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. (Sometimes the hour appears as "24" or the minute as "60," because the instant was shortly before the end of the UT day.)

Occasions such as "Moon 1.25° NNE 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, and typically happens when a planet is near its stationary moment.

Occasions when three bodies are within a circle of small size are "**trios**." Like appulses, they are most interesting when the bodies are bright and are not at small elongation from the Sun.

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 errors you notice. It's hard to check the accuracy of every detail, but errors are more easily corrected here than in the former printed *Astronomical Calendars!*

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This calendar may be subject to improvement. Come back to it!

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

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2019

8485.458	Jan	1	Tue 23	Moon 1.25° NNE of Venus; 47° from the Sun in the morning sky
8485.482	Jan	1	Tue 24	Mercury at descending node through the ecliptic plane
8485.529	Jan	2	Wed 1	Mars crosses equator northward
8485.748	Jan	2	Wed 6	Saturn at conjunction with the Sun; 11.044 AU from Earth; latitude 0.53°
8486.5	Jan	3	Thu	**Quadrantid meteors**; ZHR 110; peak Jan 3 20h; 2 days before New
8486.627	Jan	3	Thu 3	**Earth at perihelion**; †1/2 AU from the Sun

8486.729 Jan 3 Thu 6 Moon 8.4° NNE of Antares; 32° and 33° from the Sun in the morning sky
8486.896 Jan 3 Thu 10 Moon 3.1° NNE of Jupiter; 30° from the Sun in the morning sky
8488.271 Jan 4 Fri 19 Moon 2.76° N of Mercury; 15° from the Sun in the morning sky
8488.807 Jan 5 SAT 7:22 Latest sunrise, at latitude 40° north
8489.292 Jan 5 SAT 19 Moon 0.88° N of Saturn; 3° from the Sun in the morning sky
8489.300 Jan 5 SAT 19 Venus dichotomy (D-shape)
8489.562 Jan 6 SUN 1:29 **New Moon**; beginning of lunation 1188. Partial eclipse of the Sun
8489.691 Jan 6 SUN 5 **Venus at westernmost elongation**; 46.9° from Sun in morning sky
8490.269 Jan 6 SUN 18 Uranus stationary in longitude; resumes direct motion
8490.507 Jan 7 Mon 0 Moon at descending node; longitude 296.7°
8490.514 Jan 7 Mon 0 Uranus stationary in right ascension; resumes direct motion
8491.125 Jan 7 Mon 15 Moon shows minimum libration for the year, 1.22°
8492.680 Jan 9 Wed 4 Moon at apogee; distance 63.67 Earth-radii
8494.244 Jan 10 Thu 18 Mercury at southernmost declination, -24.15°
8494.542 Jan 11 Fri 1 Moon 2.96° SE of Neptune; 54° from the Sun in the evening sky
8494.725 Jan 11 Fri 5 Pluto at conjunction with the Sun; 34.702 AU from Earth; latitude -0.12°
8495.851 Jan 12 SAT 8 Mercury at aphelion, 0.4667 AU from the Sun
8496.521 Jan 13 SUN 1 Moon 5.0° SE of Mars; 76° from the Sun in the evening sky
8497.000 Jan 13 SUN 12 Mercury 1.72° S of Saturn; 10° from the Sun in the morning sky; magnitudes -0.6 and 0.5
8497.781 Jan 14 Mon 6:45 **First Quarter Moon**
8498.188 Jan 14 Mon 17 Moon 4.8° SE of Uranus; 95° and 94° from the Sun in the evening sky
8498.708 Jan 15 Tue 5 Mars at ascending node through the ecliptic plane
8500.604 Jan 17 Thu 3 Moon 8.5° SE of the Pleiades; 124° and 123° from the Sun in the evening sky
8500.641 Jan 17 Thu 3 Middle of eclipse season: Sun is at same longitude as Moon's descending node, 296.7°
8500.708 Jan 17 Thu 5 Venus 7.8° N of Antares; 47° from the Sun in the morning sky; magnitudes -4.4 and 1.0
8500.840 Jan 17 Thu 8 Venus at northernmost latitude from the ecliptic plane, 3.4°
8501.271 Jan 17 Thu 19 Moon 1.60° N of Aldebaran; 133° and 132° from the Sun in the evening sky
8502.561 Jan 19 SAT 1 Uranus at east quadrature, 90° from the Sun
8502.854 Jan 19 SAT 9 Moon 3.1° S of M35 cluster; 154° and 153° from the Sun in the evening sky
8503.596 Jan 20 SUN 2 Sun enters Capricornus, at longitude 299.71° on the ecliptic

8503.877 Jan 20 SUN 9 Sun enters the astrological sign Aquarius, i.e. its longitude is 300°
8504.292 Jan 20 SUN 19 Moon 7.0° S of Pollux; 174° and 170° from the Sun in the midnight sky
8504.450 Jan 20 SUN 23 Moon at ascending node; longitude 116.8°
8504.719 Jan 21 Mon 5:16 **Full Moon. Total eclipse of the Moon**
8505.188 Jan 21 Mon 17 Moon 0.44° SE of Beehive Cluster; 173° and 174° from the Sun in the midnight sky
8505.333 Jan 21 Mon 20:00 Perigee only 14.7 hours after Full Moon
8505.333 Jan 21 Mon 20:00 Moon at perigee; distance 56.03 Earth-radii
8506.167 Jan 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 Jan 23 Wed 4 Moon 2.45° NNE of Regulus; 153° from the Sun in the morning sky
8510.396 Jan 26 SAT 22 Moon 7.3° NNE of Spica; 102° and 103° from the Sun in the morning sky
8511.208 Jan 27 SUN 17 Moon shows maximum libration for the year, 10.11°
8511.383 Jan 27 SUN 21:11 **Last Quarter Moon**
8513.607 Jan 30 Wed 3 Mercury at superior conjunction with the Sun; 1.407 AU from Earth; latitude -6.93°
8513.979 Jan 30 Wed 12 Moon 8.4° NNE of Antares; 59° and 60° from the Sun in the morning sky
8514.563 Jan 31 Thu 2 Moon 2.74° NNE of Jupiter; 53° from the Sun in the morning sky
8515.250 Jan 31 Thu 18 Moon 0.19° ENE of Venus; 45° from the Sun in the morning sky

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8516.111 Feb 1 Fri 15 Mercury at southernmost latitude from the ecliptic plane, -7.0°
8516.5 Feb 2 SAT Ground Hog Day
8516.813 Feb 2 SAT 8 Moon 0.65° NNE of Saturn; 28° from the Sun in the morning sky
8517.775 Feb 3 SUN 7 Moon at descending node; longitude 296.8°
8519.378 Feb 4 Mon 21:04 **New Moon**; beginning of lunation 1189
8519.813 Feb 5 Tue 8 Moon 0.23° SE of Mercury; 5° from the Sun in the evening sky
8519.894 Feb 5 Tue 9 Moon at apogee; distance 63.74 Earth-radii; farthest in year
8521.875 Feb 7 Thu 9 Moon 2.98° SE of Neptune; 27° from the Sun in the evening sky
8522.5 Feb 8 Fri Alpha Centaurid meteors; ZHR 6; peak Feb 8 7h; 3 days after New
8525.358 Feb 10 SUN 21 Moon, Mars, and Uranus within circle of diameter 5.68°; about 66° from the Sun in the evening sky; magnitudes -9, 1, 6
8525.396 Feb 10 SUN 22 Moon 5.7° SE of Mars; 66° from the Sun in the evening sky
8525.521 Feb 11 Mon 1 Moon 4.7° SE of Uranus; 68° and 67° from the Sun in the evening sky

