



## Sun, Planets and Transitions

The **Sun** will be in Virgo, the Virgin (*Kanya*) during October. It entered the boundary of Virgo on 17 September. The length of the ecliptic is the longest in Virgo. It is about  $44^\circ$  across, and the Sun moves about 0.986 degrees per day. Thus, the Sun spends nearly 45 days in Virgo.

The Sun's angular size increases from  $0^\circ 31' 56.47''$  on 1 October to  $0^\circ 32' 12.74''$  on 31 October.

**Mercury** is in Leo, the Lion (*Simha*), on 1 October; on the same day it moves to Virgo and crosses over to Libra, the Scales (*Tula*) on 27 October.

**Venus** will continue to travel in Leo, this month

**Mars** is in Virgo and crosses over to Libra on 24 October.

**Jupiter** continues to travel in Aries, the Ram (*Mesha*), and **Saturn** in Aquarius, the Water Bearer (*Kumbha*).

*(Disclaimer: we categorically mention here that we do not believe in astrology and believe that the only influence a planet has on us is to give us the viewing pleasure of its beauty. The sole purpose of giving the transition of planets and the Sun is to acquaint the reader with the Indian nomenclature of planets and constellations and also to show that the actual positions of the Sun and planets, which are based on modern computing, are very different from those given in astrology tables.)*

### List of Events in October 2023

Dt	Dy	Time	Event
01	Su		Venus: $44.2^\circ$ W
02	Mo	08:46	Moon-Jupiter: $3.5^\circ$ S
02	Mo	21:03	Uranus $2.7^\circ$ S of Moon
03	Tu	09:55	Moon-Pleiades: $1.1^\circ$ N
06	Fr	02:01	Moon north declination: $28.3^\circ$ N
06	Fr	19:18	Last quarter
07	Sa	15:53	Moon-Pollux: $1.6^\circ$ N
09	Mo	11:40	Venus-Regulus: $2.3^\circ$ S
10	Tu	09:11	Moon apogee: 405400 km
10	Tu	18:14	Regulus $3.8^\circ$ S of Moon
10	Tu	21:10	Venus $5.9^\circ$ S of Moon
14	Sa	23:25	New Moon
14	Sa	23:30	Annular solar eclipse (see below)
15	Su	06:41	Moon descending node $\text{☾}$ ( <i>Ketu</i> )
18	We	18:47	Moon-Antares: $0.9^\circ$ S
20	Fr	10:38	Mercury superior conjunction
20	Fr	14:49	Moon south declination: $28.3^\circ$ S
22	Su	05:18	Orionid shower: ZHR = 20
22	Su	08:59	First quarter
24	Tu	03:29	Venus elongation: $46.4^\circ$ W
24	Tu	13:22	Moon-Saturn: $2.8^\circ$ N
26	Th	08:23	Moon perigee: 364900 km
28	Sa	08:44	Moon ascending node $\text{☽}$ ( <i>Rahu</i> )
29	Su	01:44	Partial lunar eclipse (see below)
29	Su	01:54	Full Moon
29	Su	13:40	Moon-Jupiter: $3.2^\circ$ S
30	Mo	20:00	Moon-Pleiades: $1.1^\circ$ N

## March of the Moon

On 1 October, the near Full Moon can be seen above the western horizon at dawn. The next day, it can be seen less than  $3^\circ$  to the

northwest of Jupiter. The Moon is right below the Pleiades (*Krutika*) on 3 October. On 4 October, it makes a near-perfect right-angled triangle with Aldebaran (*Rohini*) to its left (south) and the Pleiades below (west). On 5 October, the Moon will be right below Alnath ( $\beta$  Tauri or *Agni*). Alnath is the fifth star of the pentagon asterism of the constellation Auriga. On 7 October, the Moon enters the Gateway of Heaven. Between 10 and 11 October, it passes less than  $4^\circ$  south of Regulus and  $6^\circ$  south of Venus.

