1 SKY VISION

The planet on which we live is called Earth. During daytime, we see the sun in the sky. Come; let us see if there is anything else other than the sun in the sky.

1.1 WHAT IS THERE IN THE SKY?

Look at the dark sky at night when there is no cloud. You will see a large number of stars. Some of which are very bright and some are less. Some are big and some are small. The interesting point is this, that these small stars are actually quite bigger than our earth and some of them are even many times bigger than the sun. Now the question is –why do these stars appear so small to us? Let us see.

ACTIVITY -1

Take two footballs of the same size. Go to the playground and place these balls at least 50—80 metres apart. Now move away to about 30 metres and look at the balls in such a way that the two balls and you are in a straight line. Now note the size of the balls. Are the size of the two balls same? When the things are far away from us, they appear smaller to us. Now you must have understood why the stars which are big in size appear so small to us.

If you observe minutely, you will see some objects other than the stars. They do not twinkle like the stars. These are the planets, which like our earth, revolve round the sun. Some times for a moment a line of bright light can be seen in the sky. Actually, they are burning meteors. In this way our earth and the other planets, the sun and the moon, meteors etc. together form the Milky Way. Let us know some more about them.

1.2 STARS AND THE STAR WORLD

The stars are the most attractive of all the objects in the sky. These are such objects, which emit light and energy continuously. Sun is the nearest star to earth. It

is because of the Sun's light, that the other stars are not visible in the sky. Most of the stars are so far away that it takes lakhs of years for their light to reach earth. Distance of stars are indicated in light years.

The distance travelled by light in a year at the speed of three lakh kilometres per second is known as one light year. Therefore, light year is a unit of distance. It equals 365 × 24 × 60 × 60 × 300000 kilometres that is 9460000000000 or 9.46 × 10^{12}kilometres.

The Sun is about 15, 00, 00,000 km (15 crores or 1.5x10^{8} km) away from the Earth. It takes about 8.3 minutes for the sunlight to reach earth so we can say that the Sun is 8.3 light minutes away. After Sun, the nearest star to the Earth is Alpha Centuari, which is about 4.3 light year away. The brightest star 'Sirius' is about 8.7 light year away. We can see countless stars in the sky. If you look carefully, you could see a band of stars from north to south. It is the Milky Way. There are many such constellations of stars or galaxies in the universe. Our Milky Way is one among the lakhs of galaxies present in the universe. Our solar system is situated in this Milky Way.

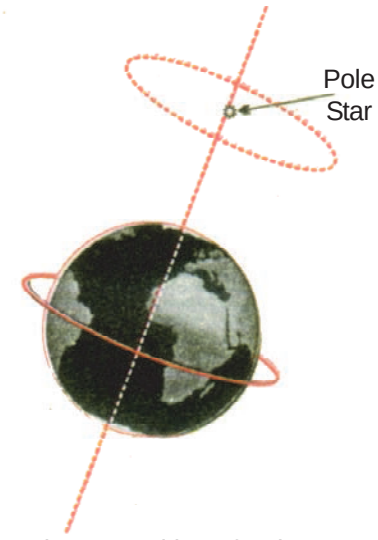

Fig 1.1 Position of Pole Star

Sun as well as all the stars are revolving with great speed around one or the other heavenly bodies. Because of the distance, we are not able to know the changes between these stars.

We know that our earth is rotating round its axis from west to east but we find the stars moving from east to west. One star, which is in the north, appears motionless. We know it by the name of Pole Star (Dhruvtara). The Pole Star has been used to know the direction for a long time. (fig 1.1)

If we observe, we can find some star groups forming some shapes. The group of stars is called constellations. All the stars of a constellation always remain together. So the shape of the constellation

