

1. Our Earth and Our Solar System

When we look up from an open ground, we see the sky. In a clear night sky we can see many stars. They are very far away from the earth.

Some stars are prominent while some are tiny and faint. If we look at them carefully, we find that many of them twinkle, but some do not.

The sun and the moon are comparatively close to the earth. So, we can see their round shapes clearly. The sun, the moon, the stars, the planets, etc. are all known as heavenly bodies.

Try this.



Observe the sky on two clear nights, keeping a gap of about a week between them. Base your observation on the following points :

- The brightness of the heavenly bodies
- Whether they twinkle
- Their colour and size
- Changes in their positions

On both nights, draw a picture of the illuminated portion of the moon and note how it changes from day to day.

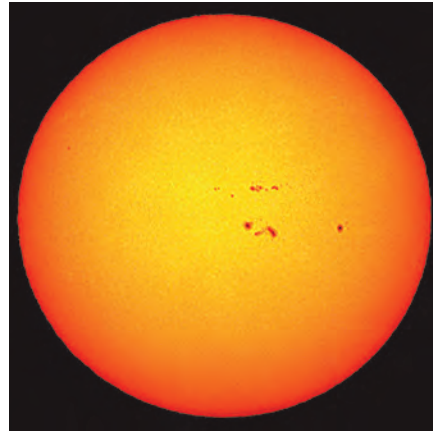
For teachers : For the sky-watching activity, call the children along with their guardians to a large open area on a clear dark night.

Stars : The heavenly bodies that twinkle are called stars. Stars have their own light.

The sun is a star. It is closer to us than any of the other stars. Hence, it appears big

and brilliant. In its bright light, during the day, we cannot see other stars.

Planets : The heavenly bodies that do not twinkle are called planets. Planets do not have light of their own. They get light



The sun

from the stars. Planets revolve around a star, even as they rotate around themselves.

The solar system : Our earth is a planet. It gets its light from the sun. It moves around the sun. Its movement around the sun is called the revolution of the earth.

Besides earth, there are seven other planets that revolve around the sun. They are Mercury, Venus, Mars, Jupiter, Saturn, Uranus and Neptune.



A photograph of the earth taken from a man-made satellite

Every planet in the solar system revolves around the sun along a specific path. This path is known as that planet's orbit. The sun, which is a star, and the planets that revolve around it are together called the solar system. Besides the planets, the solar system also includes various other heavenly bodies.

Other heavenly bodies in the solar system

Satellites : Some heavenly bodies revolve around planets. These are called satellites. Satellites too get their light from the sun. We see the moon at night. It revolves around the earth. Hence, it is called a satellite of the earth.



Most of the planets in the solar system have satellites. The planets revolve around the sun

The moon as seen on a full moon night

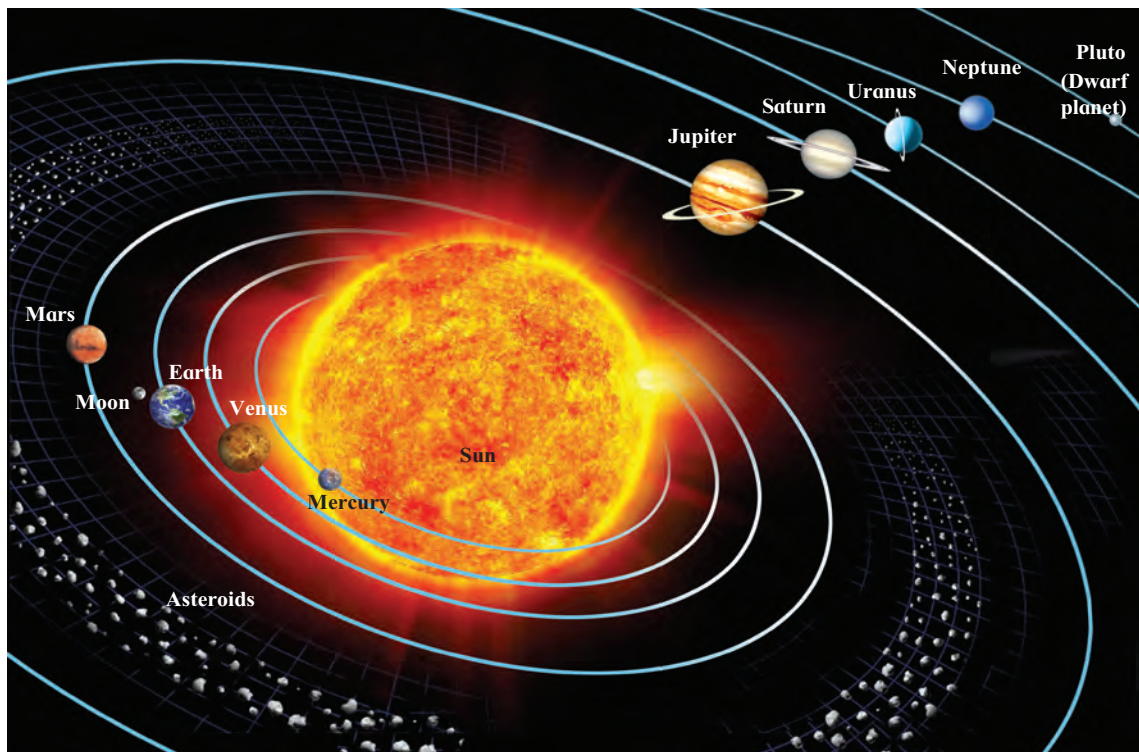
along with their satellites.

