

## 8<sup>th</sup> – STARS & SOLAR SYSTEM



If we look up into the sky on a clear dark night, we can see a faint band of light running across the heavens. This is the Milky Way, our own Galaxy. It contains about two hundred billion stars and countless other objects. The stars of this galaxy spread out from its centre like a spiral. It is, therefore, known as a spiral galaxy. All the members of this galaxy, including the sun (and its 'solar family') and billions of other stars, revolve around its centre in much the same way as the earth revolves round its own axis. The Milky Way Galaxy is, thus, indeed a very huge object. However, we now know that our universe contains billions of such galaxies. The Milky Way Galaxy is, thus, but a very tiny part of the universe as a whole.

On a clear night, we can see many stars with the naked eye. These appear to twinkle when viewed from the earth. Apart from the stars and the moon, we can also sometimes see some other 'bright objects' in the night sky. These, however, do not twinkle. They are the planets. The word 'planet' is of Greek origin and means 'wanderers'. Unlike the stars which appear almost fixed the planets keep on changing their positions. We now know that planets do not have any light of their own. Their observed brightness is because of the light of the sun reflected by them. In Hindi, planets are known as Grahahs.

We also sometimes observe bright lines of light, flashing across the sky for a very short duration; we call these as shooting stars. The stars, the sun, the moon, the planets and the shooting stars are the main celestial objects that make up the universe.

**Stars:** The star nearest to the earth is the Sun itself. The next nearest star is the Alpha Centuari or Proxima Centuari. This is at a distance of 4.3 light years from the earth. This means that we get the light from this star only 4.3 years after it gets emitted from it. We must remember that there are countless other stars whose light reaches us in a much longer time ranging from thousands of years to even millions and billions of years. In comparison it takes about 8 minutes only for the light of the sun to reach the earth. The sun's distance from the earth is, therefore,  $8 \times 60 \times 3 \times 10^8 \text{ m} = 1.44 \times 10^{11} \text{ m}$  or  $14.4 \times 10^8 \text{ km}$ . This is 14.4 crore kilometres.

**Polar Star (Dhurav Tara):** The Pole Star, known as the Dhurav Tara in Hindi, is a special star present in the northern hemisphere. This star, unlike the other stars, appears to be fixed at one place. In fact, all the stars appear to revolve around the pole star. This is so, because it lies on a line close to the axis of rotation of the earth. Because of this special feature, this star has been very useful to travelers. It helps them to find direction at night. The pole star defines the north direction. The other directions can then be defined with respect to this direction.

**Constellations:** A close and careful observation of the stars on a clear night reveals that some of these stars appear to form some kind of patterns that appear to resemble some familiar shapes. Such a group of stars is known as a constellation. Thus, a constellation is a group of stars that appear to form some recognizable pattern or shape in the sky.

**Ursa Major:** it is called the is also called the great bear one part of the Ursa Major consisting of seven stars is fairly easy to spot in the night sky. This group of stars big dipper or variant saptarshi.



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**Ursa Minor:** it is also called the lesser bear one part of this constellation comprising a group of seven stars is called the little dipper.

**Cassiopeia-** this constellation is visible from the northern hemisphere a few bright stars of the constellation make it look like an Mora .it also contain two planetary nebulae

**Orion** prominent stars of this constellation \_ are Betelgeuse and Rigel also called alpha Ori. The brightest star in the night sky, Sirius is very easy to locate with the help of the constellation Orion.

Differences between Galaxy and Constellation

Galaxy	Constellation
1. A galaxy is a cluster of billions of stars	1. Number of stars in a constellation is limited.
2. Shape of a galaxy does not resemble a recognizable shape or pattern	2 Shape of constellation resembles a recognizable shape or pattern that of an animal or object.
3. There are billions of galaxies in the sky.	3. There are only 88 constellations in the sky.

**Solar system:** The sun and everything that revolves around it form the solar system. The planets and their moons comets and other space objects orbit the sun

**Objects Of Solar System-** according to the new definition there are eight planets in the solar system. In the order of their increasing distance from the sun, they are mercury Venus earth mars Jupiter Saturn Uranus and Pluto and Ceres is placed under the category of dwarf planets.