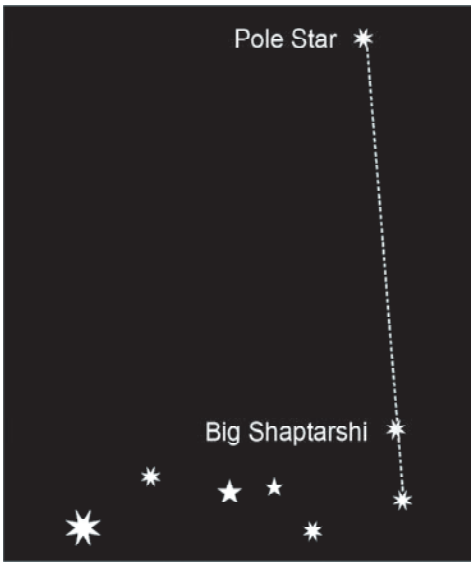

Fig 1.2 Big saptarishi

also remains the same. Our ancestors have named them according to the shapes they form, as-Big Saptarishi;Ursa Major (the great bear); Laghu Saptarishi or little bear; Ursa Minor and Orion.

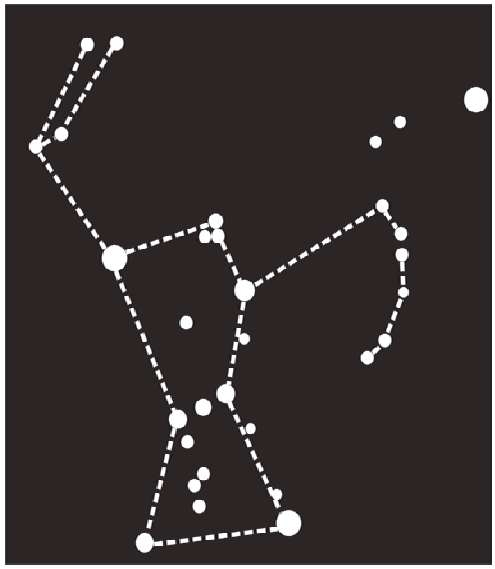

Fig 1.3 Orion/Hunter or Kalpurush

The constellation, which can be easily recognized, is the Big Saptarishi. It is also called the Big Dipper. This constellation has many stars, out of which seven brightest stars form the shape of a question mark or *saucepan.* (fig 1.2)

Out of the seven stars three are on the handle of the *saucepan* and the other four are in the *pan*. Two stars on the top of the *saucepan* are called the Indicating Stars. The line joining them, points to the Pole Star. In the Small Saptarishi all seven stars are brighter. The Pole Star is situated at the top of the handle here, therefore some times it is also called as "Dhruva Matsya".

Orion is also one of the main constellations seen in the sky, which has more bright shining stars than other constellations. The shape of this constellation is of a Hunter so it is also called the *Kal Purush.* (fig 1.3)

Try to recognize these constellations and try to find the position of the Pole Star.

NOW ANSWER THESE

1. Some stars which are bigger than the Sun, appear smaller to us .Why?
2. One star is 3.4 light years away from the Earth. What does this mean?
3. How would you find the star, which appears to be in the north?

1.3 THERE ARE ONLY EIGHT PLANETS NOT NINE

Planets are heavenly bodies that revolve round the Sun .Like a star they do not emit their own light. However, they reflect the sunlight, which falls on them and so they are as bright as a star.

Ancient astronomers already discovered Mercury, Venus, Earth, Mars, Jupiter and Saturn, as they were visible to the naked eyes. Uranus, Neptune, and Pluto were discovered after the discovery of the telescope. In this way, it was

