SOLAR SYSTEM

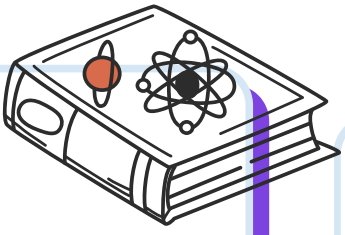
PARMAR SSC





Cosmology

Study of Universe.



Universe > Galaxy > Solar System



Galaxy



- A massive collection of stars, gas, dust and dark matter held together by gravity.
- Our Galaxy is Milky Way.
- Andromeda is the nearest galaxy to Milky Way.

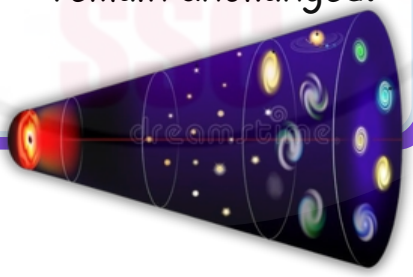
Big Bang Theory



- Given by George Lemaitre in 1927 and published in 1931.
- It was an explosion of concentrated matter in the universe that occurred 13.8 billion years ago.
- It lead to the formation of Galaxies, Stars and other heavenly bodies.

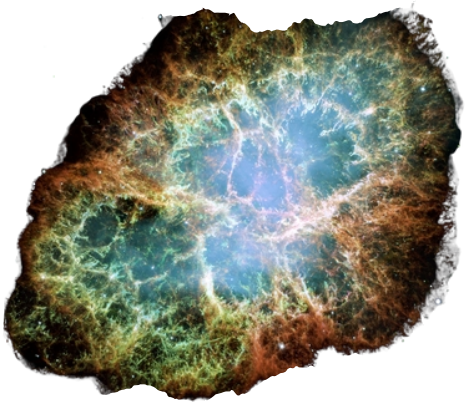
Steady State Theory

- Given by Fred Hoyle, Hermann Bondi, and Thomas Gold.
- It proposes that the universe is constantly expanding, but it's average properties remain unchanged.



Origin of Solar System

- Began 4.8 Billion Years ago.
- The Process started when a cloud of gas and dust collapsed, forming a spinning disk called Nebula











THEORIES

Planetesimal Theory

- Proposed By : Thomas Chowder Chamberlin and Forest Ray Moulton in 1905

Nebular Hypothesis

- First proposed by Immanuel Kant in 1755 and Independently expanded by Pierre-Simon Laplace in 1796
- Age of Earth : 4.5 Billion Years Old

Copernicus Theory

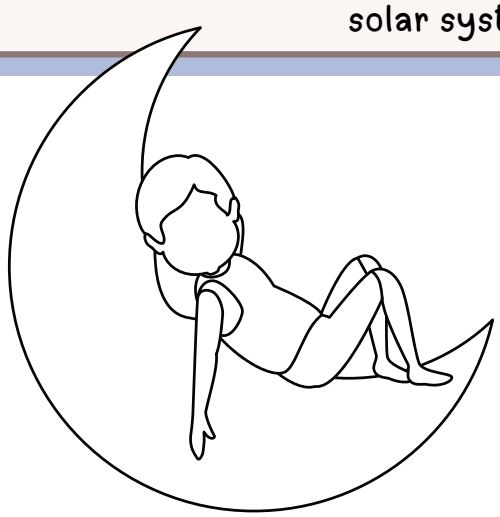
- It Predicted that the Sun is at the center of the universe, with the Earth and other planets orbiting around it.
- It is also known as Heliocentric Model



Solar System



- Our Solar System has 8 planets and 5 Dwarf Planets
- The Sun is at the center and Only star of our Solar System.
- It makes up for about 99.86% of the total mass of solar system.



Celestial Bodies

Object that glows in night Sky

- **Luminous** : Emits their own light.

Ex: Stars, Candle, Firefly, Bulb etc.

- **Non Luminous :** Do not emit their own light.

Ex: Moon, Comets, Asteroids, Meteorites, Meteor, Meteoroid.

Comets



- Comets are large ice objects that orbits the sun.
- Made of Dust, Rock & Frozen Gases like Water ,Carbon Dioxide, Ammonia, Methane.

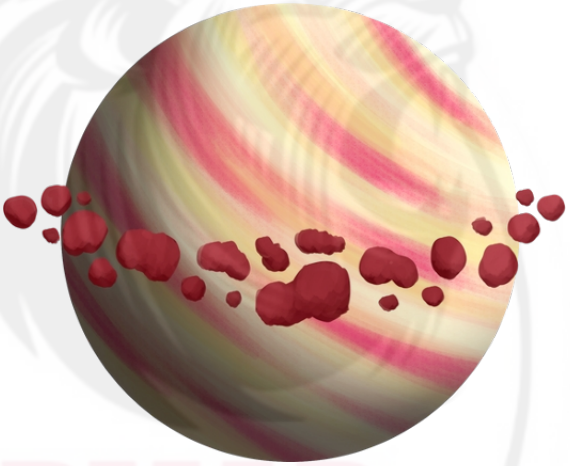
Halley's Comet

- It is seen every 76 years. It was last seen in 1986 and is expected to return in 2061



Asteroids

- A rocky , metallic or icy object that orbits the sun.





