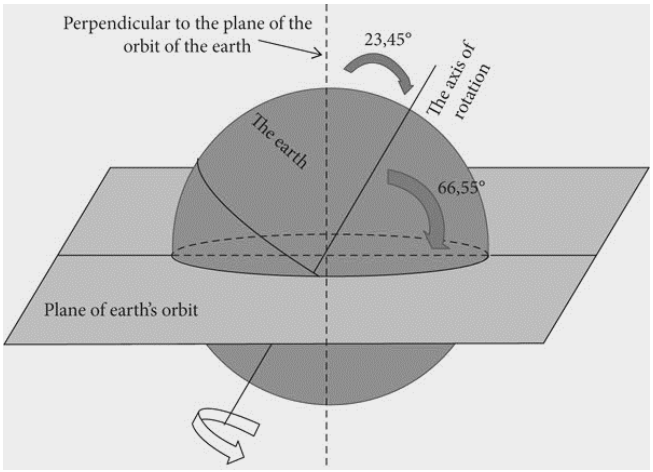
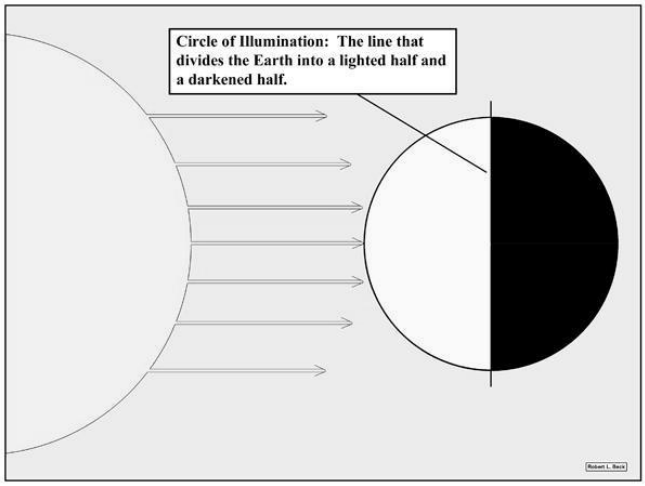
D: Answer the following questions in 10-20 words:



Q1. What do you mean by inclination of the Earth's axis?

Answer: The Earth is tilted on its axis. This tilting of earth on its own axis is known as inclination of Earth's axis. It's because of the tilted axis of the earth that days and nights are of varying lengths in deferent part of the Earth. Four main seasons are also caused due to the inclination of Earth.

Q2. What is the circle of illumination?



Answer: The circle of illumination is a fundamental concept in understanding the Earth's rotation and its impact on daylight and darkness. It is the boundary that separates the illuminated and dark portions of the Earth's surface, constantly changing its position and shape due to the Earth's rotation.

Q3. What are the effects of the earth revolution around the Sun?

Answer: The revolution of the earth causes seasons. The revolution of the earth gives the impression that the sun is moving north and south of the equator. The equator faces the Sun directly on March 21 and September 23. During these two days the day and night are equal throughout the earth.

