

HW

19.07.2021

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IMPORTANT NOTE ON LATITUDE & LONGITUDE

1) Latitude And Longitude

i) Latitude and longitude are imaginary lines used to determine the location of a place on earth.

ii) The shape of the earth is 'Geoid'. And the location of a place on the earth can be mentioned in terms of latitude and longitude.

iii) Example: The location of India - The longi-

itudinal extent of India is 68 degrees 7° E and 97 degrees 25° E whereas the latitudinal extent of India is 8 degrees 40' N and 36 degrees 7° N.

2) Latitude (The parallels of latitude refer to the angular distance, in degrees, minutes, and seconds of a point north or south of the Equator. Lines of latitude are often referred to as parallels.)

1) IMPORTANT PARALLELS OF LATITUDES

- i) Besides the equator (0°), the north pole (90°N) and the south pole (90°S), there are four important parallels of latitudes -
- ii) Tropic of Cancer (23½°N) in the Northern hemisphere,
- iii) Tropic of Capricorn (23½°S) in the Southern hemisphere
- iv) Arctic circle at (66½°N) in north of the equator.

v) Antarctic circle at $66\frac{1}{2}^{\circ}$ south of the equator.

B) LATITUDINAL HEAT ZONES OF THE EARTH

TORRID ZONES - The mid-day sun is exactly overhead at least once a year on all latitudes in between the Tropic of Cancer and the Tropic of Capricorn.

TEMPERATE ZONES - The areas bounded by the Tropic of Cancer and the Arctic Circle in the northern hemisphere, and the Tropic of Capricorn and the Antarctic circle in the southern hemisphere, have moderate temperatures.

FRIGID ZONES - Areas lying between the Arctic circle and the north pole in the northern hemisphere and the Antarctic circle and the south pole in the southern hemisphere, are very cold. It is because here the sun does not rise much above the horizon.

3) Longitude (Longitude refer to the angular distance, in degrees, minutes and seconds of a point east or west of the Prime (Greenwich) Meridian. Lines of Longitude are often referred to as meridians.)

A) LONGITUDE AND TIME

- i) Since the earth makes one complete revolution of 360° in one day or 24 hours, it passes through 15° in one hour or 1° in 4 minutes.
- ii) The earth rotates from west to east, so every 15° we go eastwards, local time is advanced by 1 hr. Conversely, if we go westwards, local time is retarded by 1 hour.
- iii) We may thus conclude that places east of Greenwich see the sun earlier and gain time, whereas places west of Greenwich see the sun later and lose time.

B) Standard time and time zones

- i) To avoid all these difficulties, a system of standard time is observed by all countries.
- ii) Most countries adopt their standard time from the central ^{part} median of their countries.
- iii) In large countries such as Canada, U.S.A, China, and U.S.S.R, it would be inconvenient to have single time zone. So these countries have multiple time zones.
- iv) Both Canada and U.S.A have five time zones - the Atlantic, Eastern, Central Mountain and Pacific Time zones. The difference between the local time of the Atlantic and Pacific coast is nearly five hours.
- v) U.S.S.R had eleven time zones before its disintegration. Russia now has nine time zones.

Q] Why is The International Dateline Drawn In a Zigzag Manner?

Some group of ^{Islands} (Polynesia, Melanesia, Micronesia) fall on either of the dateline. So if the dateline was straight, then two regions of the same Island Country or Island group would fall under different date zones. Thus, to avoid any confusion of date, this line is drawn through where the sea lies not land. Hence, the IDL is drawn in a zig-zag manner.

4] INDIAN STANDARD TIME

The Indian Government accepted the meridian of 82.5° east of the standard time which is 5hrs 30mins, ahead of Greenwich.

5] Questions

Example 1 - Determine the local time of Thimpu (Bhutan) located at 90° east longitude when the time at Greenwich (0°) is 12:00 noon.

Statement: The time increase at a rate of 4 min per one degree of longitude, east of the Prime Meridian.

⇒ Solution -

Difference between Greenwich and Thimpu = 90° of longitude

Total Time difference = $90 \times 4 = 360$ min
= $360/60$ hr

= 6 hrs / Local time of Thimpu is 6 hours more than that at Greenwich, i.e., 6:00 pm

Example 2: Determine the local time of New Orleans (the place, which was worst affected by Katrina Hurricane in October 2005), located at 90° west longitude when the time at Greenwich (00) is 12:00 noon.

Statement: The time decrease, at rate of 4 minutes per one degree of longitude, west of the prime meridian.

→ Solution:

Difference between Greenwich and New Orleans = 90° of longitude

Total Time difference = $90 \times 4 = 360$ min
= $360/60$ hr

= Cbr/Local time of New Orleans is shows less than that Greenwich, i.e. 6:00 am

Why is it at 5:30 pm in India and 12:00 noon in London?

Prime meridian or 0-degree longitude passes from London at 82 degrees 30'E. Since the Earth takes 24 hr to rotate on its own axis or to cross 360 degree longitudes.

$$360 \text{ degree} = 24 * 60 \text{ min}$$

$$1 \text{ degree} = 24 * 60 / 360 = 4 \text{ min}$$

Indian standard time passes through 82 degrees 30'E

$$82 \text{ degrees} = 82 * 4 / 60 = 328 / 60 = 5 \text{ hr and } 28 \text{ minute}$$

$$30'E = 1/2 \text{ degree} = 2 \text{ min}$$

Hence : 82 degrees 30' = 5 hours and 30 minutes.

~~Pranav~~
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