ASTRONOMICAL CALENDAR 2019

The left column gives **Julian Dates** (number of days from 4713 B.C. Jan. 1 noon), useful for finding time spans between events by subtraction. The first 3 digits of the Julian date (245) are omitted.

Hours and minutes, where given, are in Universal Time.

Occasions such as "Moon 1.25° N.N.E. of Venus" are **appulses**: closest apparent approaches. They are slightly different from **conjunctions**, when one passes north of the other as measured in right ascension or in ecliptic longitude. A **quasi-conjunction** is an appulse without a conjunction.

For **meteor showers**: ZHR (zenithal hourly rate) is an estimate of the number to be seen under ideal conditions at the peak time if the radiant were overhead; actual rates may be very different. Peak times (predicted from where the center of the stream seems to cross Earth's orbit) are uncertain; best to start watching the night before. Meteor are usually most abundant in the morning hours.

Tell me of mistakes you notice. They're inevitable, but more easily corrected here than in the former printed *Astronomical Calendars!*
universalworkshop.com/contact

Explanation of terms can be found in our glossary book ***Albedo to Zodiac***. There is more about each topic in ***The Astronomical Companion***. And events in this list can be traced in the large ***Zodiac Wavy Chart*** for the year. For all these, see
universalworkshop.com

8485.458	Jan	1	Tue	23	Moon 1.25° N.N.E. of Venus; 47° from the Sun in the morning sky
8486.627		3	Thu	3	**Earth at perihelion**; 0.9833 AU from the Sun
8486.708				5	Moon 8.4° N.N.E. of Antares; 32° and 33° from the Sun in the morning sky
8486.896				10	Moon 3.1° N.N.E. of Jupiter; 30° from the Sun in the morning sky
8487.350				20	**Quadrantid meteors**; ZHR 110; 2 days before New
8488.271		4	Fri	19	Moon 2.76° N. of Mercury; 15° from the Sun in the morning sky
8489.292		5	SAT	19	Moon 0.88° N. of Saturn; 3° from the Sun in the morning sky
8489.300				19	Venus dichotomy (D-shape)
8489.562		6	SUN	1:29	**New Moon**; beginning of lunation 1188. Partial eclipse of the Sun
8489.691				5	**Venus at westernmost elongation**; 46.9° from Sun in morning sky
8490.507		7	Mon	0	Moon at descending node; longitude 296.7°
8491.125				15	Moon shows minimum libration for the year, 1.22°
8492.680		9	Wed	4	Moon at apogee; distance 63.67 Earth-radii

8494.542	11	Fri	1	Moon 2.96° S.S.E. of Neptune; 54° from the Sun in the evening sky
8496.521	13	SUN	1	Moon 5.0° S.S.E. of Mars; 76° from the Sun in the evening sky
8497.000			12	Mercury 1.72° S. of Saturn; 10° from the Sun in the morning sky; magnitudes -0.6 and 0.5
8497.781	14	Mon	6:45	**First Quarter Moon**
8498.188			17	Moon 4.8° S.S.E. of Uranus; 95° and 94° from the Sun in the evening sky
8500.458	16	Wed	23	Venus 7.8° N. of Antares; 47° from the Sun in the morning sky; magnitudes -4.4 and 1.0
8500.604	17	Thu	3	Moon 8.5° S.S.E. of the Pleiades; 124° and 123° from the Sun in the evening sky
8500.641			3	Middle of eclipse season: Sun is at same longitude as Moon's descending node, 296.7°
8500.840			8	Venus at northernmost latitude from the ecliptic plane, 3.4°
8501.271			19	Moon 1.63° N. of Aldebaran; 133° and 132° from the Sun in the evening sky
8502.313	18	Fri	20	Mercury 1.53° S. of Pluto; 7° from the Sun in the morning sky; magnitudes -0.8 and 14.3
8503.596	20	SUN	2	Sun enters Capricornus, at longitude 299.71° on the ecliptic
8503.877			9	Sun enters the astrological sign Aquarius, i.e. its longitude is 300°
8504.271			19	Moon 7.0° S. of Pollux; 174° and 170° from the Sun in the midnight sky
8504.450			23	Moon at ascending node; longitude 116.8°
8504.719	21	Mon	5:16	**Full Moon. Total eclipse of the Moon**
8505.333			20:00	Moon at perigee; distance 56.03 Earth-radii
8505.333			20:00	Perigee only 14.7 hours after Full Moon
8506.167	22	Tue	16	Venus 2.41° N. of Jupiter; 46° from the Sun in the morning sky; magnitudes -4.3 and -1.8
8506.646	23	Wed	4	Moon 2.46° N.N.E. of Regulus; 153° from the Sun in the morning sky
8510.375	26	SAT	21	Moon 7.3° N.N.E. of Spica; 103° from the Sun in the morning sky
8511.208	27	SUN	17	Moon shows maximum libration for the year, 10.11°
8511.383			21:11	**Last Quarter Moon**
8513.938	30	Wed	11	Moon 8.4° N.N.E. of Antares; 60° and 61° from the Sun in the morning sky
8514.563	31	Thu	2	Moon 2.74° N.N.E. of Jupiter; 53° from the Sun in the morning sky
8515.250			18	Moon 0.19° E.N.E. of Venus; 45° from the Sun in the morning sky
8516.500	Feb	2	SAT		Ground Hog Day
8516.813			8	Moon 0.65° N.N.E. of Saturn; 28° from the Sun in the morning sky
8517.775		3	SUN	7	Moon at descending node; longitude 296.8°

