Sky Calendar – January 2019

1. Moon near Venus (47° from Sun, morning sky) at 22h UT. Mag. ~4.5.
2. Earth at Perihelion (closest to Sun) at 5h UT. The Sun-Earth distance is 0.983301 a.u. or 147.1 million kilometers.
3. Moon near Jupiter (morning sky) at 8h UT. Mag. ~1.8.
4. Quadrantid Meteor Shower peaks at 2h UT. Active between December 28 and January 12. Produces up to 120 meteors per hour. Radiant is in northern Boötes.
5. New Moon at 1:28 UT. Start of lunation 1188.
6. Partial Eclipse of the Sun at 1:41 UT (greatest). Visible from NE Asia and north Pacific. Begins at 23:34 (Jan 5) and ends at 3:49 UT.
7. Venus at greatest elongation west (47° from Sun, morning sky) at 5h UT. Mag. ~4.4.
8. Moon near Mars (evening sky) at 1h UT. Mag. ~0.6.
9. First Quarter Moon at 6:45 UT.
10. Venus 7.8° N of Antares (47° from Sun, morning sky) at 23h UT. Mags. ~4.4 and 1.1. Jupiter nearby.
11. Moon near Aldebaran (evening sky) at 19h UT.
12. Total Eclipse of the Moon begins at 4:41 UT and ends at 5:43 UT. Mid-eclipse at 5:13 UT. Partial phases begin at 3:34 UT and end at 6:51 UT. Moon appears red-orange in color during totality (the color of Earth’s sunsets). Visible from central Pacific, North and South America, Europe, and Africa.
13. Full Moon at 5:16 UT.
14. Moon at perigee (closest to Earth) at 20:00 UT (357,342 km; angular size 33.4°).
15. Venus 2.4° N of Jupiter (46° from Sun, morning sky) at 16h UT. Mags. ~4.3 and ~1.8. A spectacular sight over several days.
16. Moon near Regulus (morning sky) at 4h UT.
17. Last Quarter Moon at 21:11 UT.
18. Moon near Jupiter (53° from Sun, morning sky) at 2h UT. Mag. ~1.9.
19. Moon near Venus (45° from Sun, morning sky) at 17h UT. Mag. ~4.3. Spectacular occultation visible from w South America and Polynesia.

More sky events and links at http://Skymaps.com/skycalendar/

All times in Universal Time (UT). (Singapore Standard Time = UT + 8 hours.)
About the Celestial Objects
Listed on this page are the brightest, 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, nebulas, 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.

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** Easily Seen with the Naked Eye**

- **Sirius CMa** - The brightest star in the sky. Also known as the "Dog Star". Dist=8.6 ly.
- **Procyon CMi** - Greek name meaning "before the dog" — rises before Sirius (northern latitudes). Dist=11.4 ly.
- **Canopus Car** - Second brightest star in the sky. 14,000 times more luminous than the Sun. Dist=309 ly.
- **Achernar Eri** - Brightest star in Eridanus, The River. Arabic name meaning "end of river". Dist=144 ly.
- **Castor Gem** - Multiple star system with 6 components. 3 stars visible in telescope. Dist=52 ly.
- **Pollux Gem** - With Castor, the twin sons of Leda in classical mythology. Dist=34 ly.
- **Betelgeuse Ori** - One of the largest red supergiant stars known. Diameter=300 times that of Sun. Dist=430 ly.
- **Algos Per** - Famous eclipsing binary star. Magnitude varies between 2.1 & 3.4 over 2.867 days.
- **Fomalhaut PsA** - Brightest star in Piscis Austrinus. In Arabic the "fish's mouth". Dist=25 ly.
- **Pleiades Tau** - The Seven Sisters. Spectacular cluster. Many stars more visible in binoculars. Dist=399 ly.
- **Hyades Tau** - Large V-shaped star cluster. Binoculars reveal many more stars. Dist=152 ly.
- **Aldebaran Tau** - Brightest star in Taurus. It is not associated with the Hyades star cluster. Dist=66.7 ly.