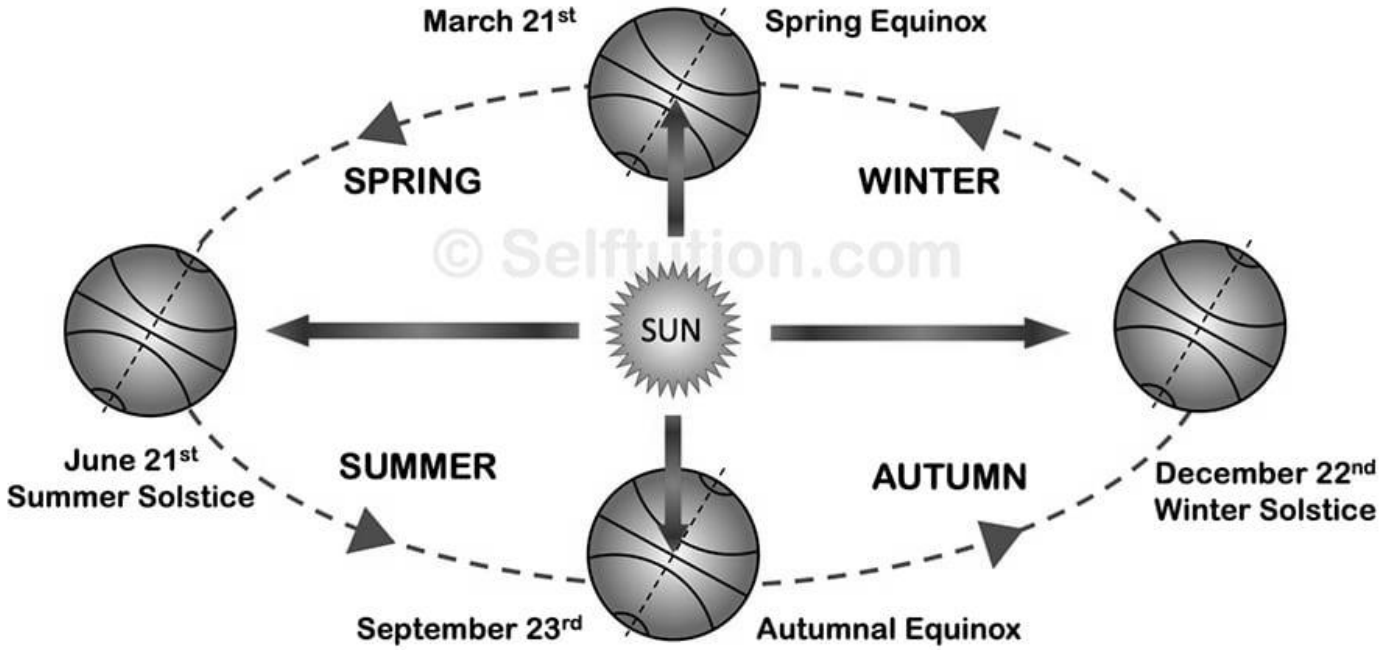
(The effects of the Earth's revolution are as follows: Variation in the lengths of days and nights. Slanting or vertical sunrays. Occurrence of various seasons (spring, summer, autumn and winter)

Q4. Name the two factors responsible for the occurrence of seasons?

Answer: The factors responsible for the phenomenon of seasons is rotation and revolution of earth around the sun.

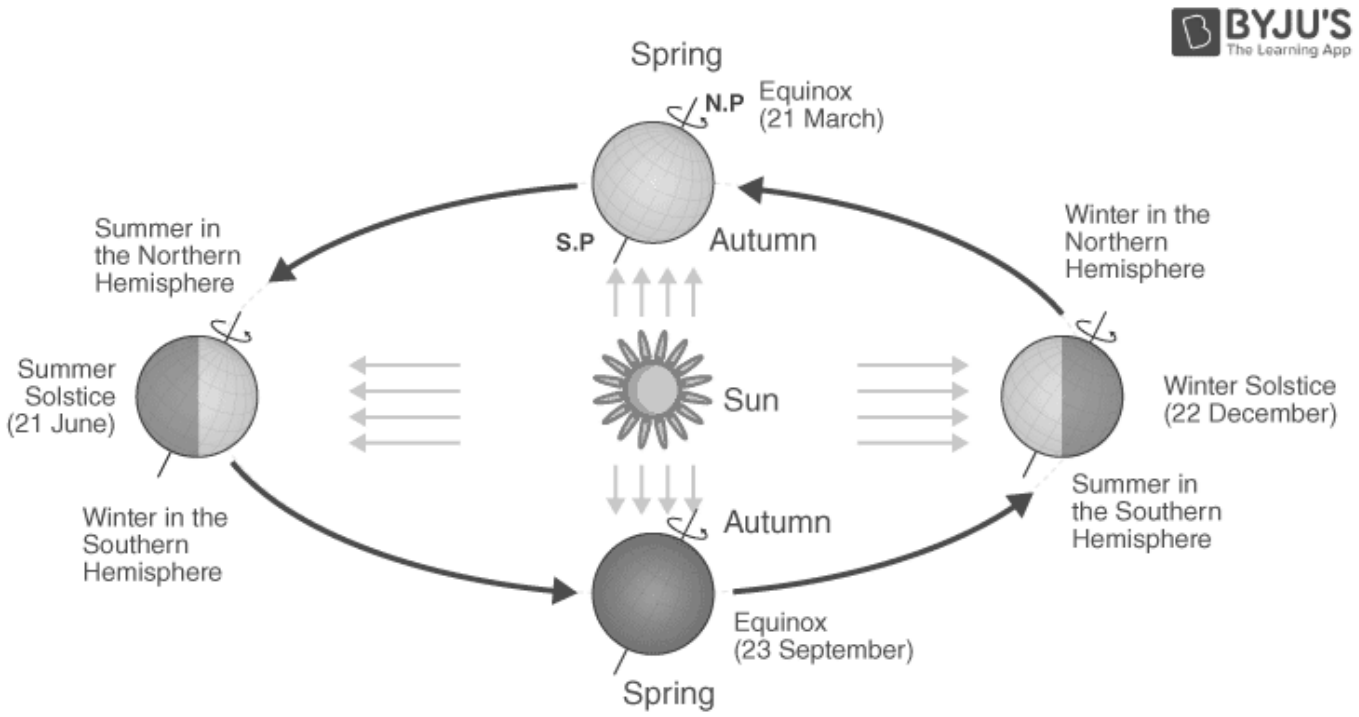
(The two factors responsible for the occurrence of seasons are as follows:

