

# Rotation and Revolution

## Exercises

### I. Short Answer Questions.

#### Question 1.

What is meant by the earth's axis ?

#### Answer:

The earth's axis is the imaginary line joining the North Pole to South Pole, around which the earth rotates.

#### Question 2.

Name the two chief motions of the earth.

#### Answer:

Two chief motions of the earth are rotation and revolution.

#### Question 3.

Describe two characteristics of rotation.

#### Answer:

Two characteristics of rotation are the complete rotation of the earth from west to east in 24 hours and along its tilted axis which is always in the same direction towards the Pole Star.

#### Question 4.

Mention two effects of the rotation of the earth.

#### Answer:

Day and night are caused by the rotation and the creation of centrifugal force resulting in a bulge in the equatorial part and flattened top at the poles.

#### Question 5.

Mention any two possible consequences if the axis of the earth was vertical instead of inclined.

#### Answer:

1. Then at all places on the earth, lengths of day and night would have been equal, i.e. 12 hr of day and 12 hr of night
2. There would have been no seasons.

#### Question 6.

State one reason why we do not feel the motions of the earth.

#### Answer:

According to the gravitational force every thing is attached to the earth, keeping

everything at rest at their original position, unless any external force compels to motivate it.

**Question 7.**

Define 'revolution'.

**Answer:**

Revolution is the revolving of the earth on its orbit around the sun in 365 days and 6 hours nearly.

**Question 8.**

State two chief characteristics of the revolution of the earth.

**Answer:**

The earth revolves at an average speed of 100,000 km per hour. The earth revolves in an elliptical orbit with two particular positions i.e. perihelion 147.3 million km away from sun in January and aphelion 152 million km away from sun in July.

**Question 9.**

Mention two effects of revolution.

**Answer:**

Two main effects of revolution are the seasonal changes throughout the year and the creation of particular heat zones on temperature zones.

**Question 10.**

What is meant by Summer Solstice ? When do we have Summer Solstice in the Northern Hemisphere ?

**Answer:**

Summer Solstice occurs on June 21, in the Northern Hemisphere, when the sun is overhead at the Tropic of Cancer and the North Pole is tilted towards the sun, so the summer season is experienced in the Northern Hemisphere.

**Question 11.**

What is meant by Equinox ? Give the dates of the two Equinoxes.

**Answer:**

Equinox means the time when the days and nights are equal all over the world. The particular dates of equinoxes are 21st March (Spring or Vernal Equinox) and 23rd September (Autumnal Equinox).

**Question 12.**

What will be the duration of daylight in the Northern Hemisphere on March 21st at 23°30' latitude ?

**Answer:**

The duration of daylight will be of 12 hours.

**Question 13.**

What is the relationship of seasons between the Northern and Southern Hemispheres ?

**Answer:**

The seasonal episodes are reciprocal with each other i.e. if Northern Hemisphere experiences summer season, then Southern Hemisphere has winter season; in the same way if there is spring season in Northern Hemisphere, there is autumn season in Southern Hemisphere and vice-versa.

**Question 14.**

How has the phenomenon of the 'Midnight Sun' come about ?

**Answer:**

Beyond the Arctic Circle, the regions experience 24 hours daylight in summer season due to the North Pole facing continuously towards the pole. It is called the 'Midnight Sun'. Norway is called land of Midnight Sun.

**Question 15.**

What are the seasons in the Northern and the Southern Hemispheres on 23rd September ?

**Answer:**

There are Autumn season and spring season in the Northern and Southern Hemispheres on 23rd September, respectively.

**Question 16.**

Mention one effect of seasons in low and high latitudes.

**Answer:**

The effect of seasons in low and high latitudes is distinct through various phases of different seasons. Low latitude areas get ample temperature and rainfall while the high latitude areas are cold and receive less rainfall. Tropical regions are always warm with heavy rainfall season, while the temperate and polar regions are cold with scanty rainfall, while the polar regions are always covered with perpetual snow due to the temperature below 0°C.

**II. Give reasons for each of the following****Question 1.**

We always see the sun rising in the East.

**Answer:**

As the earth moves from West to East, the eastern part gets lighted first and we see the sunrise in the East.

**Question 2.**

Norway is called the Land of the Midnight Sun.

**Answer:**

Northern part of Norway is beyond the Arctic Circle where the sunlight remains for she

months from March to September, so it is called the Land of Midnight sun due to the sunlight seen at night, too.

