Sky Events for January 2025 and beyond

The first eight weeks of 2025 present us with a striking lineup of evening planets. In order from west to east across the sky in early January, they are:

Venus, the brightest, gleaming at mag. –4.4 to –4.8 in SW to WSW at dusk, and setting in WSW to W nearly four hours after sunset. Venus reaches greatest elongation 47° E of Sun on Jan. 9. On Jan. 11, the planet's 25" (arcsecond) disk appears **half-full** through telescopes and binoculars, while racing toward Earth at a top speed of nearly 690,000 miles per day. **Watch for big changes in next ten weeks,** as Venus swells in apparent size while displaying ever-thinner crescent phases.

Next in the lineup on Jan. 1 is **Saturn,** of mag. +1.1, 16° upper left of Venus. The brighter planet will pass 2.2° north of Saturn on Jan. 18; Saturn will be nearly 11° below Venus on Jan. 31. A telescope reveals **Saturn's rings,** closing from 4° from edgewise on Jan. 7, through 3° on Jan. 28, look like a narrow needle piercing the planet.

Next in order east of Saturn, are very faint mag. 7.9-mag. **Neptune** in Pisces; and 5.7-mag. **Uranus** within reach of binoculars near the Taurus-Aries border. Details for locating them appear under Jan. 3 in the Moon calendar, below.

The fifth planet in the lineup, and the second brightest, is **Jupiter,** shining at mag. –2.7 to –2.5 in Taurus. On Jan. 30, Jupiter reaches minimum distance of 5.1° N and slightly E of Aldebaran, four days before ending its four months of retrograde motion on Feb. 3.

At the eastern end of the lineup of planets is the third in brightness, distinctively red **Mars.** On Jan. 1, it is in Cancer and rises in ENE about 1¼ hours after sunset. Retrograding into Gemini on Jan. 12, Mars then rises around sunset and is *closest,* 0.642 A.U. or 59.7 million miles from Earth. On the 15th, the red planet stands at *opposition.* In January's second week, Mars *reaches peak brightness* at mag. –1.4 (comparable to Sirius) and shows a disk 14.6" across. As spring progresses in Mars' N hemisphere, use a telescope magnifying at least 100x to follow Mars' now prominent **North Polar Cap,** shrinking until its summer solstice on May 29.

Also look for **Syrtis Major,** Mars' historic prominent dark marking, best seen near the center of the planet's disk on the following dates and Eastern standard times, for eastern U.S.: Jan. 19 at 7:35 p.m. EST; Jan. 20 at 8:11 p.m.; and about 36 minutes later each night through Jan. 25 at 11:11 p.m.; and Jan. 26 at 11:47 p.m. Continuing, Jan. 28 at 12:23 a.m.; Jan. 29 at 12:59 a.m.; Jan. 30 at 1:35 a.m.; Jan. 31 at 2:11 a.m.; Feb. 1 at 2:48 a.m.; and Feb. 2 at 3:24 a.m.

From the western U.S,, find Syrtis Major near the center of Mars' disk on the following dates and Pacific standard times: Jan. 23 at 6:59 p.m. PST; Jan. 24 at 7:35 p.m.; Jan. 25 at 8:11 p.m.; and about 36 minutes later each night through Jan. 30 at 11:11 p.m.; and Jan. 31 at 11:48 p.m. Continuing, Feb. 2 at 12:24 a.m.; Feb. 3 at 1:00 a.m.; Feb. 4 at 1:37 a.m.; Feb. 5 at 2:13 a.m.; and Feb. 6 at 2:50 a.m.

