TENDER HEART HIGH SCHOOL

SECTOR 33 B, CHANDIGARH

Class: IX

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Subject: Geography

Chapter 2

Latitudes and Longitudes

Good Morning Students

This is the lesson of class IX Geography, In this lesson we will Study about Earth's Grid, Latitude and its importance, Important Latitudes of Earth, Heat zones of Earth, Great Circle Routes, Longitudes and its importance, Greenwich Mean Time, Standard Time, Local Time and its calculation, International Date Line (IDL), World Time Zones.

LATITUDES AND LONGITUDES

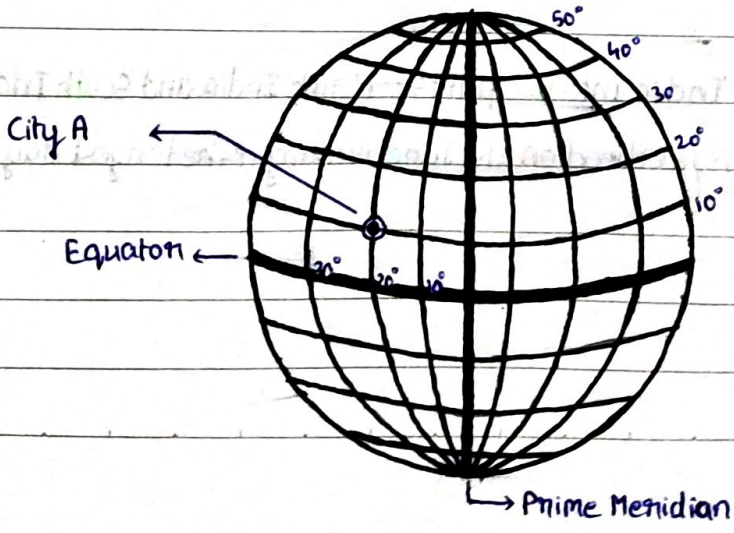
INTRODUCTION

→ Earth's Spherical Shape is best represented by a Globe.
→ The Earth is flattened at the Poles and slightly bulged at the Equator.
→ This shape of Earth is due to Centrifugal Force and Gravitational Force and this shape is referred as Geoid.
→ Equator, the 0° Latitude, divides Earth into Northern Hemisphere and Southern Hemisphere.
→ 180° Longitude and 0° Longitude, named Prime Meridian divides the Earth into Eastern and Western Hemisphere.

EARTH'S GRID SYSTEM

→ The network of Latitudes and Longitudes present on Globe is referred as Grid System.
→ It enables us to determine the location of any place on the Earth's Surface.
→ This Grid System has latitudes drawn from east to west and Longitudes drawn from North Pole to South Pole.
→ The intersection of Latitudes and Longitudes points out the exact location of a place on our Earth's Surface.
→ Latitude points whether the place is situated in Northern Hemisphere or Southern Hemisphere and Longitude points whether the place is situated in Eastern Hemisphere or Western Hemisphere.

Thus, location of place on Earth's Surface is shown below



The location of City A on Globe is 10°N and 20°W.

LATITUDES AND ITS IMPORTANCE

→ Latitude of a place is the angular distance of that place, North or South of the Equator as measured from the centre of the Earth.
→ Lines of Latitudes are drawn parallel to Equator.
→ Lines of Latitudes never meet with each other.
→ Latitudes starts growing smaller towards the Poles.
→ Equator is regarded as longest Latitudes and divides Earth into Northern and Southern Hemisphere.
→ The distance between each Latitude is 111 kms (approx)
→ Latitudes marks the Heat zones of the Earth.
→ The Latitudes helps us to know whether the place is situated North of Equator or South of Equator.
→ Latitudes also helps us to know the vegetation of a place.
→ The Sailors and Aircrafts uses Great Circle routes of Latitude to save time and Fuel.

IMPORTANT LATITUDES OF EARTH

(A) Equator (0°)

→ It is 0° Latitude that divides the Earth into two equal haves, namely Northern Hemisphere and Southern Hemisphere.
→ The rays of sun falls vertically over the Equator throughout the Year.
→ The region that falls near to Equator experiences convectional Rainfall.

(B) Tropic of Cancer (23½° N)

→ This latitude divides India into two parts – North India and South India.
→ On this latitude Sun is overhead on 21st June, making it the longest day in Northern Hemisphere.