8526.153 Feb 11 Mon 16 The equation of time is at a minimum of -14.24 minutes.
8527.434 Feb 12 Tue 22:25 **First Quarter Moon**
8527.750 Feb 13 Wed 6 Mars 0.98° NNW of Uranus; 65° from the Sun in the evening sky; magnitudes 1.0 and 5.8
8527.979 Feb 13 Wed 12 Moon 8.4° SE of the Pleiades; 97° and 96° from the Sun in the evening sky
8528.5 Feb 14 Thu St. Valentine's Day
8528.667 Feb 14 Thu 4 Moon 1.70° N of Aldebaran; 105° from the Sun in the evening sky
8530.292 Feb 15 Fri 19 Moon 3.1° SE of M35 cluster; 126° and 125° from the Sun in the evening sky
8531.370 Feb 16 SAT 21 Sun enters Aquarius, at longitude 327.89° on the ecliptic
8531.771 Feb 17 SUN 7 Moon 6.9° S of Pollux; 146° and 145° from the Sun in the evening sky
8531.904 Feb 17 SUN 10 Moon at ascending node; longitude 116.5°
8532.667 Feb 18 Mon 4 Moon 0.41° SE of Beehive Cluster; 159° and 158° from the Sun in the evening sky
8533.042 Feb 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 Feb 18 Mon 23 Sun enters the astrological sign Pisces, i.e. its longitude is 330°
8533.750 Feb 19 Tue 6 Mercury 0.67° NNW of Neptune; 15° from the Sun in the evening sky; magnitudes -1.0 and 8.0
8533.869 Feb 19 Tue 8:51 Perigee only 7.0 hours before Full Moon
8533.869 Feb 19 Tue 8:51 Moon at perigee; distance 55.94 Earth-radii; nearest in year
8534.125 Feb 19 Tue 15 Moon 2.43° NNE of Regulus; 177° and 179° from the Sun in the midnight sky
8534.162 Feb 19 Tue 15:53 **Full Moon**
8535.167 Feb 20 Wed 16 Mercury at ascending node through the ecliptic plane
8537.771 Feb 23 SAT 7 Moon 7.2° NNE of Spica; 130° from the Sun in the morning sky
8537.970 Feb 23 SAT 11 Mars and Jupiter at heliocentric opposition; longitudes 71.0° and 251.0°
8539.835 Feb 25 Mon 8 Mercury at perihelion, 0.3075 AU from the Sun
8540.978 Feb 26 Tue 11:29 **Last Quarter Moon**
8541.229 Feb 26 Tue 18 Moon 8.3° NNE of Antares; 87° and 88° from the Sun in the morning sky
8541.552 Feb 27 Wed 1 **Mercury at easternmost elongation**; 18.1° from Sun in evening sky
8542.146 Feb 27 Wed 16 Moon 2.31° NNE of Jupiter; 77° from the Sun in the morning sky

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8544.292 Mar 1 Fri 19 Moon 0.40° NE of Saturn; 53° from the Sun in the morning sky
8544.960 Mar 2 SAT 11 Moon at descending node; longitude 296.0°
8545.438 Mar 2 SAT 23 Moon 1.23° SE of Venus; 40° and 41° from the Sun in the morning sky

8546.976 Mar 4 Mon 11 Moon at apogee; distance 63.72 Earth-radii
8547.723 Mar 5 Tue 5 Mercury stationary in right ascension; starts retrograde motion
8548.259 Mar 5 Tue 18 Mercury stationary in longitude; starts retrograde motion
8548.5 Mar 6 Wed Ash Wednesday
8549.170 Mar 6 Wed 16:04 **New Moon**; beginning of lunation 1190
8549.208 Mar 6 Wed 17 Moon 2.99° SE of Neptune; 4° and 1° from the Sun in the evening sky
8549.546 Mar 7 Thu 1 Neptune at conjunction with the Sun; 30.930 AU from Earth; latitude -0.99°
8550.046 Mar 7 Thu 13 Mercury at northernmost latitude from the ecliptic plane, 7.0°
8550.292 Mar 7 Thu 19 Moon 7.9° SE of Mercury; 13° from the Sun in the evening sky
8552.5 Mar 10 SUN Clocks forward 1 hour (America)
8552.833 Mar 10 SUN 8 Moon 4.6° SE of Uranus; 41° from the Sun in the evening sky
8554.188 Mar 11 Mon 17 Moon 5.5° SE of Mars; 57° and 56° from the Sun in the evening sky
8554.956 Mar 12 Tue 11 Sun enters Pisces, at longitude 351.57° on the ecliptic
8555.229 Mar 12 Tue 18 Moon 8.2° SE of the Pleiades; 69° and 68° from the Sun in the evening sky
8555.938 Mar 13 Wed 11 Moon 1.88° N of Aldebaran; 78° from the Sun in the evening sky
8556.5 Mar 14 Thu Gamma Normid meteors; ZHR 6; peak Mar 14 21h; near First Quarter
8556.561 Mar 14 Thu 1 Jupiter at west quadrature, 90° from the Sun
8556.895 Mar 14 Thu 9 Venus at descending node through the ecliptic plane
8556.935 Mar 14 Thu 10:26 **First Quarter Moon**
8557.570 Mar 15 Fri 2 Mercury at inferior conjunction with the Sun; 0.618 AU from Earth; latitude 5.70°
8557.604 Mar 15 Fri 3 Moon 2.86° S of M35 cluster; 98° from the Sun in the evening sky
8559.146 Mar 16 SAT 16 Moon 6.8° S of Pollux; 119° and 118° from the Sun in the evening sky
8559.183 Mar 16 SAT 16 Moon at ascending node; longitude 114.9°
8559.5 Mar 17 SUN St. Patrick's Day
8560.083 Mar 17 SUN 14 Moon 0.34° SE of Beehive Cluster; 131° from the Sun in the evening sky
8561.583 Mar 19 Tue 2 Moon 2.48° NNE of Regulus; 152° from the Sun in the evening sky
8562.316 Mar 19 Tue 19:35 Moon at perigee; distance 56.34 Earth-radii
8563.417 Mar 20 Wed 22:01 Sun enters the astrological sign Aries, i.e. its longitude is 0°
8563.417 Mar 20 Wed 22:01 **March or spring or vernal equinox**
8563.571 Mar 21 Thu 1:42 **Full Moon**
8565.208 Mar 22 Fri 17 Moon 7.1° NNE of Spica; 157° and 158° from the Sun in the morning sky

8565.403 Mar 22 Fri 22 Spring equinox on Mars
8565.403 Mar 22 Fri 22 Spring equinox on Mars
8568.401 Mar 25 Mon 22 Spring equinox on Mars
8568.401 Mar 25 Mon 22 Spring equinox on Mars
8568.583 Mar 26 Tue 2 Moon 8.1° NNE of Antares; 114° and 115° from the Sun in the morning sky
8569.646 Mar 27 Wed 4 Moon 1.91° NNE of Jupiter; 102° from the Sun in the morning sky
8569.985 Mar 27 Wed 12 Mercury stationary in right ascension; resumes direct motion
8570.674 Mar 28 Thu 4:10 **Last Quarter Moon**
8571.079 Mar 28 Thu 14 Mercury stationary in longitude; resumes direct motion
8571.729 Mar 29 Fri 6 Moon 0.25° E of Saturn; 78° and 79° from the Sun in the morning sky
8572.047 Mar 29 Fri 13 Moon at descending node; longitude 293.7°
8573.451 Mar 30 SAT 23 Mercury at descending node through the ecliptic plane
8573.5 Mar 31 SUN Clocks forward 1 hour (Europe)
8574.208 Mar 31 SUN 17 Mars 3.1° SE of the Pleiades; 50° from the Sun in the evening sky; magnitudes 1.4 and 2.9

8574.5 Apr 1 Mon All Fools' Day
8574.508 Apr 1 Mon 0 Moon at apogee; distance 63.59 Earth-radii
8575.771 Apr 2 Tue 7 Moon 2.55° SE of Venus; 35° and 34° from the Sun in the morning sky
8576.354 Apr 2 Tue 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 Apr 3 Wed 1 Moon, Mercury, and Neptune within circle of diameter 3.39°; about 26° from the Sun in the morning sky; magnitudes -6, 1, 8
8576.563 Apr 3 Wed 2 Moon 3.1° SE of Neptune; 26° from the Sun in the morning sky
8576.583 Apr 3 Wed 2 Moon 3.4° SE of Mercury; 26° from the Sun in the morning sky
8578.869 Apr 5 Fri 8:51 **New Moon**; beginning of lunation 1191
8580.208 Apr 6 SAT 17 Moon 4.5° SE of Uranus; 16° and 15° from the Sun in the evening sky
8582.458 Apr 8 Mon 23 Moon 8.0° SE of the Pleiades; 42° from the Sun in the evening sky
8582.896 Apr 9 Tue 10 Moon 4.6° SE of Mars; 48° and 47° from the Sun in the evening sky
8583.167 Apr 9 Tue 16 Moon 2.11° N of Aldebaran; 51° from the Sun in the evening sky
8583.372 Apr 9 Tue 21 Jupiter at southernmost declination, -22.68°
8583.708 Apr 10 Wed 5 Mercury, Venus, and Neptune within circle of diameter 5.14°; about 31° from the Sun in the morning sky; magnitudes 0, -4, 8
8583.771 Apr 10 Wed 7 Venus 0.29° SE of Neptune; 33° from the Sun in the morning sky; magnitudes -3.9 and 8.0
8583.820 Apr 10 Wed 8 Mercury at aphelion, 0.4667 AU from the Sun

