8 th Unit 3 **Movements of the Earth: Rotation and Revolution**

1. What is Rotation ?

Answer : Earth spinning on its own axis is called rotation.

2. Direction of the Earth's rotation ?

Answer :

- The direction of rotation of the Earth is from the west to the east
- That is why we feel that the sun rises in the east and sets in the west

3. Tilt of the Earth's axis

Answer :

- The earth axis is tilted at an angle of 23.5° from the vertical

4. Explain what is day and night ?

Answer :

- The Earth receives light from the Sun.
- During rotation, the part of the Earth facing the Sun has daytime and the other part experiences night.

5. What is circle of illumination ?

Answer :

- The imaginary line that demarcates day and night on the Earth is called the Circle of Illumination.
- This circle of illumination is not parallel to the Earth's axis.

6. What if the earth didn't rotate ?

Answer :

- Half of the earth would always face the sun (permanent day)
- The other half always remain in darkness (permanent night)
- This would effect life , weather , temperature and everything

7. How much time taken for the Earth to complete one rotation ?

Answer :

- The time taken for the Earth to complete one rotation is 24 hours (23 hours 56 minutes 4 seconds).

8. Explain Coriolis Effect ?

Answer :

- Due to rotation, freely moving bodies on the Earth's surface get deflected in their direction.
- The force responsible for this deflection is known as Coriolis Force.
- The deflection in direction is called Coriolis Effect

9. What is Ferrel's Law ?

Answer :

- Ocean currents and winds change their direction in the northern hemisphere to the right and in the southern hemisphere to the left. This is known as Ferrel's law

10. Write a note about Revolution ?

Answer :

- The Earth revolves around the Sun in a fixed orbit is known as Revolution. The time taken to complete one revolution in the elliptical orbit is 365¼ days. 365 days is considered as one year for practical convenience.
- The fraction of ¼ days is added once in 4 years to the February making it 29 days. Thus the year which has 366 days is called a leap year
- The speed of revolution of the Earth is around 30 km per second.

11. What is Perihelion ?

Answer :

- The day on which the Earth comes closest to the Sun during revolution (147 million kilometres) is known as Perihelion
- This happens in the month of January (around 3rd January)

12. What is Aphelion ?

Answer :

- The distance between the Sun and the Earth will be at a maximum (152 million kilometres) is known as Aphelion.
- This happens in the month of July (around 4th July).

13. Explain the Apparent Movement of the Sun.

Answer :

- The earth's axis is maintained at an angle of 23½0 throughout the revolution.
- The Sun's apparent position moves northward and southward between the Tropic of Cancer and the Tropic of Capricorn.
- This apparent shift in the Sun's position is called the apparent movement of the Sun.

14. What is Equinox ?

Answer :

- On 21st March and 23rd September, the sun's rays fall vertically on the equator.
- The duration of day and night will be equal on both hemispheres on these days.
- These days are called equinoxes.
- 21st March is known as Spring Equinox
- 23rd September is Autumnal Equinox.

15. What is Summer Solstice ?
Answer :

- In the northern hemisphere, the Sun's apparent position shifts towards north from the Equator to the Tropic of Cancer from 21st March to 21st June.
- On 21st June, the northern hemisphere experiences the longest day and the shortest night.
- This day is known as summer solstice.
- During this period in the northern polar region, there will be continuous daylight for six months.
- The table showing the length of day in different latitudes on the summer solstice (June 21) In text book page number 48

16. What is Winter Solstice ?

Answer :

- In the southern hemisphere the Sun's apparent position shifts from the equator to the Tropic of Capricorn during the period from 23rd September to 22nd December.
- On 22nd December, the southern hemisphere experiences the longest day and the shortest night. This day is known as the Winter Solstice. Look at Figure 3.6 and identify the position of the Earth in winter solstice.
- During this period, in the northern polar region, there will be continuous darkness for six months
- The table showing the length of day in different latitudes on the winter solstice (June 21) In text book page number 49

17. Explain Uttarayanam.

Answer:

- winter solstice (December 22) the apparent movement of the Sun from Tropic of Capricorn (23½0 South) to Tropic of Cancer (23½0 North) is known as the apparent movement of the Sun towards North (Uttarayanam)

18. Explain Dakshinayanam.

- The shift in the apparent position of the Sun after the Summer Solstice (June 21) from the Tropic of Cancer (23½0 North) to Tropic of Capricorn (23½0 South) is known as the apparent movement of the Sun towards South (Dakshinayanam).

