



## About the Celestial Objects

Listed on this page are several of the brighter, more interesting celestial objects visible in the evening sky this month (refer to the monthly sky map). The objects are grouped into three categories. Those that can be easily seen with the naked eye (that is, without optical aid), those easily seen with binoculars, and those requiring a telescope to be appreciated. **Note, all of the objects (except single stars) will appear more impressive when viewed through a telescope or very large binoculars.** They are grouped in this way to highlight objects that can be seen using the optical equipment that may be available to the star gazer.

## Tips for Observing the Night Sky

When observing the night sky, and in particular deep-sky objects such as star clusters, nebulae, and galaxies, it's always best to observe from a dark location. Avoid direct light from street lights and other sources. If possible observe from a dark location away from the light pollution that surrounds many of today's large cities.

You will see more stars after your eyes adapt to the darkness—usually about 10 to 20 minutes after you go outside. Also, if you need to use a torch to view the sky map, cover the light bulb with red cellophane. This will preserve your dark vision.

Finally, even though the Moon is one of the most stunning objects to view through a telescope, its light is so bright that it brightens the sky and makes many of the fainter objects very difficult to see. So try to observe the evening sky on moonless nights around either New Moon or Last Quarter.

## Astronomical Glossary

**Conjunction** – An alignment of two celestial bodies such that they present the least angular separation as viewed from Earth.

**Constellation** – A defined area of the sky containing a star pattern.

**Diffuse Nebula** – A cloud of gas illuminated by nearby stars.

**Double Star** – Two stars that appear close to each other in the sky; either linked by gravity so that they orbit each other (binary star) or lying at different distances from Earth (optical double). Apparent separation of stars is given in seconds of arc (").

**Ecliptic** – The path of the Sun's center on the celestial sphere as seen from Earth.

**Elongation** – The angular separation of two celestial bodies. For Mercury and Venus the greatest elongation occurs when they are at their most angular distance from the Sun as viewed from Earth.

**Galaxy** – A mass of up to several billion stars held together by gravity.

**Globular Star Cluster** – A ball-shaped group of several thousand old stars.

**Light Year (ly)** – The distance a beam of light travels at 300,000 km/sec in one year.

**Magnitude** – The brightness of a celestial object as it appears in the sky.

**Open Star Cluster** – A group of tens or hundreds of relatively young stars.

**Opposition** – When a celestial body is opposite the Sun in the sky.

**Planetary Nebula** – The remnants of a shell of gas blown off by a star.

**Universal Time (UT)** – A time system used by astronomers. Also known as Greenwich Mean Time. Singapore Standard Time is UT plus 8 hours.

**Variable Star** – A star that changes brightness over a period of time.

EQUATORIAL EDITION  
JANUARY 2026

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## Easily Seen with the Naked Eye

Capella	• The 6th brightest star. Appears yellowish in color. Spectroscopic binary. Dist=42 ly.
Sirius	• The brightest star in the sky. Also known as the "Dog Star". Dist=8.6 ly.
CMi	• Greek name meaning "before the dog" -- rises before Sirius (northern latitudes). Dist=11.4 ly.
Canopus	• Second brightest star in the sky. 14,000 times more luminous than the Sun. Dist=309 ly.
Achernar	• Brightest star in Eridanus, The River. Arabic name meaning "end of river". Dist=144 ly.
Castor	• Multiple star system with 6 components. 3 stars visible in telescope. Dist=52 ly.
Pollux	• With Castor, the twin sons of Leda in classical mythology. Dist=34 ly.
Rigel	• The brightest star in Orion. Blue supergiant star with mag 7 companion. Dist=770 ly.
Betelgeuse	• One of the largest red supergiants stars known. Diameter=300 times that of Sun. Dist=430 ly.
Algol	• Famous eclipsing binary star. Magnitude varies between 2.1 & 3.4 over 2.867 days.
Fomalhaut	• Brightest star in Piscis Austrinus. In Arabic the "fish's mouth". Dist=25 ly.
Pleiades	• The Seven Sisters. Spectacular cluster. Many more stars visible in binoculars. Dist=399 ly.
Hyades	• Large V-shaped star cluster. Binoculars reveal many more stars. Dist=152 ly.
Aldebaran	• Brightest star in Taurus. It is not associated with the Hyades star cluster. Dist=66.7 ly.
Polaris	• The North Pole Star. A telescope reveals an unrelated mag 8 companion star. Dist=433 ly.

