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MOTIONS OF THE EARTH

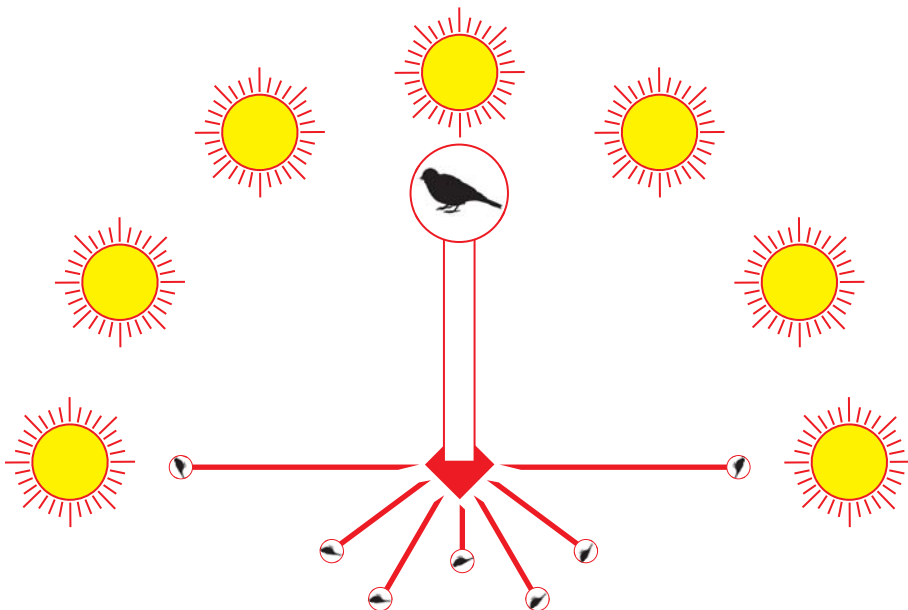
Have you noticed that the toys that you play with such as tops and discs rotate on their own axis? Similarly, our Earth too rotates on its axis. You must have taken a ride in Ferris Wheel in fairs. While the seats rotate around their axis, they also revolve in a circular manner. Like other celestial bodies, the Earth also moves in two ways: rotation and revolution. The Earth rotates on its own axis and also revolves around the Sun. The Moon and Earth are constantly in motion.

**Motions of the Earth**

1. Rotation
(Moving on its axis)
2. Revolution
(Revolving around the Sun)

2.1 A Ferris Wheel in a Fun Fair

Erect a pillar on your school grounds. Note down the details as given in the table.

**2.2 Measurement of a pillar's shadow**

Details	Time	Direction	Length of the shadow
Arrival in School			
During Short Recess			
During Long Recess			
Departure from School			

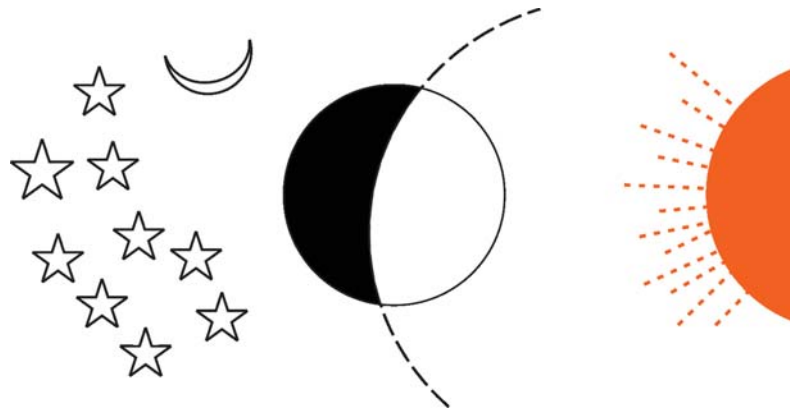
What does rotation of the Earth mean?

As the Earth rotates on its imaginary axis, the speed of rotation, at any point along the equator, is approximately 1670 km/hr. The Earth takes 24 hours to complete one rotation.

Why is the Sun seen only during the day and the moon at night?