8519.378	4	Mon	21:04	**New Moon**; beginning of lunation 1189
8519.813	5	Tue	8	Moon 0.23° S.E. of Mercury; 5° from the Sun in the evening sky
8519.894			9	Moon at apogee; distance 63.74 Earth-radii; farthest in year
8521.875	7	Thu	9	Moon 2.98° S.S.E. of Neptune; 27° from the Sun in the evening sky
8522.780	8	Fri	7	Alpha Centaurid meteors; ZHR 6; 3 days after New
8525.350	10	SUN	20	Moon, Mars, and Uranus within circle of diameter 5.68°; 66° east of the Sun
8525.396			22	Moon 5.7° S.S.E. of Mars; 66° from the Sun in the evening sky
8525.521	11	Mon	1	Moon 4.7° S.S.E. of Uranus; 68° and 67° from the Sun in the evening sky
8526.153			16	The equation of time is at a minimum of -14.24 minutes.
8527.434	12	Tue	22:25	**First Quarter Moon**
8527.750	13	Wed	6	Mars 0.98° N.N.W. of Uranus; 65° from the Sun in the evening sky; magnitudes 1.0 and 5.8
8527.958			11	Moon 8.4° S.S.E. of the Pleiades; 96° from the Sun in the evening sky
8528.500	14	Thu		St. Valentine's Day
8528.646			4	Moon 1.68° N. of Aldebaran; 105° from the Sun in the evening sky
8531.370	16	SAT	21	Sun enters Aquarius, at longitude 327.89° on the ecliptic
8531.750	17	SUN	6	Moon 7.0° S. of Pollux; 146° and 144° from the Sun in the evening sky
8531.904			10	Moon at ascending node; longitude 116.5°
8533.042	18	Mon	13	Venus 1.08° N. of Saturn; 43° from the Sun in the morning sky; magnitudes -4.1 and 0.7
8533.464			23	Sun enters the astrological sign Pisces, i.e. its longitude is 330°
8533.750	19	Tue	6	Mercury 0.67° N.N.W. of Neptune; 15° from the Sun in the evening sky; magnitudes -1.0 and 8.0
8533.869			8:51	Moon at perigee; distance 55.94 Earth-radii; nearest in year
8533.869			8:51	Perigee only 7.0 hours before Full Moon
8534.104			15	Moon 2.41° N.N.E. of Regulus; 177° and 179° from the Sun in the midnight sky
8534.162			15:53	**Full Moon**
8537.500	23	SAT	0	Venus, Saturn, and Pluto within circle of diameter 5.13°; 44° west of the Sun
8537.750			6	Venus 1.40° N. of Pluto; 42° from the Sun in the morning sky; magnitudes -4.1 and 14.3
8537.750			6	Moon 7.2° N.N.E. of Spica; 130° from the Sun in the morning sky
8537.970			11	Mars and Jupiter at heliocentric opposition; longitudes 71.0° and 251.0°
8540.978	26	Tue	11:29	**Last Quarter Moon**

8541.208			17	Moon 8.3° N.N.E. of Antares; 87° and 88° from the Sun in the morning sky
8542.146	27	Wed	16	Moon 2.31° N.N.E. of Jupiter; 77° from the Sun in the morning sky
8544.292	Mar 1	Fri	19	Moon 0.40° N.E. of Saturn; 53° from the Sun in the morning sky
8544.642	2	SAT	3	**Moon, Saturn, and Pluto within circle of diameter 4.67°**; 50° west of the Sun
8544.960			11	Moon at descending node; longitude 296.0°
8545.438			23	Moon 1.23° S.S.E. of Venus; 40° and 41° from the Sun in the morning sky
8546.976	4	Mon	11	Moon at apogee; distance 63.72 Earth-radii
8548.500	6	Wed		Ash Wednesday
8549.170			16:04	**New Moon**; beginning of lunation 1190
8549.208			17	Moon 2.99° S.S.E. of Neptune; 4° and 1° from the Sun in the evening sky
8550.292	7	Thu	19	Moon 7.9° S.S.E. of Mercury; 13° from the Sun in the evening sky
8552.500	10	SUN		Clocks forward 1 hour (America)
8552.833			8	Moon 4.6° S.S.E. of Uranus; 41° from the Sun in the evening sky
8554.188	11	Mon	17	Moon 5.5° S.S.E. of Mars; 57° and 56° from the Sun in the evening sky
8554.956	12	Tue	11	Sun enters Pisces, at longitude 351.57° on the ecliptic
8555.208			17	Moon 8.2° S.S.E. of the Pleiades; 69° and 68° from the Sun in the evening sky
8555.917	13	Wed	10	Moon 1.86° N. of Aldebaran; 77° from the Sun in the evening sky
8556.500	14	Thu		Gamma Normid meteors; ZHR 6; near First Quarter
8556.895			9	Venus at descending node through the ecliptic plane
8556.935			10:26	**First Quarter Moon**
8559.125	16	SAT	15	Moon 6.8° S. of Pollux; 118° and 117° from the Sun in the evening sky
8559.183			16	Moon at ascending node; longitude 114.9°
8559.500	17	SUN		St. Patrick’s Day
8561.563	19	Tue	2	Moon 2.46° N.N.E. of Regulus; 152° from the Sun in the evening sky
8562.316			19:35	Moon at perigee; distance 56.34 Earth-radii
8563.417	20	Wed	22:01	**March or spring or vernal equinox**
8563.417			22:01	Sun enters the astrological sign Aries, i.e. its longitude is 0°
8563.571	21	Thu	1:42	**Full Moon**
8565.188	22	Fri	17	Moon 7.1° N.N.E. of Spica; 157° and 158° from the Sun in the morning sky
8565.403			22	Spring equinox on Mars
8568.563	26	Tue	2	Moon 8.1° N.N.E. of Antares; 114° and 115° from the Sun in the morning sky

8569.646 27 Wed 4 Moon 1.91° N.N.E. of Jupiter; 102° from the Sun in the morning sky
8570.674 28 Thu 4:10 **Last Quarter Moon**
8571.729 29 Fri 6 Moon 0.25° E. of Saturn; 78° and 79° from the Sun in the morning sky
8572.047 13 Moon at descending node; longitude 293.7°
8573.792 31 SUN 7 Mars 3.1° S.S.E. of the Pleiades; 50° from the Sun in the evening sky; magnitudes 1.4 and 2.9

