30' | .5911 | .5997 | .6082 | .6167 | .6252 | .6336 | .6420 | .6504 | .6587 | .6669 | 30' |
| 32' | .5914 | .6000 | .6085 | .6170 | .6255 | .6339 | .6423 | .6506 | .6589 | .6672 | 28' |
| 34' | .5917 | .6003 | .6088 | .6173 | .6258 | .6342 | .6426 | .6509 | .6592 | .6675 | 26' |
| 36' | .5920 | .6005 | .6091 | .6176 | .6260 | .6345 | .6428 | .6512 | .6595 | .6677 | 24' |
| 38' | .5923 | .6008 | .6094 | .6179 | .6263 | .6347 | .6431 | .6515 | .6598 | .6680 | 22' |
| 40' | .5925 | .6011 | .6096 | .6181 | .6266 | .6350 | .6434 | .6517 | .6600 | .6683 | 20' |
| 42' | .5928 | .6014 | .6099 | .6184 | .6269 | .6353 | .6437 | .6520 | .6603 | .6685 | 18' |
| 44' | .5931 | .6017 | .6102 | .6187 | .6272 | .6356 | .6440 | .6523 | .6606 | .6688 | 16' |
| 46' | .5934 | .6020 | .6105 | .6190 | .6274 | .6359 | .6442 | .6526 | .6609 | .6691 | 14' |
| 48' | .5937 | .6022 | .6108 | .6193 | .6277 | .6361 | .6445 | .6528 | .6611 | .6694 | 12' |
| 50' | .5940 | .6025 | .6111 | .6195 | .6280 | .6364 | .6448 | .6531 | .6614 | .6696 | 10' |
| 52' | .5943 | .6028 | .6113 | .6198 | .6283 | .6367 | .6451 | .6534 | .6617 | .6699 | 8' |
| 54' | .5945 | .6031 | .6116 | .6201 | .6286 | .6370 | .6454 | .6537 | .6620 | .6702 | 6' |
| 56' | .5948 | .6034 | .6119 | .6204 | .6288 | .6373 | .6456 | .6540 | .6622 | .6705 | 4' |
| 58' | .5951 | .6037 | .6122 | .6207 | .6291 | .6375 | .6459 | .6542 | .6625 | .6707 | 2' |
| 60' | .5954 | .6040 | .6125 | .6210 | .6294 | .6378 | .6462 | .6545 | .6628 | .6710 | 0' |
| | 259° | 258° | 257° | 256° | 255° | 254° | 253° | 252° | 251° | 250° | |

| | 110° | 111° | 112° | 113° | 114° | 115° | 116° | 117° | 118° | 119° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .6710 | .6792 | .6873 | .6954 | .7034 | .7113 | .7192 | .7270 | .7347 | .7424 | 60' |
| 2' | .6713 | .6795 | .6876 | .6956 | .7036 | .7116 | .7194 | .7273 | .7350 | .7427 | 58' |
| 4' | .6716 | .6797 | .6878 | .6959 | .7039 | .7118 | .7197 | .7275 | .7352 | .7429 | 56' |
| 6' | .6718 | .6800 | .6881 | .6962 | .7042 | .7121 | .7200 | .7278 | .7355 | .7432 | 54' |
| 8' | .6721 | .6803 | .6884 | .6964 | .7044 | .7124 | .7202 | .7280 | .7358 | .7434 | 52' |
| 10' | .6724 | .6805 | .6887 | .6967 | .7047 | .7126 | .7205 | .7283 | .7360 | .7437 | 50' |
| 12' | .6726 | .6808 | .6889 | .6970 | .7050 | .7129 | .7208 | .7285 | .7363 | .7439 | 48' |
| 14' | .6729 | .6811 | .6892 | .6972 | .7052 | .7132 | .7210 | .7288 | .7365 | .7442 | 46' |
| 16' | .6732 | .6814 | .6895 | .6975 | .7055 | .7134 | .7213 | .7291 | .7368 | .7444 | 44' |
| 18' | .6735 | .6816 | .6897 | .6978 | .7058 | .7137 | .7215 | .7293 | .7370 | .7447 | 42' |
| 20' | .6737 | .6819 | .6900 | .6980 | .7060 | .7139 | .7218 | .7296 | .7373 | .7449 | 40' |
| 22' | .6740 | .6822 | .6903 | .6983 | .7063 | .7142 | .7221 | .7298 | .7376 | .7452 | 38' |
| 24' | .6743 | .6824 | .6905 | .6986 | .7066 | .7145 | .7223 | .7301 | .7378 | .7455 | 36' |