**Question 3.**

The speed of the rotation of the earth is greater at the Equator than at the Arctic Circle.

**Answer:**

As every part of the earth takes a full round within 24 hours, the equator being the largest circle of latitude  $0^\circ$ , the speed is greatest at the equator due to crossing the maximum distance per hour. i.e. it is 1660 km per hour, while it decreases to  $0^\circ$  at poles.

**Question 4.**

25 th of December in New Zealand may be one of the hottest days of the year.

**Answer:**

The sun's rays are vertical over the Tropic of Capricorn, so . 25th December may be one of hottest days in New Zealand, being situated in the Southern Hemisphere.

**Question 5.**

The length of day and night is not equal at all places on the earth.

**Answer:**

Due to the tilted axis of the earth and the migration belt of the sun between Tropics of Cancer and. Capricorn, the length of day and night differ from place to place and region to region.

**Question 6.**

The period of twilight and dawn increases polewards.

**Answer:**

On account of the oblique path of the sun towards poles than the vertical path along the equator, the length of dawn and twilight is greater, as it is nearly one hour near equator and 50 days at the poles.

**Question 7.**

Noon is hotter than morning.

**Answer:**

Due to the vertical rays of the sun at noon and the slanting rays in the morning, Noon is hotter than morning.

**Question 8.**

Days and nights are equal at all places on earth on March 21.

**Answer:**

The rays of the sun fall vertical on the equator or the middle part of the earth, on March 21, So the distribution of light is equal all over the world resulting the duration of the day and night equal from pole to pole. It is called the Vernal Equinox

**Question 9.**

Vertical rays are hotter than slanting rays.

**Answer:**

Vertical rays are hotter, because these cross shorter distance from the sun to the earth. Consequently the tropical belt is hotter than temperate and polar areas.

**Question 10.**

Though the earth is nearest to sun in winter yet the winter is cool.

**Answer:**

During the Winter Solstice the earth's Southern pole is facing towards the sun and the Northern Hemisphere experiences winter season and cold inspite of the earth's nearest position to the sun.

**III. Long Answer Questions****Question 1.**

What is meant by rotation of the earth ? Discuss the effect of the rotation of the earth.

**Answer:**

(a) Rotation of the earth takes place around the axis of the earth within 24 hours making one complete round.

(b) The rotation causes day and night alternately; the part of the earth facing the sun experiences day and on the opposite side the dark part experiences night. One night and one day together make a complete solar day.

**Question 2.**

Describe the two interesting phenomena made by the circle of illumination viz., Solstice and Equinox.

**Answer:**

Circle of illumination is the lighted part of the earth by the sun. On June 21, Northern Hemisphere enjoys the longest day due to the sun's position overhead at the Tropic of Cancer. It is called Summer Solstice. On the other hand when the sun is overhead on the Tropic of Capricorn, the Southern Hemisphere gets the longest day on December 22, which is known as Winter Solstice. The dates of Equinox are 21st March and 23rd September, when the days and nights are equal all over the world and there are spring and autumn seasons in Northern Hemisphere and autumn and spring in Southern Hemisphere respectively.

**Question 3.**

What is the effect of the inclined axis of the earth on day and night ?

**Answer:**

The difference in the duration of days and nights all over the earth is on account of the inclined axis of the earth. There is six months day in North Pole in summer season

(from April to September) and six months day in South Pole in winter season (from October to March).

#### Question 4.

1. On which two days are the days and nights equal all over the world and why ?  
What name do you give to these days ?
2. Which is the largest and which is the shortest day in the Northern Hemisphere and why ?
3. On which dates does the sun shine vertically overhead at
  - (a) Equator,
  - (b) Tropic of Cancer.
  - (c) Tropic of Capricorn ?

#### Answer:

1. On 21st March and 23rd September the days and nights are equal all over and world due to the sun's rays vertical on the equator. The name is Equinox of this position.
2. The largest day is 21st June and the shortest day is 22nd December in the Northern Hemisphere.
3. The sun is overhead on :
  - (a) Equator on 21st March and 23rd September.
  - (b) Tropic of Cancer on 21st June.
  - (c) Tropic of Capricorn on 22nd December.

#### Question 5.

Describe how the duration of sunlight changes from the Equator to the Poles with respect to the angle of incidence.

