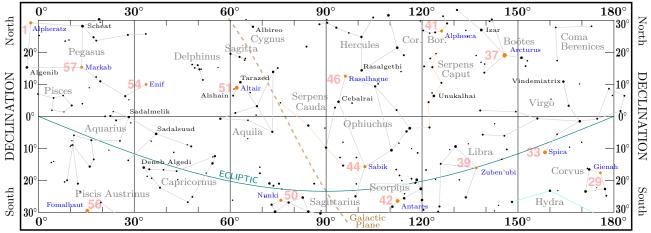
GENERATED USING SKYFIELD

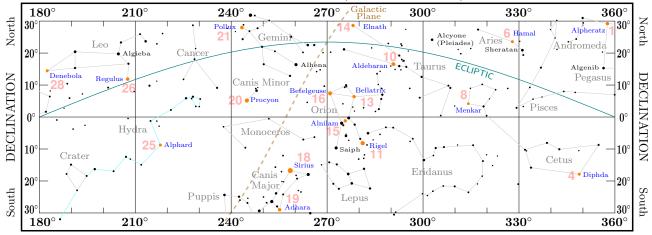
http://rhodesmill.org/skyfield/

EQUATORIAL STARS (SHA 0° to 180°)



SIDEREAL HOUR ANGLE

EQUATORIAL STARS (SHA 180° to 360°)