8583.864 Apr 10 Wed 9 Saturn at west quadrature, 90° from the Sun
8584.178 Apr 10 Wed 16 Jupiter stationary in longitude; starts retrograde motion
8584.179 Apr 10 Wed 16 Jupiter stationary in right ascension; starts retrograde motion
8584.854 Apr 11 Thu 9 Moon 2.62° S of M35 cluster; 72° and 71° from the Sun in the evening sky
8585.314 Apr 11 Thu 20 **Mercury at westernmost elongation**; 27.7° from Sun in morning sky
8586.257 Apr 12 Fri 18 Moon at ascending node; longitude 112.0°
8586.295 Apr 12 Fri 19:05 **First Quarter Moon**
8586.417 Apr 12 Fri 22 Moon 6.5° S of Pollux; 92° and 91° from the Sun in the evening sky
8587.396 Apr 13 SAT 22 Moon 0.43° E of Beehive Cluster; 104° from the Sun in the evening sky
8587.5 Apr 14 SUN Palm Sunday.
8588.938 Apr 15 Mon 11 Moon 2.65° NNE of Regulus; 125° from the Sun in the evening sky
8588.938 Apr 15 Mon 11 Mars 6.5° N of Aldebaran; 45° from the Sun in the evening sky; magnitudes 1.5 and 0.9
8589.400 Apr 15 Mon 22 The equation of time is 0.
8590.313 Apr 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 Apr 16 Tue 22:03 Moon at perigee; distance 57.10 Earth-radii
8591.603 Apr 18 Thu 2 Venus at aphelion, 0.7282 AU from the Sun
8592.5 Apr 19 Fri Good Friday
8592.646 Apr 19 Fri 4 Moon 7.1° NNE of Spica; 173° and 175° from the Sun in the midnight sky
8592.938 Apr 19 Fri 11 Sun enters Aries, at longitude 29.09° on the ecliptic
8592.966 Apr 19 Fri 11:11 **Full Moon**
8593.872 Apr 20 SAT 9 Sun enters the astrological sign Taurus, i.e. its longitude is 30°
8594.5 Apr 21 SUN Easter
8595.5 Apr 22 Mon Lyrid meteors; ZHR 18; peak Apr 22 18h; 3 days after Full
8595.979 Apr 22 Mon 12 Moon 7.9° NNE of Antares; 141° and 142° from the Sun in the morning sky
8596.466 Apr 22 Mon 23 Uranus at conjunction with the Sun; 20.854 AU from Earth; latitude -0.51°
8596.5 Apr 23 Tue Pi Puppid meteors; ZHR 10; peak Apr 23 23h; 3 days before Last Quarter
8597.021 Apr 23 Tue 13 Moon 1.66° NNE of Jupiter; 129° from the Sun in the morning sky
8597.698 Apr 24 Wed 5 Pluto stationary in longitude; starts retrograde motion
8598.370 Apr 24 Wed 21 Pluto stationary in right ascension; starts retrograde motion
8599.125 Apr 25 Thu 15 Moon 0.45° SE of Saturn; 104° and 105° from the Sun in the morning sky

8599.126 Apr 25 Thu 15 Moon at descending node; longitude 290.7°
8600.429 Apr 26 Fri 22:18 **Last Quarter Moon**
8602.267 Apr 28 SUN 18 Moon at apogee; distance 63.43 Earth-radii
8603.499 Apr 29 Mon 24 Saturn stationary in longitude; starts retrograde motion
8603.564 Apr 30 Tue 2 Saturn stationary in right ascension; starts retrograde motion
8603.958 Apr 30 Tue 11 Moon 3.3° SE of Neptune; 52° from the Sun in the morning sky
8604.080 Apr 30 Tue 14 Mercury at southernmost latitude from the ecliptic plane, -7.0°

8606.125 May 2 Thu 15 Moon 3.4° SE of Venus; 28° and 27° from the Sun in the morning sky
8606.896 May 3 Fri 10 Moon 2.73° SE of Mercury; 19° from the Sun in the morning sky
8607.096 May 3 Fri 14 Mars and Saturn at heliocentric opposition; longitudes 105.2° and 285.2°
8607.625 May 4 SAT 3 Moon 4.4° SE of Uranus; 11° and 10° from the Sun in the morning sky
8608.449 May 4 SAT 22:46 **New Moon**; beginning of lunation 1192
8609.5 May 6 Mon 1st day of Ramadan (1440 A.H.)
8609.5 May 6 Mon **Eta Aquarid meteors**; ZHR 50; peak May 6 7h; 1 day after New
8609.729 May 6 Mon 6 Moon 7.9° SE of the Pleiades; 16° and 15° from the Sun in the evening sky
8610.417 May 6 Mon 22 Moon 2.25° N of Aldebaran; 24° and 25° from the Sun in the evening sky
8611.5 May 8 Wed Eta Lyrid meteors; ZHR 3; peak May 8 21h; 3 days before First Quarter
8611.542 May 8 Wed 1 Moon 3.2° SE of Mars; 38° from the Sun in the evening sky
8612.083 May 8 Wed 14 Moon 2.41° SE of M35 cluster; 45° from the Sun in the evening sky
8612.167 May 8 Wed 16 Mercury 1.26° SE of Uranus; 14° from the Sun in the morning sky; magnitudes -0.8 and 5.9
8613.286 May 9 Thu 19 Moon at ascending node; longitude 109.3°
8613.458 May 9 Thu 23 Moon 10.0° S of Castor; 63° and 62° from the Sun in the evening sky
8613.646 May 10 Fri 4 Moon 6.3° S of Pollux; 65° and 64° from the Sun in the evening sky
8613.742 May 10 Fri 6 Venus at southernmost latitude from the ecliptic plane, -3.4°
8614.604 May 11 SAT 3 Moon 0.34° NE of Beehive Cluster; 78° and 77° from the Sun in the evening sky
8615.550 May 12 SUN 1:12 **First Quarter Moon**
8616.188 May 12 SUN 17 Moon 2.87° NNE of Regulus; 98° from the Sun in the evening sky
8617.412 May 13 Mon 21:54 Moon at perigee; distance 57.86 Earth-radii
8617.876 May 14 Tue 9 The equation of time is at a maximum of 3.65 minutes.

8618.053 May 14 Tue 13 Sun enters Taurus, at longitude 53.47° on the ecliptic
8620.000 May 16 Thu 12 Moon 7.1° NNE of Spica; 149° from the Sun in the evening sky
8620.435 May 16 Thu 22 Mars at northernmost declination, 24.56°
8622.208 May 18 SAT 17 Venus 1.08° SE of Uranus; 23° from the Sun in the morning sky; magnitudes -3.9 and 5.9
8622.382 May 18 SAT 21:10 **Full Moon**
8623.136 May 19 SUN 15 Mercury at ascending node through the ecliptic plane
8623.146 May 19 SUN 16 Mars 0.23° N of M35 cluster; 34° from the Sun in the evening sky; magnitudes 1.7 and 5.3
8623.354 May 19 SUN 21 Moon 7.8° NNE of Antares; 167° and 168° from the Sun in the morning sky
8624.250 May 20 Mon 18 Moon 1.71° NNE of Jupiter; 157° from the Sun in the morning sky
8624.833 May 21 Tue 8 Sun enters the astrological sign Gemini, i.e. its longitude is 60°
8625.038 May 21 Tue 13 Mercury at superior conjunction with the Sun; 1.322 AU from Earth; latitude 1.42°
8625.208 May 21 Tue 17 Mercury 3.7° SE of the Pleiades; 0° and 4° from the Sun in the evening sky; magnitudes -2.3 and 2.9
8626.300 May 22 Wed 19 Moon at descending node; longitude 288.5°
8626.458 May 22 Wed 23 Moon 0.63° SE of Saturn; 131° from the Sun in the morning sky
8627.805 May 24 Fri 7 Mercury at perihelion, 0.3075 AU from the Sun
8629.354 May 25 SAT 21 Mercury 6.5° NNW of Aldebaran; 5° and 8° from the Sun in the evening sky; magnitudes -1.8 and 0.9
8630.059 May 26 SUN 13 Moon at apogee; distance 63.36 Earth-radii
8630.190 May 26 SUN 16:33 **Last Quarter Moon**
8631.333 May 27 Mon 20 Moon 3.5° SE of Neptune; 78° from the Sun in the morning sky
8635.083 May 31 Fri 14 Moon 4.5° SE of Uranus; 35° from the Sun in the morning sky