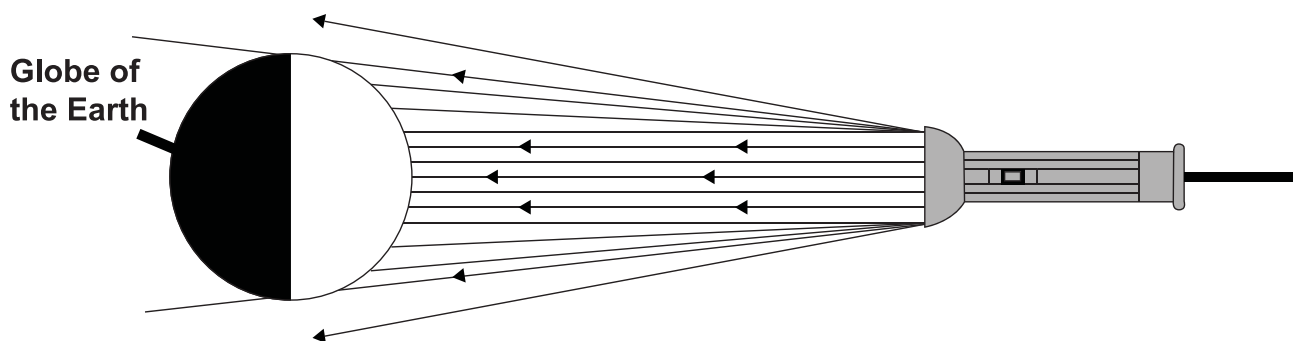
How are day and night caused?

You must probably have thought about such questions.



2.3 Day - Night Activity

- Take a globe and a torch. Shut the doors and windows of the classroom, so that there is darkness. Illuminate the globe with the torch. The part which is lit signifies day while the dark half signifies night.



2.4 Understanding Day-Night with a Torch

If it is day time in India, write whether it would be day or night in the following countries given in the table below :

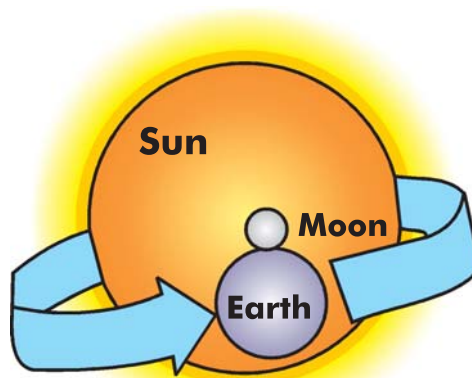
Country	day/night	Country	day/night	Country	day/night
Canada		Mexico		Brazil	
Japan		Australia		S. Africa	

Think

- How does the Earth revolve around the Sun? What is its consequence?

Revolution

The Earth takes 365 days to complete one revolution around the sun. This period is called a year. It revolves, around the Sun, at the speed of approximately 1780 km/hr. The Earth moves continuously on a fixed imaginary path called an 'Orbit'. This orbit of the earth is not round but elliptical (oval). This is the reason why the distance between the Earth and the Sun does not remain the same throughout the year. The Earth revolves around the Sun at the speed of approximately 1780 km/hr.



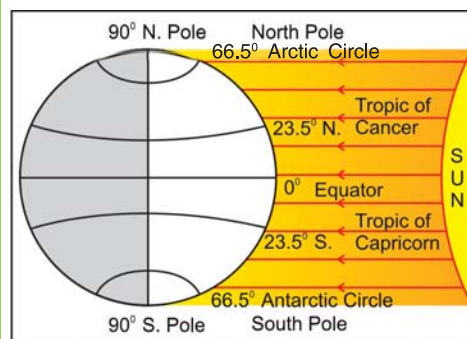
2.5 Revolution of Earth

The Moon revolves around the Earth and the Earth revolves around the Sun. The Earth makes an angle of 23.50° to its axis and 66.50° to its orbit. The tilting of the Earth on its axis causes the varying lengths of day and night and also change in seasons.

Activity

Equal Day-Night: Fill in the table given below with the help of the calendar showing the time of Sunrise and Sunset.

No.	Month	Sunrise	Sunset	Hours and Mins. of the day
1	21 st Mar.			
2	21 st Apr.			
3	21 st May			
4	21 st June			
5	21 st July			
6	21 st Aug.			
7	21 st Sept.			



