



# ASTRONOMY

OUR UNIVERSE

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# Main Contents

We hope to cover the following topics by the end of this class :

- Concept of Astronomy
- Celestial Bodies
- Stars
- Planets
- Rocks in Space
- Black Holes
- Quasars

# What is Astronomy ?

*Astronomy is the study of the sun, moon, stars, planets, comets, gas, galaxies, gas, dust and other non-Earthly bodies and phenomena. NASA defines astronomy as “the study of stars, planets and space.”*

*We come to gather that Astronomy is nothing but the study of “celestial bodies”.*



# Celestial Bodies

## *What are Celestial Bodies ?*

*The term celestial body is as expansive as the entire universe, both known and unknown. By definition a celestial body is any natural body outside of the Earth's atmosphere. Easy examples are the Moon, Sun, and the other planets of our solar system. But those are very limited examples. There are plenty of other bodies that still remain shrouded in mystery.*

# Stars – What are they ?

*A star is a sphere of gas held together by its own gravity. The force of gravity is continually trying to cause the star to collapse, but this is counteracted by the pressure of hot gas and/or radiation in the star's interior. This is called hydrostatic support. During most of the lifetime of a star, the interior heat and radiation is provided by nuclear reactions near the center, and this phase of the star's life is called the main sequence.*

# What are Planets ?



*The definition states that a planet is a body that orbits the Sun or any other star, is massive enough for its own gravity to make it round or circle the star, and has smaller objects around its orbit.*

*In our solar system, planets vary a great deal in size – smallest starting with a diameter of 4880 while the biggest with a staggering diameter of 142740 km*

# Planets from our Solar System

- *Mercury*
- *Venus*
- *Earth*
- *Mars*
- *Jupiter*
- *Saturn*
- *Neptune*
- *Uranus*



# Mercury – the smallest of ‘em all

Mercury is the innermost planet in the Solar System. It is also the smallest, and its orbit is the most the least perfectly circular of the eight planets. It orbits the Sun once in about 88 Earth days, completing three rotations about its axis for every two orbits.

Mercury's surface is heavily cratered and similar in appearance to Earth's Moon, indicating that it has been geologically inactive for billions of years. Due to its near lack of an atmosphere to retain heat, Mercury's surface experiences the steepest temperature gradient of all the planets, ranging from a very cold 100 K at night to a very hot 700 K during the day.



# Venus – the hottest of ‘em all

*Venus is the second planet from the Sun, orbiting it every 224.7 Earth days. After the Moon, it is the brightest natural object in the night sky, bright enough to cast shadows. Because Venus is an inferior planet from Earth, it never appears to venture far from the Sun: its elongation reaches a maximum of  $47.8^\circ$ . Venus reaches its maximum brightness shortly before sunrise or shortly after sunset, for which reason it has been referred to by ancient cultures as the Morning Star or Evening Star.*

*Venus is classified as a terrestrial planet and is sometimes called Earth's "sister planet" owing to their similar size, gravity, and bulk composition.*

# Earth – the place to live

A satellite view of Earth from space, showing the Americas in the center. The landmasses are green and brown, surrounded by deep blue oceans. White clouds are scattered across the globe. The image is used as a background for the text.

*Earth is the third planet from the Sun, and the densest and fifth-largest of the eight planets in the Solar System. It is also the largest of the Solar System's four terrestrial planets. It is sometimes referred to as the world, the Blue Planet, or by its Latin name, Terra.*

*Earth formed approximately 4.54 billion years ago by accretion from the solar nebula, and life appeared on its surface within one billion years. The planet is home to millions of species, including humans and has everything to support life on it.*



# Mars – the red planet

*Mars is the fourth planet from the Sun and the second smallest planet in the Solar System. It is often described as the "Red Planet", as the iron oxide prevalent on its surface gives it a reddish appearance. Mars is a terrestrial planet with a thin atmosphere, having surface features reminiscent both of the impact craters of the Moon and the volcanoes, valleys, deserts, and polar ice caps of Earth. The rotational period and seasonal cycles of Mars are likewise similar to those of Earth, as is the tilt that produces the seasons. Mars is the site of Olympus Mons, the highest known mountain within the Solar System, and of Valles Marineris, one of the largest canyons.*

# Jupiter – biggest of 'em all

*Jupiter, the largest planet in the Solar System, has a volume equal to more than 1,000 Earths. The fifth planet from the Sun is called a gas giant because it has no solid surface, being mainly composed of hydrogen and helium. It is believed to have liquid metallic hydrogen in its interior that generates the planet's intense magnetic field.*

*Powerful storms such as the centuries-old Great Red Spot travel in bands across Jupiter. Its many satellites include the moons Io, Europa, Ganymede and Callisto.*



