

**Science Benchmark: 06:03**

The solar system consists of planets, moons, and other smaller objects including asteroids and comets that orbit the sun. Planets in the solar system differ in terms of their distance from the sun, number of moons, size, composition, and ability to sustain life. Every object exerts gravitational force on every other object depending on the mass of the objects and the distance between them. The sun's gravitational pull holds Earth and other planets in orbit. Earth's gravitational force holds the moon in orbit.

**Standard 03:**

Students will understand the relationship and attributes of objects in the solar system.

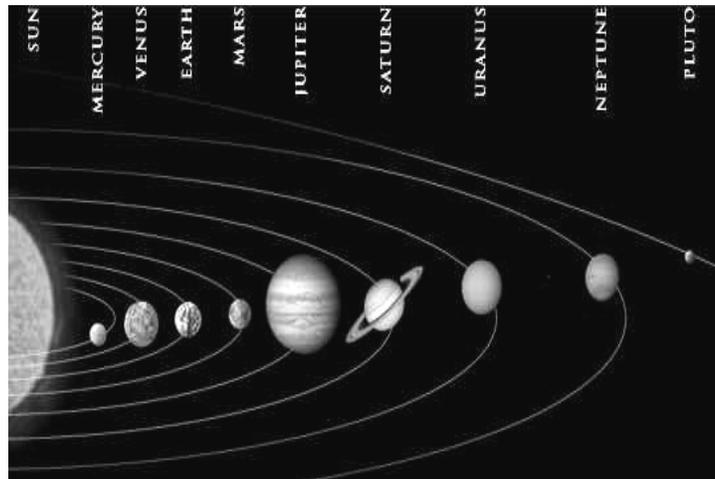
## Shared Reading

### Earth is Not the Center of the Universe



Have you ever looked up at the night sky and wondered about all the pinpoint lights? People through the ages have wondered about these points too. With the use of telescopes, artificial satellites, binoculars, and even observations with the naked eye, men and women have discovered many different *celestial objects*.

Even though all these celestial objects are very far away, astronomers have discovered that some celestial objects are closer to us than others. *Stars* are very far away from us. The celestial objects in this unit are those that are within our *solar system*. Our solar system consists of nine planets and their moons, asteroids, comets, and a *sun*. The sun is the only star in our solar system.



The Solar System

**Celestial objects** – all of the different objects in space that make up our universe

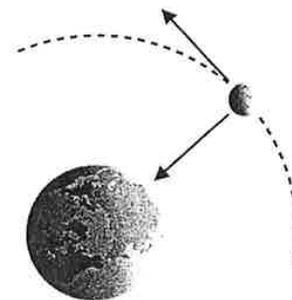
**Solar system** – the system made up of the nine unique planets, and many smaller objects that orbit the sun.

**Stars** – celestial objects that consist of gases which generate light and heat

**Sun** – the star that is the basis of the solar system and sustains life on Earth as the source of heat and light.

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Most of the celestial objects that are part of our solar system are constantly circling our sun. These circling paths are called orbits. All celestial objects have some amount of *gravity*. Large masses have a stronger *gravitational force* than small ones. If a small object is trapped by the gravity of a larger object, it must move fast enough not to be “captured” by the gravity of the larger object. If it slowed down enough, it would fall into the larger object. For example, the moon moves around Earth in an orbit. If the moon moved more slowly, Earth’s gravity would pull it into Earth. If the moon moved more rapidly, it would escape into space. Since the sun is the largest mass in our solar system, it creates the gravitational force needed to hold Earth and other planets in orbit around the sun.



The *planets* of our solar system, in order from the sun, are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto. Mercury, Venus, Earth, and Mars, the inner planets, are made up of rocky, solid matter. The other planets, Jupiter, Saturn, Uranus, Neptune, are made up of gasses. The farthest out planet, Pluto, is made up of rocky, solid matter. The chart below shows the *distance* between planets and the sun. Can you figure out how far some planets are from other planets?