The Moon reappears as a thin crescent above the western horizon at sunset on 18 October. On 19 October, it can be seen due west of Antares (*Rohini*) at dusk. It will later occult the star, but by then, the duo would have set over the Indian sky.

This month at dusk, the Moon enters the Teapot asterism of Sagittarius on 20 October. On 24 October, it is right below Saturn, above the eastern horizon.

There will be a partial lunar eclipse this month. It begins on the night of 28 October. (See below.)

The Moon rises about 40 minutes before sunset on 28 October. If the sky is clear, one should see a -12.6 magnitude Moon above the eastern horizon at sunset. Jupiter will rise about 40 minutes after the Moon. It is a great night to see the Moon moving across the background of stars. The Moon enters the Earth's penumbral shadow at about 11:30 pm.

## Eclipses this month

There are two eclipses this month. The first one will be an annular solar eclipse of the Sun; and the second will be a partial lunar eclipse.

The annular eclipse of the Sun will take place on 14 October 2023. The eclipse will begin at 03:20 hours and will end at 05:52 hours IST. It will be night in India. Hence the eclipse will not be visible over India.

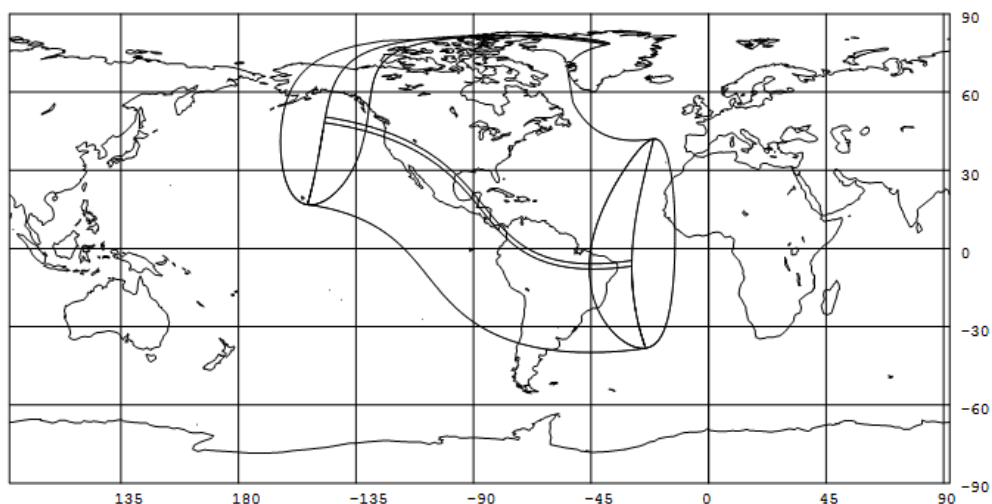
The people of Florence, Oregon, USA, will be the first to see the start of the eclipse at sunrise. The eclipse path will then pass over Nevada, Utah, New Mexico and Texas, the Gulf of Mexico, and many countries in Central America. The shadow will then cross over into Colombia in South America. It will pass over Northern Brazil before ending in the Atlantic Ocean at sunset.

During an annular eclipse, the apparent size of the Moon is smaller than that of the Sun as seen from the Earth. Hence, the Moon is seen transiting over the solar disk, leaving a thin ring-shaped — or annular — rim of fire around it.

The last annular eclipse of the Sun occurred on 10 June 2021, in the midst of the pandemic. The next annular eclipse visible over India will happen on 21 May 2031. The eclipse path will cross over the southern tip of the Indian peninsula.

### World Map - Annular Eclipse of 2023 Oct 14

Elongations Mercury  $4^\circ$  W Venus  $46^\circ$  W Mars  $11^\circ$  E Jupiter  $158^\circ$  W Saturn  $130^\circ$  E



The second eclipse will be a partial lunar eclipse on 28 October 2023.

The entire eclipse will be visible from India.

