**Extraits éphémérides nautiques**

(page 2 à 23)

et

**Formulaires et notations**

navigation astronomique

(page 24)

loxodromie et orthodromie

(page 25)

**Les éléments donnés dans ces pages sont destinés à un usage strictement pédagogique. Ils ne peuvent en aucun cas être utilisés pour la navigation.**

Il n'est pas possible de garantir qu'un document de cette sorte reproduise exactement un texte adopté officiellement, car il ne constitue pas une publication officielle.

Les heures de lever et coucher du Soleil ainsi que les relèvements se réfèrent à une observation au niveau de la mer (e = 0), à l'instant où le bord supérieur de l'astre est tangent à l'horizon.

Les heures de début de l'aube et de fin du crépuscule indiquent le moment où le centre du Soleil se trouve à 6° au-dessous de l'horizon apparent.

Les éphémérides simplifiées du Soleil donnent des éléments astronomiques pour les quatre mois de l'année au cours desquels se produisent les solstices et les équinoxes. Les heures de lever et coucher du Soleil sont établies pour une latitude de 48°N.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **27 août** | | | | | | | | |
| Heure | Soleil | | Lune | | | Vénus | | Point vernal |
| UT | AHvo | D | AHao | D | π | AHao | D | AHso |
| **00 h** | 179°33,5' | N 10°17,7' | 358°46,9' | S 11°58,2' | 57,2' | 192°02,1' | N 05°54,9' | 334°47,3' |
| **01** | 194°33,7' | N 10°16,8' | 13°16,7' | S 11°48,8' | 57,3' | 207°05,8' | N 05°55,4' | 349°49,7' |
| **02** | 209°33,9' | N 10°16,0' | 27°46,6' | S 11°39,3' | 57,3' | 222°09,6' | N 05°55,8' | 4°52,2' |
| **03** | 224°34,1' | N 10°15,1' | 42°16,4' | S 11°29,7' | 57,3' | 237°13,3' | N 05°56,3' | 19°54,6' |
| **04** | 239°34,2' | N 10°14,2' | 56°46,3' | S 11° 20,1' | 57,3' | 252°17,0' | N 05°56,8' | 34°57,1' |
| **05** | 254°34,4' | N 10°13,4' | 71°16,1' | S 11°10,3' | 57,4' | 267°20,8' | N 05°57,2' | 49°59,6' |
|  |  |  |  |  |  |  |  |  |
| **06** | 269°34,6' | N 10°12,5' | 85°46,0' | S 11°00,6' | 57,4' | 282°24,5' | N 05°57,7' | 65°02,0' |
| **07** | 284°34,8' | N 10°11,6' | 100°15,9' | S 10°50,7' | 57,4' | 297°28,2' | N 05°58,2' | 80°04,5' |
| **08** | 299°35,0' | N 10°10,7' | 114°45,8' | S 10°40,8' | 57,4' | 312°31,9' | N 05°58,6' | 95°07,0' |
| **09** | 314°35,1' | N 10°09,9' | 129°15,7' | S 10°30,8' | 57,5' | 327°35,6' | N 05°59,1' | 110°09,4' |
| **10** | 329°35,3' | N 10°09,0' | 143°45,6' | S 10°20,8' | 57,5' | 342°39,3' | N 05°59,6' | 125°11,9' |
| **11** | 344°35,5' | N 10°08,1' | 158°15,5' | S 10°10,7' | 57,5' | 357°43,1' | N 06°00,0' | 140°14,4' |
|  |  |  |  |  |  |  |  |  |
| **12** | 359°35,7' | N 10°07,2' | 172°45,5' | S 10°00,5' | 57,5' | 12°46,8' | N 06°00,5' | 155°16,8' |
| **13** | 14°35,9' | N 10°06,4' | 187°15,4' | S 09°50,3' | 57,6' | 27°50,5' | N 06°01,0' | 170°19,3' |
| **14** | 29°36,0' | N 10°05,5' | 201°45,4' | S 09°40,0' | 57,6' | 42°54,2' | N 06°01,4' | 185°21,7' |
| **15** | 44°36,2' | N 10°04,6' | 216°15,3' | S 09°29,7' | 57,6' | 57°57,9' | N 06°01,9' | 200°24,2' |
| **16** | 59°36,4' | N 10°03,7' | 230°45,3' | S 09°19,3' | 57,6' | 73°01,6' | N 06°02,4' | 215°26,7' |
| **17** | 74°36,6' | N 10°02,9' | 245°15,3' | S 09°08,8' | 57,6' | 88°05,2' | N 06°02,9' | 230°29,1' |
|  |  |  |  |  |  |  |  |  |
| **18** | 89°36,8' | N 10°02,0' | 259°45,2' | S 08°58,3' | 57,7' | 103°08,9' | N 06°03,3' | 245°31,6' |
| **19** | 104°36,9' | N 10°01,1' | 274°15,2' | S 08°47,7' | 57,7' | 118°12,6' | N 06°03,8' | 260°34,1' |
| **20** | 119°37,1' | N 10°00,2' | 288°45,2' | S 08°37,1' | 57,7' | 133°16,3' | N 06°04,3' | 275°36,5' |
| **21** | 134°37,3' | N 09°59,4' | 303°15,2' | S 08°15,7' | 57,7' | 148°20,0' | N 06°04,8' | 290°39,0' |
| **22** | 149°37,5' | N 09°58,5' | 317°45,2' | S 08°26,4' | 57,8' | 163°23,7' | N 06°05,2' | 305°41,5' |
| **23** | 164°37,7' | N 09°57,6' | 332°15,2' | S 08°04,9' | 57,8' | 178°27,3' | N 06°05,7' | 320°43,9' |
|  |  |  |  |  |  |  |  |  |
| **24** | 179°37,9' | N 09°56,7' | 346°45,3' | S 07°54,1' | 57,8' | 193°31,0' | N 06°06,2' | 335°46,4' |
| Tcp pass | 12 h 01 min 37 s | | 00 h 05,1 min | | | 11 h 09,1 min | | 01 h 41 min |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **28 août** | | | | | | | | |
| Heure | Soleil | | Lune | | | Vénus | | Point vernal |
| UT | AHvo | D | AHao | D | π | AHao | D | AHso |
| **00 h** | 179°37,9' | N 09°56,7' | 346°45,3' | S 07°54,1' | 57,8' | 193°31,0' | N 06°06,2' | 335°46,4' |
| **01** | 194°38,0' | N 09°55,8' | 1°15,3' | S 07°43,2' | 57,8' | 208°34,7' | N 06°06,7' | 350°48,9' |
| **02** | 209°38,2' | N 09°55,0' | 15°45,3' | S 07°32,3' | 57,8' | 223°38,3' | N 06°07,1' | 5°51,3' |
| **03** | 224°38,4' | N 09°54,1' | 30°15,3' | S 07°21,3' | 57,9' | 238°42,0' | N 06°07,6' | 20°53,8' |
| **04** | 239°38,6' | N 09°53,2' | 44°45,4' | S 07°10,3' | 57,9' | 253°45,6' | N 06°08,1' | 35°56,2' |
| **05** | 254°38,8' | N 09°52,3' | 59°15,4' | S 06°59,2' | 57,9' | 268°49,3' | N 06°08,6' | 50°58,7' |
|  |  |  |  |  |  |  |  |  |
| **06** | 269°38,9' | N 09°51,5' | 73°45,4' | S 06°48,1' | 57,9' | 283°53,0' | N 06°09,0' | 66°01,2' |
| **07** | 284°39,1' | N 09°50,6' | 88°15,5' | S 06°36,9' | 57,9' | 298°56,6' | N 06°09,5' | 81°03,6' |
| **08** | 299°39,3' | N 09°49,7' | 102°45,5' | S 06°25,7' | 58,0' | 314°00,3' | N 06°10,0' | 96°06,1' |
| **09** | 314°39,5' | N 09°48,8' | 117°15,6' | S 06°14,5' | 58,0' | 329°03,9' | N 06°10,5' | 111°08,6' |
| **10** | 329°39,7' | N 09°47,9' | 131°45,6' | S 06°03,2' | 58,0' | 344°07,5' | N 06°10,9' | 126°11,0' |
| **11** | 344°39,9' | N 09°47,1' | 146°15,7' | S 05°51,9' | 58,0' | 359°11,2' | N 06°11,4' | 141°13,5' |
|  |  |  |  |  |  |  |  |  |
| **12** | 359°40,1' | N 09°46,2' | 160°45,7' | S 05°40,5' | 58,1' | 14°14,8' | N 06°11,9' | 156°16,0' |
| **13** | 14°40,2' | N 09°45,3' | 175°15,8' | S 05°29,1' | 58,1' | 29°18,4' | N 06°12,4' | 171°18,4' |
| **14** | 29°40,4' | N 09°44,4' | 189°45,8' | S 05°17,6' | 58,1' | 44°22,1' | N 06°12,9' | 186°20,9' |
| **15** | 44°40,6' | N 09°43,5' | 204°15,9' | S 05°06,2' | 58,1' | 59°25,7' | N 06°13,3' | 201°23,3' |
| **16** | 59°40,8' | N 09°42,6' | 218°45,9' | S 04°54,7' | 58,1' | 74°29,3' | N 06°13,8' | 216°25,8' |
| **17** | 74°41,0' | N 09°41,8' | 233°16,0' | S 04°43,1' | 58,2' | 89°32,9' | N 06°14,3' | 231°28,3' |
|  |  |  |  |  |  |  |  |  |
| **18** | 89°41,2' | N 09°40,9' | 247°46,0' | S 04°31,5' | 58,2' | 104°36,5' | N 06°14,8' | 246°30,7' |
| **19** | 104°41,3' | N 09°40,0' | 262°16,1' | S 04°19,9' | 58,2' | 119°40,2' | N 06°15,3' | 261°33,2' |
| **20** | 119°41,5' | N 09°39,1' | 276°46,1' | S 04°08,3' | 58,2' | 134°43,8' | N 06°15,7' | 276°35,7' |
| **21** | 134°41,7' | N 09°38,2' | 291°16,1' | S 03°56,6' | 58,2' | 149°47,4' | N 06°16,2' | 291°38,1' |
| **22** | 149°41,9' | N 09°37,3' | 305°46,2' | S 03°44,9' | 58,2' | 164°51,0' | N 06°16,7' | 306°40,6' |
| **23** | 164°42,1' | N 09°36,5' | 320°16,2' | S 03°33,2' | 58,3' | 179°54,6' | N 06°17,2' | 321°43,1' |
|  |  |  |  |  |  |  |  |  |
| **24** | 179°42,3' | N 09°35,6' | 334°46,2' | S 03°21,5' | 58,3' | 194°58,2' | N 06°17,7' | 336°45,5' |
| Tcp pass | 12 h 01 min 20 s | | 00 h 54,8 min | | | 11 h 03,3 min | | 01 h 37 min |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **29 août** | | | | | | | | |
| Heure | Soleil | | Lune | | | Vénus | | Point vernal |
| UT | AHvo | D | AHao | D | π | AHao | D | AHso |
| **00 h** | 179°42,3' | N 09°35,6' | 334°46,2' | S 03°21,5' | 58,3' | 194°58,2' | N 06°17,7' | 336°45,5' |
| **01** | 194°42,5' | N 09°34,7' | 349°16,3' | S 03°09,7' | 58,3' | 210°01,7' | N 06°18,1' | 351°48,0' |
| **02** | 209°42,6' | N 09°33,8' | 3°46,3' | S 02°57,9' | 58,3' | 225°05,3' | N 06°18,6' | 6°50,5' |
| **03** | 224°42,8' | N 09°32,9' | 18°16,3' | S 02°46,1' | 58,3' | 240°08,9' | N 06°19,1' | 21°52,9' |
| **04** | 239°43,0' | N 09°32,0' | 32°46,3' | S 02°34,3' | 58,4' | 255°12,5' | N 06°19,6' | 36°55,4' |
| **05** | 254°43,2' | N 09°31,2' | 47°16,3' | S 02°22,4' | 58,4' | 270°16,1' | N 06°20,1' | 51°57,8' |
|  |  |  |  |  |  |  |  |  |
| **06** | 269°43,4' | N 09°30,3' | 61°46,2' | S 02°10,5' | 58,4' | 285°19,7' | N 06°20,6' | 67°00,3' |
| **07** | 284°43,6' | N 09°29,4' | 76°16,2' | S 01°58,6' | 58,4' | 300°23,2' | N 06°21,0' | 82°02,8' |
| **08** | 299°43,8' | N 09°28,5' | 90°46,2' | S 01°46,7' | 58,4' | 315°26,8' | N 06°21,5' | 97°05,2' |
| **09** | 314°44,0' | N 09°27,6' | 105°16,1' | S 01°34,8' | 58,4' | 330°30,4' | N 06°22,0' | 112°07,7' |
| **10** | 329°44,1' | N 09°26,7' | 119°46,1' | S 01°22,8' | 58,5' | 345°33,9' | N 06°22,5' | 127°10,2' |
| **11** | 344°44,3' | N 09°25,8' | 134°16,0' | S 01°10,9' | 58,5' | 0°37,5' | N 06°23,0' | 142°12,6' |
|  |  |  |  |  |  |  |  |  |
| **12** | 359°44,5' | N 09°25,0' | 148°45,9' | S 00°58,9' | 58,5' | 15°41,0' | N 06°23,5' | 157°15,1' |
| **13** | 14°44,7' | N 09°24,1' | 163°15,8' | S 00°46,9' | 58,5' | 30°44,6' | N 06°23,9' | 172°17,6' |
| **14** | 29°44,9' | N 09°23,2' | 177°45,7' | S 00°34,9' | 58,5' | 45°48,1' | N 06°24,4' | 187°20,0' |
| **15** | 44°45,1' | N 09°22,3' | 192°15,6' | S 00°22,9' | 58,5' | 60°51,7' | N 06°24,9' | 202°22,5' |
| **16** | 59°45,3' | N 09°21,4' | 206°45,5' | S 00°10,9' | 58,6' | 75°55,2' | N 06°25,4' | 217°25,0' |
| **17** | 74°45,5' | N 09°20,5' | 221°15,4' | N 00°01,1' | 58,6' | 90°58,8' | N 06°25,9' | 232°27,4' |
|  |  |  |  |  |  |  |  |  |
| **18** | 89°45,6' | N 09°19,6' | 235°45,2' | N 00°13,1' | 58,6' | 106°02,3' | N 06°26,4' | 247°29,9' |
| **19** | 104°45,8' | N 09°18,7' | 250°15,0' | N 00°25,1' | 58,6' | 121°05,8' | N 06°26,9' | 262°32,3' |
| **20** | 119°46,0' | N 09°17,8' | 264°44,8' | N 00°37,2' | 58,6' | 136°09,4' | N 06°27,3' | 277°34,8' |
| **21** | 134°46,2' | N 09°17,0' | 279°14,6' | N 00°49,2' | 58,6' | 151°12,9' | N 06°27,8' | 292°37,3' |
| **22** | 149°46,4' | N 09°16,1' | 293°44,4' | N 01°01,2' | 58,6' | 166°16,4' | N 06°28,3' | 307°39,7' |
| **23** | 164°46,6' | N 09°15,2' | 308°14,2' | N 01°13,2' | 58,7' | 181°19,9' | N 06°28,8' | 322°42,2' |
|  |  |  |  |  |  |  |  |  |
| **24** | 179°46,8' | N 09°14,3 | 322°43,9' | N 01°25,3' | 58,7' | 196°23,4' | N 06°29,3' | 337°44,7' |
| Tcp pass | 12 h 01 min 02 s | | 01 h 44,4 min | | | 10h 57,5 min | | 01 h 33 min |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **30 août** | | | | | | | | |
| Heure | Soleil | | Lune | | | Vénus | | Point vernal |
| UT | AHvo | D | AHao | D | π | AHao | D | AHso |
| **00 h** | 179°46,8' | N 09°14,3' | 322°43,9' | N 01°25,3' | 58,7' | 196°23,4' | N 06°29,3' | 337°44,7' |
| **01** | 194°47,0' | N 09°13,4' | 337°13,6' | N 01°37,3' | 58,7' | 211°26,9' | N 06°29,8' | 352°47,1' |
| **02** | 209°47,2' | N 09°12,5' | 351°43,3' | N 01°49,3' | 58,7' | 226°30,5' | N 06°30,3' | 7°49,6' |
| **03** | 224°47,3' | N 09°11,6' | 6°13,0' | N 02°01,3' | 58,7' | 241°34,0' | N 06°30,7' | 22°52,1' |
| **04** | 239°47,5' | N 09°10,7' | 20°42,6' | N 02°13,4' | 58,7' | 256°37,5' | N 06°31,2' | 37°54,5' |
| **05** | 254°47,7' | N 09°09,8' | 35°12,3' | N 02°25,4' | 58,7' | 271°41,0' | N 06°31,7' | 52°57,0' |
|  |  |  |  |  |  |  |  |  |
| **06** | 269°47,9' | N 09°08,9' | 49°41,9' | N 02°37,4' | 58,8' | 286°44,4' | N 06°32,2' | 67°59,4' |
| **07** | 284°48,1' | N 09°08,0' | 64°11,5' | N 02°49,3' | 58,8' | 301°47,9' | N 06°33,7' | 83°01,9' |
| **08** | 299°48,3' | N 09°07,2' | 78°41,0' | N 03°01,3' | 58,8' | 3016°51,4' | N 06°33,2' | 98°04,4' |
| **09** | 314°48,5' | N 09°06,3' | 93°10,6' | N 03°13,3' | 58,8' | 331°54,9' | N 06°33,7' | 113°06,8' |
| **10** | 329°48,7' | N 09°05,4' | 107°40,1' | N 03°25,2' | 58,8' | 346°58,4' | N 06°34,1' | 128°09,3' |
| **11** | 344°48,9' | N 09°04,5' | 122°09,6' | N 03°37,2' | 58,8' | 2°01,9' | N 06°34,6' | 143°11,8' |
|  |  |  |  |  |  |  |  |  |
| **12** | 359°49,1' | N 09°03,6' | 136°39,1' | N 03°49,1' | 58,8' | 17°05,3' | N 06°35,1' | 158°14,2' |
| **13** | 14°49,3' | N 09°02,7' | 151°08,5' | N 04°01,0' | 58,8' | 32°08,8' | N 06°35,6' | 173°16,7' |
| **14** | 29°49,4' | N 09°01,8' | 165°37,9' | N 04°12,9' | 58,9' | 47°12,3' | N 06°36,1' | 188°19,2' |
| **15** | 44°49,6' | N 09°00,9' | 180°07,3' | N 04°24,7' | 58,9' | 62°15,7' | N 06°36,6' | 203°21,6' |
| **16** | 59°49,8' | N 09°00,0' | 194°36,7' | N 04°36,6' | 58,9' | 77°19,2' | N 06°37,1' | 218°24,1' |
| **17** | 74°50,0' | N 08°59,1' | 209°06,0' | N 04°48,4' | 58,9' | 92°22,6' | N 06°37,6' | 233°26,6' |
|  |  |  |  |  |  |  |  |  |
| **18** | 89°50,2' | N 08°58,2' | 223°35,3' | N 5°00,2' | 58,9' | 107°26,1' | N 06°38,0' | 248°29,0' |
| **19** | 104°50,4' | N 08°57,3' | 238°04,6' | N 05°12,0' | 58,9' | 122°29,5' | N 06°38,5' | 263°31,5' |
| **20** | 119°50,6' | N 08°56,4' | 252°33,8' | N 05°23,7' | 58,9' | 137°33,0' | N 06°39,0' | 278°33,9' |
| **21** | 134°50,8' | N 08°55,5' | 267°03,0' | N 05°35,5' | 58,9' | 152°36,4' | N 06°39,5' | 293°36,4' |
| **22** | 149°51,0' | N 08°54,6' | 281°32,2' | N 05°47,2' | 58,9' | 167°39,8' | N 06°40,0' | 308°38,9' |
| **23** | 164°51,2' | N 08°53,7' | 296°01,3' | N 05°58,8' | 59,0' | 182°43,3' | N 06°40,5' | 323°41,3' |
|  |  |  |  |  |  |  |  |  |
| **24** | 179°51,4' | N 08°52,8' | 310°30,4' | N 06°10,5' | 59,0' | 197°46,7' | N 06°41,0' | 338°43,8' |
| Tcp pass | 12 h 00 min 44 s | | 02 h 34,3 min | | | 10 h 51,9 min | | 01 h 29 min |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **31 août** | | | | | | | | |
| Heure | Soleil | | Lune | | | Vénus | | Point vernal |
| UT | AHvo | D | AHao | D | π | AHao | D | AHso |
| **00 h** | 179°51,4' | N 08°52,8' | 310°30,4' | N 06°10,5' | 59,0' | 197°46,7' | N 06°41,0' | 338°43,8' |
| **01** | 194°51,6' | N 08°51,9' | 324°59,5' | N 06°22,1' | 59,0' | 212°50,1' | N 06°41,5' | 353°46,3' |
| **02** | 209°51,8' | N 08°51,0' | 339°28,6' | N 06°33,7' | 59,0' | 227°53,5' | N 06°41,9' | 8°48,7' |
| **03** | 224°51,9' | N 08°50,1' | 353°57,6' | N 06°45,2' | 59,0' | 242°57,0' | N 06°42,4' | 23°51,2' |
| **04** | 239°52,1' | N 08°49,3' | 8°26,5' | N 06°56,7' | 59,0' | 258°00,4' | N 06°42,9' | 38°53,7' |
| **05** | 254°52,3' | N 08°48,4' | 22°55,5' | N 07°08,2' | 59,0' | 273°03,8' | N 06°43,4' | 53°56,1' |
|  |  |  |  |  |  |  |  |  |
| **06** | 269°52,5' | N 08°47,5' | 37°24,4' | N 07°19,6' | 59,0' | 288°07,2' | N 06°43,9' | 68°58,6' |
| **07** | 284°52,7' | N 08°46,6' | 51°53,2' | N 07°31,0' | 59,0' | 303°10,6' | N 06°44,4' | 84°01,0' |
| **08** | 299°52,9' | N 08°45,7' | 66°22,1' | N 07°42,4' | 59,0' | 318°14,0' | N 06°44,9' | 99°03,5' |
| **09** | 314°53,1' | N 08°44,8' | 80°50,9' | N 07°53,7' | 59,1' | 333°17,4' | N 06°45,4' | 114°06,0' |
| **10** | 329°53,3' | N 08°43,9' | 95°19,6' | N 08°04,9' | 59,1' | 348°20,8' | N 06°45,8' | 129°08,4' |
| **11** | 344°53,5' | N 08°43,0' | 109°48,3' | N 08°16,2' | 59,1' | 3°24,2' | N 06°46,3' | 144°10,9' |
|  |  |  |  |  |  |  |  |  |
| **12** | 359°53,7' | N 08°42,1' | 124°17,0' | N 08°27,3' | 59,1' | 18°27,5' | N 06°46,8' | 159°13,4' |
| **13** | 14°53,9' | N 08°41,2' | 138°45,6' | N 08°38,5' | 59,1' | 33°30,9' | N 06°47,3' | 174°15,8' |
| **14** | 29°54,1' | N 08°40,3' | 153°14,2' | N 08°49,6' | 59,1' | 48°34,3' | N 06°47,8' | 189°18,3' |
| **15** | 44°54,3' | N 08°39,4' | 167°42,8' | N 09°00,6' | 59,1' | 63°37,7' | N 06°48,3' | 204°20,8' |
| **16** | 59°54,5' | N 08°38,5' | 182°11,3' | N 09°11,6' | 59,1' | 78°41,0' | N 06°48,8' | 219°23,2' |
| **17** | 74°54,7' | N 08°37,6' | 196°39,7' | N 09°22,5' | 59,1' | 93°44,4' | N 06°49,3' | 234°25,7' |
|  |  |  |  |  |  |  |  |  |
| **18** | 89°54,9' | N 08°36,7' | 211°08,2' | N 09°33,4' | 59,1' | 108°47,8' | N 06°49,7' | 249°28,2' |
| **19** | 104°55,1' | N 08°35,8' | 225°36,6' | N 09°44,3' | 59,1' | 123°51,1' | N 06°50,2' | 264°30,6' |
| **20** | 119°55,3' | N 08°34,9' | 240°04,9' | N 09°55,1' | 59,1' | 138°54,5' | N 06°50,7' | 279°33,1' |
| **21** | 134°55,4' | N 08°34,0' | 254°33,2' | N 10°05,8' | 59,1' | 153°57,8' | N 06°51,2' | 294°35,5' |
| **22** | 149°55,6' | N 08°33,1' | 269°01,5' | N 10°16,4' | 59,2' | 169°01,2' | N 06°51,7' | 309°38,0' |
| **23** | 164°55,8' | N 08°32,2' | 283°29,7' | N 10°27,1' | 59,2' | 184°04,5' | N 06°52,2' | 324°40,5' |
|  |  |  |  |  |  |  |  |  |
| **24** | 179°56,0' | N 08°31,3' | 297°57,8' | N 10°37,6' | 59,2' | 199°07,9' | N 06°52,7' | 339°42,9' |
| Tcp pass | 12 h 00 min 25 s | | 03 h 25,0 min | | | 10 h 46,4 min | | 01 h 25min |

