1. Seasons and Time

Let us Assess

1. Question

Identify the factor not responsible for the occurrence of seasons.

A. Revolution of the Earth

B. Tilt of the earth's axis

C. Parallelism of the Earth's axis

D. Rotation of the Earth

Answer

Option (d) is correct because rotation of the Earth is not responsible for the occurrence of seasons. It is responsible for daylight and night time.

Option (a) is not correct because revolution of the Earth is responsible for the occurrence of seasons. It not only affects but causes the temperature conditions that give us spring, summer, fall and winter seasons.

Option (b) is not correct because tilt of the Earth’s axis is responsible for the occurrence of seasons. Earth is a sphere tilted on its axis. As the Earth goes around the sun, the part that is closer to sun gets more sunlight and experience summer where as the part away from the sun experience winter.

Option (c) is not correct because parallelism of the Earth’s axis is responsible for the occurrence of seasons. Parallelism accounts for the intensity and duration of solar radiation an area of Earth receives and therefore the intensity and duration of seasons.

2. Question

The Sun's rays fall vertically between Tropic of Cancer and Tropic of Capricorn. Why?

Answer

Tropic of Cancer is the most northern latitude on the Earth where the sun can appear directly overhead. The Tropic of Cancer is positioned at 23.5 degrees north of the equator.

Tropic of Capricorn is the most southern latitude on the Earth where the sun can appear directly overhead. The Tropic of Capricorn is positioned at 23.5 degrees south of the equator.

When the Northern Hemisphere tilt towards sun then the sun’s rays fall vertically on Tropic of Cancer and when the Southern Hemisphere tilt towards sun then the sun’s rays fall vertically on Tropic of Capricorn.

This is the reason for sun rays vertically between Tropic of Cancer and Tropic of Capricorn.

3. Question

Explain the geographical importance of March 21, June 21, September 23, and December 22.

Answer

Geographical importance of March 21, June 21, September 23 and December 22 are given below:

* 21 March: This is the day when sun rays are vertically over the equator and all over the world the days and nights are equal on 21st March.

*21 June: It is very important day for our planet. 21 June is known as Summer Solstice in the Northern Hemisphere. On this day Northern Hemisphere experiences its longest day and shortest night. This day is beginning of summer in the northern hemisphere and winter in the southern hemisphere.

*23 September: On 23 September sun rays are vertically over the equator and all over the world the days and nights are equal on this day.

*22 December: 22 December is known as Winter Solstice in the Northern Hemisphere. On this day the Northern Hemisphere experiences its shortest day and longest night.

4. Question

Why is there an eastward increase and westward decrease in time?

Answer

The time is estimated at each place on the basis of position of sun known as local time.

There is eastward increase in time because Earth rotates from west to east and every 15 degree we go eastwards, local time is increased by 1 hour. There is westward decrease in time because every 15 degree we go westwards local time is decreased by 1 hour. The time is estimated to increase by 4 minutes towards the east and decrease by 4 minutes towards the west for every degree of longitude. Therefore, there is an eastward increase and westward decrease in time.

Extended Activities

1. Question

In the class, exhibit pictures along with short notes depiciting the seasonal changes in nature.

Answer

Season is the regular changes in the weather throughout the year. The factors responsible for occurrence of seasons are revolution of the Earth, tilt of the earth's axis, parallelism of earth's axis. The most important factor is the angle that the sunlight hits the Earth's surface throughout the year. The seasons are very different in the Northern Hemisphere than in the Southern Hemisphere.

Apparent movement of sun between the Tropic of Cancer and Tropic of Capricorn results into different seasons- spring, summer, autumn and winter.

1. Spring Season: Spring is one of the temperate seasons. Spring is the season of transition from winter to summer. The Northern Hemisphere experiences spring seasons between 21 March and 21 June where as Southern Hemisphere experiences spring season between 23 September and 22 December.

2. Summer Season: Summer is the hottest of the four temperate seasons. Northern Hemisphere experiences summer season between 21 June and 23 September. Southern Hemisphere experiences summer season between 22 December and 21 March.

3. Autumn Season: Autumn is one of the temperate seasons. Autumn marks the transition from summer to winter. This is the season during which the trees generally shed their leaves. Northern Hemisphere experiences autumn season between 23 September and 22 December. Southern Hemisphere experiences autumn season between 21 March and 21 June.

4. Winter Season: Winter is the coldest season in the year in polar and temperate zones. It occurs after autumn and before spring in each year. Northern Hemisphere experiences winter season between 22 December and 21 March. Southern Hemisphere experiences winter season between 21 June and 23 September.

