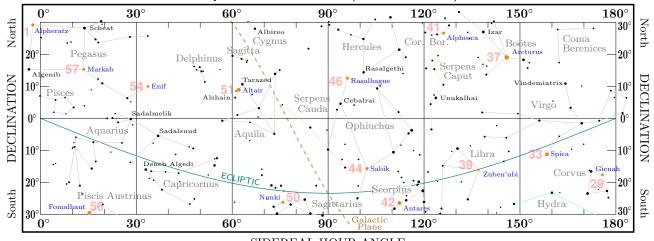
GENERATED USING SKYFIELD

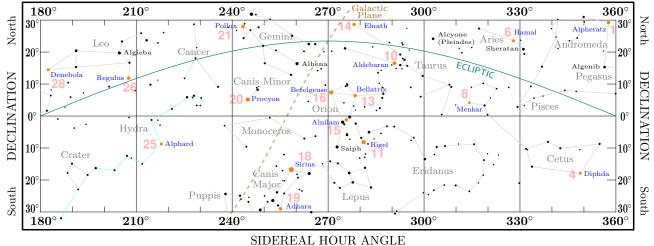
http://rhodesmill.org/skyfield/

EQUATORIAL STARS (SHA 0° to 180°)



SIDEREAL HOUR ANGLE

EQUATORIAL STARS (SHA 180° to 360°)



THE NAUTICAL ALMANAC

from 8.7.2020

Author: Andrew Bauer
Original concept from: Enno Rodegerdts

March 13, 2020

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h	Aries	Venus	Mars	Jupiter	Saturn	Stars	
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec		SHA Dec
0	286°24.1	219°15.1 N17°17.2	279°42.8 \$00°42.4	351°21.5 \$21°45.5	344°36.3 \$20°26.6		
1	301°26.5	234°16.4 17.3	294°43.9 41.9	6°24.3 45.6	359°39.0 26.7		7°38.4 29°12.0
2	316°29.0	249°17.8 17.4	309°45.0 41.4	21°27.1 45.7	14°41.6 26.7		3°10.7 -42°11.5
3	331°31.4	264°19.1 · · 17.5	324°46.1 · · 40.9	36°29.9 · · 45.7	29°44.3 · · 26.7		9°34.9 56°38.6
4	346°33.9	279°20.5 17.6	339°47.3 40.3	51°32.7 45.8	44°46.9 26.8		8°50.9 -17°52.4 5°23.1 -57°07.8
5	1°36.4	294°21.9 17.7	354°48.4 39.8	66°35.5 45.8	59°49.6 26.8		5°23.1 -57°07.8 7°55.3 23°33.3
6	16°38.8	309°23.2 N17°17.8	9°49.5 S 00°39.3	81°38.3 S 21°45.9	74°52.2 \$20°26.9		5°52.7 89°20.6
7	31°41.3	324°24.6 17.9	24°50.6 38.8	96°41.1 46.0	89°54.9 26.9		5°14.8 -40°13.3
8	46°43.8	339°25.9 18.0	39°51.8 38.3	111°43.9 46.0	104°57.5 26.9		4°10.1 4°10.1
9	61°46.2	354°27.2 · · 18.1	54°52.9 · · 37.8	126°46.7 · · 46.1	120°00.2 · · 27.0		8°33.7 49°55.7
10	76°48.7	9°28.6 18.2	69°54.0 37.3	141°49.5 46.1	135°02.8 27.0		0°44.0 16°32.9
11	91°51.2	24°29.9 18.3	84°55.2 36.8	156°52.3 46.2	150°05.5 27.1		1°07.7 -8°10.7
12	106°53.6	39°31.3 N17°18.4	99°56.3 \$00°36.3	171°55.1 S21°46.3	165°08.1 S20°27.1	Capella 280	0°27.7 46°00.9
13	121°56.1	54°32.6 18.5	114°57.4 35.8	186°57.9 46.3	180°10.8 27.1	Bellatrix 278	8°27.1 6°22.0
14 15	136°58.6 152°01.0	69°33.9 18.6 84°35.2 · · 18.7	129°58.6 35.3 144°59.7 · · 34.7	202°00.7 46.4 217°03.5 • 46.4	195°13.4 27.2 210°16.1 · · 27.2	Elnath 278	8°06.8 28°37.3
16	167°03.5	99°36.6 18.8	160°00.8 34.2	232°06.3 46.5	210 10.1 4 27.2 225°18.7 27.3	Alnilam 27!	5°41.7 -1°11.4
17	182°05.9	114°37.9 18.9	175°02.0 33.7	247°09.1 46.6	240°21.4 27.3	_	0°56.3 7°24.6
18	197°08.4	129°39.2 N17°19.0	190°03.1 S00°33.2	262°11.9 S21°46.6	255°24.0 \$20°27.4		3°54.5 -52°42.4
19	212°10.9	144°40.5 19.1	205°04.2 32.7	277°14.7 46.7	270°26.7 27.4		8°29.8 -16°44.7
20	227°13.3	159°41.8 19.2	220°05.4 32.2	292°17.5 46.7	285°29.3 27.4		5°09.1 -29°00.0
21	242°15.8	174°43.1 · · 19.3	235°06.5 · · 31.7	307°20.3 · · 46.8	300°32.0 · · 27.5	,	4°55.0 5°10.3
22	257°18.3	189°44.4 19.4	250°07.6 31.2	322°23.1 46.9	315°34.6 27.5		3°22.1 27°58.6
23	272°20.7	204°45.8 19.5	265°08.8 30.7	337°25.9 46.9	330°37.3 27.6		4°16.7 -59°34.6
1/10%	οςς ·Ω4·Ε4	v1.4 d0.1 m-4.5	v1.1 d0.5 m-0.6	v2.8 d-0.1 m-2.6	v2.6 d-0.0 m0.1		2°49.3 -43°31.0 1°39.6 -69°48.2