1. The Earth rotates on its own axis and it is tilted at an angle of 23.5° with respect to its orbital plane; this causes the occurrence of seasons.
2. The revolution of the Earth around the Sun, which requires 365 days and 6 hours, in an elliptical orbit also causes the change in seasons.)



Q5. Why are the days and nights equal all over the world on 21st March and 22nd September?

Answer: On 21st March and September 23rd, direct rays of the sun fall on the equator. At this position, neither of the poles is tilted towards the sun; so, the whole earth experiences equal days and equal nights. This is called an equinox.



E. Answer the following questions in 50-70 words?

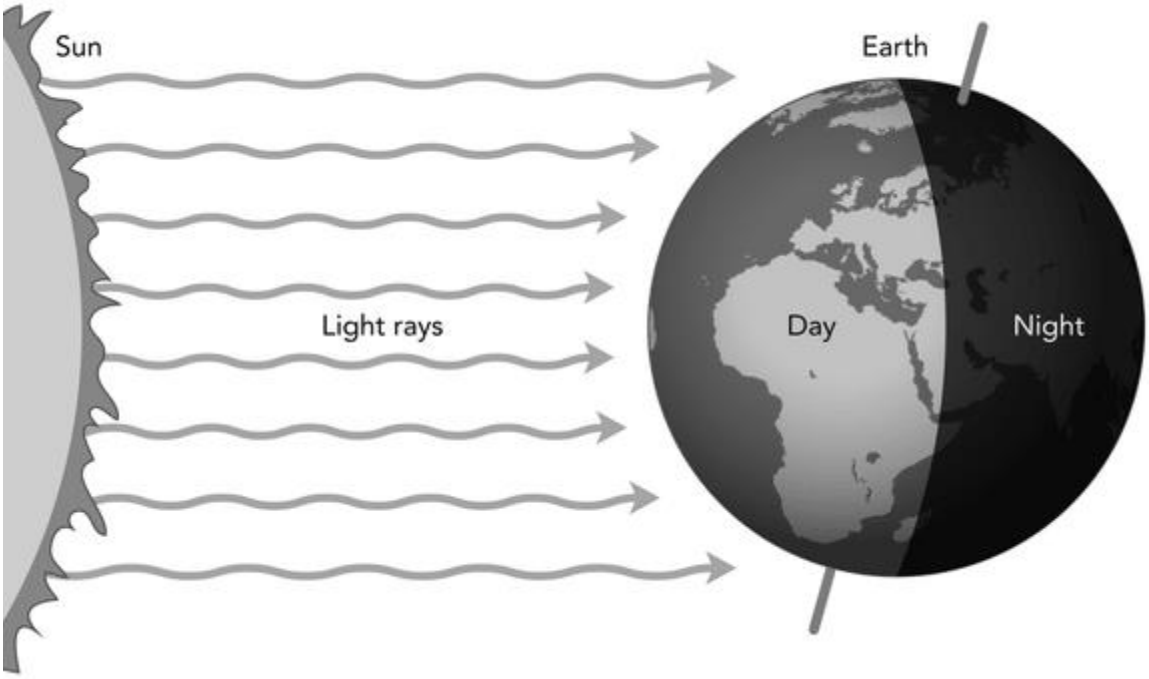
Q1. Distinguish between rotation and revolution?