|  |  |  |  |  |  |  |  |  |
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| **1er septembre** | | | | | | | | |
| Heure | Soleil | | Lune | | | Vénus | | Point vernal |
| UT | AHvo | D | AHao | D | π | AHao | D | AHso |
| **00 h** | 179°56,0' | N 08°31,3' | 297°57,8' | N 10°37,6' | 59,2' | 199°07,9' | N 06°52,7' | 339°42,9' |
| **01** | 194°56,2' | N 08°30,3' | 312°26,0' | N 10°48,1' | 59,2' | 214°11,2' | N 06°53,2' | 354°45,4' |
| **02** | 209°56,4' | N 08°29,4' | 326°54,0' | N 10°58,5' | 59,2' | 229°14,5' | N 06°53,6' | 9°47,9' |
| **03** | 224°56,6' | N 08°28,5' | 341°22,1' | N 11°08,9' | 59,2' | 244°17,8' | N 06°54,1' | 24°50,3' |
| **04** | 239°56,8' | N 08°27,6' | 355°50,1' | N 11°19,2' | 59,2' | 259°21,2' | N 06°54,6' | 39°52,8' |
| **05** | 254°57,0' | N 08°26,7' | 10°18,0' | N 11°29,4' | 59,2' | 274°24,5' | N 06°55,1' | 54°55,3' |
|  |  |  |  |  |  |  |  |  |
| **06** | 269°57,2' | N 08°25,8' | 24°45,9' | N 11°39,6' | 59,2' | 289°27,8' | N 06°55,6' | 69°57,7' |
| **07** | 284°57,4' | N 08°24,9' | 39°13,7' | N 11°49,7' | 59,2' | 304°31,1' | N 06°56,1' | 85°00,2' |
| **08** | 299°57,6' | N 08°24,0' | 53°41,6' | N 11°59,7' | 59,2' | 319°34,4' | N 06°56,6' | 100°02,6' |
| **09** | 314°57,8' | N 08°23,1' | 68°09,3' | N 12°09,7' | 59,2' | 334°37,7' | N 06°57,0' | 115°05,1' |
| **10** | 329°58,0' | N 08°22,2' | 82°37,0' | N 12°19,6' | 59,2' | 349°41,0' | N 06°57,5' | 130°07,6' |
| **11** | 344°58,2' | N 08°21,3' | 97°04,7' | N 12°29,4' | 59,2' | 4°44,3' | N 06°58,0' | 145°10,0' |
|  |  |  |  |  |  |  |  |  |
| **12** | 359°58,4' | N 08°20,4' | 111°32,3' | N 12°39,2' | 59,2' | 19°47,6' | N 06°58,5' | 160°12,5' |
| **13** | 14°58,6' | N 08°19,5' | 125°59,9' | N 12°48,8' | 59,2' | 34°50,9' | N 06°59,0' | 175°15,0' |
| **14** | 29°58,8' | N 08°18,6' | 140°27,4' | N 12°58,4' | 59,2' | 49°54,2' | N 06°59,5' | 190°17,4' |
| **15** | 44°59,0' | N 08°17,7' | 154°54,8' | N 13°08,0' | 59,2' | 64°57,5' | N 06°59,9' | 205°19,9' |
| **16** | 59°59,2' | N 08°16,8' | 169°22,3' | N 13°17,4' | 59,2' | 80°00,7' | N 07°00,4' | 220°22,4' |
| **17** | 74°59,4' | N 08°15,9' | 183°49,6' | N 13°26,8' | 59,2' | 95°04,0' | N 07°00,9' | 235°24,8' |
|  |  |  |  |  |  |  |  |  |
| **18** | 89°59,6' | N 08°15,0' | 198°17,0' | N 13°36,1' | 59,3' | 110°07,3' | N 07°01,4' | 250°27,3' |
| **19** | 104°59,8' | N 08°14,1' | 212°44,2' | N 13°45,3' | 59,3' | 125°10,5' | N 07°01,9' | 265°29,8' |
| **20** | 120°00,0' | N 08°13,2' | 227°11,5' | N 13°54,4' | 59,3' | 140°13,8' | N 07°02,4' | 280°32,2' |
| **21** | 135°00,2' | N 08°12,2' | 241°38,6' | N 14°03,4' | 59,3' | 155°17,0' | N 07°02,8' | 295°34,7' |
| **22** | 150°00,4' | N 08°11,3' | 256°05,8' | N 14°12,4' | 59,3' | 170°20,3' | N 07°03,3' | 310°37,1' |
| **23** | 165°00,6' | N 08°10,4' | 270°32,9' | N 14°21,2' | 59,3' | 185°23,5' | N 07°03,8' | 325°39,6' |
|  |  |  |  |  |  |  |  |  |
| **24** | 180°00,8' | N 08°09,5' | 284°59,9' | N 14°30,0' | 59,3' | 200°26,8' | N 07°04,3' | 340°42,1' |
| Tcp pass | 12 h 00 min 06 s | | 04 h 17,3 min | | | 10 h 41,1 min | | 01 h 21 min |