Dwarf planets : There are some smaller heavenly bodies that revolve around the sun. They are called dwarf planets. Of these, the most well-known is Pluto. Dwarf planets revolve independently around the sun. They have an orbit of their own.

Asteroids : Between the planets Mars and Jupiter, there is a band of numerous small heavenly bodies. They are called asteroids. Asteroids also revolve around the sun.

Compared to the sun, other heavenly bodies in the solar system are much smaller. The moon is closest to the earth. That is why, it appears to be so big although it is actually very much smaller than the sun.

A diagram of the solar system is given below. In it, you see the sun in the centre, the heavenly bodies that revolve around it and their orbits. The planets, satellites, dwarf planets and asteroids are all part of the solar system.



A diagram of our solar system. Please note that only the earth's satellite is shown in it.

Can you tell ?



Look at the picture of the solar system and answer the following questions.

- (1) Which planet is nearest to the sun ?
- (2) At what position is the earth from the sun ?
- (3) Which planet is placed between the earth and Mercury ?
- (4) Name the planets beyond the orbit of Mars in serial order.
- (5) Which planet is furthest from the sun ?

Gravity

All heavenly bodies exert a force of attraction or a pull on one another. This force is called the force of gravity.

The sun exerts a gravitational pull on all planets whereas the tendency of the planets is to move away from the sun. As a result of these two forces, a planet keeps revolving around the sun at a fixed distance in a fixed orbit. In the same way, satellites revolve around their planets.

In which direction do these things fall ?

- (1) Leaves, flowers, fruits from a tree.
- (2) Rocks that come loose from a hillside.
- (3) Rain falling from the sky.

Due to the earth's gravity, all things on the earth remain on it. Even if we throw something upwards with great force, it finally falls down to the ground.

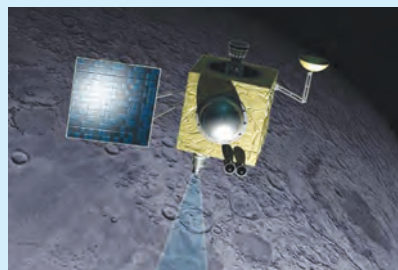
◆ **A new word – Space :** The emptiness between and beyond the stars and planets is called space or outer space.

People have always been curious about the heavenly bodies in the sky. They have always wanted to reach them. However, to send some object from the earth into space, it must be given power

Do you know ?



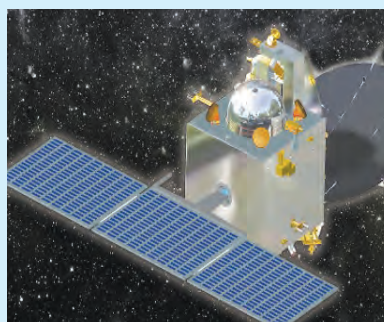
India's Space Missions



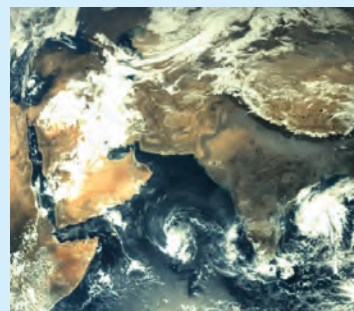
Chandrayaan

On 22 October 2008, the Indian Space Research Organization, ISRO, launched a spacecraft to the moon. The mission is known as Chandrayaan-1.

Mangalyaan is another important Indian space mission. It is known as M.O.M. or Mars Orbit Mission. It was launched on 5 November 2013. It got established in an orbit around the planet Mars on 24 September 2014. ISRO achieved this feat in its first attempt. Both these missions are unmanned, i.e. there were no people on board these spacecraft. The objective of the missions is a deeper study of the moon and Mars.



Mangalyaan



A photograph of the region around India taken by Mangalyaan

against the force of gravity. Rocket technology or space launch technology is used for that purpose.

One of the Diwali firecrackers is called a 'rocket'. It is packed with explosive substances. The explosives burn rapidly and produce a lot of energy. The design of the rocket is such that the firecracker is pushed in a certain direction at a great speed.



Space launch using a rocket



Diwali rockets

Very powerful rockets are used to send a spacecraft into space. A tremendous quantity of fuel is burnt in rockets so that spacecraft weighing thousands of tons can be launched into space. In the twentieth century, a few countries of the world developed space technology and sent hundreds of spacecraft into space. Our country is well-known for the development of its space launch technology.