(C) Tropic of Capricornn (23½°S)

→ This latitude passes through Africa, Australia and South America.
→ on this latitude Sun is overhead on 22nd December, making it the longest day in Southern Hemisphere.

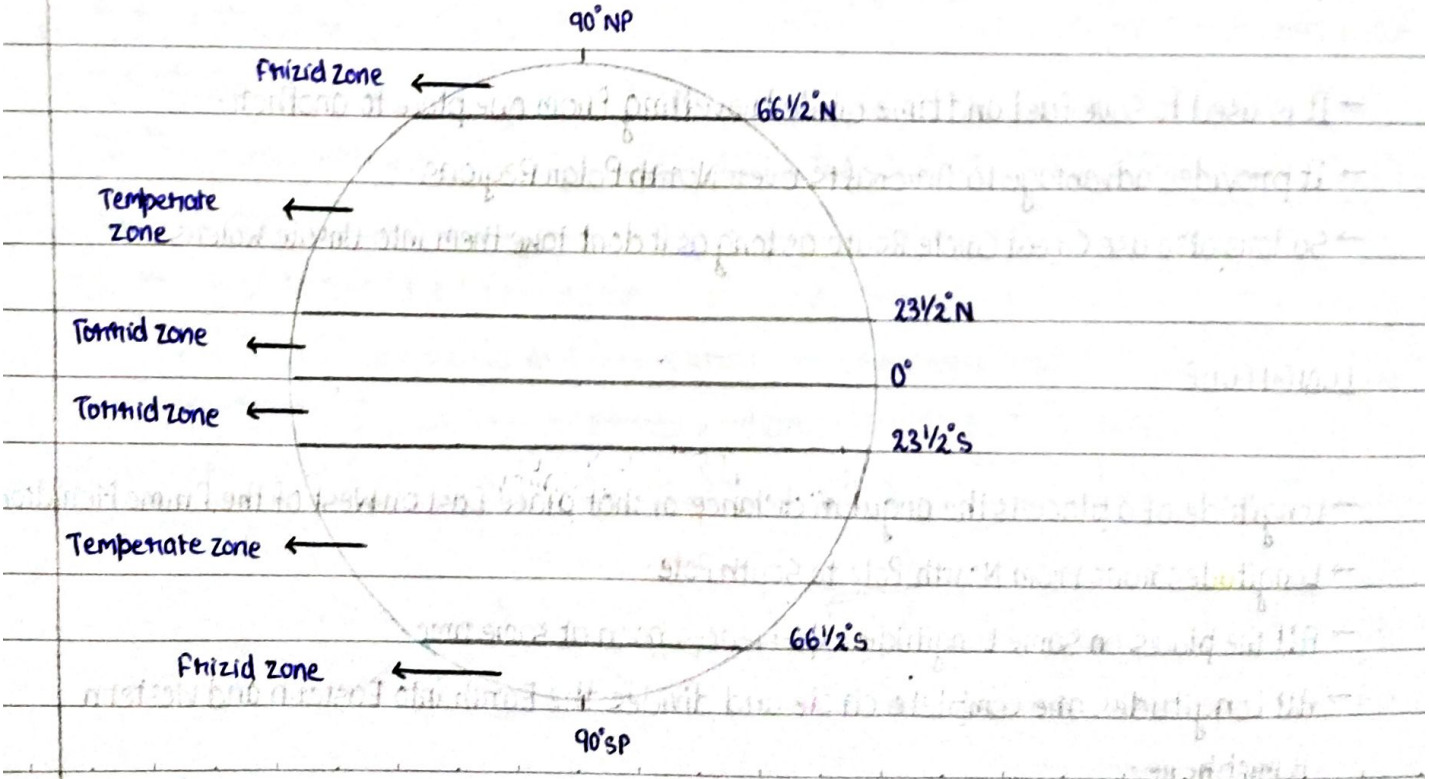
(D) Arctic Circle (66½°N)

→ It marks the Temperate Region in Northern Hemisphere.
→ It experiences 6 months days and 6 months night.
→ The area within this latitude receives oblique rays of Sun.

(E) Antarctic Circle (66½°S)

→ This latitude passes through Antarctica.
→ The area that falls on this latitude or near to this latitude has permafrost conditions.
→ The Sun Rays rarely reach here.