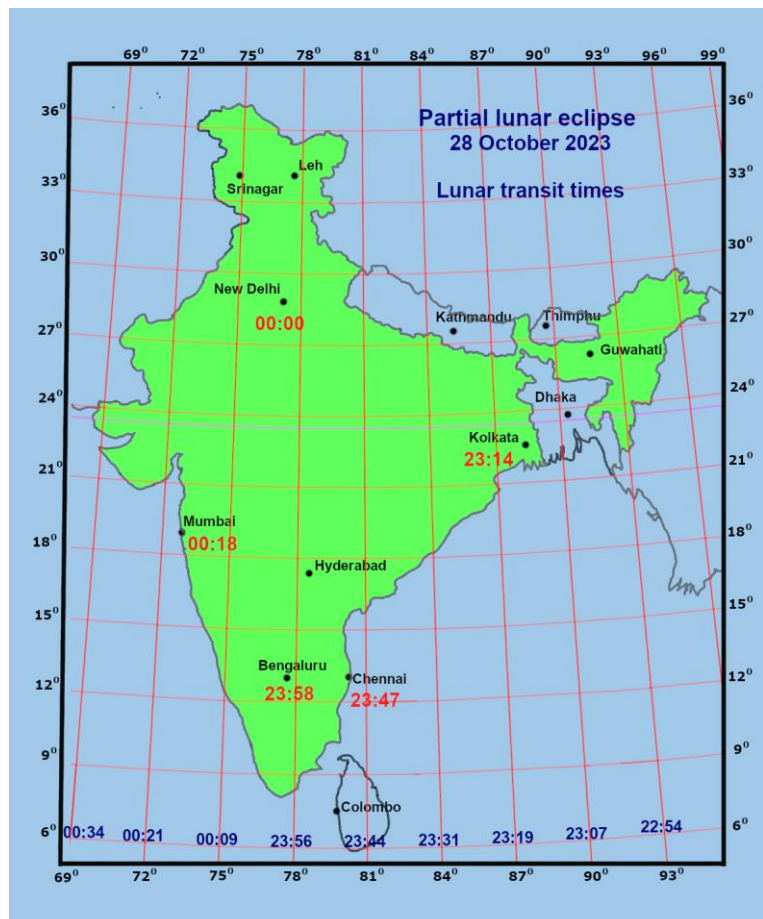
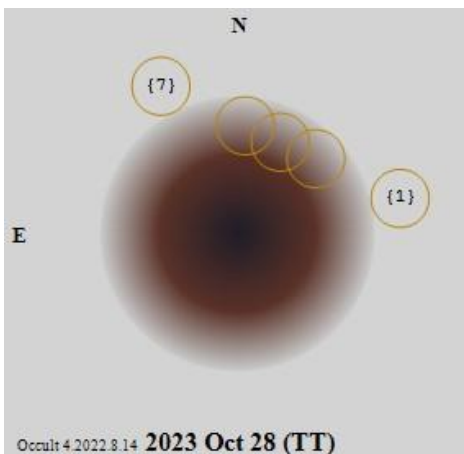
The various phenomena associated with the eclipse are given in the table below. The numbers in the first column indicate the position on the graphics below.

### LUNAR ECLIPSE ON 28/29 OCTOBER 2023

Duration of umbral phase: 1h 19m 10s

Duration of penumbral phase: 4h 28m 22s

	EVENT	IST		
		h	m	s
[1]	Moon Enters Penumbra	23	31	20
[2]	Moon Enters Umbra	01	04	43 (on 29 Oct. 23)
[4]	Maximum Eclipse	01	44	08
[6]	Moon Leaves Umbra	02	22	53
[7]	Moon Leaves Penumbra	03	56	35