## Easily Seen with Binoculars

M31	○ The Andromeda Galaxy. Most distant object visible to naked eye. Dist=2.5 million ly.
M38	○ Stars appear arranged in "pi" or cross shape. Dist=4,300 ly.
M36	○ About half size of M38. Located in rich Milky Way star field. Dist=4,100 ly.
M37	○ Very fine star cluster. Discovered by Messier in 1764. Dist=4,400 ly.
M44	○ Praesepe or Beehive Cluster. Visible to the naked eye. Dist=590±20 ly.
M41	○ First recorded observation by Aristotle in 325 BC as "cloudy spot". Dist=2,300 ly.
Mira	○ Famous long period variable star. Mag varies between 3.0 & 10.1 over 332 days.
LMC	○ Large Magellanic Cloud. A neighbouring galaxy of the Milky Way. Dist=180,000 ly.
M35	○ Fine open cluster located near foot of the twin Castor. Dist=2,800 ly.
M48	○ 12+ stars in 7x binoculars. Triangular asterism near centre. Dist=1,990 ly.
γ Leporis	● Visible with binoculars. Gold & white stars. Mags 3.6 & 6.2. Dist=30 ly. Sep=96.3".
2232	○ A large scattered star cluster of 20 stars. Dist=1,300 ly.
2244	○ Surrounded by the rather faint Rosette Nebula. Dist=5,540 ly.
M50	○ Visible with binoculars. Telescope reveals individual stars. Dist=3,000 ly.
Cr 69	○ Lambda Orionis Cluster. Dist=1,630 ly.
M42	○ The Great Orion Nebula. Spectacular bright nebula. Best in telescope. Dist=1,300 light years.
Double Cluster	○ Double Cluster in Perseus. NGC 869 & 884. Excellent in binoculars. Dist=7,300 ly.
ζ Phoenicis	○ Eclipsing binary star and double (mag 8). Varies between 3.9 & 4.4 over 1.667 days.
L <sup>2</sup>	○ Semi-regular variable. Magnitude varies between 2.6 & 6.2 over 140.42 days.
M47	○ Bright star cluster. 15+ stars in 7x binoculars. Dist=1,500 ly.
M46	○ Dist=5,400 ly. Contains planetary NGC 2438 (Mag 11, d=65") -- not associated.
2451	○ 30+ stars in binoculars. The brightest star, χ Puppis, is red. Dist=850 ly.
2477	○ Very rich but distant star cluster (4,200 ly). Resembles globular through binoculars.
253	○ Fine, large, cigar-shaped galaxy. Requires dark sky. Member of Sculptor Group.
47 Tucanae	○ Spectacular object. Telescope will reveal stars. Near edge of SMC. Dist=15,000 ly.
SMC	○ Small Magellanic Cloud. Companion galaxy to Milky Way. Requires dark sky. Dist=210,000 ly.

## Telescopic Objects

γ Andromedae	● Attractive double star. Bright orange star with mag 5 blue companion. Sep=9.8".
γ Arietis	● Impressive looking double blue-white star. Visible in a small telescope. Sep=7.8".
M67	○ Contains 500+ stars mag 10 & fainter. One of the oldest clusters. Dist=2,350 ly.
η Cassiopeiae	● Yellow star mag 3.4 & orange star mag 7.5. Dist=19 ly. Orbit=480 years. Sep=12".
2070	○ Tarantula Nebula. A bright nebula located in LMC. A star-forming region.
θ Eridani	● Striking blue-white double star. Mags 3.2 & 4.3. Visible in a small telescope. Sep=8.2".
β Monocerotis	● Triple star. Mags 4.6, 5.0 & 5.4. Requires telescope to view arc-shape. Sep=7.3".
2264	○ Christmas Tree Cluster. Associated with the Cone Nebula. Dist=2,450 ly.
σ Orionis	● Superb multiple star. 2 mag 7 stars one side, mag 9 star on other. Struve 761 triple in field.
κ Puppis	● Telescope easily shows two blue-white stars of almost equal brightness. Sep=9.9".
M1	○ Crab Nebula. Remnant from supernova which was visible in 1054. Dist=6,500 ly.
M33	○ Fine face-on spiral galaxy. Requires a large aperture telescope. Dist=2.3 million ly.