

A Tour of the Solar System

Grades K-12

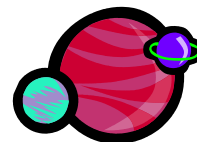
OBJECTIVES

As a result of the visit to the Planetarium the students will be able to:

1. State the differences between the Sun and the planets.
2. Correctly name the nine known planets.
3. Describe conditions (temperature, atmosphere, composition, etc) on other planets.

Concepts Covered During the Planetarium Visit

1. The Sun is at the center of the solar system.
 - a. The Sun makes its own light.
 - b. The Sun is a star.
 - c. The Sun is made mostly of the gases hydrogen and helium.
2. There are eight known planets and many dwarf planets.
 - a. The planets/dwarf planets do not make their own light, but shine by reflected light.
 - b. The planets/dwarf planets revolve around the Sun.
 - i. Those closer to the Sun than the Earth (mercury and Venus) revolve faster than the Earth. They have shorter “years”.
 - ii. Those farther from the Sun than the Earth (mars, Jupiter, Saturn, Uranus, Neptune and Pluto) revolve slower than the Earth. They have longer “years”
 - c. A planet is a body that is in orbit around the Sun, is round in shape, and has cleared its orbit of debris.
 - d. A dwarf planet is a body that orbits the Sun, round in shape, has not cleared its orbit of debris, and is not a moon. Pluto, Ceres, Makemake, Eris, and Haumea are examples.
3. There are moons orbiting some of the planets.
 - a. Moons are bodies that revolve around a planet.
 - b. Most of the planets have one or more moons (Mercury and Venus have no moons).
4. Some planets are similar to the Earth.
 - a. Mercury is made of solid rock like the Earth, but has no oceans and no atmosphere. It has craters like the moon. Daytime temperatures reach 800 degrees Fahrenheit, while at night the temperature drops to 300 degrees Fahrenheit below zero.
 - b. Venus, also a rocky planet, has an atmosphere made up of mostly carbon dioxide, not nitrogen and oxygen like the Earth. Venus is continually covered by clouds of carbon dioxide and sulfuric acid. The temperature on Venus is about 900 degrees Fahrenheit both day and night.
 - c. Mars, another rocky planet, has an extremely thin atmosphere of carbon dioxide. The temperature on Mars sometimes reaches 60 degrees Fahrenheit during the summer, but
 - d. most of the time it is colder than the Earth’s Polar Regions. There is some water on Mars, but not much. Mars is the planet most like Earth.
5. Some planets are different from the Earth.
 - a. Jupiter is much larger and more massive than the Earth. If you weigh 50 pounds on the Earth, you would weigh 160 pounds on Jupiter. Jupiter is the largest planet.
 - b. Jupiter and Saturn are made of the gases helium and hydrogen like the Sun, but also contain some methane (natural gas) and ammonia. The most prominent feature of Saturn is its rings which are made of billions of chunks of ice and rock.
 - c. Uranus is made of hydrogen, helium and methane. It is about 5 times the size of the Earth, and has a thin ring system. It is tilted over on its side as it revolves around the Sun. One of its moons, Miranda, has sheer ice cliffs eight miles high!
 - d. Neptune is slightly smaller than Uranus, but its atmosphere is similar. Neptune had great storms in its atmosphere similar to the storms of Jupiter. Neptune’s moon, Triton, is one of the coldest places in the solar system, with temperatures around 400 degrees Fahrenheit below zero.
6. There are other things in the Solar System besides the Sun, the planets and moons.
 - a. Asteroids
 - b. Spacecraft
 - c. Solar wind
 - d. Comets



PRE-VISIT ACTIVITIES

1. Discuss with the students whether or not it is possible to see planets in the sky (day or night), and if so, what they might look like.
2. Planets can quite often be found in the evening sky. Planets wander around against the background stars due to their motion about the Sun, so they are usually not where you remember them to be, unless you keep tabs on them. If you would like your students to observe a planet in the sky before their visit, please call the Planetarium for observing opportunities and tips.
3. The Moon, our nearest neighbor world, is likewise a wonderful object to watch in the sky. It is usually easy to find. As the Moon travels in its orbit about the Earth, students can observe the Moon change its place and apparent shape over the course of several nights. Binoculars give terrific views! But there are some times during the month when the Moon is difficult to watch because it rises well after midnight. Once again, please call the Planetarium before assigning your class any moon watch activities.
4. Assign teams of students to investigate the geology, environment, etc. of the planets and compare them to Earth. Be sure to assign a team to the Earth too!
5. Students may wish to investigate the various terms in the vocabulary list, particularly the ones in bold that refer to specific space craft sent to explore the planets of our solar system.
6. Plan a trip to the planet Mars. Determine the travel distance, items needed for the voyage, duration of the journey, methods of leaving Earth orbit and getting to Mars, method of landing on the red planet and, of course, method of returning to the Earth!
7. The planets and moons of our solar system are named for characters classical mythology stories and literature. Students can research the stories of the mythological figures for which each of the planets are named. Compare the characteristics of the mythological figures to the characteristics of the planet with the same name.