ivier.p	ass.:04:54	V1.4 dU.1 m-4.5	V1.1 d0.5 m-0.0	V2.8 d-U.1 m-2.0	V2.0 d-0.0 m0.1		7°51.6 -8°44.8
							7°38.6 11°52.2
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec		3°46.0 61°38.8
0	287°23.2	219°47.1 N17°19.6	280°09.9 S 00°30.2	352°28.7 S 21°47.0	345°39.9 S 20°27.6		2°28.8 14°27.7
1	302°25.7	234°48.4 19.8	295°11.0 29.7	7°31.5 47.0	0°42.6 27.6		5°47.4 -17°39.3
2	317°28.1	249°49.6 19.9	310°12.2 29.2	22°34.3 47.1	15°45.2 27.7		3°04.1 -63°12.9
3	332°30.6	264°50.9 · · 20.0	325°13.3 · · 28.7	37°37.1 · · 47.2	30°47.9 · · 27.7		1°55.6 -57°13.8
4	347°33.1	279°52.2 20.1	340°14.4 28.2	52°39.9 47.2	45°50.5 27.8		6°16.3 55°51.3
5	2°35.5	294°53.5 20.2	355°15.6 27.7	67°42.7 47.3	60°53.2 27.8	Spica 158	8°26.1 -11°16.0
6	17°38.0	309°54.8 N17°20.3	10°16.7 \$00°27.1	82°45.5 S 21°47.3	75°55.8 S20°27.8	Alkaid 152	2°54.9 49°13.1
7	32°40.4	324°56.1 20.4	25°17.8 26.6	97°48.3 47.4	90°58.5 27.9	Hadar 148	8°40.8 -60°28.4
8 9	47°42.9 62°45.4	339°57.4 20.6	40°19.0 26.1 55°20.1 · · · 25.6	112°51.1 47.5	106°01.1 27.9	Menkent 148	8°01.7 -36°28.3
10	62 45.4 77°47.8	354°58.6 · · 20.7 9°59.9 20.8	55°20.1 · · 25.6 70°21.3 25.1	127°53.9 · · 47.5 142°56.7 47.6	121°03.8 · · 28.0 136°06.4 28.0	Arcturus 14!	5°51.2 19°04.8
11	92°50.3	25°01.2 20.9	85°22.4 24.6	157°59.5 47.6	150 00.4 28.0 151°09.1 28.1		9°44.9 -60°55.3
12	107°52.8	40°02.5 N17°21.0	100°23.5 S00°24.1	173°02.3 \$21°47.7	166°11.7 S20°28.1		7°19.5 74°04.7
13	122°55.2	55°03.7 21.2	115°24.7 23.6	188°05.1 47.7	181°14.4 28.1		6°59.9 -16°07.5
14	137°57.7	70°05.0 21.3	130°25.8 23.1	203°07.9 47.8	196°17.0 28.2	'	6°06.6 26°39.0
15	153°00.2	85°06.2 · · 21.4	145°27.0 · · 22.6	218°10.7 · · 47.9	211°19.7 · · 28.2		2°20.0 -26°28.6
16	168°02.6	100°07.5 21.5	160°28.1 22.1	233°13.5 47.9	226°22.3 28.3		7°16.9 -69°03.9
17	183°05.1	115°08.8 21.7	175°29.2 21.6	248°16.3 48.0	241°25.0 28.3		2°06.6 -15°44.9 6°14.9 -37°07.0
18	198°07.5	130°10.0 N17°21.8	190°30.4 \$00°21.1	263°19.1 S 21°48.0	256°27.6 \$20°28.3		6°01.6 12°32.9
19	213°10.0	145°11.3 21.9	205°31.5 20.6	278°21.9 48.1	271°30.3 28.4	_	0°43.4 51°29.3
20	228°12.5	160°12.5 22.0	220°32.7 20.1	293°24.7 48.2	286°32.9 28.4		3°36.9 -34°22.4
21	243°14.9	175°13.7 · · 22.2	235°33.8 · · 19.6	308°27.5 · · 48.2	301°35.6 · · 28.5		0°35.2 38°48.3
22	258°17.4	190°15.0 22.3	250°35.0 19.1	323°30.3 48.3	316°38.2 28.5	_	5°51.9 -26°16.2
23	273°19.9	205°16.2 22.4	265°36.1 18.6	338°33.1 48.3	331°40.9 28.5		2°03.1 8°55.4
Mer.p	ass.:04:50	v1.3 d0.1 m-4.5	v1.1 d0.5 m-0.7	v2.8 d-0.1 m-2.6	v2.6 d-0.0 m0.1	Peacock 53	3°10.9 -56°40.0
						Deneb 49	9°27.8 45°21.1
. .	CILA	CHA	CIIA D	CUA	CHA		3°42.1 9°58.1
Fri	GHA ว∾°วว ว	GHA Dec	GHA Dec 280°37.2 S 00°18.1	GHA Dec 353°35.9 \$21°48.4	GHA Dec		7°37.2 -46°51.5
0 1	288°22.3 303°24.8	220°17.5 N17°22.6 235°18.7 22.7	280°37.2 S00°18.1 295°38.4 17.6	353°35.9 S21°48.4 8°38.7 48.5	346°43.5 S 20°28.6 1°46.2 28.6		5°18.4 -29°30.7