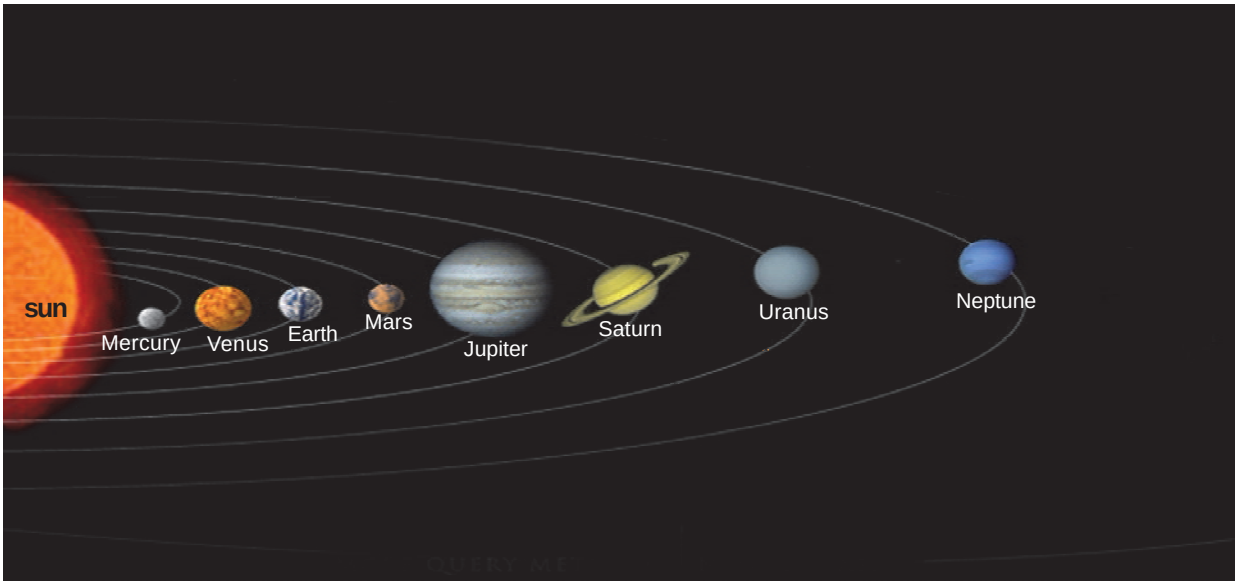

Fig 1.4 Solar System

believed that Sun has nine planets. Each planet revolved round the Sun in a fixed orbit (fig-1.4). Now after 76 years after its discovery, Pluto due to some controversies is not considered a planet. So now, there are only eight planets.

Some planets have satellites. Satellites are heavenly bodies, which move around some other heavenly body. Moon is the natural satellite of the Earth. Jupiter, Saturn are the planets which have more than one natural satellites. Come let us know more about the planets.

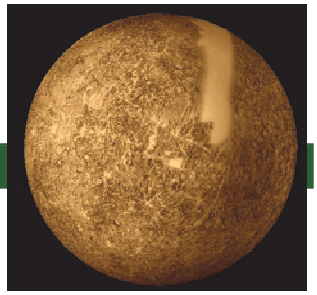

Fig 1.5 Mercury

1.3.1 MERCURY

It is the nearest planet to the Sun. Usually it cannot be seen due to the sunlight. It is the hottest planet as it is near to the Sun .Most of its properties resembles to that of the Moon, as its diametre and the mass. Like the Moon it also does not have any atmosphere and it is rocky and mountainous (fig-1.5). It does not have any known satellite.

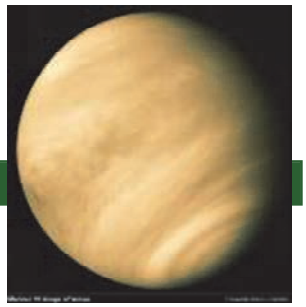

Fig 1.6 Venus

1.3.2 VENUS

It is the second planet from the Sun in distance. It is the brightest of all the heavenly bodies seen by us. Its brightness is due to the thick clouds in its atmosphere, which reflects back about three fourths of the sunlight received by it. It can be seen as a bright star at the horizon just before sunrise and just after sunset. Even though it is not a star, due to its brightness it is called the 'Morning Star' or the 'Evening Star'. Its volume is about

4/5 of that of the Earth even when its diametre is nearly same. Venus does not have any satellite (fig. 1.6).

