9 The Earth : Our Habitat

W6G1K2

Wherever we live, that place is our village and home. All this is on top of what ? Such question arises in all of our minds. Answer is very simple that my home and my village is on earth. Thus, earth is called our huge home. Which is very huge, isn't it ?

So, let's know about our huge village. You also want to know this, which is natural. You know that our earth is a member of solar family. Again, what is this solar family ? Let me give you information regarding solar system.

Solar System

Our sun is the self-illuminated star of Mandakini galaxy (milky way). It is surounded by many small and big stars. Earth is one such ball. All these are recognised as planets. Due to gravitational force of sun and gravitational force of the planet all these planets rotate around the sun in a circular form. These planets do not have light of their own, they are illuminated by the light of the sun. These planets of solar system are of different sizes and forms. All these planets together make solar family or solar system.

Thus planets, satellites, small planets, comets and meteors are included in our solar system. So let's get aquainted with this solar system. At first let's know the sun as the key member of the solar system.

Sun :

We are familiar with the sun. Our daily work begins with the sunrise. Sun is the honoured star. It is considered as the giver of life on earth. The sun is about 13 million times larger than Earth. If you want to make a revolution around sun, you sit in a plane running at a velocity of 1000 kms, it will take 107 years to complete the revolution. Gravitational force of sun is 28 times more than that of earth. Hence the weight of a substance on earth weighs 1 kg on earth, it would weigh 28 kg on the surface of sun. It is because of this gravitational force only that the planets are in their particular path and revolve on it. The earth is about 15 kms away from sun. It takes about quarter past 8 minutes for sunlight to reach the surface of earth.

The surface of sun is always unstable. It includes several kms long igniting fire-flares. The sun's core is made up of hydrogen gas. It produces light and heat from the action of Hydrogen and Helium in air, which we call 'energy'. So the surface of sun is very hot. It is because of sun's energy that organisms have developed on earth. Thus, the sun is also known as the 'gaurdian of organisms'.

Now let us briefly introduce planets. There are total eight planets in solar family. Among which Mercury, Venus, Earth, Mars are inner planets while Jupiter, Saturn, Uranus, Neptune are outer planets. The planets of Mars, Mercury, Jupiter, Venus and Saturn can be seen with the naked eyes.

(1) **Mercury :** This planet is closest to the sun. It is yellowish in colour. Mercury doesn't have atmosphere or satellite. From the earth, we see Mercury in the sky for sometime before sunrise and after sunset.

(2) **Venus :** It is most dazzling planet in the solar family. In size and weight, it is like earth, like twin brother of earth ! It resembles the moon in shine. It doesnot have a satellite. Due to thick cover of gases and clouds around it, less knowledge is there about it.

(3) **Earth :** Earth is located between Venus and Mars. Earth completes one rotation around the sun on it's axis in 24 hours. While the earth completes one revolution around the sun in 365 days. Events such as day and night and the change of seasons can only be seen here. Earth has one satellite 'Moon'.

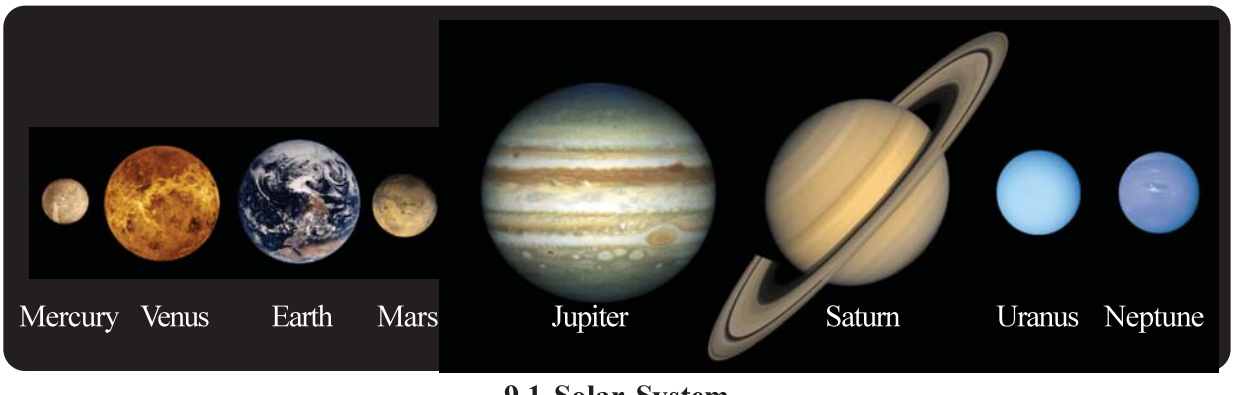
Moon : It is the only satellite of earth. It takes about 27.3 days to complete it's rotation on it's axis around sun. There is no atmosphere on the moon. There is no life on it, as there is no water and atmosphere above the moon. It is a non-luminous body. It is illuminated by the sun. Due to falling of meteorites on the surface of the moon, large pits have formed. Extinct (Dead) volcanoes are found here.

