

About SkyNews:

SkyNews is a monthly compendium of astronomy events observable from India; it is primarily meant for astronomy enthusiasts and amateur astronomers.

Most of the events listed here can be observed by the naked eye. Some interesting events are observable through a pair of binoculars or a small telescope.

SkyNews will regularly carry the following sections:

- 1) Visibility of Planets: The planets visible in the night sky during the month will be identified. Their positions will be given with respect to the constellation in which they appear. The date of transit from one constellation to other is based on the boundaries of the constellations as defined by the International Astronomical Union.
- 2) March of the Moon: An easy way to identify a star or a planet with the Moon as a reference.
- 3) List of Events: Positions and phases of the Moon, conjunctions, occultations, etc.
- 4) Notes on Events: Any extra information about a celestial event.

SkyNews will also carry notes on interesting events like equinoxes; practical tips for night sky observation; basic calculations that can be done by amateur astronomers; and simple experiments that can be done from a school ground or a building terrace.

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Sun and Planets:

Mercury, Venus and Mars are not quite favourable for observation this month. They are too close to the Sun to observe safely (i.e. without hurting your eyes).

The Sun, Mercury, Venus and Mars are in Leo, the Lion (*Simha*) in the beginning of the month and move into Virgo, the Virgin (*Kanya*) on 17, 10, 9 and 24 September respectively.

Jupiter is in Ophiuchus, the Serpent Bearer (*Bhujangadhari* or *Sarpdhar*); and Saturn is in Sagittarius, the Archer, this month.

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March of the Moon:

The Moon can be seen in the evening sky in the beginning of the month. On 2 September, the Moon passes within 6.5° N of Spica (α Virginis or *Chitra*). On 5 September it makes a nice triangle with Jupiter and

List of Events

Dt	Dy	Time	Event
02	Mo	15:48	Mars Conj.
04	We	06:56	Mercury Superior Conj.
06	Fr	08:40	First Quarter
06	Fr	12:22	Moon-Jupiter: 2.4° S
08	Su	15:09	Moon South Dec.: 22.5°
08	Su	19:23	Moon-Saturn: 0°
08	Su	23:05	Moon Descending Node
10	Tu	11:48	Neptune Opposition
13	Fr	19:02	Moon Apogee: 406400 km
14	Sa	10:03	Full Moon
20	Fr	09:30	Mercury max E 24.6°
20	Fr	21:44	Moon-Aldebaran: 2.8° S
22	Su	08:11	Last Quarter
23	Mo	07:24	Moon North Dec.: 22.7°
23	Mo	12:00	Moon Ascending Node
23	Mo	13:19	Autumnal Equinox
25	We	02:45	Moon-Beehive: 0.4° S
28	Sa	07:57	Moon Perigee: 357800 km
28	Sa	23:56	New Moon
29	Su	09:43	Mercury-Spica: 1.3° N

Antares (α Scorpii or *Jyeshtha*). The next day on 6 September it is less than 4° from Jupiter. It is also the first quarter and the Moon will be close to the celestial meridian at sunset.

The celestial meridian is an imaginary line passing from the north celestial pole through the observer's zenith to the south celestial pole.

On 8 September the Moon is less than a degree away from Saturn. On this day the Moon will occult Saturn. This event is not visible over India.

Full moon is on 14 September. Late in the night on 20 September, the waning Moon, nearly 64% illuminated, can be seen next to Aldebaran (α Tauri or *Rohini*). The Moon enters last quarter on 22 September. On this day the half illuminated moon will be close to the meridian at sunrise.

On 25 September the Moon will rise about three hours before the Sun and will pass less than a degree away from the open cluster M44, the Beehive Cluster. The

cluster is also known as Praesepe. Less than 2° south of the Moon one can spot a 4th magnitude star, δ Cancrī or Asellus Australis. This star is less than $5'$ north of the ecliptic. This star is known as *Pushya Nakshatra* in Indian astronomy.

The mornings of 25 and 26 September offer good view of the thin lunar crescent passing north of Regulus (*Magha*).

For the September star map visit ASI – POEC link
<http://astron-soc.in/outreach/resources/sky-maps/>

September Equinox:

On 23 September, the Sun crosses the celestial equator from north to south. On this day the Sun's rays fall perpendicular on the equator of the Earth. The day marks the Autumnal Equinox in the northern hemisphere.