The map alongside shows the transit time of the Moon for different longitudes ►

## Bright Star Occultation by the Moon

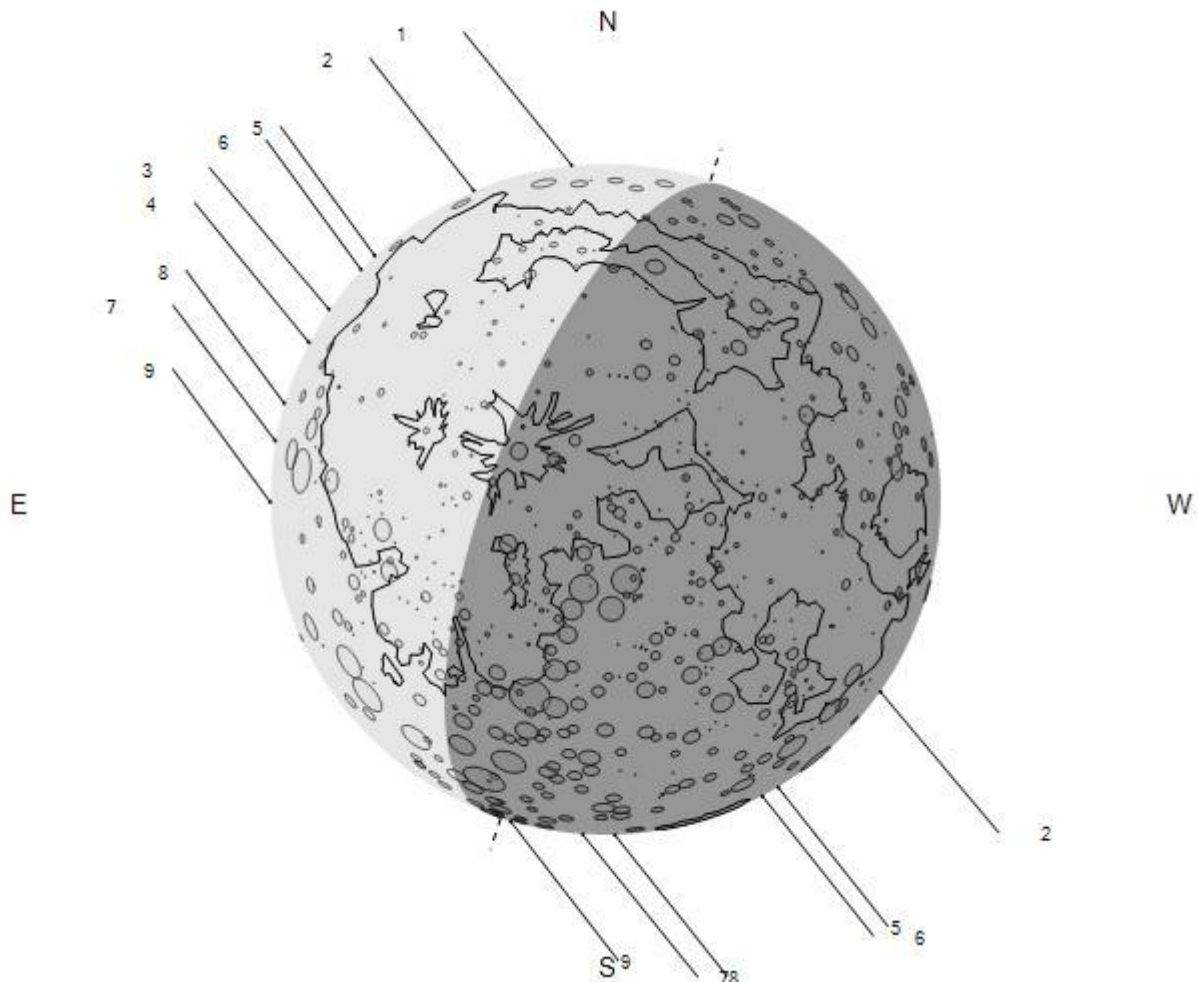
On 23 October 2023,  $\epsilon$  (Epsilon) Capricorni, a 4.5 magnitude star, will be occulted by the Moon. It is a binary system with an orbital period of 129 days.

The star is conveniently placed for those with a Newtonian telescope.