|  |  |  |  |  |  |  |  |  |
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| **2 septembre** | | | | | | | | |
| Heure | Soleil | | Lune | | | Vénus | | Point vernal |
| UT | AHvo | D | AHao | D | π | AHao | D | AHso |
| **00 h** | 180°00,8' | N 08°09,5' | 284°59,9' | N 14°30,0' | 59,3' | 200°26,8' | N 07°04,3' | 340°42,1' |
| **01** | 195°01,0' | N 08°08,6' | 299°26,9' | N 14°38,7' | 59,3' | 215°30,0' | N 07°04,8' | 355°44,5' |
| **02** | 210°01,2' | N 08°07,7' | 313°53,8' | N 14°47,3' | 59,3' | 230°33,3' | N 07°05,3' | 10°47,0' |
| **03** | 225°01,4' | N 08°06,8' | 328°20,7' | N 14°55,8' | 59,3' |  | N 07°05,7' | 25°49,5' |
| **04** | 240°01,6' | N 08°05,9' | 342°47,5' | N 15°04,2' | 59,3' | 260°39,7' | N 07°06,2' | 40°51,9' |
| **05** | 255°01,8' | N 08°05,0' | 357°14,3' | N 15°12,6' | 59,3' | 275°42,9' | N 07°06,7' | 55°54,4' |
|  |  |  |  |  |  |  |  |  |
| **06** | 270°02,0' | N 08°04,1' | 11°41,1' | N 15°20,8' | 59,3' | 290°46,2' | N 07°07,2' | 70°56,9' |
| **07** | 285°02,2' | N 08°03,2' | 26°07,8' | N 15°28,9' | 59,3' | 305°49,4' | N 07°07,7' | 85°59,3' |
| **08** | 300°02,4' | N 08°02,3' | 40°34,4' | N 15°37,0' | 59,3' | 320°52,6' | N 07°08,2' | 101°01,8' |
| **09** | 315°02,6' | N 08°01,3' | 55°01,0' | N 15°44,9' | 59,3' | 335°55,8' | N 07°08,6' | 116°04,3' |
| **10** | 330°02,8' | N 08°00,4' | 69°27,6' | N 15°52,8' | 59,3' | 350°59,0' | N 07°09,1' | 131°06,7' |
| **11** | 345°03,0' | N 07°59,5' | 83°54,1' | N 16°00,5' | 59,3' | 6°02,2' | N 07°09,6' | 146°09,2' |
|  |  |  |  |  |  |  |  |  |
| **12** | 0°03,2' | N 07°58,6' | 98°20,5' | N 16°08,2' | 59,3' | 21°05,4' | N 07°10,1' | 161°11,6' |
| **13** | 15°03,4' | N 07°57,7' | 112°46,9' | N 16°15,7' | 59,3' | 36°08,6' | N 07°10,6' | 176°14,1' |
| **14** | 30°03,6' | N 07°56,8' | 127°13,3' | N 16°23,2' | 59,3' | 51°11,8' | N 07°11,0' | 191°16,6' |
| **15** | 45°03,8' | N 07°55,9' | 141°39,6' | N 16°30,5' | 59,3' | 66°15,0' | N 07°11,5' | 206°19,0' |
| **16** | 60°04,0' | N 07°55,0' | 156°05,9' | N 16°37,7' | 59,3' | 81°18,1' | N 07°12,0' | 221°21,5' |
| **17** | 75°04,2' | N 07°54,1' | 170°32,1' | N 16°44,9' | 59,3' | 96°21,3' | N 07°12,5' | 236°24,0 |
|  |  |  |  |  |  |  |  |  |
| **18** | 90°04,4' | N 07°53,1' | 184°58,3' | N 16°51,9' | 59,3' | 111°24,5' | N 07°12,9' | 251°26,4' |
| **19** | 105°04,6' | N 07°52,2' | 199°24,4' | N 16°58,8' | 59,3' | 126°27,7' | N 07°13,4' | 266°28,9' |
| **20** | 120°04,8' | N 07°51,3' | 213°50,5' | N 17°05,7' | 59,3' | 141°30,8' | N 07°13,9' | 281°31,4' |
| **21** | 135°05,0' | N 07°50,4' | 228°16,6' | N 17°12,4' | 59,3' | 156°34,0' | N 07°14,4' | 296°33,8' |
| **22** | 150°05,2' | N 07°49,5' | 242°42,6' | N 17°19,0' | 59,3' | 171°37,1' | N 07°14,9' | 311°36,3' |
| **23** | 165°05,4' | N 07°48,6' | 257°08,6' | N 17°25,5' | 59,3' | 186°40,3' | N 07°15,3' | 326°38,8' |
|  |  |  |  |  |  |  |  |  |
| **24** | 180°05,6' | N 07°47,7' | 271°34,5' | N 17°31,8' | 59,3' | 201°43,4' | N 07°15,8' | 341°41,2' |
| Tcp pass | 11 h 59 min 47 s | | 05 h 11,5 min | | | 10 h 35,9 min | | 01 h 17 min |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **3 septembre** | | | | | | | | |
| Heure | Soleil | | Lune | | | Vénus | | Point vernal |
| UT | AHvo | D | AHao | D | π | AHao | D | AHso |
| **00 h** | 180°05,6' | N 07°47,7' | 271°34,5' | N 17°31,8' | 59,3' | 201°43,4' | N 07°15,8' | 341°41,2' |
| **01** | 195°05,8' | N 07°46,8' | 286°00,4' | N 17°38,1' | 59,3' | 216°46,6' | N 07°16,3' | 356°43,7' |
| **02** | 210°06,0' | N 07°45,8' | 300°26,2' | N 17°44,3' | 59,3' | 231°49,7' | N 07°16,8' | 11°46,1' |
| **03** | 225°06,2' | N 07°44,9' | 314°52,0' | N 17°50,3' | 59,3' | 246°52,9' | N 07°17,2' | 26°48,6' |
| **04** | 240°06,4' | N 07°44,0' | 329°17,8' | N 17°56,2' | 59,3' | 261°56,0' | N 07°17,7' | 41°51,1' |
| **05** | 255°06,6' | N 07°43,1' | 343°43,5' | N 18°02,0' | 59,3' | 276°59,1' | N 07°18,2' | 56°53,5' |
|  |  |  |  |  |  |  |  |  |
| **06** | 270°06,8' | N 07°42,2' | 358°09,2' | N 18°07,7' | 59,3' | 292°02,2' | N 07°18,7' | 71°56,0' |
| **07** | 285°07,0' | N 07°41,3' | 12°34,8' | N 18°13,3' | 59,3' | 307°05,4' | N 07°19,1' | 86°58,5' |
| **08** | 300°07,2' | N 07°40,3' | 27°00,4' | N 18°18,8' | 59,3' | 322°08,5' | N 07°19,6' | 102°00,9' |
| **09** | 315°07,4' | N 07°39,4' | 41°26,0' | N 18°24,1' | 59,3' | 337°11,6' | N 07°20,1' | 117°03,4' |
| **10** | 330°07,6' | N 07°38,5' | 55°51,5' | N 18°29,3' | 59,3' | 352°14,7' | N 07°20,6' | 132°05,9' |
| **11** | 345°07,8' | N 07°37,6' | 70°17,0' | N 18°34,4' | 59,3' | 7°17,8' | N 07°21,0' | 147°08,3' |
|  |  |  |  |  |  |  |  |  |
| **12** | 0°08,0' | N 07°36,7' | 84°42,5' | N 18°39,4' | 59,3' | 22°20,9' | N 07°21,5' | 162°10,8' |
| **13** | 15°08,2' | N 07°35,8' | 99°07,9' | N 18°44,3' | 59,3' | 37°24,0' | N 07°22,0' | 177°13,2' |
| **14** | 30°08,4' | N 07°34,9' | 113°33,3' | N 18°49,0' | 59,3' | 52°27,1' | N 07°22,4' | 192°15,7' |
| **15** | 45°08,6' | N 07°33,9' | 127°58,7' | N 18°53,7' | 59,3' | 67°30,2' | N 07°22,9' | 207°18,2' |
| **16** | 60°08,8' | N 07°33,0' | 142°24,0' | N 18°58,1' | 59,3' | 82°33,2' | N 07°23,4' | 222°20,6' |
| **17** | 75°09,0' | N 07°32,1' | 156°49,3' | N 19°02,5' | 59,3' | 97°36,3' | N 07°23,9' | 237°23,1' |
|  |  |  |  |  |  |  |  |  |
| **18** | 90°09,2' | N 07°31,2' | 171°14,6' | N 19°06,8' | 59,3' | 112°39,4' | N 07°24,3' | 252°25,6' |
| **19** | 105°09,4' | N 07°30,3' | 185°39,9' | N 19°10,9' | 59,2' | 127°42,5' | N 07°24,8' | 267°28,0' |
| **20** | 120°09,6' | N 07°29,4' | 200°05,1' | N 19°14,9' | 59,2' | 142°45,5' | N 07°25,3' | 282°30,5' |
| **21** | 135°09,8' | N 07°28,4' | 214°30,3' | N 19°18,8' | 59,2' | 157°48,6' | N 07°25,7' | 297°33,0' |
| **22** | 150°10,0' | N 07°27,5' | 228°55,5' | N 19°22,5' | 59,2' | 172°51,6' | N 07°26,2' | 312°35,4' |
| **23** | 165°10,2' | N 07°26,6' | 243°20,6' | N 19°26,1' | 59,2' | 187°54,7' | N 07°26,7' | 327°37,9' |
|  |  |  |  |  |  |  |  |  |
| **24** | 180°10,5' | N 07°25,7' | 257°45,7' | N 19°29,6' | 59,2' | 202°57,7' | N 07°27,1' | 342°40,4' |
| Tcp pass | 11 h 59 min 28 s | | 06 h 07,7 min | | | 10 h 30,9 min | | 01 h 13 min |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Levers et couchers du Soleil** | | | | | | | | | | | | |
| LATI- TUDE | **27 août** | | | **28 août** | | | **29 août** | | | **30 août** | | |
| Début de l'aube | Lever | Z | Coucher | Z | Fin du crépus | Début de l'aube | Lever | Z | Coucher | Z | Fin du crépus |
| (h. min) | (h. min) | (h. min) | (h. min) | (h. min) | (h. min) | (h. min) | (h. min) |
| **70°N** | 02 26 | 03 51 | 056° | 20 04 | 302° | 21 25 | 02 39 | 04 00 | 058° | 19 54 | 299° | 21 12 |
| **66°N** | 03 14 | 04 17 | 062° | 19 40 | 296° | 20 41 | 03 23 | 04 24 | 064° | 19 32 | 294° | 20 32 |
| **62°N** | 03 44 | 04 35 | 066° | 19 24 | 292° | 20 13 | 03 50 | 04 40 | 067° | 19 17 | 291° | 20 06 |
| **58°N** | 04 05 | 04 48 | 069° | 19 11 | 290° | 19 54 | 04 09 | 04 52 | 070° | 19 06 | 288° | 19 48 |
| **56°N** | 04 13 | 04 53 | 070° | 19 06 | 288° | 19 46 | 04 17 | 04 57 | 071° | 19 01 | 287° | 19 41 |
| **54°N** | 04 20 | 04 58 | 071° | 19 01 | 288° | 19 39 | 04 24 | 05 02 | 072° | 18 57 | 286° | 19 34 |
| **52°N** | 04 27 | 05 03 | 072° | 18 57 | 287° | 19 33 | 04 30 | 05 06 | 073° | 18 53 | 285° | 19 28 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **50°N** | 04 32 | 05 07 | 073° | 18 53 | 286° | 19 28 | 04 36 | 05 10 | 074° | 18 49 | 285° | 19 23 |
| **45°N** | 04 44 | 05 15 | 074° | 18 45 | 284° | 19 16 | 04 47 | 05 18 | 075° | 18 42 | 283° | 19 12 |
| **40°N** | 04 54 | 05 22 | 076° | 18 39 | 283° | 19 07 | 04 56 | 05 24 | 076° | 18 35 | 282° | 19 03 |
| **35°N** | 05 02 | 05 29 | 077° | 18 33 | 282° | 18 59 | 05 04 | 05 30 | 077° | 18 30 | 281° | 18 56 |
| **30°N** | 05 09 | 05 34 | 077° | 18 28 | 281° | 18 52 | 05 10 | 05 35 | 078° | 18 25 | 280° | 18 50 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **20°N** | 05 21 | 05 43 | 078° | 18 19 | 280° | 18 42 | 05 21 | 05 44 | 079° | 18 17 | 279° | 18 40 |
| **10°N** | 05 30 | 05 51 | 079° | 18 12 | 280° | 18 33 | 05 30 | 05 51 | 080° | 18 10 | 279° | 18 32 |
| **0°N** | 05 37 | 05 58 | 079° | 18 05 | 279° | 18 26 | 05 37 | 05 58 | 080° | 18 04 | 278° | 18 25 |
| **10°S** | 05 44 | 06 06 | 079° | 17 58 | 279° | 18 19 | 05 43 | 06 04 | 080° | 17 58 | 278° | 18 19 |
| **20°S** | 05 51 | 06 13 | 079° | 17 51 | 279° | 18 13 | 05 49 | 06 11 | 080° | 17 51 | 279° | 18 13 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **30°S** | 05 57 | 06 22 | 078° | 17 43 | 280° | 18 07 | 05 55 | 06 19 | 079° | 17 44 | 279° | 18 08 |
| **35°S** | 06 01 | 06 27 | 077° | 17 38 | 281° | 18 04 | 05 58 | 06 24 | 078° | 17 39 | 280° | 18 05 |
| **40°S** | 06 05 | 06 32 | 077° | 17 33 | 281° | 18 00 | 06 02 | 06 29 | 078° | 17 35 | 280° | 18 02 |
| **45°S** | 06 09 | 06 38 | 076° | 17 27 | 282° | 17 57 | 06 05 | 06 35 | 077° | 17 29 | 281° | 17 59 |
| **50°S** | 06 13 | 06 46 | 074° | 17 20 | 283° | 17 52 | 06 09 | 06 42 | 075° | 17 23 | 282° | 17 55 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **52°S** | 06 15 | 06 49 | 074° | 17 16 | 284° | 17 51 | 06 11 | 06 45 | 075° | 17 20 | 283° | 17 54 |
| **54°S** | 06 17 | 06 53 | 073° | 17 13 | 285° | 17 49 | 06 13 | 06 48 | 074° | 17 16 | 284° | 17 52 |
| 56°S | 06 19 | 06 57 | 072° | 17 09 | 286° | 17 47 | 06 15 | 06 52 | 073° | 17 13 | 284° | 17 50 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Levers et couchers du Soleil** | | | | | | | | | | | | |
| LATI- TUDE | **31 août** | | | **1er septembre** | | | **2 septembre** | | | **3 septembre** | | |
| Début de l'aube | Lever | Z | Coucher | Z | Fin du crépus | Début de l'aube | Lever | Z | Coucher | Z | Fin du crépus |
| (h. min) | (h. min) | (h. min) | (h. min) | (h. min) | (h. min) | (h. min) | (h. min) |
| **70°N** | 02 51 | 04 09 | 061° | 19 44 | 297° | 20 59 | 03 02 | 04 17 | 063° | 19 35 | 295° | 20 47 |
| **66°N** | 03 30 | 04 30 | 066° | 19 25 | 292° | 20 23 | 03 38 | 04 37 | 068° | 19 17 | 290° | 20 14 |
| **62°N** | 03 56 | 04 45 | 069° | 19 11 | 289° | 19 59 | 04 02 | 04 50 | 071° | 19 04 | 288° | 19 52 |
| **58°N** | 04 14 | 04 57 | 072° | 19 00 | 287° | 19 42 | 04 19 | 05 01 | 073° | 18 55 | 285° | 19 36 |
| **56°N** | 04 21 | 05 01 | 073° | 18 56 | 286° | 19 35 | 04 26 | 05 05 | 074° | 18 51 | 284° | 19 30 |
| **54°N** | 04 28 | 05 05 | 073° | 18 52 | 285° | 19 29 | 04 32 | 05 09 | 075° | 18 47 | 284° | 19 24 |
| **52°N** | 04 34 | 05 09 | 074° | 18 48 | 284° | 19 24 | 04 37 | 05 12 | 075° | 18 44 | 283° | 19 19 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **50°N** | 04 39 | 05 13 | 075° | 18 45 | 284° | 19 19 | 04 42 | 05 16 | 076° | 18 41 | 282° | 19 14 |
| **45°N** | 04 50 | 05 20 | 076° | 18 38 | 282° | 19 08 | 04 52 | 05 22 | 077° | 18 34 | 281° | 19 05 |
| **40°N** | 04 58 | 05 26 | 077° | 18 32 | 281° | 19 00 | 05 00 | 05 28 | 078° | 18 29 | 280° | 18 57 |
| **35°N** | 05 06 | 05 31 | 078° | 18 27 | 280° | 18 53 | 05 07 | 05 33 | 079° | 18 25 | 279° | 18 50 |
| **30°N** | 05 12 | 05 36 | 079° | 18 23 | 280° | 18 47 | 05 13 | 05 37 | 080° | 18 21 | 279° | 18 45 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **20°N** | 05 22 | 05 44 | 080° | 18 16 | 279° | 18 38 | 05 22 | 05 44 | 081° | 18 14 | 278° | 18 36 |
| **10°N** | 05 30 | 05 51 | 080° | 18 09 | 278° | 18 31 | 05 29 | 05 51 | 081° | 18 08 | 277° | 18 29 |
| **0°N** | 05 36 | 05 57 | 081° | 18 03 | 278° | 18 24 | 05 36 | 05 57 | 081° | 18 03 | 277° | 18 24 |
| **10°S** | 05 42 | 06 03 | 081° | 17 58 | 278° | 18 19 | 05 41 | 06 02 | 081° | 17 57 | 277° | 18 19 |
| **20°S** | 05 48 | 06 10 | 080° | 17 51 | 278° | 18 14 | 05 46 | 06 08 | 081° | 17 52 | 277° | 18 14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **30°S** | 05 53 | 06 17 | 080° | 17 45 | 278° | 18 09 | 05 51 | 06 15 | 081° | 17 46 | 278° | 18 10 |
| **35°S** | 05 56 | 06 21 | 079° | 17 41 | 279° | 18 06 | 05 53 | 06 19 | 080° | 17 42 | 278° | 18 08 |
| **40°S** | 05 59 | 06 26 | 079° | 17 36 | 279° | 18 04 | 05 56 | 06 23 | 079° | 17 38 | 278° | 18 06 |
| **45°S** | 06 02 | 06 31 | 078° | 17 31 | 280° | 18 01 | 05 58 | 06 28 | 079° | 17 34 | 279° | 18 03 |
| **50°S** | 06 05 | 06 38 | 077° | 17 25 | 281° | 17 58 | 06 01 | 06 33 | 078° | 17 28 | 280° | 18 01 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **52°S** | 06 06 | 06 41 | 076° | 17 23 | 282° | 17 57 | 06 02 | 06 36 | 077° | 17 26 | 280° | 18 00 |
| **54°S** | 06 08 | 06 44 | 075° | 17 20 | 282° | 17 55 | 06 03 | 06 39 | 077° | 17 23 | 281° | 17 59 |
| **56°S** | 06 10 | 06 47 | 075° | 17 16 | 283° | 17 54 | 06 05 | 06 42 | 076° | 17 20 | 282° | 17 58 |

