

## Solar System & Universe

We live on a planet named 'Earth'. Likewise, Earth also exists in its home with other 7 planets, only star 'Sun' and many other small objects called asteroids, comets, dwarf planets, meteors, etc. So basically the Solar system is a system of the Sun, 8 planets, dwarf planets, asteroids, meteors, and comets under the gravitational influence of the Sun.

### Origin

- There are 3 to 4 major theories of the evolution of the universe and ultimately of the solar system. The prominent theory among all of these is **the Big Bang theory**.

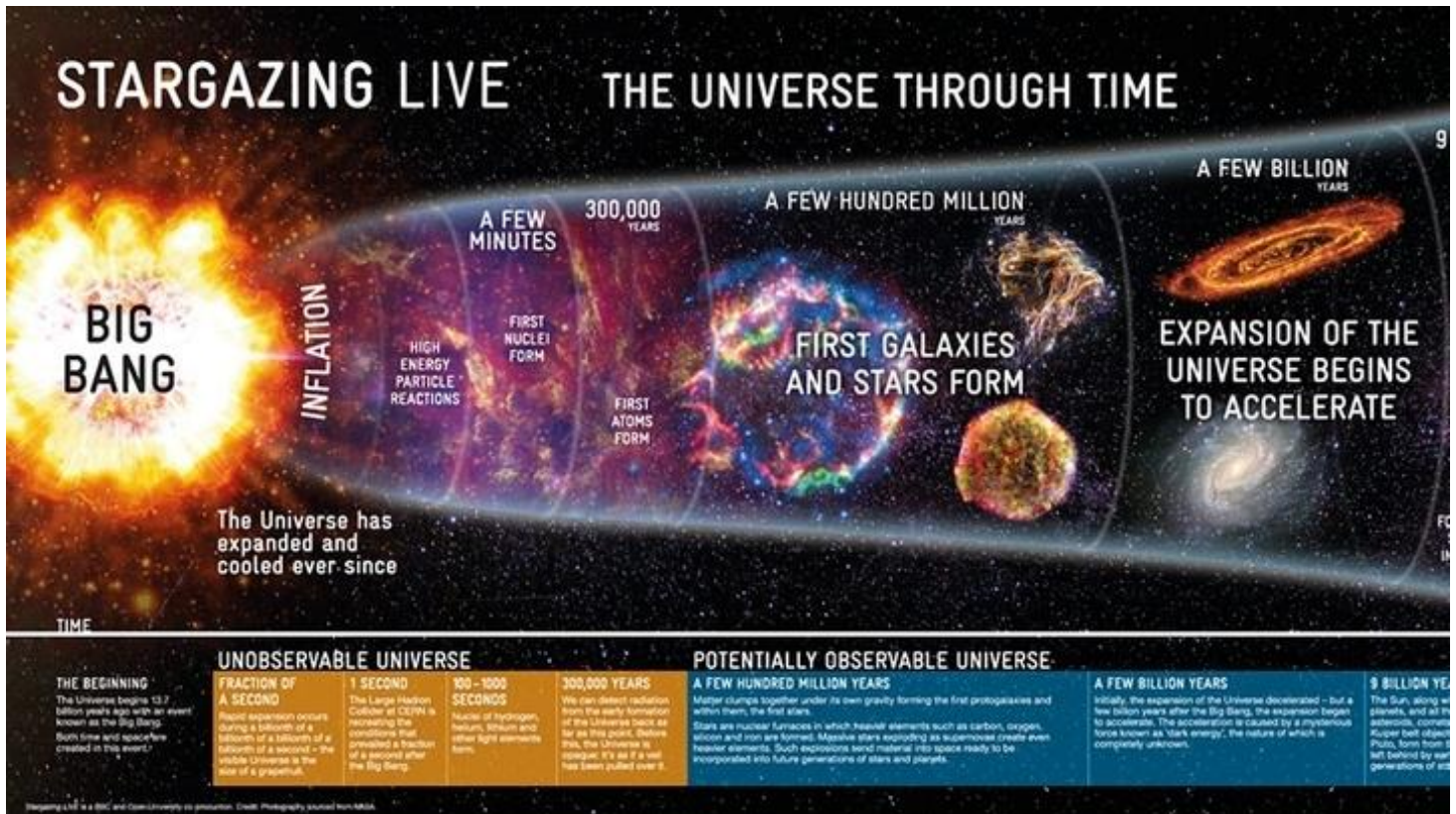


