

St Benedict's

NIGHT SKY NEWS – Dec 2022

St Benedict's is a member of the **SOCIETY FOR POPULAR ASTRONOMY** and receives regular newsletters regarding astronomical events and information. If you would like to be included on the mailing list for these, please contact JGregory@st-benedicts.suffolk.sch.uk

STARS IN YOUR EYES

December is a pivotal month in the astronomical year as the 21st of the month is the **Winter Solstice** – the shortest day of the year and the longest night, which is a delight for naked-eye astronomers. After this, of course, the days get longer and the nights get shorter. However, there will be much to see in the evening skies right up to when the clocks go forward in March.

When it comes to great, winter constellations in the northern sky, none stands out more than **Ursa Major** – the “Great Bear”, popularly known as “The Plough”, or “The Big Dipper”. Our featured constellation this month, though, is Ursa Major's smaller relation: **URSA MINOR**, the “Little Bear”.



To find Ursa Minor, you can use the two right end stars in Ursa Major as “pointers”. Imagine a line drawn between the two stars and extend it upwards towards north. The next bright star you will come to is **Polaris**, which is the brightest star in the constellation Ursa Minor.

Ursa Minor, in the pattern of its seven visible stars, is very similar to Ursa Major – so it is not surprising that the two constellations should be seen to form a “matching pair”.

Although Ursa Minor was first catalogued by the Greek astronomer Ptolemy in the 2nd century, the constellation is believed to have been created by Thales of Miletus, a philosopher and astronomer who lived

between 625 and 545 BC and was known as one of the Seven Sages of Greece (early 6th century philosophers known for their wisdom). He was believed to be descended from a Phoenician family, and Phoenicians frequently used Ursa Minor in navigation because, lying so close to the North Pole, the constellation was an excellent guide to true north. Indeed, its brightest star, Polaris, is also known as the “North Star” and more will be explained later.

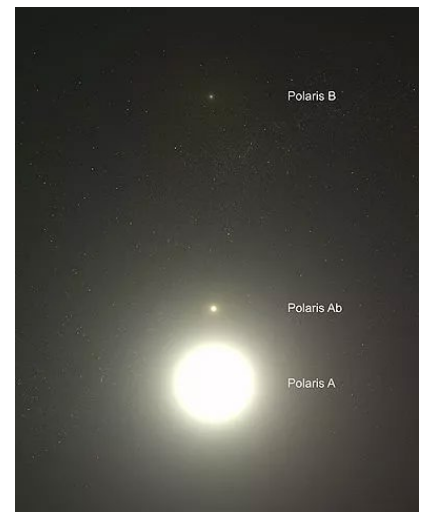
Ursa Minor is usually associated with two different myths. In one, the constellation represents Ida, the nymph who took care of Zeus on the island of Crete when he was small, along with Adrasteia, the nymph represented by the larger constellation Ursa Major. Zeus' mother Rhea hid Zeus on the island when he was very young to protect him from his father Cronus. Cronus, fearful of an old prophecy that said that one of his children would overthrow him, swallowed five of his children after they were born. When Zeus was born, Rhea tricked Cronus into swallowing a stone instead, and Zeus eventually fulfilled the prophecy. He freed his brothers Poseidon and Hades and sisters Hera, Hestia and Demeter, and became the supreme god of the Olympians.

In an older myth, the seven stars that form Ursa Minor were said to represent the Hesperides, seven daughters of Atlas, who tended to Hera's orchard (Garden of the Hesperides) where a tree of golden, immortality-giving apples grew.

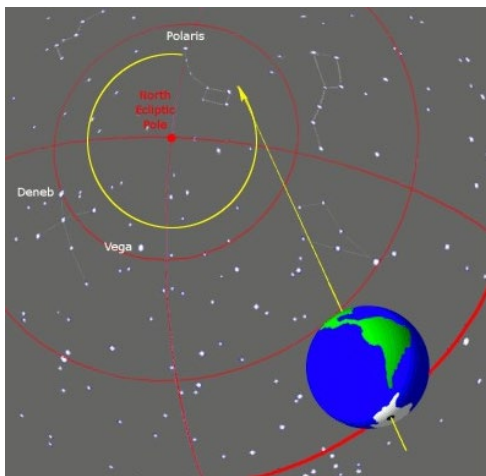


POLARIS – THE “NORTH STAR” (or “POLE STAR”) - is the closest bright star to the north celestial pole since the High Middle Ages and is the brightest star in Ursa Minor. It has an apparent magnitude of 1.985 and is approximately 434 light years distant from Earth. It is actually a triple-star system with a main, yellow giant star (Polaris A) and two smaller companions (Polaris Ab and Polaris B) in orbit. Polaris does not appear brighter than it is because it is so distant.

Because of its brightness and proximity to the pole, Polaris is an important star in celestial navigation and has been known by many different names, including **Stella Maris** (sea star), **Alruccabah**, **Phoenix**, **Lodestar** (guiding star, derived from the Old Norse leiðarstjarna), **Cynosūra** (from the Greek κυνόσουρα, meaning “the dog’s tail”), **Angel Stern**, **Star of Arcady**, **Yilduz**, **Mismar** (needle or nail), **Tramontana**, **Navigatoria** and **Pole Star**.