2	303 24.8 318°27.3	250°19.9 22.8	295 38.4 17.6 310°39.5 17.1	8 38.7 48.5 23°41.5 48.5	1 40.2 28.0 16°48.8 28.7		3°48.5 28°11.5
3	310 27.3 333°29.7	265°21.2 · · 22.9	325°40.7 · · 16.6	38°44.3 · · 48.6	31°51.5 · · 28.7	Markab 13	3°33.3 15°18.8
4	348°32.2	280°22.4 23.1	340°41.8 16.1	53°47.2 48.6	46°54.1 28.8	Jul 08 Wed	SHA Mer.pass
5	3°34.7	295°23.6 23.2	355°43.0 15.6	68°50.0 48.7	61°56.8 28.8		2°51.0 09:22
6	18°37.1	310°24.8 N17°23.3	10°44.1 S00°15.1	83°52.8 S 21°48.8	76°59.4 \$20°28.8		3°18.7 05:21
7	33°39.6	325°26.0 23.5	25°45.3 14.6	98°55.6 48.8	92°02.1 28.9		4°57.4 00:34
8	48°42.0	340°27.3 23.6	40°46.4 14.1	113°58.4 48.9	107°04.7 28.9	Saturn 58	8°12.3 01:01
9	63°44.5	355°28.5 · · 23.7	55°47.6 · · 13.6	129°01.2 · · 48.9	122°07.4 · · 29.0	III OO Thii	SUA Massisse
10	78°47.0	10°29.7 23.9	70°48.7 13.1	144°04.0 49.0	137°10.0 29.0		SHA Mer.pass 2°23.9 09:20
11	93°49.4	25°30.9 24.0	85°49.9 12.6	159°06.8 49.1	152°12.7 29.0		2°46.7 05:19
12	108°51.9	40°32.1 N17°24.2	100°51.0 S00°12.1	174°09.6 S 21°49.1	167°15.3 \$20°29.1		5°05.5 00:30
13	123°54.4	55°33.3 24.3	115°52.2 11.6	189°12.4 49.2	182°18.0 29.1		8°16.7 00:57
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		SHA Mer.pass
16	169°01.8	100°36.9 24.7	160°55.6 10.1	234°20.8 49.4	227°25.9 29.2		1°55.1 09:18
17	184°04.2	115°38.1 24.9	175°56.8 09.6	249°23.6 49.4	242°28.6 29.3		2°14.9 05:17
18 19	199°06.7 214°09.1	130°39.3 N17°25.0 145°40.5 25.1	190°57.9 S00°09.1 205°59.1 08.6	264°26.4 S21°49.5 279°29.2 49.5	257°31.2 S 20°29.3 272°33.9 29.4		5°13.6 00:26
20	214°09.1 229°11.6	145°40.5 25.1 160°41.6 25.3	205°59.1 08.6 221°00.2 08.1	279°29.2 49.5 294°32.0 49.6	272°33.9 29.4 287°36.5 29.4	Saturn 58	8°21.2 00:53
21	229°11.6 244°14.1	175°42.8 · · 25.4	236°01.4 · · 07.6	309°34.8 · · 49.6	302°39.2 · · 29.5	Horizontal p	arallax
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
						•	
ivler.p	ass.: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		

h	Su	n	Moor					
Wed	GHA	Dec	GHA	ν	Dec	d	HP	
0	178°43.3	$N22^{\circ}26.5$	$322^{\circ}11.8$	11.2'	S 18°34.0	8.5'	56.0'	
1	193°43.2	26.2	336°42.1	11.3'	18°25.4	8.6'	56.0'	
2	208°43.1 223°43.0	25.9 •• 25.6	351°12.4 5°42.8	11.4' 11.4'	18° 16.7 18° 08.0	8.7' 8.8'	56.0' 55.9'	
4	238°43.0	25.3	20°13.3	11.5'	17°59.2	8.9'	55.9'	
5	253°42.9	25.1	34°43.9	11.6'	17°50.3	8.9'	55.9'	
6	268°42.8	N22°24.8	$49^{\circ}14.5$	11.7'	S 17°41.3	9.0'	55.8'	
7	283°42.7	24.5	63°45.3	11.8'	17°32.2	9.1'	55.8'	
8 9	298°42.6 313°42.5	24.2 •• 23.9	78°16.1 92°47.0	11.9' 12.0'	17°23.1 17°13.9	9.2' 9.2'	55.8' 55.8'	
10	313 42.5 328°42.4	23.6	107°18.0	12.0'	17 13.9 17°04.6	9.2	55.7'	
11	343°42.3	23.3	121°49.1	12.1'	16°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' 12.5'	16° 26.8 16° 17.2	9.6' 9.7'	55.6' 55.6'	
16	58°41.8	21.8	194°25.7	12.5'	16° 07.5	9.7'	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 21	118°41.5 133°41.4	20.6	252°32.5 267°04.4	12.8' 12.9'	15°28.1 15°18.1	10.0' 10.0'	55.5' 55.5'	