Image Source: BBC.com

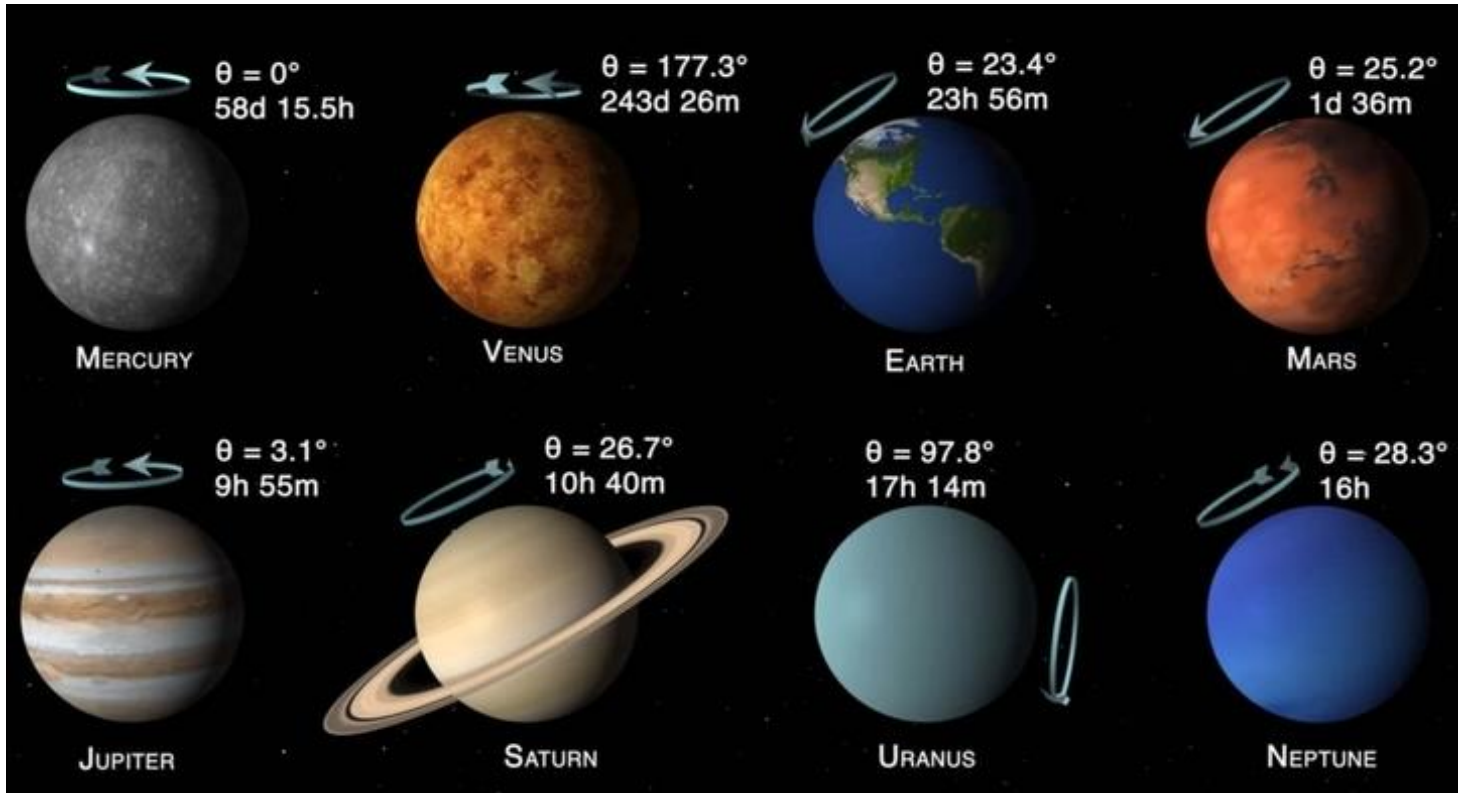
- According to this theory proposed by **Georges Lemaitre**, the universe is evolved from a small singularity and then expands over the next 13.8 billion years and still expanding.
- It led to the formation of many billions of galaxies, solar systems, stars, etc.
- Our solar system lies in a spiral-shaped galaxy called '**Milky Way**'. The nearest galaxy to us is '**Andromeda**'.
- Generally, there is a Black hole at the center of every galaxy. '**Sagittarius A**' is the black hole at the center of the Milky Way.