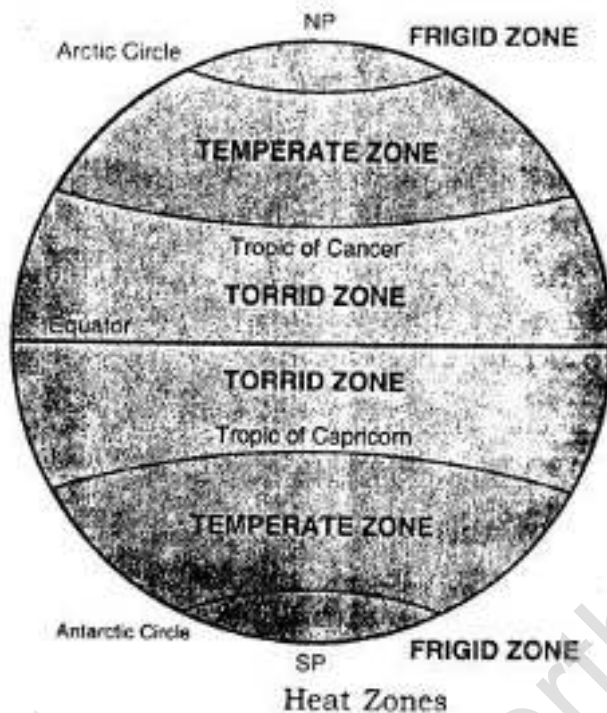
#### Answer:

As the angle of incidence changes from  $0^\circ$  to  $90^\circ$  from Poles towards the Equator; So the duration of sunlight also changes. Duration of daylight is 12 hours on equator and 24 hours on the North Pole in summer and 24 hours on the South Pole in winter. So the duration of sunlight increases from the Equator to the North Pole and decrease in the winter season and vice-versa in between Equator and South Pole.

**Question 6.**

With the help of a diagram describe the heat zones.

**Answer:**



**Question 7.**

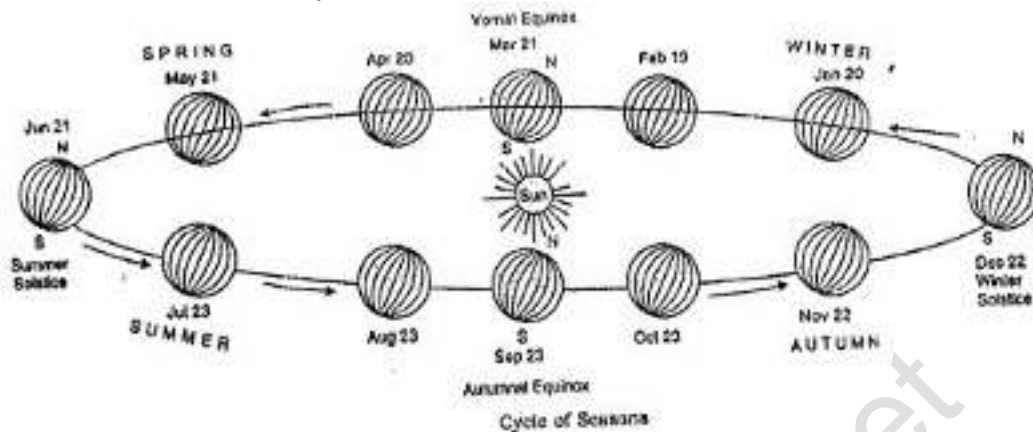
Explain with the help of diagram how the tilt of the earth's axis and the revolution cause

1. seasons.
2. variation in the length of day and night; and
3. changes in the altitude of the midday sun at different times of the year.

**Answer:**

1. On account of the different positions of the earth with respect to the sun, in its orbit, various types of seasons are caused. The sun remains vertical on Tropic of Cancer on 21st June and on Tropic of Capricorn on 22nd December and on equator on 21st March and 23rd September. Besides this, the Arctic and the Antarctic Circles, there is the sunlight for six months from March to September and from September to March respectively. The winter season from December to March, spring season from March to June, summer from June to September and Autumn from September to December in the Northern Hemisphere and vice-versa

in the Southern Hemisphere.



*Motions of the Earth — Rotation and Revolution*

2. The length of day decreases from the equator to the Poles. Apart from this the polar areas experience six month days and six months nights respectively.
3. The belt of sun's migration lies between the Tropic of Cancer and Capricorn, consequently the sun remains overhead in this belt, while beyond this belt the sun never remains vertical at noon and the sun's track remains slanting with shorter curved path in other regions.