22	133 41.4 148°41.3	20.3	281°36.3	13.0'	15 18.1 15°08.0	10.0	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			
				J.	15.2			
Thu	GHA	Dec	GHA	ν	Dec	d	HP	
0 1	178°41.1 193°41.0	N22°19.4 19.1	310°40.5 325°12.7	13.2' 13.2'	\$14°47.7 14°37.5	10.2' 10.3'	55.4' 55.4'	
2	193°41.0 208°40.9	19.1 18.8	325°12.7 339°45.0	13.2	14°37.5 14°27.2	10.3'	55.4' 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'	$14^{\circ}06.5$	10.4'	55.3'	
5	253°40.6	17.9	23°22.2	13.5'	13°56.0	10.5'	55.3'	
6 7	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'	
8	203 40.5 298°40.4	16.9	67°00.1	13.7'	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 13	358°40.0 13°39.9	N22°15.7 15.4	125°11.6 139°44.6	14.0' 14.1'	\$12°41.4 12°30.6	10.8' 10.9'	55.1' 55.1'	
14	28°39.8	15.4	159 44.0 154°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	58°39.7	14.5	$183^{\circ}24.2$	14.3'	11°57.8	11.0'	55.1'	
17	73°39.6	14.1	197°57.5	14.3'	11°46.8	11.0'	55.0'	
18 19	88°39.5 103°39.4	N22°13.8 13.5	212°30.8 227°04.3	14.4' 14.5'	\$11°35.8 11°24.7	11.1' 11.1'	55.0' 55.0'	
20	118°39.3	13.2	241°37.8		11°13.5	11.1'	55.0'	
21	133°39.2	• • 12.9	256°11.3	14.6'	11°02.4	11.2'	55.0'	
22	148°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	
0	178°39.0	N22°11.9	299°52.3	14.8'	S10°28.6	11.3'	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°59.9 343°33.8	14.9'	10°06.0 09°54.6	11.4'	54.9' 54.8'	
3 4	223°38.7 238°38.6	· · 11.0 10.6	343°33.8 358°07.7	14.9' 15.0'	09°54.6 09°43.2	11.4' 11.4'	54.8°	
5	253°38.5	10.3	12°41.7	15.0'	09°43.2	11.5'	54.8'	
6	268°38.5	N22°10.0	27°15.8	15.1'	S09°20.3	11.5'	54.8'	
7	283°38.4	09.7	41°49.9	15.1'	09°08.8	11.5'	54.8'	
8 9	298°38.3 313°38.2	09.3 •• 09.0	56°24.0 70°58.2	15.2' 15.2'	08°57.3 08°45.7	11.5' 11.6'	54.8' 54.7'	
10	313 38.2 328°38.1	08.7	70 58.2 85°32.5	15.2 15.3'	08°34.1	11.6'	54.7'	
11	343°38.0	08.4	$100^{\circ}06.8$	15.3'	08°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 15	28°37.8 43°37.7	07.4 •• 07.0	143°49.9 158°24.4	15.5' 15.5'	07°47.5 07°35.8	11.7' 11.7'	54.7' 54.6'	
16	58°37.6	06.7	172°58.9	15.5'	07°24.1	11.7'	54.6	
17	73°37.5	06.4	$187^{\circ}33.5$	15.6'	$07^{\circ}12.3$	11.8'	54.6'	
18	88°37.4	N22°06.1	202°08.1	15.6'	S07°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 21	118°37.3 133°37.2	05.4 •• 05.1	231°17.4 245°52.1	15.7' 15.7'	06°36.9 06°25.1	11.8' 11.8'	54.6' 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			

Natt. Civil Sunset Civil Naut. N 70° □ □ □ □ □ 68° □ □ □ □ □ 66° □ 01:10 22:57 □ □ 64° □ 02:00 22:09 □ □ 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	Lat.	Twi	light	Sunrise	Sunset	Twilight		
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68° □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	N 72°							
