

Lesson at a Glance

- **Celestial Objects:** Objects, such as the stars, the planets, the moon and many other objects, in the sky are called *celestial objects*.
- **Phases of the Moon:** The various shapes of the *bright part* of the moon as seen during a month are called phases of moon. The moon revolves round the earth. It also revolves round the sun *along with the earth*. The various stages of the moon during a month are shown in Fig. 17.1.

In position 1, the part of the moon facing earth does not receive light from the sun. Hence it appears dark. The other part of the moon that is facing away from earth is lit by the sun light. This position of moon, when it appears dark on earth is known as **new moon**.

In position 2, 3 and 4, we see the moon not as a full disc but as a crescent. Position 2 of the moon is known as **crescent moon**, Position 3 as **first quarter** and position 4 as **Gibbous (bright part is greater than a semicircle) moon**.

In position 5, the Sun's rays fall directly on the part of the moon facing earth. In this position we see the moon as a full disc of light. This position of moon is known as **full moon**.

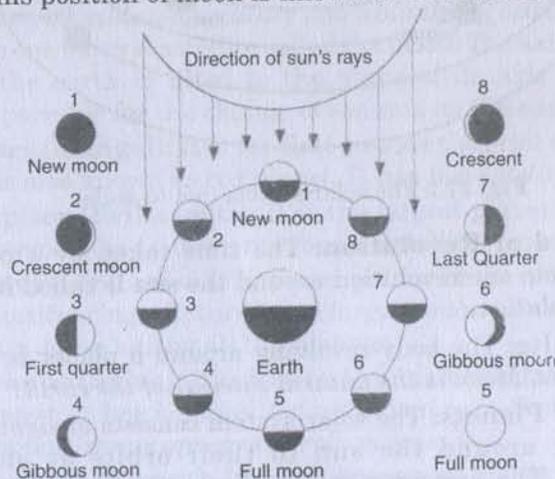


Fig. 17.1

Between the positions 1 and 5, the bright portion of moon increases. It is called waxing phase of the moon. We have "Amavasya" at position 1, and "Purnima" at position 5. During positions 6, 7, 8 and 1, the moon wanes, that is the bright portion of moon becomes smaller and smaller.

- The time period between one full moon to the next full moon is slightly longer than *29 days*. In many calendars this period is called a month.
- **The Solar System:** The sun and the celestial bodies such as planets, comets, asteroids and meteors which revolve around the sun form the *solar system*.

➤ **The sun** is the nearest star which is the main source of heat and light for all the planets.

➤ **The planets do not emit light** from their own like stars. They *reflect* the sunlight that fall on them. Planets *do not* twinkle like stars.

A planet has a definite path in which it revolves around the sun. This path is known as an **orbit**.

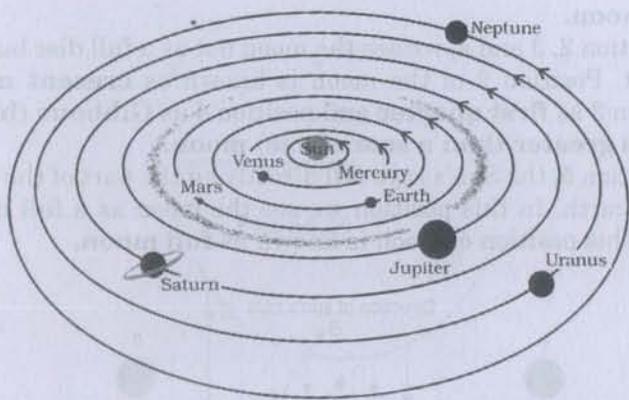


Fig. 17.2 The solar system (not to scale)

- **Period of Revolution:** The time taken by a planet to complete one revolution around the sun is called its *period of revolution*.
- **Satellite:** The body revolving around a planet is called a *satellite*. *Moon is the natural satellite of the earth.*
- **Different Planets:** The solar system consists of *eight planets* revolving around the sun in their orbits as shown in Fig. 17.2. The arrangement of planets in Fig. 17.2 is with

respect to the position of the sun, i.e. in order of distance from the sun.

- **Mercury (Budh):** It is the smallest planet and nearest to the sun. Mercury has no satellite of its own.
- **Venus (Shukra):** It is nearest to the earth and is the brightest planet in the night sky. Venus has no moon or satellite of its own. It rotates from east to west while the earth rotates from west to east.

Comet: A comet appears as a bright head with a long tail. They revolve around the sun in highly *elliptical orbits*. The tail of a comet is always directed away from the sun.

Meteors and Meteorites: Sometimes we see bright streaks of light in the sky. These are commonly known as *shooting stars*, although they are not stars. Actually, these are small objects which glow due to friction when they enter the earth's atmosphere. These are called **meteors**. Meteors glow and evaporate quickly before reaching the Earth's surface. The bodies that reach the earth are called as **meteorites**.