### Question 8.

Describe how seasons are made and reversed between the Northern and Southern Hemispheres.

### Answer:

Due to the tilted axis of the earth, the Northern Hemisphere gets maximum sunlight from March to September and Southern Hemisphere from September to March. So, the seasons are also reversed e.g. the summer season in Northern Hemisphere correspond by winter in Southern Hemisphere and the spring is exchanged with Autumn season.

### Question 9.

Distinguish between :

1. Rotation and Revolution
2. Vertical and Slanting Rays.
3. Equinox and Solstice.
4. Twilight and Dawn.

### Answer:

(i) Rotation :

- (a) It is the motion of the earth along its axis.
- (b) The time taken for rotation is 24 hours.
- (c) It causes days and nights.



### **Revolution :**

- (a) It is the motion of the earth on its orbit around the sun.
- (b) The time taken for revolution is 365 days. It causes the different types of seasons.

### **(ii) Vertical Rays :**

- (a) Vertical Rays of the sun fall within its migration belt.
- (b) Migration belts is between Tropics of Cancer and Capricorn.

### **Slanting Rays. :**

- (a) Slanting Rays of the sun fall in temperate and Polar regions.
- (b) Slanting Rays of the sun fall in  $23\frac{1}{2}^{\circ}$  N –  $90^{\circ}$ N and  $23\frac{1}{2}^{\circ}$  s –  $90^{\circ}$ S regions

### **(iii) Equinox :**

- (a) It means the duration of days and nights equal.
- (b) 21st March and 23rd September are the dates of Equinox all over the world.
- (c) The sun is vertical on the equator.

### **Solstice :**

- (a) It is the particular position of the earth during the year.
- (b) The dates of summer and Winter Solstices are 21st June and 22nd December.
- (c) The sun is vertical on the Tropic of Cancer and Tropic of Capricorn respectively.

### **(iv) Twilight :**

- (a) It is the reflection of light of the sun after the sunset.
- (b) This light is slightly yellowish in colour.

### **Dawn :**

- (a) It is the reflection of light of the sun before the sunrise.
- (b) This light is slightly reddish in colour

## Practice Questions (Solved)

### Question 1.

Name the two movements of the Earth.

#### Answer:

Rotation and Revolution.

### Question 2.

How much time does the Earth take for one revolution?

#### Answer:

365 days 5 hours 48 minutes 46 seconds.

### Question 3.

State the direction of rotation of Earth.

#### Answer:

West to East.

### Question 4.

Name the longest day in the Northern Hemisphere.

#### Answer:

21st June.

### Question 5.

Name the shortest day in the Northern Hemisphere.

#### Answer:

22nd December.

### Question 6.

Name the longest day in the Southern Hemisphere.

#### Answer:

22nd December

### Question 7.

Name the shortest day in the Southern Hemisphere.

#### Answer:

21st June.

### Question 8.

On what dates are the days and nights equal throughout the world ?

#### Answer:

21st March and 23rd September.

**Question 9.**

At which latitude, is the Sun overhead on 21st June ?

**Answer:**

23 1/2° North.

**Question 10.**

At which latitude is the Sun overhead on 22nd – December?

**Answer:**

23 1/2° South.

**Question 11.**

Name the two ends of the Axis of the Earth.

**Answer:**

North pole and South Pole.

**Question 12.**

What is the speed of rotation at the equator ?

**Answer:**

1600 km per hour.

**Question 13.**

Which country is known as the land of the 'midnight Sun'?

**Answer:**

Norway.

**Question 14.**

Which country is known as the land of the rising Sun?

**Answer:**

Japan.

**Question 15.**

What does the word equinox mean ?

**Answer:**

Equal nights.

**Question 16.**

We always see the Sun rising in the East. Why ?

**Answer:**

Because the Earth rotates from West to East.

**Question 17.**

What the word 'Solstice mean'?

**Answer:**

It means the Sun standing still.

**Question 18.**

When does the summer solstice occur ?

**Answer:**

On 21st June.

**Question 19.**

When does the winter solstice occur ?

**Answer:**

On 22nd December.

**Question 20.**

When is the spring equinox ?

**Answer:**

On 21st March.

**Question 21.**

(a) What do you mean by "Rotation of Earth" ?

(b) What are its effects ?

