GEOGRAPHIC GRID—LATITUDES AND LONGITUDES
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LEARNING OBJECTIVES:
- To acquire knowledge of the lines of latitudes and longitudes, their location and their significance in locating place on a spherical surface.
- To be able to understand the difference between local and standard time and the need for time zones.
- To develop an understanding about the significance of the International date line and is able to calculate time.
- To be able to understand the meaning of Great circle and its significance.

CONTENT: 1. meaning of latitudes and longitudes, their characteristics.

2. Uses of latitudes and longitudes.

3. Meaning of Heat Zones, Time zones, Standard time, Local time, Great and Small circles

4. Significance and features of the International Date Line.

5. Calculation of local time.

NOTES FOR GUIDANCE:

The earth's surface is so vast that unless a mathematical method is used, it is impossible to locate any place on it. For this reason, imaginary lines are drawn on the globe. The lines running east to west, parallel to the Equator, are called lines of latitude. The lines running north to south passing through the poles are called lines of longitude. The intersection of latitudes and longitudes pinpoint any place on the

earth's surface. These crisscrossing lines form a framework known as the **Geographic Grid.**

LINES OF LATITUDES

- A latitude is the angular distance of a place north or south of the Equator.
- A latitude is marked in degrees, with Equator being O degrees.
- Latitudes are calculated according to the angle a place makes with the centre of the earth
- Lines of Latitude are the imaginary lines joining all places having the same latitude towards north or south of the Equator.
- Since the lines of latitude are parallel to the equator and each other, they are called parallelof latitudes.
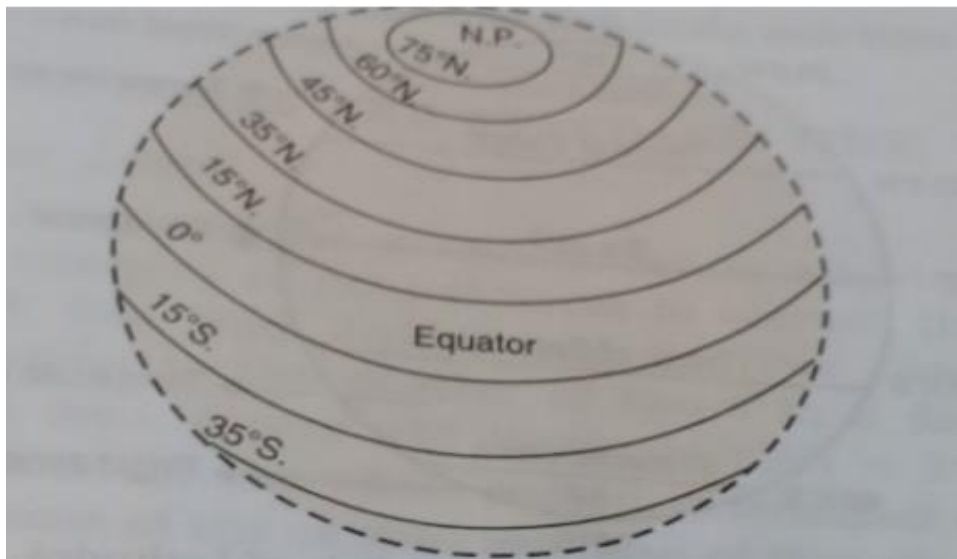
LINES OF LATITUDES.

a) They run from west to east.

b) They are parallel to the Equator.

c) There are 181 lines of latitudes at an interval of 1degree.

d) The distance between them is the same.

e) The length of the parallels of latitudes decreases towards the

poles.(this is due to the spherical shape of the Earth.)

IMPORTANT LINES OF LATITUDES AND HEAT ZONES (THERMAL ZONES)
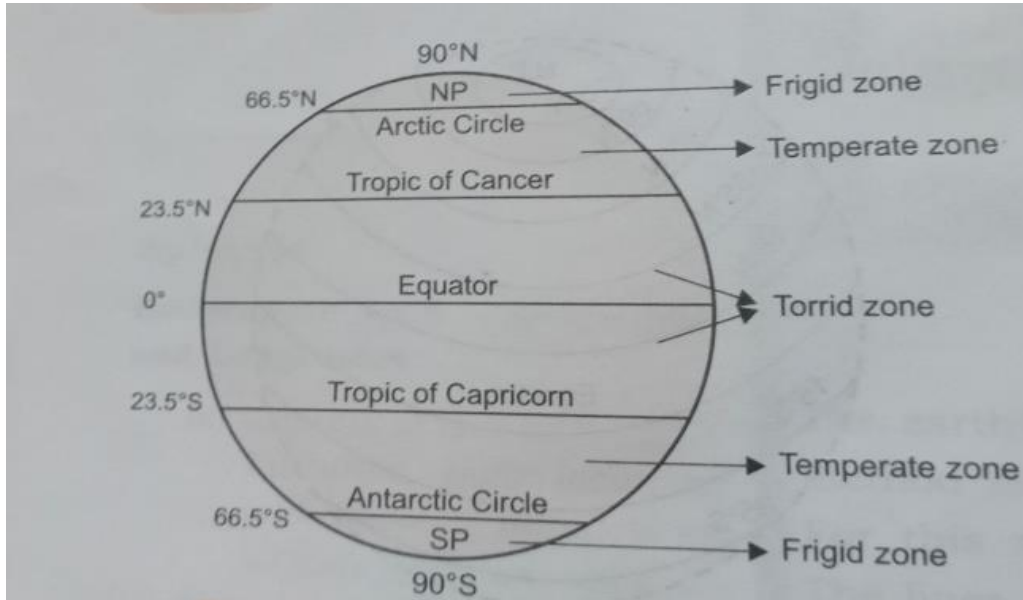
1). *TORRID ZONE* : THIS IS THE HOTTEST ZONE.(RECEIVES DIRECT RAYS OF THE SUN.)