SIDEREAL HOUR ANGLE

THE NAUTICAL ALMANAC

from 8.7.2020

Author: Andrew Bauer
Original concept from: Enno Rodegerdts

June 3, 2020

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6 18°37.1 310°24.8 N17°23.3 10°44.1 S00°15.1 83°52.8 S21°48.8 76°59.4 S20°28.8 7 33°39.6 325°26.0 23.5 25°45.3 14.6 98°55.6 48.8 92°02.1 28.9 8 48°42.0 340°27.3 23.6 40°46.4 14.1 113°58.4 48.9 107°04.7 28.9 9 63°44.5 355°28.5 · 23.7 55°47.6 · · 13.6 129°01.2 · · 48.9 122°07.4 · · · 29.0 10 78°47.0 10°29.7 23.9 70°48.7 13.1 144°04.0 49.0 137°10.0 29.0 11 93°49.4 25°30.9 24.0 85°49.9 12.6 159°06.8 49.1 152°12.7 29.0 12 108°51.9 40°32.1 N17°24.2 100°51.0 S00°12.1 174°09.6 S21°49.1 167°15.3 S20°29.1 14 138°56.8 70°34.5 24.4 130°53.3 11.1 204°15.2 49.2 197°20.6 29.2 15 153°59.3 85°35.7 · · · · 24.6 145°54.5 · · · 10.6 219°18.0 · · · 49.3 212°23.3 · · · · 29.2 15 153°59.3 85°35.7 · · · · 24.6 145°54.5 · · · 10.6 219°18.0 · · · 49.3 212°23.3 · · · · 29.2 16 169°01.8 100°36.9 24.7 160°55.6 10.1 234°20.8 49.4 227°25.9 29.2 17 184°04.2 115°38.1 24.9 175°56.8 09.6 249°23.6 49.4 242°28.6 29.3 18 199°06.7 130°39.3 N17°25.0 190°57.9 S00°09.1 264°26.4 S21°49.5 257°31.2 S20°29.3 19 214°09.1 145°40.5 25.1 205°59.1 08.6 279°29.2 49.5 272°33.9 29.4 22°21.1 244°14.1 175°42.8 · · · 25.4 236°01.4 · · · 07.6 309°34.8 · · · 49.6 302°39.2 · · · 29.5 190°44.0 25.6 251°02.5 07.1 324°37.6 49.7 317°41.8 29.5 10.2 10.2 10.2 10.2 10.2 10.2 10.2 10.2										!		Mer.pass
7 33°39.6 325°26.0 23.5 25°45.3 14.6 98°55.6 48.8 92°02.1 28.9 8 48°42.0 340°27.3 23.6 40°46.4 14.1 113°58.4 48.9 107°04.7 28.9 9 63°44.5 355°28.5 · 23.7 55°47.6 · 13.6 129°01.2 · 48.9 122°07.4 · · 29.0 10 78°47.0 10°29.7 23.9 70°48.7 13.1 144°04.0 49.0 137°10.0 29.0 11 93°49.4 25°30.9 24.0 85°49.9 12.6 159°06.8 49.1 152°12.7 29.0 12 108°51.9 40°32.1 N17°24.2 100°51.0 500°12.1 174°09.6 521°49.1 167°15.3 \$20°29.1 13 123°54.4 55°33.3 24.3 115°52.2 11.6 189°12.4 49.2 182°18.0 29.1 14 138°56.8 70°34.5 24.4 130°53.3 11.1 204°15.2 49.2 197°20.6 29.2 15 153°59.3 85°35.7 · · 24.6 145°54.5 · · 10.6 219°18.0 · · 49.3 212°23.3 · · 29.2 15 153°59.3 85°35.7 · · 24.6 145°54.5 · · 10.6 219°18.0 · · 49.3 212°23.3 · · 29.2 16 169°01.8 100°36.9 24.7 160°55.6 10.1 234°20.8 49.4 227°25.9 29.2 17 184°04.2 115°38.1 24.9 175°56.8 09.6 249°23.6 49.4 242°28.6 29.3 19 214°09.1 145°40.5 25.1 205°59.1 08.6 279°29.2 49.5 272°33.9 29.4 20 229°11.6 160°41.6 25.3 221°00.2 08.1 294°32.0 49.6 287°36.5 29.4 21 244°14.1 175°42.8 · · 25.4 236°01.4 · · 07.6 309°34.8 · · 49.6 302°39.2 · · 29.5 190°44.0 25.6 251°02.5 07.1 324°37.6 49.7 317°41.8 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5												09:22
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9 63°44.5 355°28.5 · · 23.7 55°47.6 · · · 13.6 129°01.2 · · · 48.9 122°07.4 · · · 29.0 10 78°47.0 10°29.7 23.9 70°48.7 13.1 144°04.0 49.0 137°10.0 29.0 11 93°49.4 25°30.9 24.0 85°49.9 12.6 159°06.8 49.1 152°12.7 29.0 12 108°51.9 40°32.1 N17°24.2 100°51.0 S00°12.1 174°09.6 S21°49.1 167°15.3 S20°29.1 13 123°54.4 55°33.3 24.3 115°52.2 11.6 189°12.4 49.2 182°18.0 29.1 14 138°56.8 70°34.5 24.4 130°53.3 11.1 204°15.2 49.2 197°20.6 29.2 15 153°59.3 85°35.7 · · · · · 24.6 145°54.5 · · · 10.6 219°18.0 · · · 49.3 212°23.3 · · · 29.2 16 169°01.8 100°36.9 24.7 160°55.6 10.1 234°20.8 49.4 227°25.9 29.2 17 184°04.2 115°38.1 24.9 175°56.8 09.6 249°23.6 49.4 242°28.6 29.3 199°06.7 130°39.3 N17°25.0 190°57.9 S00°09.1 264°26.4 S21°49.5 257°31.2 S20°29.3 191etr 65°13.6 00: 229°11.6 160°41.6 25.3 221°00.2 08.1 294°32.0 49.6 287°36.5 29.4 21 244°14.1 175°42.8 · · · 25.4 236°01.4 · · · 07.6 309°34.8 · · · 49.6 287°36.5 29.4 29.5 259°16.5 190°44.0 25.6 251°02.5 07.1 324°37.6 49.7 317°41.8 29.5 14 10°20.1 1												00:34