CLIMATIC ZONES OR HEAT ZONES OF THE EARTH



(A) Tornid Zone

→ This Zone lies between Tropic of Cancer (23½°N) and Tropic of Capricorn (23½°S).
→ Equator divides this zone into North Tornid Zone and South Tornid Zone.
→ In this zone, the areas that lie between 5°N and 5°S are referred as Doldrums and these areas experiences high temperature and low pressure due to direct rays of the Sun.

(B) Temperate Zone

→ The Northern Part of this Zone lies between 23½°N to 66½°N and the Southern Part of this zone lies between 23½°S to 66½°S.
→ This zone experiences moderate type of Climate.
→ This zone has great difference between summer and winter Temperature.

THE GREAT CIRCLE ROUTES

The Great Circle routes follows the Perimeter of the Earth that covers the Shortest distance between any two places inspite of Zig zag route along the surface of the Earth.

Importance of Great Circle Routes

→ It is used to save fuel and time while travelling from one place to another.
→ It provides advantage to Aircrafts over North Polar Regions.
→ Sailors also use Great Circle Route as long as it dont take them into Unsafe Waters.

LONGITUDE

→ Longitude of a place is the angular distance of that place East or West of the Prime Meridian.
→ Longitudes runs from North Pole to South Pole.
→ All the places on same Longitude experiences noon at same time.
→ All Longitudes are complete circle and divides the Earth into Eastern and Western Hemisphere.

→ The 180° Longitude and the Prime Meridian together forms one complete circle.
→ The 0° Longitude is known as Prime Meridian and 180° Longitude is known as International Date Line.
→ The Distance between two longitudes is maximum at Equator, about 111 kms and it decreases Polewards.

Importance of Longitudes

→ They help us to find location on Earth's Surface along with Equator.
→ They help us to find time of an area.
→ 180° Longitude forms International Date Line that helps us to know date.

GREENWICH MEAN TIME (GMT)

→ If there would have been no system of Time, the working system in the world would have stopped.
→ Moreover, if each town, village or city in the world would have kept its own time, then a lot of Confusion would have caused.
→ This is because while travelling from one place to another the clocks and watches have to be altered on regular basis.
→ To solve this problem Greenwich Mean Time (GMT) is taken as reference for International Time of the Globe.
→ The longitude Prime Meridian is the zero degree meridian that passes through Greenwich near London
→ In the year 1884, the local time of Prime Meridian (0°) was accepted as International Time by all the countries of the world and it was known as Greenwich Mean Time (GMT).
→ When Sun is directly overhead at Prime Meridian, it is 12 o'clock (noon) there. Hence, the time is added to GMT towards East of Prime Meridian and deducted to GMT towards West of Prime Meridian.
→ Thus, when it will be noon at Prime Meridian, then the places situated towards the East of Prime Meridian will have Evening while the places situated to the west of Prime Meridian will have Morning.

LOCAL TIME AND ITS CALCULATION

→ When the Sun overhead on a longitude, than the places situated on that particular longitude will experience noon at same time and this particular time will be referred as local time.

→ The local time of a place can be calculated if we know the longitude of that place.

→ This concept is explained below with the help of Example:

Example 1:

▲ Find out the time difference between Greenwich - 0° Longitude and Allahabad - 82°30' East longitude.

Ans - Longitude at Greenwich = 0°

Longitude at Allahabad = 82°30'

Longitudinal Difference = 82°30'E - 0°

= 82°30'

∴ Time Difference = 82°30' x 4 (It is multiplied by 4 because 4 minutes in every 1°)

= 330 minutes

Conversion in hours = $\frac{330}{60}$

= 5:30 hrs

Example 2:

▲ Find out the time at 40°E longitude when the time at 20°W longitude is 2:00PM.

Ans. Time at 20°W longitude = 2:00 PM

Longitudinal Difference = 20° + 40°

= 60°

∴ Time Difference = 60° x 4 (It is multiplied by 4 because every 1° has 4 minutes)

= 240 minutes

Conversion in hrs = $\frac{240}{60}$

= 4 hrs

Since time in 20°W longitude is = 2:00 PM

So, the time in 40°E longitude is = 2 + 4 = 6:00 PM

Example 3:

▲ What will be the time at 90°W longitude when the time at 10°W longitude is 8:00 AM

Ans Time at 10°W longitude = 8:00 AM

Longitudinal Difference = 90°-10°

= 80°

∴ Time Difference = 80×4

= 320 minutes

Conversion into hours = $\frac{320}{60}$

= 5:20 hrs

∴ Time at 90°W = 8:00 - 5:20 (because 90°W is situated to the west of 10°W)