Meteoroid

Smaller than Asteroids, Rocky or Metallic space rock, orbits around the Sun.



Meteor

Meteoroid enters earth's Mesosphere, Burns up and Creates a streak of light, called Meteor



Meteorite

If meteoroid hits the ground, it is called Meteorite.

Meteor shower Quadrantids is visible in the early month of January



Constellation

A group of star that appears to form a pattern or shape in the night sky.

Ursa Major

- Also known as Great Bear and Saptarishi.
- Big Dipper asterism is seen in ursa major

Cassiopeia

- It is a W-shaped constellation.
- The brightest Star of Cassiopeia is Schedar.

Cygnus

- A prominent northern constellation known for its distinctive Cross Shape

Orion

- Known as Hunter.
- Brightest Star of Orion is Rigel

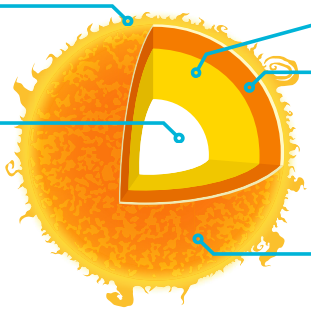
The Sun

- Only Star of our solar System
- Composed of Hydrogen (73%), Helium (25-28%) and other gases.
- Approx 15 crore KM (149.6 Million KM) away from the earth.
- Light takes 8 minutes 20 seconds to reach earth from Sun.
- Temperature at Surface : 5800 K or 5600° C.
- Temperature at Center : 15.7 million Kelvin (K).

Light Years

- It is a unit of length used to measure distance between two astronomical objects.
- It is the distance that light travels in a vacuum in one Julian year (365 Days)
- 1 LY= 9.461×10^{12} KM

Layers Of Sun



1 Photosphere

The only visible surface of the Sun.

2 Chromosphere

Visible as a dim red ring just above the photosphere.

3 Corona

The Outermost layer of the sun, which is extremely hot, and only visible during Solar Eclipses.



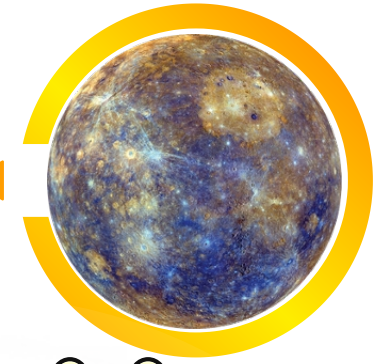
Planets

Classification of planets

Terrestrial Planets	Jovian Planets
• They are relatively very small • They are made of Rocky material • Their surface is solid. • They are nearer to sun • They have few or No Moons. • They do not have rings • Eg : Mercury, Venus, Earth, Mars	• They are Immense in size. • They are made of gaseous material. • They do not have solid surface • They are far away from sun • They have multiple moons. • They support ring system. • Eg : Jupiter, Saturn, Uranus, Neptune

Mercury

- Closest planet to Sun.
- Smallest Planet in Solar System, with diameter of 4900 Km.
- Fastest planet to revolve around the sun in 88 days.
- Only planet that has no atmosphere.



Venus



- Hottest planet in Solar System
- Known as 'Earth's Twin"
- Brightest Planet in the Solar System
- Slowest Rotation (243 Earth Days)
- Has Clouds of Sulphuric Acid

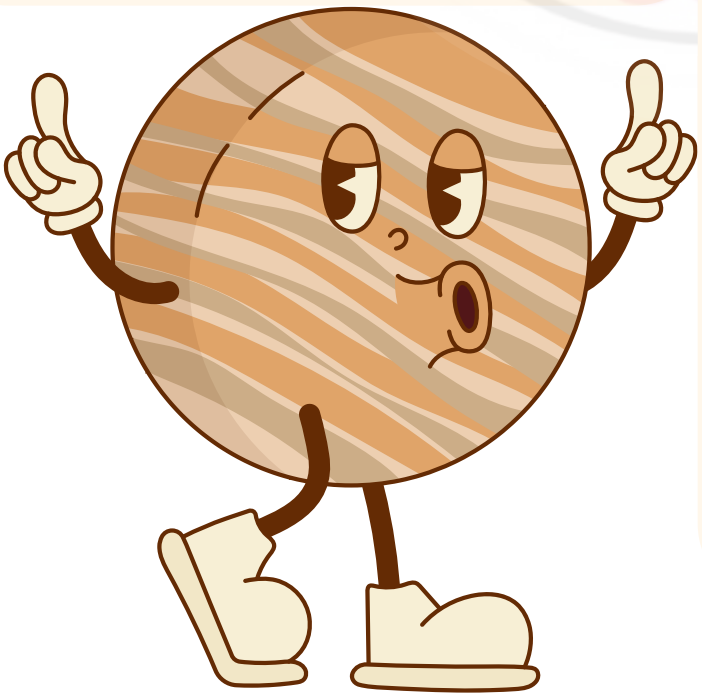
Earth

- Only Planet that supports Life.
- Also known as 'Blue Planet" (70% of water)
- Natural Satellite : Moon
- It has the highest density (5.5 g/cm cube)
- Closest Planet to Earth is Venus.