### Solar System

- In our solar system, 8 planets and many other celestial bodies revolve around the sun in elliptical orbits.



- The dwarf planet named **Pluto** was removed from the list of the planets by the **International Astronomical Union** in **2006**.
- Sun is the powerhouse of the solar system. It is the only source of energy in the solar system.
- Planet Mercury is nearest to the sun while Neptune is the farthest planet from the sun.
- There is an asteroid belt between Mars and Jupiter. Planets inside the belt are distinctly different from that outside in terms of size, mass, and composition, etc.
- Planets inside the belt are called **Terrestrial planets** and they are Mercury, Venus, Earth, and Mars. Planets outside the belt are called **Jovian planets** and they are Jupiter, Saturn, Uranus, and Neptune.



- Terrestrial planets are nearer to the sun, with metallic minerals and rock crust, with a thin atmosphere, and have less number of natural satellites. While Jovian planets are away from the Sun, made up of hot gases, have rings around them, and have a large number of natural satellites.

## Facts about the Sun and Planets

### Sun

- **The only star** in our solar system and **powerhouse of the solar system**.
- Composed of Hydrogen (73%), Helium (25%) gases, and other metals. Sun carries **almost 99% mass** of our solar system.
- Approximately 15 crore Kilometres further away from Earth. It takes around 8 minutes 30 seconds for the light at the speed of 3 lakh Km/sec to reach the earth.
- The temperature at surface= 5800 K or 5600 degrees Celsius.
- The temperature at the center = 15.7 million K



## 1. Mercury

- **The closest planet** to the Sun and a very hot planet.
- **The smallest planet** in the solar system with a diameter of 4900 Km.
- **Fastest Planet** with a speed of 172500 Km per hour to complete revolution around the Sun in 88 days.
- The planet with no water and gases like Nitrogen, Hydrogen, Oxygen, and Carbon Dioxide.

## 2. Venus

- **The hottest planet** in the solar system with a surface temperature of 478 degrees Celsius.
- Also known as **“Earth’s Twin”**. It is because of the similarity in size and mass between Venus and Earth.
- One of the two planets in the solar system which rotates around the axis in a clockwise direction.
- **Brightest Star** in the Solar system. It can be seen in the morning and evening with open eyes. So known as **“Evening Star”** and **“Morning Star”**.

## 3. Earth

- The only Planet to give support to live with a pleasant atmosphere.
- Also known as **“Blue Planet”** because of the presence of water on it.
- It has one natural satellite named **“Moon”**.

## 4. Mars

- Known as **“Red Planet”** because of Iron-rich red soil.
- The second smallest planet in the solar system after Mercury.
- Has two natural moons **“Phobos”** and **“Deimos”**.
- Has a thin atmosphere and surface with valleys, craters, deserts, and ice caps, etc.
- **“Olympus Mons”** – The largest volcano and the tallest mountain in the solar system lies on Mars.

## 5. Jupiter

- **The largest planet** of the solar system with the **shortest rotation**
- Has an atmosphere filled with Hydrogen, Helium, and other gases
- **The third brightest object** in the night sky after the Moon and Venus.
- **Great Red Spot**, a giant storm in the solar system exists on this planet.
- Has at least 69 moons, including 4 large Galilean Moons **“Io, Europa, Ganymede, and Callisto”** which were discovered by **Galileo**. **“Ganymede”** is the largest among them.
- It has an unclear ring around it.

