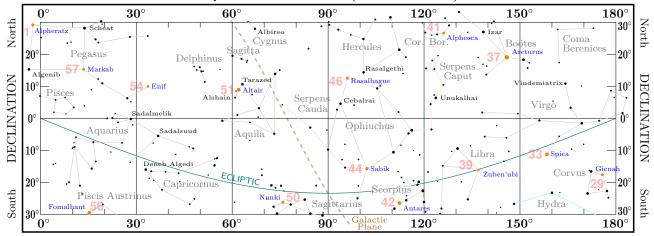
## GENERATED USING EPHEM AND SKYFIELD

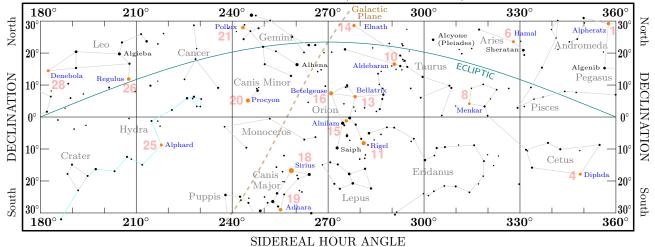
http://rhodesmill.org/skyfield/

### EQUATORIAL STARS (SHA $0^{\circ}$ to $180^{\circ}$ )



SIDEREAL HOUR ANGLE

#### EQUATORIAL STARS (SHA 180° to 360°)



## THE NAUTICAL ALMANAC

# from 27.6.2021

Author: Andrew Bauer
Original concept from: Enno Rodegerdts

March 18, 2021

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## June 27, 28, 29 UT (Sun., Mon., Tue.)