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12 108°51.9										Venus		09:20
13 123°54.4 55°33.3 24.3 115°52.2 11.6 189°12.4 49.2 182°18.0 29.1 14 138°56.8 70°34.5 24.4 130°53.3 11.1 204°15.2 49.2 197°20.6 29.2 15 153°59.3 85°35.7 · · · 24.6 145°54.5 · · · 10.6 219°18.0 · · · 49.3 212°23.3 · · · 29.2 160°01.8 100°36.9 24.7 160°55.6 10.1 234°20.8 49.4 227°25.9 29.2 17 184°04.2 115°38.1 24.9 175°56.8 09.6 249°23.6 49.4 242°28.6 29.3 18 199°06.7 130°39.3 N17°25.0 190°57.9 500°09.1 264°26.4 \$21°49.5 257°31.2 \$20°29.3 Jupiter 65°13.6 00:										!		05:19
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15 153°59.3 85°35.7 · · · 24.6 145°54.5 · · · 10.6 219°18.0 · · · 49.3 212°23.3 · · · 29.2 16 169°01.8 100°36.9 24.7 160°55.6 10.1 234°20.8 49.4 227°25.9 29.2 17 184°04.2 115°38.1 24.9 175°56.8 09.6 249°23.6 49.4 242°28.6 29.3 18 199°06.7 130°39.3 N17°25.0 190°57.9 500°09.1 264°26.4 521°49.5 257°31.2 520°29.3 190°40.5 25.1 205°59.1 08.6 279°29.2 49.5 272°33.9 29.4 21 244°09.1 145°40.5 25.1 205°59.1 08.6 279°29.2 49.5 272°33.9 29.4 21 244°14.1 175°42.8 · · 25.4 236°01.4 · · · 07.6 309°34.8 · · · 49.6 302°39.2 · · · 29.5 29.5 29.6 29.6 29.6 29.6 29.6 29.6 29.6 29.6										Saturn	58°16.7	00:57
16 169°01.8 100°36.9 24.7 160°55.6 10.1 234°20.8 49.4 227°25.9 29.2 Venus 291°55.1 09: 17 184°04.2 115°38.1 24.9 175°56.8 09.6 249°23.6 49.4 242°28.6 29.3 Mars 352°14.9 05: 18 199°06.7 130°39.3 N17°25.0 190°57.9 500°09.1 264°26.4 \$21°49.5 257°31.2 \$20°29.3 Jupiter 65°13.6 00: 19 214°09.1 145°40.5 25.1 205°59.1 08.6 279°29.2 49.5 272°33.9 29.4 Saturn 58°21.2 00: 20 229°11.6 160°41.6 25.3 221°00.2 08.1 294°32.0 49.6 287°36.5 29.4 29.4 224°14.1 175°42.8 25.4 236°01.4 07.6 309°34.8 49.6 302°39.2 29.5 49.7 49.7 49.7 49.7 49.7 49.7 49.7 49.7 49.7 49.7 49.7 49.7 49.7 49.7 49.7 49.7 49.7 49.7 <										Jul 10 Fri	SHA	Mer.pass
17 184°04.2 115°38.1 24.9 175°56.8 09.6 249°23.6 49.4 242°28.6 29.3 Mars 352°14.9 05: 18 199°06.7 130°39.3 N17°25.0 190°57.9 S00°09.1 264°26.4 S21°49.5 257°31.2 S20°29.3 Jupiter 65°13.6 00: 19 214°09.1 145°40.5 25.1 205°59.1 08.6 279°29.2 49.5 272°33.9 29.4 20 229°11.6 160°41.6 25.3 221°00.2 08.1 294°32.0 49.6 287°36.5 29.4 21 244°14.1 175°42.8 · · 25.4 236°01.4 · · 07.6 309°34.8 · · 49.6 302°39.2 · · 29.5 22 259°16.5 190°44.0 25.6 251°02.5 07.1 324°37.6 49.7 317°41.8 29.5 Venus: 0.3 23 274°19.0 205°45.2 25.7 266°03.7 06.6 339°40.4 49.8 332°44.5 29.5 Mars: 0.2								227°25.9				09:18
18 199°06.7 130°39.3 N17°25.0 190°57.9 S00°09.1 264°26.4 S21°49.5 257°31.2 S20°29.3 Jupiter 65°13.6 00: 19 214°09.1 145°40.5 25.1 205°59.1 08.6 279°29.2 49.5 272°33.9 29.4 20 229°11.6 160°41.6 25.3 221°00.2 08.1 294°32.0 49.6 287°36.5 29.4 21 244°14.1 175°42.8 · · 25.4 236°01.4 · · 07.6 309°34.8 · · 49.6 302°39.2 · · 29.5 22 259°16.5 190°44.0 25.6 251°02.5 07.1 324°37.6 49.7 317°41.8 29.5 23 274°19.0 205°45.2 25.7 266°03.7 06.6 339°40.4 49.8 332°44.5 29.5 Mars: 0.2										!		05:17
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21 244°14.1 175°42.8 ··· 25.4 236°01.4 ··· 07.6 309°34.8 ··· 49.6 302°39.2 ··· 29.5 Horizontal parallax 22 259°16.5 190°44.0 25.6 251°02.5 07.1 324°37.6 49.7 317°41.8 29.5 23 274°19.0 205°45.2 25.7 266°03.7 06.6 339°40.4 49.8 332°44.5 29.5 Mars: 0.2												
23 274°19.0 205°45.2 25.7 266°03.7 06.6 339°40.4 49.8 332°44.5 29.5 Mars: 0.2		$244^{\circ}14.1$	175°42.8 · ·	5.4 236°01.4	• • 07.6	309°34.8	• • 49.6	302°39.2	• • 29.5	Horizo	•	
25 211 15.0 205 15.2 25.1 200 05.1 05.0 355 10.1 15.0 352 11.5 25.5												
Mer.pass.:04:46 v1.2 d0.1 m-4.5 v1.1 d0.5 m-0.7 v2.8 d-0.1 m-2.6 v2.7 d-0.0 m0.1	23	274°19.0	205°45.2	25.7 266°03.7	06.6	339°40.4	49.8	332°44.5	29.5		Mars:	0.2
	Merr	ass ·04·46	v1 2 d0 1 m-4	5 v1 1 dr) 5 m-0 7	V2 8 4-U) 1 m-2 6	v2 7 d-0) 0 m0 1			