| 26' | .6746 | .6827 | .6908 | .6988 | .7068 | .7147 | .7226 | .7304 | .7381 | .7457 | 34' |
| 28' | .6748 | .6830 | .6911 | .6991 | .7071 | .7150 | .7228 | .7306 | .7383 | .7460 | 32' |
| 30' | .6751 | .6833 | .6913 | .6994 | .7073 | .7153 | .7231 | .7309 | .7386 | .7462 | 30' |
| 32' | .6754 | .6835 | .6916 | .6996 | .7076 | .7155 | .7234 | .7311 | .7388 | .7465 | 28' |
| 34' | .6756 | .6838 | .6919 | .6999 | .7079 | .7158 | .7236 | .7314 | .7391 | .7467 | 26' |
| 36' | .6759 | .6841 | .6921 | .7002 | .7081 | .7160 | .7239 | .7316 | .7393 | .7470 | 24' |
| 38' | .6762 | .6843 | .6924 | .7004 | .7084 | .7163 | .7241 | .7319 | .7396 | .7472 | 22' |
| 40' | .6765 | .6846 | .6927 | .7007 | .7087 | .7166 | .7244 | .7322 | .7399 | .7475 | 20' |
| 42' | .6767 | .6849 | .6930 | .7010 | .7089 | .7168 | .7247 | .7324 | .7401 | .7477 | 18' |
| 44' | .6770 | .6851 | .6932 | .7012 | .7092 | .7171 | .7249 | .7327 | .7404 | .7480 | 16' |
| 46' | .6773 | .6854 | .6935 | .7015 | .7095 | .7174 | .7252 | .7329 | .7406 | .7482 | 14' |
| 48' | .6776 | .6857 | .6938 | .7018 | .7097 | .7176 | .7254 | .7332 | .7409 | .7485 | 12' |
| 50' | .6778 | .6860 | .6940 | .7020 | .7100 | .7179 | .7257 | .7335 | .7411 | .7487 | 10' |
| 52' | .6781 | .6862 | .6943 | .7023 | .7103 | .7181 | .7260 | .7337 | .7414 | .7490 | 8' |
| 54' | .6784 | .6865 | .6946 | .7026 | .7105 | .7184 | .7262 | .7340 | .7416 | .7492 | 6' |
| 56' | .6786 | .6868 | .6948 | .7028 | .7108 | .7187 | .7265 | .7342 | .7419 | .7495 | 4' |
| 58' | .6789 | .6870 | .6951 | .7031 | .7110 | .7189 | .7267 | .7345 | .7422 | .7497 | 2' |
| 60' | .6792 | .6873 | .6954 | .7034 | .7113 | .7192 | .7270 | .7347 | .7424 | .7500 | 0' |
| | 249° | 248° | 247° | 246° | 245° | 244° | 243° | 242° | 241° | 240° | |

| | 120° | 121° | 122° | 123° | 124° | 125° | 126° | 127° | 128° | 129° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .7500 | .7575 | .7650 | .7723 | .7796 | .7868 | .7939 | .8009 | .8078 | .8147 | 60' |
| 2' | .7503 | .7578 | .7652 | .7726 | .7798 | .7870 | .7941 | .8011 | .8081 | .8149 | 58' |
| 4' | .7505 | .7580 | .7655 | .7728 | .7801 | .7873 | .7944 | .8014 | .8083 | .8151 | 56' |
| 6' | .7508 | .7583 | .7657 | .7731 | .7803 | .7875 | .7946 | .8016 | .8085 | .8153 | 54' |
| 8' | .7510 | .7585 | .7659 | .7733 | .7806 | .7877 | .7948 | .8018 | .8087 | .8156 | 52' |
| 10' | .7513 | .7588 | .7662 | .7735 | .7808 | .7880 | .7951 | .8021 | .8090 | .8158 | 50' |
| 12' | .7515 | .7590 | .7664 | .7738 | .7810 | .7882 | .7953 | .8023 | .8092 | .8160 | 48' |
| 14' | .7518 | .7593 | .7667 | .7740 | .7813 | .7885 | .7955 | .8025 | .8094 | .8162 | 46' |
| 16' | .7520 | .7595 | .7669 | .7743 | .7815 | .7887 | .7958 | .8028 | .8097 | .8165 | 44' |
| 18' | .7523 | .7598 | .7672 | .7745 | .7818 | .7889 | .7960 | .8030 | .8099 | .8167 | 42' |
| 20' | .7525 | .7600 | .7674 | .7748 | .7820 | .7892 | .7962 | .8032 | .8101 | .8169 | 40' |