Fig.   Color   Colo	h	Aries	Ven	ius	М	ars	Jup	oiter	Sat	urn		Stars	
1 907919   188706 4 48   187508 0 43   187508 0 3   307505 387   387 0 1 4 7 1	Sun	GHA		Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
2				N21°44.4		N19°04.8					A l l +		
2007-266   1379-50   4.64   140-027   5.55   140-027	1	290°21.9	168°00.4	43.8	158°00.9	04.3	315°53.7	38.7	335°06.1	42.7			
84 Sept. 19. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.													
Section   Company   Comp													
Fig.													I
7 20°367 27°561 401 20°662 018 40°682 389 06°217 420 40°692 318 30°692 42 430 430 46°304 40°103 30°52 40°692 31°564 020°765 40°765 40°692 31°564 020°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°692 31°765 40°69											Hamal	327°54.6	23°33.6
8 95 93 2 27 533 99 20 377.1 0.14 0.1713 839 90 24.2 4.50   March 131/150.8 1.0713   March 131/1											Polaris		I
9 99'41.6 287'91.6 - 389 276'80\$ - 0.09 70'138 - 39.0 95'268 - 4.10   11 80'466 317'531 37.7 386'98 19'001 100'188 39.0 157'304 430.   11 80'466 317'531 37.7 386'98 19'001 100'188 39.0 157'320 41.1   18 180'038 347'31.7 38.0 389'18 19'001 100'188 39.0 157'320 41.1   18 180'038 437'31.7 38.0 389'18 19'001 100'188 39.0 157'320 41.1   18 180'038 41'51.0 25'01 36.0 383'12.5 568 151'263 39.1 170'308 43.2   18 180'038 62'481 102'333 53'161 108'388 39.1 157'308 43.2   18 180'038 62'481 102'333 53'161 108'51 211'368 43.2   19 201'063 77'473 12.7 69'66 56'60.0 25'885 50'60.0 25'885 50'60.0 1 19 201'063 77'473 12.7 69'66 56'60.0 85'85 50'60.0 1 108'51 211'368 43'392 225'85'85 50'60.0 1 108'51 211'368 50'60 1 108'61 211'368 50'60 1 108'61 211'368 50'60 1 108'61 211'368 50'60 1 108'61 211'368 50'60 1 108'											1		
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14   195   40   33   32   74   74   30   32   10   10   10   10   10   10   10   1	11		$317^{\circ}53.1$	37.7	308°09.8	19°00.1	$106^{\circ}18.8$						
1   10   10   10   10   10   10   10											_		I
149   149													
150   150													
17   17   17   18   18   33   38   15   2   75   16   33   39   21   57   6   43   31   31   31   32   23   23   32   32											Alnilam	275°41.0	
188   186   03.8   03.7   03											Betelgeuse		
19													-52°42.4
20 216°087 9 24'466 320 83118 502 211'414 393 200'554 435 pt													
24   11   2													
28   13   17   12   24   25   30   113   190   5.44   27   48   394   27   40   395   43   36   503   43.6	21	231°11.2	107°45.9	• • 31.4	98°18.7	• • 55.8		• • 39.3	275°58.0	• • 43.5			
Mer. pass. 05.10.   19/44.   801   128 00.   5.99   280 9.00   394   500 0.01   1.93.   5.00 0.01   1.93													
Mon   CHA	23	261°16.1	137°44.4	30.1	128°20.5	54.9	286°49.0	39.4	306°03.1	43.6	1		
Many GHA	Mer.p	ass.:05:38	v-0.7 d-0.	.6 m-3.8	v0.9 d-0	).4 m1.8	v2.5 d-0	.0 m-2.5	v2.6 d-0	0.0 m0.4			
GHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec								=.0					
2021  11   167*430   289   185*23   541   305*15   511*394   321*057, 517*43.6   December 1972  11   167*430   289   185*23   541   316*340   395   335*360   343.7   General 177*0132   637133   312*260   197*416   276   188*241   532.3   346*590   395   65*135   343.8   Across   177*0132   637133   321*260   197*416   276   188*241   532.3   346*590   395   65*135   343.8   Across   177*0132   637133   331*260   197*416   276   188*241   532.3   346*590   395   65*135   343.8   Across   177*0132   637133   365*30   277*01   285.2   287*260   278*261   287*260   278*261   278*260   278*261   278*260   278*261   278*260   278*261   278*260   278*261   278*260   278*261   278*260   278*261   278*260   278*261   278*260   278*261   278*260   278*261   278*260   278*261   278*26	N4	CIIA	CIIA	D	CIIA	D	CIIA	D	CIIA	D	Regulus	207°37.7	11°51.9
291°21.1   167'43.0   299   158'22.3   591.1   316'54.0   39.5   336'08.3   43.7   Grand   175'46.5   177'93.7   379'3.7   323'25.5   182'42.1   53.2   346'59.0   39.5   61'3.5   43.8   63.0   43.8   43.6											Dubhe	193°44.9	
3 321260 107416													
3312°260   197°41.6   -27.6   188°24.1   -53.2   346°59.0   -39.5   6°13.5   -43.8   Garrix   17.9°54.2   -67.15.5   -67.													
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5 351-309. 227-401. 26.3 218-25.9 52.3 17-04.1 39.6 36-18.7 438.9 56-6 0-23.9 4.90 4.90 4.90 4.90 4.90 4.90 4.90 4.													
6 6°334 242′394 122′257 233°268 N18°51.9 32′066 51′213 517′43.9 4.8	5										1		
7 21°35.9 25°38.0 24.4 263°28.6 5.11 62°11.6 39.7 60°23.9 43.9 43.9 43.8 36°38.3 272°38.0 24.4 263°28.6 5.11 62°11.6 39.7 61°23.9 43.9 44.0 46.8 26°37.3 6.2 29°10.7 44.0 46.2 29°20.1 4.40 46.2 29°20.2 1.40 46.2	6	6°33.4	242°39.4	N21°25.7	233°26.8	N18°51.9	32°06.6	S11°39.6	51°21.3	S17°43.9			
8 36°38.3 272°38.0 24.4 263°28.6 51.1 62°11.6 39.7 81°26.5 44.0 51.0 67°1.6 130.8 287°37.3 23.7 287°29.4 50.6 77°14.1 39.7 81°26.5 44.0 40.1 148°0.8 36°28.6 51.0 66°43.2 302°36.5 23.1 293°30.3 50.2 92°16.7 39.8 111°31.7 4.0 40.1 148°0.8 38°36.8 6.0 55.5 11.8 18°45.7 31°755.8 22.5 308°31.2 49.8 10°79.2 39.8 11°31.7 4.0 40.1 12°53.1 13°45.7 31°755.8 22.5 308°31.2 49.8 10°79.2 39.8 11°31.7 4.0 40.1 12°53.1 11°50.6 347°34.4 21.2 338°33.0 48.9 137°24.2 39.9 156°39.5 44.2 44.6 28°3.1 12°53.3 2°33.7 20.5 353°33.9 48.5 152°26.7 39.9 17°14.1 44.2 44.3 44.1 12°53.3 11°50.6 347°33.0 19.9 8°34.8 48.0 167°29.3 39.9 17°14.1 44.2 44.3 Artia 10°153.3 6.0°40.0 10.1 156°38.0 32°32.3 19.2 23°35.7 47.6 182°31.8 40.0 201°47.3 44.3 Artia 10°153.6 6.0°40.0 10.1 156°38.0 32°32.3 19.2 23°35.7 47.6 182°31.8 40.0 201°47.3 44.3 Artia 10°153.6 6.0°40.0 11.1 14°40.0 11.1 14°40.0 11.1 14°40.0 11.1 14°40.0 11.1 156°38.0 32°32.3 11°17.9 353°35.5 N18°46.7 212°38.8 811°40.0 211°52.4 \$17°44.4 5.0 \$18°40.0 11°17				25.0		51.5		39.7		43.9			
9 51°40.8 287°37.3 23.7 278°294 · · · 50.6 77°14.1 · 39.7 96°29.1 · · · 44.0 1 6 ° 63.2 29°30.3 29°30.5 20.2 92°10.7 39.8 111°31.7 44.0 1 81°45.7 31°35.6 22.5 308°31.2 · 49.8 10°19.2 39.8 126°34.3 · 44.1 1 81°45.7 31°35.6 22.5 308°31.2 · 49.8 10°19.2 39.8 126°34.3 · 44.1 1 81°45.7 31°35.6 23°35.1 N21°21.8 32°32.1 N18°9.3 122°21.7 \$11°39.8 121°36.9 31°44.1 24.0 130°39.0 · 1.6°07.8 13 111°50.6 34°35.4 · 21.2 338°33.0 · 48.9 137°24.2 39.9 156°39.5 · 44.2 Attares 112°19.0 · 26°28.7 15 141°55.6 17°33.0 · 19.9 8°34.8 · 48.0 16°29.3 · 39.9 156°44.7 · 44.3 Attar 10°19.0 · 26°28.7 15 141°55.6 17°33.0 · 19.9 8°34.8 · 48.0 16°29.3 · 39.9 156°44.7 · 44.3 Sabik 10°20.8 · 15°11.1 × 15°5.6 17°33.0 · 19.9 8°34.8 · 48.0 16°29.3 · 39.9 156°44.7 · 44.3 Sabik 10°20.8 · 15°4.6 15°5.0 · 44.4 Attar 112°19.0 · 26°28.7 17°20.5 · 47°31.5 · 15.6 · 38°36.6 · 47.2 19°34.3 · 40.0 · 21°49.9 · 44.3 Sabik 10°20.8 · 15°45.0 · 17°10.0 · 47°31.5 · 15.6 · 38°36.6 · 47.2 19°34.3 · 40.0 · 21°54.9 · 44.3 Sabik 10°20.8 · 15°45.0 · 18°40.2 · 22°20.5 · 44.4 · 40.1 · 24°55.0 · 44.4 · 40.1 · 24°55.0 · 44.5 · 45°40.2 · 45°40.2 · 45°40.2 · 45°40.9 · 40.2 · 20°20.4 · 45°5.0 · 44.5 · 45°40.2 · 45°40.2 · 45°40.9 · 40.2 · 20°20.2 · 44°5.5 · 44.5 · 45°40.2 · 45°40.2 · 45°40.9 · 40.2 · 20°20.2 · 44°5.5 · 44.5 · 45°40.2 · 45°40.2 · 45°40.9 · 40.2 · 20°20.2 · 44°5.5 · 44.5 · 45°40.2 · 45°40.2 · 45°40.9 · 40.2 · 20°20.2 · 44°5.5 · 44°50.2 · 45°40.9 · 40.2 · 20°20.2 · 44°5.5 · 44°50.2 · 45°40.9 · 40.2 · 20°20.2 · 44°5.5 · 44°50.2 · 45°40.9 · 40°20.2 · 45°40											1		
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16 1656.80 32°32.3 19.2 23°35.7 47.6 182°31.8 40.0 20147.3 44.3 Atria 107°15.3 66°04.0 17°20.5 17°20.5 17°20.5 17°20.5 17°20.5 18.6 38°36.6 47.2 197°34.3 40.0 216°49.9 44.3 Sabik 102°05.8 15°45.0 18 187°03.0 62°30.8 N21°17.9 53°37.5 N18°46.7 212°38.6 \$11°40.0 221°52.4 54.4 Elamin 90°43.0 51°29.2 20°217°07.9 92°29.4 16.6 83°39.3 45.9 242°41.9 40.1 261°57.6 44.5 Eltamin 90°43.0 51°29.2 21°20.1 010°28.7 15.9 98°40.2 45.4 22°27°44.4 40.1 27°00.2 44.5 22°247°12.8 122°28.0 15.3 113°41.1 45.0 272°46.9 40.2 292°02.8 44.6 Nunki 75°51.0 -26°16.1 Munki 75°51.0 -26°16.1 Munki 75°51.0 226°16.1 Munki 75°17.0 226°16.1 Munki 75°													
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10 67°42.4 302°19.5 07.3 293°51.8 39.8 93°17.2 40.6 112°34.0 45.1 12°34.0 45.1 12°34.0 45.1 12°34.0 45.1 12°34.0 45.1 12°34.0 45.1 12°34.0 45.1 12°34.0 12°35.1 12°47.3 332°18.1 N21°06.0 323°53.6 N18°38.9 123°22.3 S11°40.7 142°39.2 S17°45.2 13°112°49.8 347°17.4 05.3 338°54.5 38.4 138°24.8 40.7 157°41.8 45.2 12°52.2 2°16.7 04.6 353°55.4 38.0 153°27.3 40.7 172°44.4 45.2 15°142°54.7 17°16.0 · · · 04.0 8°56.3 · · · 37.6 168°29.9 · · · 40.8 187°47.0 · · · 45.3 16°15°57.2 32°15.3 03.3 23°57.2 37.1 183°32.4 40.8 202°49.6 45.3 17°172°59.6 47°14.6 02.6 38°58.1 36.7 198°34.9 40.8 217°52.2 45.4 18 188°02.1 62°13.9 N21°01.9 53°59.0 N18°36.3 213°37.4 S11°40.9 232°54.8 S17°45.4 19 203°04.6 77°13.2 01.2 68°59.9 35.8 228°40.0 40.9 247°57.4 45.5 20 218°07.0 92°12.5 21°00.6 84°00.8 35.4 243°42.5 41.0 263°00.0 45.5 21 233°09.5 107°11.8 20°59.9 99°01.7 · · · 34.9 258°45.0 · · 41.0 278°02.6 · · 45.6 23 23°05.2 45.6 23 263°14.4 137°10.4 58.5 129°03.5 34.1 288°50.1 41.1 308°07.8 45.6 10.1 Mars: 0.1													
11 82°44.8 317°18.8 06.6 308°52.7 39.3 108°19.7 40.6 127°36.6 45.1 12 97°47.3 332°18.1 N21°06.0 323°53.6 N18°38.9 123°22.3 S11°40.7 142°39.2 S17°45.2 112°49.8 347°17.4 05.3 338°54.5 38.4 138°24.8 40.7 157°41.8 45.2 12 127°52.2 2°16.7 04.6 353°55.4 38.0 153°27.3 40.7 172°44.4 45.2 15 142°54.7 17°16.0 · · · 04.0 8°56.3 · · · 37.6 168°29.9 · · · 40.8 187°47.0 · · · 45.3 16 157°57.2 32°15.3 03.3 23°57.2 37.1 183°32.4 40.8 202°49.6 45.3 17 172°59.6 47°14.6 02.6 38°58.1 36.7 198°34.9 40.8 217°52.2 45.4 18 188°02.1 62°13.9 N21°01.9 53°59.0 N18°36.3 213°37.4 S11°40.9 232°54.8 S17°45.4 19 203°04.6 77°13.2 01.2 68°59.9 35.8 228°40.0 40.9 247°57.4 45.5 20 218°07.0 92°12.5 21°00.6 84°00.8 35.4 243°42.5 41.0 263°00.0 45.5 21 233°09.5 107°11.8 20°59.9 99°01.7 · · · 34.9 258°45.0 · · 41.0 278°02.6 · · 45.6 23 263°14.4 137°10.4 58.5 129°03.5 34.1 288°50.1 41.1 308°07.8 45.6													
12 97*47.3 332*18.1 N21*06.0 322*53.6 N18*38.9 123*22.3 \$11*40.7 142*39.2 \$17*45.2   13 112*49.8 347*17.4 05.3 338*54.5 38.4 138*24.8 40.7 157*41.8 45.2   14 127*52.2 2*16.7 04.6 353*55.4 38.0 153*27.3 40.7 172*44.4 45.2   15 142*54.7 17*16.0 ·· 04.0 8*56.3 ·· 37.6 168*29.9 ·· 40.8 187*47.0 ·· 45.3   16 157*57.2 32*15.3 03.3 23*57.2 37.1 183*32.4 40.8 202*49.6 45.3   17 172*59.6 47*14.6 02.6 38*58.1 36.7 198*34.9 40.8 217*52.2 45.4   18 188*02.1 62*13.9 N21*01.9 53*59.0 N18*36.3 213*37.4 \$11*40.9 232*54.8 \$17*45.4   19 203*04.6 77*13.2 01.2 68*59.9 35.8 228*40.0 40.9 247*57.4 45.5   20 218*07.0 92*12.5 21*00.6 84*00.8 35.4 243*42.5 41.0 263*00.0 45.5   21 233*09.5 107*11.8 20*59.9 99*01.7 ·· 34.9 258*45.0 ·· 41.0 278*02.6 ·· 45.6   22 248*12.0 122*11.1 59.2 114*02.6 34.5 273*47.6 41.0 293*05.2 45.6   23 263*14.4 137*10.4 58.5 129*03.5 34.1 288*50.1 41.1 308*07.8 45.6    Mars: 0.1	11	82°44.8	$317^{\circ}18.8$	06.6	$308^{\circ}52.7$	39.3	$108^{\circ}19.7$	40.6	127°36.6	45.1			
13 112 <sup>4</sup> 9.8 347 <sup>1</sup> 17.4 05.3 338 <sup>5</sup> 4.5 38.4 138 <sup>5</sup> 24.8 40.7 157 <sup>4</sup> 1.8 45.2 120 <sup>5</sup> 52.2 2°16.7 04.6 353°55.4 38.0 153°27.3 40.7 172°44.4 45.2 15 142°54.7 17°16.0 ·· 04.0 8°56.3 ·· 37.6 168°29.9 ·· 40.8 187°47.0 ·· 45.3 16 157°57.2 32°15.3 03.3 23°57.2 37.1 183°32.4 40.8 202°49.6 45.3 17 172°59.6 47°14.6 02.6 38°58.1 36.7 198°34.9 40.8 217°52.2 45.4 18 188°02.1 62°13.9 N21°01.9 53°59.0 N18°36.3 213°37.4 S11°40.9 232°54.8 S17°45.4 19 203°04.6 77°13.2 01.2 68°59.9 35.8 228°40.0 40.9 247°57.4 45.5 20 218°07.0 92°12.5 21°00.6 84°00.8 35.4 243°42.5 41.0 263°00.0 45.5 21 233°09.5 107°11.8 20°59.9 99°01.7 ·· 34.9 258°45.0 ·· 41.0 278°02.6 ·· 45.6 22 248°12.0 122°11.1 59.2 114°02.6 34.5 273°47.6 41.0 293°05.2 45.6 23 263°14.4 137°10.4 58.5 129°03.5 34.1 288°50.1 41.1 308°07.8 45.6													
14 127 52.2 2 16.7 04.6 353 55.4 38.0 153 27.3 40.7 172 44.4 45.2 15 142 54.7 17°16.0 · · · 04.0 8°56.3 · · 37.6 168°29.9 · · 40.8 187°47.0 · · · 45.3 16 157°57.2 32°15.3 03.3 23°57.2 37.1 183°32.4 40.8 202°49.6 45.3 17 172°59.6 47°14.6 02.6 38°58.1 36.7 198°34.9 40.8 217°52.2 45.4 18 188°02.1 62°13.9 N21°01.9 53°59.0 N18°36.3 213°37.4 S11°40.9 232°54.8 S17°45.4 19 203°04.6 77°13.2 01.2 68°59.9 35.8 228°40.0 40.9 247°57.4 45.5 20 218°07.0 92°12.5 21°00.6 84°00.8 35.4 243°42.5 41.0 263°00.0 45.5 21 233°09.5 107°11.8 20°59.9 99°01.7 · · · 34.9 258°45.0 · · · 41.0 278°02.6 · · · 45.6 22 248°12.0 122°11.1 59.2 114°02.6 34.5 273°47.6 41.0 293°05.2 45.6 23 263°14.4 137°10.4 58.5 129°03.5 34.1 288°50.1 41.1 308°07.8 45.6							138°24.8						
16       157°57.2       32°15.3       03.3       23°57.2       37.1       183°32.4       40.8       202°49.6       45.3       Venus       235°08.8       13:51         17       172°59.6       47°14.6       02.6       38°58.1       36.7       198°34.9       40.8       217°52.2       45.4       Mars       226°25.1       14:24         18       188°02.1       62°13.9       N21°01.9       53°59.0       N18°36.3       213°37.4       S11°40.9       232°54.8       S17°45.4       Jupiter       25°34.2       03:48         19       203°04.6       77°13.2       01.2       68°59.9       35.8       228°40.0       40.9       247°57.4       45.5       Saturn       44°50.3       02:31         20       218°07.0       92°12.5       21°00.6       84°00.8       35.4       243°42.5       41.0       263°00.0       45.5       45.6       Saturn       44°50.3       02:31         21       233°09.5       107°11.8       20°59.9       99°01.7       34.9       258°45.0       41.0       293°05.2       45.6       45.6       Venus:       0.1         22       248°12.0       122°11.1       59.2       114°02.6       34.5       273°47.6       41.0       <													
17       172°59.6       47°14.6       02.6       38°58.1       36.7       198°34.9       40.8       217°52.2       45.4         18       188°02.1       62°13.9       N21°01.9       53°59.0       N18°36.3       213°37.4       S11°40.9       232°54.8       S17°45.4       Jupiter       25°34.2       03:48         19       203°04.6       77°13.2       01.2       68°59.9       35.8       228°40.0       40.9       247°57.4       45.5       Saturn       44°50.3       02:31         20       218°07.0       92°12.5       21°00.6       84°00.8       35.4       243°42.5       41.0       263°00.0       45.5       44.6       Horizontal parallax         21       233°09.5       107°11.8       20°59.9       99°01.7       34.9       258°45.0       41.0       293°05.2       45.6       45.6       Venus:       0.1         22       248°12.0       122°11.1       59.2       114°02.6       34.5       273°47.6       41.0       293°05.2       45.6       45.6       Mars:       0.1         23       263°14.4       137°10.4       58.5       129°03.5       34.1       288°50.1       41.1       308°07.8       45.6       Mars:       0.1 </td <td></td>													
18													
19 203°04.6 77°13.2 01.2 68°59.9 35.8 228°40.0 40.9 247°57.4 45.5 21°07.0 92°12.5 21°07.6 84°07.8 35.4 243°42.5 41.0 263°07.0 45.5 21°27.0 12°11.1 59.2 114°02.6 34.5 273°47.6 41.0 293°05.2 45.6 23 263°14.4 137°10.4 58.5 129°03.5 34.1 288°50.1 41.1 308°07.8 45.6 Mars: 0.1											1		
20 218°07.0 92°12.5 21°00.6 84°00.8 35.4 243°42.5 41.0 263°00.0 45.5 21 233°09.5 107°11.8 20°59.9 99°01.7 · 34.9 258°45.0 · 41.0 278°02.6 · 45.6 22 248°12.0 122°11.1 59.2 114°02.6 34.5 273°47.6 41.0 293°05.2 45.6 23 263°14.4 137°10.4 58.5 129°03.5 34.1 288°50.1 41.1 308°07.8 45.6 Mars: 0.1													
21       233°09.5       107°11.8       20°59.9       99°01.7       · · 34.9       258°45.0       · · 41.0       278°02.6       · · 45.6       Horizontal parallax         22       248°12.0       122°11.1       59.2       114°02.6       34.5       273°47.6       41.0       293°05.2       45.6       Venus:       0.1         23       263°14.4       137°10.4       58.5       129°03.5       34.1       288°50.1       41.1       308°07.8       45.6       Mars:       0.1											Jatuiii	77 30.3	02.31
22       248°12.0       122°11.1       59.2       114°02.6       34.5       273°47.6       41.0       293°05.2       45.6       Venus:       0.1         23       263°14.4       137°10.4       58.5       129°03.5       34.1       288°50.1       41.1       308°07.8       45.6       Mars:       0.1		233°09.5	$107^{\circ}11.8$		99°01.7						Horizoi		
25 265 11.1 251 26.1 36.5 31.1 266 36.1 12.1 366 41.6 13.6	22		$122^{\circ}11.1$			34.5				45.6			
Mer.pass.:05:30 v-0.7 d-0.7 m-3.8 v0.9 d-0.4 m1.8 v2.5 d-0.0 m-2.5 v2.6 d-0.0 m0.4	23	263°14.4	137°10.4	58.5	129°03.5	34.1	288°50.1	41.1	308°07.8	45.6		Mars:	0.1
	Mer.n	ass.:05:30	v-0.7 d-0	.7 m-3.8	v0.9 d-0	).4 m1.8	v2.5 d-0	.0 m-2.5	v2.6 d-0	0.0 m0.4			