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**Easily Seen with Binoculars**

- **M31 And** - The Andromeda Galaxy. Most distant object visible to naked eye. Dist=2.5 million ly.
- **M38 Aur** - Stars appear arranged in "pi" or cross shape. Dist=4,300 ly.
- **M36 Aur** - About half size of M38. Located in rich Milky Way star field. Dist=4,100 ly.
- **M37 Aur** - Very fine star cluster. Discovered by Messier in 1764. Dist=4,600 ly.
- **M44 Cnc** - Praesepe or Beehive Cluster. Visible to the naked eye. Dist=590 ly.
- **M41 CMa** - First recorded observation by Aristotle in 325 BC as "cloudy spot". Dist=2,300 ly.
- **Mira Cet** - Longest period variable star. Mag varies between 3.0 & 10.1 over 332 days.
- **LMC Dor** - Large Magellanic Cloud. A neighbouring galaxy of the Milky Way. Dist=180,000 ly.
- **M35 Gem** - Fine open cluster located near foot of the twin Castor. Dist=2800 ly.
- **M48 Hya** - 12+ stars in 7x binoculars. Triangular asterism near centre. Dist=1,990 ly.
- **2232 Mon** - A large scattered star cluster of 20 stars. Dist=1,300 ly.
- **2244 Mon** - Surrounded by the rather faint Rosette Nebula. Dist=5,540 ly.
- **Cr 69 Ori** - Lambda Orionis Cluster. Dist=1,630 ly.
- **M42 Ori** - The Great Orion Nebula. Spectacular bright nebula. Best in telescope. Dist=1,300 light years.
- **ζ Phoenicis Phe** - Eclipsing binary star and double (mag 8). Varies between 3.9 & 4.4 over 1,667 days.
- **L12 Pup** - Semi-regular variable. Magnitude varies between 2.0 & 5.1 over 264 days.
- **M47 Pup** - Bright star cluster. 15+ stars in 7x binoculars. Dist=1,500 ly.
- **M66 Pup** - Dist=5,400 ly. Contains planetary NGC 2438 [Mag 11, d=65°] — not associated.
- **2451 Pup** - 30+ stars in binoculars. The brightest star, χ Puppis, is red. Dist=850 ly.
- **2477 Pup** - Very rich but distant star cluster (4,200 ly). Resembles globular through binoculars.
- **253 Scl** - Fine, large, cigar-shaped galaxy. Requires dark sky. Member of Sculptor Group.
- **47 Tucanae Tuc** - Spectacular object. Telescope will reveal stars. Near edge of SMC. Dist=15,000 ly.

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**Telescopic Objects**

- **γ Andromedae And** - Attractive double star. Bright orange star with mag 5 blue companion. Sep=9.8″.
- **α Arietis Ari** - Impressive looking double blue-white star. Visible in a small telescope. Sep=7.8″.
- **M67 Cnc** - Contains 500+ stars mag 10 & fainter. One of the oldest clusters. Dist=2,350 ly.
- **ν Cassiopeiae Cas** - Yellow star mag 3.4 & orange star mag 7.5. Dist=19 ly. Orbit=480 years. Sep=12″.
- **2070 Dor** - Tarantula Nebula. A bright nebula located in LMC. Dist=1,500 ly.
- **0 Eridani Eri** - Striking blue-white double star. Mags 3.2 & 4.3. Visible in a small telescope. Sep=8.2″.
- **β Monocerotis Mon** - Triple star. Mags 4.6, 5.0 & 5.4. Requires telescope to view arc-shape. Sep=7.3″.
- **2264 Mon** - Christmas Tree Cluster. Associated with the Cone Nebula. Dist=2,450 ly.
- **κ Orionis Ori** - Superb multiple star. 2 mag 7 stars one side, mag 9 star on other. Struve 761 triple in field.
- **k Puppis Pup** - Telescope easily shows two blue-white stars of almost equal brightness. Sep=9.9″.
- **M1 Tau** - Fine on spiral galaxy. Requires a large aperture telescope. Dist=6,500 ly.

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