(4) **Mars :** It is beautiful red coloured illuminated planet. Atmosphere of Mars is lighter. As per seasons more cold and heat is there on Mars. It has two satellites. Scientists are trying to develop organisms on Mars.

(5) **Jupiter :** Jupiter is light yellowish white planet. Jupiter has gaseous atmosphere around it. This planet is believed to be very cold. It is the largest planet of solar system. It has 79 satellites. In this also scientists have different opinions. This huge planet can be seen with the help of binoculars. While watching through binoculars droplets can be seen on the surface which looks beautiful.

(6) **Saturn :** In the solar family, It is located between Jupiter and Uranus. It is the second largest planet after Jupiter. It looks beautiful with bright rings of blue colour. It looks different because of rings. These rings look like a turban worn on the head. Saturn is also called 'Turban Planet'. Saturn has more than 62 satellites. The surface temperature of Saturn is quite low because of it's distance from the Sun.

(7) **Uranus :** It is so far away from the earth that it could not be seen with the help of ordinary binoculars. The light of sun is also like light moonlight. An astronomer named William Herschel discovered the planet in 1781. This planet is very cold.



9.1 Solar System

(8) **Neptune :** This planet is blue in colour. It's atmosphere contains a toxic gas called Methane. Seasonal variation is observed on this planet like earth.

Do you remember the names of the planets according to their location ?

Then speak this only.

My Very Excellent Mother Just Served Us Noodles

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune

Meteors : Sometimes it appears that star is falling from the sky at night. Actually stars do not fall. Small pieces of stones/rocks moving in the sky or small parts of planets are called meteors. These meteors are quickly drawn towards earth because of gravitational force. As soon as it enters atmosphere it gets ignited due to friction. At this time a bright line is seen in the sky, for which we say that star is falling. Some of meteors which are not burnt fully cause huge cracks in the earth. Koyana Lake of Maharashtra is believed to be composed due to falling of such meteorites. In Saurashtra near Dhajala, a meteorite had fallen which weighted 40 kgs.

Constellations : In wider sense any set of stars or even a single star is called "Constellation". Some of the constellations have specific shape because of the mass of stars. It sometimes looks like a goose and sometimes like an eagle. There are total 27 constellations like Ashwini, Revti, Vishakha, Punarvasu, Orion, Rohini, Pushya, Arya, Swati etc. Two or three constillations surround the moon for which we have to look at sky continuously. Remembering the names of constellations is not easy, but they can be easily memorized by repeated viewing and understanding. Some names are remembered as they are associated with auspicious work like, at the time of Pushya constellation gold and silver is purchased.

This is information about our solar family or solar system. You still have to learn a lot about your home i.e. Earth. So, Let's begin.

Activity

- Draw sun in your notebook, anywhere you like. Starting from there make solar system and write about solar system.

Location and Shape of Earth

We see the sun and the moon shaking. How good it looks ! Our earth is also such a sphere only. It is spherical. It is flat at both the poles. Some astronauts have gone upto the moon. They have taken earth's photographs from there. From moon earth looks like a giant sphere.

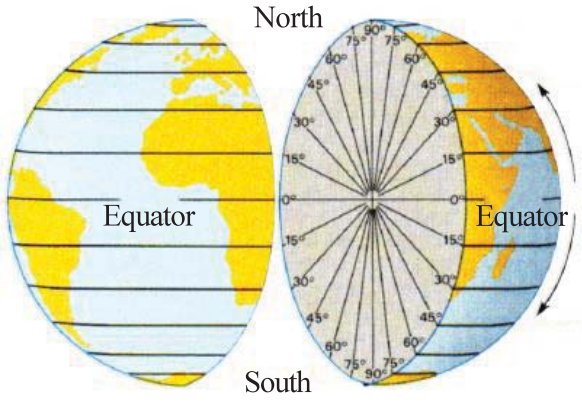
We are living in a small village or city. The part of earth which we are able to see is a very small part of earth. Thus, it can not be said by us, that earth is spherical. Have you ever seen broken earthen pot ? If you take a small piece of it in your hand, you can not imagine that it would have been round. Thus, looking at a small part of the earth does not tell us that the whole earth is spherical. But now with the help of photographs taken from moon and space, we can say that there is no doubt about the earth's shape.

Earth is not round like a ball but it is like an orange. The earth's poles are slightly flat and is slightly inflated at equator. The centre of the earth is larger than the polar circle. We can know the volume and weight of the earth. In order to study about earth, it is used as a circular device. A map of the world is drawn on it. Continents, oceans and important lines are drawn on it. The globe is a small replica of the Earth. On the circle of earth you can show North pole and south pole. With the help of globe it can be said that earth is tilted towards one side.

