

Chapter – 17

Stars and the Solar System

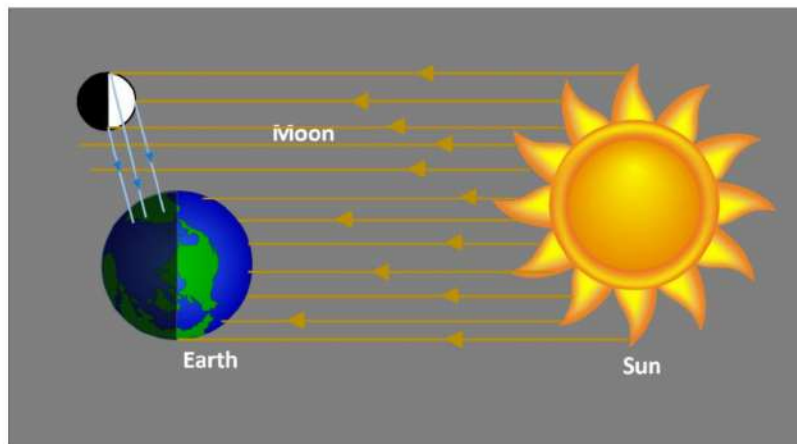
The Moon

Celestial objects: The stars, the planets, the moon and many other objects in the sky are called celestial objects or heavenly bodies.

Moon: Moon is the non-luminous celestial object which revolves around the earth and it is also known as the natural satellite of the earth.

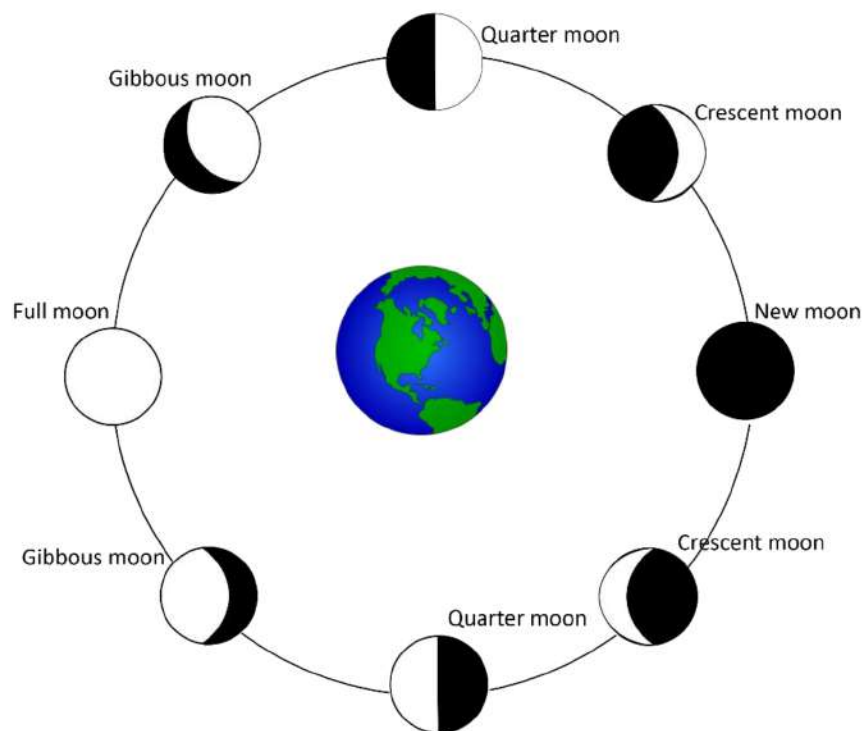
Moon is the non-luminous but we can see the moon because the sunlight falling on it gets reflected towards the earth.

We, therefore, see only that part of the moon, which reflects the light from the Sun towards Earth.



Phases of Moon: The various shapes of the bright part of the moon as seen during a month are called phases of the moon.

- Full Moon: The day on which the whole disc is visible is called the full moon.
- New Moon: The day on which the moon is not visible that day is known as the new moon day. New moon appears after fifteen days of full moon.



Time period of Moon: The time period between one full moon day to the next full moon day is slightly longer than 29.5 days. In many calendars, this period is called a month.

Example: Why are we not able to see the other side of the moon from the earth?

Solution: The moon rotates and revolves in such a way that only one side of the moon always faces the earth. This happened because the moon completes one rotation on its axis at the same time which it takes to complete one revolution around the earth.

Surface of Moon:

- The moon's surface is dusty and barren. There are many craters of different sizes.
- Moon also has a large number of steep and high mountains. Some of these are as high as the highest mountains on the Earth.
- The moon has no atmosphere and no water.