**Éphémérides partielles du Soleil**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Mars** | **AHvo** | **Déclinaison** | **Tcp pass** | **Lever** | **Coucher** |
| à 00 h UT | à 00 h UT | h min s | h min | h min |
| **1** | 176°52,4' | S 07°50,3' | 12 12 25 | 06 42 | 17 44 |
| **2** | 176°55,3' | S 07°27,5' | 12 12 13 | 06 40 | 17 46 |
| **3** | 176°58,3' | S 07°04,7' | 12 12 01 | 06 38 | 17 47 |
| **4** | 177°01,4' | S 06°41,7' | 12 11 48 | 06 36 | 17 49 |
| **5** | 177°04,7' | S 06°18,6' | 12 11 34 | 06 34 | 17 50 |
|  |  |  |  |  |  |
| **6** | 177°08,1' | S 05°55,5' | 12 11 21 | 06 32 | 17 52 |
| **7** | 177°11,5' | S 05°32,2' | 12 11 07 | 06 30 | 17 53 |
| **8** | 177°15,1' | S 05°08,9' | 12 10 52 | 06 28 | 17 54 |
| **9** | 177°18,8' | S 04°45,5' | 12 10 37 | 06 26 | 17 55 |
| **10** | 177°22,5' | S 04°22,1' | 12 10 22 | 06 24 | 17 57 |
|  |  |  |  |  |  |
| **11** | 177°26,4' | S 03°58,5' | 12 10 07 | 06 22 | 17 59 |
| **12** | 177°30,3' | S 03°35,0' | 12 09 51 | 06 20 | 18 01 |
| **13** | 177°34,2' | S 03°11,4' | 12 09 35 | 06 18 | 18 02 |
| **14** | 177°38,3' | S 02°47,7' | 12 09 19 | 06 16 | 18 03 |
| **15** | 177°42,4' | S 02°24,1' | 12 09 02 | 06 14 | 18 04 |
|  |  |  |  |  |  |
| **16** | 177°46,6' | S 02°00,4' | 12 08 45 | 06 12 | 18 06 |
| **17** | 177°50,8' | S 01°36,7' | 12 08 28 | 06 10 | 18 07 |
| **18** | 177°55,1' | S 01°12,9' | 12 08 11 | 06 08 | 18 09 |
| **19** | 177°59,4' | S 00°49,2' | 12 07 53 | 06 06 | 18 11 |
| **20** | 178°03,8' | S 00°25,5' | 12 07 36 | 06 04 | 18 13 |
|  |  |  |  |  |  |
| **21** | 178°08,2' | S 00°01,8' | 12 07 18 | 06 02 | 18 14 |
| **22** | 178°12,6' | N 00°22,0' | 12 07 00 | 06 00 | 18 16 |
| **23** | 178°17,1' | N 00°45,6' | 12 06 42 | 05 58 | 18 17 |
| **24** | 178°21,6' | N 01°09,3' | 12 06 24 | 05 56 | 18 18 |
| **25** | 178°26,1' | N 01°32,9' | 12 06 06 | 05 54 | 18 19 |
|  |  |  |  |  |  |
| **26** | 178°30,7' | N 01°56,5' | 12 05 48 | 05 52 | 18 21 |
| **27** | 178°35,2' | N 02°20,1' | 12 05 30 | 05 50 | 18 22 |
| **28** | 178°39,8' | N 02°43,6' | 12 05 12 | 05 48 | 18 24 |
| **29** | 178°44,3' | N 03°07,0' | 12 04 54 | 05 46 | 18 25 |
| **30** | 178°48,9' | N 03°30,4' | 12 04 35 | 05 44 | 18 27 |
|  |  |  |  |  |  |
| **31** | 178°53,4' | N 03°53,7' | 12 04 17 | 05 42 | 18 28 |