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	$179^{\circ}14.7$	$N23^{\circ}19.2$	$325^{\circ}55.9$	5.7'	S22°58.6	7.2'	59.2'
1	194°14.6	19.1	340°20.7	5.9'	22°51.3	7.3'	59.2'
2	209°14.4 224°14.3	19.0 •• 18.9	354°45.6 9°10.6	6.0' 6.1'	22°43.9 22°36.4	7.5' 7.6'	59.1' 59.1'
3 4	239°14.2	18.8	23°35.7	6.2	22°28.7	7.0 7.7'	59.1'
5	254°14.1	18.7	38°01.0	6.3	22°21.0	7.9'	59.0'
6	269°13.9	N23°18.6	52°26.4	6.4'	S22°13.0	8.0'	59.0'
7	284°13.8	18.4	66°51.9	6.6'	22°05.0	8.1'	59.0'
8	299°13.7	18.3	81°17.5	6.7'	21°56.8	8.2'	58.9'
9 10	314°13.5 329°13.4	· · 18.2 18.1	95°43.2 110°09.1	6.8' 6.9'	21°48.5 21°40.0	8.4' 8.5'	58.9' 58.8'
10	329 13.4 344°13.3	18.1	110 09.1 124°35.0	6.9 7.0'	21°40.0	8.6'	58.8'
12	359°13.2	N23°17.9	139°01.1	7.2	S21°22.8	8.7'	58.8'
13	14°13.0	17.8	153°27.3	7.3'	21°14.0	8.9'	58.7'
14	29°12.9	17.7	167°53.7	7.4'	$21^{\circ}05.1$	9.0'	58.7'
15	44°12.8	• • 17.6	182°20.1	7.5'	20°56.1	9.1'	58.7'
16	59°12.6 74°12.5	17.5	196°46.7 211°13.4	7.6'	20°46.9	9.2'	58.6'
17 18	74°12.5 89°12.4	17.4 N23°17.2	211°13.4 225°40.2	7.8' 7.9'	20°37.7 \$20°28.3	9.3' 9.4'	58.6' 58.5'
19	104°12.3	17.1	240°07.1	8.0'	20°18.9	9.4	58.5
20	119°12.1	17.0	254°34.2	8.1'	20°09.3	9.6'	58.5'
21	134°12.0	• • 16.9	269°01.4	8.2'	19°59.6	9.7'	58.4'
22	149°11.9	16.8	283°28.7	8.4'	19°49.8	9.8'	58.4'
23	164°11.8	16.7	297°56.1	8.5'	19°39.9	9.9'	58.4'
	SD.=15.7	d=-0.1		S.	D.=16.0		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°11.6	N23°16.6	312°23.7	8.6'	S19°29.9	10.0'	58.3'
1	194°11.5	16.4	326°51.3	8.7'	19°19.9	10.1'	58.3'
2	209°11.4	16.3	341°19.1	8.8'	19°09.7	10.2'	58.2'
3	224°11.2	• • 16.2	355°47.0	9.0'	18°59.4	10.3'	58.2'
4	239°11.1	16.1	10°15.0	9.1'	18°49.1	10.4	58.2'
5 6	254°11.0 269°10.9	16.0 N23°15.8	24°43.2 39°11.4	9.2' 9.3'	18°38.6 \$18°28.1	10.5' 10.6'	58.1' 58.1'
7	209 10.9 284°10.7	15.7	59 11.4 53°39.8	9.3 9.4'	18°17.4	10.0	58.0'
8	299°10.6	15.6	68°08.3	9.6'	18°06.7	10.8'	58.0'
9	314°10.5	• • 15.5	82°36.9	9.7'	17°55.9	10.8'	58.0'
10	329°10.4	15.3	97°05.6	9.8'	17°45.0	10.9'	57.9'
11	344°10.2	15.2	111°34.5	9.9'	17°34.1	11.0'	57.9'
12	359°10.1	N23°15.1	126°03.4	10.0'	S17°23.0	11.1'	57.9'
13	14°10.0 29°09.9	15.0	140°32.5	10.1'	17°11.9	11.2'	57.8'
14 15	29°09.9 44°09.7	14.8 •• 14.7	155°01.7 169°31.0	10.2' 10.4'	17°00.7 16°49.4	11.2' 11.3'	57.8' 57.7'
16	59°09.6	14.7	184°00.4	10.4	16°38.1	11.4	57.7'
17	74°09.5	14.5	198°29.9	10.6'	16°26.7	11.4'	57.7'
18	89°09.4	N23°14.3	212°59.6	10.7'	S16°15.2	11.5'	57.6'
19	104°09.2	14.2	227°29.3	10.8'	16°03.7	11.6'	57.6'
20	119°09.1	14.1	241°59.2		15°52.0	11.6'	57.5'
21	134°09.0 149°08.8	• • 13.9	256°29.1	11.0'	15°40.4	11.7'	57.5'
22 23	149°08.8 164°08.7	13.8 13.7	270°59.2 285°29.4	11.1' 11.2'	15°28.6 15°16.8	11.8' 11.8'	57.5' 57.4'
25			203 29.4			11.0	31.4
	SD.=15.7	d=-0.1		5.	D.=15.8		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°08.6	N23° 13.5	299°59.7	11.3'	\$15°04.9	11.9'	57.4'
1	194°08.5	13.4	314°30.1	11.4'	14°53.0	12.0'	57.4'
2	209°08.3 224°08.2	13.3 •• 13.1	329°00.5 343°31.1	11.5' 11.6'	14°41.0 14°29.0	12.0' 12.1'	57.3' 57.3'
4	239°08.1	13.1	358°01.8	11.7	14 29.0 14°16.9	12.1'	57.3'
5	254°08.0	12.9	12°32.6	11.8'	14°04.8	12.2'	57.2'
6	269°07.8	N23°12.7	27°03.5	11.9'	<b>S</b> 13°52.6	12.2'	57.2'
7	284°07.7	12.6	41°34.5	12.0'	13°40.3	12.3'	57.1'
8	299°07.6	12.4	56°05.6	12.1'	13°28.0	12.3'	57.1
9	314°07.5 329°07.4	12.3	70°36.8 85°08.1	12.2' 12.3'	13°15.7 13°03.3	12.4'	57.1'
10 11	329°07.4 344°07.2	12.2 12.0	99°39.5	12.3'	13°03.3 12°50.8	12.4' 12.5'	57.0' 57.0'
12	359°07.1	N23°11.9	99° 39.3 114° 10.9	12.5	\$12°38.3	12.5'	56.9'
13	14°07.0	11.7	128°42.5	12.6'	12°25.8	12.5'	56.9'
14	29°06.9	11.6	143°14.2	12.7'	12°13.2	12.6'	56.9'
15	44°06.7	• • 11.4	157°45.9	12.8'	12°00.6	12.6'	56.8'
16	59°06.6	11.3	172°17.7	12.9'	11°48.0	12.7'	56.8'
17	74°06.5	11.1	186°49.7	13.0'	11°35.3	12.7'	56.8'
18 19	89°06.4 104°06.2	N23°11.0 10.9	201°21.7 215°53.8	13.1' 13.1'	\$11°22.6 11°09.8	12.7' 12.8'	56.7' 56.7'
20	104 06.2 119°06.1	10.9	215 53.8 230°25.9	13.1	11 09.8 10°57.0	12.8'	56.7'
21	134°06.0	• • 10.6	244°58.2	13.3'	10° 44.2	12.8'	56.6'
22	149°05.9	10.4	259°30.5	13.4'	10°31.4	12.9'	56.6'
23	164°05.7	10.3	274°03.0	13.5'	10°18.5	12.9'	56.6'
	SD.=15.7	d=-0.1		S.	D.=15.5		