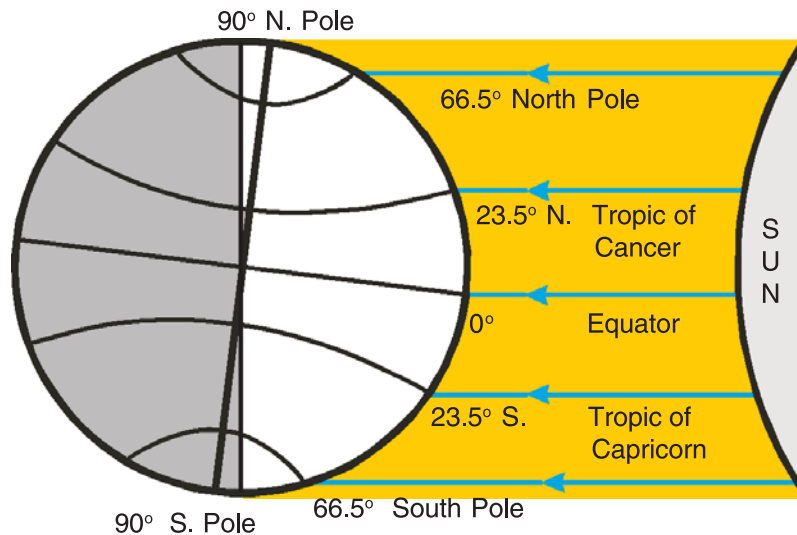
2.6 Equal Day-Night

Things to know

- The line that separates the lighter from the darker half of the earth and joins the two poles is called the 'Circle of Illumination' (Prakash Vartul).

Varying Lengths of Days and Nights

The rays of the Sun fall vertically on the Tropic of Cancer on 21st June and on the Tropic of Capricorn on 22nd December. Wherever the rays fall vertically, days are longer; wherever they are slanting, days are shorter. The two Tropics are in opposite hemispheres.



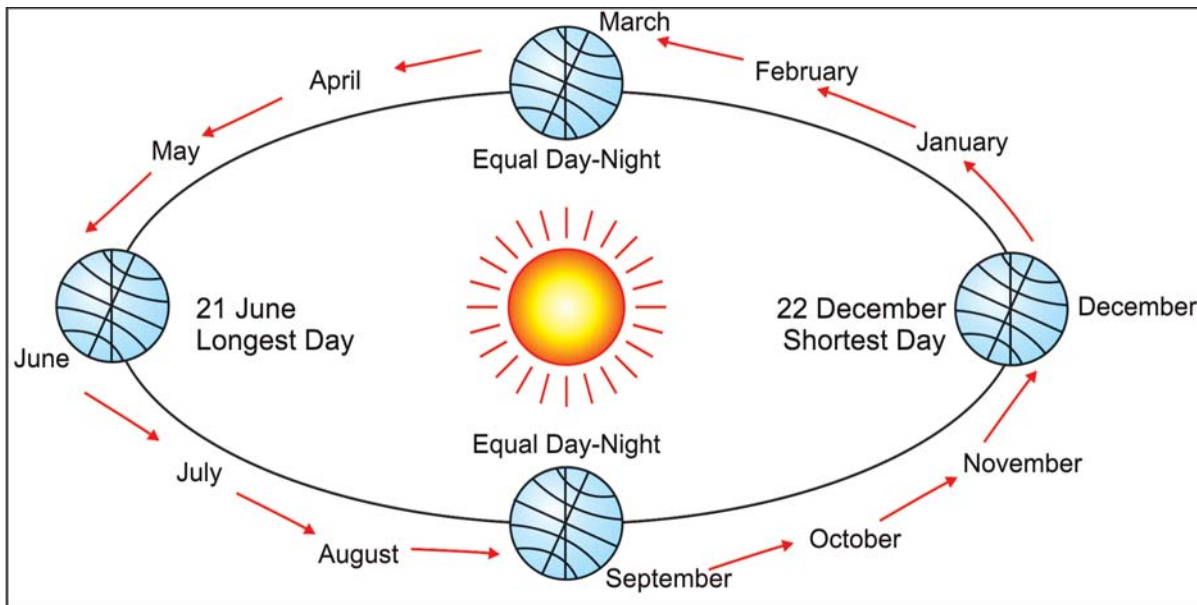
2.7 Varying Lengths of Days and Nights

Thus, seasons in the northern and southern hemispheres are opposite. Look at the diagram and answer the following questions.

- (1) How long would a day be on the Tropic of Cancer on 21st June?
- (2) Which season do the places on the Tropic of Cancer experience?
- (3) What would be the duration of day and night?
- (4) What will occur on the Tropic of Capricorn on 22nd December?
- (5) How long would a day be on the Tropic of Capricorn on 22nd December?