Mars

- Known as Red Planet because of Iron-rich red soil.
- second smallest planet.
- Phobos and Deimos are two natural moons.
- Olympus Mons (height: 22-25 KM) is the largest volcano and Tallest mountain in the solar system lies in Mars.
- Length of day : 24 hrs 37 minutes.
- Asteroid belt is found between orbits of Mars and Jupiter.
- Asteroid Bennu studied by Nasa's OSIRIS-REx mission .





Jupiter

- Larget planet of solar system
- Shortest rotation time : 9 hrs 55 minutes
- It is the 3rd brightest star in night sky after Moon and Venus.
- It has 95 Moons including 'Io, Europa, Ganymede and Callisto"
- Ganymede is largest among them.
- It has unclear ring around it.
- Great Red spot, a giant storm in the solar system exist on this planet.

Saturn

- Second largest planet in the solar system
- it has Bright and concentric rings around it, which are made up of tiny rocks and pieces of ice.
- Saturn has least density (0.69 g/cm cube), it can float in water.
- It has 274 moons and "Titan" is the largest among them.
- Satellites : Titan, Enceladus show possibility of life on it.
- In 1655 : Huygenes discovered Saturn rings.
- In 1665 : Cassini discovered the Gap between them.
- Rotation time : 11 hours

Uranus

- Known as Green Planet due to Presence of Methane gas in it.
- Discovered by : William Herschel in 1781.
- Atmosphere composed of Hydrogen and Helium, Ammonia and Water
- It has at least 27 moons (Miranda, Ariel and Umbriel)
- It is tilted to 98° on its axis, hence known as Rolling Planet.
- Rotation time : 17 hours

Neptune

- Slowest Revolution of 165 years
- Rotation time : 16 hours
- Windiest Planet, Atmosphere of Hydrogen & Helium
- Bluish in colour because of Methane.
- Discovered by : Johann Galle and Urbain Le Verrier in 1846
- Only planet found by Mathematical Prediction.
- Triton is famous satellite amoung 14 Satellites.

Moon

- The Moon is Earth's only natural Satellite.
- It is Non-Luminous.
- Radii = 1.74×10^6 m.
- Moon's light takes 1.26 Seconds to reach Earth.
- Distance Between Earth and Moon : 3,84,000 KM.
- Gravity on moon = $1/6^{th}$ on Earth.
- Only one side of moon is visible because rotation and revolution time of Moon is same.
- The Highest point on Moon : Mt. Leibniz (Known as Mons Huygens)



Dwarf Planets

Kuiper Belt

It is a ring of bodies beyond Neptune containing a number of asteroids, rocks and comets.

Characteristics

1. To be around the Sun.
2. To have nearly Spherical Shape
3. Not able to clear their orbit of Debris.

Pluto



- Pluto has been omitted from the list of planets in 2006.
- Pluto is considered as dwarf planet and now it is a member of Kuiper Belt
- Charon is the largest moon of Pluto out of its 5 Moons.
- 1 revolution of Pluto = 248 earth years
- Pluto's Oblong orbit overlaps with that of Neptune.
- It is the largest and Brightest Dwarf Planet.

Other Dwarf Planets

- Eris : Second largest dwarf planet
- Makemake : Third largest and it orbits in 310 years
- Haumea : Fastest rotating dwarf planet in Kuiper Belt
- Ceres : This dwarf planet is present in Asteroid Belt

Solar & Lunar Mission

Sun

- Aditya-L1 : India's 1st solar observatory mission launched by ISRO.
- L1 refers to 1st Lagrange points on the sun. (Total-5)

Moon

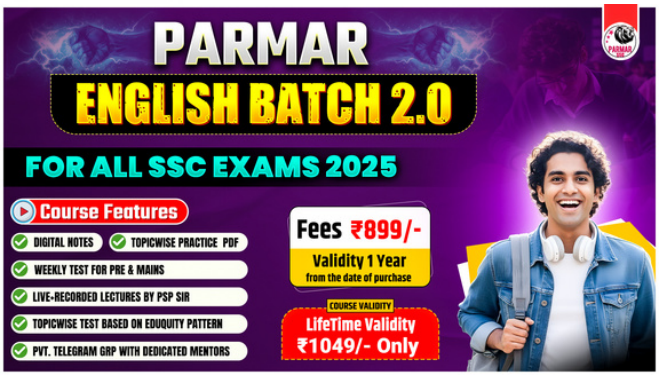
- Chandrayaan 3 : It is the third lunar-exploration mission of ISRO.
- Lander : Vikram
- Rover : Pragyaan
- Point : Shiv Shakti Point
- Chandrayaan-3 landed on near side of moon (South Pole)



Terms to Understand

- Supernova : Explosion of Stars
- Pulsar : A neutron Star
- Black Hole : A place in space with immense gravity.
- Van Allen Radiation Belt : These are two concentric rings of charged particle that surrounded the Earth.





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