**Answer:**

The two motion of the earth are :

1. Rotation or the daily motion and,
2. Revolution or the annual motion.

**Rotation :** The earth rotates (turns) round its axis from west to east once in twenty four hours. This motion is called the Daily Motion or Rotation. This rotation of the earth is the real cause of the apparent rising and setting of the sun which is stationary.

**Its effects :**

1. Day and night's are caused. This is by far the most important effect of rotation.
2. The sun, the moon and the star appear to revolve round the earth from east to west.
3. Winds and currents changes their direction.
4. Different places have different local times.
5. Tides occur regularly twice a day.

**Revolution :** The earth revolves round the Sun once approximately 365 – 1/4 days. This motion of the earth round the Sun is called Revolution. The earth revolves round the sun in a fixed path at a speed of 29.8 km/sec. or 107,2000 km. per hour. This path is called the orbit of the earth. The earth's orbit round the Sun cover a distance of about 965 million km.

**Its effects :**

1. This motion of the earth is one of the cause of the seasons.
2. Days and nights are of unequal length at the same place.
3. Change in the altitude of midday Sun during the year.

**Question 22.**

**Give reasons for the following statements :**

- (a) The Sun does not rise at the same time everywhere in the world.
- (b) The speed of rotation at Leningrad ( $60^{\circ}\text{N}$ ), Genoa ( $45^{\circ}\text{N}$ ) and Singapore ( $0^{\circ}\text{N}$ ) along the Earth's axis is not the same.
- (c) We do not feel the great speeds of Earth's rotation in day-to-day life.

**Answer:**

- (a) The Sun does not rise at the same time everywhere in the world because earth is not a flat disc.
- (b) The speed of rotation at Leningrad ( $60^{\circ}\text{N}$ ), Genoa ( $45^{\circ}\text{N}$ ) and Singapore ( $0^{\circ}\text{N}$ ) along the Earth's axis is not the same because of the spherical shape of the earth.
- (c) We do not feel the great speeds of Earth's rotation in day- to-day life because the land, water and the air around the Earth are moving as a whole.

**Question 23.**

**Give reasons for the following statements :**

- (a) The areas, lying on the Equator, have their duration of day-light almost constant throughout the year.
- (b) The duration of day and night is equal everywhere on 21st March and 23rd September.
- (c) Daylight decreases as we go polewards from March 21st to June 21st in the Southern Hemisphere.
- (d) Beyond the tropics, the Sun is never overhead.
- (e) On the 22nd of December, the altitude of the midday Sun at Colombo is different from that of Delhi.
- (f) The regions, near North Pole and South Pole, have six months of continuous day-light and darkness.

### Answer:

(a) Days and Night are equal throughout the year at the equator that is both days and nights are of twelve hours duration there.

**Reason :** The reason for this is that throughout the course of earth's revolution round the Sun, one half of the equator is always in the light and other is in the dark, that is the circle of illumination always cut the equator into two equal parts. Hence days and nights are always equal to every point at the equator.

(b) These are two special positions in the revolutionary course of the Earth, when days and nights are equal throughout the world. They are the two equinox, the first on March 21 st and the second on September, 23 rd. Because on these two days the mid-day sun is overhead at the equator, the positions of both the hemispheres are the same in respect of the sun.

(c) After March 21st the sun starts its apparent movement towards the North and Circle of illumination cuts the latitude of southern portion unequally so that the antarctic circle comes in complete darkness till June 21st, and the major portion of other latitude lies on darker side.

(d) This happens because tilt causes each hemisphere to lean towards the sun alternately for parts of the year. It also changes the apparent altitude of the mid day Sun.

(e) On December 22 the altitude of mid-day sun decreases beyond the Tropic of Cancer (Delhi) and increases towards the Equator (Colombo).

(f) On account of the obliquity of the earth's axis, for six month i.e., from March 21 to Sept. 23 the north pole is inclined towards the Sun and is always in the light. During this period the South pole is inclined away from the Sun and is throughout in the dark. Hence it is day for six months at the north pole and night at the south pole. But from September 23 to March 21st the case is just the opposite. The north pole is inclined away from the Sun and is in the dark while the south pole is inclined, towards the Sun and is in the light.

### Question 24.

**Give reasons for the following :**

(a) Twilight is of longer duration in higher latitudes than at Equator.

(b) Altitude of the Sun varies at a place according to seasons.

(c) Seasons are reversed between Northern and Southern Hemisphere.