Lat.	Twi	light	Sunrise	Sunset	Twilight		
Lat.	Naut.	Civil	Juliuse	Juliset	Civil	Naut.	
N 72°							
N 70°							
68°							
66°							
64°			01:37	22:29			
62°			02:14	21:52			
60°		00:57	02:40	21:27	23:08		
N 58°		01:45	03:00	21:06	22:21		
56°		02:14	03:16	20:50	21:52		
54°	00:52	02:36	03:30	20:36	21:30	23:13	
52°	01:37	02:54	03:43	20:24	21:12	22:29	
50°	02:04	03:09	03:53	20:13	20:57	22:02	
45°	02:49	03:38	04:16	19:51	20:28	21:17	
N 40°	03:19	04:01	04:34	19:33	20:06	20:47	
35°	03:42	04:19	04:49	19:18	19:48	20:24	
30°	04:01	04:34	05:01	19:05	19:33	20:06	
20°	04:30	04:59	05:23	18:43	19:08	19:37	
N 10°	04:52	05:19	05:42	18:24	18:47	19:15	
0°	05:11	05:37	06:00	18:07	18:29	18:56	
S 10°	05:28	05:54	06:17	17:50	18:12	18:39	
20°	05:44	06:11	06:35	17:31	17:55	18:23	
30°	06:00	06:30	06:56	17:10	17:37	18:06	
35°	06:09	06:41	07:09	16:58	17:26	17:58	
40°	06:18	06:52	07:23	16:44	17:14	17:48	
45°	06:29	07:06	07:40	16:27	17:01	17:38	
<b>S</b> 50°	06:40	07:22	08:00	16:07	16:45	17:27	
52°	06:45	07:29	08:10	15:57	16:38	17:21	
54°	06:51	07:37	08:21	15:46	16:30	17:16	
56°	06:57	07:46	08:33	15:33	16:21	17:10	
58°	07:04	07:56	08:48	15:19	16:11	17:03	
<b>S</b> 60°	07:11	80:80	09:05	15:02	15:59	16:56	