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8636.375 Jun 1 SAT 21 Moon 3.1° SE of Venus; 20° from the Sun in the morning sky
8637.063 Jun 2 SUN 14 Moon 7.9° SE of the Pleiades; 11° and 12° from the Sun in the morning sky
8637.750 Jun 3 Mon 6 Moon 2.30° N of Aldebaran; 4° and 6° from the Sun in the morning sky
8637.918 Jun 3 Mon 10:02 **New Moon**; beginning of lunation 1193
8638.015 Jun 3 Mon 12 Mercury at northernmost latitude from the ecliptic plane, 7.0°
8639.208 Jun 4 Tue 17 Moon 3.7° S of Mercury; 17° and 16° from the Sun in the evening sky
8639.242 Jun 4 Tue 18 Moon, Mercury, and M35 clu within circle of diameter 3.72°; about 17° from the Sun in the evening sky; magnitudes -6, -1, 5
8639.375 Jun 4 Tue 21 Moon 2.32° S of M35 cluster; 19° and 18° from the Sun in the evening sky

8640.146 Jun 5 Wed 16 Moon 1.60° S of Mars; 29° from the Sun in the evening sky
8640.372 Jun 5 Wed 21 Mercury at northernmost declination, 25.50°
8640.450 Jun 5 Wed 23 Moon at ascending node; longitude 107.9°
8640.583 Jun 6 Thu 2 Mercury 1.18° N of M35 cluster; 17° from the Sun in the evening sky; magnitudes -0.7 and 5.3
8640.729 Jun 6 Thu 6 Moon 9.8° S of Castor; 37° and 36° from the Sun in the evening sky
8640.896 Jun 6 Thu 10 Moon 6.2° S of Pollux; 39° from the Sun in the evening sky
8641.5 Jun 7 Fri Daytime Arietid meteors; ZHR 30; peak Jun 7 15h; 3 days before First Quarter
8641.854 Jun 7 Fri 9 Moon 0.55° NE of Beehive Cluster; 52° and 51° from the Sun in the evening sky
8642.469 Jun 7 Fri 23:16 Moon at perigee; distance 57.78 Earth-radii
8643.417 Jun 8 SAT 22 Moon 3.0° NNE of Regulus; 72° from the Sun in the evening sky
8643.5 Jun 9 SUN Whit Sunday
8643.896 Jun 9 SUN 10 Venus 5.1° SE of the Pleiades; 18° from the Sun in the morning sky; magnitudes -3.9 and 2.9
8644.750 Jun 10 Mon 5:59 **First Quarter Moon**
8645.138 Jun 10 Mon 15 **Jupiter at opposition**; magnitude -2.6
8647.271 Jun 12 Wed 19 Moon 7.3° NNE of Spica; 123° from the Sun in the evening sky
8647.899 Jun 13 Thu 10 The equation of time is 0.
8648.688 Jun 14 Fri 4:31 Earliest sunrise, at latitude 40° north
8650.708 Jun 16 SUN 5 Moon 7.8° NNE of Antares; 166° and 165° from the Sun in the evening sky
8651.333 Jun 16 SUN 20 Moon 1.99° NNE of Jupiter; 173° from the Sun in the midnight sky
8651.583 Jun 17 Mon 2 Mars 8.9° S of Castor; 25° and 27° from the Sun in the evening sky; magnitudes 1.8 and 1.5
8651.708 Jun 17 Mon 5 Venus 4.7° N of Aldebaran; 16° and 17° from the Sun in the morning sky; magnitudes -3.9 and 0.9
8651.792 Jun 17 Mon 7 Mercury 8.6° SSW of Castor; 24° and 27° from the Sun in the evening sky; magnitudes 0.1 and 1.5
8651.854 Jun 17 Mon 8:30 **Full Moon**
8653.271 Jun 18 Tue 19 Mercury 0.22° NNE of Mars; 24° from the Sun in the evening sky; magnitudes 0.2 and 1.8
8653.577 Jun 19 Wed 2 Moon at descending node; longitude 287.6°
8653.688 Jun 19 Wed 5 Moon 0.56° SE of Saturn; 159° from the Sun in the morning sky
8654.271 Jun 19 Wed 19 Mercury 5.5° SSW of Pollux; 25° and 26° from the Sun in the evening sky; magnitudes 0.3 and 1.2
8654.958 Jun 20 Thu 11 **Mercury, Mars, and Pollux within circle of diameter 5.58°**; about 25° from the Sun in the evening sky; magnitudes 0, 2, 1
8655.925 Jun 21 Fri 10 Neptune stationary in longitude; starts retrograde motion

8656.164 Jun 21 Fri 15:56 Sun enters the astrological sign Cancer, i.e. its longitude is 90°
8656.164 Jun 21 Fri 15:56 **June or summer solstice**
8656.250 Jun 21 Fri 18 Mars 5.5° S of Pollux; 23° and 24° from the Sun in the evening sky; magnitudes 1.8 and 1.2
8656.492 Jun 21 Fri 24 Neptune stationary in right ascension; starts retrograde motion
8656.616 Jun 22 SAT 3 Sun enters Gemini, at longitude 90.43° on the ecliptic
8657.5 Jun 23 SUN June Boötid meteors; ZHR 5; peak Jun 23 0h; 2 days before Last Quarter
8657.821 Jun 23 SUN 8 Moon at apogee; distance 63.43 Earth-radii
8658.463 Jun 23 SUN 23 **Mercury at easternmost elongation**; 25.2° from Sun in evening sky
8658.667 Jun 24 Mon 4 Moon 3.6° SE of Neptune; 104° from the Sun in the morning sky
8659.908 Jun 25 Tue 9:47 **Last Quarter Moon**
8661.420 Jun 26 Wed 22 Mercury at descending node through the ecliptic plane
8662.563 Jun 28 Fri 2 Moon 4.5° SE of Uranus; 60° from the Sun in the morning sky
8663.315 Jun 28 Fri 19:33 Latest sunset, at latitude 40° north
8664.458 Jun 29 SAT 23 Moon 7.9° SE of the Pleiades; 37° and 38° from the Sun in the morning sky
8665.125 Jun 30 SUN 15 Moon 2.24° N of Aldebaran; 29° from the Sun in the morning sky

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8666.438 Jul 1 Mon 23 Moon 1.64° SE of Venus; 12° from the Sun in the morning sky
8666.658 Jul 2 Tue 4 Moon, Venus, and M35 clu within circle of diameter 4.20°; about 9° from the Sun in the morning sky; magnitudes -5, -4, 5
8666.750 Jul 2 Tue 6 Moon 2.31° S of M35 cluster; 8° from the Sun in the morning sky
8667.303 Jul 2 Tue 19:16 **New Moon**; beginning of lunation 1194. Total eclipse of the Sun
8667.788 Jul 3 Wed 7 Moon at ascending node; longitude 107.6°
8668.063 Jul 3 Wed 14 Moon 9.8° S of Castor; 10° and 14° from the Sun in the evening sky
8668.250 Jul 3 Wed 18 Moon 6.1° S of Pollux; 13° and 14° from the Sun in the evening sky
8668.750 Jul 4 Thu 6 Moon 0.19° ENE of Mars; 20° and 19° from the Sun in the evening sky
8668.883 Jul 4 Thu 9 Moon, Mercury, and Mars within circle of diameter 3.80°; about 21° from the Sun in the evening sky; magnitudes -6, 1, 2
8668.917 Jul 4 Thu 10 Moon 3.3° NNE of Mercury; 22° from the Sun in the evening sky
8669.100 Jul 4 Thu 14 Moon, Mercury, and Beehive within circle of diameter 4.73°; about 24° from the Sun in the evening sky; magnitudes -6, 2, 4