**Éphémérides partielles du Soleil**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Juin** | **AHvo** | **Déclinaison** | **Tcp pass** | **Lever** | **Coucher** |
| à 00 h UT | à 00 h UT | h min s | h min | h min |
| **1** | 180°35,0' | N 21°57,6' | 11 57 45 | 04 05 | 19 52 |
| **2** | 180°32,7' | N 22°05,8' | 11 57 54 | 04 04 | 19 53 |
| **3** | 180°30,4' | N 22°13,6' | 11 58 03 | 04 03 | 19 54 |
| **4** | 180°27,9' | N 22°21,1' | 11 58 13 | 04 02 | 19 55 |
| **5** | 180°25,4' | N 22°28,1' | 11 58 24 | 04 02 | 19 55 |
|  |  |  |  |  |  |
| **6** | 180°22,8' | N 22°34,8' | 11 58 34 | 04 01 | 19 56 |
| **7** | 180°20,1' | N 22°41,0' | 11 58 45 | 04 01 | 19 57 |
| **8** | 180°17,3' | N 22°46,9' | 11 58 57 | 04 01 | 19 58 |
| **9** | 180°14,4' | N 22°52,4' | 11 59 08 | 04 00 | 19 58 |
| **10** | 180°11,5' | N 22°57,4' | 11 59 20 | 04 00 | 19 59 |
|  |  |  |  |  |  |
| **11** | 180°08,5' | N 23°02,1' | 11 59 32 | 04 00 | 19 59 |
| **12** | 180°05,4' | N 23°06,3' | 11 59 44 | 03 59 | 20 00 |
| **13** | 180°02,3' | N 23°10,2' | 11 59 57 | 03 59 | 20 01 |
| **14** | 179°59,2' | N 23°13,6' | 12 00 10 | 03 59 | 20 02 |
| **15** | 179°56,0' | N 23°16,6' | 12 00 22 | 03 59 | 20 02 |
|  |  |  |  |  |  |
| **16** | 179°52,8' | N 23°19,2' | 12 00 35 | 03 59 | 20 03 |
| **17** | 179°49,5' | N 23°21,4' | 12 00 48 | 03 59 | 20 03 |
| **18** | 179°46,3' | N 23°23,2' | 12 01 01 | 03 59 | 20 03 |
| **19** | 179°43,0' | N 23°24,6' | 12 01 14 | 03 59 | 20 03 |
| **20** | 179°39,7' | N 23°25,6' | 12 01 28 | 03 59 | 20 03 |
|  |  |  |  |  |  |
| **21** | 179°36,5' | N 23°26,1' | 12 01 41 | 04 00 | 20 04 |
| **22** | 179°33,2' | N 23°26,3' | 12 01 54 | 04 00 | 20 04 |
| **23** | 179°30,0' | N 23°26,0' | 12 02 07 | 04 00 | 20 04 |
| **24** | 179°26,7' | N 23°25,3' | 12 02 19 | 04 00 | 20 04 |
| **25** | 179°23,5' | N 23°24,2' | 12 02 32 | 04 01 | 20 04 |
|  |  |  |  |  |  |
| **26** | 179°20,4' | N 23°22,7' | 12 02 45 | 04 01 | 20 04 |
| **27** | 179°17,2' | N 23°20,7' | 12 02 57 | 04 02 | 20 04 |
| **28** | 179°14,1' | N 23°18,4' | 12 03 10 | 04 02 | 20 04 |
| **29** | 179°11,1' | N 23°15,6' | 12 03 22 | 04 03 | 20 04 |
| **30** | 179°08,1' | N 23°12,5' | 12 03 34 | 04 03 | 20 04 |
|  |  |  |  |  |  |

**Éphémérides partielles du Soleil**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sept.** | **AHvo** | **Déclinaison** | **Tcp pass** | **Lever** | **Coucher** |
| à 00 h UT | à 00 h UT | h min s | h min | h min |
| **1** | 179°56,0' | N 08°31,3' | 12 00 06 | 05 16 | 18 42 |
| **2** | 180°00,8' | N 08°09,5' | 11 59 47 | 05 18 | 18 40 |
| **3** | 180°05,6' | N 07°47,7' | 11 59 28 | 05 20 | 18 38 |
| **4** | 180°10,5' | N 07°25,7' | 11 59 08 | 05 21 | 18 36 |
| **5** | 180°15,4' | N 07°03,6' | 11 58 49 | 05 23 | 18 34 |
|  |  |  |  |  |  |
| **6** | 180°20,4' | N 06°41,3' | 11 58 28 | 05 24 | 18 32 |
| **7** | 180°25,4' | N 06°19,0' | 11 58 08 | 05 25 | 18 30 |
| **8** | 180°30,5' | N 05°56,6' | 11 57 48 | 05 27 | 18 28 |
| **9** | 180°35,6' | N 05°34,0' | 11 57 27 | 05 29 | 18 26 |
| **10** | 180°40,8' | N 05°11,4' | 11 57 06 | 05 30 | 18 24 |
|  |  |  |  |  |  |
| **11** | 180°46,0' | N 04°48,7' | 11 56 46 | 05 31 | 18 22 |
| **12** | 180°51,2' | N 04°25,9' | 11 56 25 | 05 32 | 18 20 |
| **13** | 180°56,5' | N 04°03,0' | 11 56 03 | 05 34 | 18 18 |
| **14** | 181°01,8' | N 03°40,0' | 11 55 42 | 05 35 | 18 16 |
| **15** | 181°07,1' | N 03°17,0' | 11 55 21 | 05 36 | 18 14 |
|  |  |  |  |  |  |
| **16** | 181°12,5' | N 02°53,9' | 11 55 00 | 05 37 | 18 12 |
| **17** | 181°17,8' | N 02°30,8' | 11 54 38 | 05 39 | 18 09 |
| **18** | 181°23,2' | N 02°07,6' | 11 54 17 | 05 40 | 18 07 |
| **19** | 181°28,5' | N 01°44,4' | 11 53 55 | 05 42 | 18 05 |
| **20** | 181°33,9' | N 01°21,2' | 11 53 34 | 05 43 | 18 03 |
|  |  |  |  |  |  |
| **21** | 181°39,2' | N 00°57,9' | 11 53 13 | 05 44 | 18 01 |
| **22** | 181°44,5' | N 00°34,5' | 11 52 51 | 05 45 | 17 59 |
| **23** | 181°49,8' | N 00°11,2' | 11 52 30 | 05 47 | 17 57 |
| **24** | 181°55,1' | S 00°12,1' | 11 52 09 | 05 48 | 17 55 |
| **25** | 182°00,4' | S 00°35,5' | 11 51 48 | 05 50 | 17 53 |
|  |  |  |  |  |  |
| **26** | 182°05,6' | S 00°58,9' | 11 51 27 | 05 52 | 17 51 |
| **27** | 182°10,8' | S 01°22,2' | 11 51 07 | 05 54 | 17 48 |
| **28** | 182°15,9' | S 01°45,6' | 11 50 46 | 05 55 | 17 46 |
| **29** | 182°20,9' | S 02°08,9' | 11 50 26 | 05 57 | 17 44 |
| **30** | 182°25,9' | S 02°32,2' | 11 50 06 | 05 58 | 17 42 |

**Éphémérides partielles du Soleil**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Dec.** | **AHvo** | **Déclinaison** | **Tcp pass** | **Lever** | **Coucher** |
| à 00 h UT | à 00 h UT | h min s | h min | h min |
| **1** | 182°49,6' | S 21°41,6' | 11 48 53 | 07 28 | 16 09 |
| **2** | 182°44,0' | S 21°51,0' | 11 49 15 | 07 30 | 16 09 |
| **3** | 182°38,3' | S 22°00,0' | 11 49 38 | 07 31 | 16 08 |
| **4** | 182°32,4' | S 22°08,5' | 11 50 02 | 07 32 | 16 08 |
| **5** | 182°26,4' | S 22°16,7' | 11 50 27 | 07 33 | 16 08 |
|  |  |  |  |  |  |
| **6** | 182°20,2' | S 22°24,4' | 11 50 52 | 07 35 | 16 07 |
| **7** | 182°13,9' | S 22°31,6' | 11 51 17 | 07 36 | 16 07 |
| **8** | 182°07,4' | S 22°38,5' | 11 51 43 | 07 37 | 16 07 |
| **9** | 182°00,8' | S 22°44,9' | 11 52 10 | 07 38 | 16 07 |
| **10** | 181°54,1' | S 22°50,8' | 11 52 37 | 07 39 | 16 06 |
|  |  |  |  |  |  |
| **11** | 181°47,3' | S 22°56,3' | 11 53 04 | 07 40 | 16 06 |
| **12** | 181°40,4' | S 23°01,3' | 11 53 32 | 07 41 | 16 06 |
| **13** | 181°33,5' | S 23°05,9' | 11 54 00 | 07 42 | 16 06 |
| **14** | 181°26,4' | S 23°10,0' | 11 54 29 | 07 43 | 16 06 |
| **15** | 181°19,3' | S 23°13,7' | 11 54 57 | 07 44 | 16 06 |
|  |  |  |  |  |  |
| **16** | 181°12,0' | S 23°16,9' | 11 55 26 | 07 45 | 16 06 |
| **17** | 181°04,8' | S 23°19,6' | 11 55 55 | 07 45 | 16 07 |
| **18** | 180°57,5' | S 23°21,9' | 11 56 25 | 07 46 | 16 07 |
| **19** | 180°50,1' | S 23°23,7' | 11 56 54 | 07 46 | 16 08 |
| **20** | 180°42,7' | S 23°25,0' | 11 57 24 | 07 47 | 16 08 |
|  |  |  |  |  |  |
| **21** | 180°35,3' | S 23°25,8' | 11 57 53 | 07 48 | 16 09 |
| **22** | 180°27,9' | S 23°26,2' | 11 58 23 | 07 48 | 16 09 |
| **23** | 180°20,5' | S 23°26,1' | 11 58 53 | 07 49 | 16 10 |
| **24** | 180°13,0' | S 23°25,6' | 11 59 23 | 07 49 | 16 10 |
| **25** | 180°05,6' | S 23°24,6' | 11 59 52 | 07 49 | 16 11 |
|  |  |  |  |  |  |
| **26** | 179°58,2' | S 23°23,1' | 12 00 22 | 07 50 | 16 11 |
| **27** | 179°50,8' | S 23°21,1' | 12 00 52 | 07 50 | 16 12 |
| **28** | 179°43,4' | S 23°18,7' | 12 01 21 | 07 50 | 16 13 |
| **29** | 179°36,0' | S 23°15,8' | 12 01 51 | 07 50 | 16 14 |
| **30** | 179°28,7' | S 23°12,4' | 12 02 20 | 07 50 | 16 14 |
|  |  |  |  |  |  |
| **31** | 179°21,5' | S 23°08,6' | 12 02 49 | 07 51 | 16 15 |