| 22' | .7528 | .7603 | .7677 | .7750 | .7822 | .7894 | .7965 | .8035 | .8103 | .8171 | 38' |
| 24' | .7530 | .7605 | .7679 | .7752 | .7825 | .7896 | .7967 | .8037 | .8106 | .8174 | 36' |
| 26' | .7533 | .7608 | .7682 | .7755 | .7827 | .7899 | .7969 | .8039 | .8108 | .8176 | 34' |
| 28' | .7535 | .7610 | .7684 | .7757 | .7830 | .7901 | .7972 | .8041 | .8110 | .8178 | 32' |
| 30' | .7538 | .7612 | .7686 | .7760 | .7832 | .7904 | .7974 | .8044 | .8113 | .8180 | 30' |
| 32' | .7540 | .7615 | .7689 | .7762 | .7834 | .7906 | .7976 | .8046 | .8115 | .8183 | 28' |
| 34' | .7543 | .7617 | .7691 | .7765 | .7837 | .7908 | .7979 | .8048 | .8117 | .8185 | 26' |
| 36' | .7545 | .7620 | .7694 | .7767 | .7839 | .7911 | .7981 | .8051 | .8119 | .8187 | 24' |
| 38' | .7548 | .7622 | .7696 | .7769 | .7842 | .7913 | .7983 | .8053 | .8122 | .8189 | 22' |
| 40' | .7550 | .7625 | .7699 | .7772 | .7844 | .7915 | .7986 | .8055 | .8124 | .8192 | 20' |
| 42' | .7553 | .7627 | .7701 | .7774 | .7846 | .7918 | .7988 | .8058 | .8126 | .8194 | 18' |
| 44' | .7555 | .7630 | .7704 | .7777 | .7849 | .7920 | .7990 | .8060 | .8128 | .8196 | 16' |
| 46' | .7558 | .7632 | .7706 | .7779 | .7851 | .7922 | .7993 | .8062 | .8131 | .8198 | 14' |
| 48' | .7560 | .7635 | .7709 | .7781 | .7854 | .7925 | .7995 | .8065 | .8133 | .8201 | 12' |
| 50' | .7563 | .7637 | .7711 | .7784 | .7856 | .7927 | .7997 | .8067 | .8135 | .8203 | 10' |
| 52' | .7565 | .7640 | .7713 | .7786 | .7858 | .7930 | .8000 | .8069 | .8138 | .8205 | 8' |
| 54' | .7568 | .7642 | .7716 | .7789 | .7861 | .7932 | .8002 | .8071 | .8140 | .8207 | 6' |
| 56' | .7570 | .7645 | .7718 | .7791 | .7863 | .7934 | .8004 | .8074 | .8142 | .8209 | 4' |
| 58' | .7573 | .7647 | .7721 | .7794 | .7865 | .7937 | .8007 | .8076 | .8144 | .8212 | 2' |
| 60' | .7575 | .7650 | .7723 | .7796 | .7868 | .7939 | .8009 | .8078 | .8147 | .8214 | 0' |
| | 239° | 238° | 237° | 236° | 235° | 234° | 233° | 232° | 231° | 230° | |

| | 130° | 131° | 132° | 133° | 134° | 135° | 136° | 137° | 138° | 139° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .8214 | .8280 | .8346 | .8410 | .8473 | .8536 | .8597 | .8657 | .8716 | .8774 | 60' |
| 2' | .8216 | .8282 | .8348 | .8412 | .8475 | .8538 | .8599 | .8659 | .8718 | .8775 | 58' |
| 4' | .8218 | .8285 | .8350 | .8414 | .8477 | .8540 | .8601 | .8661 | .8720 | .8777 | 56' |
| 6' | .8221 | .8287 | .8352 | .8416 | .8480 | .8542 | .8603 | .8663 | .8722 | .8779 | 54' |
| 8' | .8223 | .8289 | .8354 | .8418 | .8482 | .8544 | .8605 | .8665 | .8723 | .8781 | 52' |
| 10' | .8225 | .8291 | .8356 | .8421 | .8484 | .8546 | .8607 | .8667 | .8725 | .8783 | 50' |
| 12' | .8227 | .8293 | .8359 | .8423 | .8486 | .8548 | .8609 | .8669 | .8727 | .8785 | 48' |
| 14' | .8230 | .8296 | .8361 | .8425 | .8488 | .8550 | .8611 | .8671 | .8729 | .8787 | 46' |
| 16' | .8232 | .8298 | .8363 | .8427 | .8490 | .8552 | .8613 | .8673 | .8731 | .8789 | 44' |