8669.142 Jul 4 Thu 15 Moon, Mars, and Beehive within circle of diameter 5.89°; about 23° from the Sun in the evening sky; magnitudes -6, 2, 4
8669.167 Jul 4 Thu 16 Moon 0.54° NNE of Beehive Cluster; 25° from the Sun in the evening sky
8669.458 Jul 4 Thu 23 **Earth at aphelion**; †1/2 AU from the Sun
8669.5 Jul 5 Fri 0 Mercury 4.7° WSW of Beehive Cluster; 21° and 25° from the Sun in the evening sky; magnitudes 1.6 and 3.7; quasi-conjunction
8669.708 Jul 5 Fri 4:60 Moon at perigee; distance 57.03 Earth-radii
8670.021 Jul 5 Fri 13 Venus 0.91° S of M35 cluster; 11° from the Sun in the morning sky; magnitudes -3.9 and 5.3
8670.032 Jul 5 Fri 13 Venus at ascending node through the ecliptic plane
8670.458 Jul 5 Fri 23 Mercury 3.8° SE of Mars; 21° and 19° from the Sun in the evening sky; magnitudes 1.7 and 1.8
8670.688 Jul 6 SAT 5 Moon 3.1° NNE of Regulus; 46° from the Sun in the evening sky
8671.680 Jul 7 SUN 4 Mercury stationary in right ascension; starts retrograde motion
8671.695 Jul 7 SUN 5 Venus at northernmost declination, 23.43°
8671.790 Jul 7 SUN 7 Mercury at aphelion, 0.4667 AU from the Sun
8672.083 Jul 7 SUN 14 **Mercury, Mars, and Beehive within circle of diameter 5.08°**; about 20° from the Sun in the evening sky; magnitudes 2, 2, 4
8672.465 Jul 7 SUN 23 Mercury stationary in longitude; starts retrograde motion
8673.955 Jul 9 Tue 10:55 **First Quarter Moon**
8674.207 Jul 9 Tue 17 **Saturn at opposition**; magnitude 0.1
8674.5 Jul 10 Wed 0 Moon 7.3° NNE of Spica; 97° from the Sun in the evening sky
8674.512 Jul 10 Wed 0 Middle of eclipse season: Sun is at same longitude as Moon's ascending node, 107.5°
8677.958 Jul 13 SAT 11 Moon 7.8° NNE of Antares; 140° and 139° from the Sun in the evening sky
8678.375 Jul 13 SAT 21 Moon 2.31° NNE of Jupiter; 145° from the Sun in the evening sky
8678.438 Jul 13 SAT 23 Mars 0.12° S of Beehive Cluster; 16° from the Sun in the evening sky; magnitudes 1.8 and 3.7
8678.821 Jul 14 SUN 8 **Pluto at opposition**; magnitude 14.2
8680.833 Jul 16 Tue 8 Moon 0.44° ESE of Saturn; 174° and 173° from the Sun in the midnight sky
8680.880 Jul 16 Tue 9 Moon at descending node; longitude 287.7°
8681.402 Jul 16 Tue 21:38 **Full Moon. Partial eclipse of the Moon**
8683.274 Jul 18 Thu 19 Mars at northernmost latitude from the ecliptic plane, 1.8°
8685.104 Jul 20 SAT 15 Venus 9.5° S of Castor; 7° and 12° from the Sun in the morning sky; magnitudes -3.9 and 1.5
8685.510 Jul 21 SUN 0 Moon at apogee; distance 63.58 Earth-radii
8685.795 Jul 21 SUN 7 Sun enters Cancer, at longitude 118.26° on the ecliptic

8685.958 Jul 21 SUN 11 Moon 3.6° SE of Neptune; 130° from the Sun in the morning sky
8686.019 Jul 21 SUN 12 Mercury at inferior conjunction with the Sun; 0.582 AU from Earth; latitude -6.58°
8687.438 Jul 22 Mon 23 Venus 6.0° S of Pollux; 6° and 9° from the Sun in the morning sky; magnitudes -3.9 and 1.2
8687.620 Jul 23 Tue 3 Sun enters the astrological sign Leo, i.e. its longitude is 120°
8689.555 Jul 25 Thu 1:19 **Last Quarter Moon**
8689.604 Jul 25 Thu 3 Mercury 5.6° SSW of Venus; 7° and 6° from the Sun in the morning sky; magnitudes 4.1 and -3.9
8689.958 Jul 25 Thu 11 Moon 4.5° SE of Uranus; 85° and 86° from the Sun in the morning sky
8690.994 Jul 26 Fri 12 The equation of time is at a minimum of -6.55 minutes.
8691.854 Jul 27 SAT 9 Moon 7.9° SE of the Pleiades; 63° and 64° from the Sun in the morning sky
8692.049 Jul 27 SAT 13 Mercury at southernmost latitude from the ecliptic plane, -7.0°
8692.5 Jul 28 SUN Piscid Austrinid meteors; ZHR 5; peak Jul 28 9h; 4 days before New
8692.542 Jul 28 SUN 1 Moon 2.27° N of Aldebaran; 55° from the Sun in the morning sky
8694.167 Jul 29 Mon 16 Moon 2.30° S of M35 cluster; 34° from the Sun in the morning sky
8694.465 Jul 29 Mon 23 Uranus at west quadrature, 90° from the Sun
8694.5 Jul 30 Tue **Southern Delta Aquarid meteors**; ZHR 25; peak Jul 30 11h; 2 days before New
8694.5 Jul 30 Tue Alpha Capricornid meteors; ZHR 5; peak Jul 30 11h; 2 days before New
8695.211 Jul 30 Tue 17 Moon at ascending node; longitude 107.6°
8695.5 Jul 31 Wed 0 Moon 9.8° S of Castor; 16° and 20° from the Sun in the morning sky
8695.646 Jul 31 Wed 4 Moon 4.5° N of Mercury; 14° from the Sun in the morning sky
8695.667 Jul 31 Wed 4 Moon 6.1° S of Pollux; 13° and 16° from the Sun in the morning sky
8696.281 Jul 31 Wed 19 Mercury stationary in right ascension; resumes direct motion
8696.396 Jul 31 Wed 22 Moon 0.71° NE of Venus; 4° from the Sun in the morning sky

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8696.542 Aug 1 Thu 1 Moon, Venus, and Beehive within circle of diameter 2.73°; only about 3° from the Sun; magnitudes -4, -4, 4
8696.583 Aug 1 Thu 2 Moon 0.59° NE of Beehive Cluster; 2° from the Sun in the morning sky
8696.633 Aug 1 Thu 3:12 **New Moon**; beginning of lunation 1195
8696.662 Aug 1 Thu 4 Mercury stationary in longitude; resumes direct motion

8697.375 Aug 1 Thu 21 Moon 1.65° NNE of Mars; 11° and 10° from the Sun in the evening sky
8697.801 Aug 2 Fri 7:13 Moon at perigee; distance 56.35 Earth-radii
8698.063 Aug 2 Fri 14 Moon 3.1° NNE of Regulus; 20° from the Sun in the evening sky
8698.771 Aug 3 SAT 7 Venus 0.28° S of Beehive Cluster; 3° from the Sun in the morning sky; magnitudes -3.9 and 3.7
8701.750 Aug 6 Tue 6 Moon 7.3° NNE of Spica; 71° from the Sun in the evening sky
8703.230 Aug 7 Wed 17:32 **First Quarter Moon**
8703.708 Aug 8 Thu 5 Mercury 9.1° S of Pollux; 19° and 23° from the Sun in the morning sky; magnitudes 0.4 and 1.2
8703.883 Aug 8 Thu 9 Venus at perihelion, 0.7185 AU from the Sun
8705.188 Aug 9 Fri 17 Moon 7.7° NNE of Antares; 114° and 113° from the Sun in the evening sky
8705.458 Aug 9 Fri 23 **Mercury at westernmost elongation**; 19.0° from Sun in morning sky
8705.521 Aug 10 SAT 1 Moon 2.46° NNE of Jupiter; 118° and 117° from the Sun in the evening sky
8706.623 Aug 11 SUN 3 Sun enters Leo, at longitude 138.18° on the ecliptic
8707.049 Aug 11 SUN 13 Jupiter stationary in longitude; resumes direct motion
8707.166 Aug 11 SUN 16 Jupiter stationary in right ascension; resumes direct motion
8707.465 Aug 11 SUN 23 Uranus stationary in longitude; starts retrograde motion
8707.596 Aug 12 Mon 2 Uranus stationary in right ascension; starts retrograde motion
8707.938 Aug 12 Mon 11 Moon 0.31° E of Saturn; 146° from the Sun in the evening sky
8708.115 Aug 12 Mon 15 Moon at descending node; longitude 287.4°
8708.188 Aug 12 Mon 17 Jupiter 6.7° NE of Antares; 115° and 110° from the Sun in the evening sky; magnitudes -2.3 and 1.0; quasi-conjunction
8708.5 Aug 13 Tue Perseid meteors; ZHR 110; peak Aug 13 0h; 3 days before Full
8709.729 Aug 14 Wed 6 Venus at superior conjunction with the Sun; 1.731 AU from Earth; latitude 3.06°
8710.985 Aug 15 Thu 12 Venus brightest; magnitude -3.92°
8711.021 Aug 15 Thu 12:30 **Full Moon**
8711.105 Aug 15 Thu 15 Mercury at ascending node through the ecliptic plane
8712.938 Aug 17 SAT 11 Mercury 0.92° S of Beehive Cluster; 16° and 17° from the Sun in the morning sky; magnitudes -0.8 and 3.7
8712.971 Aug 17 SAT 11 Moon at apogee; distance 63.69 Earth-radii
8713.188 Aug 17 SAT 17 Moon 3.5° SE of Neptune; 156° and 157° from the Sun in the morning sky
8713.5 Aug 18 SUN Kappa Cygnid meteors; ZHR 3; peak Aug 18 5h; 3 days after Full
8713.875 Aug 18 SUN 9 Mars 0.66° NNE of Regulus; 5° from the Sun in the evening sky; magnitudes 1.8 and 1.4