2. Question

Record your observations on the changes in nature in each season and prepare a weather observation diary.

Answer

Season is the changes in weather, ecology and amount of daylight throughout the year. Factors responsible for occurrence of season are revolution of earth, tilt of earth’s axis, parallelism of the earth’s axis and apparent movement of the sun. The different seasons are winter, summer, spring and autumn. Change in season causes great change in the world.

Different observations on the changes in nature in each season are described as:

1. Spring Season: Spring is the season of transition from winter to summer. The days grow longer, temperatures rise and plants begin to bud and start their life cycles again. Birds build nests, find mates and

start their breeding seasons. Insects hatch and begin to feed.

2. Summer Season: It is the warmest season in the Northern Hemisphere. Plants grow and provide food for herbivores. Summer is when all animals, including humans, take advantage of the warmer weather to eat fresh foods. Human grow the fresh food we will eat all year.

3. Autumn Season: In this season leaves of deciduous trees change colour and drop off. Days continue to grow shorter. Plant cycles end. Animals migrate south or prepare for winter sleep. Some animals grow warmer fur or feathers.

4. Winter Season: This is the season of freezing cold temperatures, snowfall, wind and ice. Many animals hibernate or sleep a lot to save energy. This helps them survive, because it takes energy to stay warm. In winter there are fewer plants.

Weather Observations: Weather observation includes temperature, humidity, precipitation, air pressure, wind direction and wind speed observation which help in predicting the weather. Some of the weather instruments like thermometers, rain gauges and barometers are used to predict the weather.

During summer season very high temperature is seen. Warmer temperatures can hold more moisture than colder temperature so humidity is more in summer. During winter season temperature is very low and less humidity is seen. In spring season temperature is moderate; it is neither too hot nor too cold. Rain is observed during spring season. In autumn season wind speed is high which leads to drop off leaves.

3. Question

With the help of an atlas, find out the standard meridians of different countries and calculate their local time.

Answer

A meridian used for determining standard time of a country is known as standard meridians. Standard meridians of different countries are given below:

*Standard meridian of Pakistan- 74 degree 22’ east longitude.

*Standard meridian of Bangladesh- 90 degree east longitude.

*Standard meridian of England- 0 degree.

*Standard meridian of Malaysia- 105 degree east longitude.

*Standard meridian of Japan- 135 degree east longitude.

*Standard meridian of India – 82 degree 30’ east longitude.

At each longitude the local time would be different. Different places having different longitude will have different local time. The time required to complete 360 degree rotation is 24 hours. The time required for the completion of one rotation is 1440 minutes. The time required for Earth to complete the rotation of 1 degree rotation is 4 minutes.

Local time of Pakistan is calculated as:

The longitudinal difference between Pakistan and India = 82 degree 30’ – 74 degree 22’

= 8 degree 8’

Time difference for 1 degree longitude is 4 minutes.

Time difference for 8 degree 8’ longitude = 8*4+1/60 *8*4

= 32.53 minutes

Hence, the time in India would be 32.53 minutes ahead of time in Pakistan.

Local time of Bangladesh is calculated as:

The longitudinal difference between Bangladesh and India = 90 degree – 82 degree 30’

= 7 degree 30’

Time difference for 1 degree longitude is 4 minutes.

Time difference for 7 degree 30’ = 7*4+1/60*30*4

= 30 minute

Hence, the time in Bangladesh would be 30 minutes ahead of time in India.

Local time of England is calculated as:

The longitudinal difference between England and India = 82 degree 30’

Time difference for 1 degree longitude is 4 minutes.

Time difference for 82 degree 30’ = 5 hours 30 minutes

Hence, the time in India would be 5 hours 30 minutes ahead of time in England.

Local time of Malaysia is calculated as:

The longitude difference between Malaysia and India = 105 degree – 82 degree 30’

=22 degree 30’

Time difference for 1 degree longitude is 4 minutes.

Time difference for 22 degree 30’ = 1 hour 30 minute

Hence, the time in Malaysia would be 1 hour 30 minute ahead of time in India.

Local time of Japan is calculated as:

The longitudinal difference between Japan and India = 135 degree- 82 degree 30’

= 52 degree 30’

Time difference for 1 degree longitude is 4 minutes.

Time difference for 52 degree 30’ = 3 hour 30 minutes

Hence, the time in Japan would be 3 hour 30 minutes ahead of time in India.