Lat.		Moonrise	9		Moonset	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°			01:43			06:57
<b>N</b> 70°		02:10	01:12		04:42	07:26
68°		01:16	00:49		05:35	07:48
66°	01:08	00:43	00:30	03:47	06:07	08:04
64°	00:21	00:19	00:16	04:33	06:31	08:18
62°	23:59	-:-	00:03	05:03	06:49	08:29
60°	23:43	23:52	23:58	05:26	07:05	08:39
N 58°	23:29	23:43	23:53	05:44	07:17	08:47
56°	23:18	23:35	23:48	06:00	07:28	08:54
54°	23:07	23:28	23:43	06:13	07:38	09:01
52°	22:58	23:21	23:39	06:24	07:47	09:07
50°	22:50	23:15	23:35	06:34	07:54	09:12
45°	22:32	23:02	23:27	06:56	08:11	09:23
<b>N</b> 40°	22:18	22:52	23:20	07:13	08:24	09:33
35°	22:05	22:42	23:14	07:27	08:35	09:41
30°	21:55	22:34	23:09	07:39	08:45	09:48
20°	21:36	22:20	22:59	08:00	09:02	10:00
N 10°	21:20	22:08	22:51	08:19	09:16	10:10
0°	21:05	21:56	22:44	08:36	09:30	10:20
S 10°	20:49	21:45	22:36	08:52	09:43	10:29
20°	20:33	21:32	22:28	09:10	09:58	10:39
30°	20:14	21:18	22:19	09:31	10:14	10:51
35°	20:03	21:10	22:13	09:43	10:23	10:57
40°	19:50	21:00	22:07	09:56	10:34	11:05
45°	19:35	20:49	22:00	10:12	10:46	11:14
<b>S</b> 50°	19:17	20:36	21:51	10:32	11:01	11:24
52°	19:08	20:29	21:47	10:41	11:08	11:29
54°	18:58	20:22	21:43	10:52	11:16	11:34
56°	18:47	20:14	21:38	11:04	11:25	11:40
58°	18:34	20:05	21:32	11:17	11:35	11:46
<b>S</b> 60°	18:19	19:55	21:26	11:33	11:46	11:54

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	17-19	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	90-73%	
27	03:01	03:07	12:03	02:22	14:50		
28	03:13	03:20	12:03	03:17	15:43		
29	03:26	03:32	12:04	04:08	16:32		