8715.774 Aug 20 Tue 7 Mercury at perihelion, 0.3075 AU from the Sun
8716.875 Aug 21 Wed 9 Venus, Mars, and Regulus within circle of diameter 2.08°; only about 3° from the Sun; magnitudes -4, 2, 1
8716.958 Aug 21 Wed 11 Venus 0.90° NNE of Regulus; 2° from the Sun in the evening sky; magnitudes -3.9 and 1.4
8717.271 Aug 21 Wed 19 Moon 4.4° SE of Uranus; 111° and 112° from the Sun in the morning sky
8718.920 Aug 23 Fri 10 Sun enters the astrological sign Virgo, i.e. its longitude is 150°
8719.123 Aug 23 Fri 14:58 **Last Quarter Moon**
8719.188 Aug 23 Fri 17 Moon 7.8° SE of the Pleiades; 89° and 90° from the Sun in the morning sky
8719.896 Aug 24 SAT 10 Moon 2.39° N of Aldebaran; 81° from the Sun in the morning sky
8720.229 Aug 24 SAT 18 Venus 0.29° NNE of Mars; 3° from the Sun in the evening sky; magnitudes -3.9 and 1.8
8721.553 Aug 26 Mon 1 Mars at aphelion, 1.6661 AU from the Sun
8721.583 Aug 26 Mon 2 Moon 2.21° SE of M35 cluster; 60° from the Sun in the morning sky
8722.577 Aug 27 Tue 2 Moon at ascending node; longitude 106.7°
8722.917 Aug 27 Tue 10 Moon 9.7° S of Castor; 42° and 44° from the Sun in the morning sky
8723.104 Aug 27 Tue 15 Moon 6.1° S of Pollux; 40° and 41° from the Sun in the morning sky
8724.021 Aug 28 Wed 13 Moon 0.57° NNE of Beehive Cluster; 27° from the Sun in the morning sky
8724.875 Aug 29 Thu 9 Mercury 1.28° NNE of Regulus; 6° from the Sun in the morning sky; magnitudes -1.6 and 1.4
8725.5 Aug 30 Fri 0 Moon, Mercury, and Regulus within circle of diameter 3.06°; about 6° from the Sun in the morning sky; magnitudes -5, -2, 1
8725.521 Aug 30 Fri 1 Moon 3.1° NNE of Regulus; 7° and 6° from the Sun in the morning sky
8725.539 Aug 30 Fri 1 Venus at northernmost latitude from the ecliptic plane, 3.4°
8725.604 Aug 30 Fri 3 Moon 1.86° NNE of Mercury; 6° and 5° from the Sun in the morning sky
8725.942 Aug 30 Fri 11 Moon, Mercury, and Mars within circle of diameter 5.62°; only about 0° from the Sun; magnitudes -4, -2, 2
8725.943 Aug 30 Fri 10:37 **New Moon**; beginning of lunation 1196
8725.985 Aug 30 Fri 12 Mercury at northernmost latitude from the ecliptic plane, 7.0°
8726.021 Aug 30 Fri 13 Moon 2.91° NNE of Mars; 4° and 1° from the Sun in the evening sky
8726.100 Aug 30 Fri 14 Moon, Venus, and Mars within circle of diameter 3.97°; only about 4° from the Sun; magnitudes -5, -4, 2
8726.165 Aug 30 Fri 15:58 Moon at perigee; distance 56.00 Earth-radii

8726.165 Aug 30 Fri 15:58 Perigee only 5.3 hours after New Moon
8726.271 Aug 30 Fri 19 Moon 2.79° NNE of Venus; 6° and 5° from the Sun in the evening sky

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8727.5 Sep 1 SUN 1st day of Muslim year (1441 A.H.)
8727.5 Sep 1 SUN Aurigid meteors; ZHR 5; peak Sep 1 8h; 2 days after New
8728.335 Sep 1 SUN 20 The equation of time is 0.
8728.962 Sep 2 Mon 11 Mars at conjunction with the Sun; 2.675 AU from Earth; latitude 1.74°
8729.104 Sep 2 Mon 15 Moon 7.1° NNE of Spica; 45° and 44° from the Sun in the evening sky
8730.188 Sep 3 Tue 17 Mercury 0.64° NNE of Mars; 2° and 1° from the Sun in the evening sky; magnitudes -1.8 and 1.7
8730.560 Sep 4 Wed 1 Mercury at superior conjunction with the Sun; 1.369 AU from Earth; latitude 6.47°
8732.458 Sep 5 Thu 23 Moon 7.6° NNE of Antares; 88° and 87° from the Sun in the evening sky
8732.632 Sep 6 Fri 3:11 **First Quarter Moon**
8732.833 Sep 6 Fri 8 Moon 2.27° NNE of Jupiter; 92° from the Sun in the evening sky
8735.083 Sep 8 SUN 14 Moon 0.15° ESE of Saturn; 118° from the Sun in the evening sky
8735.142 Sep 8 SUN 15 Jupiter at east quadrature, 90° from the Sun
8735.235 Sep 8 SUN 18 Moon at descending node; longitude 286.0°
8735.5 Sep 9 Mon September Epsilon Perseid meteors; ZHR 10; peak Sep 9 16h; 4 days after First Quarter
8736.800 Sep 10 Tue 7 **Neptune at opposition**; magnitude 7.8
8740.057 Sep 13 Fri 13 Moon at apogee; distance 63.71 Earth-radii
8740.063 Sep 13 Fri 14 Mercury 0.29° SSW of Venus; 8° from the Sun in the evening sky; magnitudes -0.9 and -3.9
8740.375 Sep 13 Fri 21 Moon 3.4° SE of Neptune; 174° and 176° from the Sun in the midnight sky
8740.690 Sep 14 SAT 4:34 **Full Moon**
8743.846 Sep 17 Tue 8 Sun enters Virgo, at longitude 174.16° on the ecliptic
8744.479 Sep 17 Tue 24 Moon 4.2° SE of Uranus; 138° and 139° from the Sun in the morning sky
8744.691 Sep 18 Wed 5 Saturn stationary in right ascension; resumes direct motion
8744.799 Sep 18 Wed 7 Saturn stationary in longitude; resumes direct motion
8746.458 Sep 19 Thu 23 Moon 7.6° SE of the Pleiades; 116° from the Sun in the morning sky
8746.477 Sep 19 Thu 23 Mars and Neptune at heliocentric opposition; longitudes 167.4° and 347.4°
8747.167 Sep 20 Fri 16 Moon 2.61° N of Aldebaran; 107° from the Sun in the morning sky
8748.613 Sep 22 SUN 2:42 **Last Quarter Moon**
8748.896 Sep 22 SUN 10 Moon 1.97° S of M35 cluster; 87° from the Sun in the morning sky

8749.389 Sep 22 SUN 21 Mercury at descending node through the ecliptic plane
8749.771 Sep 23 Mon 7 Moon at ascending node; longitude 104.4°
8749.827 Sep 23 Mon 7:51 Sun enters the astrological sign Libra, i.e. its longitude is 180°
8749.827 Sep 23 Mon 7:51 **September of fall or autumn equinox**
8750.292 Sep 23 Mon 19 Moon 9.5° S of Castor; 69° and 70° from the Sun in the morning sky
8750.479 Sep 23 Mon 24 Moon 5.9° S of Pollux; 66° and 67° from the Sun in the morning sky
8751.438 Sep 24 Tue 23 Moon 0.75° NNE of Beehive Cluster; 54° from the Sun in the morning sky
8752.958 Sep 26 Thu 11 Moon 3.2° NNE of Regulus; 33° from the Sun in the morning sky
8754.355 Sep 27 Fri 21 Saturn at southernmost declination, -22.52°
8754.604 Sep 28 SAT 2:29 Moon at perigee; distance 56.10 Earth-radii
8754.604 Sep 28 SAT 2:29 Perigee only 16.0 hours before New Moon
8754.688 Sep 28 SAT 5 Moon 3.8° NNE of Mars; 10° and 9° from the Sun in the morning sky
8755.269 Sep 28 SAT 18:27 **New Moon**; beginning of lunation 1197
8755.5 Sep 29 SUN Rosh Hashanah, 1st say of Hebrew year 5780 A.M.
8755.875 Sep 29 SUN 9 Mercury 1.27° NNE of Spica; 18° from the Sun in the evening sky; magnitudes -0.2 and 1.0
8756.167 Sep 29 SUN 16 Moon 4.0° NNE of Venus; 14° and 13° from the Sun in the evening sky
8756.542 Sep 30 Mon 1 Moon 7.0° NNE of Spica; 19° and 18° from the Sun in the evening sky
8756.604 Sep 30 Mon 3 Moon 5.8° NNE of Mercury; 19° from the Sun in the evening sky