66° □ □ □ 01:10 22:57 □ □ □ 64° 64° □ □ 02:00 22:09 □ □ □ 62° □ □ 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 06:00 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° 06:47 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	N 70°							
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	S 60°	07:06	08:01	08:56	15:15	16:10	17:05	

Lat.		Moonrise	е		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
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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			Mer.Pass. Upper Lower Age hh:mm			
	Day	Eqn.o	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%)		
ı	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	Ven	us	M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	$289^{\circ}21.5$		N17°25.9	$281^{\circ}04.8$	500°06.1	$354^{\circ}43.2$	S21°49.8	$347^{\circ}47.1$	S20°29.6	Alpheratz	357°38.3	29°12.0
1	304°23.9	235°47.5	26.0	296°06.0	05.6	9°46.0	49.9	2°49.8	29.6	Ankaa	353° 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	Schedar	349°34.9	56°38.6
3 4	334°28.9 349°31.3	265°49.8 280°51.0	· · 26.3 26.5	326°08.3 341°09.4	· · 04.6 04.1	39°51.6 54°54.4	· · 50.0 50.1	32°55.1 47°57.7	· · 29.7 29.7	Diphda	348°50.9	-17°52.4
5	4°33.8	295°52.2	26.6	356° 10.6	03.6	69°57.2	50.1	63°00.4	29.8	Achernar	335°23.1	-57°07.8
6	19°36.3		N17°26.8	11° 11.7	S00°03.1	85°00.0	S21°50.2	78°03.0	S20°29.8	Hamal	327°55.3	23°33.3 89°20.6
7	34°38.7	325°54.5	26.9	$26^{\circ}12.9$	02.6	100°02.8	50.2	93°05.7	29.9	Polaris Acamar	315°51.4 315°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	Menkar	314°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	• • 29.9	Mirfak	308°33.6	49°55.7
10 11	79°46.1 94°48.6	10°57.9 25°59.1	27.4 27.5	71°16.4 86°17.5	01.1 00.6	145°11.3 160°14.1	50.4 50.5	138° 13.6 153° 16.3	30.0 30.0	Aldebaran	290°44.0	16°32.9
12	109°51.0		N17°27.7	101° 18.7	500°00.1	175° 16.9	S21°50.5	168° 18.9	\$20°30.1	Rigel	281°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	Capella Bellatrix	280°27.6 278°27.1	46°00.9 6°22.0
14	139°56.0	71°02.5	28.0	131°21.0	8.00	205°22.5	50.7	198°24.2	30.2	Elnath	278°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	Alnilam	275°41.7	-1°11.4
16 17	170°00.9 185°03.4	101°04.8 116°05.9	28.3	161°23.3 176°24.5	01.8	235°28.1 250°30.9	50.8 50.8	228°29.6 243°32.2	30.2	Betelgeuse	270°56.3	7°24.6
17 18	200°05.8		28.5 N17°28.6	176 24.5 191°25.7	02.3 N00°02.8	265°33.7	50.8 S21°50.9	243 32.2 258°34.9	30.3 \$20°30.3	Canopus	263°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	Sirius	258°29.8	-16°44.7
20	230°10.8	161°09.3	28.9	221°28.0	03.8	295°39.3	51.0	288°40.2	30.4	Adhara	255°09.1	-29°00.0 5°10.4
21	$245^{\circ}13.2$	$176^{\circ}10.4$	• • 29.1	$236^{\circ}29.1$	• • 04.3	$310^{\circ}42.1$	•• 51.1	303°42.8	• • 30.4	Procyon Pollux	244°55.0 243°22.1	5 10.4 27°58.6
22	260°15.7	191°11.5	29.2	251°30.3	04.8	325°44.9	51.1	318°45.5	30.5	Avior	234°16.7	-59°34.6