Do not miss the occultation of Mars by the Full Moon on the evening of Jan. 13; a telescope is required. From Palm Springs, Mars is hidden by the Moon at 5:50 p.m. PST and emerges at 6:46 p.m. From East Lansing, MI, Mars is hidden from 9:11 p.m. EST until 10:21 p.m. For maps of where occultations of planets and bright stars take place in 2025, with times for many cities, visit www.lunar-occultations.com.iota/ and click on "2025 Occultations of Planets by the Moon", or "2025 Worldwide Total Occultations of Bright Stars". Scroll down the list to the U.S. cities, and remember to adjust the Universal times provided to obtain the correct times for your own time zone. For example, subtract 5 hours from UT to obtain EST, or 8 hours to get PST.
After Jan. 13, watch Mars closely align with Pollux and Castor during the night of Jan. 16-17 and again at dusk on Jan. 17. On Jan. 22, Mars passes within 2.4° S of Pollux, the second and closest of the red planet's triple conjunction with that star.

Follow the Moon. The Moon is above the horizon one hour after sunset each evening Jan. 1-14.

On **Jan. 1,** the 5-percent crescent Moon could be spotted low in SW to WSW, 21° lower right of Venus. Jupiter was then in the east, with reddish Aldebaran, eye of Taurus, 5.7° to its upper right. Nearly 14° above and forming an isosceles triangle with Jupiter and Aldebaran that evening was the Pleiades star cluster, a beautiful sight for binoculars.

On **Jan. 2,** the 11-percent crescent Moon closed to within 9° lower right of Venus. Two hours after sunset, observers had a good view of Mars low in ENE with Moon still visible in WSW: Five naked-eye solar system bodies in view simultaneously, Moon-Venus-Saturn-Jupiter-Mars, spanning 159°.

On **Jan. 3,** the 19-percent crescent climbed nearly 5° upper left of Venus and 9° lower right of Saturn. It was a good day to try for Venus in the daytime. Just before sunset, to the lower right of the Moon. Once Mars had risen, the span of five objects, Venus-Moon-Saturn-Jupiter-Mars, was 150°. With optical aid, a total of seven solar system bodies could be seen by adding **Neptune,** 12.6° upper left of Saturn and within 0.9° upper left of the 5.5-mag. star 20 in Pisces; and **Uranus,** easily for binoculars 19° upper right of Jupiter and 8° upper right of the Pleiades. Here are more details for locating these two outermost known planets of our solar system.

On Jan. 1 and 2, **Neptune,** moving ENE by less than 1' (arcminute) per day in early January, passed 9' NNW of a similarly bright 7.9-mag. star, HIP117614, the close planet-star pair being located 50' (just over 0.8°) ENE of 5.5-mag. 20 Piscium. The star 20 Psc marks the end of the handle of a 6-star dipper-shaped asterism between the Circlet of Pisces and Iota Ceti. The entire asterism, consisting of stars ranging from mag. 4.4 to 5.9, fits into a binocular field 5¼° across. Neptune and its equally faint stellar companion can be distinguished by their colors, orange for the spectral type K star, contrasting with the bluish color of Neptune. Another difference: With sufficient magnification, Neptune will reveal its disk, 2.2 arcseconds in diameter. On Jan. 31, as Venus passes 3¼° north of Neptune, the faint planet will have widened its distance ENE of 20 Piscium to 1.5°. For the star field of Neptune and the dipper asterism, I recommend Charts 76 and 7 of Sky & Telescope's *Pocket Sky Atlas.*

Uranus, at mag. 5.7, is readily spotted with binoculars if you know where to look. During January, Uranus moves only 21' WSW, as its retrograde motion comes to an end on Jan. 30. Look within 4.6° south and slightly west of 2.9-mag. Alcyone, or Eta Tauri, brightest member of the Pleiades, and 7.2° to 7.5° due east of 4.3-mag. Delta in Aries, for a pair of stars, 21' apart, 13 and 14 Tauri, of mag. 5.7 and 6.1 respectively. Brighter 13 Tauri is a close match to Uranus in brightness; fainter 14 Tauri is almost due east of 13. On Jan. 1, Uranus was 8.0° SSW of Eta Tauri, 3.2° SE of Delta Ari, and 4.6° WSW of 13 Tauri. In good seeing conditions, a telescope at 100-power or more reveals Uranus' disk, 3.7 arcseconds across. For the star field of Uranus, I recommend Charts 15 and 4 of Sky & Telescope's *Pocket Sky Atlas.*

On **Jan. 4,** Saturn was within 5° lower right of the 29-percent crescent.