9.2 Picture of Earth from Satellite

Pole Star : There is a star in the sky which always appears in the same direction and at the same place. Then, how to recognize the star ? The polar star can easily be detected with the help of constellation Saptrishi. You will see a bright star while moving in the direction of the fabulous line connecting the two stars in front of Saptrishi, that's the Polar star. People who travel by sea or who travel in desert can easily find Polar star. The direction in which the star appears is North. It is visible only in Northern Hemisphere. Due to it's stability and nearly circular shape of the earth, it can not be seen from the Southern Hemisphere.

9.3 Globe of Earth



9.4 latitude and longitude

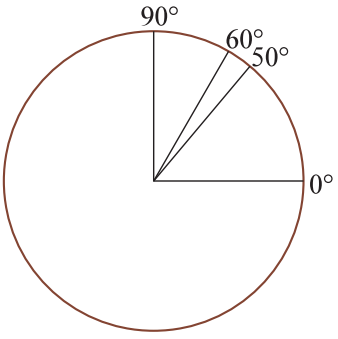
Latitude-Longitude : There are vertical and horizontal imaginary lines on the Earth's surface. With the help of these imaginary lines exact time and location can be known. These lines are not there on the earth's surface. These lines can only be seen on the map.

Latitude : The horizontal imaginary lines drawn on the Earth's surface are called latitudes. If any point on the surface of the earth is connected by a straight line to the center of the earth, then the line becomes latitude of the point as far as the angle of the centre is along the equator. The total number of latitudes are 181.

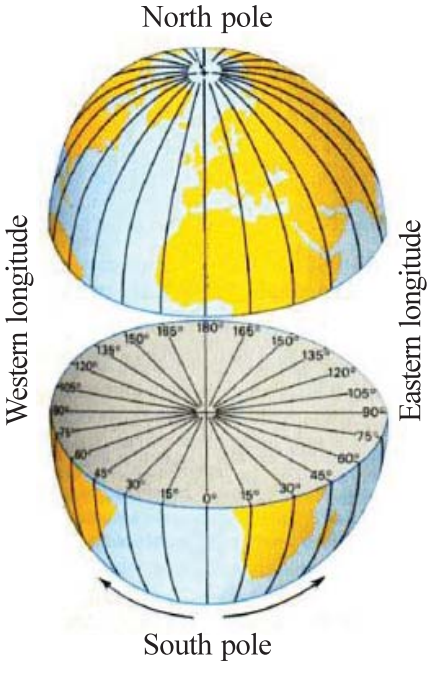
Know it

- The distance between two latitudes is actually 111 kms. on ground.

Latitudinal Line : The east-west circle connecting the places found on the earth in the Northern or Southern Hemisphere at a equal distance from equator are called latitudinal lines.



9.5 Circle and Corners



9.6 Longitude

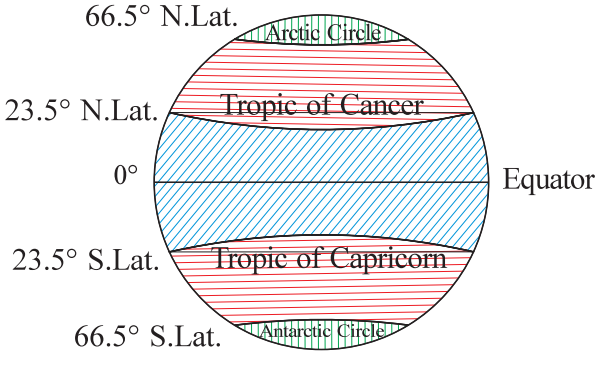
Longitudes : The vertical imaginary lines drawn on the surface of the earth are called longitudes. The longitudes meet each other at the poles. These lines come closer to each other while going towards poles. There are total 360 longitudes, among which 0° longitude and 180° longitude are important.

Liner Circle : The North-South straight line connecting the imaginary surface of the original linear to the Earth's axis at the same angular distance along the Earth's surface is called linear circle. (Semicircle)

Activity

- Draw a circle in your note-book showing 23.5° North and South latitude and write their names. Along with it also show 0° latitude and it's name.