## 6. Saturn

- **The second-largest planet** in the solar system and a gas giant.
- Has bright and concentric rings around it which are made up of tiny rocks and pieces of Ice.
- Saturn can float on water because it has **less density** than water.
- Has at least **82** moons and **Titan** is the largest among them.

## 7. Uranus



- Has the **third-largest planetary** radius and **fourth-largest planetary mass** in the Solar system.
- Greenish in color.
- Discovered by **William Herschel** in 1781.
- Known as "**Ice Giant**". The atmosphere of Uranus is composed of Hydrogen and Helium primarily, but it also contains more water, ammonia, etc.
- Has the coldest planetary atmosphere in the solar system.
- **Rotates clockwise on its axis** like Venus but unlike other planets
- Has at least 25 moons. Famous moons- **Miranda, Ariel, and Umbriel**

## 8. Neptune

- The farthest planet from the Sun.
- It is also "**Ice Giant**". Atmosphere primarily composed of Hydrogen and Helium.
- Bluish in color because of Methane.
- The fourth largest planet and the third most- massive planet in the solar system
- Discovered by **Johann Galle and Urbain Le Verrier** in 1846. **The only planet** in the solar system found by **Mathematical Predictions**.
- Has known 14 satellites. **Famous moon – Triton**

### Other

## Pluto

- As per the new definition of Planets determined by the **International Astronomical Union (IAU)**, Pluto has been omitted from the list of planets in 2006.
- Pluto is considered as a dwarf planet (size between planets and asteroids) now and it is a member of the Kuiper Belt.

## Kuiper Belt

- It is a spherical boundary **outside the orbit of Neptune** containing a number of asteroids, rocks, and comets.

## Goldilocks Zone

- It refers to the habitable zone around a star where the temperature is just right - not too hot and not too cold - for liquid water to exist on a planet.

### Other Space Objects

## 1. Asteroids

- These are small objects; rocks (mostly debris) revolve around the Sun.
- They are mostly found in the **Asteroid Belt** which lies between the orbits of Mars and Jupiter.
- These are also known as **Minor planets**.
- **Ceres, Vesta, Psyche** are some famous and largest asteroids in the solar system.

## 2. Meteors and Meteorites



- These are also known as **Shooting stars**.
- Meteors are the small-sized rocky material that is generally formed due to asteroid collision and approaching the earth.
- Because of Earth's atmospheric layers, these small rocks burn before reaching the surface.
- But there are some meteors that do not burn completely and land on Earth's surface. They are called **Meteorites**.
- **Willamette, Mbozi, Cape York, and El Chaco** are some meteorites found on the Earth.
- **Lonar lake, Maharashtra** in India is supposed to be created by a meteor impact in **Pleistocene Epoch**.

### 3. Comets

- These are shiny, luminous "**Tailed Stars**". These are rocky and metallic materials surrounded by frozen gases.
- These are generally found in **Kuiper Belt**. They travel towards the Sun.
- Their tail faces the opposite of the sun and head faces towards the Sun.
- They become visible when they travel close to the Sun.
- **Halley comet** is famous which appeared last time in 1986 and which reappears after every 76 years.

Tricks to Learn planets Planets in order from the sun

My Very Efficient Mother Just Served Us Nuts

Inner Planets (Terrestrial planets)

1. M- Mercury
2. V- Venus
3. E- Earth
4. M- Mars

Outer Planets (Jovian planets)

5. J- Jupiter
6. S- Saturn
7. U- Uranus
8. N- Neptune

Tricks to learn planets in order of size

Just Sit Up Now Each Monday Morning

1. J- Jupiter
2. S- Saturn
3. U- Uranus
4. N- Neptune
5. E- Earth
6. V- Venus
7. M- Mars
8. M- Mercury





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