23	275°18.1	206°12.6	29.4	266°31.5	05.3	340° 47.7	51.2	333°48.1	30.5	Suhail	222°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	0.0 m0.1	Miaplacidus	221°39.6	-69°48.2
-										Alphard	217°51.6	-8°44.8
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207°38.6 193°46.0	11°52.2 61°38.8
0	$290^{\circ}20.6$		N17°29.6	$281^{\circ}32.6$	N00°05.8	$355^{\circ}50.5$	S21°51.2	$348^{\circ}50.8$	\$20°30.6	Denebola	193 40.0 182°28.8	14°27.7
1	305°23.1	236°14.8	29.7	296°33.8	06.3	10°53.3	51.3	3°53.4	30.6	Gienah	175°47.4	-17°39.3
2	320°25.5	251°15.9	29.9	311°35.0	06.8	25°56.1	51.4	18° 56.1	30.7	Acrux	173°04.1	-63°12.9
3 4	335°28.0 350°30.5	266° 17.1 281° 18.2	· · 30.1 30.2	326°36.1 341°37.3	· · 07.3 07.7	40°58.9 56°01.7	· · 51.4 51.5	33°58.7 49°01.4	· · 30.7 30.7	Gacrux	171°55.6	-57°13.8
5	5°32.9	296° 19.3	30.4	356° 38.4	08.2	71°04.5	51.5	64°04.0	30.8	Alioth	166°16.4	55°51.3
6	20°35.4		N17°30.6	11°39.6	N00°08.7	86°07.3	S21°51.6	79°06.7	S20°30.8	Spica Alkaid	158°26.1 152°54.9	-11°16.0 49°13.1
7	35°37.9	$326^{\circ}21.4$	30.7	26°40.8	09.2	101°10.2	51.7	94°09.3	30.9	Hadar	148°40.9	-60°28.4
8	50°40.3	341°22.5	30.9	41°41.9	09.7	116°13.0	51.7	109°12.0	30.9	Menkent	148°01.7	-36°28.3
9	65°42.8	356°23.6	• • 31.0	56° 43.1	10.2	131°15.8	• • 51.8	124°14.6	• • 30.9	Arcturus	145°51.2	19°04.8
10 11	80°45.2 95°47.7	11°24.7 26°25.8	31.2 31.4	71°44.3 86°45.4	10.7 11.2	146°18.6 161°21.4	51.8 51.9	139° 17.3 154° 19.9	31.0 31.0	Rigil Kent.	139°44.9	-60°55.3
12	110°50.2		N17°31.6	101°46.6	N00°11.7	176°24.2	S21°52.0	169°22.6	S20°31.1	Kochab	137°19.5	74°04.7
13	125°52.6	56°28.0	31.7	116°47.8	12.2	191°27.0	52.0	184°25.3	31.1	Zuben'ubi Alphecca	136°59.9 126°06.6	-16°07.5 26°39.0
14	$140^{\circ}55.1$	$71^{\circ}29.0$	31.9	$131^{\circ}48.9$	12.7	$206^{\circ}29.8$	52.1	$199^{\circ}27.9$	31.1	Antares	112° 20.0	-26°28.6
15	155°57.6	86°30.1	• • 32.1	146°50.1	• 13.1	221°32.6	• • 52.1	214°30.6	• • 31.2	Atria	107°16.9	-69°03.9
16 17	171°00.0 186°02.5	101°31.2 116°32.3	32.2 32.4	161°51.3 176°52.5	13.6 14.1	236°35.4 251°38.2	52.2 52.2	229°33.2 244°35.9	31.2 31.3	Sabik	$102^{\circ}06.6$	-15°44.9
18	201°05.0		N17°32.6	170 52.5 191°53.6	N00°14.6	266°41.0	52.2 \$21°52.3	259°38.5	520°31.3	Shaula	96°14.9	-37°07.0
19	216°07.4	146°34.4	32.7	206°54.8	15.1	281°43.8	52.4	274°41.2	31.4	Rasalhague	96°01.6	12°32.9
20	231°09.9	161°35.5	32.9	221°56.0	15.6	296°46.6	52.4	289°43.8	31.4	Eltanin Kaus Aust.	90°43.4 83°36.9	51°29.3 -34°22.4
21	$246^{\circ}12.4$	$176^{\circ}36.5$	• • 33.1	$236^{\circ}57.1$	•• 16.1	$311^{\circ}49.4$	• • 52.5	$304^{\circ}46.5$	• • 31.4	Vega	80°35.2	38°48.3
22	261°14.8	191°37.6	33.3	251°58.3	16.6	326°52.2	52.5	319°49.1	31.5	Nunki	75°51.9	-26°16.2
23	276°17.3	206°38.6	33.4	266°59.5	17.1	341°55.0	52.6	334°51.8	31.5	Altair	62°03.1	8°55.4
Mer.p	ass.:04:38	v1.1 d0.2	2 m-4.5	v1.2 d0	5 m-0.7	v2.8 d-0	0.1 m-2.6	v2.7 d-0	0.0 m0.1	Peacock	53°10.9	-56°40.0
										Deneb	49°27.7	45°21.1