Answer: Rotation refers to the spinning motion of an object around its own axis, influencing phenomena such as day and night. Revolution refers to the orbital motion of an object around another object, determining the duration of a year and affecting seasons

Rotation	Revolution
It is the spinning of the earth on its axis.	It is the motion of the earth around the sun in an elliptical orbit.
The time taken for one rotation is 23 hrs 56 min.	The time taken for one revolution is 365 days, 5 hrs and 48 min.
It causes day and night.	It causes seasonal changes.

Q2. What are the effects of Earth's rotation?

Answer: The rotation of the earth causes day and night. As the earth is spherical in shape, only one half of it is illuminated by the sun at a time. The other half remains dark. The illuminated portion of the earth experiences day and the other part of the earth experiences night. This rotation also affects the time of day experienced in different regions across the globe. Rotation causes tides, i.e. rise and fall of the sea level twice a day. Rotation causes sunrise in the east and sunset in the west (the earth move from west to east).



Q3. What is the relationship between the inclination of the Earth's axis and length of days and night?

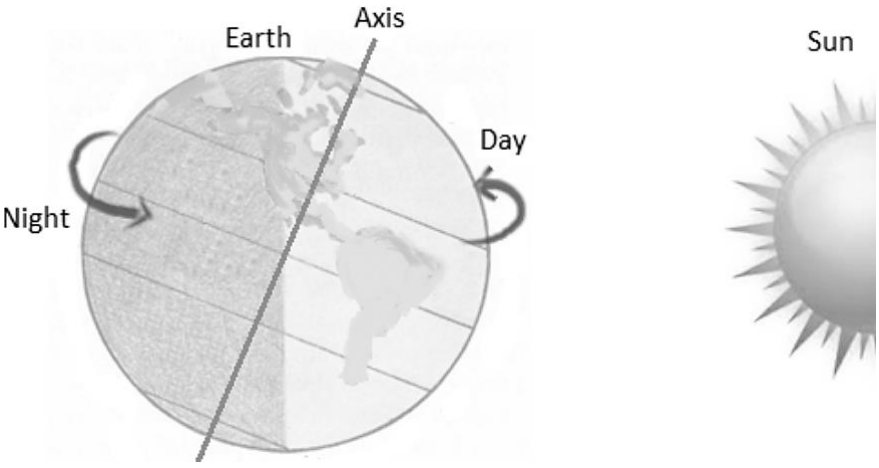
Answer: Due to the inclination of the Earth's axis:

(1) The lengths of day and night are not the same throughout the year at different places on the globe.

(2) This variation between the lengths of days and nights increases with increasing distance from the Equator to the poles.

(3) Due to the inclined axis of the earth, the duration of day and night is different at different places of the earth. The time of day at any place is determined by the height of the sun in the sky.

(4) Due to this inclination, the Northern Hemisphere remains inclined towards the Sun for half of the year and the Southern Hemisphere remains so for the other half of the year.



Q4. Why does February have 29 days after every 4 years?