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°43.3	N22°26.5	322°11.8	11.2'	\$18°34.0	8.5'	56.0'
1	193°43.2	26.2	$336^{\circ}42.1$	11.3'	18°25.4	8.6'	56.0'
2	208°43.1	25.9	351°12.4	11.4'	18°16.7	8.7'	56.0'
3	223°43.0	• • 25.6	5°42.8	11.4'	18°08.0	8.8'	55.9'
4	238°43.0	25.3	20°13.3	11.5'	17°59.2	8.9'	55.9'
5	253°42.9 268°42.8	25.1 N22°24.8	34°43.9 49°14.5	11.6' 11.7'	17°50.3 \$17°41.3	8.9' 9.0'	55.9' 55.8'
6 7	208 42.8 283°42.7	24.5	49 14.5 63°45.3	11.7	17°32.2	9.0	55.8'
8	203°42.7 298°42.6	24.2	78°16.1	11.9'	17°23.1	9.2'	55.8'
9	313°42.5	23.9	92°47.0	12.0'	17°13.9	9.2'	55.8'
10	328°42.4	23.6	107°18.0	12.0'	17°04.6	9.3'	55.7'
11	343°42.3	23.3	$121^{\circ}49.1$	12.1'	$16^{\circ}55.3$	9.4'	55.7'
12	358°42.2	N22°23.0	136°20.2	12.2'	S16°45.9	9.5'	55.7'
13	13°42.1	22.7	150°51.5	12.3'	16°36.4	9.5'	55.7'
14 15	28°42.0 43°41.9	22.4 •• 22.1	165°22.8 179°54.2	12.4'	16°26.8 16°17.2	9.6' 9.7'	55.6'
16	43 41.9 58°41.8	21.8	179 54.2 194°25.7	12.5' 12.5'	16 17.2 16°07.5	9.7 9.7'	55.6' 55.6'
17	73°41.7	21.5	208°57.3	12.6'	15°57.7	9.8'	55.6'
18	88°41.6	N22°21.2	223°28.9	12.7'	S15°47.9	9.9'	55.5'
19	103°41.6	20.9	238°00.7	12.8'	15°38.0	9.9'	55.5'
20	118°41.5	20.6	252°32.5	12.8'	15°28.1	10.0'	55.5'
21	133°41.4	• • 20.3	267°04.4	12.9'	15°18.1	10.0'	55.5'
22	148°41.3	20.0	281°36.3	13.0'	15°08.0	10.1'	55.5'
23	163°41.2	19.7	296°08.4	13.1'	14°57.9	10.2'	55.4'
	SD.=15.7	d=-0.3		S.	D.=15.2		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°41.1	N22°19.4	310°40.5	13.2'	\$14°47.7	10.2	55.4'
1	193°41.0	19.1	325°12.7	13.2'	14°37.5	10.3	55.4'
2	208°40.9	18.8	339°45.0	13.3'	14°27.2	10.3'	55.4'
3	223°40.8	• • 18.5	354°17.3	13.4'	14°16.9	10.4'	55.3'
4	238°40.7	18.2	8°49.7	13.5'	14°06.5	10.4'	55.3'
5	253°40.6	17.9	23°22.2	13.5'	13°56.0	10.5	55.3'
6	268°40.6 283°40.5	N22°17.6 17.3	37°54.8 52°27.4	13.6' 13.7'	\$13°45.5 13°34.9	10.5' 10.6'	55.3' 55.2'
7 8	283 40.5 298°40.4	16.9	52 27.4 67°00.1	13.7'	13 34.9 13°24.3	10.6	55.2'
9	313°40.3	. 16.6	81°32.9	13.8'	13°13.7	10.7	55.2'
10	328°40.2	16.3	96°05.7	13.9'	13°03.0	10.7	55.2'
11	343°40.1	16.0	110°38.6	13.9'	12°52.2	10.8'	55.2'
12	358°40.0	N22°15.7	125°11.6	14.0'	S12°41.4	10.8'	55.1'
13	13°39.9	15.4	139°44.6	14.1'	12°30.6	10.9'	55.1'
14	28°39.8	15.1	154°17.8	14.1'	12°19.7	10.9'	55.1'
15	43°39.8	• • 14.8	168°50.9	14.2'	12°08.8	10.9'	55.1'
16 17	58°39.7 73°39.6	14.5 14.1	183°24.2 197°57.5	14.3' 14.3'	11°57.8 11°46.8	11.0' 11.0'	55.1' 55.0'
18	88°39.5	N22°13.8	212°30.8	14.4	\$11°35.8	11.1'	55.0'
19	103°39.4	13.5	227°04.3	14.5'	11°24.7	11.1'	55.0'
20	118°39.3	13.2	241°37.8	14.5'	11°13.5	11.1'	55.0'
21	133°39.2	• • 12.9	$256^{\circ}11.3$	14.6'	11°02.4	11.2'	55.0'
22	$148^{\circ}39.1$	12.6	270°44.9	14.6'	10°51.2	11.2'	54.9'
23	163°39.1	12.2	285°18.6	14.7'	10°39.9	11.3'	54.9'
	SD.=15.7	d=-0.3		S.	D.=15.0		
Fri	GHA	Dec	GHA	ν	Dec	d	НР
6 0	178°39.0	Dec N22°11.9	299°52.3	u 14.8'	S10°28.6	a 11.3'	пР 54.9'
1	193°38.9	11.6	314°26.1	14.8'	10°17.3	11.3'	54.9'
2	208°38.8	11.3	$328^{\circ}59.9$	14.9'	10°06.0	11.4'	54.9'
3	223°38.7	• • 11.0	343°33.8	14.9'	09°54.6	11.4'	54.8'
4	238°38.6	10.6	358°07.7	15.0'	09°43.2	11.4'	54.8'
5	253°38.5	10.3	12°41.7 27°15.8	15.0'	09°31.8	11.5'	54.8'
6 7	268°38.5 283°38.4	N22°10.0 09.7	27°15.8 41°49.9	15.1' 15.1'	\$09°20.3 09°08.8	11.5' 11.5'	54.8' 54.8'
8	283°38.4 298°38.3	09.7 09.3	41°49.9 56°24.0	15.1 15.2'	09°08.8 08°57.3	11.5'	54.8'
9	313°38.2	• • 09.0	70°58.2	15.2'	08°45.7	11.6'	54.7'
10	328°38.1	08.7	85°32.5	15.3'	08°34.1	11.6'	54.7'
11	343°38.0	08.4	$100^{\circ}06.8$	15.3'	$08^{\circ}22.5$	11.6'	54.7'
12	358°37.9	N22°08.0	114°41.1	15.4'	S08°10.9	11.6'	54.7'
13	13°37.9	07.7	129°15.5	15.4'	07°59.2	11.7'	54.7'
14	28°37.8	07.4	143°49.9	15.5'	07°47.5	11.7'	54.7'
15 16	43°37.7 58°37.6	· · 07.0 06.7	158°24.4 172°58.9	15.5' 15.5'	07°35.8 07°24.1	11.7' 11.7'	54.6' 54.6'
16 17	58 37.0 73°37.5	06.7	172 58.9 187°33.5	15.5' 15.6'	07 24.1 07°12.3	11.7	54.6'
18	88°37.4	N22°06.1	202°08.1	15.6'	507°00.6	11.8'	54.6'
19	103°37.4	05.7	216°42.7	15.7'	06°48.8	11.8'	54.6'
20	118°37.3	05.4	231°17.4	15.7'	06°36.9	11.8'	54.6'
21	133°37.2	•• 05.1	245°52.1	15.7'	06°25.1	11.8'	54.6'
22	148°37.1	04.7	260°26.9	15.8'	06°13.3	11.9'	54.5'
23	163°37.0	04.4	275°01.6	15.8'	06°01.4	11.9'	54.5'
	SD.=15.7	d=-0.3		S.	D.=14.9		