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8758.924 Oct 2 Wed 10 Pluto stationary in right ascension; resumes direct motion
8759.399 Oct 2 Wed 22 Pluto stationary in longitude; resumes direct motion
8759.760 Oct 3 Thu 6 Mercury at aphelion, 0.4667 AU from the Sun
8759.792 Oct 3 Thu 7 Moon 7.3° NNE of Antares; 61° and 60° from the Sun in the evening sky
8760.396 Oct 3 Thu 22 Moon 1.87° NNE of Jupiter; 69° and 68° from the Sun in the evening sky
8760.542 Oct 4 Fri 1 Venus 2.88° NNE of Spica; 14° from the Sun in the evening sky; magnitudes -3.9 and 1.0
8762.199 Oct 5 SAT 16:47 **First Quarter Moon**
8762.286 Oct 5 SAT 19 Moon at descending node; longitude 283.2°
8762.375 Oct 5 SAT 21 Moon 0.31° SE of Saturn; 92° from the Sun in the evening sky
8762.5 Oct 6 SUN October Camelopardalid meteors; ZHR 5; peak Oct 6 1h; near First Quarter
8764.074 Oct 7 Mon 14 Mars crosses equator southward
8764.294 Oct 7 Mon 19 Saturn at east quadrature, 90° from the Sun
8764.5 Oct 8 Tue **Draconid meteors**; ZHR 20; peak Oct 8 24h; 3 days after First Quarter

8766.5 Oct 10 Thu Southern Taurid meteors; ZHR 5; peak Oct 10 15h; 3 days before Full
8767.256 Oct 10 Thu 18 Summer solstice on Mars
8767.256 Oct 10 Thu 18 Summer solstice on Mars
8767.276 Oct 10 Thu 19 Moon at apogee; distance 63.64 Earth-radii
8767.5 Oct 11 Fri Delta Aurigid meteors; ZHR 2; peak Oct 11 15h; 2 days before Full
8767.583 Oct 11 Fri 2 Moon 3.4° SE of Neptune; 149° from the Sun in the evening sky
8770.382 Oct 13 SUN 21:10 **Full Moon**
8771.646 Oct 15 Tue 4 Moon 4.1° SE of Uranus; 165° and 166° from the Sun in the morning sky
8773.688 Oct 17 Thu 5 Moon 7.4° SE of the Pleiades; 142° and 143° from the Sun in the morning sky
8774.396 Oct 17 Thu 22 Moon 2.83° N of Aldebaran; 134° from the Sun in the morning sky
8774.5 Oct 18 Fri Epsilon Geminid meteors; ZHR 3; peak Oct 18 17h; 3 days before Last Quarter
8775.807 Oct 19 SAT 7 Pluto at southernmost declination, -22.39°
8776.146 Oct 19 SAT 16 Moon 1.71° S of M35 cluster; 113° and 114° from the Sun in the morning sky
8776.661 Oct 20 SUN 4 **Mercury at easternmost elongation**; 24.6° from Sun in evening sky
8776.812 Oct 20 SUN 7 Moon at ascending node; longitude 101.4°
8777.5 Oct 21 Mon **Orionid meteors**; ZHR 25; peak Oct 21 17h; near Last Quarter
8777.563 Oct 21 Mon 2 Moon 9.3° S of Castor; 96° and 97° from the Sun in the morning sky
8777.771 Oct 21 Mon 7 Moon 5.6° S of Pollux; 93° and 94° from the Sun in the morning sky
8778.028 Oct 21 Mon 12:40 **Last Quarter Moon**
8778.750 Oct 22 Tue 6 Moon 0.97° NNE of Beehive Cluster; 81° from the Sun in the morning sky
8780.018 Oct 23 Wed 12 Mercury at southernmost latitude from the ecliptic plane, -7.0°
8780.222 Oct 23 Wed 17 Sun enters the astrological sign Scorpius, i.e. its longitude is 210°
8780.333 Oct 23 Wed 20 Moon 3.4° NNE of Regulus; 60° from the Sun in the morning sky
8780.5 Oct 24 Thu Leo Minorid meteors; ZHR 2; peak Oct 24 17h; 3 days before New
8781.595 Oct 25 Fri 2 Venus at descending node through the ecliptic plane
8782.946 Oct 26 SAT 10:42 Moon at perigee; distance 56.65 Earth-radii
8783.354 Oct 26 SAT 21 Moon 4.2° NNE of Mars; 19° and 18° from the Sun in the morning sky
8783.5 Oct 27 SUN Clocks back 1 hour (Europe)
8783.979 Oct 27 SUN 12 Moon 7.0° NNE of Spica; 11° and 10° from the Sun in the morning sky
8784.652 Oct 28 Mon 3:39 **New Moon**; beginning of lunation 1198
8784.835 Oct 28 Mon 8 **Uranus at opposition**; magnitude 5.7

8785.964 Oct 29 Tue 11 Mercury at southernmost declination, -22.42°
8786.167 Oct 29 Tue 16 Moon 3.7° NNE of Venus; 21° and 20° from the Sun in the evening sky
8786.292 Oct 29 Tue 19 Moon 6.4° NNE of Mercury; 22° from the Sun in the evening sky
8787.188 Oct 30 Wed 17 Moon 7.1° NNE of Antares; 34° and 33° from the Sun in the evening sky
8787.708 Oct 31 Thu 5 Mercury 2.55° SSW of Venus; 20° and 21° from the Sun in the evening sky; magnitudes 0.5 and -3.9
8788.039 Oct 31 Thu 13 Sun enters Libra, at longitude 217.80° on the ecliptic
8788.125 Oct 31 Thu 15 Moon 1.30° NNE of Jupiter; 46° and 45° from the Sun in the evening sky
8788.150 Oct 31 Thu 16 Mercury stationary in longitude; starts retrograde motion
8788.352 Oct 31 Thu 20 Mercury stationary in right ascension; starts retrograde motion

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8789.403 Nov 1 Fri 22 Moon at descending node; longitude 280.3°
8789.833 Nov 2 SAT 8 Moon 0.67° SE of Saturn; 66° from the Sun in the evening sky
8790.5 Nov 3 SUN Clocks back 1 hour (America)
8791.126 Nov 3 SUN 15 The equation of time is at a maximum of 16.49 minutes.
8791.932 Nov 4 Mon 10:22 **First Quarter Moon**
8794.833 Nov 7 Thu 8 Moon 3.6° SE of Neptune; 121° from the Sun in the evening sky
8794.867 Nov 7 Thu 9 Moon at apogee; distance 63.51 Earth-radii
8797.542 Nov 10 SUN 1 Venus 3.9° N of Antares; 23° from the Sun in the evening sky; magnitudes -3.9 and 1.0
8797.875 Nov 10 SUN 9 Mars 2.83° NNE of Spica; 24° from the Sun in the morning sky; magnitudes 1.8 and 1.0
8798.5 Nov 11 Mon Armistice Day
8798.833 Nov 11 Mon 8 Moon 4.1° SE of Uranus; 165° from the Sun in the evening sky
8799.074 Nov 11 Mon 14 Mercury at ascending node through the ecliptic plane
8799.136 Nov 11 Mon **Transit of Mercury across the Sun**
8799.136 Nov 11 Mon 15 Mercury at inferior conjunction with the Sun; 0.676 AU from Earth; latitude 0.05°
8799.5 Nov 12 Tue Northern Taurid meteors; ZHR 5; peak Nov 12 17h; near Full
8800.067 Nov 12 Tue 13:36 **Full Moon**
8800.938 Nov 13 Wed 11 Moon 7.3° SE of the Pleiades; 169° and 170° from the Sun in the morning sky
8801.646 Nov 14 Thu 4 Moon 2.96° N of Aldebaran; 161° from the Sun in the morning sky
8803.375 Nov 15 Fri 21 Moon 1.53° SE of M35 cluster; 141° from the Sun in the morning sky
8803.744 Nov 16 SAT 6 Mercury at perihelion, 0.3075 AU from the Sun
8803.867 Nov 16 SAT 9 Moon at ascending node; longitude 99.1°