**Sun-**the sun is a medium sized star it is a huge ball of gases mainly hydrogen there is a massive nuclear reaction taking place in the sun. The solar system is dominated by the Sun, which accounts for almost 99.9% of the matter of the whole system. The Sun is also the source of almost all the energy in the solar system. The Earth receives almost all its energy (heat and light) from the Sun.

The Sun is essentially a sphere of hot gases. The temperature of the bright disc (visible), which is the source of energy for us is about 6,000 K. The disc is called the photosphere. The radius of the Sun is almost 100 times the radius of the earth and its mass is about a million times the mass of the Earth.

**Planets-** difference between inner and outer planets. The planets, relatively 'nearer' to the sun have features that are quite different from those which are 'far-off'. We, therefore, find it convenient to divide the planets into two categories

1. The Terrestrial planets
2. The Jovian planets

Mercury, Venus, Earth, and Mars are the Terrestrial planets. They have solid and rocky surfaces. The Jovian planets are Jupiter, Saturn, Uranus and Neptune. These planets are very large in size and are made up largely of gases.

**Inner planets-**they are closer to the sun as compared to the outer planets. They are smaller in size .they are very dense mostly made of rock.

**Outer planets-** they are much farther away from the sun as compared to the inner planets. They are very large in size. They are very light and are made up mostly of gases



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**Mercury-** it can be seen as a bright spot of light during sunrise and sun set at a particular time of the year. Mercury is known as the morning star or the evening star.

**Venus-**Venus is also called the morning star on the evening star. It rotates from east to west.

**Earth-**the axis of rotation of the earth is tilted to the plane of its orbit

**Mars-**.this planet is visible to the naked eye. It looks like a bright orange red star.

Mars has two satellites- Phobos and Deimos

**Jupiter-** Jupiter can be easily seen with the naked eye. It looks like a bright star .Jupiter has four large moons (Io Europa Ganymede and Callisto)

**Saturn-** Saturn is called the ringed planet, because it is surrounding by distinctive rings of dust and rocks. Saturn biggest satellite, tirtan is even bigger than the planet mercury some astronomers think that it may be able to support life.

**Uranus-** it was identified as a planet by the British astronomer William Hershel in 1781.

**Neptune-**it was first identified as a planet by the German astronomer Gottfriedgalle in 1846.neptune has two known satellites

**Pluto-** it was discovered in 1930 by Clyde Tombaugh of America Pluto has an oval shaped orbit which takes it 249 years to get once around the sun.

**Small solar system bodies-**

**Asteroids-**these are large pieces of rock or metal and rock .most asteroids orbit the sun between mars and Jupiter. This region is called the **asteroid belt**.

**Comets-**these are small chunks of ice and dust that revolve around the sun

**Meteoroids meteors and meteorites:** Meteoroids are smaller than comets. They are mainly chunks of rock.

**Moon:** the surface of the moon has many craters which were made by meteorites hitting there are many dark patches on the moon surface.

**Let us begin with the new moon.-**At new moon the moon is between the earth and the sun and we do not see any light from the moon after a few days a small portion of the moon becomes visible to us. This is called the crescent moon. The lit portion of the moon keeps increasing even further till it becomes a full moon

**Phases of Moon:** The moon appears to change its shape every night. Moon does not have light of its own. It just reflects light falling on it. On full moon day we see whole disc of the Moon. The shape and size of a bright part of the moon every day. On new moon day, the moon is not visible. From here, the visible area of the sunlight portion increases and moon is said to be growing or waxing when the visible sunlight from full moon day begins to reduce with each day. The moon at this phase is said to be waning. In 29 1/2 days, moon completes one revolution.

**Artificial Satellites-** Artificial satellites are man -made objects which can be made to revolve around the earth. Artificial satellites perform various tasks such as transmitting radio telephone and television signals sending back information for weather forecasting military and for locating minerals resources.

**Aryabatta was India's first artificial satellite launched in 1975. Bhaskra, Rohini, Apple and INSAT are some of the other Indian satellites.**

**Satellites:** That are being put to the maximum use are the geostationary satellites. The time period of their revolution around the earth, equals the time



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period of rotation of the earth around its own axis. These satellites stay in the same position relative to the surface of the earth.