(d) The duration of day and night is equal everywhere in the world on 21st March.

(e) Tropical latitudes are the hottest part of the Earth.

(f) The period of Twilight and Dawn increases polewards.

(g) 25th of December (Christmas) in New Zealand may be one of the hottest days of the year.

(h) Noon is hotter than morning.

(i) Vertical rays are hotter than slanting rays.

(j) There is no Twilight and Dawn on the Equator.

(k) Sun rises on the east.

- (l) Norway is called the land of the Midnight Sun.
- (m) The speed of the rotation of the earth is greater at the Equator than at the Arctic Circle.
- (n) Winds are deflected to the right in Northern Hemisphere and to the left in Southern Hemisphere.
- (o) The variation in the lengths of day and night goes on increasing polewards.

**Answer:**

- (a) The duration of twilight at a place depends on the path of the Sun in the sky. In the low latitudes, where the Sun's path is almost vertical, the duration of twilight is short. The Sun sinks below the horizon rapidly. In the middle and high latitudes the duration of twilight is long because at these latitudes the Sun has an inclined path.
- (b) The altitude of the mid-day sun is related to the latitude of a place. Because of seasonal changes in the altitude of the sun at different latitudes, the altitude of midday sun also varies.
- (c) The  $23.45^\circ$  tilt between the equator and the orbital plane causes each Hemisphere to lean towards the sun for part of the year. So seasons are reversed between the two Hemispheres.
- (d) On March 21 rays of the sun fall vertically on the equator, and because of inclined axis of the earth, the circle of illumination passes through the two poles resulting in equal duration of day and night all over the world.
- (e) Tropical latitudes are the hottest part of the Earth, because the belt between Tropic of cancer and Capricorn is the migration belt of the Sun in which the Sun remains overhead on one or another place which naturally receives the maximum heat of Sun.
- (f) Latitudes go on increasing polewards. In the middle and high altitudes duration of sunlight is limited. Both twilight and dawn continue so long as the sun is  $18^\circ$  below the horizon. Duration of twilight and dawn is especially large beyond  $50^\circ$  latitude.
- (g) New Zealand is located at  $40^\circ$  latitude. On 22 December sun is in the Southern Hemisphere (Winter Solstice). So December 25 may be one of the hottest days of the year in New Zealand.
- (h) At noon sun rays fall vertically overhead covering shorter distance than the slanting rays of the morning.
- (i) Vertical rays remain focussed over a shorter area than slanting rays. During slanting rays solar radiation is spread over a larger area.
- (j) The Twilight and Dawn depend on the path of the sun in the sky. At the Equators, sun's path is almost vertical. So duration of twilight and dawn combine with sunset and sunrise.
- (k) Earth rotates from west to east, which makes us see sun rise from the east.
- (l) The good part of Norway is situated North of the Arctic Circle where duration of daylight goes on increasing from 24 hrs to six months poleward.
- (m) Earth is spherical in shape and its circumference is greater at the equator than at the Arctic Circle.
- (n) Earth spins west to east in inclined position. The deflection of moving air streams, known as Coriolis Force, is produced because earth beneath moves.

(o) It is because circle of illumination is widest at the equator and goes on decreasing towards the poles.

#### **Question 25.**

What is Midnight Sun ? Where does it shine ?

##### **Answer:**

Day light increases as we go polewards. At the Arctic Circle the sun never sets at mid-summer (21st June) and sunshine is received for all the 24 hours. The areas include parts of Alaska and Northern Europe. In most parts of Norway, situated north of the Arctic Circle, Sun shines 24 hours over the beautiful country side. A place called Hammerfest has become famous as the place of Midnight Sun. In the Antarctica, surrounding the South Pole, Sun shine all night during the South Summer, late in December.

#### **Question 26.**

Why are there seasons on earth ?

##### **Answer:**

The axis of the earth is inclined at an angle of  $66\frac{1}{2}^\circ$  to its orbital plane or  $23\frac{1}{2}^\circ$  between equator and orbital plane. While earth swings around the Sun. Different parts of its surface are exposed to sunlight for different lengths of time each day. Some regions bask in the warmth of the sunlight while others remain cold. Earth's tilt while spreading the light over a larger area causes changes in the altitudes of the sun in different latitudes. This causes slow changes in temperature at a place. The changing weather conditions in an annual cycle of revolution is called Season. If the earth did not tilt on its axis there would be no seasons.