Moon: % illumination = 67+; Solar elongation = 110

No.	Location	Disappearance		Reappearance	
		IST	Altitude	IST	Altitude
1	Leh	23:23:16	16		
2	New Delhi	23:18:34	21	0:18:27	10
3	Guwahati	23:25:08	10		
4	Kolkata	23:24:27	15		
5	Mumbai	23:10:19	31	0:15:18	19
6	Pune	23:11:16	31	0:15:18	18
7	Chennai	23:20:58	27	0:07:20	17
8	Bengaluru	23:16:39	30	0:08:14	19
9	Thiruvananthapuram	23:19:26	32	23:57:53	24

Lunar map of disappearance and reappearance of  $\epsilon$  Capricorni. The numbers on the map correspond to the stations in the table above

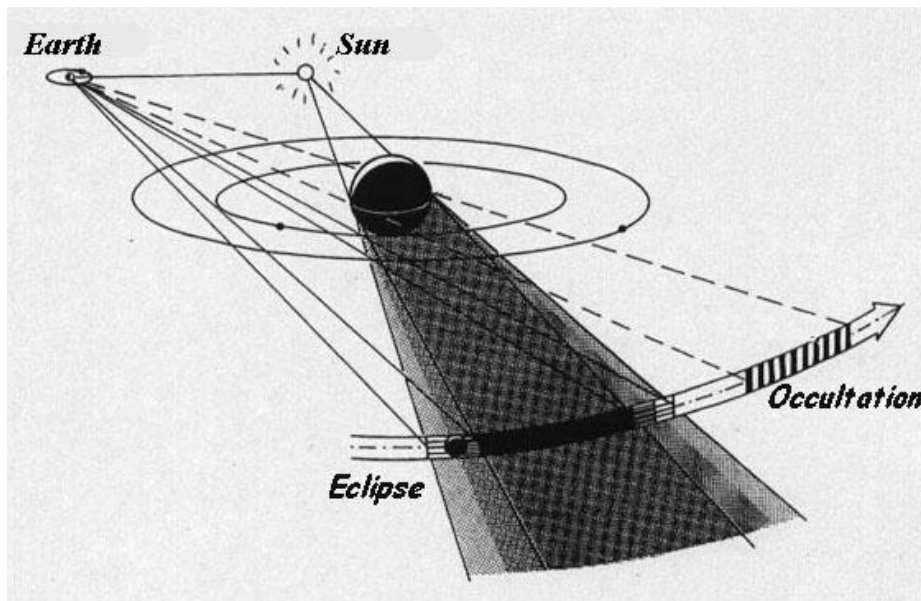


## Events involving the moons of Jupiter

Jupiter rises nearly two hours after sunset in the beginning of the month, and then soon after sunset by month-end. We will now bring you predictions of events involving the moons

of Jupiter.

These events are very enjoyable to observe. During an eclipse of the Jovian moons, one of them enters or comes out of the planet's shadow. Sometimes a moon or its shadow is seen moving across the disc of Jupiter; or a moon is occulted by it. Do enjoy these events.



*Eclipses occur when the satellites pass in the shadow of Jupiter. Occultations occur when the satellites pass behind Jupiter for a terrestrial observer. Picture courtesy: <https://promenade.imcce.fr/en/pages3/365.html#eclip>*

In the table below, we have listed events that can be seen from India. The table gives the timings of eclipses, occultations, transits and shadow transits of the moons of Jupiter, suitable for Indian observers. The timings are given in Indian Standard Time (IST).

The output is given as per the following abbreviations and notations:

**Columns:** 1 = date (given only for the first event listed for that day); 2 = time; 3 = satellite number; 4 = event type; and 5 = phase.

**Satellite numbers:** 1 = Io; 2 = Callisto; 3 = Europa; and 4 = Ganymede.

**Event type:** Ec = eclipse; Oc = occultation; Tr = transit; and Sh = shadow transit.

**Phase:** D = disappear; R = reappear; I = ingress; and E = egress.

Example: An event listed as

**1 21:14:06 1 Ec D**

Means that on 1 Oct. at 21h 14m 6s, Jupiter will eclipse Io

**00:12:06 1 Oc R**

Means that on the night of 1 Oct. at 0h 12 m 6 s (of 2nd Oct), Io will reappear from behind Jupiter.