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

Lat.		Moonrise	2		Moonset	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°		00:55	00:20 23:56		06:12	08:19
N 70°	01:01	00:25	00:04 23:48	04:27	06:41	08:33
68°	00:18	00:02 23:51	23:41	05:09	07:02	08:45
66°	23:44	23:40	23:35	05:37	07:19	08:54
64°	23:29	23:30	23:31	05:58	07:32	09:02
62°	23:17	23:23	23:26	06:15	07:44	09:08
60°	23:07	23:16	23:23	06:30	07:53	09:14
N 58°	22:57	23:10	23:19	06:42	08:02	09:19
56°	22:49	23:04	23:17	06:52	08:09	09:24
54°	22:42	22:59	23:14	07:01	08:16	09:28
52°	22:36	22:55	23:12	07:09	08:21	09:32
50°	22:30	22:51	23:09	07:17	08:27	09:35
45°	22:17	22:42	23:05	07:32	08:38	09:42
N 40°	22:07	22:35	23:01	07:45	08:47	09:48
35°	21:58	22:29	22:57	07:56	08:55	09:53
30°	21:50	22:23	22:54	08:05	09:02	09:57
20°	21:36	22:14	22:49	08:21	09:14	10:05
N 10°	21:24	22:05	22:44	08:35	09:25	10:12
0°	21:12	21:57	22:40	08:48	09:34	10:18
S 10°	21:01	21:49	22:35	09:01	09:44	10:24
20°	20:49	21:41	22:30	09:15	09:54	10:31
30°	20:35	21:31	22:25	09:30	10:06	10:38
35°	20:27	21:25	22:22	09:39	10:13	10:42
40°	20:17	21:19	22:18	09:50	10:20	10:47
45°	20:06	21:11	22:14	10:02	10:29	10:53
S 50°	19:53	21:02	22:09	10:16	10:40	10:59
52°	19:47	20:58	22:07	10:23	10:45	11:03
54°	19:40	20:53	22:04	10:31	10:50	11:06
56°	19:32	20:48	22:02	10:39	10:56	11:09
58°	19:24	20:42	21:59	10:48	11:03	11:14
S 60°	19:14	20:36	21:55	10:59	11:10	11:18