19. What is Seasons ?

Answer :

- Due to the apparent shift in the position of the Sun, different places experience specific weather patterns. These patterns are known as seasons.
- The revolution of the Earth and variations in the availability of solar energy is the reason for the occurrence of the seasons.
- The occurrence of spring, summer, autumn and winter in a cyclical manner during a year is called seasonal change.

20. What are the different seasons and their characteristics?

Answer:

Spring

- Plants bloom and produce fruits
- During this period duration of daytime gradually increases

Summer

- high atmospheric Temperature
- generally longer days

Autumn

- Trees shed their leaves before the arrival of winter
- During this period duration of daytime gradually decreases

Winter

- Low atmospheric temperature
- Snowfall
- Generally longer nights

21. What is Time and how much time taken to the earth to rotate 1° ?

Answer:

- The Earth takes 24 hours to complete one rotation or to spin 360° on its axis.
- It takes 1 hour (60 minutes) to turn 15°.
- The proportionate time difference for 1° longitudinal extent is 4 minutes
- 15° = 1 hour = 60 minutes
- 1° = 60/15 = 4 minutes

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22. What is Local Time?

- In the early days, local time was calculated based on the shadow and the overhead position of the Sun.
- It was considered to be noon when the Sun is vertically overhead.
- The time calculated based on the length of the shadow and position of the Sun is termed as the Local time

23. What is Standard Time ?

- The local time at each longitude will be different.
- This will create confusion for commonly conducted examinations, railway time, radio telecast etc.
- To overcome this crisis, based on an international understanding, countries have selected a longitude, which is a multiple of 7½° longitude as Standard Meridian.
- The local time at this Standard Meridian is considered as the standard time of the country.

24. What is Greenwich Mean Time?

- The size of the circles of latitude decreases from the equator to the poles.
- All meridians of longitude are semi circles.
- For international time calculation, the longitude that passes through the Royal British Observatory in England is taken as zero degree meridian.This is called Prime Meridian.
- The local time at Prime Meridian is called the Greenwich Mean Time.
- The rotation of the Earth is from the west to the east, as we move each longitude east of Greenwich, 4 minutes is added and towards the west 4 minutes is subtracted.

25. Indian Standard Time

- There is around 30° longitudinal difference between India's easternmost state of Arunachal Pradesh (97°.25 East) and the westernmost state of Gujarat (68°.7 East).
- So there is almost two hours of difference in the local time of these places.
- To avoid the practical difficulty caused by this, a standard time has been fixed for the country.
- The 82½° East longitude which is a multiple of 7½° longitude is selected as the Standard Meridian of the country.
- The local time at this Standard Meridian is taken as the Standard Time of India.

26. What is the time difference between Greenwich Meridian (0° longitude) and Indian Standard Meridian (82½° East) ?

Answer :

- To move 1° longitude earth take 4 minuts.
- So from Greenwich Meridian to Indian Standard Meridian , Earth take 4 x 82.5 = 330 Minuts
- That's mean 330/60 = 5.5 Hours.

27. Time zones

- Based on international understanding, the world has been divided into 24 zones with 1 hour difference. These are time zones.
- Each time zone has 15° longitudinal distance.
- There is a time difference of about two hours between India's easternmost state Arunachal Pradesh and the westernmost state Gujarat.
- Since this time difference is not very large, choosing a common standard time for the country was not difficult. But countries like Russia, the USA, and Australia with large longitudinal extensions have many time zones and Standard Time

28. International Date Line

- The 180 degree longitude is called international date line.
- It Is an imaginary line on the globe used to separate two consecutive calendar dates.
- It lies opposite the prime meridian (0° Longitude)

29. What happened when you cross the international date line ?

- The person travelling towards the east loses a day while crossing this longitude
- And a person travelling towards the west gains a day.

30. Why the international date line looks like zigzag ?

- The international date line does not following a straight line .
- It has adjusted to avoid cutting through countries and islands.
- This line is arranged to avoid populated land areas in the Pacific Ocean