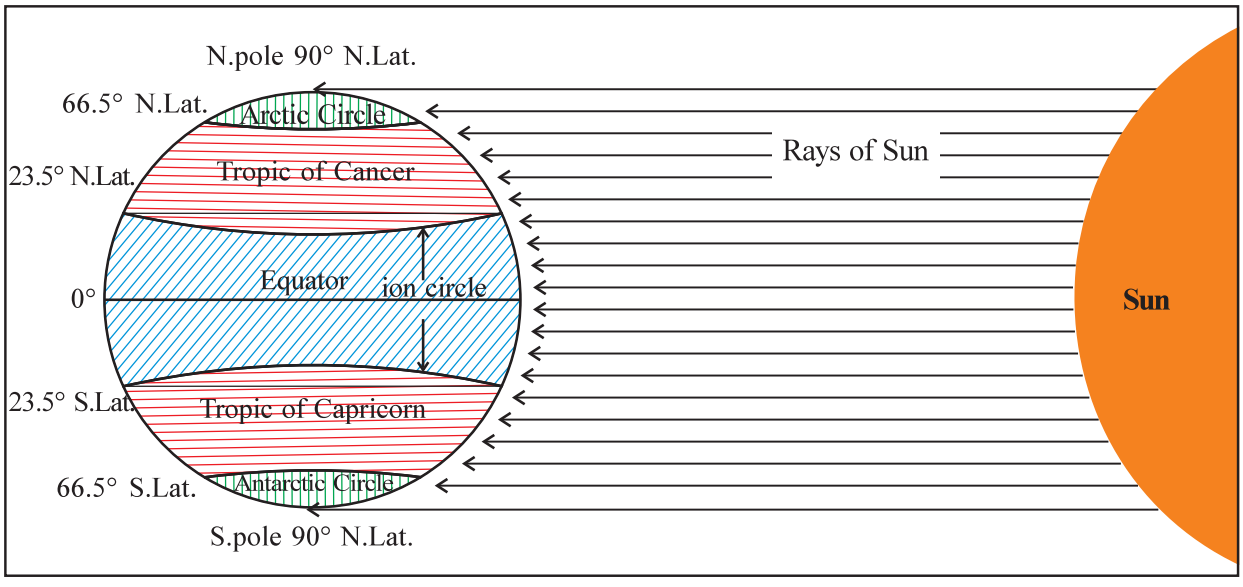
Notice that there is a horizontal line drawn in the center of the earth's surface, it is equator. The equator divides earth into two equal parts. The portion above equator is called Northern Hemisphere and the portion towards the south of equator is called Southern Hemisphere. Thus, latitudes in it's North are called Northern latitudes and those towards South are called Southern Latitudes. 23.5° N. latitude in the Northern Hemisphere is called Tropic of Cancer, while 23.5° S latitude in the Southern Hemisphere is called Tropic of Capricorn. Similarly 66.5° latitude in the North of equator is called Arctic circle and 66.5° latitude in the South of equator is called Antarctic circle. The speed of the sun between Tropic Of Cancer in the north and Tropic of Capricorn in the South of equator is called Solctice. Therefore, the circles between these are called solctices. It takes six months for this speed of the sun. Earth is titled the at corner at 23.5°. Thus, sunrays fall almost straight between Tropic of Cancer and Tropic of Capricorn.



9.7 Main latitudes

Know it

- In 23.5°, 23 is read as degree and 0.5 is read as minute.



9.8 Ion circle

Activity

- Draw 23.5° North latitude. Similarly draw 23.5° south latitude. Now with the help of globe find out that both these latitudes pass through which countries. Write it in your note-book.

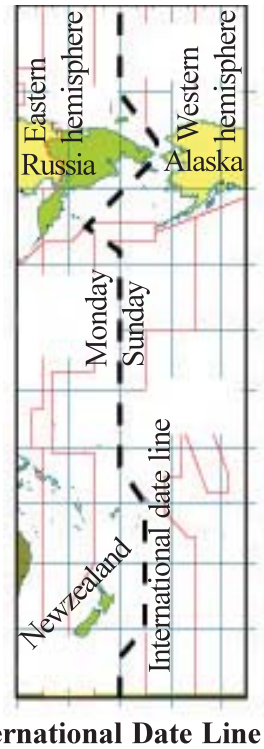
GPS (Global Positioning System)

With the help of Global positioning system we come to know the latitudinal and longitudinal location of any place through mobile phones and Google Earth. The latitudinal and longitudinal location of any place may be found with the help of mobiles which have internet access. Today latitudes-longitudes can easily be understood with this.

Major Longitudes

(1) Greenwitch Mean Time (GMT) line : The 0° longitude which passes through Greenwich city of England is called Greenwich line. Greenwich line divides earth into two equal parts from east to west which is known as Eastern Hemisphere and Western Hemisphere. The longitudes upto 180° E of Greenwich line are called eastern longitudes and the longitudes upto 180° W of Greenwich line are called western longitudes.