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.			
	00 ^h	12 ^h	Pass	Upper	Lower	Age	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm		
08	05:07	05:11	12:05	02:36	15:00	17(88%)	
09	05:16	05:20	12:05	03:24	15:46	18(81%)	
10	05:24	05:28	12:05	04:08	16:29	19(73%)	

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

h	Aries	Venus	Mars	Jupiter	Saturn	S	tars
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec		SHA Dec
0	289°21.5	220°46.3 N17°25.9	281°04.8	354°43.2 S 21°49.8	347°47.1 \$20°29.6		
1	304°23.9	235°47.5 26.0	296°06.0 05.6	9°46.0 49.9	2°49.8 29.6		57°38.3 29°12.0 53°10.7 -42°11.5
2	319°26.4	250°48.7 26.2	311°07.1 05.1	24°48.8 49.9	17°52.4 29.7		19°34.9 56°38.6
3	334°28.9	265°49.8 · · 26.3	326°08.3 · · 04.6	39°51.6 · · 50.0	32°55.1 · · 29.7		8°50.9 -17°52.4
4 5	349°31.3 4°33.8	280°51.0 26.5 295°52.2 26.6	341°09.4 04.1 356°10.6 03.6	54°54.4 50.1 69°57.2 50.1	47°57.7 29.7 63°00.4 29.8	Achernar 33	35°23.1 -57°07.8
6	19°36.3	310°53.3 N17°26.8	11°11.7 S00°03.1	85°00.0 S 21°50.2	78°03.0 \$20°29.8		27°55.3 23°33.3
7	34°38.7	325°54.5 26.9	26°12.9 02.6	100°02.8 50.2	93°05.7 29.9	1	.5°51.4 89°20.6 .5°14.8 -40°13.2
8	49°41.2	340°55.6 27.1	41°14.1 02.1	115°05.6 50.3	108°08.3 29.9		.5 14.8 -40 13.2 .4°10.1 4°10.1
9	64°43.6	355°56.8 · · 27.2	56°15.2 · · 01.6	130°08.5 · · 50.4	123°11.0 · · 30.0		18°33.6 49°55.7
10 11	79°46.1 94°48.6	10°57.9 27.4 25°59.1 27.5	71°16.4 01.1 86°17.5 00.6	145°11.3 50.4 160°14.1 50.5	138°13.6 30.0 153°16.3 30.0	l .	00°44.0 16°32.9
12	94 46.0 109°51.0	41°00.2 N17°27.7	101°18.7 S00°00.1	160°14.1 50.5 175°16.9 \$21°50.5	168°18.9 \$20°30.1	_	81°07.6 -8°10.7
13	124°53.5	56°01.4 27.8	116°19.9 N00°00.3	190°19.7 50.6	183°21.6 30.1		30°27.6 46°00.9 '8°27.1 6°22.0
14	$139^{\circ}56.0$	71°02.5 28.0	131°21.0 00.8	205°22.5 50.7	198°24.2 30.2		78°27.1 6°22.0 78°06.8 28°37.3
15	154°58.4	86°03.6 · · 28.1	146°22.2 · · 01.3	220°25.3 · · 50.7	213°26.9 · · 30.2	l .	75°41.7 -1°11.4
16 17	170°00.9 185°03.4	101°04.8 28.3 116°05.9 28.5	161°23.3 01.8 176°24.5 02.3	235°28.1 50.8 250°30.9 50.8	228°29.6 30.2 243°32.2 30.3	Betelgeuse 27	70°56.3 7°24.6
18	200°05.8	131°07.0 N17°28.6	191°25.7 N00°02.8	265°33.7 S21°50.9	258°34.9 S20°30.3		3°54.5 -52°42.4
19	215°08.3	146°08.1 28.8	206°26.8 03.3	280°36.5 50.9	273°37.5 30.4		58°29.8 -16°44.7 55°09.1 -29°00.0
20	$230^{\circ}10.8$	161°09.3 28.9	221°28.0 03.8	295°39.3 51.0	288°40.2 30.4		55°09.1 -29°00.0 4°55.0 5°10.4
21	245°13.2	176°10.4 · · 29.1	236°29.1 · · 04.3	310°42.1 · · 51.1	303°42.8 · · 30.4	,	3°22.1 27°58.6
22 23	260°15.7 275°18.1	191°11.5 29.2 206°12.6 29.4	251°30.3 04.8 266°31.5 05.3	325°44.9 51.1 340°47.7 51.2	318°45.5 30.5 333°48.1 30.5	Avior 23	34°16.7 -59°34.6
							2°49.3 -43°31.0
Mer.p	ass.:04:42	v1.2 d0.1 m-4.5	v1.2 d0.5 m-0.7	v2.8 d-0.1 m-2.6	v2.7 d-0.0 m0.1		21°39.6 -69°48.2
							.7°51.6 -8°44.8 07°38.6 11°52.2
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	1 .0	93°46.0 61°38.8
0	290°20.6	221°13.7 N17°29.6	281°32.6 N00°05.8	355°50.5 S21°51.2	348°50.8 \$20°30.6		32°28.8 14°27.7
1 2	305°23.1 320°25.5	236°14.8 29.7 251°15.9 29.9	296°33.8 06.3 311°35.0 06.8	10°53.3 51.3 25°56.1 51.4	3°53.4 30.6 18°56.1 30.7		′5°47.4 -17°39.3
3	335°28.0	266°17.1 · · 30.1	326°36.1 · · 07.3	40°58.9 · · 51.4	33°58.7 · · 30.7		'3°04.1 -63°12.9
4	350°30.5	281°18.2 30.2	341°37.3 07.7	56°01.7 51.5	49°01.4 30.7		71°55.6 -57°13.8 66°16.4 55°51.3
5	5°32.9	296°19.3 30.4	356°38.4 08.2	71°04.5 51.5	64°04.0 30.8		68°26.1 -11°16.0
6	20°35.4	311°20.4 N17°30.6	11°39.6 N00°08.7	86°07.3 S 21°51.6	79°06.7 \$20°30.8		52°54.9 49°13.1
7 8	35°37.9 50°40.3	326°21.4 30.7 341°22.5 30.9	26°40.8 09.2 41°41.9 09.7	101°10.2 51.7 116°13.0 51.7	94°09.3 30.9 109°12.0 30.9	Hadar 14	8°40.9 -60°28.4
9	65°42.8	356°23.6 · · 31.0	56°43.1 · · 10.2	116°13.0 51.7 131°15.8 · · 51.8	109°12.0 30.9 124°14.6 · · 30.9	l .	8°01.7 -36°28.3