1.3.3 EARTH

Fig 1.7 Earth

As per the distance from the Sun the Earth is in third position(fig-1.7). No other planet is known to have life other than the Earth. The Earth revolves round the Sun in 365.26 days. It takes 24 hours to rotate round its axis. Days and nights are formed due to this rotation. Earth is inclined on its axis due to which there are changes in seasons. Earth has one natural satellite–the Moon. The Moon revolves round the Earth and along with the Earth, it revolves round the Sun also. It reflects the sunlight which falls on it, thus, we can see only that part of the Moon which faces us.

1.3.4 MARS

Fig 1.8 Mars

Mars is the next in position from the distance to Sun.It appears red in colour (fig-1.8). So it is also known as the red planet. It can be seen mostly every day through out the year from the Earth. Its radius is a little bigger than half the radius of Earth but its volume is 1/9 of the Earth's volume. There is no strong evidence of the presence of water and life on this planet. But astronomers are researching about it. Mars has two natural satellites.

1.3.5 JUPITER

Fig 1.9 Jupiter

Jupiter is the biggest of the planets (fig-1.9). Its volume is more than the total volume of all the other planets.Its distance from the Sun is more than the sum total of the distances of the earlier four planets.The amount of light and energy reaching this planet is less than the amount reaching Earth and Mars.But this planet is brighter than other planets except Venus and sometimes Mars. This is because of its dense atmosphere which reflects most of the light it receives. Jupiter has 28 known natural satellites.

Fig 1.10 Saturn

1.3.6 SATURN

This the sixth planet from the Sun. Its distance from the Sun is about twice the distance of Jupiter (fig-1.10).Its volume and nature is same as Jupiter but it is colder than Jupiter. Because of the three rings around it,it looks more beautiful than the other planets. These rings can be seen with the help of a telescope. Saturn has 30 known satellites.

1.3.7 URANUS

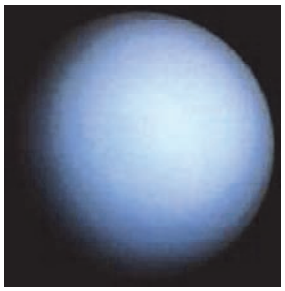

Fig 1.11 Uranus

This is the first planet discovered with the help of telescope(fig-1.11). Its distance from the Sun is twice the distance of the Saturn from the Sun.It has 21 known satellites.

1.3.8 NEPTUNE

Fig 1.12 Neptune

This is the eightth planet from the Sun. It has eight satellites. Because of being far away from the Sun, it is the coldest planet.

PLUTO: WHY IS IT NOT A PLANET?

Compared to the planets this object is farthest (about 39.5 times more than the distance of the earth from the Sun) and is the smallest in size. The light from the Sun reach here in 32 hours.For many years there had been discussions on Pluto being a planet.On 24th August 2006 at the meeting of the International Union of Astronomy (Czechoslovakiya)the definition of a planet was determined. And according to it, planet is that object :-

1. Which revolves round the Sun.
2. Which has that much volume that it takes a spherical shape due to gravity.
3. Which has a clear orbital.
4. There are no other heavenly bodies in the orbital.

Now the question arises,why Pluto is not a planet?

Pluto revolves round the Sun ,but being very small and having less volume, it is not perfectly round. Moving in an elliptical orbit , it cuts Neptune's orbital and enters inside it. Apart from this, all the other planets revolve round the Sun in the same plain, but Pluto makes an angle of 17°. Because of all these Pluto has been placed outside the group of planets. It is known as a psuedo planet.

NOW ANSWER THESE

Recognize the planet according to the information given:-

a) The biggest planet.

b) The planet which has life.

c) The brightest planet.

d) The red planet.

e) The first planet discovered with the telescope.

f) The planet with three rings.

g) The planet with eight satellites.

You know that there are some other heavenly bodies other than the Sun and the planets in the Solar System. Let's know about these bodies.