**Étoiles**

**Coordonnées équatoriales entre le 27 août et le 3 septembre**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Étoile** | **Constellation** | **Magnitude** | **Ascension verse** | **Déclinaison** |
| Achernar | α Eridan | 0,6 | 335°34,4' | S 57°14,2' |
| Acrux | α Croix du Sud | 1,1 | 173°21,9' | S 63°05,8' |
| Aldébaran | α Taureau | 1,1 | 291°01,7' | N 16°30,4' |
| Alkaïd | η Grande Ourse | 1,9 | 153°07,6' | N 49°19,3' |
| Alnaïr | α Grue | 2,2 | 27°56,7' | S 46°57,7' |
| Alphératz | α Andromède | 2,2 | 357°54,3' | N 29°05,3' |
| Altaïr | α Aigle | 0,9 | 62°18,4' | N 08°52,2' |
| Antarès | α Scorpion | 1,2 | 112°39,4' | S 26°25,8' |
| Arcturus | α Bouvier | 0,2 | 146°05,7' | N 19°11,4' |
| Bételgeuse | α Orion | 0,1 – 1,2 | 271°13,0' | N 07°24,4' |
| Canopus | α Carène | -0,9 | 264°01,2' | S 52°41,5' |
| Capella (la Chèvre) | α Cocher | 0,2 | 280°50,4' | N 45°59,6' |
| Deneb | α Cygne | 1,3 | 49°38,4' | N 45°17,0' |
| Denebola | β Lion | 2,2 | 182°44,9' | N 14°34,7' |
| Dubhe | α Grande Ourse | 2,0 | 194°05,4' | N 61°45,3' |
| Fomalhaut | α Poisson austral | 1,3 | 15°35,4' | S 29°37,4' |
| Peacock | α Paon | 2,1 | 53°35,6' | S 56°44,2' |
| Polaire (la) | α Petite Ourse | 2,1 – 2,2 | 321°57,2 (27/08) 321°54,5 (03/09) | N 89°15,4' |
| Pollux | β Gémeaux | 1,2 | 243°41,1 | N 28°01,6' |
| Procyon | α Petit Chien | 0,5 | 245°11,2' | N 05°13,6' |
| Rashalague | α Ophiuchus | 2,1 | 96°16,3' | N 12°33,9' |
| Régulus | α Lion | 1,3 | 207°55,2' | N 11°58,3' |
| Rigel | β Orion | 0,3 | 281°22,4' | S 08°12,1' |
| Rigil Kentarus | α Centaure | 0,1 | 140°06,8' | S 60°50,1' |
| Sirius | α Grand Chien | -1,6 | 258°43,3' | S 16°42,8' |
| Spica (l'Epi) | α Vierge | 1,2 | 158°42,8' | S 11°09,4' |
| Véga | α Lyre | 0,1 | 80°46,0' | N 38°47,3' |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Corrections des hauteurs observées du Soleil** | | | | | | | | | | | | | | | |
| **Première correction** | | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hauteur observée | Élévation de l'œil | | | | | | | | | | | | | | |
| 0 m | 2 m | 4 m | 6 m | 8 m | 10 m | 12 m | 14 m | 16 m | 18 m | 20 m | 22 m | 24 m | 26 m | 28 m |
| **07°00'** | + 8,7' | + 6,2' | + 5,1' | + 4,3' | + 3,6' | + 3,0' | + 2,5' | + 2,0' | + 1,5' | + 1,1' | + 0,7' | + 0,3' | - 0,1' | - 0,4' | - 0,8' |
| **07°20'** | + 9,0' | + 6,5' | + 5,4' | + 4,6' | + 4,0' | + 3,4' | + 2,8' | + 2,3' | + 1,9' | + 1,4' | + 1,0' | + 0,6' | + 0,2' | - 0,1' | - 0,5' |
| **07°40'** | + 9,3' | + 6,8' | + 5,7' | + 4,9' | + 4,2' | + 3,6' | + 3,1' | + 2,6' | + 2,2' | + 1,7' | + 1,3' | + 0,9' | + 0,5' | + 0,2' | - 0,2' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **08°00'** | + 9,6' | + 7,1' | + 6,0' | + 5,2' | + 4,5' | + 3,9' | + 3,4' | + 2,9' | + 2,4' | + 2,0' | + 1,6' | + 1,2' | + 0,8' | + 0,4' | + 0,1' |
| **08°20'** | + 9,8' | + 7,3' | + 6,3' | + 5,4' | + 4,8' | + 4,2' | + 3,6' | + 3,1' | + 2,7' | + 2,2' | + 1,8' | + 1,4' | + 1,1' | + 0,7' | + 0,4' |
| **08°40'** | +10,1' | + 7,5' | + 6,5' | + 5,7' | + 5,0' | + 4,4' | + 3,9' | + 3,4' | + 2,9' | + 2,5' | + 2,1' | + 1,7' | + 1,3' | + 0,9' | + 0,6' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **09°00'** | +10,3' | + 7,7' | + 6,7' | + 5,9' | + 5,2' | + 4,6' | + 4,1' | + 3,6' | + 3,1' | + 2,7' | + 2,3' | + 1,9' | + 1,5' | + 1,1' | + 0,8' |
| **09°20'** | +10,5' | + 7,9' | + 6,9' | + 6,1' | + 5,4' | + 4,8' | + 4,3' | + 3,8' | + 3,3' | + 2,9' | + 2,5' | + 2,1' | + 1,7' | + 1,3' | + 1,0' |
| **09°40'** | +10,7' | + 8,1' | + 7,1' | + 6,3' | + 5,6' | + 5,0' | + 4,5' | + 4,0' | + 3,5' | + 3,1' | + 2,7' | + 2,3' | + 1,9' | + 1,5' | + 1,2' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **10°00'** | +10,8' | + 8,3' | + 7,3' | + 6,5' | + 5,8' | + 5,2' | + 4,7' | + 4,2' | + 3,7' | + 3,3' | + 2,9' | + 2,5' | + 2,1' | + 1,7' | + 1,4' |
| **10°20'** | +11,0' | + 8,5' | + 7,4' | + 6,6' | + 5,9' | + 5,3' | + 4,8' | + 4,3' | + 3,9' | + 3,4' | + 3,0' | + 2,6' | + 2,3' | + 1,9' | + 1,6' |
| **10°40'** | +11,2' | + 8,6' | + 7,6' | + 6,8' | + 6,1' | + 5,5' | + 5,0' | + 4,5' | + 4,0' | + 3,6' | + 3,2' | + 2,8' | + 2,4' | + 2,1' | + 1,7' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **11°00'** | +11,3' | + 8,8' | + 7,7' | + 6,9' | + 6,3' | + 5,7' | + 5,1' | + 4,6' | + 4,2' | + 3,7' | + 3,3' | + 2,9' | + 2,6' | + 2,2' | + 1,9' |
| **11°30'** | +11,5' | + 9,0' | + 7,9' | + 7,1' | + 6,5' | + 5,9' | + 5,3' | + 4,8' | + 4,4' | + 3,9' | + 3,5' | + 3,1' | + 2,8' | + 2,4' | + 2,1' |
| **12°00'** | +11,7' | + 9,2' | + 8,1' | + 7,3' | + 6,7' | + 6,1' | + 5,5' | + 5,0' | + 4,6' | + 4,1' | + 3,7' | + 3,3' | + 3,0' | + 2,6' | + 2,3' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **12°30'** | +11,9' | + 9,4' | + 8,3' | + 7,5' | + 6,8' | + 6,2' | + 5,7' | + 5,2' | + 4,8' | + 4,3' | + 3,9' | + 3,5' | + 3,2' | + 2,8' | + 2,4' |
| **13°00'** | +12,0' | + 9,5' | + 8,5' | + 7,7' | + 7,0' | + 6,4' | + 5,9' | + 5,4' | + 4,9' | + 4,5' | + 4,1' | + 3,7' | + 3,3' | + 2,9' | + 2,6' |
| **13°30'** | +12,2' | + 9,7' | + 8,6' | + 7,8' | + 7,1' | + 6,5' | + 6,0' | + 5,5' | + 5,1' | + 4,6' | + 4,2' | + 3,8' | + 3,5' | + 3,1' | + 2,8' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **14°00'** | +12,3' | + 9,8' | + 8,8' | + 8,0' | + 7,3' | + 6,7' | + 6,2' | + 5,7' | + 5,2' | + 4,8' | + 4,4' | + 4,0' | + 3,6' | + 3,2' | + 2,9' |
| **15°00'** | +12,6' | +10,1' | + 9,0' | + 8,2' | + 7,5' | + 6,9' | + 6,4' | + 5,9' | + 5,5' | + 5,0' | + 4,6' | + 4,2' | + 3,9' | + 3,5' | + 3,2' |
| **16°00'** | +12,8' | +10,3' | + 9,3' | + 8,5' | + 7,8' | + 7,2' | + 6,7' | + 6,2' | + 5,7' | + 5,3' | + 4,9' | + 4,5' | + 4,1' | + 3,7' | + 3,4' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **17°00'** | +13,0' | +10,5' | + 9,5' | + 8,7' | + 8,0' | + 7,4' | + 6,9' | + 6,4' | + 5,9' | + 5,5' | + 5,1' | + 4,7' | + 4,3' | + 3,9' | + 3,6' |
| **18°00'** | +13,2' | +10,7' | + 9,6' | + 8,8' | + 8,2' | + 7,6' | + 7,1' | + 6,6' | + 6,1' | + 5,7' | + 5,3' | + 4,9' | + 4,5' | + 4,1' | + 3,8' |
| **19°00'** | +13,4' | +10,8' | + 9,8' | + 9,0' | + 8,3' | + 7,7' | + 7,2' | + 6,7' | + 6,3' | + 5,8' | + 5,4' | + 5,0' | + 4,7' | + 4,3' | + 4,0' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **20°00'** | +13,5' | +11,0' | + 9,9' | + 9,1' | + 8,5' | + 7,9' | + 7,4' | + 6,9' | + 6,4' | + 6,0' | + 5,6' | + 5,2' | + 4,8' | + 4,4' | + 4,1' |
| **22°00'** | +13,8' | +11,3' | +10,2' | + 9,4' | + 8,7' | + 8,1' | + 7,6' | + 7,1' | + 6,7' | + 6,2' | + 5,8' | + 5,4' | + 5,1' | + 4,7' | + 4,4' |
| **24°00'** | +14,0' | +11,5' | +10,4' | + 9,6' | + 8,9' | + 8,3' | + 7,8' | + 7,3' | + 6,9' | + 6,4' | + 6,0' | + 5,7' | + 5,3' | + 4,9' | + 4,6' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **26°00'** | +14,2' | +11,7' | +10,6' | + 9,8' | + 9,1' | + 8,5' | + 8,0' | + 7,5' | + 7,1' | + 6,6' | + 6,2' | + 5,9' | + 5,5' | + 5,1' | + 4,8' |
| **28°00'** | +14,3' | +11,8' | +10,8' | +10,0' | + 9,3' | + 8,7' | + 8,2' | + 7,7' | + 7,2' | + 6,8' | + 6,4' | + 6,0' | + 5,6' | + 5,3' | + 4,9' |
| **30°00'** | +14,5' | +12,0' | +10,9' | +10,1' | + 9,4' | + 8,8' | + 8,3' | + 7,8' | + 7,4' | + 6,9' | + 6,5' | + 6,2' | + 5,8' | + 5,4' | + 5,1' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **32°00'** | +14,6' | +12,1' | +11,0' | +10,2' | + 9,6' | + 9,0' | + 8,5' | + 8,0' | + 7,5' | + 7,1' | + 6,7' | + 6,3' | + 5,9' | + 5,5' | + 5,2' |
| **34°00'** | +14,7' | +12,2' | +11,1' | +10,3' | + 9,7' | + 9,1' | + 8,6' | + 8,1' | + 7,6' | + 7,2' | + 6,8' | + 6,4' | + 6,0' | + 5,6' | + 5,3' |
| **36°00'** | +14,8' | +12,3' | +11,2' | +10,4' | + 9,8' | + 9,2' | + 8,7' | + 8,2' | + 7,7' | + 7,3' | + 6,9' | + 6,5' | + 6,1' | + 5,7' | + 5,4' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **38°00'** | +14,9' | +12,4' | +11,3' | +10,5' | + 9,9' | + 9,3' | + 8,8' | + 8,3' | + 7,8' | + 7,4' | + 7,0' | + 6,6' | + 6,2' | + 5,8' | + 5,5' |
| **40°00'** | +15,0' | +12,5' | +11,4' | +10,6' | +10,0' | + 9,4' | + 8,8' | + 8,3' | + 7,9' | + 7,4' | + 7,0' | + 6,7' | + 6,3' | + 5,9' | + 5,6' |
| **45°00'** | +15,1' | +12,6' | +11,6' | +10,8' | +10,1' | + 9,5' | + 9,0' | + 8,5' | + 8,1' | + 7,6' | + 7,2' | + 6,8' | + 6,5' | + 6,1' | + 5,8' |
|  |  |  |  |  |  |  |  | 0 |  |  |  |  |  |  |  |
| **50°00'** | +15,3' | +12,8' | +11,7' | +10,9' | +10,3' | + 9,7' | + 9,2' | + 8,7' | + 8,2' | + 7,8' | + 7,4' | + 7,0' | + 6,6' | + 6,3' | + 5,9' |
| **55°00'** | +15,4' | +12,9' | +11,9' | +11,1' | +10,4' | + 9,8' | + 9,3' | + 8,8' | + 8,3' | + 7,9' | + 7,5' | + 7,1' | + 6,7' | + 6,4' | + 6,0' |
| **60°00'** | +15,5' | +13,0' | +12,0' | +11,2' | +10,5' | + 9,9' | + 9,4' | + 8,9' | + 8,4' | + 8,0' | + 7,6' | + 7,2' | + 6,8' | + 6,5' | + 6,1' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **70°00'** | +15,7' | +13,2' | +12,2' | +11,4' | +10,7' | +10,1' | + 9,6' | + 9,1' | + 8,6' | + 8,2' | + 7,8' | + 7,4' | + 7,0' | + 6,7' | + 6,3' |
| **80°00'** | +15,9' | +13,4' | +12,3' | +11,5' | +10,9' | +10,3' | + 9,7' | + 9,2' | + 8,8' | + 8,4' | + 8,0' | + 7,6' | + 7,2' | + 6,8' | + 6,5' |
| **90°00'** | +16,0' | +13,5' | +12,5' | +11,7' | +11,0' | +10,4' | + 9,9' | + 9,4' | + 8,9' | + 8,5' | + 8,1' | + 7,7' | + 7,3' | + 7,0' | + 6,6' |

**Corrections des hauteurs observées du Soleil**

**Deuxième correction (bord inférieur)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| janvier | février | mars | avril | mai | juin | juillet | août | septembre | octobre | novembre | décembre |
| + 0.3' | + 0.2' | + 0.1' | 0.0' | - 0.2' | - 0.2' | - 0.2' | - 0.2' | - 0.1' | + 0.1' | + 0.2' | + 0.3' |