(2) International Date Line : 180° longitude is called international date line. It is just one longitude. The date and time changes when we cross this line it passes through the Pacific Ocean. It is exactly not at 180° at some places, it is in zigzag form. The reason behind it is that if it is drawn straight, it will cross some islands or the some countries because of which two dates will mix up on the same island. In some places, while going to other side of an island date may change, which will create confusion. To prevent this confusion, the line is deviated roughly. To

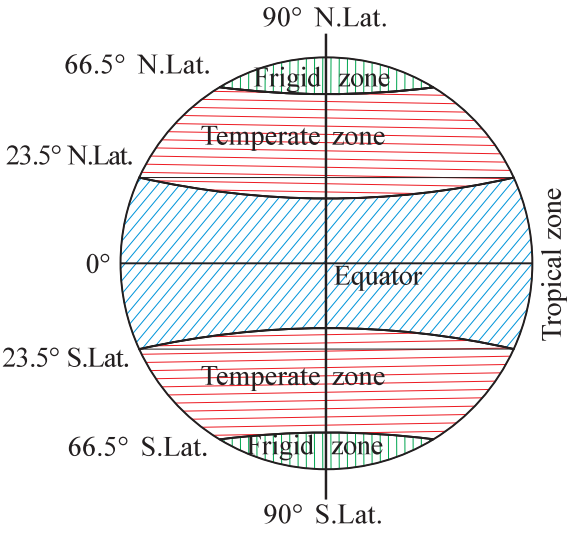


9.9 International Date Line

avoid any confusion of date, this line is drawn through the sea and not the land.

Tropics (Zone)

From the given figure 9.10, it becomes clear that earth is divided in different parts on the basis of difference in temperature, light, heat and cold. These parts are called zones. Regions receiving more or less light and heat have been divided as follows :



9.10 Tropics (Zones)

Zones

Torrid Zone [Tropical Zone]	Temperate Zone	Frigid Zone [Polar Zone]
Excessive heat	Moderate heat-cold	Excessive cold

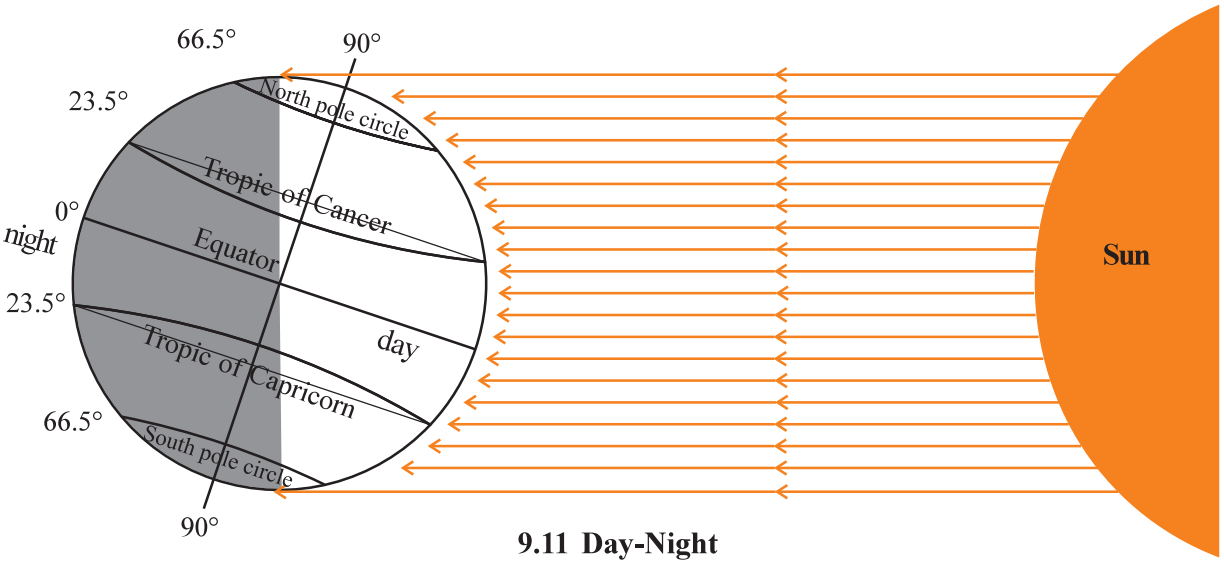
Types of Motions of the Earth : Like other planets, there are two types of motions of earth also.

(1) Rotation : As the top rotates on it's axis, in the same way earth also rotates on it's axis, from west to east direction. This circular motion of earth is called daily motion. It is also called rotation. The Earth completes a cycle of 1670 kms per hour on equator. It takes 24 hours to complete this cycle. This speed has played an important role in shaping the earth's orange shape.