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33°42.1 27°37.2	9°58.1 -46°51.5
0	291°19.7		N17°33.6	282°00.7	N00°17.5	356° 57.8	S21°52.7	349° 54.4	S20°31.6	Fomalhaut	15°18.3	-40°31.3
1	306°22.2	236°40.7	33.8	297°01.8	18.0	12°00.6	52.7	4°57.1	31.6	Scheat	13°48.4	28°11.5
2 3	321°24.7 336°27.1	251°41.8 266°42.8	34.0	312°03.0 327°04.2	18.5 •• 19.0	27°03.5 42°06.3	52.8 •• 52.8	19°59.7 35°02.4	31.6	Markab	13°33.3	15°18.8
4	350 27.1 351°29.6	200 42.8 281°43.9	· · 34.1 34.3	342°05.4	19.5	42 06.3 57°09.1	52.8	50°05.1	· · 31.7 31.7	Jul 11 Sat	SHA	Mer.pass
5	6°32.1	296° 44.9	34.5	357°06.5	20.0	72°11.9	52.9	65°07.7	31.8	Venus	291°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	S20°31.8	Mars	351°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	Jupiter	65°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	58°25.7	00:49
9	66°41.9 81°44.4	356°49.1 11°50.1	· · 35.2 35.4	57° 11.2 72° 12.4	· · 21.9 22.4	132°23.1 147°25.9	· · 53.2 53.2	125°18.3 140°21.0	· · 31.9 32.0	Jul 12 Sun	SHA	Mer.pass
10 11	81 44.4 96°46.8	26°51.1	35.4 35.6	72 12.4 87°13.6	22.4	147 25.9 162°28.7	53.2	140 21.0 155°23.6	32.0	Venus	290°53.1	09:14
12	111°49.3		N17°35.8	102° 14.8	N00°23.4	177°31.5	S21°53.4	170°26.3	S20°32.1	Mars	351°12.0	05:13
13	126°51.8	$56^{\circ}53.2$	35.9	$117^{\circ}15.9$	23.9	$192^{\circ}34.3$	53.4	$185^{\circ}28.9$	32.1	Jupiter Saturn	65°29.9 58°30.2	00:17 00:44
14	141°54.2	71°54.2	36.1	132°17.1	24.4	207°37.1	53.5	200°31.6	32.1			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	Jul 13 Mon	SHA	Mer.pass
16 17	171°59.2 187°01.6	101°56.2 116°57.2	36.5 36.7	162° 19.5 177° 20.7	25.3 25.8	237° 42.7 252° 45.5	53.6 53.7	230°36.9 245°39.5	32.2 32.3	Venus	290°19.9	09:13
18	202°04.1		N17°36.9	192°21.8	N00°26.3	267°48.3	\$21°53.7	260°42.2	\$20°32.3	Mars Jupiter	350°40.9 65°38.1	05:12 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	Saturn	58°34.7	00:12
20	232°09.0	$162^{\circ}00.2$	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	Horizoi	ntal parallax Venus:	0.3
22 23	262°14.0 277°16.4	192°02.3 207°03.3	37.6 37.8	252°26.6 267°27.8	28.2	327°59.6 343°02.4	53.9 54.0	320°52.8 335°55.5	32.5 32.5		venus: Mars:	0.3
			37.8		28.7		54.0		32.5			V
Mer.p	pass.:04:34	v1.1 d0.2	2 m-4.5	v1.2 d0	5 m-0.7	v2.8 d-0	0.1 m-2.6	v2.7 d-0	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'	\$05°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° 36.6 253° 36.5	02.7	347°56.1 2°31.1	16.0'	05°01.8 04°49.8	12.0'	54.5'
5 6	253°36.5 268°36.5	02.4 N22°02.0	2°31.1 17°06.1	16.0' 16.0'	04°49.8 S04°37.9	12.0' 12.0'	54.5' 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	$328^{\circ}36.1$	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 13°35.9	N22°00.0 21°59.6	104°36.7 119°11.9	16.2	\$03°25.8 03°13.7	12.0'	54.4'
13 14	28° 35.8	21 59.6 59.3	119°11.9 133°47.1	16.2' 16.2'	03°13.7 03°01.7	12.1' 12.1'	54.4' 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'	S02°13.4	12.1'	54.3'