8574.500 Apr 1 Mon All Fools' Day
8574.508 0 Moon at apogee; distance 63.59 Earth-radii
8575.771 2 Tue 7 Moon 2.55° S.S.E. of Venus; 35° and 34° from the Sun in the morning sky
8576.354 21 Mercury 0.38° N. of Neptune; 25° and 26° from the Sun in the morning sky; magnitudes 0.8 and 8.0
8576.558 3 Wed 1 **Moon, Mercury, and Neptune within circle of diameter 3.39°**; 26° west of the Sun
8576.563 2 Moon 3.1° S.S.E. of Neptune; 26° from the Sun in the morning sky
8576.583 2 Moon 3.4° S.S.E. of Mercury; 26° from the Sun in the morning sky
8578.869 5 Fri 8:51 **New Moon**; beginning of lunation 1191
8580.208 6 SAT 17 Moon 4.5° S.S.E. of Uranus; 16° and 15° from the Sun in the evening sky
8582.438 8 Mon 23 Moon 8.0° S.S.E. of the Pleiades; 42° and 41° from the Sun in the evening sky
8582.896 9 Tue 10 Moon 4.6° S.S.E. of Mars; 48° and 47° from the Sun in the evening sky
8583.146 16 Moon 2.09° N. of Aldebaran; 51° from the Sun in the evening sky
8583.692 10 Wed 5 Mercury, Venus, and Neptune within circle of diameter 5.15°; 31° west of the Sun
8583.771 7 Venus 0.29° S.S.E. of Neptune; 33° from the Sun in the morning sky; magnitudes -3.9 and 8.0
8586.257 12 Fri 18 Moon at ascending node; longitude 112.0°
8586.295 19:05 **First Quarter Moon**
8586.396 22 Moon 6.6° S. of Pollux; 91° from the Sun in the evening sky
8587.500 14 SUN Palm Sunday.
8588.521 15 Mon 1 Mars 6.5° N. of Aldebaran; 45° from the Sun in the evening sky; magnitudes 1.5 and 0.9
8588.917 10 Moon 2.63° N.N.E. of Regulus; 125° from the Sun in the evening sky
8589.400 22 The equation of time is 0.
8590.313 16 Tue 20 Mercury 4.3° E. of Venus; 27° and 31° from the Sun in the morning sky; magnitudes 0.2 and -3.9; quasi-conjunction
8590.419 22:03 Moon at perigee; distance 57.10 Earth-radii
8591.603 18 Thu 2 Venus at aphelion, 0.7282 AU from the Sun
8592.500 19 Fri Good Friday

8592.625			3	Moon 7.1° N.N.E. of Spica; 173° and 175° from the Sun in the midnight sky
8592.938			11	Sun enters Aries, at longitude 29.09° on the ecliptic
8592.966			11:11	**Full Moon**
8593.872	20	SAT	9	Sun enters the astrological sign Taurus, i.e. its longitude is 30°
8594.500	21	SUN		Easter
8595.958	22	Mon	11	Moon 7.9° N.N.E. of Antares; 141° and 142° from the Sun in the morning sky
8596.251			18	Lyrid meteors; ZHR 18; 3 days after Full
8596.500	23	Tue		Pi Puppid meteors; ZHR 10; 3 days before Last Quarter
8597.021			13	Moon 1.66° N.N.E. of Jupiter; 129° from the Sun in the morning sky
8599.125	25	Thu	15	Moon 0.45° S.E. of Saturn; 104° and 105° from the Sun in the morning sky
8599.126			15	Moon at descending node; longitude 290.7°
8600.429	26	Fri	22:18	**Last Quarter Moon**
8601.500	28	SUN		Clocks forward 1 hour (Europe)
8602.267			18	Moon at apogee; distance 63.43 Earth-radii
8603.958	30	Tue	11	Moon 3.3° S.S.E. of Neptune; 52° from the Sun in the morning sky
8605.708	May 2	Thu	5	Saturn 2.71° W. of Pluto; 111° and 109° from the Sun in the morning sky; magnitudes 0.5 and 14.3; quasi-conjunction
8606.125			15	Moon 3.4° S.S.E. of Venus; 28° and 27° from the Sun in the morning sky
8606.896	3	Fri	10	Moon 2.73° S.S.E. of Mercury; 19° from the Sun in the morning sky
8607.096			14	Mars and Saturn at heliocentric opposition; longitudes 105.2° and 285.2°
8607.625	4	SAT	3	Moon 4.4° S.S.E. of Uranus; 11° and 10° from the Sun in the morning sky
8608.449			22:46	**New Moon**; beginning of lunation 1192
8609.500	6	Mon		1st day of Ramadan (1440 A.H.)
8609.500				**Eta Aquarid meteors**; ZHR 50; 1 day after New
8609.708			5	Moon 7.9° S.S.E. of the Pleiades; 16° and 15° from the Sun in the evening sky
8610.396			22	Moon 2.23° N. of Aldebaran; 24° from the Sun in the evening sky
8611.500	8	Wed		Eta Lyrid meteors; ZHR 3; 3 days before First Quarter
8611.542			1	Moon 3.2° S.S.E. of Mars; 38° from the Sun in the evening sky
8612.167			16	Mercury 1.26° S.S.E. of Uranus; 14° from the Sun in the morning sky; magnitudes -0.8 and 5.9
8613.286	9	Thu	19	Moon at ascending node; longitude 109.3°