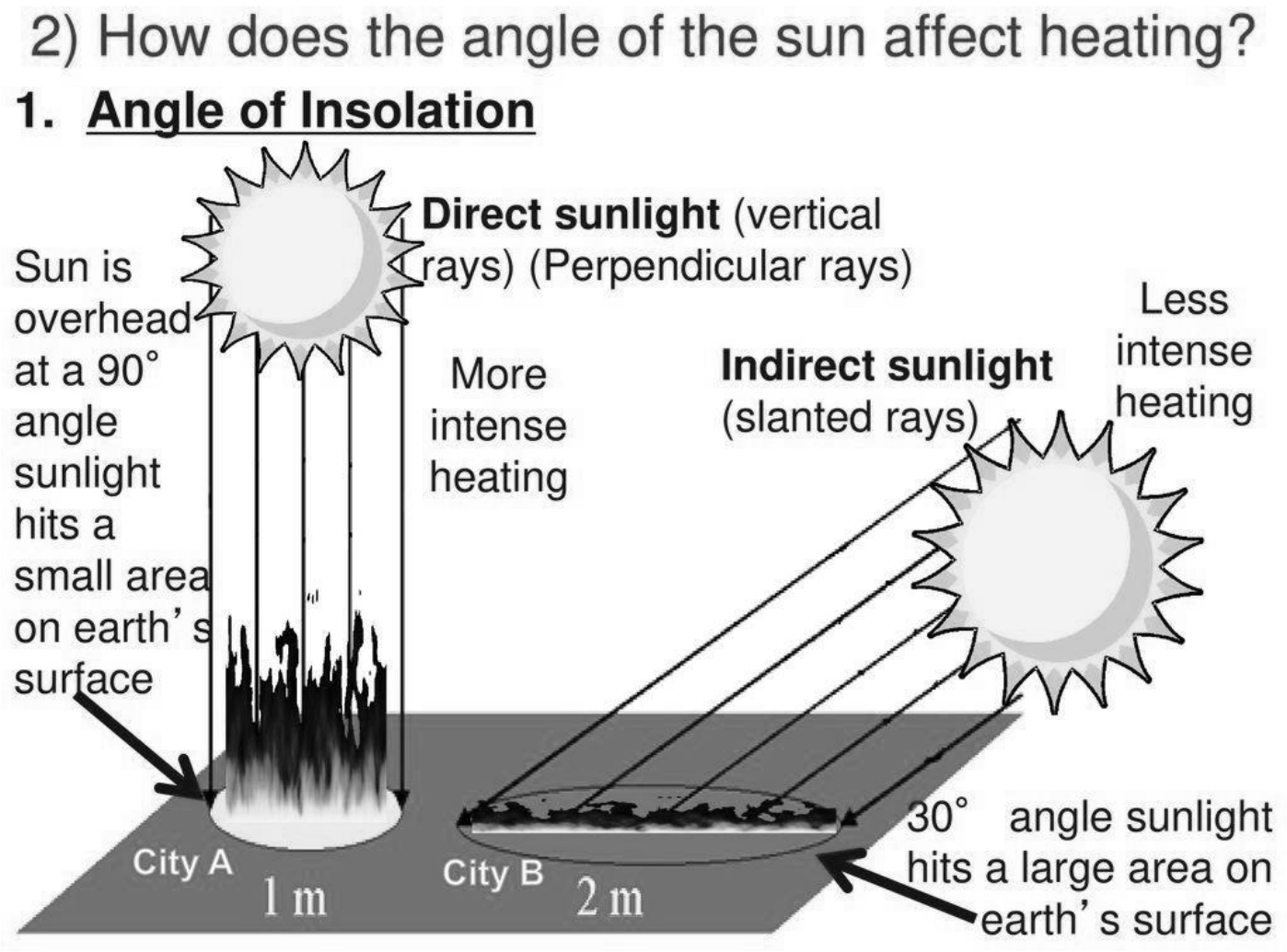
Answer: The movement of the Earth on its axis around the sun takes 365 days (one year) and 6 hours to revolve once around the sun. We ignore six hours for the sake of convenience and consider a year consisting

of 365 days. Saved six hours are added to make one day (24 hours) over a span of four years. This surplus day is added to the month of February and in every fourth year, February is of 29 days in spite of 28 days.

Q5. Why do vertical rays of the Sun give more heat than the slanting rays?

Answer: The vertical rays of the Sun give more insolation than the slanting rays because vertical rays travel a shorter distance and heat up a smaller surface area leading to higher temperatures whereas slanting rays not only travel a longer distance, but also heat a larger area. Thus, they have less heating power.

Slanting rays travel over a larger distance and loose more heat. Vertical Rays of the sun fall within its migration belt i.e. between the Tropics of Cancer and Capricorn. Slanting Rays of the sun fall in temperate and Polar regions.



F. Answer the following question in 80 – 100 words.

Q1. How are the alternated days and nights by the rotation of the earth?

Answer: Days and nights are caused by the rotation of the Earth around its own axis. Due to the spherical shape of the Earth, only one half of the Earth gets light and heat from the Sun at a particular time. The portion of the Earth that receives sunlight is known as day, while the other portion is known as night. And as

earth rotates these halves keep changing so that's why sometimes there is day at a place and at the same place sometimes there is night.