Tip: Remember Neil Armstrong is the first human being who walked on the moon. He landed on the moon first time in human history followed by Edwin Aldrin in the spacecraft Apollo 11.

The Stars

Stars: The stars are luminous celestial objects and they are extremely hot.

- The sun is also the star, the nearest star to earth.
- The stars (other than the sun) appear to be small because they are very, very far away from earth.
- The stars appear to move in the sky from east to west because the earth rotates on its from west to east.
- The only star which appears stationary from the earth is the Pole star. It appears to be stationary because it lies on the axis of rotation of the earth on the side of the north pole.
- The next nearest star to the earth after the sun is Alpha Centauri.

Light year: The distance between the celestial objects is very large so it is measured in the unit of a light-year.

- 1 light-year = 9.46×10^{12} Km
- The sun is 8 light minutes far from the earth.

Constellations

Constellations: The stars forming a group that appears to form some recognizable shape is called a constellation.

Constellation			
	Ursa Major (also called Great Bear, Big Dipper or Saptarshi)	Orion (also called Hunter)	Cassiopeia
No. of prominent Stars	6	7	8
Position	During summer in the early part of the night (In northern hemisphere)	During winter in the late evenings.	During winter in the early part of the night

Sirius is the brightest star in the sky. The three middle stars represent the belt of the hunter and these three stars lead us to the brightest star Sirius.

If we draw an imaginary straight line from these three stars towards the east, we find the brightest star in the sky is Sirius.

Pole star is located near the Ursa Major.

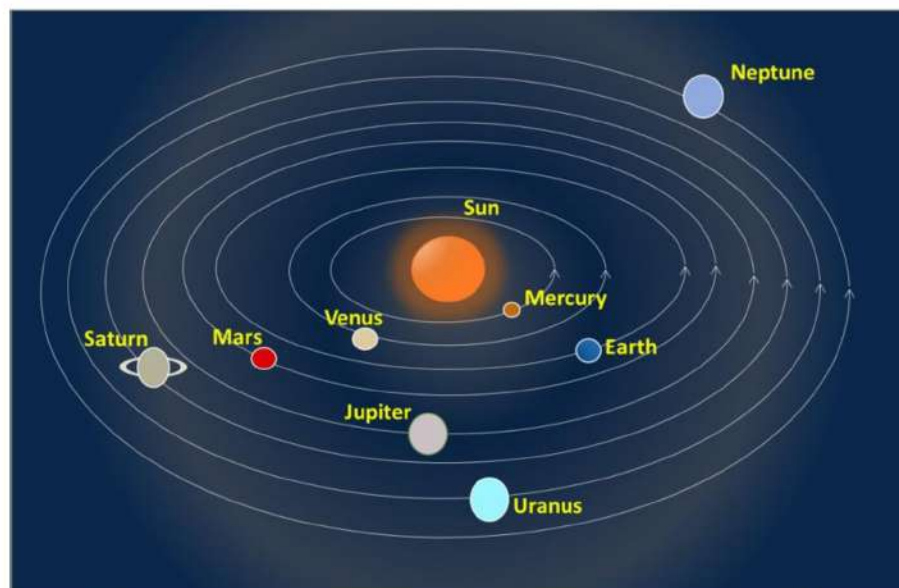
Remember, a constellation does not have only few stars. It has a huge number of stars. However, we can see only the bright stars in a constellation with our naked eyes.

All the stars which make up a constellation are not at the same distance from each other. They are just in the same line of sight in the sky.

The Solar System

Solar system: The sun and the celestial bodies which revolve around it form the solar system.

Planet: Planets are large celestial objects which revolve around the sun in the fixed path called orbits. e.g. The Earth.



Mercury:

- Mercury is the first planet from the sun.
- Nearest planet to the sun.
- Smallest planet of the solar system.
- No natural satellite.
- Observed before sunrise (morning star) and after sunset (evening star).

Venus:

- Venus is the second planet from the sun.
- Closest planet to the earth.
- Brightest object in the night sky (except the moon).
- Hottest planet.
- No natural satellite.
- Observed before sunrise (morning star) and after sunset (evening star).
- Venus rotate from east to west (exceptional).

Example: The sunrises from the west and sunset in the east on Venus. It is just opposite to the earth. Why does this happen?

Solution: We know sunrises from the east and sunset in the west on earth. Because the earth rotates on its axis from west to east. Similarly, the sun rises from the west and sunset in the east on Venus because it rotates on its axis from east to west.

Earth:

- Earth is the third planet from the sun.
- Life only exist here.
- The Earth has an atmosphere and large amount of water.
- 1 natural satellite (Moon).
- The axis of rotation of earth is tilt which is responsible for change of seasons.