#### **Question 27.**

Why are days longer than nights in summer ?

##### **Answer:**

During summer the North Pole continue to slant more towards the sun. Because of the tilt it exposes larger area to sunshine. The Northern Hemisphere in this case has longer days and shorter nights. On 22 June, North Pole slants most towards the Sun, this is the longest day (the Summer Solstice) in Northern Hemisphere. The situation is exactly opposite in Southern Hemisphere. On 22nd December it remains tilted most towards the Sun. So the days are longer and nights are shorter in the Southern Summer which is opposite of Northern Winter.

#### **Question 28.**

Nearness to Sun is normally responsible for hot- weather conditions, but in July earth is farthest from Sun when it is hot in Northern Hemisphere. Why does reverse happen ?

##### **Answer:**

Due to tilt in earth's axis the Northern Hemisphere is directly exposed to Sun in July when the Sun rays strike directly. Further considering the enormous distance between sun and earth the difference between maximum and minimum distance is small, just 5 million km.



**Question 29.**

How is that the opposite seasons are found in Australia and India ?

**Answer:**

India lies in the Northern Hemisphere while Australia lies in the Southern Hemisphere. Due to inclination of the Axis of the Earth, opposite seasons occur in two Hemispheres. On 21st June, when the Northern Hemisphere is inclined towards the Sun, the Southern Hemisphere turns away from the Sun. When it is summer in India, it is winter in Australia.

**Question 30.**

Why are days and nights equal throughout the world on 21st March and 23rd September ?

**Answer:**

21 st March and 23rd September are seasonal positions of the Earth and are known as equinoxes meaning equal nights. The Sun is overhead at the equator. Both the Hemispheres are equally inclined towards the Sun. The circle of light passes through the poles. With the result, one half of each hemisphere is in the light and the other half in darkness. So the days and nights are equal all over the world.

**Question 31.**

Daylight increases as we go polewards in summer in The Northern Hemisphere. Why ?

**Answer:**

In summer, the Sun is overhead at the Tropic of Cancer ( $23\frac{1}{2}^{\circ}$  N). The northern hemisphere is inclined towards the Sun. The circle of light does not pass through the poles. The circle, of light cuts all the parallels unequally. The larger part of each parallel is in light. So days are longer than nights. At  $66\frac{1}{2}^{\circ}$  N latitude, there is 24 hour complete, continuous daylight. Thus, North pole has daylight for six months

**Question 32.**

Account for the unequal length of day and night.

**Answer:**

The length of day and night varies throughout the year. Sometimes the days are longer and nights are shorter and vice versa. It is due to two reasons :

- (a) The inclination of the axis.
- (b) The revolution of the Earth.

Due to inclined axis, one hemisphere leans towards the Sun for the six months ; the other Hemisphere leans towards the Sun for the next six months. In summer, on 21st June, days are longer in northern Hemisphere and the nights are shorter. In winter, the conditions are reversed, the days are shorter and nights are longer in the Northern Hemisphere. If the axes were vertical, there would have been equal days and nights everywhere.

**Question 33.**

What are the effects of the inclination of the axis ?

**Answer:**

- (a) There is apparent movement of the Sun from the equator towards tropics.
- (b) It causes opposite seasons in the two Hemisphere.
- (c) It results in the variation of length of day and night.
- (d) When North Pole is tilted towards the Sun, the South Pole turns away from the Sun. So the two Hemispheres are alternately exposed to the Sun rays.

**Question 34.**

What are the results of the difference in the Earth's speed of rotation at various latitudes ?

**Answer:**

At equator, the Earth's speed of rotation is about 1600 km per hour. The speed, goes on decreasing poleward. At 60° latitude, it is 800 km per hour. This difference affects the general circulation of the atmosphere. Winds are deflected to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. Similarly, the ocean currents are also deflected. This is known as Ferral's Law. Due to this, the Earth is flattened at the poles and bulging at the equator.

**Question 35.**

**Distinguish between the following pairs :**

- (a) Summer Solstice and Winter Solstice.
- (b) Solstice and Equinoxes

**Answer:**

(a)

**Summer Solstice :**

1. The Earth is in this position on its orbit on 21st June.
2. The Sun is overhead on Tropic of Cancer ( $23\frac{1}{2}^{\circ}$  N).
3. Days are longer than nights in the Northern Hemisphere.
4. There is summer season in the Northern and winter season in the Southern Hemisphere.