19	103°35.4	57.6	206°43.4	16.3	02°01.3	12.1'	54.3'
20	118°35.3 133°35.3	57.2	221°18.7 235°54.0	16.3' 16.3'	01°49.2 01°37.1	12.1' 12.1'	54.3' 54.3'
21 22	133°35.3 148°35.2	· · 56.9 56.5	235°54.0 250°29.4	16.3'	01°37.1 01°25.0	12.1'	54.3'
23	146 35.2 163° 35.1	56.2	265°04.7	16.4	01°12.9	12.1	54.3'
							5
	SD.=15.7	d=-0.3	-	5.	.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°34.8 238°34.7	• • 54.7	323°26.2 338°01.6	16.4	00°24.6 00°12.5	12.1' 12.1'	54.3'
4 5	258 34.7 253°34.6	54.4 54.0	352°37.0	16.4' 16.4'	500°00.4	12.1	54.3' 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 13	358°34.1 13°34.0	N21°51.5 51.2	94°44.9 109°20.3	16.4' 16.4'	N01°24.2 01°36.3	12.1' 12.1'	54.3' 54.3'
14	28° 34.0	50.8	109 20.3 123°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	49.7	167°41.9	16.4'	02°24.4	12.0'	54.2'
18	88°33.7	N21°49.4	182°17.3	16.4	N02°36.5	12.0'	54.2'
19 20	103°33.6 118°33.5	49.0 48.6	196°52.7 211°28.1	16.4' 16.4'	02°48.5 03°00.5	12.0' 12.0'	54.2' 54.2'
21	118 33.5 133°33.4	48.0 •• 48.3	211 28.1 226°03.4	16.4	03 00.5 03°12.5	12.0'	54.2'
22	148° 33.4	47.9	240°38.8	16.3	03°24.4	12.0'	54.2'
23	163°33.3	47.5	255° 14.1	16.3'	03°36.4	12.0'	54.2'
	SD.=15.7	d=-0.4	-	S	D.=14.8		
ŊA.	CUA	D	CIIA		D-:	.1	LID
Mon 0	GHA 178°33.2	Dec N21°47.2	GHA 269° 49.5	u 16.3'	Dec N03°48.4	d 11.9'	HP 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°00.1	16.3'	$04^{\circ}12.2$	11.9'	54.3'
3	223°33.0	• • 46.1	313°35.4	16.3'	04°24.1	11.9'	54.3'
4	238° 32.9	45.7	328° 10.6	16.3'	04°36.0	11.9'	54.3'
5	253°32.9 268°32.8	45.3 N21°45.0	342°45.9 357°21.1	16.2' 16.2'	04°47.9 N04°59.8	11.9' 11.9'	54.3' 54.3'
6 7	268° 32.8 283° 32.7	N21 45.0 44.6	357°21.1 11°56.3	16.2'	05°11.6	11.9	54.3'
8	203 32.7 298° 32.6	44.0	26°31.5	16.2	05°11.0	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°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 14	13°32.3 28°32.2	42.4 42.0	99°27.1 114°02.1	16.1' 16.0'	06°22.3 06°34.0	11.7' 11.7'	54.3' 54.3'
14 15	28° 32.2 43° 32.2	42.0 •• 41.6	114°02.1 128°37.1	16.0'	06° 45.6	11.7' 11.7'	54.3'
16	58° 32.1	41.2	143°12.1	16.0'	06°57.3	11.6'	54.3'
17	73°32.0	40.8	$157^{\circ}47.1$	15.9'	07°08.9	11.6'	54.3'
18	88°31.9	N21°40.5	172° 22.0	15.9'	N07°20.6	11.6'	54.3'
19	103°31.9	40.1	186°56.9	15.9'	07°32.1	11.6'	54.3'
20	118° 31.8	39.7	201°31.8	15.8'	07°43.7	11.5'	54.3'
21 22	133°31.7 148°31.7	· · 39.3 38.9	216°06.6 230°41.4	15.8' 15.8'	07°55.2 08°06.7	11.5' 11.5'	54.3' 54.4'
23	148 31.7 163°31.6	38.9 38.6	230 41.4 245°16.1	15.8	08 06.7 08°18.2	11.5	54.4'
	SD.=15.7	d=-0.4			.D.=14.8		

Lat.	Twi	light	Sunrise	Sunset	Twi	ilight
Lat.	Naut.	Civil	Juillise	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	
Lat.	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	f Time	Mer.	Mer.	Pass.		
	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%)	