Artificial Satellites: They are man-made and launched from the earth. They revolve around the earth much closer than the moon. **Aryabhata** was the first Indian satellite. Artificial satellites are used for weather forecasting, education, long distance communication and remote sensing.

- **The Earth (Prithvi):** It is the fifth largest planet and third in order of distance from the sun. It is the only planet of the solar system known to *support life*, because it has *atmosphere, water, suitable temperature and a blanket of ozone*. The earth has one natural satellite called the moon. The axis of rotation of the earth is tilted to the plane of its axis. The tilt is responsible for the change of seasons on the earth.
- **Mars (Mangal):** It is the first outside the orbit of the earth. It is also known as *red planet*. It has *two satellites*.
- **Jupiter (Brihaspati):** It is the largest planet of the solar system. It has a large number of satellites (moons).
- **Saturn (Shani):** It appears yellowish in colour. It has beautiful rings. Saturn has a *large number of satellites*. It is least dense among all the planets.
- **Uranus (Indra):** Like Venus, Uranus also rotates from east to west. It has *highly tilted rotational axis*. So in its orbital motion *Uranus appears to roll on its side*.
- **Neptune (Varun):** It is the outermost planet of the solar system. It has two moons.

Asteroids: A large number of small objects that revolve around the sun between Mars and Jupiter are called *asteroids*.

TEXTBOOK QUESTIONS SOLVED

Choose the Correct answer in Questions 1-3:

Q. 1. Which of the following is **NOT** a member of the solar system.

- (a) An asteroid (b) A satellite
(c) A constellation (d) A comet.

Ans. (c) A constellation.

Q. 2. Which of the following is **NOT** a planet of the sun?

- (a) Sirius (b) Mercury
(c) Saturn (d) Earth

Ans. (a) Sirius

Q. 3. Phases of the moon occur because:

- (a) We can see only that part of the moon which reflects light towards us.
(b) Our distance from the moon keeps changing.
(c) the shadow of the Earth covers only a part of the moon's surface.
(d) the thickness of the moon's atmosphere is not constant.

Ans. (a) We can see only that part of the moon which reflects light towards us.

Q. 4. Fill in the blanks:

- (a) The planet which is farthest from the Sun is _____.
(b) The planet which appears reddish in colour is _____.
(c) A group of stars that appear to form a pattern in the sky is known as a _____.
(d) A celestial body that revolves around a planet is known as _____.
(e) Shooting stars are actually not _____.
(f) Asteroids are found between the orbits of _____ and _____.

Ans. (a) Neptune (b) Mars
(c) Constellation (d) Satellite
(e) meteors (f) Mars, Jupiter.

Q. 5. Mark the following statements as true or false:

- (a) Pole star is a member of the solar system.

- (b) Mercury is the smallest planet of the solar system.
(c) Uranus is the farthest planet in our solar system.
(d) INSAT is an artificial satellite.
(e) There are nine planets in our solar system.
(f) Constellation Orion can be seen only with the telescope.

Ans. (a) False (b) True (c) False
(d) True (e) False (f) False

Q. 6. Match items in Column A with one or more items of Column B:

Column A	Column B
(i) Inner planets	(a) Saturn
(ii) Outer planets	(b) Pole star
(iii) Constellation	(c) Great Bear
(iv) Satellite of the Earth	(d) Moon
	(e) Earth
	(f) Orion
	(g) Mars

Ans.

Column A	Column B
(i) Inner planets	(g) Mars and (e) Earth
(ii) Outer planets	(a) Saturn
(iii) Constellation	(c) Great Bear and (f) Orion
(iv) Satellite of the Earth	(d) Moon

Q. 7. In which part of the sky can you find Venus, if it is visible as an evening star?

Ans. In west side of the sky.

Q. 8. Name the largest planet of the solar system.

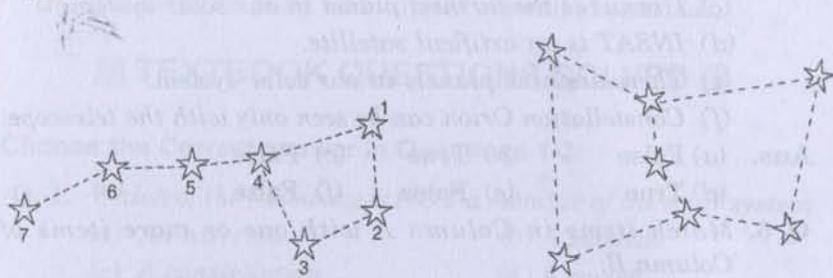
Ans. The largest planet is Jupiter.

Q. 9. What is constellation? Name any two constellations.

Ans. A group of star which has a recognizable shape is called constellation. Two constellations are great Bear and Orion.

Q. 10. Draw sketch to show the relative position of prominent star in
(i) Ursa Major (ii) Orion.

Ans.



(i) Ursa major constellation or Great bear constellation

(ii) Arrangement of major stars in orion constellation

Q. 11. Name two objects other than planets which are members of the solar system.

Ans. Comets and asteroids.

