

16. The Universe

A galaxy is a huge group of stars held together by the gravitational force.

1. Types:

- (i) Spiral galaxy
- (ii) Elliptical galaxy
- (iii) Irregular galaxies

2. Milky Way:

- (i) The galaxy of which our solar system is a part.
- (ii) Its diameter is about one lakh light years and the central thickness is about 6000 ly.
- (iii) Milky way is spiral in shape.

- **The Stars**

- All stars emit their own light. They appear small because of large distances from the earth.
- The sun appears bigger because it is nearer than any other stars in the space.
- In the day time, stars are not visible because of bright sunlight.
- Stars appear to move from east to west because of earth's rotation from west to east.
- Pole star does not appear to move because it is very nearly situated on earth's rotational axis over the North pole.
- There are various types of stars - sun-like, red giants, super nova, twin, and variable stars.
- The imaginary line where it seems that sky and the ground are meeting with each other is known as the **horizon**.
- An imaginary sphere is formed and all the stars and planets appear moving in it. This sphere is known as **celestial sphere**.
- Celestial sphere consists of zenith, nadir, celestial poles, meridian, celestial equator and

- **Solar System**

- **The Sun**

- Nearest star from the earth

- **Planets**

- Stars twinkle in the night sky, but planets do not.
- Planets revolve around the sun along definite paths, called orbits.
- Time taken by a planet to complete one revolution of its orbit is called revolution period.
- Time taken by a planet to rotate about its axis is called the period of rotation.
- Satellites revolve around planets.

- **Inner planets**

- **Mercury**

- Nearest planet to the sun
- It is seen just before sunrise and just after sunset near horizon. It has no satellite.
- **Venus**
 - Nearest planet to the earth
 - Brightest planet in the night sky
 - Seen in the eastern sky before sunrise and in the western sky after sunset
 - Also known as morning or evening star
 - Has no satellite and rotates from east to west (sun rises in the west of Venus)
- **Earth**
 - From space, it appears blue because of 75% water content.
- **Mars**
 - It appears reddish and therefore, is known as red planet.
- **Outer planets**
- **Jupiter**
 - Largest planet in the solar system
 - Rotates very fast about its axis and has large numbers of satellites
- **Saturn**
 - Has prominent ring system and large numbers of satellites
 - Its density is less than water and is the least among the planets
- **Uranus and Neptune**
 - Both have a ring system.
 - Uranus has a tilted rotational axis and appears to roll on its side.
 - Uranus rotates from east to west similar to Venus.
- Except for mercury and venus, all the other planets have their **satellites**. Also, except for mercury, all the other planets have an **atmosphere**.
- Planets can also be categorised as terrestrial and jovian planets.
- Planets which are found inside the orbit of mars are known as **terrestrial planets**.
- Planets which are found outside the orbit of mars are known as **jovian planets**.

Other members

- **Asteroids**
 - Small rocky objects found in large numbers between Mars and Jupiter
- **Comets**
 - Highly elliptical objects
 - Have a bright head and long gaseous tail.
 - Tail is always directed away from the sun.
 - Halley's comet appears after every 76 years.
 - Long period comets have a longer orbital period (200 - 1000 years) while short period comets have a shorter orbital period (less than 200 years).
- **Meteors & Meteorites**
 - Objects that enter the earth's atmosphere and burn because of friction with the atmosphere
 - Large meteors that reach earth's surface are called meteorites.