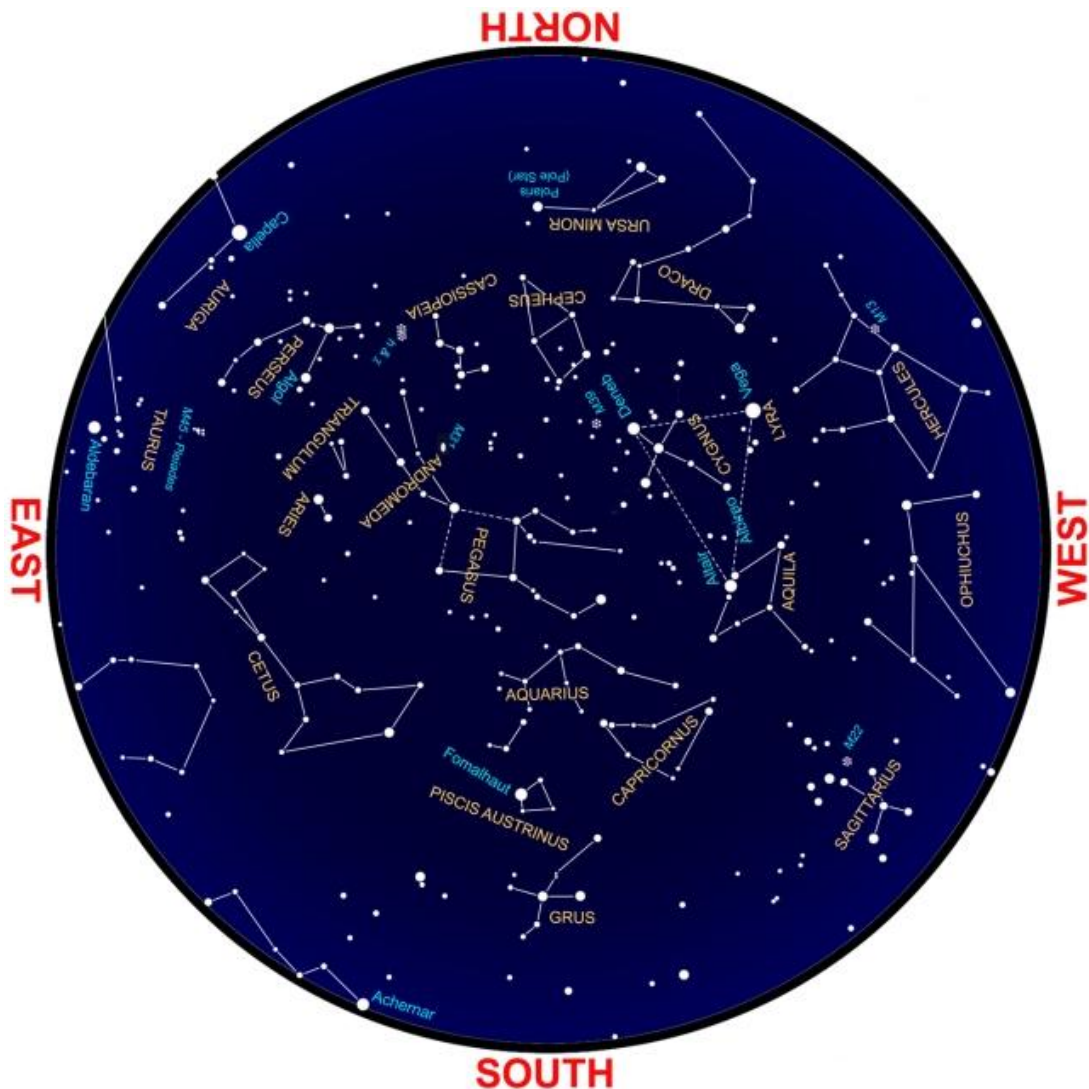
In other words, on 1 October at 9.16.06 pm we will see Io entering the shadow of Jupiter, and then after three hours we will see it emerging from behind Jupiter.