2). *TEMPERATE ZONE* :THIS NEITHER TOO HOT NOR TO COLD.(RECEIVES THE SLANTING RAYS OF THE SUN.)

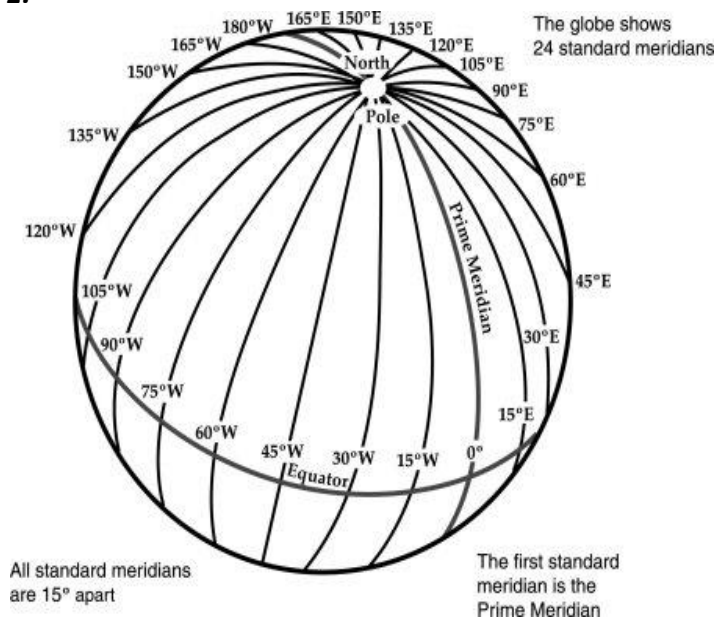3). *FRIGID ZONE* THIS IS THE COLDEST ZONE.(RECEIVES EXTREMELY SLANTING RAYS OF THE SUN.)

LINES OF LONGITUDES

A LONGITUDE OF A PLACE IS THE ANGULAR DISTANCE OF A PLACE EAST OR WEST OF THE PRIME MERIDIAN.

• The Prime Meridian is the Line of longitude whose angular distance is defined as 0 degree.

- It passes through Greenwich near London. The lines to the west of Greenwich are suffixed with 'W'   and those east of the Greenwich are suffixed with 'E'

LINES OF LONGITUDES

1.

The globe shows 24 standard meridians

All standard meridians are 15° apart

The first standard meridian is the Prime Meridian

These Lines Run From North Pole To The South

2. They Converge At The Poles.

3. They Are Of Equal Length.

4. The Distance Between Them Is Not The Same.

5. There Are 360 Lines Of Longitude At An Interval Of 1degree.

LONGITUDE AND TIME

The earth makes a complete turn on its axis in 24 hours. Thus, the 360 meridians of longitude take 24 hours to pass under the Sun i.e. 15 degrees pass under the Sun in one hour, i.e., one degree in 4 minutes. Time is measured on the basis of the overhead

Sun at a place, which is 12.00 noon. This is local time for each degree of longitude. Local time varies by 4 minutes.

TIME ZONES

Zones located between a given east or west longitudinal extent within which standard time is applied uniformly are called time zones.

LOCAL TIME AND STANDARD TIME

❖ Local time of any place is obtained by the overhead Sun at noon. So places at different longitudes will have their own local time. All places situated along a meridian have the overhead Sun at the same time so they will have same local time even if they are situated at different latitudes.

❖ A uniform time throughout the country is followed in most parts of the world and is called the standard time. The world is divided into 24 time zones. The central longitude of each zone is the standard longitude of the time zone in which it lies. Standard time must always be divisible by 7*30'.

GREENWICH MEAN TIME AND INDIAN STANDARD TIME

❖ To bring about international uniformity, one particular standard time has been selected by all the countries. That standard meridian pertains to the Prime Meridian (0 degree longitude) which is known as the Greenwich Mean Time.

❖ 82 degree 30' is the Central Meridian of India which passes through Allahabad. So the standard meridian of India is 82 degree 30'. The Indian Standard Time with respect to the Greenwich meridian is 82 degree 30'*4minutes=330 minutes or 5 hours 30 minutes. Indian time is 5 hours 30 minutes ahead of G.M.T.(Greenwich Mean Time)

CALCULATION OFLONGITUDE AND TIME

➢ ***To find local time when we know the longitude:***

EXAMPLE NO. 1

If the GMT at 0 degree longitude is noon, find the local time at 30 degree east.