8613.625	10	Fri	3	Moon 6.3° S. of Pollux; 65° and 64° from the Sun in the evening sky
8613.742			6	Venus at southernmost latitude from the ecliptic plane, -3.4°
8615.550	12	SUN	1:12	**First Quarter Moon**
8616.188			17	Moon 2.88° N.N.E. of Regulus; 98° from the Sun in the evening sky
8617.412	13	Mon	21:54	Moon at perigee; distance 57.86 Earth-radii
8617.876	14	Tue	9	The equation of time is at a maximum of 3.65 minutes.
8618.053			13	Sun enters Taurus, at longitude 53.47° on the ecliptic
8619.979	16	Thu	12	Moon 7.1° N.N.E. of Spica; 148° from the Sun in the evening sky
8622.208	18	SAT	17	Venus 1.08° S.S.E. of Uranus; 23° from the Sun in the morning sky; magnitudes -3.9 and 5.9
8622.382			21:10	**Full Moon**
8623.354	19	SUN	21	Moon 7.8° N.N.E. of Antares; 167° and 168° from the Sun in the morning sky
8624.250	20	Mon	18	Moon 1.71° N.N.E. of Jupiter; 157° from the Sun in the morning sky
8624.833	21	Tue	8	Sun enters the astrological sign Gemini, i.e. its longitude is 60°
8625.104			15	Mercury 3.7° S.S.E. of the Pleiades; 0° and 4° from the Sun in the evening sky; magnitudes -2.3 and 2.9
8626.300	22	Wed	19	Moon at descending node; longitude 288.5°
8626.458			23	**Moon, Saturn, and Pluto within circle of diameter 2.94°**; 130° west of the Sun
8626.458			23	Moon 0.63° S.E. of Saturn; 131° from the Sun in the morning sky
8629.229	25	SAT	18	Mercury 6.5° N.N.W. of Aldebaran; 5° and 8° from the Sun in the evening sky; magnitudes -1.8 and 0.9
8630.059	26	SUN	13	Moon at apogee; distance 63.36 Earth-radii
8630.190			16:33	**Last Quarter Moon**
8631.333	27	Mon	20	Moon 3.5° S.S.E. of Neptune; 78° from the Sun in the morning sky
8635.083	31	Fri	14	Moon 4.5° S.S.E. of Uranus; 35° from the Sun in the morning sky
8636.375	Jun 1	SAT	21	Moon 3.1° S.S.E. of Venus; 20° from the Sun in the morning sky
8637.042	2	SUN	13	Moon 7.9° S.S.E. of the Pleiades; 12° from the Sun in the morning sky
8637.729	3	Mon	6	Moon 2.27° N. of Aldebaran; 4° and 6° from the Sun in the morning sky
8637.918			10:02	**New Moon**; beginning of lunation 1193
8639.208	4	Tue	17	Moon 3.7° S. of Mercury; 17° and 16° from the Sun in the evening sky
8640.146	5	Wed	16	Moon 1.60° S. of Mars; 29° from the Sun in the evening sky

8640.450			23	Moon at ascending node; longitude 107.9°
8640.896	6	Thu	10	Moon 6.2° S. of Pollux; 39° and 38° from the Sun in the evening sky
8641.500	7	Fri		Daytime Arietid meteors; ZHR 30; 3 days before First Quarter
8642.469			23:16	Moon at perigee; distance 57.78 Earth-radii
8643.396	8	SAT	22	Moon 3.0° N.N.E. of Regulus; 72° from the Sun in the evening sky
8643.500	9	SUN		Whit Sunday
8643.688			5	Venus 5.1° S.S.E. of the Pleiades; 18° and 19° from the Sun in the morning sky; magnitudes -3.9 and 2.9
8644.750	10	Mon	5:59	First Quarter Moon
8647.250	12	Wed	18	Moon 7.3° N.N.E. of Spica; 123° and 122° from the Sun in the evening sky
8647.899	13	Thu	10	The equation of time is 0.
8650.688	16	SUN	5	Moon 7.8° N.N.E. of Antares; 166° and 164° from the Sun in the evening sky
8651.333			20	Moon 1.99° N.N.E. of Jupiter; 173° from the Sun in the midnight sky
8651.479			24	Venus 4.7° N. of Aldebaran; 16° and 17° from the Sun in the morning sky; magnitudes -3.9 and 0.9
8651.854	17	Mon	8:30	Full Moon
8653.271	18	Tue	19	Mercury 0.22° N.N.E. of Mars; 24° from the Sun in the evening sky; magnitudes 0.2 and 1.8
8653.577	19	Wed	2	Moon at descending node; longitude 287.6°
8653.688			5	Moon 0.56° S.E. of Saturn; 159° from the Sun in the morning sky
8654.063			14	Mercury 5.4° S.S.W. of Pollux; 25° and 26° from the Sun in the evening sky; magnitudes 0.3 and 1.2
8655.833	21	Fri	8	Mars 5.5° S. of Pollux; 24° from the Sun in the evening sky; magnitudes 1.8 and 1.2
8656.164			15:56	Sun enters the astrological sign Cancer, i.e. its longitude is 90°
8656.164			15:56	June or summer solstice
8656.616	22	SAT	3	Sun enters Gemini, at longitude 90.43° on the ecliptic
8657.500	23	SUN		June Boötid meteors; ZHR 5; 2 days before Last Quarter
8657.821			8	Moon at apogee; distance 63.43 Earth-radii
8658.667	24	Mon	4	Moon 3.6° S.S.E. of Neptune; 104° from the Sun in the morning sky
8659.908	25	Tue	9:47	Last Quarter Moon
8662.563	28	Fri	2	Moon 4.5° S.S.E. of Uranus; 60° from the Sun in the morning sky
8664.438	29	SAT	23	Moon 7.9° S.S.E. of the Pleiades; 37° and 38° from the Sun in the morning sky
8665.125	30	SUN	15	Moon 2.25° N. of Aldebaran; 29° from the Sun in the morning sky