Q2. Explain the occurrence of seasons with the help of a diagram.

Answer: The Earth revolves around the sun on an elliptical orbit.

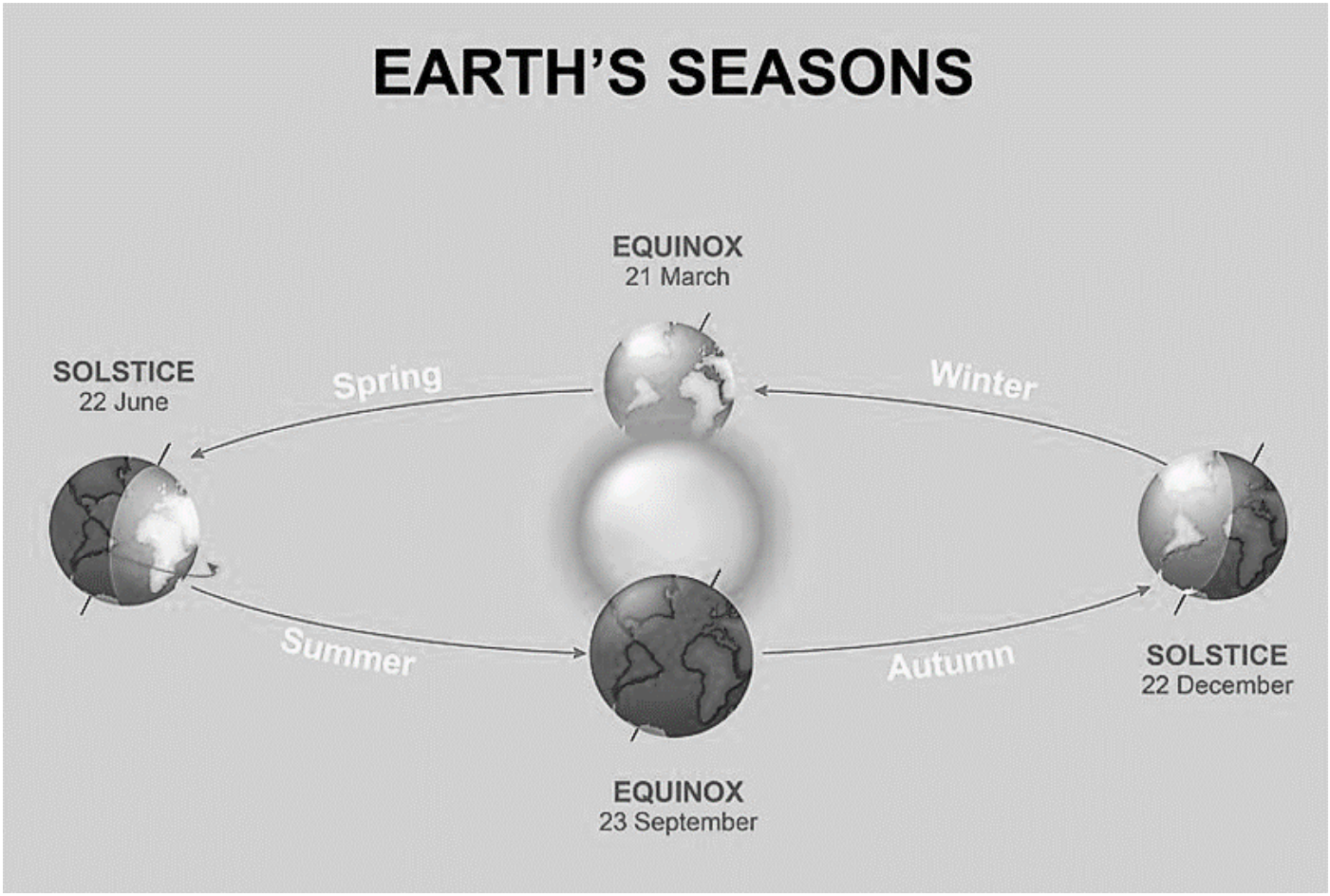
- Its axis is inclined in the same direction (east) on its orbit by $23\frac{1}{2}^{\circ}$.