The difference in longitude between 0 degree and 30 degree east is 30 longitudes

Since it is 12 o'clock at 0 degree, the difference of time will be 30*4=120 minutes or 2 hours

As the place is located to the east, it will be 2 hours ahead of Greenwich time: 12+2=14 hours or 2:00 p. m.(EGA)

Therefore time at 30 degree east longitude will be 2:00 p. m.

EXAMPLE NO. 2

If the GMT at 0 degree longitude is 12 noon, find the local time at 60 degree west.

The difference in longitude between 0 degree and 60 degree west is 60 longitudes

Since it is 12 o'clock at 0 degree, the difference of time will be 60*4=240 minutes or 4 hours

As the place is located to the west, it will be 4 hours behind Greenwich time: 12-4=8 hours or 8:00 a.m.(WLS)

Therefore time at 60 degree west longitude will be 8:00 a.m.

➢ *To find longitude when time is given:*

EXAMPLE

What is the longitude of station A whose local time is 7:00 p.m. while GMT is 12 noon?

Difference in time between GMT and the given place A is 7 hours or 7*60 minutes= 420 minutes

There is a time difference of 4 minutes between each longitude.

Hence, the longitude of station A will be ¼*420=105 longitude

Since the local time of place A is ahead of Greenwich, i.e., 7:00 p.m., longitude of station A is 105 degree east.

INTERNATIONAL DATE LINE

- International Date Line or IDL is a line concerned with the dates of the calendar and adopted internationally.

- It is taken as 180 degree meridian. It passes through the middle of the Pacific Ocean.
- When we travel east of this line it is referred to as 180 degree east and when we travel west of this line it is referred to as 180 degree west.
- On either side of this line, a difference of one whole day is observed. This is because the earth completes one rotation on its axis in 24 hours as it moves from west to east.
- Meridian 180 degree was chosen as International Date Line because it passes through the middle of the Pacific Ocean and there is practically no landmass, and wherever there is landmass a deviation has been taken.
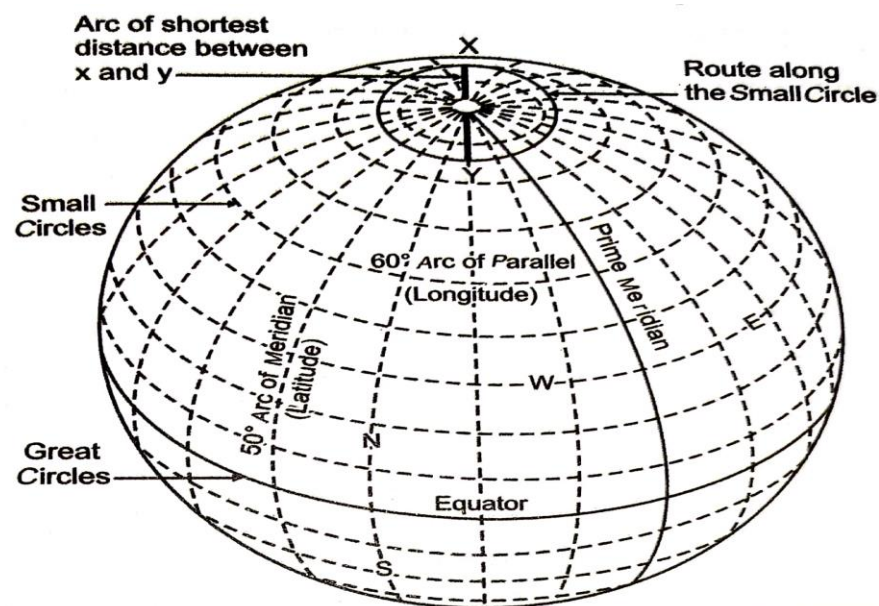
GREAT AND SMALL CIRCLES

- The 0 degree latitude is the only *Great Circle* as its plane passes through the center of the globe. All other latitudes are *Small circles.*
- A circle dividing the Earth into two equal parts is called the Great Circle as this circle is drawn on the Earth in such a way that the centre of this circle is the centre of the Earth.
- A small circle on the Earth does not divide it into two equal parts.

- ➢ The Equator and all diametrically opposite longitudes touch the centre of a circle and therefore are Great circles.
- ➢ All the parallels of latitudes, except equator, are small circles.

USES OF GREAT CIRCLES

The shortest distance between two points on the earth's surface is the *Arc of Great Circle,* and is known as the **Great CircleRoute.**

- ❖ Navigators use great circles to find the shortest distance between any two points on the earth's surface.
- ❖ Great Circles are used by meteorologists to determine the climate and weather conditions in a region.

ADDITIONAL RESOURCES.

1.https://youtu.be/y6aPerEPbvw
2.https://www.youtube.com/watch?v=hPpWCTHjzQI
3.https://www.youtube.com/watch?v=X1DkiuaFCuA