On **Jan. 5,** the 40-percent fat crescent Moon climbed 19° upper left of Saturn.

On **Jan. 9,** the Moon moved through the Pleiades star cluster, covering and uncovering some of its stars.

Jan. 10. Have you ever spotted Jupiter in the daytime? It is a good time to attempt it today. Just before sunset, look 5°-6° right of the Moon. Use binoculars if necessary. As the evening progresses, notice the changing alignment of Moon-Jupiter Aldebaran.

Jan. 11. Northernmost Moon, passes within 5°-6° south of overhead at 10:23 p.m. in Palm Springs.

Jan. 12. From top to bottom, Castor-Pollux-Mars appear 10° to 14° to lower left of nearly Full Moon tonight. Look again tomorrow night!

Jan. 13. About one hour after sunset, Pollux and Castor, the "Twin" stars of Gemini, appear 4° to 8½° to upper left of the Moon tonight. Where is Mars? Reread the section about Mars in the planet summary above, especially about tonight's occultation. Look again later this evening, and watch the Moon gradually move eastward, away from Mars. Two lunar cycles or 59 days from now, on the night of March 13, there will be a total eclipse of the Moon.

Jan. 14. One hour after sunset, the 98-percent Moon is just rising, 13°-14° lower left of Mars. For next several evenings, watch for changes in the arrangement of Mars-Pollux-Castor.

Jan. 15. Mars at opposition. Two hours after sunset, the 95-percent waning Moon is just rising, 27° lower left of Mars. Wait another hour for a good view of the lineup Venus-Saturn-Jupiter-Mars-Moon, nearly 161° in extent. Can you see Regulus, about 6° lower left of Moon?

Jan. 16. Tonight, note the special arrangement of Mars-Pollux-Castor. The 89-percent waning Moon rises about three hours after sunset, not long before Venus and Saturn set. After another hour, Venus and Saturn are gone, the Moon is low in the east with the star Regulus 7° to its upper right, Jupiter is high in the south, and Mars is high in the east, about midway between Jupiter and the Moon.

Rather than staying up later each night to see the Moon after Full, you can **switch your viewing time to mornings, an hour before sunrise,** and follow the waning Moon for the rest of its cycle of phases.

On Jan. 13, one hour before sunrise, the Full Moon is low in WNW, 9° to the lower right of Mars. Note Pollux and Castor above the Moon and to the right of Mars. Check the arrangement of Mars and the Twins for the next few mornings.

On **Jan. 14**, an hour before sunup, the Moon is in WNW, about 5° to the upper left of Mars.

On **Jan. 16,** the 92-percent waning gibbous Moon is in the west, within 2°-3° of Regulus, heart of Leo, the Lion.

On **Jan. 20 and 21**, the Moon, approaching Last Quarter phase when it would be half full and 90° or a quarter-circle west of the Sun, is found 7° upper right, and then 5° lower left, of Spica, the spike of grain in the hand of Virgo.

Within two minutes after Spica reaches its high point in the south (45° up as seen from the Coachella Valley at latitude 34° N in southern California), **the brightest globular cluster, 3.6-mag. Omega Centauri,** reaches its high point, 36° below Spica, or 9° above the southern horizon. In clear dark skies, it can be seen with unaided eye and easily with binoculars. Using Charts 46-48 in Sky & Telescope's *Pocket Sky Atlas,* make your way down from Spica past Gamma and Pi Hydrae, to bright, 2.1-mag. Menkent, or Theta Centauri, then down past a compact isosceles triangle of Mu, Nu, and Phi, down again to Zeta, and west to Omega. See description of star hop on another page.