= 2:40 AM

STANDARD TIME

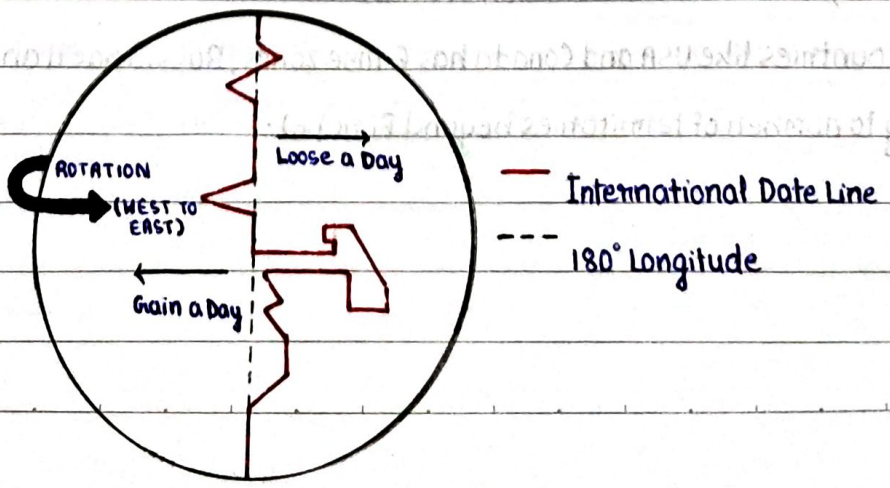
→ If each city would have kept the time of its own longitude then there would have been much difference in local time between one city and another.

→ So to counter this problem, most countries adopted the local time of central Meridian as the standard time of the country.

→ The Standard Meridian of a country is taken as multiple of 15° or 7½°. This is taken so that the difference of time between GMT and country's Standard Time is expressed as multiple of 1 hour or half an hour.

→ India follows the local time of 82°30'E Longitude and it is 5hrs and 30minutes ahead of GMT Moreover, Nepal and Srilanka being close to India also follows the same time.

INTERNATIONAL DATE LINE



→ we know that dates are necessary for the measurement of time.
→ The simplest way to keep date of the place is to change the date as the place has next sunrise.
→ Each successive sunrise will mark the beginning of next day and date.
→ But this method has major limitations. Say a large country may have two dates within its territory.
→ This problem was solved by considering 180° meridian as International Date Line.
→ International Date Line (IDL) passes through centre centre of Pacific Ocean and when we travel East of this line, it is referred as 180°E and when we travel west of this line, it is referred as 180°W.
→ on either side of this line a time difference of 1 Day is observed and the reason of this is that Earth completes one rotation in 24 hrs from west to East.
→ while travelling across 180° meridian from West to East will add one day. on the other hand, while travelling across 180° meridian from East to West will loose one day.
→ Thus, the shape of International Date Line is straight, but wherever there is landmass in Pacific Ocean, a zig zag deviation is internationally accepted.

REASON FOR INTERNATIONAL DATE LINE NOT STRAIGHT

International Date Line is not straight because some islands along this line lies either close to this line or on it. So to keep those islands either on Eastern Side or Western Side, International Date Line is not a straight Line.

WORLD TIME ZONE

→ The world is divided in 24 Time Zones.
→ Each Time Zone differs from other by 15° or 1 hour.
→ All the places follows fixed time as per the central Meridian. Say, India follows time of 82°30' East longitude, which is central Meridian of India.
→ Some countries like USA and Canada has 6 Time zones, Russia has 11 and France has 12 Time Zones (owing to number of territories beyond Europe).

Now Students Lets revise the topic by means of quick retest. I will again read out the questions which you all will try to find.

Q1) Which Zone experiences 6 Months days and 6 Months Night?

Q2) Which longitude gives International Time?

Q3) Name the Standard Meridian of India.

Q4) Which longitude is considered as International Date Line?

Q5) Which Country has more Time Zones?

Thus, after sometime, the answers were discussed in the Class.

Ans1) North Temperate Zone.

Ans2) Prime Meridian

Ans3) 82°30'E Longitude

Ans4) 180° Longitude

Ans5) France

I hope you all have understood the topic very well. So you all are required to read chapter 1 and also the questions and answers of Back exercise of chapter 1.

With this I conclude the interactive session.