| 18' | .8234 | .8300 | .8365 | .8429 | .8492 | .8554 | .8615 | .8675 | .8733 | .8791 | 42' |
| 20' | .8236 | .8302 | .8367 | .8431 | .8494 | .8556 | .8617 | .8677 | .8735 | .8793 | 40' |
| 22' | .8238 | .8304 | .8369 | .8433 | .8496 | .8558 | .8619 | .8679 | .8737 | .8794 | 38' |
| 24' | .8241 | .8307 | .8372 | .8435 | .8498 | .8560 | .8621 | .8680 | .8739 | .8796 | 36' |
| 26' | .8243 | .8309 | .8374 | .8438 | .8500 | .8562 | .8623 | .8682 | .8741 | .8798 | 34' |
| 28' | .8245 | .8311 | .8376 | .8440 | .8502 | .8564 | .8625 | .8684 | .8743 | .8800 | 32' |
| 30' | .8247 | .8313 | .8378 | .8442 | .8505 | .8566 | .8627 | .8686 | .8745 | .8802 | 30' |
| 32' | .8249 | .8315 | .8380 | .8444 | .8507 | .8568 | .8629 | .8688 | .8747 | .8804 | 28' |
| 34' | .8252 | .8317 | .8382 | .8446 | .8509 | .8570 | .8631 | .8690 | .8749 | .8806 | 26' |
| 36' | .8254 | .8320 | .8384 | .8448 | .8511 | .8572 | .8633 | .8692 | .8751 | .8808 | 24' |
| 38' | .8256 | .8322 | .8387 | .8450 | .8513 | .8574 | .8635 | .8694 | .8752 | .8810 | 22' |
| 40' | .8258 | .8324 | .8389 | .8452 | .8515 | .8576 | .8637 | .8696 | .8754 | .8811 | 20' |
| 42' | .8260 | .8326 | .8391 | .8454 | .8517 | .8578 | .8639 | .8698 | .8756 | .8813 | 18' |
| 44' | .8263 | .8328 | .8393 | .8457 | .8519 | .8580 | .8641 | .8700 | .8758 | .8815 | 16' |
| 46' | .8265 | .8330 | .8395 | .8459 | .8521 | .8583 | .8643 | .8702 | .8760 | .8817 | 14' |
| 48' | .8267 | .8333 | .8397 | .8461 | .8523 | .8585 | .8645 | .8704 | .8762 | .8819 | 12' |
| 50' | .8269 | .8335 | .8399 | .8463 | .8525 | .8587 | .8647 | .8706 | .8764 | .8821 | 10' |
| 52' | .8272 | .8337 | .8401 | .8465 | .8527 | .8589 | .8649 | .8708 | .8766 | .8823 | 8' |
| 54' | .8274 | .8339 | .8404 | .8467 | .8529 | .8591 | .8651 | .8710 | .8768 | .8825 | 6' |
| 56' | .8276 | .8341 | .8406 | .8469 | .8531 | .8593 | .8653 | .8712 | .8770 | .8826 | 4' |
| 58' | .8278 | .8343 | .8408 | .8471 | .8533 | .8595 | .8655 | .8714 | .8772 | .8828 | 2' |
| 60' | .8280 | .8346 | .8410 | .8473 | .8536 | .8597 | .8657 | .8716 | .8774 | .8830 | 0' |
| | 229° | 228° | 227° | 226° | 225° | 224° | 223° | 222° | 221° | 220° | |

| | 140° | 141° | 142° | 143° | 144° | 145° | 146° | 147° | 148° | 149° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .8830 | .8886 | .8940 | .8993 | .9045 | .9096 | .9145 | .9193 | .9240 | .9286 | 60' |
| 2' | .8832 | .8888 | .8942 | .8995 | .9047 | .9097 | .9147 | .9195 | .9242 | .9287 | 58' |
| 4' | .8834 | .8889 | .8944 | .8997 | .9049 | .9099 | .9148 | .9197 | .9243 | .9289 | 56' |
| 6' | .8836 | .8891 | .8945 | .8998 | .9050 | .9101 | .9150 | .9198 | .9245 | .9290 | 54' |
| 8' | .8838 | .8893 | .8947 | .9000 | .9052 | .9102 | .9152 | .9200 | .9246 | .9292 | 52' |
| 10' | .8840 | .8895 | .8949 | .9002 | .9054 | .9104 | .9153 | .9201 | .9248 | .9293 | 50' |
| 12' | .8841 | .8897 | .8951 | .9004 | .9055 | .9106 | .9155 | .9203 | .9249 | .9295 | 48' |