(2) Revolution : The earth revolves around the sun as it rotates on it's axis. It takes about 365 days for the earth to complete it's revolution. We call this period as a year. An imaginary way to Earth's rotation around the sun, in the space has been determined which is known as orbit. Along with this, the earth do not move in circular path rather it moves in elliptical orbit. Distance between sun and earth is not same throughout the year. The earth rotates on it's axis by making an angle of 23.5° on it's axis and 66.5° along it's orbit. Due to this movement of earth, the seasons occur and day and night are extended and shorterned.

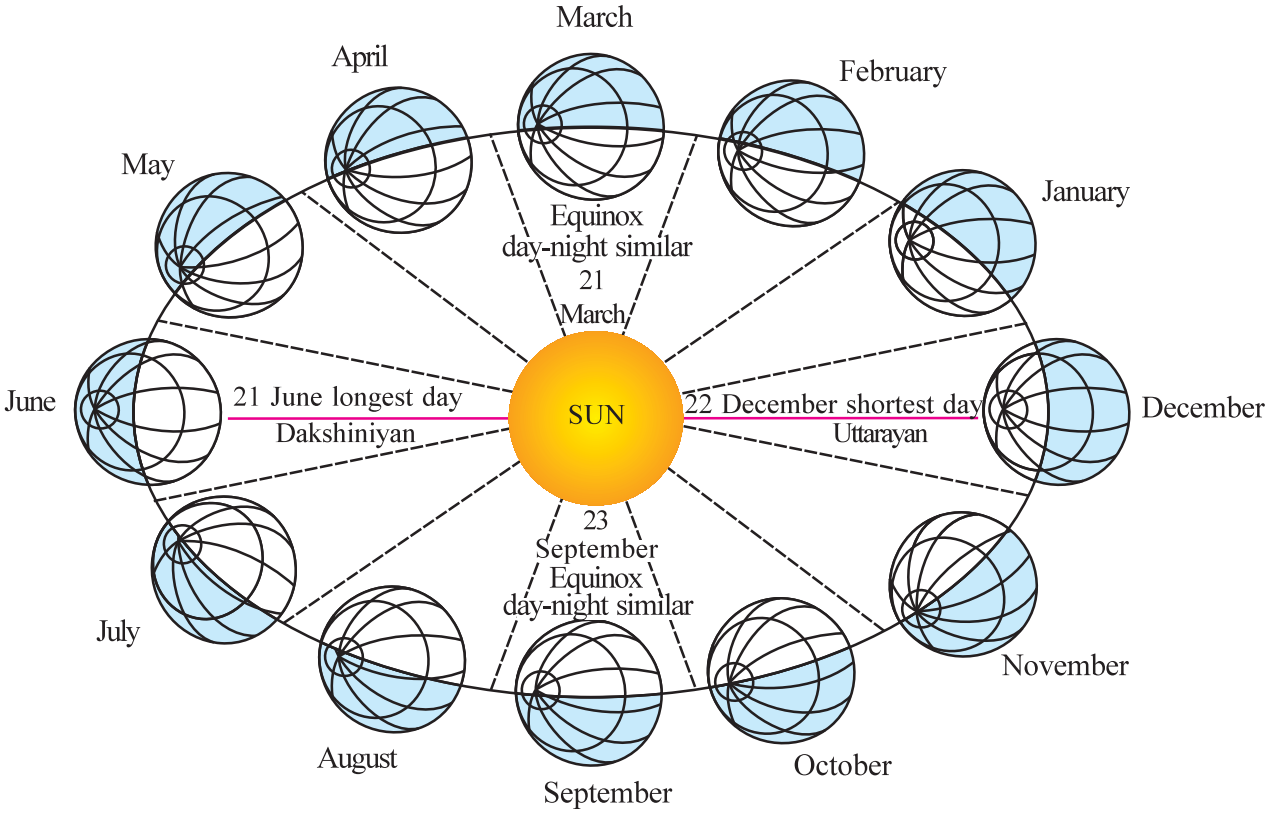
Day And Night : Due to daily motion of the earth, day and night occur. As the earth is tilted and rotates on it's own axis, the sun shines only on half of it and the other half is dark. If earth would not have rotated then on one side only light would have been there while on the other side it would have remained dark. But it isn't so. Thus, every part of earth experiences light from darkness and darkness

from light in every 24 hours. Because of it every part of earth experiences morning, afternoon and evening. As the earth is tilted on it's axis, we find difference in the length of day and night.



9.11 Day-Night

Sun-rays fall directly on Tropic of Cancer on 21st June and on Tropic of Capricorn on 22nd December. Where the sun's rays fall directly and in the adjacent areas, the days are longer and the nights are shorter. Where the sun rays fall diagonally, the days are short and nights are long. While days and nights are of same length on 21st march and 23rd september.



9.12 Long-short Day-Night [Northern Hemispere]

Activity

- See figure 9.12 and write answers.
  (1) What will be the length of day and night on December 22 ?
  (2) What is the speciality of March 21st and September 23rd ?