### June 30, 01, 02 UT (Wed., Thu., Fri.)

h	Aries	Venus	Mars	Jupiter	Saturn	S	Stars
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec		SHA Dec
0	278°16.9	152°09.7 N20°57.8	144°04.4 N18°33.6	303°52.6 \$11°41.1	323°10.4 \$17°45.7		
1	293°19.3	167°09.0 57.2	159°05.3 33.2	318°55.2 41.1	338°13.0 45.7		357°37.7 29°12.3 353°10.0 -42°11.2
2	$308^{\circ}21.8$	182°08.3 56.5	174°06.2 32.7	333°57.7 41.2	353°15.6 45.8		349°34.2 56°38.9
3	323°24.3	197°07.6 · · 55.8	189°07.1 · · 32.3	349°00.2 · · 41.2	8°18.2 · · 45.8		348°50.2 -17°52.1
4 5	338°26.7 353°29.2	212°06.9 55.1 227°06.2 54.4	204°08.0 31.9 219°08.9 31.4	4°02.8 41.3 19°05.3 41.3	23°20.8 45.9 38°23.4 45.9		335°22.6 -57°07.5
6	8°31.7	242°05.5 N20°53.7	234°09.8 N18°31.0	34°07.8 \$11°41.3	53°26.0 \$17°45.9		327°54.6 23°33.6
7	23°34.1	257°04.9 53.0	249°10.7 30.5	49°10.4 41.4	68°28.6 46.0		815°37.9 89°20.9
8	38°36.6	272°04.2 52.3	264°11.6 30.1	64°12.9 41.4	83°31.2 46.0		315°14.3 -40°13.0 314°09.4 4°10.3
9	53°39.1	287°03.5 · · 51.6	279°12.5 · · 29.7	79°15.4 · · 41.4	98°33.8 · · 46.1		308°32.7 49°56.0
10	68°41.5 83°44.0	302°02.8 51.0 317°02.1 50.3	294°13.4 29.2 309°14.3 28.8	94°18.0 41.5 109°20.5 41.5	113°36.4 46.1 128°39.0 46.2		290°43.2 16°33.0
11 12	98°46.5	332°01.4 N20°49.6	309°14.3 28.8 324°15.2 N18°28.3	109°20.5 41.5 124°23.0 \$11°41.6	128°39.0 46.2 143°41.6 \$17°46.2	_	281°07.0 -8°10.6
13	113°48.9	347°00.7 48.9	339°16.1 27.9	139°25.6 41.6	158°44.2 46.3		280°26.6 46°01.0
14	$128^{\circ}51.4$	2°00.0 48.2	354°17.0 27.4	154°28.1 41.6	173°46.8 46.3		278°26.3 6°22.1 278°05.9 28°37.4
15	143°53.8	16°59.3 · · 47.5	9°17.9 · · 27.0	169°30.6 · · 41.7	188°49.4 · · 46.3	I .	275°41.0 -1°11.3
16 17	158°56.3 173°58.8	31°58.6 46.8 46°58.0 46.1	24°18.8 26.6 39°19.7 26.1	184°33.2 41.7 199°35.7 41.8	203°52.0 46.4 218°54.6 46.4		270°55.5 7°24.6
18	189°01.2	61°57.3 N20°45.4	54°20.6 N18°25.7	214°38.2 \$11°41.8	233°57.2 S17°46.5		263°54.2 -52°42.4
19	204°03.7	76°56.6 44.7	69°21.5 25.2	229°40.8 41.8	248°59.8 46.5	I .	258°29.1 -16°44.7 255°08.5 -29°00.1
20	$219^{\circ}06.2$	91°55.9 44.0	84°22.4 24.8	244°43.3 41.9	264°02.4 46.6		255°08.5 -29°00.1   244°54.2 5°10.2
21	234°08.6	106°55.2 · · 43.3	99°23.3 · · 24.3	259°45.8 · · 41.9	279°05.0 · · 46.6		243°21.2 27°58.5
22 23	249°11.1 264°13.6	121°54.5 42.6 136°53.9 41.8	114°24.2 23.9 129°25.1 23.4	274°48.4 42.0 289°50.9 42.0	294°07.6 46.6 309°10.2 46.7		234°16.4 -59°34.8
			·				222°48.7 -43°31.2
Mer.p	ass.:05:26	v-0.7 d-0.7 m-3.8	v0.9 d-0.4 m1.8	v2.5 d-0.0 m-2.5	v2.6 d-0.0 m0.4		221°39.5 -69°48.4
							217°50.8 -8°45.1 207°37.7 11°51.9
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	_	193°44.9 61°38.5
0	279°16.0	151°53.2 N20°41.1	144°26.0 N18°23.0	304°53.5 \$11°42.0	324°12.8 \$17°46.7		182°28.0 14°27.3
1	294°18.5 309°20.9	166°52.5 40.4 181°51.8 39.7	159°26.9 22.6 174°27.8 22.1	319°56.0 42.1 334°58.5 42.1	339°15.4 46.8 354°18.0 46.8	Gienah 1	175°46.6 -17°39.7
2	309 20.9 324°23.4	196°51.1 · · 39.0	174°27.8 22.1 189°28.7 · · 21.7	334°58.5 42.1 350°01.1 · · 42.2	9°20.6 · · 46.9		173°03.2 -63°13.3
4	339°25.9	211°50.4 38.3	204°29.6 21.2	5°03.6 42.2	24°23.2 46.9	I .	171°54.8 -57°14.2 166°15.5 55°51.0
5	354°28.3	226°49.8 37.6	219°30.5 20.8	20°06.2 42.2	39°25.8 47.0		166°15.5 55°51.0 158°25.3 -11°16.3
6	9°30.8	241°49.1 N20°36.9	234°31.4 N18°20.3	35°08.7 \$11°42.3	54°28.4 <b>S</b> 17°47.0		152°54.2 49°12.7
7	24°33.3	256°48.4 36.2	249°32.3 19.9 264°33.2 19.4	50°11.2 42.3 65°13.8 42.4	69°31.0 47.0	Hadar 1	
8 9	39°35.7 54°38.2	271°47.7 35.4 286°47.0 · · 34.7	264°33.2 19.4 279°34.1 • 19.0	65°13.8 42.4 80°16.3 · · 42.4	84°33.6 47.1 99°36.2 · · 47.1		148°00.8 -36°28.6
10	69°40.7	301°46.4 34.0	294°35.0 18.5	95°18.9 42.4	114°38.9 47.2		145°50.4 19°04.5
11	84°43.1	316°45.7 33.3	309°35.9 18.1	110°21.4 42.5	129°41.5 47.2		139°43.8 -60°55.6 137°19.2 74°04.4
12	99°45.6	331°45.0 N20°32.6	324°36.8 N18°17.6	125°24.0 \$11°42.5	144°44.1 <b>S</b> 17°47.3		136°59.0 -16°07.8
13	114°48.1	346°44.3 31.9	339°37.7 17.2	140°26.5 42.6	159°46.7 47.3	I .	126°05.9 26°38.8
14 15	129°50.5 144°53.0	1°43.7 31.1 16°43.0 · · · 30.4	354°38.6 16.7 9°39.5 •• 16.3	155°29.0 42.6 170°31.6 · · 42.7	174°49.3 47.4 189°51.9 •• 47.4		112°19.0 -26°28.7
16	159°55.4	31°42.3 29.7	24°40.4 15.8	185°34.1 42.7	204°54.5 47.4		107°15.3 -69°04.0
17	$174^{\circ}57.9$	46°41.6 29.0	39°41.3 15.4	200°36.7 42.7	219°57.1 47.5		102°05.8 -15°45.0 96°13.9 -37°07.1
18	190°00.4	61°41.0 N20°28.2	54°42.2 N18°15.0	215°39.2 \$11°42.8	234°59.7 \$17°47.5	Rasalhague	96°00.9 12°32.8
19	205°02.8 220°05.3	76°40.3 27.5 91°39.6 26.8	69°43.1 14.5 84°44.0 14.1	230°41.8 42.8 245°44.3 42.9	250°02.3 47.6 265°04.9 47.6	Eltanin	90°43.0 51°29.2
20 21	235°07.8	106°38.9 · · 26.1	84°44.0 14.1 99°44.9 •• 13.6	260°46.8 · · 42.9	265°04.9 47.6 280°07.5 · · 47.7	Kaus Aust.	83°35.9 -34°22.4
22	250°10.2	121°38.3 25.3	114°45.8 13.2	275°49.4 43.0	295°10.1 47.7	_	80°34.7 38°48.2 75°51.0 -26°16.1
23	$265^{\circ}12.7$	136°37.6 24.6	129°46.7 12.7	290°51.9 43.0	310°12.7 47.8	Nunki Altair	62°02.4 8°55.5
Mer.p	pass.:05:22	v-0.7 d-0.7 m-3.8	v0.9 d-0.4 m1.8	v2.5 d-0.0 m-2.5	v2.6 d-0.0 m0.4	Peacock	53°09.8 -56°39.8
						Deneb	49°27.3 45°21.3
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif	33°41.4 9°58.3
0	280°15.2	151°36.9 N20°23.9	144°47.6 N18°12.3	305°54.5 \$11°43.0	325°15.3 \$17°47.8	Al Na'ir	27°36.3 -46°51.3   15°17.6 -29°30.4
1	$295^{\circ}17.6$	166°36.3 23.1	159°48.5 11.8	320°57.0 43.1	340°17.9 47.9	Fomalhaut Scheat	15°17.6 -29°30.4   13°47.8 28°11.7
2	310°20.1	181°35.6 22.4	174°49.4 11.4	335°59.6 43.1	355°20.5 47.9		13°32.6 15°19.1
3	325°22.5 340°25.0	196°34.9 · · 21.7 211°34.3 20.9	189°50.3 · · 10.9 204°51.2 10.5	351°02.1 · · 43.2 6°04.7 43.2	10°23.1 · · 47.9 25°25.7 48.0	Jun 30 Wed	SHA Mer.pass
4 5	340°25.0 355°27.5	211° 34.3 20.9 226° 33.6 20.2	204°51.2 10.5 219°52.1 10.0	6°04.7 43.2 21°07.2 43.3	40°28.3 48.0		233°52.8 13:52
6	10°29.9	241°32.9 N20°19.5	234°53.0 N18°09.6	36°09.8 S11°43.3	55°31.0 S17°48.1	Mars 2	225°47.5 14:23
7	$25^{\circ}32.4$	256°32.3 18.7	249°53.9 09.1	51°12.3 43.3	70°33.6 48.1		25°35.7 03:44
8	40°34.9	271°31.6 18.0	264°54.8 08.6	66°14.9 43.4	85°36.2 48.2	Saturn	44°53.5 02:27
9	55°37.3 70°39.8	286°30.9 · · 17.2 301°30.3 16.5	279°55.7 · · · 08.2 294°56.7	81°17.4 · · 43.4 96°20.0 43.5	100°38.8 · · 48.2 115°41.4 48.3	Jun 01 Thu	SHA Mer.pass
10 11	70 39.8 85°42.3	316°29.6 15.8	309°57.6 07.3	90 20.0 43.5 111°22.5 43.5	115 41.4 48.3 130°44.0 48.3		232°37.1 13:53
12	100°44.7	331°28.9 N20°15.0	324°58.5 N18°06.8	126°25.1 S11°43.6	145°46.6 S17°48.3		225°10.0 14:21
13	$115^{\circ}47.2$	346°28.3 14.3	339°59.4 06.4	141°27.6 43.6	160°49.2 48.4	Jupiter Saturn	25°37.4 03:40 44°56.8 02:23
14	130°49.7	1°27.6 13.5	355°00.3 05.9	156°30.2 43.7	175°51.8 48.4		
15 16	145°52.1 160°54.6	16°27.0 · · 12.8 31°26.3 12.0	$10^{\circ}01.2$ · · 05.5 $25^{\circ}02.1$ 05.0	171°32.7 · · 43.7 186°35.3       43.7	190°54.4 · · 48.5 205°57.0 48.5	Jun 02 Fri	SHA Mer.pass
16 17	160°54.6 175°57.0	31°26.3 12.0 46°25.6 11.3	25°02.1 05.0 40°03.0 04.6	201°37.8 43.8	205°57.0 48.5 220°59.6 48.6		231°21.8 13:54 224°32.5 14:20
18	190°59.5	61°25.0 N20°10.5	55°03.9 N18°04.1	216°40.4 S11°43.8	236°02.2 S17°48.6		25°39.3 03:36
19	$206^{\circ}02.0$	76°24.3 09.8	70°04.8 03.7	231°42.9 43.9	251°04.8 48.7	Saturn	45°00.2 02:19
20	221°04.4	91°23.7 09.0	85°05.7 03.2	246°45.5 43.9	266°07.4 48.7	Uori-ont-l	
21 22	236°06.9 251°09.4	106°23.0 · · 08.3 121°22.3 07.5	100°06.6 · · 02.8 115°07.5 02.3	261°48.0 · · 44.0 276°50.6 44.0	281°10.1 · · 48.8 296°12.7 48.8	Horizontal	Venus: 0.1
23	266°11.8	136°21.7 06.8	130°08.4 01.8	270 50.0 44.0 291°53.1 44.1	311°15.3 48.8		Mars: 0.1
ivier.p	bass.:05:18	v-0.7 d-0.7 m-3.8	v0.9 d-0.5 m1.8	v2.5 d-0.0 m-2.5	v2.6 d-0.0 m0.4		