**Deuxième correction (bord supérieur)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| janvier | février | mars | avril | mai | juin | juillet | août | septembre | octobre | novembre | décembre |
| - 32.3' | - 32.2 | - 32.1' | - 32.0' | - 31.8' | - 31.8' | - 31.8' | - 31.8' | - 31.9' | - 32.1' | - 32.2' | - 32.3' |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Corrections des hauteurs observées des étoiles et des planètes** | | | | | | | | | | | | | | | | |
| **Première correction** | | | | | | | | | | | | | | | | |
| Hauteur observée | | Élévation de l’œil | | | | | | | | | | | | | | |
| 0 m | 2 m | 4 m | 6 m | 8 m | 10 m | 12 m | 14 m | 16 m | 18 m | 20 m | 22 m | 24 m | 26 m | 28 m |
| **07°00'** | | - 7,4' | -10,0' | -11,0' | -11,8' | -12,5' | -13,1' | -13,7' | -14,2' | -14,6' | -15,1' | -15,5' | -15,9' | -16,2' | -16,6' | -16,9' |
| **07°20'** | | - 7,1' | - 9,7' | -10,7' | -11,5' | -12,2' | -12,8' | -13,3' | -13,8' | -14,3' | -14,7' | -15,1' | -15,5' | -15,9' | -16,3' | -16,6' |
| **07°40'** | | - 6,8' | - 9,4' | -10,4' | -11,2' | -11,9' | -12,5' | -13,0' | -13,5' | -14,0' | -14,5' | -14,9' | -15,3' | -15,6' | -16,0' | -16,3' |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **08°00'** | | - 6,6' | - 9,1' | -10,2' | -11,0' | -11,7' | -12,3' | -12,8' | -13,3' | -13,7' | -14,2' | -14,6' | -15,0' | -15,4' | -15,7' | -16,1' |
| **08°20'** | | - 6,3' | - 8,9' | - 9,9' | -10,7' | -11,4' | -12,0' | -12,5' | -13,0' | -13,5' | -13,9' | -14,3' | -14,7' | -15,1' | -15,5' | -15,8' |
| **08°40'** | | - 6,1' | - 8,6' | - 9,7' | -10,5' | -11,2' | -11,8' | -12,3' | -12,8' | -13,3' | -13,7' | -14,1' | -14,5' | -14,9' | -15,2' | -15,6' |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **09°00'** | | - 5,9' | - 8,4' | - 9,5' | -10,3' | -11,0' | -11,6' | -12,1' | -12,6' | -13,0' | -13,5' | -13,9' | -14,3' | -14,7' | -15,0' | -15,4' |
| **09°20'** | | - 5,7' | - 8,2' | - 9,3' | -10,1' | -10,8' | -11,4' | -11,9' | -12,4' | -12,8' | -13,3' | -13,7' | -14,1' | -14,5' | -14,8' | -15,2' |
| **09°40'** | | - 5,5' | - 8,0' | - 9,1' | - 9,9' | -10,6' | -11,2' | -11,7' | -12,2' | -12,6' | -13,1' | -13,5' | -13,9' | -14,3' | -14,6' | -15,0' |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **10°00'** | | - 5,3' | - 7,8' | - 8,9' | - 9,7' | -10,4' | -11,0' | -11,5' | -12,0' | -12,5' | -12,9' | -13,3' | -13,7' | -14,1' | -14,4' | -14,8' |
| **10°20'** | | - 5,2' | - 7,7' | - 8,7' | - 9,5' | -10,2' | -10,8' | -11,3' | -11,8' | -12,3' | -12,7' | -13,1' | -13,5' | -13,9' | -14,3' | -14,6' |
| **10°40'** | | - 5,0' | - 7,5' | - 8,6' | - 9,4' | -10,1' | -10,7' | -11,2' | -11,7' | -12,1' | -12,6' | -13,0' | -13,4' | -13,7' | -14,1' | -14,5' |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **11°00'** | | - 4,9' | - 7,4' | - 8,4' | - 9,2' | - 9,9' | -10,5' | -11,0' | -11,5' | -12,0' | -12,4' | -12,8' | -13,2' | -13,6' | -14,0' | -14,3' |
| **11°30'** | | - 4,7' | - 7,2' | - 8,2' | - 9,0' | - 9,7' | -10,3' | -10,8' | -11,3' | -11,8' | -12,2' | -12,6' | -13,0' | -13,4' | -13,8' | -14,1' |
| **12°00'** | | - 4,5' | - 7,0' | - 8,0' | - 8,8' | - 9,5' | -10,1' | -10,6' | -11,1' | -11,6' | -12,0' | -12,4' | -12,8' | -13,2' | -13,6' | -13,9' |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **12°30'** | | - 4,3' | - 6,8' | - 7,8' | - 8,7' | - 9,3' | - 9,9' | -10,5' | -11,0' | -11,4' | -11,9' | -12,3' | -12,6' | -13,0' | -13,4' | -13,7' |
| **13°00'** | | - 4,1' | - 6,6' | - 7,7' | - 8,5' | - 9,2' | - 9,8' | -10,3' | -10,8' | -11,2' | -11,7' | -12,1' | -12,5' | -12,8' | -13,2' | -13,5' |
| **13°30'** | | - 4,0' | - 6,5' | - 7,5' | - 8,3' | - 9,0' | - 9,6' | -10,1' | -10,6' | -11,1' | -11,5' | -11,9' | -12,3' | -12,7' | -13,1' | -13,4' |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **14°00'** | | - 3,8' | - 6,3' | - 7,4' | - 8,2' | - 8,9' | - 9,5' | -10,0' | -10,5' | -10,9' | -11,4' | -11,8' | -12,2' | -12,5' | -12,9' | -13,2' |
| **15°00'** | | - 3,6' | - 6,1' | - 7,1' | - 7,9' | - 8,6' | - 9,2' | - 9,7' | -10,2' | -10,7' | -11,1' | -11,5' | -11,9' | -12,3' | -12,6' | -13,0' |
| **16°00'** | | - 3,3' | - 5,9' | - 6,9' | - 7,7' | - 8,4' | - 9,0' | - 9,5' | -10,0' | -10,4' | -10,9' | -11,3' | -11,7' | -12,0' | -12,4' | -12,7' |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **17°00'** | | - 3,1' | - 5,7' | - 6,7' | - 7,5' | - 8,2' | - 8,8' | - 9,3' | - 9,8' | -10,2' | -10,7' | -11,1' | -11,5' | -11,8' | -12,2' | -12,5' |
| **18°00'** | | - 3,0' | - 5,5' | - 6,5' | - 7,3' | - 8,0' | - 8,6' | - 9,1' | - 9,6' | -10,1' | -10,5' | -10,9' | -11,3' | -11,7' | -12,0' | -12,4' |
| **19°00'** | | - 2,8' | - 5,3' | - 6,3' | - 7,1' | - 7,8' | - 8,4' | - 8,9' | - 9,4' | - 9,9' | -10,3' | -10,7' | -11,1' | -11,5' | -11,9' | -12,2' |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **20°00'** | | - 2,7' | - 5,2' | - 6,2' | - 7,0' | - 7,7' | - 8,3' | - 8,8' | - 9,3' | - 9,8' | -10,2' | -10,6' | -11,0' | -11,3' | -11,7' | -12,1' |
| **22°00'** | | - 2,4' | - 4,9' | - 5,9' | - 6,7' | - 7,4' | - 8,0' | - 8,5' | - 9,0' | - 9,5' | - 9,9' | -10,3' | -10,7' | -11,1' | -11,4' | -11,8' |
| **24°00'** | | - 2,2' | - 4,7' | - 5,7' | - 6,5' | - 7,2' | - 7,8' | - 8,3' | - 8,8' | - 9,3' | - 9,7' | -10,1' | -10,5' | -10,9' | -11,2' | -11,6' |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **26°00'** | | - 2,0' | - 4,5' | - 5,5' | - 6,3' | - 7,0' | - 7,6' | - 8,1' | - 8,6' | - 9,1' | - 9,5' | - 9,9' | -10,3' | -10,7' | -11,0' | -11,4' |
| **28°00'** | | - 1,8' | - 4,3' | - 5,4' | - 6,2' | - 6,8' | - 7,4' | - 8,0' | - 8,5' | - 8,9' | - 9,3' | - 9,7' | -10,1' | -10,5' | -10,9' | -11,2' |
| **30°00'** | | - 1,7' | - 4,2' | - 5,2' | - 6,0' | - 6,7' | - 7,3' - | - 7,8' | - 8,3' | - 8,8' | - 9,2' | - 9,6' | -10,0' | -10,4' | -10,7' | -11,1' |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **32°00'** | | - 1,5' | - 4,0' | - 5,1' | - 5,9' | - 6,6' | - 7,2' | - 7,7' | - 8,2' | - 8,6' | - 9,1' | - 9,5' | - 9,9' | -10,2' | -10,6' | -10,9' |
| **34°00'** | | - 1,4' | - 3,9' | - 5,0' | - 5,8' | - 6,5' | - 7,1' | - 7,6' | - 8,1' | - 8,5' | - 9,0' | - 9,4' | - 9,8' | -10,1' | -10,5' | -10,8' |
| **36°00'** | | - 1,3' | - 3,8' | - 4,9' | - 5,7' | - 6,4' | - 7,0' | - 7,5' | - 8,0' | - 8,4' | - 8,9' | - 9,3' | - 9,7' | -10,0' | -10,4' | -10,7' |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **38°00'** | | - 1,2' | - 3,7' | - 4,8' | - 5,6' | - 6,3' | - 6,9' | - 7,4' | -7,9° | -8,3° | - 8,8' | - 9,2' | - 9,6' | - 9,9' | -10,3' | -10,6' |
| **40°00'** | | - 1,2' | - 3,7' | - 4,7' | - 5,5' | - 6,2' | - 6,8' | - 7,3' | - 7,8' | - 8,2' | - 8,7' | - 9,1' | - 9,5' | - 9,8' | -10,2' | -10,5' |
| **45°00'** | | - 1,0' | - 3,5' | - 4,5' | - 5,3' | - 6,0' | - 6,6' | - 7,1' | - 7,6' | - 8,0' | - 8,5' | - 8,9' | - 9,3' | - 9,6' | -10,0' | -10,3' |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **50°00'** | | - 0,8' | - 3,3' | - 4,4' | - 5,2' | - 5,8' | - 6,4' | - 6,9' | - 7,4' | - 7,9' | - 8,3' | - 8,7' | - 9,1' | - 9,5' | -9,9° | -10,2’ |
| **55°00'** | | - 0,7' | - 3,2' | - 4,2' | - 5,0' | - 5,7' | - 6,3' | - 6,8' | - 7,3' | - 7,8' | - 8,2' | - 8,6' | - 9,0' | - 9,3' | - 9,7' | -10,0' |
| **60°00'** | | - 0,6' | - 3,1' | - 4,1' | - 4,9' | - 5,6' | - 6,2' | - 6,7' | - 7,2' | - 7,6' | - 8,1' | - 8,5' | - 8,9' | - 9,2' | - 9,6' | - 9,9' |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **70°00'** | | - 0,4' | - 2,9' | - 3,9' | - 4,7' | - 5,4' | - 6,0' | - 6,5' | - 7,0' | - 7,4' | - 7,9' | - 8,3' | - 8,7' | - 9,0' | - 9,4' | - 9,7' |
| **80°00'** | | - 0,2' | - 2,7' | - 3,7' | - 4,5' | - 5,2' | - 5,8' | - 6,3' | - 6,8' | - 7,2' | - 7,7' | - 8,1' | - 8,5' | - 8,8' | - 9,2' | - 9,5' |
| **90°00'** | | 0,0' | - 2,5' | - 3,5' | - 4,3' | - 5,0' | - 5,6' | - 6,1' | - 6,6' | - 7,1' | - 7,5' | - 7,9' | - 8,3' | - 8,7' | - 9,0' | - 9,4' |

|  |
| --- |
| **Corrections des hauteurs observées des étoiles et des planètes** |
| **Deuxième correction (pour la parallaxe des planètes)** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hauteur observée | **Vénus** | | | | **Mars** | | | |
| janvier | avril | août | décembre | janvier | avril | août | décembre |
| 0° | + 0,1' | + 0,1' | + 0,5' | + 0,1' | + 0,1' | + 0,2' | + 0,1' | + 0,1' |
| 30° | + 0,1' | + 0,1' | + 0,4' | + 0,1' | + 0,1' | + 0,2' | + 0,1' | + 0,1' |
| 60° | 0,0' | + 0,1' | + 0,2' | + 0,1' | + 0,1' | + 0,1' | + 0,1' | 0,0' |

**Corrections des hauteurs observées de la Lune**

**Première correction**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Élévation de l'œil | 0 m | 2 m | 4 m | 6 m | 8 m | 10 m | 12 m | 14 m | 16 m | 18 m | 20 m | 22 m | 24 m | 26 m | 28 m |
| Dépression | 0,0' | - 2,5' | - 3,5' | - 4,3' | - 5,0' | - 5,6' | - 6,1' | - 6,6' | - 7,1' | - 7,5' | - 7,9' | - 8,3' | - 8,7' | - 9,0' | - 9,4' |