Seasons : As the earth is tilted on it's axis, one by one Northern Hemisphere and Southern Hemisphere come in front of sun. The rays of sun fall straight on North or South of Equator. Thus, there is difference in day and night. In the areas where sunshine is for longer time, they experience summer whereas the areas the sunshine is for shorter time they experiences winter. Season directly affects human life.

Activity

- With the help of globe find out which season will be there in following countries when it is summer in India :
  (1) America - _____ (2) Australia - _____ (3) Srilanka - _____
  (4) England - _____ (5) Bhutan - _____ (6) Brazil - _____

Uttarayan : The direct rays of the sun begin to fall towards North of equator. Thus Northern solstice occurs on 22 December. Sun enters Makar rashi on 14 January. So it is called 'Makarsankranti'.

Dakshiniyan : From 22 June, the direct rays of the sun shift from Tropic of Cancer, towards south of equator, it is called Dakshiniyan.

Equinox : Sun and the equator intersect each other twice in a year. This intersection is called equinox. During equinox sun moves towards Northern hemisphere, so from 22 March length of days increases and nights become short. On 21st June longest day and shortest night is experienced in Northern hemisphere. As the sun moves toward Southern hemisphere, from 24th September, length of the days start increasing and nights become shorter. On 22 December, days are longest and nights are shortest in southern Hemisphere. During the year on 21st March and 23rd September sunrays fall straight on equator because of which nights and days are equal. It is called equinoxes.

Leap Year : Since 1 year of Earth is 365 days and six hours, but it is diffcult to calculate one fourth of the day. So we count year as having 365 days. In order to compensate remaining 6 hours, are added to the month of February every four years. i.e. February has 29 days in place of 28 days. We call that year leap year.

Activity

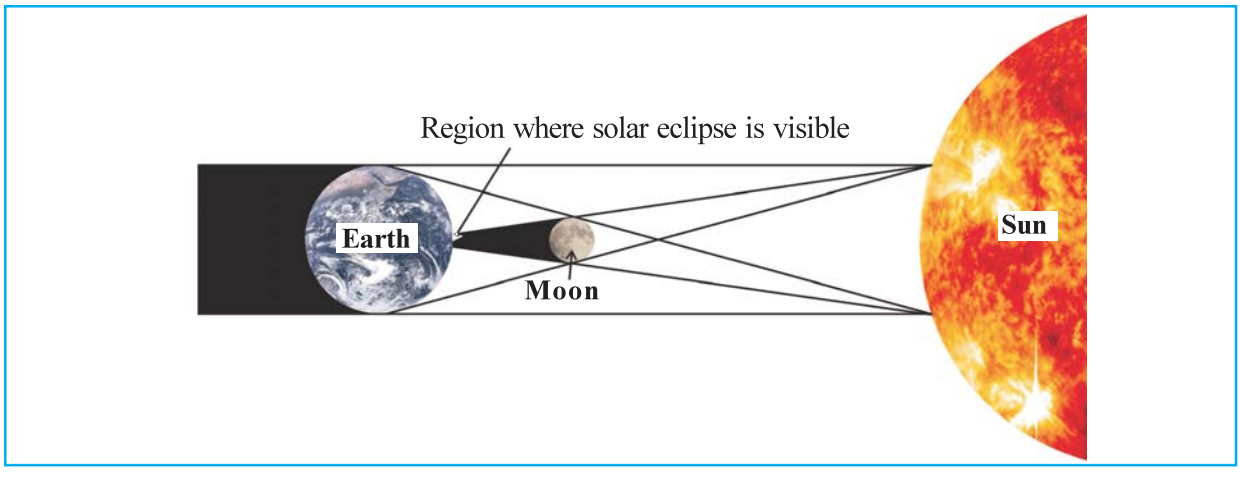
- With the help of your teacher learn the details about, how the leap year is calculated.

Eclipse

We get light from sun and moon. Sun is self-illuminated and shines brightly, while the moon is illuminated with the light of the sun. Illumined part is seen on earth on different days. An occasion when moon or the sun seem to be completely or partialy disappearing, because one of them in passing between the other and the earth, in such situation it is Eclipse.