Being at the point of the north celestial pole in the night sky, to the naked eye Polaris seems to remain fixed in the same northerly direction. Its altitude (distance above the horizon) will vary throughout the year because the earth is tilted on its axis in relation to the Sun. However, Polaris is not exactly at the north pole – it is currently about 0.6 degrees away from it, so will move in a small circle around it and all the stars of the northern sky appear to rotate around it too.



Polaris is, in fact, continually on the move and after a few hundred years will no longer be a “North Star” – this is due to the Earth’s rotational axis constantly changing, a process known as **precession of the equinoxes**. Basically, in the manner of a spinning top, the Earth is in a slow, gravity-induced and continuous change in the orientation of its rotational axis. It is a process which goes around in a 26,000 year cycle. In about 8,000 years the North Star will be the bright star **Deneb** (in the constellation Cygnus), and in about 12,000 years, **Vega** (in the constellation Lyra).

In compiling his famous star catalogue (completed in 129 BCE), the Greek astronomer Hipparchus noticed that the positions of the stars were shifted in a systematic way. This indicated that it was not the stars that were moving but rather the observing platform—Earth. Precession is caused by the gravitational influence of the Sun and the Moon acting on Earth’s equatorial bulge. To a much lesser extent, the planets exert influence as well.

THE MOON THIS MONTH

PHASE

Full Moon	8 TH
3rd Quarter	16 TH
New Moon	23 RD
1st Quarter	30 TH

A variety of Native American peoples traditionally used the monthly Moons and nature’s corresponding signs as a calendar to track the seasons. December’s full Moon is most commonly known as the **COLD MOON**—a Mohawk name that conveys the frigid conditions of this time of year,

when cold weather truly begins to grip us. Other names that allude to the cold and snow include **Drift Clearing Moon** (Cree), **Frost Exploding Trees Moon** (Cree), **Moon of the Popping Trees** (Oglala), **Hoar Frost Moon** (Cree), **Snow Moon** (Haida, Cherokee), and **Winter Maker Moon** (Western Abenaki).

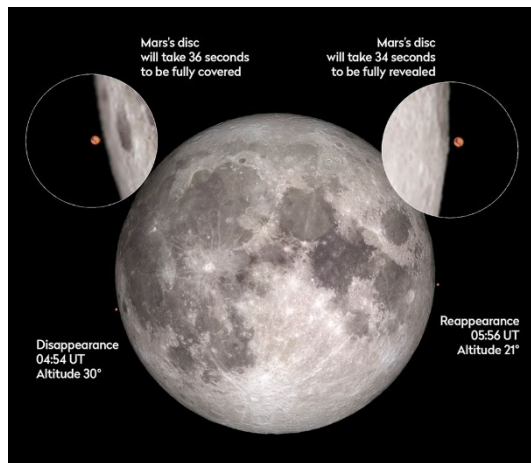
This full Moon has also been called the **Long Night Moon** (Mohican), as it rises during the “longest” nights of the year, which are near the December **winter solstice**. This name is doubly fitting because December’s full Moon shines above the horizon for a longer period of time than most full Moons.

In Europe, ancient pagans called the December full Moon the “**Moon Before Yule**,” in honour of the Yuletide festival celebrating the return of the sun heralded by winter solstice.



LUNAR OCCULTATION OF MARS There is a notable lunar event on Thursday the 8th when the Full Moon will pass in front of the planet Mars – an event known as a lunar occultation. It will begin with the disappearance of Mars behind the Moon at 04:58 GMT in the western sky at an altitude of 27.1 degrees. Its reappearance will be visible at 05:59 GMT at an altitude of 17.9 degrees.

Lunar occultations are only ever visible from a small fraction of the Earth's surface. Since the Moon is much closer to the Earth than other celestial objects, its exact position in the sky differs depending on your exact location on Earth due to its large parallax.



The position of the Moon as seen from two points on opposite sides of the Earth varies by up to two degrees, or four times the diameter of the full moon. This means that if the Moon is aligned to pass in front of a particular object for an observer on one side of the Earth, it will appear

up to two degrees away from that object on the other side of the Earth. This month's occultation will be visible only from parts of the Americas, Europe and Northern Africa.

THE PLANETS THIS MONTH

MERCURY: Poor positioning at start of December, improving through the month, jostling with Venus in the evening twilight.

VENUS: Evening planet. Near Mercury in the latter half of December, when it sets 70 minutes after sunset.

MARS: Bright planet reaching opposition 8 December. Occulted by the full Moon on the morning of 8 December.

JUPITER: Bright evening planet. Waxing Moon nearby on the evenings of 1 and 29 December.

SATURN: Evening planet but past its best. 15%-lit waxing crescent Moon nearby on the evening of 26 December.