Su	Sun			Moon		
GHA	GHA Dec	GHA	ν	Dec	d	HP
179°05.6		288° 35.5	13.5'	\$10°05.6	12.9'	56.5
194°05.5		303°08.1	13.6'	09°52.6	13.0'	56.5'
209°05.4	209°05.4 09.8	317°40.7	13.7'	09°39.7	13.0'	56.5'
224°05.2	224°05.2 · · 09.6	332°13.5	13.8'	09°26.7	13.0'	56.4'
239°05.1	239°05.1 09.5	346°46.3	13.8'	$09^{\circ}13.6$	13.0'	56.4'
254°05.0	254°05.0 09.3	1°19.2	13.9'	09°00.6	13.1'	56.3'
269°04.9		15°52.1	14.0'	S08°47.5	13.1'	56.3'
284°04.8		30°25.1	14.1'	08°34.4	13.1'	56.3'
299°04.6		44°58.2	14.1'	08°21.3	13.1'	56.2'
314°04.5		59°31.4	14.2'	08°08.2	13.1'	56.2'
329°04.4		74°04.7	14.3'	07°55.0	13.2'	56.2'
344°04.3		88°38.0	14.3'	07°41.9	13.2'	56.1'
359°04.1		103°11.3	14.4'	S07°28.7	13.2'	56.1'
14°04.0		117°44.8	14.5'	07°15.5	13.2'	56.1'
29°03.9 44°03.8		132°18.3 146°51.8	14.5' 14.6'	07°02.3 06°49.0	13.2' 13.2'	56.1' 56.0'
59°03.7		140 51.6 161°25.4	14.6'	06°35.8	13.2'	56.0'
74°03.5		101 25.4 175°59.1	14.7	06°22.5	13.2	56.0'
89°03.4		175 39.1 190°32.8	14.8'	506°09.3	13.3'	55.9'
104°03.3		205°06.6	14.8'	05°56.0	13.3'	55.9'
119°03.2		219°40.5	14.9'	05°42.7	13.3'	55.9'
134°03.1		234°14.4	14.9'	05°29.4	13.3'	55.8'
149°02.9		248°48.4	15.0'	05°16.1	13.3'	55.8'
164°02.8		263°22.4	15.0'	05°02.8	13.3'	55.8'
					0	•
SD.=15.7	SD.=15.7 d=-0.2		S.	D.=15.3		
GHA	GHA Dec	GHA	ν	Dec	d	HP
179°02.7		277°56.4	15.1'	S04°49.5	13.3'	55.7'
194°02.6		292°30.5	15.1'	04°36.2	13.3'	55.7'
209°02.5		307°04.7	15.2'	04°22.9	13.3'	55.7'
224°02.3		321°38.9	15.2'	04°09.5	13.3'	55.7'
239°02.2		336°13.2	15.3'	03°56.2	13.3'	55.6'
254°02.1	254°02.1 05.4	350°47.5	15.3'	03°42.9	13.3'	55.6'
269°02.0	269°02.0 N23°05.2	5°21.8	15.4'	S03°29.5	13.3'	55.6'
284°01.9	284°01.9 05.1	19°56.2	15.4'	03°16.2	13.3'	55.5'
299°01.7	299°01.7 04.9	34°30.6	15.4'	03°02.9	13.3'	55.5'
314°01.6	314°01.6 · · 04.7	49°05.1	15.5'	02°49.5	13.3'	55.5'
329°01.5		63°39.6	15.5'	02°36.2	13.3'	55.5'
344°01.4		78°14.1	15.6'	02°22.9	13.3'	55.4'
359°01.3		92°48.7	15.6'	502°09.6	13.3'	55.4'
14°01.1		107°23.3	15.6'	01°56.3	13.3'	55.4'
29°01.0		121°58.0	15.7'	01°42.9	13.3'	55.3'
44°00.9		136°32.6	15.7'	01°29.6	13.3'	55.3'
59°00.8		151°07.4	15.7'	01°16.3	13.3'	55.3'
74°00.7 89°00.5		165°42.1 180°16.9	15.8'	01°03.0 S00°49.8	13.3'	55.3'
104°00.4		180 16.9 194°51.7	15.8' 15.8'	00°36.5	13.3' 13.3'	55.2' 55.2'
				00°30.5		
119°00.3 134°00.2		209°26.5 224°01.4	15.8' 15.9'	500°10.0	13.3' 13.2'	55.2' 55.2'
149°00.1		238°36.3	15.9'	N00°03.3	13.2'	55.1'
163°59.9		253°11.2	15.9'	00°16.5	13.2'	55.1'
SD.=15.7	SD.=15.7 d=-0.2	_		D.=15.1		
30.—13.7	5D.—15.7 u—-0.2		٥.	D.—13.1		
GHA	GHA Dec	GHA	$\nu$	Dec	d	HP
178°59.8		267°46.1	15.9'	N00°29.7	13.2'	55.1'
193°59.7		282°21.0	16.0'	00°42.9	13.2'	55.1'
208°59.6	208°59.6 01.7	296°56.0	16.0'	$00^{\circ}56.1$	13.2'	55.0'
223°59.5		$311^{\circ}31.0$	16.0'	$01^{\circ}09.3$	13.2'	55.0'
238°59.4		$326^{\circ}06.0$	16.0'	$01^{\circ}22.4$	13.2'	55.0'
253°59.2		340°41.0	16.0'	01°35.6	13.1'	55.0'
268°59.1		355°16.1	16.1'	N01°48.7	13.1'	55.0'
283°59.0		9°51.1	16.1'	02°01.8	13.1'	54.9'
298°58.9		24°26.2	16.1'	02°14.9	13.1'	54.9'
313°58.8		39°01.3	16.1'	02°28.0	13.1'	54.9'
328°58.7		53°36.4	16.1'	02°41.1	13.0'	54.9'
343°58.5		68°11.5 82°46.6	16.1'	02°54.1	13.0'	54.9'
358°58.4 13°58.3		82°46.6 97°21.7	16.1' 16.1'	N03°07.1 03°20.1	13.0' 13.0'	54.8' 54.8'
13 58.3 28°58.2		97 21.7 111°56.9	16.1	03°20.1	13.0'	54.8'
43°58.1		111 50.9 126°32.0	16.1	03°46.0	12.9'	54.8'
58°58.0		141°07.2	16.1	03°58.9	12.9'	54.8'
73°57.8		155°42.3	16.1	04°11.8	12.9'	54.7'
88°57.7		170°17.5	16.2'	N04°24.7	12.9'	54.7'
103°57.6		184°52.6	16.2'	04°37.6	12.8'	54.7'
118°57.5		199°27.8	16.2'	04°50.4	12.8'	54.7'
133°57.4	133°57.4 · · 58.0	214°02.9	16.2'	05°03.2	12.8'	54.7'
148°57.3		228°38.1	16.2'	$05^{\circ}16.0$	12.8'	54.6'
163°57.1	163°57.1 57.6	243°13.2	16.1'	05°28.7	12.7'	54.6'
SD.=15.7	SD.=15.7 d=-0.2		S.	D.=14.9		
133° 148° 163°	133° 148° 163°	57.4 · · 58.0 57.3 57.8 57.1 57.6	57.4     · · 58.0     214°02.9       57.3     57.8     228°38.1       57.1     57.6     243°13.2	57.4     · · 58.0     214°02.9     16.2'       57.3     57.8     228°38.1     16.2'       57.1     57.6     243°13.2     16.1'	57.4       · · 58.0       214°02.9       16.2'       05°03.2         57.3       57.8       228°38.1       16.2'       05°16.0         57.1       57.6       243°13.2       16.1'       05°28.7	57.4     · · 58.0     214°02.9     16.2'     05°03.2     12.8'       57.3     57.8     228°38.1     16.2'     05°16.0     12.8'       57.1     57.6     243°13.2     16.1'     05°28.7     12.7'

