

# Research paper on solar system

[Environment](#), [Earth](#)



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## **Introduction**

At the centre of the solar system is the Sun. The nearest four planets are Mercury, Venus, Earth and Mars these are terrestrial and rocky worlds. The next four are Jupiter, Saturn, Uranus and Neptune these are gas giants. Between the orbits of Jupiter and Mars lies an asteroid belt that includes the dwarf planet of Ceres. After the orbit of Neptune, a disk shaped Kuiper belt exists where the dwarf planet Pluto exists and further beyond that there is a giant spherical Oort Cloud and the heliopause that is teardrop shaped (Choi).

## **History and Discovery**

Many ancient astronomers thought that the Earth used to be the heart of the Universe and other stars revolved around it. It was not until Copernicus proved that Sun was the centre and all planets including the Earth revolve around the Sun.

“ With the dawn of space-age, dozens of probes were launched for exploring the solar system with this adventure still ongoing. The discovery of Eris has started rash of discoveries for dwarf planets with hundreds left to be found”

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(Choi).

For past millennia, astronomers used to follow the points of light that moved among the stars. Ancient Greeks named them planets, meaning wanderers in Greek. The planets Mercury, Venus, Mars, Jupiter and Saturn were known in the ancient times. Telescope's invention added the Uranus, Neptune, Asteroid belt and moons of these worlds.

## **The Solar System**

Solar System comprises of the Sun and several other objects that are gravitationally bound to the Sun. These celestial objects consists of 8 planets that have 165 moons in total, 3 dwarf planets and their 4 moons and billions of other small celestial bodies such as meteoroids, comets and asteroids. All these planets apart from the Earth were named after the Greco-Roman gods and goddesses (National Geographic). The following are the important objects in the solar system:

The Sun is the largest object in the solar system and is the centre of the solar system, with all planets, meteoroids, comets, asteroids and dust orbiting the Sun. Sunlight (Energy from the Sun) supports all life on the Earth with photosynthesis driving the Earth's weather and climate. Greater than 99.8% of the total mass in the Solar System exists in the Sun. Currently, Sun's mass is around 70% hydrogen, close to 28% helium and other metals make the rest. This mass will change slowly with the passage of time as the Sun converts its hydrogen into Helium in the Sun's core (spaceandmotion.com).

Mercury is the smallest and closest planet to the Sun in the Solar System, it takes 88 days to orbit the Sun. The Mercury can only be viewed in the

twilight of the morning and evening. Physically, Mercury's appearance is similar to the Moon being heavily cratered. It has no substantial atmosphere and no natural satellites. The core of the planet is made up of iron that generates magnetic field of 0. 1% stronger than the Earth (spaceandmotion. com).

The second planet from the Sun is Venus and it is sixth planet. Among all planets Venus' orbit is the most circular with eccentricity lesser than 1%. The rotation of Venus is very slow with 243 Earth days is equal to 1 day on Venus. Additionally, the Venus' rotation period and its orbit are coordinated in such a manner that presents the same face to the Earth when they are closest to each other (spaceandmotion. com).

Earth is the next planet from the Sun and is the fifth largest planet. It is home to the humans, it is referred as " Planet Earth", " Terra", " Gaia" and " the World". Water consists 71% of the Earth's surface, and was the first planet to support human life and have liquid water n its surface. Oceans' heat capacity also is very important for keeping the temperature of Earth relatively stable. The atmosphere of Earth is 77% nitrogen, 21% oxygen and traces of water, carbon dioxide and there are traces of water, carbon dioxide and argon. The magnetic field of the Earth, along with its nitrogen-oxygen atmosphere protects Earth's surface and life from harmful radiation (spaceandmotion. com).

Mars the next planet from the Sun is named after the Roman god of war. It is also referred to as the ' Red Planet' due to its reddish appearance from the Earth. Mars atmosphere is thin and it has most interesting and varied terrain in comparison with other terrestrial planets. Also, Mars has the highest

known mountain in the Solar system the Olympus Mons and the largest canyon in the Valles Marineris. Additionally, Mars' seasonal cycles and rotation period are similar to the Earth (spaceandmotion. com).