Solar Eclipse

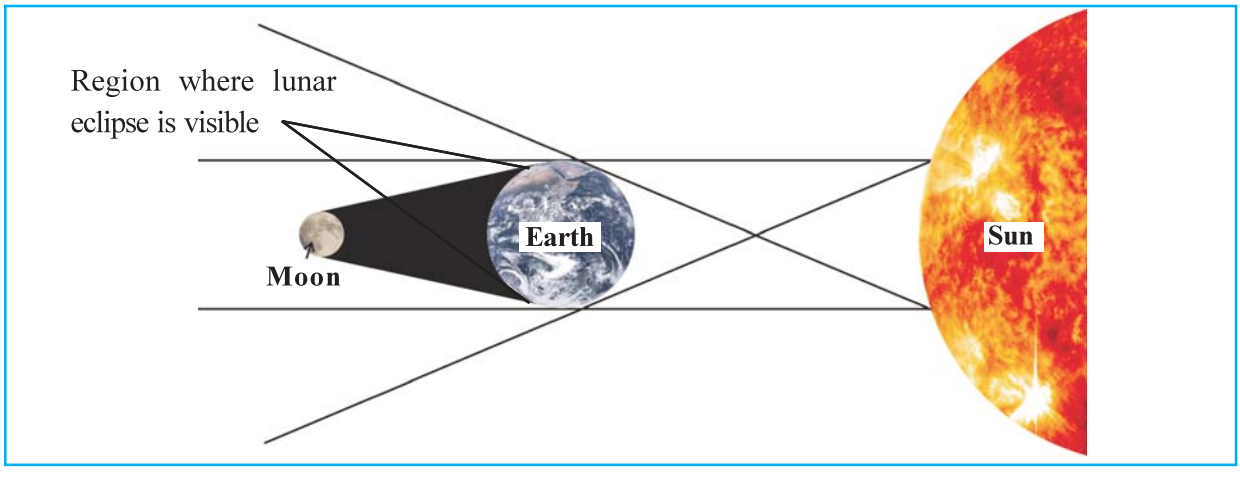
Moon is close to earth, it revolves around the earth. Sometimes while revolving it comes between sun and earth, at this time as the shadow of moon constraints, sun is not visible. This event is called 'Solar Eclipse'. As the moon is very small as compared to sun it can not cover whole sun, thus, solar eclipse can not be seen all over the world together. Solar eclipse occurs on no-moon day but this event doesn't take place on every no-moon day.



9.13 Solar Eclipse

Lunar Eclipse

Moon gets light from the sun. Thus, if the sunrays going towards moon are obstructed by the earth, then that part of moon remains dark. In nutshell, that much part of earth's shadow falls on moon, this part is not visible to us; which is called 'Lunar Eclipse'. Such event occurs on full moon night, but such events do not take place on every full moon night.



9.14 Lunar Eclipse

Know this

- Solar Eclipse occurs on no-moon day, but not on every no moon day.
- Lunar Eclipse occurs on full moon night, but not on every full moon light. Regarding both these subjects gather more information from your teacher.

Activity

- Collect information about myths and beliefs about solar eclipses and lunar eclipses.
- Make a note of what your elders used to do at the time of eclipses.
- Make a note of beliefs prevailing in different countries about eclipses. Critically examine them and discuss them in the classroom.

Exercises

1. Choose the correct alternative and write correct answer :

(1) Which planet is closest to the sun ?

(A) Earth (B) Mercury (C) Venus (D) Neptune

(2) 0° Latitude is known by which name ?

(A) Greenwich (B) Tropic of cancer (C) Equator (D) Tropic of capricorn

(3) Which tropics is located between 23.5° N Latitude and 66.5° N latitude ?

(A) Frigid zone (B) Temperate zone (C) Torrid zone [Tropical] (D) All of these

(4) I make an angle of 23.5° on my axis. Identify me.

(A) Sun (B) Moon (C) Earth (D) Venus

(5) How many times, in a year does the sun intersect equator ?

(A) One (B) Two (C) Three (D) Four

(6) Because of whose obstruction 'Solar Eclipse' is seen on Earth ?

(A) Moon (B) Sun (C) Earth (D) None of these

2. Identify me :

(1) I am called a giant planet also. _____

(2) On crossing me date has to be changed. _____

(3) I am 90° south latitude. _____

(4) I revolve around the earth. _____

(5) If I were not there, the organisms would have died. _____

3. Tell whether the following statements are true or false :

(1) Moon is self-illuminated.

(2) Neptune is a blue coloured planet.

(3) The horizontal lines drawn on the earth are called latitudes.

(4) On 21st June, it is winter on tropic of cancer.

(5) It's very cool on equator.

(6) 90° N latitude is called North pole.

4. Answer the following questions in short :

(1) What is the speed the of the earth ?

(2) Polar star is seen in which direction ?

(3) Which is the brightest planet in solar system ?

(4) By which name is 180° longitude known ?

5. Answer in three or four sentences :

(1) If the earth doesn't rotate on it's axis, what will happen ?

(2) What do you mean by latitude and longitude ?

(3) February month sometimes has 29 days. Explain the staement.

(4) Which planets are known as inner planets ?

(5) What is Uttarayan ?

6. Write short note on the following :

(1) Lunar Eclipse (2) Solar system (3) Tropics [zones] (4) Equinox