8666.438	Jul	1	Mon 23	Moon 1.64° S.S.E. of Venus; 12° from the Sun in the morning sky
8667.303		2	Tue 19:16	**New Moon**; beginning of lunation 1194. Total eclipse of the Sun
8667.788		3	Wed 7	Moon at ascending node; longitude 107.6°
8668.229			18	Moon 6.1° S. of Pollux; 13° from the Sun in the evening sky
8668.750		4	Thu 6	Moon 0.19° E.N.E. of Mars; 20° and 19° from the Sun in the evening sky
8668.917			10	Moon 3.3° N.N.E. of Mercury; 22° from the Sun in the evening sky
8669.458			23	**Earth at aphelionn**; 1.0167 AU from the Sunom the Sun
8669.708		5	Fri 4:60	Moon at perigee; distance 57.03 Earth-radii
8670.032			13	Venus at ascending node through the ecliptic plane
8670.458			23	Mercury 3.8° S.S.E. of Mars; 21° and 19° from the Sun in the evening sky; magnitudes 1.7 and 1.8
8670.688		6	SAT 5	Moon 3.1° N.N.E. of Regulus; 46° from the Sun in the evening sky
8671.695		7	SUN 5	Venus at northernmost declination, 23.43°
8673.955		9	Tue 10:55	**First Quarter Moon**
8674.479			24	Moon 7.3° N.N.E. of Spica; 97° and 96° from the Sun in the evening sky
8674.512		10	Wed 0	Middle of eclipse season: Sun is at same longitude as Moon's ascending node, 107.5°
8677.938		13	SAT 11	Moon 7.8° N.N.E. of Antares; 140° and 139° from the Sun in the evening sky
8678.375			21	Moon 2.31° N.N.E. of Jupiter; 145° from the Sun in the evening sky
8680.833		16	Tue 8	Moon 0.44° E.S.E. of Saturn; 174° and 173° from the Sun in the midnight sky
8680.880			9	Moon at descending node; longitude 287.7°
8681.402			21:38	**Full Moon. Partial eclipse of the Moon**
8685.510		21	SUN 0	Moon at apogee; distance 63.58 Earth-radii
8685.795			7	Sun enters Cancer, at longitude 118.26° on the ecliptic
8685.958			11	Moon 3.6° S.S.E. of Neptune; 130° from the Sun in the morning sky
8687.208		22	Mon 17	Venus 6.0° S. of Pollux; 6° and 9° from the Sun in the morning sky; magnitudes -3.9 and 1.2
8687.620		23	Tue 3	Sun enters the astrological sign Leo, i.e. its longitude is 120°
8689.555		25	Thu 1:19	**Last Quarter Moon**
8689.604			3	Mercury 5.6° S.S.W. of Venus; 7° and 6° from the Sun in the morning sky; magnitudes 4.1 and -3.9
8689.958			11	Moon 4.5° S.S.E. of Uranus; 85° and 86° from the Sun in the morning sky
8690.994		26	Fri 12	The equation of time is at a minimum of -6.55 minutes.

8691.833		27 SAT	8	Moon 7.9° S.S.E. of the Pleiades; 63° and 64° from the Sun in the morning sky
8692.500		28 SUN		Piscid Austrinid meteors; ZHR 5; 4 days before New
8692.521			1	Moon 2.25° N. of Aldebaran; 55° from the Sun in the morning sky
8694.500		30 Tue		**Southern Delta Aquarid meteors**; ZHR 25; 2 days before New
8694.500				Alpha Capricornid meteors; ZHR 5; 2 days before New
8695.211			17	Moon at ascending node; longitude 107.6°
8695.646		31 Wed	4	Moon 4.5° N. of Mercury; 14° from the Sun in the morning sky
8695.646			4	Moon 6.1° S. of Pollux; 14° and 16° from the Sun in the morning sky
8696.396			22	Moon 0.71° N.E. of Venus; 4° from the Sun in the morning sky
8696.633	Aug	1 Thu	3:12	**New Moon**; beginning of lunation 1195
8697.375			21	Moon 1.65° N.N.E. of Mars; 11° and 10° from the Sun in the evening sky
8697.801		2 Fri	7:13	Moon at perigee; distance 56.35 Earth-radii
8698.063			14	Moon 3.1° N.N.E. of Regulus; 20° from the Sun in the evening sky
8701.729		6 Tue	6	Moon 7.3° N.N.E. of Spica; 71° and 70° from the Sun in the evening sky
8703.230		7 Wed	17:32	**First Quarter Moon**
8703.500		8 Thu	0	Mercury 9.2° S. of Pollux; 19° and 23° from the Sun in the morning sky; magnitudes 0.4 and 1.2
8703.883			9	Venus at perihelion, 0.7185 AU from the Sun
8705.167		9 Fri	16	Moon 7.8° N.N.E. of Antares; 114° and 113° from the Sun in the evening sky
8705.521		10 SAT	1	Moon 2.46° N.N.E. of Jupiter; 118° and 117° from the Sun in the evening sky
8706.623		11 SUN	3	Sun enters Leo, at longitude 138.18° on the ecliptic
8707.938		12 Mon	11	Moon 0.31° E. of Saturn; 146° from the Sun in the evening sky
8708.115			15	Moon at descending node; longitude 287.4°
8708.125			15	Jupiter 6.9° N.E. of Antares; 115° and 110° from the Sun in the evening sky; magnitudes -2.3 and 1.0; quasi-conjunction
8708.500		13 Tue		Perseid meteors; ZHR 110; 3 days before Full
8709.729		14 Wed	6	Venus at superior conjunction with the Sun; 1.731 AU from Earth; latitude 3.06°
8710.985		15 Thu	12	Venus brightest; magnitude -3.92°
8711.021			12:30	**Full Moon**
8712.971		17 SAT	11	Moon at apogee; distance 63.69 Earth-radii
8713.188			17	Moon 3.5° S.S.E. of Neptune; 156° and 157° from the Sun in the morning sky
8713.458			23	Mars 0.66° N.N.E. of Regulus; 5° from the Sun in the evening sky; magnitudes 1.8 and 1.4
8713.500		18 SUN		Kappa Cygnid meteors; ZHR 3; 3 days after Full

