

11

Keeping Time with the Skies

Keep the curiosity alive

1. State whether the following statements are True or False.

- (i) We can only see that part of the Moon which reflects sunlight towards us. **True**
- (ii) The shadow of Earth blocks sunlight from reaching the Moon causing phases. **False**
- (iii) Calendars are based on various astronomical cycles which repeat in a predictable manner. **True**
- (iv) The Moon can only be seen at night. **False**

2. Amol was born on 6th of May on a full Moon day. Does his birthday fall on the full Moon day every year? Explain your answer.

Ans: No, his birthday will not always fall on a full Moon day because the lunar and solar calendars do not align perfectly. The Moon's phases follow a 29.5-day cycle, which does not match the solar year (30-31 days cycle).

3. Name two things that are incorrect in Fig. 11.10.

Ans:

- The illuminated side of the Moon is shown incorrectly.
- Orientation of the Sun relative to Moon is wrong.



Fig. 11.10

4. Look at the pictures of the Moon in Fig. 11.11, and answer the following questions.



Fig. 11.11

(i) Write the correct panel number corresponding to the phases of the Moon shown in the pictures above.

Picture label (e.g. A, B, C, etc.)	Phase of Moon
D	Three days after New Moon
E	Full Moon
A	Three days after Full Moon
C	A week after Full Moon
B	Day of New Moon

(ii) List the picture labels of the phases of the Moon that are never seen from Earth. Hint: You can use your observations from Activity 11.1 or Fig. 11.2 as reference.

Ans: Picture (B) New Moon phase is never seen from Earth

5. Malini saw the Moon overhead in the sky at sunset.

(i) Draw the phase of the Moon that Malini saw.

Ans: The phase would be First Quarter (Half Moon).

(ii) Is the Moon in the waxing or the waning phase?

Ans: It is in the waxing phase. Overhead Moon at sunset corresponds to first quarter (the illuminated part increases)

6. Ravi said, "I saw a crescent Moon, and it was rising in the East, when the Sun was setting." Kaushalya said, "Once I saw the gibbous Moon during the afternoon in the East." Who out of the two is telling the truth?

Ans: Kaushalya is telling the truth

- A crescent Moon you usually see in the evening just after sunset (that's a waxing crescent), and it will be in the western sky, not rising in the east. The waning crescent appears just before sunrise in the east, not at sunset. So Ravi's claim — crescent rising in the east while the Sun was setting — is inconsistent with Moon-phase geometry.
- A gibbous Moon (more than half illuminated) can be visible in the afternoon/evening. A waxing gibbous rises in the afternoon and moves across the eastern part of the sky before reaching high sky by evening — so seeing a gibbous Moon in the afternoon in the east is perfectly possible. Hence Kaushalya could be correct.

7. Scientific studies show that the Moon is getting farther away from the Earth and slower in its revolution. Will luni-solar calendars need an intercalary month more often or less often?

Ans:
The length of lunar months will increase, making lunar years longer, so intercalary months (to correct the difference with solar year) will be needed less often.

8. A total of 37 full Moons happen during 3 years in a solar calendar. Show that at least two of the 37 full moons must happen during the same month of the solar calendar.

Ans: A solar calendar has 36 months in 3 years.
If 37 full Moons occur, at least two full Moons must fall in the same calendar month.

9. On a particular night, Vaishali saw the Moon in the sky from sunset to sunrise. What phase of the Moon would she have noticed?

Ans: Full Moon phase. The full Moon rises at sunset and sets at sunrise, visible throughout the night.

10. If we stopped having leap years, in approximately how many years would the Indian Independence day happen in winter?

Ans: Indian Independence Day occurs in August but for it to occur in winter (December), the calendar would need to shift by about 4 to 5 months.
Without leap years, the calendar shifts by 1 day every 4 years. To shift 120 days it will take 480 years. Thus it would take around 500 years for Independence Day to occur in the winter season.

11. What is the purpose of launching artificial satellites?

Ans: Artificial satellites are launched for communication, navigation, weather forecasting, Earth observation, scientific research, and disaster management.

12. On which periodic phenomenon are the following measures of time based: (i) day (ii) month (iii) year?

Ans:
Day: Earth's rotation.
Month: Moon's revolution around Earth (phases).
Year: Earth's revolution around Sun.