| 14' | .8843 | .8899 | .8953 | .9005 | .9057 | .9107 | .9157 | .9204 | .9251 | .9296 | 46' |
| 16' | .8845 | .8900 | .8954 | .9007 | .9059 | .9109 | .9158 | .9206 | .9253 | .9298 | 44' |
| 18' | .8847 | .8902 | .8956 | .9009 | .9060 | .9111 | .9160 | .9208 | .9254 | .9299 | 42' |
| 20' | .8849 | .8904 | .8958 | .9011 | .9062 | .9112 | .9161 | .9209 | .9256 | .9301 | 40' |
| 22' | .8851 | .8906 | .8960 | .9012 | .9064 | .9114 | .9163 | .9211 | .9257 | .9302 | 38' |
| 24' | .8853 | .8908 | .8961 | .9014 | .9066 | .9116 | .9165 | .9212 | .9259 | .9304 | 36' |
| 26' | .8854 | .8909 | .8963 | .9016 | .9067 | .9117 | .9166 | .9214 | .9260 | .9305 | 34' |
| 28' | .8856 | .8911 | .8965 | .9018 | .9069 | .9119 | .9168 | .9215 | .9262 | .9307 | 32' |
| 30' | .8858 | .8913 | .8967 | .9019 | .9071 | .9121 | .9169 | .9217 | .9263 | .9308 | 30' |
| 32' | .8860 | .8915 | .8969 | .9021 | .9072 | .9122 | .9171 | .9219 | .9265 | .9310 | 28' |
| 34' | .8862 | .8917 | .8970 | .9023 | .9074 | .9124 | .9173 | .9220 | .9266 | .9311 | 26' |
| 36' | .8864 | .8918 | .8972 | .9024 | .9076 | .9126 | .9174 | .9222 | .9268 | .9313 | 24' |
| 38' | .8866 | .8920 | .8974 | .9026 | .9077 | .9127 | .9176 | .9223 | .9269 | .9314 | 22' |
| 40' | .8867 | .8922 | .8976 | .9028 | .9079 | .9129 | .9177 | .9225 | .9271 | .9316 | 20' |
| 42' | .8869 | .8924 | .8977 | .9030 | .9081 | .9130 | .9179 | .9226 | .9272 | .9317 | 18' |
| 44' | .8871 | .8926 | .8979 | .9031 | .9082 | .9132 | .9181 | .9228 | .9274 | .9318 | 16' |
| 46' | .8873 | .8927 | .8981 | .9033 | .9084 | .9134 | .9182 | .9229 | .9275 | .9320 | 14' |
| 48' | .8875 | .8929 | .8983 | .9035 | .9086 | .9135 | .9184 | .9231 | .9277 | .9321 | 12' |
| 50' | .8877 | .8931 | .8984 | .9037 | .9087 | .9137 | .9185 | .9233 | .9278 | .9323 | 10' |
| 52' | .8878 | .8933 | .8986 | .9038 | .9089 | .9139 | .9187 | .9234 | .9280 | .9324 | 8' |
| 54' | .8880 | .8935 | .8988 | .9040 | .9091 | .9140 | .9189 | .9236 | .9281 | .9326 | 6' |
| 56' | .8882 | .8936 | .8990 | .9042 | .9092 | .9142 | .9190 | .9237 | .9283 | .9327 | 4' |
| 58' | .8884 | .8938 | .8991 | .9043 | .9094 | .9144 | .9192 | .9239 | .9284 | .9329 | 2' |
| 60' | .8886 | .8940 | .8993 | .9045 | .9096 | .9145 | .9193 | .9240 | .9286 | .9330 | 0' |
| | 219° | 218° | 217° | 216° | 215° | 214° | 213° | 212° | 211° | 210° | |

| | 150° | 151° | 152° | 153° | 154° | 155° | 156° | 157° | 158° | 159° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .9330 | .9373 | .9415 | .9455 | .9494 | .9532 | .9568 | .9603 | .9636 | .9668 | 60' |
| 2' | .9332 | .9375 | .9416 | .9456 | .9495 | .9533 | .9569 | .9604 | .9637 | .9669 | 58' |
| 4' | .9333 | .9376 | .9417 | .9458 | .9497 | .9534 | .9570 | .9605 | .9638 | .9670 | 56' |
| 6' | .9334 | .9377 | .9419 | .9459 | .9498 | .9535 | .9571 | .9606 | .9639 | .9671 | 54' |
| 8' | .9336 | .9379 | .9420 | .9460 | .9499 | .9536 | .9572 | .9607 | .9640 | .9672 | 52' |