The other time that the Sun's rays fall perpendicular on the equator is around 20 March. On this day, the Sun crosses the celestial equator from south to north, as it moves northward. This is called the Vernal Equinox.

It has been taught and generally believed that on the day of an equinox the hours of day and night are of equal duration. The reason given is that on this day the Sun's rays fall perpendicular to the axis of the Earth. This is quite true indeed. Yet, nowhere on the Earth are the duration of day and night equal on an equinox.

There are two reasons why the duration of day and night is not equal on an equinox. One is that the Earth is a spherical body; therefore, even though the Sun's rays fall perpendicular to the equator on an equinox, at other places the rays fall at slanting angles. And, therefore, the sunrise and sunset times differ from one latitude to the other.

Secondly, the Sun is not a point source of light. It has an appreciably large size of about half a degree. The time of sunrise is calculated when its upper edge (or limb, as one would say in astronomy) is seen above the horizon and the end of day is defined as the moment when the last rays of the Sun disappear.

There is a further complication. Because of the bending of light rays in the Earth's atmosphere due to a phenomenon called refraction, the Sun's rays close to the horizon are seen a few minutes ahead or later of the 'true' sunrise or sunset respectively.

The cumulative effect of these factors is that during an equinox the daylight hours are about 7–8 minutes longer than the dark hours. This difference is much higher near and at the poles. At the poles the rays are almost parallel to the horizon; therefore there will be 24 hours daylight at both the poles.

Interestingly, the hours of daylight are always longer than the dark hours by about 14 minutes all through the year at the equator.

There are indeed days when daylight hours equal dark hours. Such days are different for different latitudes. For example people on the latitudes of Delhi ($\sim 28^\circ$ N) and Chennai ($\sim 13^\circ$ N) will have equal day and night on 16 and 12 March respectively. They will have the same again on 27 September and 2 October respectively.

One can confirm these facts easily by checking the sunset and sunrise times published in the newspapers and almanacs, or by downloading almanac generating apps.

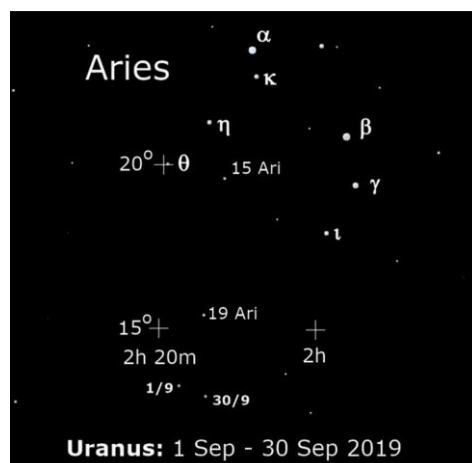
Observe Uranus:

Uranus was the first planet to be discovered through a telescope by Sir William Herschel who announced its discovery on 13 March 1781. The brightness of the planet is just at the limits of naked eye visibility. This month its magnitude is 5.7. But of course, it can be easily spotted using a pair of binoculars. Uranus is in the constellation Aries that rises about an hour after the local sunset.

Use the star chart given below to find Uranus and then follow its changing positions over the month.

The faintest star on the map has magnitude 6.0. α Arietis is a star named Hamal (2.0 mag); β Arietis is Sheratan (2.6 mag); and γ Arietis is Mesarthim, a beautiful binary star for small telescopes, separated by 7.6 arcsec with a combined magnitude of 3.9. The individual magnitudes of the stars are 4.58 and 4.64; with some experience, one can make out the 0.06 mag difference.

γ Arietis and β Arietis make *Ashwin Nakshatra*.



Uranus is just about 10.5° south of α Arietis. Star hop using a pair of binoculars (field of view $\sim 5^\circ$) as follows: from α Ari go south to reach the equilateral triangle of η , θ and 15 Ari. The base of this triangle is about 1.8° . Go further 4° south to reach the 5.72 mag star 19 Ari, which is just about as bright as Uranus, which is further south east of this star. You will notice that planet Uranus looks different from 19 Ari. Uranus is more like a dot with a slight bluish tinge and does not twinkle.

Positions of Uranus are marked for 1 and 30 September.

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