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

Lat.		Moonrise	9		Moonset	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°	00:59	00:29	00:04 23:39	09:17	11:18	13:11
<b>N</b> 70°	00:44	00:23	00:05 23:47	09:30	11:21	13:07
68°	00:31	00:17	00:05 23:53	09:41	11:24	13:03
66°	00:21	00:13	00:05 23:58	09:49	11:26	13:00
64°	00:12	00:09	00:06	09:56	11:28	12:57
62°	00:05	00:06	00:06	10:02	11:30	12:55
60°	-:-	00:03	00:06	10:07	11:31	12:53
N 58°	-:-	00:00	00:07	10:12	11:33	12:51
56°	23:58	-:-	00:07	10:16	11:34	12:49
54°	23:56	-:-	00:07	10:20	11:35	12:48
52°	23:54	-:-	00:07	10:23	11:36	12:46
50°	23:52	-:-	00:07	10:26	11:37	12:45
45°	23:48	-:-	80:00	10:33	11:39	12:43
<b>N</b> 40°	23:45	-:-	00:08	10:38	11:40	12:40
35°	23:42	-:-	80:00	10:42	11:41	12:39
30°	23:40	-:-	80:00	10:47	11:43	12:37
20°	23:35	-:-	00:09	10:53	11:45	12:34
N 10°	23:31	-:-	00:09	11:00	11:46	12:32
0°	23:28	-:-	00:10	11:05	11:48	12:29
<b>S</b> 10°	23:24	-:-	00:10	11:11	11:50	12:27
20°	23:20	-:-	00:10	11:17	11:51	12:24
30°	23:16	-:-	00:11	11:23	11:53	12:22
35°	23:13	-:-	00:11	11:27	11:54	12:20
40°	23:11	-:-	00:12	11:31	11:55	12:18
45°	23:07	-:-	00:12	11:36	11:57	12:16
<b>S</b> 50°	23:03	-:-	00:12	11:42	11:58	12:14
52°	23:01	-:-	00:13	11:45	11:59	12:12
54°	22:59	-:-	00:13	11:48	12:00	12:11
56°	22:57	-:-	00:13	11:51	12:01	12:10
58°	22:55	-:-	00:14	11:55	12:02	12:08
<b>S</b> 60°	22:52	-:-	00:14	11:59	12:03	12:06

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	20-22	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	64-44%	
30	03:38	03:43	12:04	04:55	17:17		
01	03:49	03:55	12:04	05:38	17:59		
02	04:01	04:06	12:04	06:19	18:40		