| 10' | .9337 | .9380 | .9422 | .9462 | .9500 | .9538 | .9574 | .9608 | .9641 | .9673 | 50' |
| 12' | .9339 | .9382 | .9423 | .9463 | .9502 | .9539 | .9575 | .9609 | .9642 | .9674 | 48' |
| 14' | .9340 | .9383 | .9424 | .9464 | .9503 | .9540 | .9576 | .9610 | .9644 | .9675 | 46' |
| 16' | .9342 | .9384 | .9426 | .9466 | .9504 | .9541 | .9577 | .9612 | .9645 | .9676 | 44' |
| 18' | .9343 | .9386 | .9427 | .9467 | .9505 | .9543 | .9578 | .9613 | .9646 | .9677 | 42' |
| 20' | .9345 | .9387 | .9428 | .9468 | .9507 | .9544 | .9579 | .9614 | .9647 | .9678 | 40' |
| 22' | .9346 | .9389 | .9430 | .9469 | .9508 | .9545 | .9581 | .9615 | .9648 | .9679 | 38' |
| 24' | .9347 | .9390 | .9431 | .9471 | .9509 | .9546 | .9582 | .9616 | .9649 | .9680 | 36' |
| 26' | .9349 | .9391 | .9432 | .9472 | .9510 | .9547 | .9583 | .9617 | .9650 | .9681 | 34' |
| 28' | .9350 | .9393 | .9434 | .9473 | .9512 | .9549 | .9584 | .9618 | .9651 | .9682 | 32' |
| 30' | .9352 | .9394 | .9435 | .9475 | .9513 | .9550 | .9585 | .9619 | .9652 | .9683 | 30' |
| 32' | .9353 | .9395 | .9436 | .9476 | .9514 | .9551 | .9586 | .9621 | .9653 | .9684 | 28' |
| 34' | .9355 | .9397 | .9438 | .9477 | .9515 | .9552 | .9588 | .9622 | .9654 | .9685 | 26' |
| 36' | .9356 | .9398 | .9439 | .9479 | .9517 | .9553 | .9589 | .9623 | .9655 | .9686 | 24' |
| 38' | .9357 | .9400 | .9440 | .9480 | .9518 | .9555 | .9590 | .9624 | .9656 | .9687 | 22' |
| 40' | .9359 | .9401 | .9442 | .9481 | .9519 | .9556 | .9591 | .9625 | .9657 | .9688 | 20' |
| 42' | .9360 | .9402 | .9443 | .9482 | .9520 | .9557 | .9592 | .9626 | .9658 | .9689 | 18' |
| 44' | .9362 | .9404 | .9444 | .9484 | .9522 | .9558 | .9593 | .9627 | .9660 | .9690 | 16' |
| 46' | .9363 | .9405 | .9446 | .9485 | .9523 | .9559 | .9595 | .9628 | .9661 | .9691 | 14' |
| 48' | .9365 | .9407 | .9447 | .9486 | .9524 | .9561 | .9596 | .9629 | .9662 | .9692 | 12' |
| 50' | .9366 | .9408 | .9448 | .9488 | .9525 | .9562 | .9597 | .9630 | .9663 | .9693 | 10' |
| 52' | .9367 | .9409 | .9450 | .9489 | .9527 | .9563 | .9598 | .9632 | .9664 | .9694 | 8' |
| 54' | .9369 | .9411 | .9451 | .9490 | .9528 | .9564 | .9599 | .9633 | .9665 | .9695 | 6' |
| 56' | .9370 | .9412 | .9452 | .9491 | .9529 | .9565 | .9600 | .9634 | .9666 | .9696 | 4' |
| 58' | .9372 | .9413 | .9454 | .9493 | .9530 | .9567 | .9601 | .9635 | .9667 | .9697 | 2' |
| 60' | .9373 | .9415 | .9455 | .9494 | .9532 | .9568 | .9603 | .9636 | .9668 | .9698 | 0' |
| | 209° | 208° | 207° | 206° | 205° | 204° | 203° | 202° | 201° | 200° | |

| | 160° | 161° | 162° | 163° | 164° | 165° | 166° | 167° | 168° | 169° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| 0' | .9698 | .9728 | .9755 | .9782 | .9806 | .9830 | .9851 | .9872 | .9891 | .9908 | 60' |
| 2' | .9699 | .9729 | .9756 | .9782 | .9807 | .9830 | .9852 | .9873 | .9891 | .9909 | 58' |
| 4' | .9700 | .9729 | .9757 | .9783 | .9808 | .9831 | .9853 | .9873 | .9892 | .9909 | 56' |