**Winter Solstice :**

1. The Earth is in this position on its orbit on 22nd December.
2. The Sun is overhead on Tropic of Capricorn ( $23\frac{1}{2}^{\circ}$  S).
3. Days are shorter than night in the Northern Hemisphere.
4. There is winter season in the Northern and summer season in the Southern Hemisphere.

(b)

**Solstices :**

1. The positions of the Earth on 21st June and 22nd December are known as Solstices.
2. The Sun is overhead at tropics.
3. Days and nights are unequal.
4. The term Solstice mean “Sun standing ‘still’.
5. There is summer or winter season in Northern Hemisphere.

**Equinoxes :**

1. The positions of the Earth on 23rd September and 21st March are known as Equinoxes.
2. The Sun is overhead at Equator.
3. Days and nights are equal.
4. The term Equinox means ‘Equal nights’.
5. There is autumn or spring season in Northern Hemisphere.

**Question 36.**

(a) Define Rotation

(b) What is the period of rotation?

(c) What are its effects ?

**Answer:**

**Rotation :** The spinning of the Earth on its axis from West to East is called rotation. The Earth takes about 24 hours (23 hours 56 minutes 4 seconds) to complete one rotation. It is also known as daily motion of the Earth.

**Effects :**

(a) Rotation causes days and nights.

(b) All heavenly bodies like Sun, Moon, planets appear to move from East to West.

(c) Tides occur regularly twice a day.

(d) Winds and ocean currents change their directions.

(e) The four main directions (North, South, East, West) can be determined with the help of rotation.

(f) We get a measure of time. A day consists of 24 hours – one complete rotation.

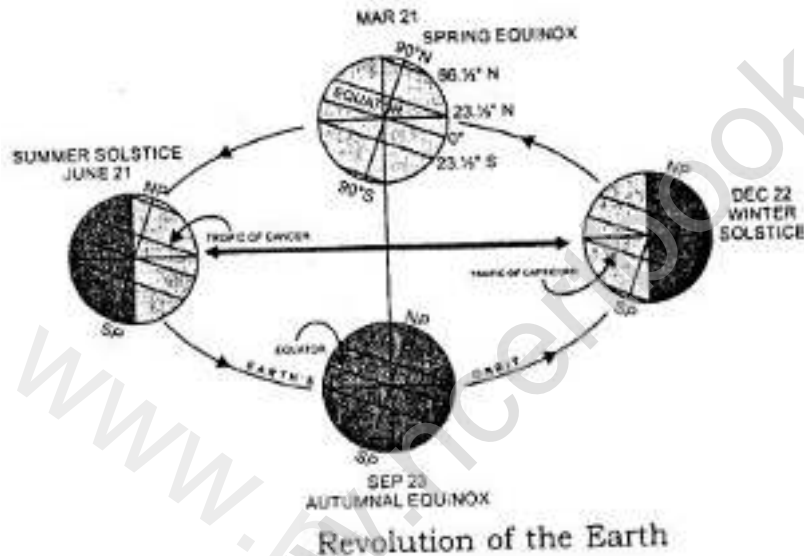
(g) The different times of a day like sunrise, noon, sunset, midnight can be determined due to rotation.

### Question 37.

- (a) What is revolution ?
- (b) What is period of revolution ?
- (c) What are aphelion and perihelion ?
- (d) What are its effects ?

#### Answer:

**Revolution :** The spinning of the Earth around the sun, along an elliptical orbit from West to East is known as revolution. It takes a year or  $365 \frac{1}{4}$  days to complete one revolution. Hence, it is also known as annual motion of the Earth. The Earth's axis is always inclined at a fixed angle of  $66 \frac{1}{2}^\circ$  to the plane of the ecliptic. When the Earth is farthest from the Sun (152 million km) it is aphelion. When the Earth is nearest the Sun (147 million km) it is perihelion.



#### Effects :

- (a) Due to revolution, the length of days and nights vary at a place at different times of the year.
- (b) Revolution causes change of seasons.
- (c) It helps in the location of Tropic of Cancer and Tropic of Capricorn due to the fact that Sun rays fall vertical here.
- (d) Altitude of the mid-day Sun changes.
- (e) It gives us a measure of time for one year.
- (f) Poles have days and nights of 6 months duration.
- (g) It determines the distribution of solar energy on the Earth.