- The revolution of the Earth and the inclination of the Earth's axis in a fixed direction cause seasons. - A year is divided into four seasons. They are spring, summer, autumn and winter.

- Seasons change with the change in the position of the Earth around the Sun.
- From June to August, it is summer in the northern hemisphere and winter in the southern hemisphere.

- March to May is spring in the northern hemisphere and autumn in the southern and vice versa from September to December.

Because of this reason, different parts of the Earth receive different amounts of sunlight at different times of the year and hence experience changes in seasons. When the axis faces the Sun, the respective hemisphere experiences summer. When the axis faces away from the Sun, the respective hemisphere experiences winter.



G. Complete the following table: (to be done by student)

	21st June	23rd September	23 December	21st March

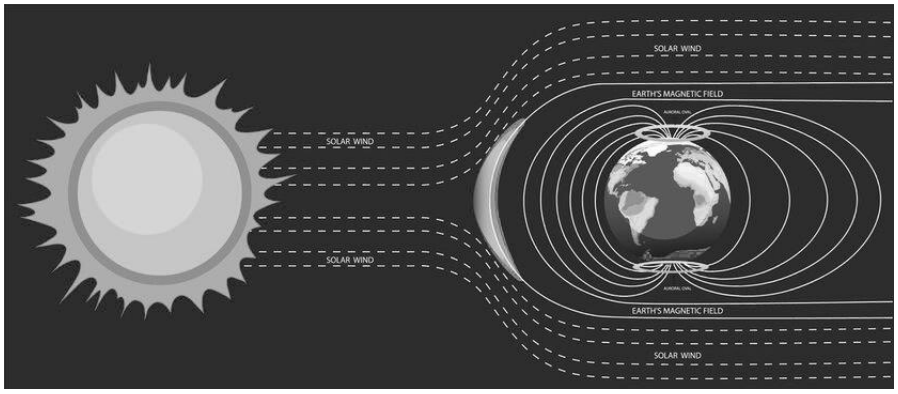
Northern Hemisphere				
Southern Hemisphere				

H. Think and Answer:

Q1. Would be there be life on Earth if it did not rotate on its axis?

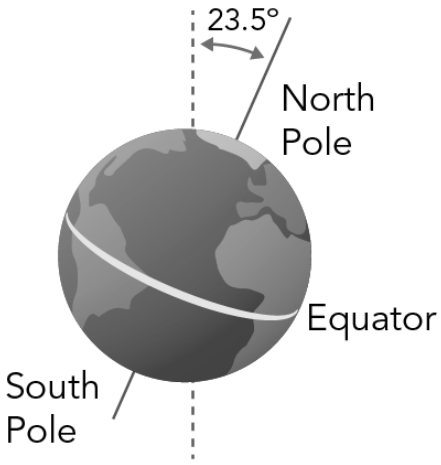
Answer: If Earth did not rotate on its axis, one side would always face the Sun while the other side would be away from the Sun. Thus, one side would become very hot and the other side would become very cold. It'll destroy habitat. Ultimately, life would not have been possible under such circumstances.

At the Equator, the earth's rotational motion is at its fastest, about a thousand miles an hour (1100 mile per hour rotation). If that motion suddenly stopped, the momentum would send things flying eastward. Moving rocks and oceans would trigger earthquakes and tsunamis.



The natural transition between seasons would also be inhibited due to the year-long day. The final and most fatal consequence would be the loss of the magnetic field of the earth. The earth's magnetic field plays an important role in blocking the sun's deadly cosmic rays, in the absence of it, our atmosphere would pave way for these high-frequency rays to enter the earth's atmosphere, and destroy any life that is left on the planet.

However, the formation of seasons and the occurrence of leap years take place due to the revolution of the Earth and not due to the rotation of the Earth



Q2. What would happen if the Earth's axis was perpendicular to its orbital plane and not inclined at an angle of $66\frac{1}{2}^0$?

Answer: If the axis becomes perpendicular, the whole geographical characteristics of our planet will be changed drastically. The day-night cycle will be hampered. And the normal weather cycle will be also hampered.

If the Earth's axis were perpendicular to the plane of its orbit, no change of seasons will take place as there will be no change in the intensity of Sun's rays falling on different latitudes of the Earth over the span of a year. Days and nights will be equal throughout the year and the Sun will be perpendicular to the equator.