| 6' | .9701 | .9730 | .9758 | .9784 | .9809 | .9832 | .9854 | .9874 | .9893 | .9910 | 54' |
| 8' | .9702 | .9731 | .9759 | .9785 | .9810 | .9833 | .9854 | .9874 | .9893 | .9910 | 52' |
| 10' | .9703 | .9732 | .9760 | .9786 | .9810 | .9833 | .9855 | .9875 | .9894 | .9911 | 50' |
| 12' | .9704 | .9733 | .9761 | .9787 | .9811 | .9834 | .9856 | .9876 | .9894 | .9911 | 48' |
| 14' | .9705 | .9734 | .9762 | .9787 | .9812 | .9835 | .9856 | .9876 | .9895 | .9912 | 46' |
| 16' | .9706 | .9735 | .9762 | .9788 | .9813 | .9836 | .9857 | .9877 | .9896 | .9913 | 44' |
| 18' | .9707 | .9736 | .9763 | .9789 | .9813 | .9836 | .9858 | .9878 | .9896 | .9913 | 42' |
| 20' | .9708 | .9737 | .9764 | .9790 | .9814 | .9837 | .9858 | .9878 | .9897 | .9914 | 40' |
| 22' | .9709 | .9738 | .9765 | .9791 | .9815 | .9838 | .9859 | .9879 | .9897 | .9914 | 38' |
| 24' | .9710 | .9739 | .9766 | .9792 | .9816 | .9839 | .9860 | .9880 | .9898 | .9915 | 36' |
| 26' | .9711 | .9740 | .9767 | .9792 | .9817 | .9839 | .9860 | .9880 | .9898 | .9915 | 34' |
| 28' | .9712 | .9741 | .9768 | .9793 | .9817 | .9840 | .9861 | .9881 | .9899 | .9916 | 32' |
| 30' | .9713 | .9742 | .9769 | .9794 | .9818 | .9841 | .9862 | .9881 | .9900 | .9916 | 30' |
| 32' | .9714 | .9743 | .9769 | .9795 | .9819 | .9841 | .9863 | .9882 | .9900 | .9917 | 28' |
| 34' | .9715 | .9743 | .9770 | .9796 | .9820 | .9842 | .9863 | .9883 | .9901 | .9917 | 26' |
| 36' | .9716 | .9744 | .9771 | .9797 | .9820 | .9843 | .9864 | .9883 | .9901 | .9918 | 24' |
| 38' | .9717 | .9745 | .9772 | .9797 | .9821 | .9844 | .9865 | .9884 | .9902 | .9918 | 22' |
| 40' | .9718 | .9746 | .9773 | .9798 | .9822 | .9844 | .9865 | .9885 | .9903 | .9919 | 20' |
| 42' | .9719 | .9747 | .9774 | .9799 | .9823 | .9845 | .9866 | .9885 | .9903 | .9919 | 18' |
| 44' | .9720 | .9748 | .9775 | .9800 | .9824 | .9846 | .9867 | .9886 | .9904 | .9920 | 16' |
| 46' | .9721 | .9749 | .9776 | .9801 | .9824 | .9847 | .9867 | .9886 | .9904 | .9920 | 14' |
| 48' | .9722 | .9750 | .9776 | .9801 | .9825 | .9847 | .9868 | .9887 | .9905 | .9921 | 12' |
| 50' | .9723 | .9751 | .9777 | .9802 | .9826 | .9848 | .9869 | .9888 | .9905 | .9921 | 10' |
| 52' | .9724 | .9752 | .9778 | .9803 | .9827 | .9849 | .9869 | .9888 | .9906 | .9922 | 8' |
| 54' | .9725 | .9753 | .9779 | .9804 | .9827 | .9849 | .9870 | .9889 | .9906 | .9923 | 6' |
| 56' | .9726 | .9753 | .9780 | .9805 | .9828 | .9850 | .9871 | .9890 | .9907 | .9923 | 4' |
| 58' | .9727 | .9754 | .9781 | .9806 | .9829 | .9851 | .9871 | .9890 | .9908 | .9924 | 2' |
| 60' | .9728 | .9755 | .9782 | .9806 | .9830 | .9851 | .9872 | .9891 | .9908 | .9924 | 0' |
| | 199° | 198° | 197° | 196° | 195° | 194° | 193° | 192° | 191° | 190° | |

| | 170° | 171° | 172° | 173° | 174° | 175° | 176° | 177° | 178° | 179° | |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------|
| 0' | .9924 | .9938 | .9951 | .9963 | .9973 | .9981 | .9988 | .9993 | .9997 | .9999 | 60' |