1.4 ASTEROIDS

These are small bodies which revolve round the Sun in an orbit between Mars and Jupiter. Asteroid is said to be that parts of matter which could not take the shape of a planet due to some reason.

1.5 COMETS (DHUMKETU)

Comets are small heavenly bodies which revolve round the Sun.We can see them only when they are very near to the Sun. Its characterstic feature is small bright head with a long tail. The tail of the comet always points away from the Sun. Usually the comet is seen after a fixed

Fig 1.13 Comet

interval of time . Hailey's Comet is one such comet which appears after 76 years. Last time it was seen in 1986 (fig- 1.13).

1.6 METEORS AND METEORITES

Sometimes during dark nights you may see bright lines of light in the sky. Some call these as 'shooting star' or 'falling star'. But they are not stars,they are meteors. Meteors are small heavenly bodies that revolve round the Sun. When these bodies enter the earth's atmosphere at very high speed ,they burn up due to friction and they appear as bright lights in the sky. Some meteors do not burn up completely in the atmosphere and some part of it falls on the earth without burning. These un-burned bodies are called meteorites.

As we know all the eight planets and satellites revolve on their own path without obstructing the others around the sun in a disciplined manner.

Do we also behave in the same manner ? Are we maintaining the peace and integrity in our society ?

Let us give a thought on how to maintain a harmonious relationship with our fellow being in the society.

NOW ANSWER THESE

1. Give short notes on:-
   a. Those heavenly bodies that could not take the shape of a planet.
   b. Those heavenly bodies which have a long shining tail.
2. Give the difference between meteors and meteorites.

WE HAVE LEARNT

- Stars are such heavenly bodies which emit light and energy of its own.
- The distance between the heavenly bodies are measured in light years.
- Constellations are the group of stars which tends to form a particular shape.
- Planets are those heavenly bodies which revolve round the Sun.

- Satellites are those heavenly bodies which revolve round any of the planets.
- Solar System is made up of Sun ,planets, its satellites, asteroids, comets, meteors and meteorites.
- The planets revolving round the Sun are Mercury, Venus,Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

QUESTIONS FOR PRACTICE

1. Fill in the blanks.

a) Group of stars forming a particular shape is called _____.

b) The heavenly body which revolve round any planet is called _____.

c) _____ is the coldest planet.

d) The _____ star seems to be fixed at the north direction.

e) The shape of the _____ constellation is like a hunter.

2. Choose the correct alternative.

1. The planet closest to the Sun is :-

   (a) Venus (b) Mercury (c) Jupiter (d) Earth

2. Asteroids are found in between these planets:-

   (a) Mars and Jupiter (b) Saturn and Jupiter

   (c) Venus and Jupiter (d) Earth and Mars

3. This planet doesnot have any natural satellite:-

   (a) Mars (b) Uranus (c) Mercury (d) Neptune

4. This is not a member of the solar system:-

   (a) asteroids (b) planets (c) satellites (d) constellations

5. This is not a constellation:-

   (a) Ursa Major (b) Ursa Minor (c) Orion (d) Hailey

3. Answer the following questions:-

1. Why do we find the Sun to be the biggest and the brightest star?
2. Why does the Pole Star appear to be stationary?
3. Draw diagrams of the positions of different stars in Ursa Major and Orion.
4. Venus is not the nearest planet to the Sun .Then why is it the brightest?
5. How will you recognise the Pole Star?
6. Write the names of the planets as per their increasing distance from the Sun.
7. Spell out differences between a planet and a star ?

TRY TO DO THESE ALSO

1. Observe the sky regularly and try to recognise these heavenly bodies.
   a. Venus (brightest)
   b. Mars (red)
   c. Jupiter (biggest and brightest)
   d. Saturn (yellow)
   e. Saptarishi and Pole Star
2. Collect interesting articles about heavenly bodies from newspapers and magazines and paste them in your scrap book.