10	80°45.2	11°24.7 31.2	71°44.3 10.7	146°18.6 51.8	139°17.3 31.0	l .	15°51.2 19°04.8 19°44.9 -60°55.3
11	95°47.7	26°25.8 31.4	86°45.4 11.2	161°21.4 51.9	154°19.9 31.0		37°19.5 74°04.7
12	110°50.2	41°26.9 N17°31.6	101°46.6 N00°11.7	176°24.2 \$21°52.0	169°22.6 \$20°31.1		36°59.9 -16°07.5
13 14	125°52.6 140°55.1	56°28.0 31.7 71°29.0 31.9	116°47.8 12.2 131°48.9 12.7	191°27.0 52.0 206°29.8 52.1	184°25.3 31.1 199°27.9 31.1	Alphecca 12	26°06.6 26°39.0
15	140 55.1 155°57.6	86°30.1 · · 32.1	146°50.1 · · 13.1	200 29.6 52.1 221°32.6 · · 52.1	214°30.6 · · 31.2		.2°20.0 -26°28.6
16	171°00.0	101°31.2 32.2	161°51.3 13.6	236°35.4 52.2	229°33.2 31.2		07°16.9 -69°03.9 02°06.6 -15°44.9
17	$186^{\circ}02.5$	116°32.3 32.4	176°52.5 14.1	251°38.2 52.2	244°35.9 31.3		02°06.6 -15°44.9 06°14.9 -37°07.0
18	201°05.0	131°33.3 N17°32.6	191°53.6 N00°14.6	266°41.0 S21°52.3	259°38.5 \$20°31.3		06°01.6 12°32.9
19	216°07.4	146°34.4 32.7 161°35.5 32.9	206°54.8 15.1	281°43.8 52.4	274°41.2 31.4		00°43.4 51°29.3
20 21	231°09.9 246°12.4	161°35.5 32.9 176°36.5 · · 33.1	221°56.0 15.6 236°57.1 · · 16.1	296°46.6 52.4 311°49.4 • 52.5	289°43.8 31.4 304°46.5 · · 31.4	1	33°36.9 -34°22.4
22	261°14.8	191°37.6 33.3	251°58.3 16.6	326°52.2 52.5	319°49.1 31.5	_	30°35.2 38°48.3
23	$276^{\circ}17.3$	206°38.6 33.4	266°59.5 17.1	341°55.0 52.6	334°51.8 31.5		75°51.9 -26°16.2 52°03.1 8°55.4
Mer n	ass.:04:38	v1.1 d0.2 m-4.5	v1.2 d0.5 m-0.7	v2.8 d-0.1 m-2.6	v2.7 d-0.0 m0.1		63°10.9 -56°40.0
						Deneb 4	9°27.7 45°21.1
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	l .	3°42.1 9°58.1
0	291°19.7	221°39.7 N17°33.6	282°00.7 N00°17.5	356°57.8 S 21°52.7	349°54.4 \$20°31.6		.7°37.2 -46°51.5 .5°18.3 -29°30.7
1	306°22.2	236°40.7 33.8	297°01.8 18.0	12°00.6 52.7	4°57.1 31.6		.3°48.4 28°11.5
2	321°24.7	251°41.8 34.0	312°03.0 18.5	27°03.4 52.8	19°59.7 31.6		3°33.3 15°18.8
3	336°27.1 351°29.6	266°42.8 · · 34.1	327°04.2 · · 19.0	42°06.3 · · 52.8	35°02.4 · · 31.7		SHA Mer.pass
4 5	351°29.6 6°32.1	281°43.9 34.3 296°44.9 34.5	342°05.4 19.5 357°06.5 20.0	57°09.1 52.9 72°11.9 52.9	50°05.1 31.7 65°07.7 31.8		01°24.9 09:16
6	21°34.5	311°46.0 N17°34.7	12°07.7 N00°20.5	87°14.7 S21°53.0	80°10.4 S 20°31.8		51°43.4 05:15
7	36°37.0	326°47.0 34.9	27°08.9 21.0	102°17.5 53.1	95°13.0 31.9		55°21.7 00:21
8	51°39.5	341°48.0 35.0	42°10.1 21.4	117°20.3 53.1	110°15.7 31.9	Saturn 5	68°25.7 00:49
9	66°41.9	356°49.1 · · 35.2	57°11.2 · · 21.9	132°23.1 · · 53.2	125°18.3 · · 31.9	Jul 12 Sun	SHA Mer.pass
10	81°44.4 96°46.8	11°50.1 35.4 26°51.1 35.6	72°12.4 22.4 87°13.6 22.9	147°25.9 53.2 162°28.7 53.3	140°21.0 32.0 155°23.6 32.0		00°53.1 09:14
11 12	96 46.8 111°49.3	41°52.1 N17°35.8	102°14.8 N00°23.4	162 28.7 53.3 177°31.5 S 21°53.4	155°23.6 32.0 170°26.3 \$20°32.1		51°12.0 05:13
13	126°51.8	56°53.2 35.9	117°15.9 23.9	192°34.3 53.4	185°28.9 32.1		55°29.9 00:17
14	$141^{\circ}54.2$	71°54.2 36.1	132°17.1 24.4	207°37.1 53.5	200°31.6 32.1	Saturn 5	58°30.2 00:44
15	156°56.7	86°55.2 · · 36.3	147°18.3 · · 24.8	222°39.9 · · 53.5	215°34.2 · · 32.2		SHA Mer.pass
16 17	171°59.2 187°01.6	101°56.2 36.5 116°57.2 36.7	162°19.5 25.3 177°20.7 25.8	237°42.7 53.6 252°45.5 53.7	230°36.9 32.2 245°39.5 32.3		00°19.9 09:13
17 18	202°04.1	116°57.2 36.7 131°58.2 N17°36.9	177 20.7 25.8 192°21.8 N00°26.3	267°48.3 S21°53.7	260°42.2 S20°32.3		50°40.9 05:12 55°38.1 00:12
19	217°06.6	146°59.2 37.0	207°23.0 26.8	282°51.1 53.8	275°44.9 32.4	· ·	68°34.7 00:40
20	232°09.0	162°00.2 37.2	222°24.2 27.3	297°54.0 53.8	290°47.5 32.4		
21	247°11.5	177°01.3 · · 37.4	237°25.4 · · 27.7	312°56.8 · · 53.9	305°50.2 · · 32.4	Horizontal p	
22 23	262°14.0 277°16.4	192°02.3 37.6 207°03.3 37.8	252°26.6 28.2 267°27.8 28.7	327°59.6 53.9 343°02.4 54.0	320°52.8 32.5 335°55.5 32.5		Venus: 0.3 Mars: 0.2
						L	0.2
Mer.p	ass.:04:34	v1.1 d0.2 m-4.5	v1.2 d0.5 m-0.7	v2.8 d-0.1 m-2.6	v2.7 d-0.0 m0.1		