# Saturn – the ring planet



*Saturn is the sixth planet from the Sun and the second largest planet in the Solar System, after Jupiter. Saturn is a gas giant with an average radius about nine times that of Earth. While only one-eighth the average density of Earth, with its larger volume Saturn is just over 95 times as massive as Earth.*

*Saturn's interior is probably composed of a core of iron, nickel and rock (silicon and oxygen compounds), surrounded by a deep layer of metallic hydrogen, an intermediate layer of liquid hydrogen and liquid helium and an outer gaseous layer. The planet exhibits a pale yellow hue due to ammonia crystals in its upper atmosphere. Electrical current within the metallic hydrogen layer is thought to give rise to Saturn's planetary magnetic field, which is slightly weaker than Earth's and around one-twentieth the strength of Jupiter's. Wind speeds on Saturn can reach 1,800 km/h (1,100 mph), faster than on Jupiter, but not as fast as those on Neptune.*

# Uranus – the ice giant

*Uranus is the seventh planet from the Sun. It has the third-largest planetary radius and fourth-largest planetary mass in the Solar System. Though it is visible to the naked eye like the five classical planets, it was never recognized as a planet by ancient observers because of its dimness and slow orbit. Sir William Herschel announced its discovery on March 13, 1781, expanding the known boundaries of the Solar System for the first time in modern history. Uranus was also the first planet discovered with a telescope.*

*Uranus is similar in composition to Neptune, and both are of different chemical composition than the larger gas giants, Jupiter and Saturn. Astronomers sometimes place them in a separate category called "ice giants".*



# Neptune – the windy planet

*Neptune is the eighth and farthest planet from the Sun in the Solar System. It is the fourth-largest planet by diameter and the third-largest by mass. Neptune is 17 times the mass of Earth and is somewhat more massive than its near-twin Uranus, which is 15 times the mass of Earth but not as dense. On average, Neptune orbits the Sun at a distance of 30.1 AU, approximately 30 times the Earth–Sun distance.*

*Neptune is similar in composition to Uranus, and both have compositions which differ from those of the larger gas giants, Jupiter and Saturn. Neptune's atmosphere, while similar to Jupiter's and Saturn's in that it is composed primarily of hydrogen and helium, along with traces of hydrocarbons and possibly nitrogen, contains a higher proportion of "ices" such as water, ammonia and methane.*

# **Rocks in Space**

- *Asteroids*
- *Shooting Stars*
- *Meteorite*
- *Comets*



# Shooting Stars

*Shooting star is a common name for the visible path of a meteoroid as it enters the atmosphere to become a meteor.*

*Also, shooting stars are the glowing tails of meteors, which heat up as they enter the Earth's Atmosphere.*

# Asteroids

*Asteroids are a class of small Solar System bodies in orbit around the Sun. They have also been called planetoids, especially the larger ones.*

*Also, asteroids are mini – planets that orbit the Sun in a ‘belt’ between Mars and Jupiter.*

# Meteorites



*A meteorite is a natural object originating in outer space that survives impact with the Earth's surface. A meteorite's size can range from small to extremely large. Most meteorites derive from small astronomical objects called meteoroids, but they are also sometimes produced by impacts of asteroids.*



# Comets

*Comets are chunks of ice filled with dust and rock that orbit the sun, just like planets.*

*However, comets travel much farther out into distant space, often to the outer reaches of the Solar System, so comets can take up to thousands of years to make on orbit of the sun.*



# Black Holes

*A black hole is a region of space time where gravity prevents anything, including light, from escaping. The theory of general relativity predicts that a sufficiently compact mass will deform space time to form a black hole. Around a black hole there is a mathematically defined surface called an event horizon that marks the point of no return. It is called "black" because it absorbs all the light that hits the horizon, reflecting nothing, just like a perfect black body in thermodynamics. Quantum mechanics predicts that black holes emit radiation like a black body with a finite temperature. This temperature is inversely proportional to the mass of the black hole, making it difficult to observe this radiation for black holes of stellar mass or greater.*

# Quasars

*The word quasar stands for quasi-stellar radio source. They are the brightest and most distant objects in the universe as we know it. The term quasar has fallen out of common use by astronomers and they are now known as quasi-stellar objects(QSOs) because we now know that they are not true stars.*

# TYPES OF GALAXIES





# Life of a star



Stars begin life when Nebulae are pulled together by their own gravity.. They get squeezed and begin to get hot. Nuclear fusion begins as Hydrogen atoms fused together to make Helium. The heat from the fusion makes the Star shine. The heat generated in the core pushes gas out as hard as gravity pulls in it. After 10 Billion years all the Hydrogen in the Stars core is burned up and it begins to burn Helium.

Then the Star goes on swri;ing into super giants, once Iron forms in the center the Star fails to give energy and collapses that triggers an explosion like the nuclear bomb which is called super nova.

.Then the Star either turns into a Black hole or a Neutron Star.



Tag By Aelona

**Thank You**