8716.750	21	Wed	6	Venus 0.90° N.N.E. of Regulus; 2° from the Sun in the evening sky; magnitudes -3.9 and 1.4
8717.271			19	Moon 4.4° S.S.E. of Uranus; 111° and 112° from the Sun in the morning sky
8718.920	23	Fri	10	Sun enters the astrological sign Virgo, i.e. its longitude is 150°
8719.123			14:58	**Last Quarter Moon**
8719.167			16	Moon 7.8° S.S.E. of the Pleiades; 89° and 90° from the Sun in the morning sky
8719.875	24	SAT	9	Moon 2.37° N. of Aldebaran; 81° from the Sun in the morning sky
8720.229			18	Venus 0.29° N.N.E. of Mars; 3° from the Sun in the evening sky; magnitudes -3.9 and 1.8
8722.577	27	Tue	2	Moon at ascending node; longitude 106.7°
8723.083			14	Moon 6.1° S. of Pollux; 40° and 41° from the Sun in the morning sky
8724.750	29	Thu	6	Mercury 1.28° N.N.E. of Regulus; 6° from the Sun in the morning sky; magnitudes -1.6 and 1.4
8725.500	30	Fri	0	Moon 3.1° N.N.E. of Regulus; 7° from the Sun in the morning sky
8725.539			1	Venus at northernmost latitude from the ecliptic plane, 3.4°
8725.604			3	Moon 1.86° N.N.E. of Mercury; 6° and 5° from the Sun in the morning sky
8725.943			10:37	**New Moon**; beginning of lunation 1196
8726.021			13	Moon 2.91° N.N.E. of Mars; 4° and 1° from the Sun in the evening sky
8726.165			15:58	Perigee only 5.3 hours after New Moon
8726.165			15:58	Moon at perigee; distance 56.00 Earth-radii
8726.271			19	Moon 2.79° N.N.E. of Venus; 6° and 5° from the Sun in the evening sky
8727.500	Sep	1	SUN	1st day of Muslim year (1441 A.H.)
8727.500				Aurigid meteors; ZHR 5; 2 days after New
8728.335			20	The equation of time is 0.
8729.083	2	Mon	14	Moon 7.1° N.N.E. of Spica; 45° and 44° from the Sun in the evening sky
8730.188	3	Tue	17	Mercury 0.64° N.N.E. of Mars; 2° and 1° from the Sun in the evening sky; magnitudes -1.8 and 1.7
8732.438	5	Thu	23	Moon 7.6° N.N.E. of Antares; 88° and 87° from the Sun in the evening sky
8732.632	6	Fri	3:11	**First Quarter Moon**
8732.833			8	Moon 2.27° N.N.E. of Jupiter; 92° from the Sun in the evening sky
8735.083	8	SUN	14	Moon 0.15° E.S.E. of Saturn; 118° from the Sun in the evening sky
8735.235			18	Moon at descending node; longitude 286.0°
8736.182	9	Mon	16	September Epsilon Perseid meteors; ZHR 10; 4 days after First Quarter
8740.057	13	Fri	13	Moon at apogee; distance 63.71 Earth-radii

8740.063			14	Mercury 0.29° S.S.W. of Venus; 8° from the Sun in the evening sky; magnitudes -0.9 and -3.9
8740.375			21	Moon 3.4° S.S.E. of Neptune; 174° and 176° from the Sun in the midnight sky
8740.690	14	SAT	4:34	**Full Moon**
8743.846	17	Tue	8	Sun enters Virgo, at longitude 174.16° on the ecliptic
8744.479			24	Moon 4.2° S.S.E. of Uranus; 138° and 139° from the Sun in the morning sky
8746.438	19	Thu	23	Moon 7.6° S.S.E. of the Pleiades; 116° and 117° from the Sun in the morning sky
8746.477			23	Mars and Neptune at heliocentric opposition; longitudes 167.4° and 347.4°
8747.146	20	Fri	16	Moon 2.59° N. of Aldebaran; 108° from the Sun in the morning sky
8748.613	22	SUN	2:42	**Last Quarter Moon**
8749.771	23	Mon	7	Moon at ascending node; longitude 104.4°
8749.827			7:51	**September of fall or autumn equinox**
8749.827			7:51	Sun enters the astrological sign Libra, i.e. its longitude is 180°
8750.458			23	Moon 5.9° S. of Pollux; 67° and 68° from the Sun in the morning sky
8752.938	26	Thu	11	Moon 3.1° N.N.E. of Regulus; 33° from the Sun in the morning sky
8754.604	28	SAT	2:29	Moon at perigee; distance 56.10 Earth-radii
8754.604			2:29	Perigee only 16.0 hours before New Moon
8754.688			5	Moon 3.8° N.N.E. of Mars; 10° and 9° from the Sun in the morning sky
8755.269			18:27	**New Moon**; beginning of lunation 1197
8755.500	29	SUN		Rosh Hashanah, 1st say of Hebrew year 5780 A.M.
8755.708			5	Mercury 1.29° N.N.E. of Spica; 18° from the Sun in the evening sky; magnitudes -0.3 and 1.0
8756.167			16	Moon 4.0° N.N.E. of Venus; 14° and 13° from the Sun in the evening sky
8756.521	30	Mon	1	Moon 7.0° N.N.E. of Spica; 18° and 17° from the Sun in the evening sky
8756.604			3	Moon 5.8° N.N.E. of Mercury; 19° from the Sun in the evening sky
8759.771	Oct 3	Thu	7	Moon 7.3° N.N.E. of Antares; 61° and 60° from the Sun in the evening sky
8760.333			20	Venus 2.88° N.N.E. of Spica; 14° from the Sun in the evening sky; magnitudes -3.9 and 1.0
8760.396			22	Moon 1.87° N.N.E. of Jupiter; 69° and 68° from the Sun in the evening sky
8762.199	5	SAT	16:47	**First Quarter Moon**
8762.286			19	Moon at descending node; longitude 283.2°
8762.375			21	Moon 0.31° S.E. of Saturn; 92° from the Sun in the evening sky