The North Pole will not always lie in dark, rather it would receive light throughout the year.

Extra Innings:

Q1. What do you mean by the inclination of the earth's axis?

Answer: The tilted position of the Earth's axis is known as inclination of the Earth's axis. The Earth's rotation axis makes an angle of about 66.5° with the plane of its orbit around the Sun or about 23.5° from the perpendicular to the elliptical plane. This inclination is the reason we experience different seasons on the Earth.

Q2. What are the effects of the earth's rotation?

Answer: The Earth rotates about its axis and it takes about 24 hours to complete one rotation. Some of the effects of the Earth's rotation are as follows:

1. Rotation creates a diurnal cycle of light and darkness, i.e. day and night.
2. Rotation causes tides, i.e. rise and fall of the sea level twice a day.
3. Rotation causes sunrise in the east and sunset in the west.

Q3. Why does February have 29 days after every 4 years?

Answer: The Earth revolves around the Sun in anticlockwise direction and it takes about 365 days and 6 hours to complete one revolution. However, for our convenience, these extra 6 hours are added every year for the next four years to create a total of 24 hours or one more day in February. This extra day in February comes after every four years and the year in which it occurs is known as the leap year; it has 366 days in total.

Q4. What are the effects of revolution?

Answer: The Earth takes around 365 days and 6 hours to complete one revolution around the Sun. The effects of the Earth's revolution are as follows:

1. Variation in the lengths of days and nights
2. Slanting or vertical sunrays
3. Occurrence of various seasons (spring, summer, autumn and winter)
4. Movement of the Sun between the Tropic of Cancer and the Tropic of Capricorn

Q5. Name the two factors responsible for the occurrence of seasons?

Answer: The two factors responsible for the occurrence of seasons are as follows:

1. The Earth rotates on its own axis and it is tilted at an angle of 23.5° with respect to its orbital plane; this causes the occurrence of seasons.
2. The revolution of the Earth around the Sun, which requires 365 days and 6 hours, in an elliptical orbit also causes the change in seasons.

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Q6. Rotation and revolution

Answer:

Rotation	Revolution
1. The Earth takes 24 hours to complete one rotation.	The Earth takes around 365 days and 6 hours to complete one revolution around the Sun.
2. The Earth rotates on its axis.	The Earth revolves around the Sun in an elliptical orbit.
3. The rotation of the Earth causes day and night.	The revolution of the Earth causes the occurrence of seasons.

Q7. Vertical rays of the sun and slanting rays of the sun

Answer:

Vertical Rays	Slanting Rays
1. These are concentrated rays and carry more heat.	These are not concentrated and carry less heat.
2. These rays spread over a very small area on the Earth	These rays spread over a large area on the Earth.
3. The part of the Earth tilted towards the Sun receives vertical rays.	The part of the Earth tilted away from the Sun receives slanting rays.

Q8. We have alternate days and nights.

Answer: This is because the Earth rotates on its axis and completes one rotation in 24 hours. During this rotation, sunrays fall on half of the spinning Earth and this half of the Earth experiences day. The other darker side of the Earth experiences night during this time. With each spin, the Earth moves from darkness to light and vice versa.

Q9. Days and nights are not equal in length.

Answer: The variation in the lengths of days and nights occurs because the Earth revolves around the Sun, with its axis always inclined at an angle of 66.5°. This causes longer days and shorter nights in summer in the southern hemisphere. This variation between the lengths of days and nights increases with increasing distance from the Equator to the poles.

Q10. 21st June is the longest day in the Northern Hemisphere.

Answer: On 21 June, the Northern Hemisphere is inclined towards the Sun. The rays of the Sun fall directly on the Tropic of Cancer, causing summer in the Northern Hemisphere and winter in the Southern Hemisphere. Because of this, we experience the longest day and the shortest night of the year on 21 June

Q11. On 21st March and 23rd September days and nights are equal all over the world.

Answer: On 21 March and 23 September, the Sun shines vertically on the Equator; therefore, all places on the Earth experience equal days and equal nights. On 21 March, the Northern Hemisphere has spring, while the Southern Hemisphere has autumn. On 23 September, the Northern Hemisphere has autumn, while the Southern Hemisphere has spring.