Seasons

The Earth rotates on its axis in the same direction while revolving around the Sun on its orbit. Due to this, the North Pole faces the Sun at regular intervals. The rays of the Sun fall vertically either on north or south of the Equator. This causes variation in the length of days and nights. Those parts of the Earth which receive more sunlight experience summer while those that receive less sunlight experience winter. The Northern Hemisphere experiences summer in the period between 21st March to 21st September, while it is winter in the Southern Hemisphere during that period. The change of seasons is a phenomenon that directly affects human life.

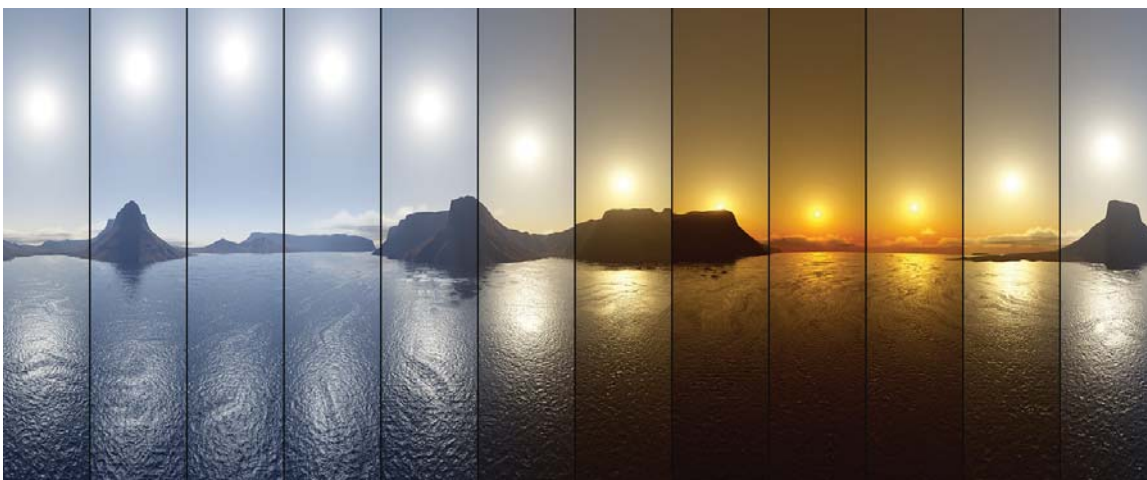


2.8 Revolution of the Earth

List of some festivals and the seasons of their celebration is given below. When we celebrate a particular festival here, name the season experienced at that same time in a different country. Find out and complete the table.

Festival and season (India)			Season (other countries)			
No.	Festival	Season	Country	Season	Country	Season
1	Holi	Summer	Kenya		Australia	
2	Diwali	Winter	Japan		Canada	
3	Christmas	Winter	USA		China	

Sun at Midnight



2.9 The Sun at Midnight in Norway

(This photograph has been taken at different times of the day)

In the European nation of Norway, the Sun does not set from mid-May to the end of July. This means that sunrise and sunset are simultaneous. So, the Sun is seen even at midnight !

EXERCISE

1. Name the two main motions of the Earth.
2. What will happen if the Earth does not revolve around the Sun?
3. There is a test match between India and West Indies in the West Indies. When will you watch the match - during the day or at night?
4. What is the length and direction of your shadow in the morning, afternoon and evening?

No.	Morning 8 am (Direction)	Long/ Short	At 12 noon (Direction)	Long/ Short	Evening 5 pm (Direction)	Long/ Short

5. 'The Sun is never overhead in London and there is sunlight till 8 o'clock in the evening whereas the Sun is overhead in Singapore'. Why?

Things to know

- **Uttarayan or Makarsankranti:** The vertical rays of the Sun start falling to the north of the Equator from 22nd December onwards. So, Uttarayan actually falls on 22nd December and not on 14th January. Usually, the Sun enters the zodiac sign of Capricorn on 14th January and so it is called 'Makarsankranti'.
- **Solstice:** From 22nd June onwards, the vertical rays of the sun start moving from the Tropic of Cancer towards the south of the Equator. This is known as 'Solstice'.
- **Circle of Illumination (Prakash Vartul):** The line that separates the lighted from the darker half of the earth and joins the two poles is called the 'Circle of Illumination'.
- **Revolution:** This is the Earth's orbit around the Sun. One Complete revolution takes about 365 1/4 days
- **Celsius:** Celsius is a unit of measurement of temperature. It is named after the Swedish astronomer, Anders Celsius(1701 - 1744).