METEORS THIS MONTH

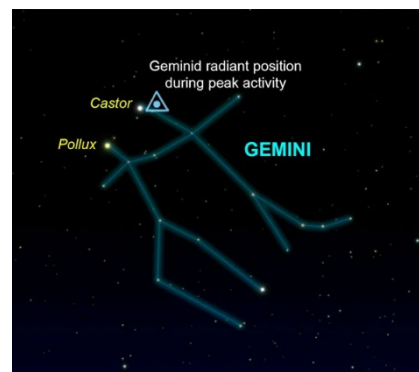
This month sees two showers: the **URSIDS** and the **GEMINIDS**. The Ursids peak on the 22-23 December, but are relatively minor with a maximum rate of only about 10 per hour. On the other hand, the Geminids, peaking on the 14-15 December, is one of the best of the year.

The meteors of the Geminid meteor shower are very bright, moderately fast, and are unusual in being multi-coloured – mainly white, but with some yellow and a few green, red and blue. These colours are partly caused by the presence of traces of metals like sodium and calcium, the same effect that is used to make fireworks colourful. The shower has been known produce over 100 meteors per hour at its peak, although light pollution and other factors mean that in reality, the actual number visible is far less. This year they occur at the time of a bright, 3rd quarter Moon, which will also reduce the visibility.

Geminids meteors appear to radiate from near the bright star Castor in the constellation Gemini. However, the actual source of the shooting stars is a stream of debris left behind by **asteroid 3200 Phaethon**, making this one of the only major showers not to originate from a comet.

Geminids were first observed in 1862, much more recently than other showers such as the Perseids and Leonids. They are thought to be intensifying every year.

If you are lucky enough to live under very dark skies and can observe from the comfort of your own garden, turn off the lights in your house so they don't spoil the view. Avoid using lights such as torches and mobile phones as this will spoil your dark adapted vision. It may take 10-20 minutes for your eyes to become adapted to the dark.



ISS SIGHTING TIMETABLE

The following ISS sightings are possible from Thursday Dec 1, 2022 through Tuesday Dec 13, 2022

Date	Visible	Max Height*	Appears	Disappears
Thu Dec 1, 4:49 PM	7 min	79°	10° above W	9° above E
Thu Dec 1, 6:26 PM	3 min	36°	10° above W	36° above SSW
Fri Dec 2, 5:38 PM	5 min	47°	10° above W	20° above SE
Fri Dec 2, 7:15 PM	< 1 min	12°	10° above WSW	12° above WSW
Sat Dec 3, 4:49 PM	7 min	60°	10° above W	10° above ESE
Sat Dec 3, 6:27 PM	3 min	20°	10° above W	18° above SSW
Sun Dec 4, 5:38 PM	6 min	27°	10° above W	10° above SSE
Mon Dec 5, 4:50 PM	6 min	37°	10° above W	10° above SE
Tue Dec 6, 5:39 PM	4 min	15°	10° above WSW	10° above S
Wed Dec 7, 4:51 PM	5 min	21°	10° above W	10° above SSE
Fri Dec 9, 4:53 PM	1 min	10°	10° above SW	10° above SW

ARTEMIS 1 UPDATE NASA's Artemis 1 moon mission, the agency's first big step toward returning astronauts to the lunar surface, launched to the Moon on 16th November on a critical test flight. Artemis 1 is the first test flight of the agency's new **Space Launch System** megarocket and the **Orion** spacecraft. The SLS rocket launched the uncrewed Orion spacecraft on an approximately 25-day mission, during which it will orbit the moon before returning to Earth on or around 11th December.



NASA's uncrewed Orion spacecraft reached its farthest distance from Earth just after 21:00 GMT on 28th November. It was the greatest distance from Earth of any craft ever built for human space travel: 268,563 miles (432,210 km).

Although there are no live astronauts aboard Orion, there are three 'moonikins', mannequins wearing the First-Generation Orion Crew Survival System spacesuit, which the real astronauts will wear on Artemis 2 and 3. Sensors have been placed all over the moonikins to provide data on what human crew members may experience in flight.

Artemis is the mythological Greek goddess of the Moon and twin sister of Apollo. The link with the mission which first launched humans to the Moon over 50 years ago therefore is clear. The crewed spacecraft, meanwhile, is called **Orion**. Orion is one of the most recognisable constellations in the sky, while in Classical mythology Orion is the hunting companion of Artemis.

NASA's long-term goals are more ambitious than just visiting the Moon: using the technology and research developed during the Artemis flights, NASA intends to launch a future crewed mission to Mars. This 'Moon to Mars' plan involves building a new space station in lunar orbit and, eventually, a habitable Moon base.

PRINCIPAL SOURCES OF INFORMATION

<https://www.almanac.com/full-moon-december>

<https://www.rmg.co.uk/stories/topics/meteor-shower-guide>

https://in-the-sky.org/news.php?id=20221208_16_100

<https://www.skyatnightmagazine.com/advice/skills/astronomy-guide-viewing-planets-night-sky/>

https://spotthestation.nasa.gov/sightings/view.cfm?country=United_Kingdom®ion=England&city=Newmarket#.Y4XWtkB2vIU

<https://www.rmg.co.uk/stories/topics/nasa-moon-mission-artemis-program-launch-date>