## Satellites of Jupiter in October 2023

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
1	21:14:06	1	Ec	D	16	00:22:00	1	Sh	E
	00:12:06	1	Oc	R		00:29:18	3	Oc	R
2	19:10:24	1	Tr	I		00:48:24	1	Tr	E
	20:32:54	1	Sh	E	17	19:31:24	1	Ec	D
	21:18:48	1	Tr	E		22:07:00	1	Oc	R
4	01:13:18	2	Ec	D	18	18:50:36	1	Sh	E
	05:00:12	2	Oc	R		19:14:24	1	Tr	E
5	03:23:30	3	Sh	I	20	01:33:36	2	Sh	I
	05:11:48	3	Sh	E		02:19:18	2	Tr	I
6	20:22:18	2	Sh	I		03:53:48	2	Sh	E
	21:49:24	2	Tr	I		04:32:06	2	Tr	E
	22:42:24	2	Sh	E	22	19:46:06	2	Ec	D
	00:01:48	2	Tr	E		22:41:00	2	Oc	R
	04:39:54	1	Ec	D		02:57:12	1	Ec	D
7	01:48:06	1	Sh	I		05:24:42	1	Oc	R
	02:29:12	1	Tr	I	23	00:05:54	1	Sh	I
	03:58:36	1	Sh	E		00:23:24	1	Tr	I
	04:37:42	1	Tr	E		01:16:54	3	Ec	D
8	23:08:24	1	Ec	D		02:16:42	1	Sh	E
	01:57:00	1	Oc	R		02:32:24	1	Tr	E
9	19:03:36	3	Ec	R		03:47:36	3	Oc	R
	20:14:30	3	Oc	D	24	21:25:54	1	Ec	D
	20:16:48	1	Sh	I		23:50:36	1	Oc	R
	20:55:24	1	Tr	I	25	18:34:30	1	Sh	I
	21:08:54	3	Oc	R		18:49:18	1	Tr	I
	22:27:18	1	Sh	E		20:45:24	1	Sh	E
	23:04:00	1	Tr	E		20:58:18	1	Tr	E
10	20:23:06	1	Oc	R	26	18:16:24	1	Oc	R
11	03:50:06	2	Ec	D	27	04:09:12	2	Sh	I
13	22:57:54	2	Sh	I		04:32:36	2	Tr	I
	0:05:06	2	Tr	I	29	22:23:30	2	Ec	D
	01:18:06	2	Sh	E		00:55:54	2	Oc	R
	02:17:36	2	Tr	E		04:51:48	1	Ec	D
14	03:42:30	1	Sh	I	30	02:00:42	1	Sh	I
	04:13:36	1	Tr	I		02:07:00	1	Tr	I
15	20:25:36	2	Oc	R		04:11:42	1	Sh	E
	1:02:48	1	Ec	D		04:16:06	1	Tr	E
	03:41:06	1	Oc	R		05:18:42	3	Ec	D
16	21:15:30	3	Ec	D	31	19:47:18	2	Sh	E
	22:11:12	1	Sh	I		19:52:18	2	Tr	E
	22:39:42	1	Tr	I		23:20:24	1	Ec	D
	23:04:42	3	Ec	R		01:33:54*	1	Oc	R
	23:32:54	3	Oc	D					

\* 1 November

**This sky map for October is drawn for mid-northern latitudes,  
to be used around 9:30 p.m. local time**



**These pages are contributed by:**

Arvind Paranjpye (paranjpye.arvind@gmail.com) (<http://arvindparanjpye.blogspot.com/>) and Anjane Rao (rao.anjaneer@gmail.com)

For star maps of other months please visit <http://astron-soc.in/outreach/resources/sky-maps/>

For notes on stargazing [click here](#).

Or visit <https://skytonight.wordpress.com/monthly-sky-notes-and-links/>

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<https://www.gimp.org/>