**Deuxième correction (bord inférieur)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **08°00'** | + 61,8' | + 63,1' | + 63,7' | + 64,3' | + 64,9' | + 65,6' | + 66,2' | + 66,8' | + 67,5' | + 68,1' | + 68,7' | + 69,4' | + 70,7' |
| **10°00'** | + 62,7' | + 64,0' | + 64,6' | + 65,2' | + 65,8' | + 66,5' | + 67,1' | + 67,7' | + 68,3' | + 69,0' | + 69,6' | + 70,3' | + 71,5' |
| **12°00'** | + 63,2' | + 64,4' | + 65,0' | + 65,7' | + 66,3' | + 66,9' | + 67,5' | + 68,2' | + 68,8' | + 69,5' | + 70,1' | + 70,7' | + 72,0' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **14°00'** | + 63,4' | + 64,6' | + 65,2' | + 65,9' | + 66,5' | + 67,1' | + 67,7' | + 68,4' | + 69,0' | + 69,6' | + 70,2' | + 70,9' | + 72,1' |
| **16°00'** | + 63,4' | + 64,6' | + 65,2' | + 65,8' | + 66,5' | + 67,1' | + 67,7' | + 68,3' | + 68,9' | + 69,6' | + 70,2' | + 70,8' | + 72,0' |
| **18°00'** | + 63,2' | + 64,4' | + 65,0' | + 65,6' | + 66,2' | + 66,9' | + 67,5' | + 68,1' | + 68,7' | + 69,3' | + 69,9' | + 70,6' | + 71,8' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **26°00'** | + 61,3' | + 62,5' | + 63,1' | + 63,7' | + 64,3' | + 64,9' | + 65,5' | + 66,0' | + 66,6' | + 67,2' | + 67,8' | + 68,4' | + 69,6' |
| **28°00'** | + 60,7' | + 61,8' | + 62,4' | + 63,0' | + 63,6' | + 64,1' | + 64,7' | + 65,3' | + 65,9' | + 66,4' | + 67,0' | + 67,6' | + 68,8' |
| **30°00'** | + 59,9' | + 61,0' | + 61,6' | + 62,2' | + 62,8' | + 63,3' | + 63,9' | + 64,4' | + 65,0' | + 65,6' | + 66,2' | + 66,7' | + 67,9' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **32°00'** | + 59,0' | + 60,2' | + 60,8' | + 61,3' | + 61,9' | + 62,4' | + 63,0' | + 63,5' | + 64,1' | + 64,7' | + 65,3' | + 65,8' | + 66,9' |
| **34°00'** | + 58,1' | + 59,2' | + 59,8' | + 60,3' | + 60,9' | + 61,4' | + 62,0' | + 62,5' | + 63,1' | + 63,6' | + 64,2' | + 64,8' | + 65,9' |
| **36°00'** | + 57,2' | + 58,2' | + 58,8' | + 59,3' | + 59,9' | + 60,4' | + 61,0' | + 61,5' | + 62,1' | + 62,6' | + 63,2' | + 63,7' | + 64,7' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **38°00'** | + 56,1' | + 57,2' | + 57,8' | + 58,2' | + 58,8' | + 59,3' | + 59,9' | + 60,4' | + 61,0' | + 61,4' | + 62,0' | + 62,5' | + 63,6' |
| **40°00'** | + 55,0' | + 56,1' | + 56,7' | + 57,1' | + 57,7' | + 58,1' | + 58,7' | + 59,2' | + 59,8' | + 60,2' | + 60,8' | + 61,3' | + 62,3' |
| **42°00'** | + 53,9' | + 54,9' | + 55,5' | + 55,9' | + 56,5' | + 56,9' | + 57,5' | + 57,9' | + 58,5' | + 59,0' | + 59,5' | + 60,0' | + 61,0' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **44°00'** | + 52,7' | + 53,7' | + 54,3' | + 54,7' | + 55,2' | + 55,6' | + 56,1' | + 56,6' | + 57,1' | + 57,6' | + 58,1' | + 58,6' | + 59,6' |
| **46°00'** | + 51,4' | + 52,4' | + 52,8' | + 53,3' | + 53,8' | + 54,3' | + 54,8' | + 55,3' | + 55,8' | + 56,2' | + 56,7' | + 57,2' | + 58,2' |
| **48°00'** | + 50,1' | + 51,0' | + 51,5' | + 52,0' | + 52,5' | + 52,9' | + 53,4' | + 53,9' | + 54,4' | + 54,8' | + 55,3' | + 55,7' | + 56,7' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **50°00'** | + 48,7' | + 49,6' | + 50,1' | + 50,5' | + 51,0' | + 51,5' | + 52,0' | + 52,4' | + 52,9' | + 53,3' | + 53,8' | + 54,2' | + 55,1' |
| **52°00'** | + 47,3' | + 48,2' | + 48,7' | + 49,1' | + 49,6' | + 50,0' | + 50,4' | + 50,9' | + 51,4' | + 51,8' | + 52,2' | + 52,7' | + 53,5' |
| **54°00'** | + 45,8' | + 46,7' | + 47,2' | + 47,6' | + 48,0' | + 48,4' | + 48,9' | + 49,3' | + 49,8' | + 50,2' | + 50,6' | + 51,0' | + 51,9' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **56°00'** | + 44,4' | + 45,2' | + 45,6' | + 46,0' | + 46,4' | + 46,8' | + 47,3' | + 47,7' | + 48,1' | + 48,5' | + 48,9' | + 49,4' | + 50,2' |
| **58°00'** | + 42,8' | + 43,6' | + 44,0' | + 44,4' | + 44,8' | + 45,2' | + 45,6' | + 46,0' | + 46,4' | + 46,9' | + 47,3' | + 47,7' | + 48,5' |
| **60°00'** | + 41,3' | + 42,1' | + 42,5' | + 42,8' | + 43,2' | + 43,6' | + 44,0' | + 44,4' | + 44,8' | + 45,1' | + 45,5' | + 45,9' | + 46,7' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **62°00'** | + 39,6' | + 40,4' | + 40,8' | + 41,1' | + 41,5' | + 41,9' | + 42,3' | + 42,6' | + 43,0' | + 43,4' | + 43,8' | + 44,1' | + 44,9' |
| **64°00'** | + 38,0' | + 38,7' | + 39,1' | + 39,4' | + 39,8' | + 40,2' | + 40,6' | + 40,9' | + 41,2' | + 41,6' | + 42,0' | + 42,3' | + 43,0' |
| **66°00'** | + 36,4' | + 37,0' | + 37,3' | + 37,7' | + 38,1' | + 38,4' | + 38,8' | + 39,1' | + 39,4' | + 39,8' | + 40,1' | + 40,4' | + 41,1' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **68°00'** | + 34,7' | + 35,3' | + 35,6' | + 36,0' | + 36,3' | + 36,6' | + 37,0' | + 37,3' | + 37,6' | + 37,9' | + 38,3' | + 38,6' | + 39,2' |
| **70°00'** | + 32,9' | + 33,6' | + 33,9' | + 34,2' | + 34,5' | + 34,8' | + 35,1' | + 35,4' | + 35,7' | + 36,0' | + 36,3' | + 36,7' | + 37,3' |
| **72°00'** | + 31,2' | + 31,8' | + 32,1' | + 32,3' | + 32,6' | + 32,9' | + 33,2' | + 33,5' | + 33,8' | + 34,1' | + 34,4' | + 34,7' | + 35,3' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **74°00'** | + 29,4' | + 30,0' | + 30,3' | + 30,5' | + 30,8' | + 31,1' | + 31,4' | + 31,6' | + 31,9' | + 32,2' | + 32,5' | + 32,7' | + 33,3' |
| **76°00'** | + 27,7' | + 28,2' | + 28,5' | + 28,7' | + 29,0' | + 29,2' | + 29,5' | + 29,7' | + 30,0' | + 30,2' | + 30,5' | + 30,8' | + 31,3' |
| **78°00'** | + 25,8' | + 26,3' | + 26,5' | + 26,8' | + 27,1' | + 27,3' | + 27,6' | + 27,8' | + 28,0' | + 28,3' | + 28,5' | + 28,7' | + 29,2' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **80°00'** | + 24,0' | + 24,5' | + 24,7' | + 24,9' | + 25,1' | + 25,4' | + 25,6' | + 25,8' | + 26,0' | + 26,3' | + 26,5' | + 26,7' | + 27,2' |
| **82°00'** | + 22,2' | + 22,6' | + 22,8' | + 23,0' | + 23,2' | + 23,4' | + 23,6' | + 23,9' | + 24,1' | + 24,3' | + 24,5' | + 24,7' | + 25,1' |
| **84°00'** | + 20,4' | + 20,8' | + 20,9' | + 21,1' | + 21,3' | + 21,5' | + 21,7' | + 21,9' | + 22,1' | + 22,3' | + 22,5' | + 22,6' | + 23,0' |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **86°00'** | + 18,5' | + 18,9' | + 19,0' | + 19,2' | + 19,4' | + 19,6' | + 19,8' | + 19,9' | + 20,1' | + 20,3' | + 20,4' | + 20,6' | + 20,9' |
| **88°00'** | + 16,7' | + 17,0' | + 17,1' | + 17,3' | + 17,4' | + 17,6' | + 17,8' | + 17,9' | + 18,1' | + 18,2' | + 18,3' | + 18,5' | + 18,8' |
| **90°00'** | + 14,7' | + 15,0' | + 15,1' | + 15,3' | + 15,4' | + 15,6' | + 15,7' | + 15,8' | + 16,0' | + 16,1' | + 16,2' | + 16,4' | + 16,7' |
| **Diamètre de**  **la lune** | 29,4’ | 30,0’ | 30,3’ | 30,6’ | 30,8’ | 31,1’ | 31,4’ | 31,7’ | 32,0’ | 32,2’ | 32 ,5’ | 32,8’ | 33,3’ |
| **Pour le bord supérieur, retrancher le diamètre de la correction précédente** | | | | | | | | | | | | | |

**TABLE DES AZIMUTHS DE LA POLAIRE**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Angle horaire sidéral local AHsg** | **Latitude Nord** | | | | | | | | **Angle horaire approché AHag** |
| **0°** | **10°** | **20°** | **30°** | **40°** | **50°** | **60°** | **65°** |
| **°** | ° | ° | ° | ° | ° | ° | ° | ° | **°** |
| **0** | 0,5 | 0,5 | 0,5 | 0,5 | 0,6 | 0,7 | 0,9 | 1,1 | **320** |
| **20** | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,4 | 0,5 | 0,6 | **340** |
| **40** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **0** |
| **60** | 359,8 | 359,8 | 359,7 | 359,7 | 359,7 | 359,6 | 359,5 | 359,4 | **20** |
| **80** | 359,5 | 359,5 | 359,5 | 359,5 | 359,4 | 359,3 | 359,1 | 358,9 | **40** |
| **100** | 359,4 | 359,4 | 359,4 | 359,4 | 359,2 | 359,1 | 358,8 | 358,6 | **60** |
| **120** | 359,3 | 359,3 | 359,3 | 359,3 | 359,1 | 358,9 | 358,6 | 358,4 | **80** |
| **140** | 359,3 | 359,3 | 359,3 | 359,3 | 359,1 | 358,9 | 358,6 | 358,4 | **100** |
| **160** | 359,4 | 359,4 | 359,4 | 359,4 | 359,2 | 359,1 | 358,8 | 358,6 | **120** |
| **180** | 359,5 | 359,5 | 359,5 | 359,5 | 359,4 | 359,3 | 359,1 | 358,9 | **140** |
| **200** | 359,8 | 359,8 | 359,7 | 359,7 | 359,7 | 359,6 | 359,5 | 359,4 | **160** |
| **220** | 360,0 | 360,0 | 360,0 | 360,0 | 360,0 | 360,0 | 360,0 | 360,0 | **180** |
| **240** | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,4 | 0,5 | 0,6 | **200** |
| **260** | 0,5 | 0,5 | 0,5 | 0,5 | 0,6 | 0,7 | 0,9 | 1,1 | **220** |
| **280** | 0,6 | 0,6 | 0,6 | 0,6 | 0,8 | 0,9 | 1,2 | 1,4 | **240** |
| **300** | 0,7 | 0,7 | 0,7 | 0,7 | 0,9 | 1,1 | 1,4 | 1,6 | **260** |
| **320** | 0,7 | 0,7 | 0,7 | 0,7 | 0,9 | 1,1 | 1,4 | 1,6 | **280** |
| **340** | 0,6 | 0,6 | 0,6 | 0,6 | 0,8 | 0,9 | 1,2 | 1,4 | **300** |
| **360** | 0,5 | 0,5 | 0,5 | 0,5 | 0,6 | 0,7 | 0,9 | 1,1 | **320** |

**Fuseaux horaires**

|  |  |  |
| --- | --- | --- |
| **Numéro** | **Lettre** | **Limites** |
|  |  | 180° |
| + 12 | Y |  |
|  |  | 172,5° W |
| + 11 | X |  |
|  |  | 157,5° W |
| + 10 | W |  |
|  |  | 142,5° W |
| + 9 | V |  |
|  |  | 127,5° W |
| + 8 | U |  |
|  |  | 112,5° W |
| + 7 | T |  |
|  |  | 097,5° W |
| + 6 | S |  |
|  |  | 082,5° W |
| + 5 | R |  |
|  |  | 067,5° W |
| + 4 | Q |  |
|  |  | 052,5° W |
| + 3 | P |  |
|  |  | 037,5° W |
| + 2 | O |  |
|  |  | 022,5° W |
| + 1 | N |  |
|  |  | 07,5° W |
| 0 | Z |  |
|  |  | 07,5° E |
| - 1 | A |  |
|  |  | 22,5° E |
| - 2 | B |  |
|  |  | 37,5° E |
| - 3 | C |  |
|  |  | 52,5° E |
| - 4 | D |  |
|  |  | 67,5° E |
| - 5 | E |  |
|  |  | 82,5° E |
| - 6 | F |  |
|  |  | 97,5° E |
| - 7 | G |  |
|  |  | 112,5° E |
| - 8 | H |  |
|  |  | 127,5° E |
| - 9 | I |  |
|  |  | 142,5° E |
| - 10 | K |  |
|  |  | 157,5 ° E |
| - 11 | L |  |
|  |  | 172,5° E |
| - 12 | M |  |
|  |  | 180° |

**Formulaire et notation**

navigation astronomique

AHag : angle horaire local de l’astre

AHao : angle horaire de l’astre à Greenwich

AHsg : angle horaire sidéral au lieu de longitude G

AHso : angle horaire sidéral à Greenwich

AHvg : angle horaire du Soleil vrai au lieu de longitude G

AHvo : angle horaire du Soleil vrai à Greenwich

Aze : azimut estimé, compté de 0 à 180° Est ou Ouest

Ze : azimut estimé, compté de 0° à 360°

Co : correction

D : déclinaison de l’astre

Dep : dépression

F : notation internationale du fuseau

G : longitude

Ge : longitude estimée

Ha : hauteur apparente

He : hauteur estimée

Hi : hauteur instrumentale

Ho : hauteur observée

Hv : hauteur vraie

I : intercept

Pe : angle au pôle de l’astre au lieu de longitude Ge

Tcf : temps civil du fuseau

Tcg : temps civil local

Tcp : temps civil au premier méridien

Tcp pass : heure de passage de l'astre à la méridienne origine.

UT : temps civil au premier méridien

ε : erreur instrumentale

π : Parallaxe horizontale

Φ : latitude

φe : latitude estimée

**Formules de la droite de hauteur**

Astre à l’est Ze = Aze, astre à l’ouest Ze = 360° - Aze

**Formulaire et notation**

loxodromie et orthodromie

φa : latitude d’arrivée

Ga : longitude d’arrivée

φd : latitude de départ

Gd : longitude de départ

Λa : latitude croissante à l’arrivée

Λd : latitude croissante au départ

dist : distance

Rfq : Route fond quart

φV : latitude vertex

GV : longitude vertex

Ad : angle de route initial

V : route fond initiale orthodromique

Rfi : route fond initiale loxodromique

α : correction de Givry

**Formules exactes de la loxodromie**

**et**

**Formules de l’orthodromie**