On **Jan. 24,** an hour before sunrise, find the 25-percent crescent Moon in SSE, with reddish Antares, heart of the Scorpion, 5° to the Moon's lower left. On the next morning, a thinner 17-percent crescent will appear 8° lower left of that star.

On **Jan. 26,** this month's southernmost Moon, a 10-percent crescent, will appear very low in SE, 21° lower left of Antares. Look in brighter twilight closer to the time of sunrise one additional morning, and you might see a 5-percent crescent.

Folks going outdoors before dawn might want to continue checking Corona Borealis, the Northern Crown, for the appearance of a star not seen with unaided eye since 1946. At the peak of its outburst, **recurrent Nova T Coronae Borealis** is expected to briefly rival 2.2-mag. Alphecca, that constellation's brightest star, one-third of the way from Arcturus toward Vega. T CrB is located just off the arc of stars, and only 6° from Alphecca. See Chart 53 of *Pocket Sky Atlas*, and, on a separate page, an AAVSO chart of the field with magnitudes of comparison stars rounded to nearest 0.1 mag. with decimal points omitted. Latest observations from AAVSO.org report T CrB near visual magnitude 10. The explosion, predicted by many astronomers to occur in 2024, has not happened yet! For an update, visit:

https://universemagazine.com/en/t-coronae-borealis-why-the-mysterious-star-still-remains-unexploded/

The Moon returns to the evening sky on **Jan. 30.** Within an hour after sunset that evening, find Venus in WSW, Saturn 10 degrees below it, and a pretty, 3-percent crescent Moon 18° lower right of Saturn.

On **Jan. 31**, the 9-percent crescent will appear 2° from Saturn and 13° below Venus. **Don't miss the spectacle on the next evening, Saturday Feb. 1,** with the 16-percent crescent Moon just 2° to 3° from Venus. That afternoon, at 4:24 p.m. PST from Palm Springs, CA, Venus appears just 2.2° from Moon's northern limb, providing another easy chance to spot Venus in the daytime. Venus itself then shows a crescent, 37 percent illuminated and 33 arcseconds in diameter. Can you resolve Venus's crescent with your binoculars? That evening, Jupiter-Aldebaran, and Mars and the Twin stars are still putting on a great show. Watch the waxing Moon pass the groupings on Feb. 6 and 9. During the rest of February, watch Venus with Saturn below it sink lower in the western sky. Mercury emerges from behind the Sun to pass near departing Saturn on Feb. 24 -- all five bright planets at dusk -- on the innermost planet's way to its best evening apparition of the year, in early March. Watch Moon pass all the naked-eye planets within ten days, Feb. 28-Mar. 9. Jupiter gradually pulls away from Aldebaran, and Mars passes Pollux by the end of March.

In the ten weeks from greatest elongation 47° east of Sun on January 9 through its inferior conjunction 8.4° NNW of Sun on March 20, **Venus** puts on its most spectacular display as the evening "star." The planet will be impressive whether observed with unaided eye, binoculars, or telescope. During that interval, Venus begins as a half-illuminated disk nearly 25" (arc-seconds) in diameter, thinning to a striking one percent crescent while expanding in apparent size to nearly 60" or one arcminute across!

At its distance of 0.72 astronomical units from the Sun, Venus receives a flux of 1/(0.72 squared), or nearly double the intensity of solar radiation received by Earth. Combined with the reflective efficiency (albedo 65 percent) of its planetwide cloud cover, this makes Venus a very bright object, often readily observable in the daytime, to those who know where to look. Monthly conjunctions of Venus and the Moon provide easy opportunities for spotting Venus in daylight. Another strategy, while Venus is an evening star, is to locate it as soon as possible after sunset, and look a few minutes earlier on successive days, to upper left of the previous day's location, until you are spotting it before sunset. Within several weeks before or after inferior conjunction, its passage nearly between Earth and Sun, the crescent Venus appears large enough to be easily resolved with binoculars, even at the low magnification of 7x or 8x. The key is to look while the sky is bright, around sunrise or sunset, or in broad daylight, even midday, to eliminate the contrast of brilliant Venus against a darkened sky. Deep blue skies, unsullied by aerosols of moisture or dust, really help, too.