Jupiter is the 5th planet from the Sun and it is also the largest in size. Jupiter is more than double in size in comparison to all other planet and its mass is 318 times that of the Earth. It is made of 93% hydrogen and 7% helium, also it might have rocky core having heavier elements. Due to Jupiter's heavy rotation it is an oblate spheroid. It is also the fourth brightest object seen in the sky after the Sun, the Moon and Venus (spaceandmotion. com).

Saturn is the 6th planet from the Sun in terms of distance and it is the second largest. Early observations about Saturn used to be complications regarding the fact that the Earth used to pass through the Saturn rings plane in every few years. Saturn's low resolution image therefore changes drastically. Christiaan Huygens was the person to correctly infer the geometry of the Saturn rings in 1659. Similar to Jupiter, Saturn is around 75% hydrogen and around 25% Helium having traces of water, ammonia, methane and 'Rocks' (spaceandmotion. com).

Uranus is the 7th planet from the Sun and is named after the god of sky. It is the third largest planet by diameter and the fourth largest in terms of mass, it is also a gas giant. Uranus comprises primarily of ice and rocks, with about 15% hydrogen and very less Helium. Uranus's atmosphere comprises of 83% hydrogen, around 15% Helium and remaining 2% is Methane. The Blue colour of Uranus results from the absorption of the red light by Methane in its upper atmosphere. There might be some coloured bands just like Jupiter but they get hidden due to its overlaying Methane layer

(spaceandmotion. com).

Finally, Neptune is the farthest and the eighth on the base of distance from the Sun in the solar system. Neptune is third largest in terms of mass and fourth largest in terms of diameter with mass of Neptune is round 17 times that of Earth. Atmosphere of Neptune is majorly composed of helium and hydrogen having traces of methane that makes the planet look blue in appearance. Blue colour of Neptune is brighter in comparison to the Uranus; though it has the same amount of methane it is assumed that an unknown component causes the intense blue colour of Neptune (spaceandmotion. com).

“ When one of these objects (called Eris) was discovered to be larger than Pluto, the International Astronomical Union decided in 2006 that Pluto cannot be considered a real planet any more, and instead belongs to a new class of objects called dwarf planets” (Journey through the Universe).

There are possibly any other dwarf planets in the outer reaches of the Solar System that are still to be discovered. There are currently 140 known natural satellites which are also called the moons, which revolve in orbits around their planets in the Solar system. These moons range from celestial bodies that are larger than Earth’s moon to smaller than pieces of debris. Most of the planets in the Solar system have magnetic fields that extend in the form of magnetosphere around the planets into the space. The magnetospheres keep rotating around the planets and sweeping charged particles along with them. Sun’s magnetic field is called the heliosphere that envelops the entire Solar System (Journey through the Universe).

Finally, Comets also known as the dirt snowballs that consists mainly of rocks

and ice. When orbit of a comet takes it closer to the Sun, the ice in the central nucleus converts into gas shooting out from the sunlit side, that the solar wind carries outwards forming its long-tail.

“ Short-period comets that complete their orbits in less than 200 years are thought to originate from the the disk-shaped Kuiper belt, while long-period comets that take more than 200 years to return are thought to come from the spherical Oort cloud” (Choi).

Small rocky objects that orbit the sun just like the planets, but are smaller than planets are called asteroids. Ceres is the largest asteroid that is over 900 kms in diameter and it has more than third of the mass of all the asteroids.

“ There are hundreds of thousands of known asteroids. Astronomers probably have seen almost all of the asteroids larger than 100 km, and about half of those with diameters in the 10-100 km range” (Journey Through the Universe).

Sometimes these asteroids collide and their pieces break off. These broken pieces travel around the solar system. Occasionally, they even cross paths with some even hitting the planet Earth. When they fly across the atmosphere of Earth, they are viewed as meteors in the sky. These rocks burn-up due heating to heat in atmosphere. Sometimes, these meteors are called the ‘ shooting stars’ but they are categorized under real stars.

## **Conclusion**

The solar system comprises a large variety of celestial objects - The Sun, 8 planets, the dwarf planets and asteroids also life on the planet Earth. The inner solar system occasionally gets visited by looping comets from the outer

reaches of the Solar system on its highly elliptical orbits. The outer reaches of the solar system has the Oort cloud and the Kuiper belt. Further, at the limits of Heliosphere, the outer reaches of the Solar system interacts with the interstellar space. The formation of solar system began billions of years ago when dust and gases started to come together leading to formation of the Solar system, its Sun, planets and other celestial bodies.

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