8762.553 6 SUN 1 October Camelopardalid meteors; ZHR 5; near First Quarter
8763.868 7 Mon 9 Summer solstice on Mars
8765.493 8 Tue 24 **Draconid meteors**; ZHR 20; 3 days after First Quarter
8766.500 10 Thu Southern Taurid meteors; ZHR 5; 3 days before Full
8767.276 19 Moon at apogee; distance 63.64 Earth-radii
8767.500 11 Fri Delta Aurigid meteors; ZHR 2; 2 days before Full
8767.583 2 Moon 3.4° S.S.E. of Neptune; 149° from the Sun in the evening sky
8770.382 13 SUN 21:10 **Full Moon**
8771.646 15 Tue 4 Moon 4.1° S.S.E. of Uranus; 165° and 166° from the Sun in the morning sky
8773.667 17 Thu 4 Moon 7.4° S.S.E. of the Pleiades; 143° from the Sun in the morning sky
8774.375 21 Moon 2.81° N. of Aldebaran; 134° from the Sun in the morning sky
8774.500 18 Fri Epsilon Geminid meteors; ZHR 3; 3 days before Last Quarter
8776.812 20 SUN 7 Moon at ascending node; longitude 101.4°
8777.500 21 Mon **Orionid meteors**; ZHR 25; near Last Quarter
8777.750 6 Moon 5.6° S. of Pollux; 94° from the Sun in the morning sky
8778.028 12:40 **Last Quarter Moon**
8780.222 23 Wed 17 Sun enters the astrological sign Scorpius, i.e. its longitude is 210°
8780.313 20 Moon 3.3° N.N.E. of Regulus; 60° from the Sun in the morning sky
8780.500 24 Thu Leo Minorid meteors; ZHR 2; 3 days before New
8781.595 25 Fri 2 Venus at descending node through the ecliptic plane
8782.946 26 SAT 10:42 Moon at perigee; distance 56.65 Earth-radii
8783.354 21 Moon 4.2° N.N.E. of Mars; 19° and 18° from the Sun in the morning sky
8783.500 27 SUN Clocks back 1 hour (Europe)
8783.979 12 Moon 7.0° N.N.E. of Spica; 11° and 10° from the Sun in the morning sky
8784.652 28 Mon 3:39 **New Moon**; beginning of lunation 1198
8786.167 29 Tue 16 Moon 3.7° N.N.E. of Venus; 21° and 20° from the Sun in the evening sky
8786.292 19 Moon 6.4° N.N.E. of Mercury; 22° from the Sun in the evening sky
8787.167 30 Wed 16 Moon 7.1° N.N.E. of Antares; 34° and 33° from the Sun in the evening sky
8787.708 31 Thu 5 Mercury 2.55° S.S.W. of Venus; 20° and 21° from the Sun in the evening sky; magnitudes 0.5 and -3.9
8788.039 13 Sun enters Libra, at longitude 217.80° on the ecliptic
8788.125 15 Moon 1.30° N.N.E. of Jupiter; 46° and 45° from the Sun in the evening sky

8789.403 Nov 1 Fri 22 Moon at descending node; longitude 280.3°

8789.833	2	SAT	8	Moon 0.67° S.S.E. of Saturn; 66° from the Sun in the evening sky
8790.500	3	SUN		Clocks back 1 hour (America)
8791.126			15	The equation of time is at a maximum of 16.49 minutes.
8791.932	4	Mon	10:22	**First Quarter Moon**
8794.833	7	Thu	8	Moon 3.6° S.S.E. of Neptune; 121° from the Sun in the evening sky
8794.867			9	Moon at apogee; distance 63.51 Earth-radii
8797.333	9	SAT	20	Venus 3.9° N. of Antares; 23° from the Sun in the evening sky; magnitudes -3.9 and 1.0
8797.479			24	Mars 2.83° N.N.E. of Spica; 23° and 24° from the Sun in the morning sky; magnitudes 1.8 and 1.0
8798.500	11	Mon		Armistice Day
8798.833			8	Moon 4.1° S.S.E. of Uranus; 165° from the Sun in the evening sky
8799.500	12	Tue		Northern Taurid meteors; ZHR 5; near Full
8800.067			13:36	**Full Moon**
8800.917	13	Wed	10	Moon 7.3° S.S.E. of the Pleiades; 170° from the Sun in the morning sky
8801.625	14	Thu	3	Moon 2.94° N. of Aldebaran; 162° and 161° from the Sun in the morning sky
8803.867	16	SAT	9	Moon at ascending node; longitude 99.1°
8804.979	17	SUN	12	Moon 5.4° S. of Pollux; 121° from the Sun in the morning sky
8805.438			23	**Leonid meteors**; ZHR 15; 2 days before Last Quarter
8807.383	19	Tue	21:12	**Last Quarter Moon**
8807.583	20	Wed	2	Moon 3.6° N.N.E. of Regulus; 87° and 88° from the Sun in the morning sky
8808.500	21	Thu		Alpha Monocerotid meteors; ZHR 5; 5 days before New
8810.124	22	Fri	15	Sun enters the astrological sign Sagittarius, i.e. its longitude is 240°
8810.821	23	SAT	7:42	Moon at perigee; distance 57.50 Earth-radii
8811.253			18	Sun enters Scorpius, at longitude 241.14° on the ecliptic
8811.354			21	Moon 7.1° N.N.E. of Spica; 37° from the Sun in the morning sky
8812.021	24	SUN	13	Moon 4.0° N.N.E. of Mars; 28° from the Sun in the morning sky
8812.042			13	Venus 1.41° S. of Jupiter; 26° from the Sun in the evening sky; magnitudes -3.9 and -1.8
8812.542	25	Mon	1	Mercury 9.5° E. of Mars; 20° and 29° from the Sun in the morning sky; magnitudes -0.3 and 1.7; quasi-conjunction
8812.688			5	Moon 1.81° N.N.E. of Mercury; 19° and 20° from the Sun in the morning sky
8814.130	26	Tue	15:07	**New Moon**; beginning of lunation 1199
8814.604	27	Wed	3	Moon 7.1° N.N.E. of Antares; 7° from the Sun in the evening sky
8815.500	28	Thu		November Orionid meteors; ZHR 3; 1 day after New