I sometimes use software or the U.S. Naval Observatory Astronomical Applications Department Data Services at https://aa.usno.navy.mil/data/index to obtain the azimuth and altitude of Venus just before a daytime search, and then look up to the sky and find it right away with unaided eye. (At least I used to when I had better eyesight.) Or, I plop my Dobsonian altazimuth-mounted telescope down on the ground, point it in approximately the direction toward Venus, sweep the area while looking through a low power eyepiece, and pick it up forthwith! No high tech Go-To equipment needed. Make sure you pre-focus the telescope on a distant object before using this method.

When Venus is a morning "star", it is much easier to secure a daytime sighting. Just observe Venus in morning twilight, then keep track of it until sunrise.

When Venus appears close to the Sun, take care not to allow sunlight to enter the instrument. Swift and permanent damage to eyesight can result. During the inferior conjunction of March 22, 2025, Venus gets no closer than 8.4° from the Sun, so it is possible to safely block the Sun with a building, and aim your binoculars or telescope at Venus. Two days earlier, on March 20, Venus passes 9.3° directly above the midday Sun, so observers can stand in the shade on the north side of a building, look about 9° directly above where the hidden Sun is known to be, and spot the incredibly thin crescent. Venus goes through five complete evening-morning cycles in just 2 or 3 days less than 8 years, so Venus's very wide pass north of the Sun at inferior conjunction in 2025 will closely repeat in 2033 and 2041. It was in the same series in April 1961, when I got my first inferior conjunction sighting of Venus one morning before sunup, while residing as a college senior on the grounds of Planting Fields Arboretum, which served as a temporary campus for what became Stony Brook University. It was a memorable view through my 7-power binoculars.

On March 20, Venus will be about equally visible just before sunrise and just after sunset, to upper left of the rising Sun and upper right of the setting Sun. For perhaps four days before until two days after March 20, it will be possible to spot Venus with optical aid, both before sunrise and after sunset.

Thereafter Venus will be a morning star for nearly the rest of this year, until it sinks into bright twilight in December on its way to superior conjunction on the far side of the Sun on Jan. 6, 2026. **During April 26-May 1, 2025, Venus lingers within 4° of a rare, ringless Saturn**. Between July 14 and November 2, 2025, Venus will pass four of the five first magnitude stars of the zodiac. **The most spectacular of Venus's conjunctions will be its passage 0.9° from Jupiter on August 12.** And of course, the monthly pairings of Venus with the waning crescent Moon are ample reward for getting up early to witness them.

Overnight on March 13 to 14, there will be a total eclipse of the Moon. In the Pacific time zone, mid-eclipse, when the Moon is deepest in Earth's shadow, occurs on Tuesday, March 13 at 11:59 p.m. PST, one minute before 12 midnight. In the Eastern time zone, the middle of total eclipse occurs at 2:59 a.m. EDT. First and last contacts of the Moon with the umbra, or dark central core of Earth's shadow, circumscribing the entire encounter of Moon with Earth's shadow core, occur during the early morning hours on Wednesday, March 14.

A complete timetable for the eclipse, with suggestions for an observing project, and illustrations of gatherings of the Moon, planets, and stars, appear on the Abrams Planetarium *Sky Calendar.* For $12 per year, subscribers receive quarterly mailings of three monthly issues, each comprising an illustrated calendar of events and an evening star map. Subscriptions and a sample issue are available from www.abramsplanetarium.org/skycalendar