Some spacecraft remain in space. Some are brought back to earth while some land on other planets or satellites. In some missions, scientists also travel in the spacecraft. They are called astronauts.

Do you know ?



Indian astronaut

Rakesh Sharma became the first Indian astronaut to go into space in 1984. He spent eight days on a space station for a joint mission of the ISRO and the Soviet Intercosmos. Seeing India from space, he said that it looked 'Saare jahan se achha!'

Find out more about the work of Kalpana Chawala and Sunita Williams, astronauts of Indian origin.

Man-made satellites : Man-made satellites provide useful information for agriculture, environment, weather forecasting, making maps, and searching for water and mineral wealth on the earth. They are also used for telecommunication. They are put into orbit around the earth. They can remain in space for many years.

Always remember –



Space scientists have not yet been able to find a single other planet which has life on it. Therefore, our earth is an invaluable planet. The degradation of its environment for any reason will be a threat to the existence of life itself.

What we have learnt –



- The sun is a star. All the other bodies in the solar system get light from the sun.
- The sun and the planets, their satellites, dwarf planets and asteroids that revolve around the sun are together called the solar system.
- Things on the earth remain on it due to the force of gravity.
- To travel in space, the earth's gravitational force has to be overcome. Rocket technology helps us do that.

Exercises

1. What's the solution ?

One of the asteroids has fallen out of its place in the asteroid belt and is hurtling towards the sun. Our earth is in its way and there is all likelihood of a collision. What can be done to prevent this collision?

2. Use your brain power !

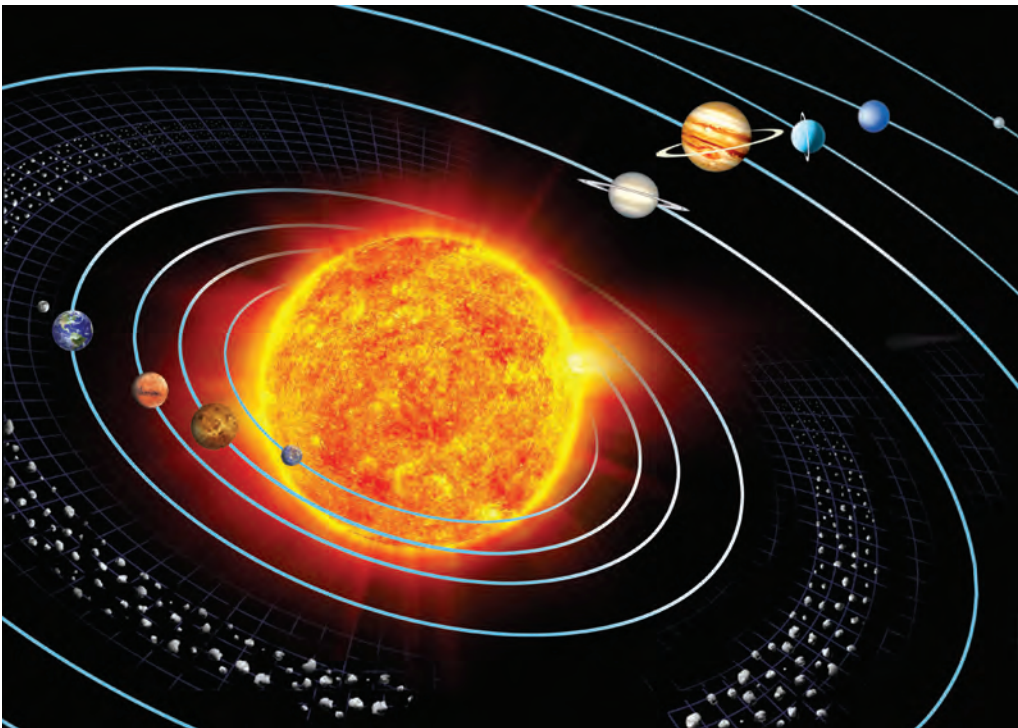
- (1) What will happen to our solar system if the sun were to suddenly disappear?
- (2) Suppose you want to give your address to a friend you have on the planet Mars. How will you write your address if you want them to understand exactly where you live?

3. In the picture below, correct the sequence of the planets from the sun.

4. Who am I ?

- (a) You can see me from the earth but the lighted part of me that you see changes every day.
- (b) I have my own light. It is only from me that the planets get light and heat.
- (c) I turn around myself, around a planet and also around a star.
- (d) I turn around myself and revolve around the sun.
- (e) No other planet has a living world like mine.
- (f) I am the nearest star to the earth.

5. (a) For what purpose are rockets used in space travel ?
- (b) What information do man-made satellites provide ?



Activities (1) Make charts about space research and display them in an exhibition.
(2) Find out which planets in the solar system have satellites.