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°36.9	N22°04.0	289°36.5	15.8'	S05°49.5	11.9'	54.5'
1	193°36.9	03.7	304°11.3	15.9'	05°37.6	11.9'	54.5'
2	208°36.8	03.4	318°46.2	15.9'	05°25.7	11.9'	54.5'
3	223°36.7	• • 03.0	333°21.1	15.9'	05°13.7	11.9'	54.5'
4	238°36.6	02.7	347°56.1	16.0'	05°01.8	12.0'	54.5'
5	253°36.5	02.4	2°31.1	16.0'	04°49.8	12.0'	54.5'
6	268°36.5	N22°02.0	17°06.1	16.0'	S04°37.9	12.0'	54.5'
7	283°36.4	01.7	31°41.1	16.1'	04°25.9	12.0'	54.4'
8	298°36.3	01.3	46°16.2	16.1'	04°13.9	12.0'	54.4'
9	313°36.2	• • 01.0	60°51.3	16.1'	04°01.9	12.0'	54.4'
10	328°36.1	00.7	75°26.4	16.1'	03°49.8	12.0'	54.4'
11	343°36.1	00.3	90°01.5	16.2'	03°37.8	12.0'	54.4'
12	358°36.0	N22°00.0	104°36.7	16.2'	S03°25.8	12.0'	54.4'
13	13°35.9	$21^{\circ}59.6$	$119^{\circ}11.9$	16.2'	03°13.7	12.1'	54.4'
14	28°35.8	59.3	133°47.1	16.2'	03°01.7	12.1'	54.4'
15	43°35.7	• • 58.9	148°22.3	16.2'	02°49.6	12.1'	54.4'
16	58°35.7	58.6	162°57.6	16.3'	02°37.5	12.1'	54.4'
17	73°35.6	58.2	177°32.8	16.3'	$02^{\circ}25.5$	12.1'	54.4'
18	88°35.5	N21°57.9	192°08.1	16.3'	502°13.4	12.1'	54.3'
19	103°35.4	57.6	206°43.4	16.3'	$02^{\circ}01.3$	12.1'	54.3'
20	118°35.3	57.2	221°18.7	16.3'	01°49.2	12.1'	54.3'
21	133°35.3	• • 56.9	235°54.0	16.3'	$01^{\circ}37.1$	12.1'	54.3'
22	148°35.2	56.5	250°29.4	16.3'	01°25.0	12.1'	54.3'
23	163°35.1	56.2	$265^{\circ}04.7$	16.4'	01°12.9	12.1'	54.3'
	SD.=15.7	d=-0.3		S.	D.=14.8		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°35.0	N21°55.8	279°40.1	16.4'	S01°00.8	12.1'	54.3'
1	193°34.9	55.4	294°15.5	16.4	00°48.7	12.1'	54.3'
2	208°34.9	55.1	308°50.8	16.4'	00°36.6	12.1'	54.3'
3	223°34.8	• • 54.7	323°26.2	16.4	00°24.6	12.1'	54.3'
4	238°34.7	54.4	338°01.6	16.4	00°12.5	12.1'	54.3'
5	253°34.6	54.0	352°37.0	16.4'	500°00.4	12.1'	54.3'
6	268°34.6	N21°53.7	7°12.4	16.4'	N00°11.7	12.1'	54.3'
7	283°34.5	53.3	21°47.8	16.4'	00°23.8	12.1'	54.3'
8	298°34.4	53.0	36°23.2	16.4	00°35.9	12.1'	54.3'
9	313°34.3	• • 52.6	50°58.7	16.4'	00°48.0	12.1'	54.3'
10	328°34.3	52.3	65°34.1	16.4'	01°00.1	12.1'	54.3'
11	343°34.2	51.9	80°09.5	16.4	01°12.1	12.1'	54.3'
12	358°34.1	N21°51.5	94°44.9	16.4	N01°24.2	12.1'	54.3'
13	13°34.0	51.2	109°20.3	16.4'	01°36.3	12.1'	54.3'
14	28°34.0	50.8	123°55.7	16.4'	01°48.3	12.1'	54.3'
15	43°33.9	• • 50.5	138°31.1	16.4	02°00.4	12.0'	54.2'
16	58°33.8	50.1	153°06.5	16.4	02°12.4	12.0'	54.2'
17	73°33.7 88°33.7	49.7 N21°49.4	167°41.9	16.4'	02°24.4	12.0'	54.2'
18			182°17.3	16.4	N02°36.5	12.0'	54.2'
19	103°33.6	49.0	196°52.7	16.4'	02°48.5	12.0'	54.2'
20	118°33.5 133°33.4	48.6 •• 48.3	211°28.1 226°03.4	16.4' 16.4'	03°00.5 03°12.5	12.0'	54.2' 54.2'
21 22	133°33.4 148°33.4	47.9	240°38.8	16.4	03°12.5	12.0' 12.0'	54.2'
23	148 33.4 163°33.3	47.9 47.5	240 38.8 255°14.1	16.3'	03°24.4	12.0'	54.2'
	SD.=15.7				D.=14.8	12.0	
	3D.=15.7	d=-0.4		5.	ال.=14.		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°33.2	N21°47.2	$269^{\circ}49.5$	16.3'	N03°48.4	11.9'	54.2'
1	193°33.1	46.8	284°24.8	16.3'	04°00.3	11.9'	54.3'
2	208°33.1	46.4	$299^{\circ}00.1$	16.3'	04°12.2	11.9'	54.3'
3	223°33.0	• • 46.1	$313^{\circ}35.4$	16.3'	$04^{\circ}24.1$	11.9'	54.3'
4	238°32.9	45.7	$328^{\circ}10.6$	16.3'	04°36.0	11.9'	54.3'
5	253°32.9	45.3	$342^{\circ}45.9$	16.2'	04°47.9	11.9'	54.3'
6	268°32.8	N21°45.0	$357^{\circ}21.1$	16.2'	N04°59.8	11.9'	54.3'
7	283°32.7	44.6	$11^{\circ}56.3$	16.2'	05°11.6	11.8'	54.3'
8	298°32.6	44.2	$26^{\circ}31.5$	16.2'	05°23.4	11.8'	54.3'
9	313°32.6	• • 43.8	41°06.7	16.2'	05°35.2	11.8'	54.3'
10	328°32.5	43.5	55°41.8	16.1'	05°47.0	11.8'	54.3'
11	343°32.4	43.1	$70^{\circ}16.9$	16.1'	05°58.8	11.8'	54.3'
12	358°32.4	N21°42.7	84°52.0	16.1'	N06°10.5	11.7'	54.3'
13	13°32.3	42.4	$99^{\circ}27.1$	16.1'	06°22.3	11.7'	54.3'
14	28°32.2	42.0	$114^{\circ}02.1$	16.0'	06°34.0	11.7'	54.3'
15	43°32.2	• • 41.6	$128^{\circ}37.1$	16.0'	06°45.6	11.7'	54.3'
16	58°32.1	41.2	$143^{\circ}12.1$	16.0'	06°57.3	11.6'	54.3'
	73°32.0	40.8	$157^{\circ}47.1$	15.9'	07°08.9	11.6'	54.3'
17	000010	N21°40.5	172°22.0	15.9'	N07°20.6	11.6'	54.3'
17 18	88°31.9		186°56.9	15.9'	$07^{\circ}32.1$	11.6'	54.3'
18 19	103°31.9	40.1					E 4 2'
18 19 20	103°31.9 118°31.8	39.7	201°31.8	15.8'	07°43.7	11.5'	54.3'
18 19 20 21	103°31.9 118°31.8 133°31.7	39.7 · · 39.3	201°31.8 216°06.6	15.8'	07°55.2	11.5'	54.3'
18 19 20 21 22	103°31.9 118°31.8 133°31.7 148°31.7	39.7 · · 39.3 38.9	201°31.8 216°06.6 230°41.4	15.8' 15.8'	07°55.2 08°06.7	11.5' 11.5'	54.3' 54.4'
18 19 20 21	103°31.9 118°31.8 133°31.7	39.7 · · 39.3	201°31.8 216°06.6	15.8'	07°55.2	11.5'	54.3'
18 19 20 21 22	103°31.9 118°31.8 133°31.7 148°31.7	39.7 · · 39.3 38.9	201°31.8 216°06.6 230°41.4	15.8' 15.8' 15.7'	07°55.2 08°06.7	11.5' 11.5'	54.3' 54.4'

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.			
Day	00 ^h	12 ^h	Pass	Upper	Lower	Age	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm		
11	05:32	05:36	12:06	04:50	17:10	20(64%)	
12	05:40	05:44	12:06	05:30	17:51	21(55%)	
13	05:47	05:51	12:06	06:11	18:31	22(45%)	