Q. 12. Explain how you can locate the pole star with the help of Ursa Major.

Ans. Pole star can be located with the help of the three stars at the end of Ursa Major. Imagine a straight line passing through these stars. Extend the imaginary line in north direction. This line is about five times the distance between two stars. A star is to be seen in this direction. This is pole star.

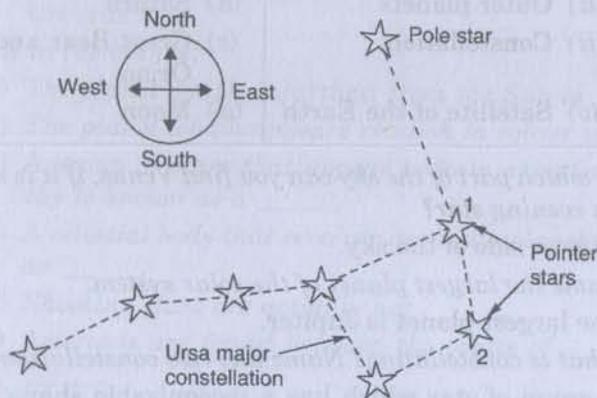


Fig. 17.3 Pole star is in the direction of earth.

Q. 13. Do all the stars in the sky move? Explain.

Ans. No, all the stars do not move in the sky. They appear to move from east to west. It is due to the rotation of earth on which we live. The earth moves from west to east. But pole star does not appear to move.

Q. 14. Why is the distance between stars expressed in light years? What do you understand by the statement that a star is eight light years away from the earth?

Ans. Stars are far away from each other. The distance between two stars is millions of kilometers. The distance between sun and earth is 150,000,000 km, whereas the distance of alpha centauri is 40,000,000,000,000 km. It is not convenient to show in km. So it is expressed in light year. A light year is the distance covered by light in one year. Eight light year means the distance covered by light in eight years.

Q. 15. The radius of Jupiter is 11 times the radius of the Earth. Calculate the ratio of the volume of Jupiter and the Earth. How many Earths can Jupiter accommodate?

Ans. Let the radius of Earth = R units

$$\therefore \text{Volume of Earth} = \frac{4}{3}\pi R^3 \text{ cu. units.}$$

Now, the radius of Jupiter = 11R units.

$$\therefore \text{Volume of Jupiter} = \frac{4}{3}\pi(11R)^3 = \frac{4}{3}\pi(1331R^3) \text{ cu. units.}$$

Now the ratios of the volume of Jupiter and Earth

$$\begin{aligned} &= \frac{\text{Volume of Jupiter}}{\text{Volume of the Earth}} \\ &= \frac{\frac{4}{3}\pi(1331R^3) \text{ cu. units}}{\frac{4}{3}\pi R^3 \text{ cu. units}} \\ &= \frac{1331}{1} = 1331 : 1 \end{aligned}$$

So 1331 Earths can be accommodated in one Jupiter.

Q. 16. Boojho made the solar system (Fig. 17.4). Is the sketch correct? If not, correct it.

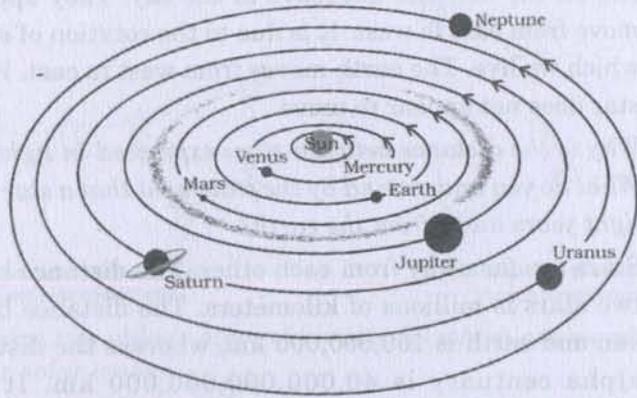


Fig. 17.4

Ans. No, the given sketch is not correct. The following figure is correct.

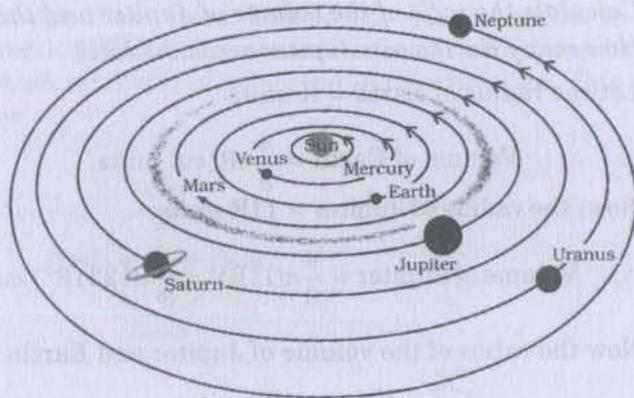


Fig. 17.5