| 2' | .9925 | .9939 | .9952 | .9963 | .9973 | .9981 | .9988 | .9993 | .9997 | .9999 | 58' |
| 4' | .9925 | .9939 | .9952 | .9963 | .9973 | .9981 | .9988 | .9993 | .9997 | .9999 | 56' |
| 6' | .9926 | .9940 | .9953 | .9964 | .9974 | .9982 | .9988 | .9994 | .9997 | .9999 | 54' |
| 8' | .9926 | .9940 | .9953 | .9964 | .9974 | .9982 | .9989 | .9994 | .9997 | .9999 | 52' |
| 10' | .9927 | .9941 | .9953 | .9964 | .9974 | .9982 | .9989 | .9994 | .9997 | .9999 | 50' |
| 12' | .9927 | .9941 | .9954 | .9965 | .9974 | .9982 | .9989 | .9994 | .9998 | 1.000 | 48' |
| 14' | .9928 | .9942 | .9954 | .9965 | .9975 | .9983 | .9989 | .9994 | .9998 | 1.000 | 46' |
| 16' | .9928 | .9942 | .9955 | .9966 | .9975 | .9983 | .9989 | .9994 | .9998 | 1.000 | 44' |
| 18' | .9929 | .9942 | .9955 | .9966 | .9975 | .9983 | .9990 | .9994 | .9998 | 1.000 | 42' |
| 20' | .9929 | .9943 | .9955 | .9966 | .9976 | .9983 | .9990 | .9995 | .9998 | 1.000 | 40' |
| 22' | .9929 | .9943 | .9956 | .9967 | .9976 | .9984 | .9990 | .9995 | .9998 | 1.000 | 38' |
| 24' | .9930 | .9944 | .9956 | .9967 | .9976 | .9984 | .9990 | .9995 | .9998 | 1.000 | 36' |
| 26' | .9930 | .9944 | .9956 | .9967 | .9976 | .9984 | .9990 | .9995 | .9998 | 1.000 | 34' |
| 28' | .9931 | .9945 | .9957 | .9968 | .9977 | .9984 | .9990 | .9995 | .9998 | 1.000 | 32' |
| 30' | .9931 | .9945 | .9957 | .9968 | .9977 | .9985 | .9991 | .9995 | .9998 | 1.000 | 30' |
| 32' | .9932 | .9946 | .9958 | .9968 | .9977 | .9985 | .9991 | .9995 | .9998 | 1.000 | 28' |
| 34' | .9932 | .9946 | .9958 | .9969 | .9978 | .9985 | .9991 | .9995 | .9998 | 1.000 | 26' |
| 36' | .9933 | .9946 | .9958 | .9969 | .9978 | .9985 | .9991 | .9996 | .9999 | 1.000 | 24' |
| 38' | .9933 | .9947 | .9959 | .9969 | .9978 | .9985 | .9991 | .9996 | .9999 | 1.000 | 22' |
| 40' | .9934 | .9947 | .9959 | .9969 | .9978 | .9986 | .9992 | .9996 | .9999 | 1.000 | 20' |
| 42' | .9934 | .9948 | .9959 | .9970 | .9979 | .9986 | .9992 | .9996 | .9999 | 1.000 | 18' |
| 44' | .9935 | .9948 | .9960 | .9970 | .9979 | .9986 | .9992 | .9996 | .9999 | 1.000 | 16' |
| 46' | .9935 | .9948 | .9960 | .9970 | .9979 | .9986 | .9992 | .9996 | .9999 | 1.000 | 14' |
| 48' | .9936 | .9949 | .9961 | .9971 | .9979 | .9987 | .9992 | .9996 | .9999 | 1.000 | 12' |
| 50' | .9936 | .9949 | .9961 | .9971 | .9980 | .9987 | .9992 | .9996 | .9999 | 1.000 | 10' |
| 52' | .9937 | .9950 | .9961 | .9971 | .9980 | .9987 | .9993 | .9997 | .9999 | 1.000 | 8' |
| 54' | .9937 | .9950 | .9962 | .9972 | .9980 | .9987 | .9993 | .9997 | .9999 | 1.000 | 6' |
| 56' | .9938 | .9951 | .9962 | .9972 | .9980 | .9987 | .9993 | .9997 | .9999 | 1.000 | 4' |
| 58' | .9938 | .9951 | .9962 | .9972 | .9981 | .9988 | .9993 | .9997 | .9999 | 1.000 | 2' |
| 60' | .9938 | .9951 | .9963 | .9973 | .9981 | .9988 | .9993 | .9997 | .9999 | 1.000 | 0' |
| | 189° | 188° | 187° | 186° | 185° | 184° | 183° | 182° | 181° | 180° | |