Mars:

- Mars is the fourth planet from the sun.
- It is called red planet due to its red surface.
- First planet outside the earth orbit.
- 2 natural satellites.

Jupiter:

- Jupiter is the fifth planet from the sun.
- Biggest planet of the solar system.
- It is very bright object in the sky.
- 28 natural satellites (4 are very large).
- Mainly made up of gases (hydrogen and helium).

Saturn:

- Saturn is the sixth planet from the sun.
- Second biggest planet of the solar system.
- Only planet having a system of rings.
- It has maximum number of natural satellites (30).
- Mainly made up of gases (hydrogen and helium).
- Least dense among all planets (its density is less than water).

Uranus:

- Uranus is the seventh planet from the sun.
- Third biggest planet of the solar system.
- It rotates from east to west like Venus.
- First planet discovered with the telescope.
- It has highly tilted axis of rotation.
- 21 natural satellites.
- Mainly made up of gases (hydrogen and helium).

Neptune:

- Neptune is the eighth planet from the sun.
- Farthest planet from the sun.
- Second planet discovered with the telescope.
- 8 natural satellites.

Inner Planets: First four-planet Mercury, Venus, Earth and Mars are called the inner planets.

Outer Planets: Jupiter, Saturn, Uranus and Neptune are called the outer planets.

Tip: Remember till 2006 there are nine planets in the solar system. The ninth planet Pluto is the farthest from the sun. It is no longer a planet according to a new definition of planets by International Astronomical Union.

Some Other Members of the Solar System

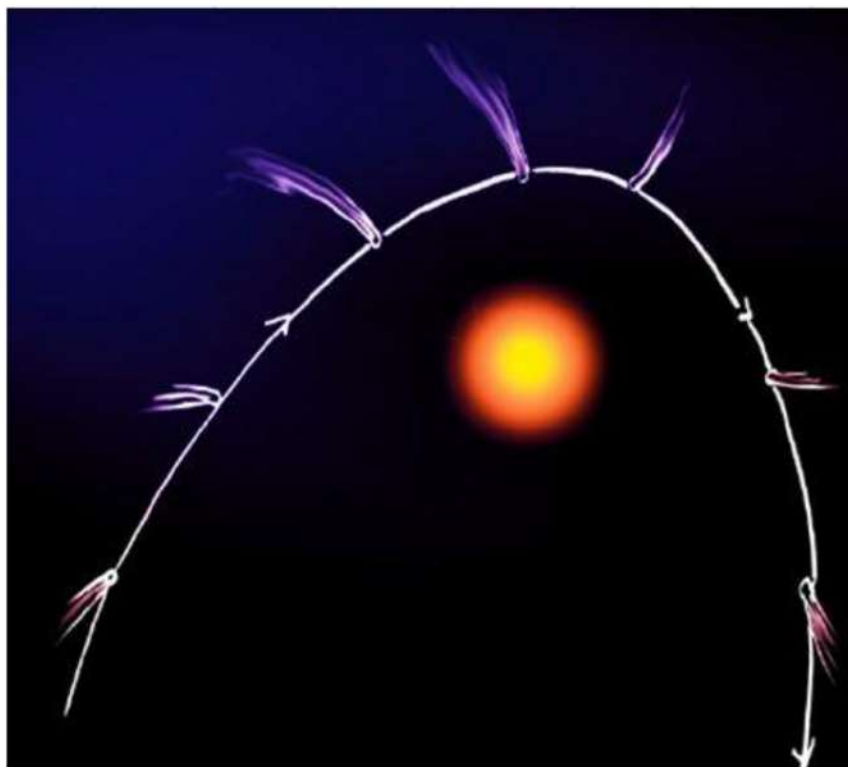
Artificial Satellite: The artificial satellites are man-made and they revolve around the earth much closer than the moon. E.g. Aryabhata, INSAT, IRS, Kalpana – 1, EDUSAT.

Tip: Remember Aryabhata is the first Indian satellite.

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

Comets: Comets are very small celestial objects made of gas and dust and they revolve around the sun in an elliptical orbit.

The length of the tail grows in size as it approaches the sun. Tail is always directed away from the sun.



Tip: Many comets are known to appear periodically. One such comet is Halley's comet, which appears after nearly every 76 years.

Meteoroids: They are the celestial bodies that revolve around the sun and are much smaller than asteroids and comets in size.

- **Meteors:** When meteoroids enter the earth atmosphere a bright streak of light flashes for a moment. They are called meteors or the shooting star.
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- **Meteorite:** A meteor that reaches the earth (surface) before it evaporates completely is called a meteorite.