Distance from the Sun:

| <u>Name of the Planet</u> | <u>Miles</u>  | <u>Kilometers</u> |
|---------------------------|---------------|-------------------|
| Mercury                   | 36,000,000    | 58,000,000        |
| Venus                     | 67,000,000    | 108,000,000       |
| Earth                     | 93,000,000    | 150,000,000       |
| Mars                      | 141,000,000   | 228,000,000       |
| Jupiter                   | 484,000,000   | 778,000,000       |
| Saturn                    | 888,000,000   | 1,429,000,000     |
| Uranus                    | 1,786,000,000 | 2,875,000,000     |
| Neptune                   | 2,799,000,000 | 4,504,000,000     |
| Pluto                     | 3,666,000,000 | 5,900,000,000     |

**distance** – a measure of the amount of space between objects

**force** – a push or a pull that causes an object to move, stop, or change position

**gravitational force** – the measurement of the pull of gravity

**gravity** – the attraction of one mass to another mass

**planet** – a celestial object, larger than asteroids or comets, that revolves around a star without giving off its own light.

**Below are data that can be used to compare the planets:**

**Mercury:**

- It is the nearest planet to our sun.
- Our moon and Mercury's surface look similar.
- It has no atmosphere.
- It has no moons.
- Mercury revolves around the sun with the same side always facing the sun.
- It has the greatest range of temperature- 662° F (day) to -274° F (night) = 936°

**Planet's size  
shown in comparative  
scale to Earth**



**Venus:**

- It is the second planet from the sun.
- It spins slowly backwards as it orbits the sun.
- Its atmosphere is mostly made up of carbon dioxide.
- The atmosphere traps heat making Venus the Hottest planet (860° F).
- Its surface is mostly craters, mountains, and volcanic lava flows.
- It has no moons.



**Earth:**

- It is the third planet from the sun.
- It is covered by 70% water and 30% land
- It has one moon
- It has the conditions necessary for life as we know it.
- It has volcanoes and earthquakes.



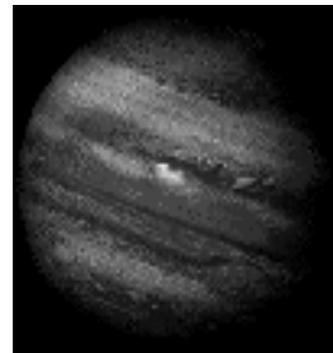
**Mars:**

- It is the fourth planet from the sun.
- Iron oxide (rust) causes its surface to have a red glow.
- It has polar ice caps made of frozen carbon dioxide and water.
- It has two small moons.
- It has a thin atmosphere.
- Huge dust storms sometimes cover the surface.



**Jupiter:**

- It is the fifth planet from the sun.
- Its atmosphere is made mostly of hydrogen, helium, methane, and ammonia.
- Its Great Red Spot is a storm, which has lasted For millions of years.
- It has a ring system.
- It has four large and twenty-four small moons.
- It is the largest planet in our solar system.

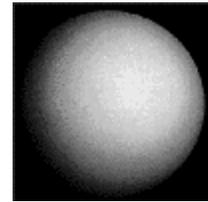


**Saturn:**

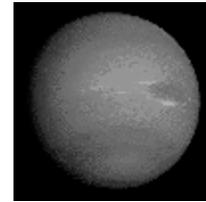
- It is the sixth planet from the sun.
- It is the second largest planet.
- It has an atmosphere of hydrogen, helium, methane and ammonia.
- It has at least thirty moons.
- The largest moon, Titan, is larger than Mercury.
- If it were set upon Earth's oceans, it would float.
- It has a ring system.

**Uranus:**

- It is the seventh planet from the sun.
- It is the third largest planet in our solar system.
- It has a ring system.
- Its axis points toward the sun.
- It has 21 moons.
- It has an atmosphere of hydrogen, helium, methane and ammonia.
- Methane causes Uranus to appear blue in color.

**Neptune:**

- It is the eighth planet from the sun.
- It has a Great Dark Spot that is a huge storm system as large as Earth.
- It has high altitude winds.
- Its atmosphere is made of hydrogen, helium, Methane and ammonia.
- Methane causes Neptune to appear blue in color.
- It has eight moons.
- Its moon, Triton, has an atmosphere.
- It has a ring system.

**Pluto:**

- It is the ninth planet from the sun.
- Its atmosphere is nitrogen, carbon monoxide and methane.
- Its moon, Charon, is half the size of Pluto.
- It is the outermost known planet.
- Its oval orbit sometimes puts it closer to the sun than Neptune.