8815.979			12	Moon 0.78° N.N.E. of Jupiter; 24° and 23° from the Sun in the evening sky
8816.198			17	Venus at southernmost declination, -24.79°
8816.269			18	Venus at aphelion, 0.7282 AU from the Sun
8816.313			20	Moon 1.87° N. of Venus; 28° and 27° from the Sun in the evening sky
8816.676	29	Fri	4	Moon at descending node; longitude 278.6°
8817.396			22	Moon 0.95° S.S.E. of Saturn; 41° from the Sun in the evening sky
8817.642	30	SAT	3	**Moon, Saturn, and Pluto within circle of diameter 3.60°**; 42° east of the Sun
8818.067			14	Sun enters Ophiuchus, at longitude 248.04° on the ecliptic
8819.500	Dec 2	Mon		Phoenicid meteors; ZHR 5; 2 days before First Quarter
8821.790	4	Wed	6:58	**First Quarter Moon**
8822.146			16	Moon 3.8° S.S.E. of Neptune; 94° from the Sun in the evening sky
8822.675	5	Thu	4	Moon at apogee; distance 63.41 Earth-radii
8824.500	7	SAT		Puppid-Velid meteors; ZHR 10; 3 days after First Quarter
8826.104	8	SUN	15	Moon 4.3° S.S.E. of Uranus; 137° from the Sun in the evening sky
8826.500	9	Mon		Monocerotid meteors; ZHR 3; 3 days before Full
8828.271	10	Tue	19	Moon 7.3° S.S.E. of the Pleiades; 162° and 161° from the Sun in the evening sky
8828.917	11	Wed	10	Venus 1.80° S. of Saturn; 30° from the Sun in the evening sky; magnitudes -4.0 and 0.6
8828.958			11	Moon 2.95° N. of Aldebaran; 170° and 169° from the Sun in the evening sky
8829.500	12	Thu		Sigma Hydrid meteors; ZHR 3; near Full
8829.718			5:14	**Full Moon**
8830.292			19	**Venus, Saturn, and Pluto within circle of diameter 2.68°**; 30° east of the Sun
8831.094	13	Fri	14	Moon at ascending node; longitude 98.4°
8831.146			16	Venus 1.13° S. of Pluto; 31° and 30° from the Sun in the evening sky; magnitudes -4.0 and 14.4
8831.375			21	Moonnor southernmost declination in ye 23.233.23°
8832.018	14	SAT	12	Geminid meteors; ZHR 120; 2 days after Full
8832.229			18	Moon 5.3° S. of Pollux; 148° and 149° from the Sun in the morning sky
8833.500	16	Mon		Coma Berenicid meteors; ZHR 3; 3 days before Last Quarter
8833.792			7	Mercury 5.0° N.N.E. of Antares; 14° and 15° from the Sun in the morning sky; magnitudes -0.6 and 1.0
8834.792	17	Tue	7	Moon 3.7° N.N.E. of Regulus; 115° from the Sun in the morning sky
8836.344	18	Wed	20:16	Moon at perigee; distance 58.05 Earth-radii

8836.348		20	Sun enters Sagittarius, at longitude 266.61° on the ecliptic
8836.707	19 Thu	4:58	**Last Quarter Moon**
8837.500	20 Fri		December Leo Minorid meteors; ZHR 5; 1 day after Last Quarter
8838.442		23	Venus at southernmost latitude from the ecliptic plane, -3.4°
8838.646	21 SAT	4	Moon 7.2° N.N.E. of Spica; 65° from the Sun in the morning sky
8839.500	22 SUN		**Ursid meteors**; ZHR 15; 3 days before New
8839.681		4:21	Sun enters the astrological sign Capricornus, i.e. its longitude is 270°
8839.681		4:21	**December or winter solstice**
8840.688	23 Mon	5	Moon 3.4° N.N.E. of Mars; 38° and 39° from the Sun in the morning sky
8841.958	24 Tue	11	Moon 7.1° N.N.E. of Antares; 22° and 23° from the Sun in the morning sky
8842.500	25 Wed		Christmas
8843.000		12	Moon 1.93° N.N.E. of Mercury; 9° from the Sun in the morning sky
8843.151		16	The equation of time is 0.
8843.718	26 Thu	5:14	**New Moon**; beginning of lunation 1200. Annular eclipse of the Sun
8843.833		8	Moon 0.30° N.E. of Jupiter; 1° from the Sun in the evening sky
8844.043		13	Moon at descending node; longitude 278.4°
8844.333		20	Moon at southernmost declination in year, -23.23°
8845.021	27 Fri	13	Moon 1.23° S.S.E. of Saturn; 16° and 15° from the Sun in the evening sky
8846.604	29 SUN	3	Moon 1.01° S.S.E. of Venus; 34° from the Sun in the evening sky
8847.845	30 Mon	8	Middle of eclipse season: Sun is at same longitude as Moon's descending node, 278.3°