8804.5 Nov 17 SUN **Leonid meteors**; ZHR 15; peak Nov 17 23h; 2 days before Last Quarter
8804.792 Nov 17 SUN 7 Moon 9.0° S of Castor; 123° and 124° from the Sun in the morning sky
8805.000 Nov 17 SUN 12 Moon 5.4° S of Pollux; 120° and 121° from the Sun in the morning sky
8805.979 Nov 18 Mon 12 Moon 1.18° NNE of Beehive Cluster; 108° from the Sun in the morning sky
8807.383 Nov 19 Tue 21:12 **Last Quarter Moon**
8807.583 Nov 20 Wed 2 Moon 3.5° NNE of Regulus; 87° from the Sun in the morning sky
8808.101 Nov 20 Wed 14 Mercury stationary in right ascension; resumes direct motion
8808.296 Nov 20 Wed 19 Mercury stationary in longitude; resumes direct motion
8808.5 Nov 21 Thu Alpha Monocerotid meteors; ZHR 5; peak Nov 21 23h; 5 days before New
8810.124 Nov 22 Fri 15 Sun enters the astrological sign Sagittarius, i.e. its longitude is 240°
8810.821 Nov 23 SAT 7:42 Moon at perigee; distance 57.50 Earth-radii
8811.253 Nov 23 SAT 18 Sun enters Scorpius, at longitude 241.14° on the ecliptic
8811.375 Nov 23 SAT 21 Moon 7.1° NNE of Spica; 37° from the Sun in the morning sky
8812.021 Nov 24 SUN 13 Moon 4.0° NNE of Mars; 28° from the Sun in the morning sky
8812.042 Nov 24 SUN 13 Venus 1.41° S of Jupiter; 26° from the Sun in the evening sky; magnitudes -3.9 and -1.8
8812.542 Nov 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 Nov 25 Mon 5 Moon 1.81° NNE of Mercury; 19° and 20° from the Sun in the morning sky
8813.954 Nov 26 Tue 11 Mercury at northernmost latitude from the ecliptic plane, 7.0°
8814.130 Nov 26 Tue 15:07 **New Moon**; beginning of lunation 1199
8814.625 Nov 27 Wed 3 Moon 7.1° NNE of Antares; 7° from the Sun in the evening sky
8814.914 Nov 27 Wed 10 Neptune stationary in longitude; resumes direct motion
8815.238 Nov 27 Wed 18 Neptune stationary in right ascension; resumes direct motion
8815.5 Nov 28 Thu November Orionid meteors; ZHR 3; peak Nov 28 0h; 1 day after New
8815.930 Nov 28 Thu 10 **Mercury at westernmost elongation**; 20.1° from Sun in morning sky
8815.979 Nov 28 Thu 12 Moon 0.78° NNE of Jupiter; 24° and 23° from the Sun in the evening sky

8816.000 Nov 28 Thu 12 Moon, Venus, and Jupiter within circle of diameter 4.30°; about 25° from the Sun in the evening sky; magnitudes -6, -4, -2
8816.198 Nov 28 Thu 17 Venus at southernmost declination, -24.79°
8816.269 Nov 28 Thu 18 Venus at aphelion, 0.7282 AU from the Sun
8816.313 Nov 28 Thu 20 Moon 1.87° N of Venus; 28° and 27° from the Sun in the evening sky
8816.676 Nov 29 Fri 4 Moon at descending node; longitude 278.6°
8817.396 Nov 29 Fri 22 Moon 0.95° SE of Saturn; 41° from the Sun in the evening sky
8818.067 Nov 30 SAT 14 Sun enters Ophiuchus, at longitude 248.04° on the ecliptic

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8819.5 Dec 2 Mon Phoenicid meteors; ZHR 5; peak Dec 2 12h; 2 days before First Quarter
8821.790 Dec 4 Wed 6:58 **First Quarter Moon**
8822.146 Dec 4 Wed 16 Moon 3.8° SE of Neptune; 94° from the Sun in the evening sky
8822.675 Dec 5 Thu 4 Moon at apogee; distance 63.41 Earth-radii
8824.5 Dec 7 SAT Puppid-Velid meteors; ZHR 10; peak Dec 7 0h; 3 days after First Quarter
8824.570 Dec 7 SAT 2 Jupiter at southernmost declination, -23.30°
8826.104 Dec 8 SUN 15 Moon 4.3° SE of Uranus; 137° from the Sun in the evening sky
8826.191 Dec 8 SUN 16:35 Earliest sunset, at latitude 40° north
8826.5 Dec 9 Mon Monocerotid meteors; ZHR 3; peak Dec 9 10h; 3 days before Full
8828.292 Dec 10 Tue 19 Moon 7.3° SE of the Pleiades; 162° and 161° from the Sun in the evening sky
8828.917 Dec 11 Wed 10 Venus 1.80° S of Saturn; 30° from the Sun in the evening sky; magnitudes -4.0 and 0.6
8828.979 Dec 11 Wed 12 Moon 2.97° N of Aldebaran; 171° and 169° from the Sun in the evening sky
8829.5 Dec 12 Thu Sigma Hydrid meteors; ZHR 3; peak Dec 12 8h; near Full
8829.718 Dec 12 Thu 5:14 **Full Moon**
8830.667 Dec 13 Fri 4 Moon 1.47° SE of M35 cluster; 168° and 169° from the Sun in the morning sky
8831.094 Dec 13 Fri 14 Moon at ascending node; longitude 98.4°
8831.375 Dec 13 Fri 21 Moon at northernmost declination in year, 23.23°
8831.5 Dec 14 SAT Geminid meteors; ZHR 120; peak Dec 14 12h; 2 days after Full
8832.063 Dec 14 SAT 14 Moon 9.0° S of Castor; 151° and 150° from the Sun in the morning sky
8832.250 Dec 14 SAT 18 Moon 5.3° S of Pollux; 148° from the Sun in the morning sky
8833.229 Dec 15 SUN 18 Moon 1.33° NNE of Beehive Cluster; 136° from the Sun in the morning sky
8833.5 Dec 16 Mon Coma Berenicid meteors; ZHR 3; peak Dec 16 7h; 3 days before Last Quarter

8833.979 Dec 16 Mon 12 Mercury 5.0° NNE of Antares; 14° and 15° from the Sun in the morning sky; magnitudes -0.6 and 1.0
8834.813 Dec 17 Tue 8 Moon 3.7° NNE of Regulus; 115° from the Sun in the morning sky
8836.344 Dec 18 Wed 20:16 Moon at perigee; distance 58.05 Earth-radii
8836.348 Dec 18 Wed 20 Sun enters Sagittarius, at longitude 266.61° on the ecliptic
8836.707 Dec 19 Thu 4:58 **Last Quarter Moon**
8837.358 Dec 19 Thu 21 Mercury at descending node through the ecliptic plane
8837.5 Dec 20 Fri December Leo Minorid meteors; ZHR 5; peak Dec 20 5h; 1 day after Last Quarter
8838.442 Dec 20 Fri 23 Venus at southernmost latitude from the ecliptic plane, -3.4°
8838.646 Dec 21 SAT 4 Moon 7.1° NNE of Spica; 65° from the Sun in the morning sky
8839.5 Dec 22 SUN **Ursid meteors**; ZHR 15; peak Dec 22 21h; 3 days before New
8839.681 Dec 22 SUN 4:21 **December or winter solstice**
8839.681 Dec 22 SUN 4:21 Sun enters the astrological sign Capricornus, i.e. its longitude is 270°
8840.688 Dec 23 Mon 5 Moon 3.4° NNE of Mars; 38° and 39° from the Sun in the morning sky
8841.979 Dec 24 Tue 12 Moon 7.1° NNE of Antares; 22° and 23° from the Sun in the morning sky
8842.5 Dec 25 Wed Christmas
8843.000 Dec 25 Wed 12 Moon 1.93° NNE of Mercury; 9° from the Sun in the morning sky
8843.151 Dec 25 Wed 16 The equation of time is 0.
8843.718 Dec 26 Thu 5:14 **New Moon**; beginning of lunation 1200. Annular eclipse of the Sun
8843.833 Dec 26 Thu 8 Moon 0.30° ENE of Jupiter; 1° from the Sun in the evening sky
8844.043 Dec 26 Thu 13 Moon at descending node; longitude 278.4°
8844.333 Dec 26 Thu 20 Moon at southernmost declination in year, -23.23°
8845.021 Dec 27 Fri 13 Moon 1.23° SE of Saturn; 16° and 15° from the Sun in the evening sky
8845.273 Dec 27 Fri 19 Jupiter at conjunction with the Sun; 6.213 AU from Earth; latitude 0.11°
8846.604 Dec 29 SUN 3 Moon 1.01° SE of Venus; 34° from the Sun in the evening sky
8847.728 Dec 30 Mon 5 Mercury at aphelion, 0.4667 AU from the Sun
8847.845 Dec 30 Mon 8 Middle of eclipse season: Sun is at same longitude as Moon's descending node, 278.3°