Sunshine State Standards Benchmarks

SC.K.N.1.5	Recognize that learning can come from careful observation.
SC.K.E.5.2	Recognize the repeating pattern of day and night.
SC.K.E.5.3	Recognize that the Sun can only be seen in the daytime.
SC.K.E.5.4	Observe that sometimes the Moon can be seen at night and sometimes during the day.
SC.K.E.5.6	Observe that some objects are far away and some are nearby as seen from Earth.
SC.K.P.12.1	Investigate that things move in different ways, such as fast, slow, etc.
SC.1.E.5.1	Observe and discuss that there are more stars in the sky than anyone can easily count and that they are not scattered evenly in the sky.
SC.1.E.5.2	Explore the Law of Gravity by demonstrating that Earth's gravity pulls any object on or near Earth toward it even though nothing is touching the object.
SC.1.E.5.3	Investigate how magnifiers make things appear bigger and help people see things they could not see without them.
SC.1.E.5.4	Identify the beneficial and harmful properties of the Sun.
SC.1.P.12.1	Demonstrate and describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow.
SC.2.N.1.1	Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations.
SC.3.N.1.6	Infer based on observation.
SC.3.E.5.2	Identify the Sun as a star that emits energy; some of it in the form of light.
SC.3.E.5.3	Recognize that the Sun appears large and bright because it is the closest star to Earth.
SC.3.E.5.4	Explore the Law of Gravity by demonstrating that gravity is a force that can be overcome.
SC.3.E.6.1	Demonstrate that radiant energy from the Sun can heat objects and when the Sun is not present, heat may be lost.
SC.4.E.5.2	Describe the changes in the observable shape of the moon over the course of about a month.
SC.4.E.5.3	Recognize that Earth revolves around the Sun in a year and rotates on its axis in a 24-hour day.
SC.4.E.5.4	Relate that the rotation of Earth (day and night) and apparent movements of the Sun, Moon, and stars are connected.
SC.5.E.5.1	Recognize that a galaxy consists of gas, dust, and many stars, including any objects orbiting the stars. Identify our home galaxy as the Milky Way.
SC.5.E.5.2	Recognize the major common characteristics of all planets and compare/contrast the properties of inner and outer planets.
SC.5.E.5.3	Distinguish among the following objects of the Solar System -- Sun, planets, moons, asteroids,

	comets -- and identify Earth's position in it.
SC.8.E.5.1	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.
SC.8.E.5.3	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
SC.8.E.5.4	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
SC.8.E.5.7	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
SC.8.E.5.9	Explain the impact of objects in space on each other including: 1.the Sun on the Earth including seasons and gravitational attraction 2.the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.
SC.912.E.5.4	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
SC.912.E.5.5	Explain the formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary systems.
SC.912.E.5.6	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.

Vocabulary

Asteroid: A small, mostly rocky body orbiting the Sun. Asteroids range in size from 1000 kilometers in diameter to tiny objects you could hold in your hand. Most asteroids orbit the Sun between Mars and Jupiter, and are the source of most meteorites.

Astronaut: Person engaged in or trained for spaceflight.

Astronomy: The study of stars, planets, comets, asteroids, galaxies, and other phenomena that occur outside the Earth's atmosphere.

Comet: A small body (a "dirty ice ball", typically 1 km across, with dust and plasma tails) that circles the Sun with a highly elliptical orbit.

Crater: A hole or depression. Most are roughly circular or oval in outline. On Earth most natural craters are of volcanic origin. On the Moon most are of impact origin.

Dwarf Planet: A body that orbits the Sun, round in shape, has not cleared its orbit of debris, and is not a moon. Pluto, Ceres, Makemake, Eris, and Haumea are called this.

Earth: Third planet from the Sun and made out of rocks. It's our home planet.

Eclipse: the blocking out of light from one object by the intervention of another object. The most dramatic eclipses visible from the Earth are eclipses of the sun (when sunlight is blocked by the moon) and eclipses of the moon (when sunlight on its way to the moon is blocked by the Earth).

Gas: The atoms or molecules in gases are more widely spaced than in solids or liquids and suffer only occasional collisions with one another

High Tide: The tide at its fullest, when the water reaches its highest level.

Jupiter: Fifth planet from the Sun and made out of gases. It's the largest planet in our Solar System.

Low Tide: The lowest level of the tide.

Mars: Fourth planet from the Sun and made out of rocks. Also known as the "Red Planet".

Mercury: Closest planet to the Sun and made out of rocks. It's the smallest planet.

Moon: A natural satellite orbiting a planet.

Neptune: Eighth planet from the Sun and made of gases.

Orbit: The path of one object as it moves around another.

Phases: The way planets and moons look different from time to time. Full Moon, Half Moon, or New Moon.

Planet: A body that is in orbit around the Sun, is round in shape, and has cleared its orbit of debris.

Saturn: Sixth planet from the Sun and made of gases. Also known as the “Ringed Planet”.

Solar System: A system of planets or other bodies orbiting a star.

Space: The expanse in which the solar system, stars, and galaxies exist; the universe.

Star: A ball of gases that glows and makes heat

Sun: The “Star” of our Solar System. Where most of our light and heat comes from.

Uranus: Seventh planet from the Sun and made of gases.

Venus: Second planet from the Sun and made of rocks.

Revolution: Orbital motion about a point, especially as distinguished from axial rotation.

Rotation: movement of an object in a circular motion.

Saturn: The sixth planet from the sun and the second largest in the solar system.

Season: One of the four natural divisions of the year, spring, summer, fall, and winter, in the North and South Temperate zones. Each season, beginning astronomically at an equinox or solstice, is characterized by specific meteorological or climatic conditions.

Shadow: Darkness that results from the blocking of light rays.

Space: The expanse in which the solar system, stars, and galaxies exist; the universe.

Spaceship: A vehicle intended to be launched into space.

Star: Mass of gases that glows and makes heat.

Sun: A star that is the basis of the solar system and that sustains life on Earth, being the source of heat and light.

Uranus: Seventh planet from the Sun.

Venus: Second major planet from the Sun.