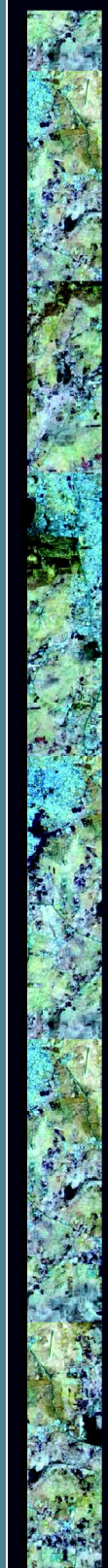


26

Chapter 3



Glossary

Parallels of 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.

Meridians of Longitude : The meridians of 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
as meridians.

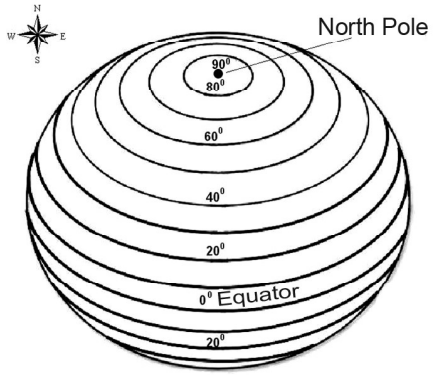


Figure 3.1 Parallels of Latitudes

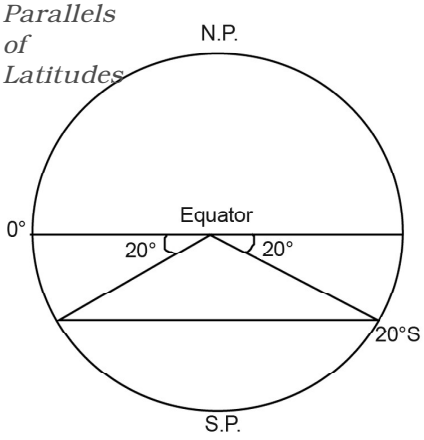


Figure 3.2 Drawing of Parallels of Latitudes

© BSTBPC
WEB COPY ,NOT TO BE PUBLISHED

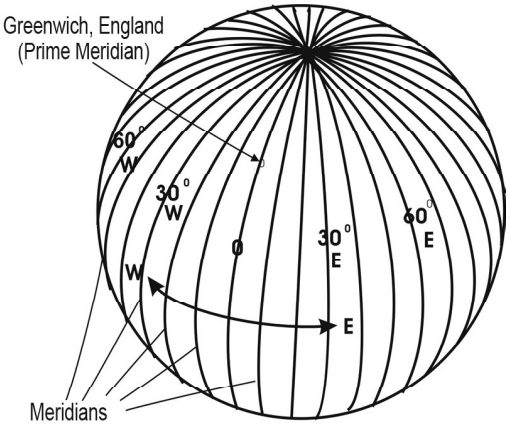


Figure 3.3 Meridians of Longitude

The latitudes and longitudes are commonly referred to as geographical coordinates as they provide systematic network of lines upon which the position of various surface features of the earth, can be represented. With the help of these coordinates, location, distance and direction of various points can be easily determined.

Although an infinite number of parallels and meridians may be drawn on a globe, only a selected number of them are usually drawn on a map. Latitudes and longitudes are measured in degrees (°) because they represent angular distances. Each degree is further divided into 60 minutes (') and each minute into 60 seconds (").

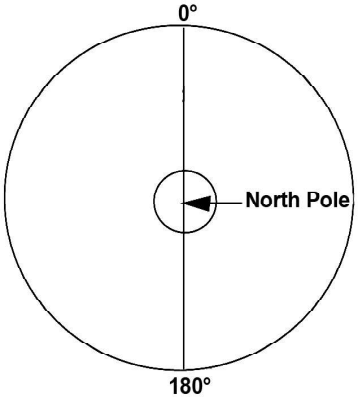


Figure 3.4 Meridians of 0^0 and 180^0 join at the North Pole

Parallels of Latitudes

The latitude of a place on the earth's surface is its distance north or south of the equator, measured along the meridian of that place as an angle from the centre of the earth. Lines joining places with the same latitudes are called *parallels.* The value of equator is 0° and the latitude of the poles are 90°N and 90°S (Fig. 3.1 on the next page). If parallels of latitude are drawn at an interval of one degree, there will be 89 parallels in the northern and the

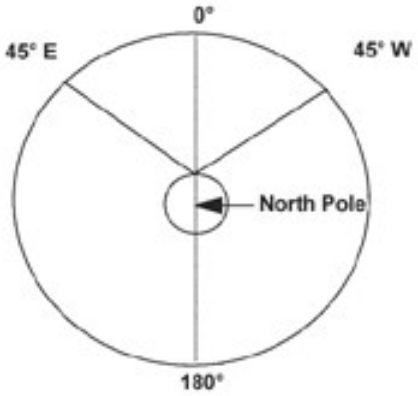


Figure 3.5 Drawing of Meridians of Longitude

Table 3.1 A Comparison between the Parallels of Latitudes and t he Meridians of Longitudes

S. No.	Parallels of Latitude	Meridians of Longitude

southern hemispheres each. The total number of parallels thus drawn, including the equator, will be 179. Depending upon the location of a feature or a place north or south of the equator, the letter N or S is written along with the value of the latitude.

If the earth were a perfect sphere, the length of 1^0 of latitude (a one degree arc of a meridian) would be a constant value, i.e. 111 km everywhere on the earth. This length is almost the same as that of a degree of longitude at the equator. But to be precise, a degree of latitude changes slightly in length from the equator to the poles. While at the equator, it is 110.6 km at the poles, it is 111.7 km. Latitude of a place may be determined with the help of the altitude of the sun or the Pole Star.

Drawing The Parallels Of Latitudes

How to draw the parallels of latitudes? Draw a circle and divide it into two equal halves by drawing a horizontal line in the centre. This represents the equator. Place a protractor on this circle in a way that 0° and 180° line on the protractor coincide with the equator on the paper. Now to draw 20°S, mark two points at an angle of 20° from the equator, east and west in the lower half of the circle, as shown in Fig. 3.2. The arms of the angle cut the circle at two points. Join these two points by a line parallel to the equator. It will be 20^0S.

Meridians of Longitude

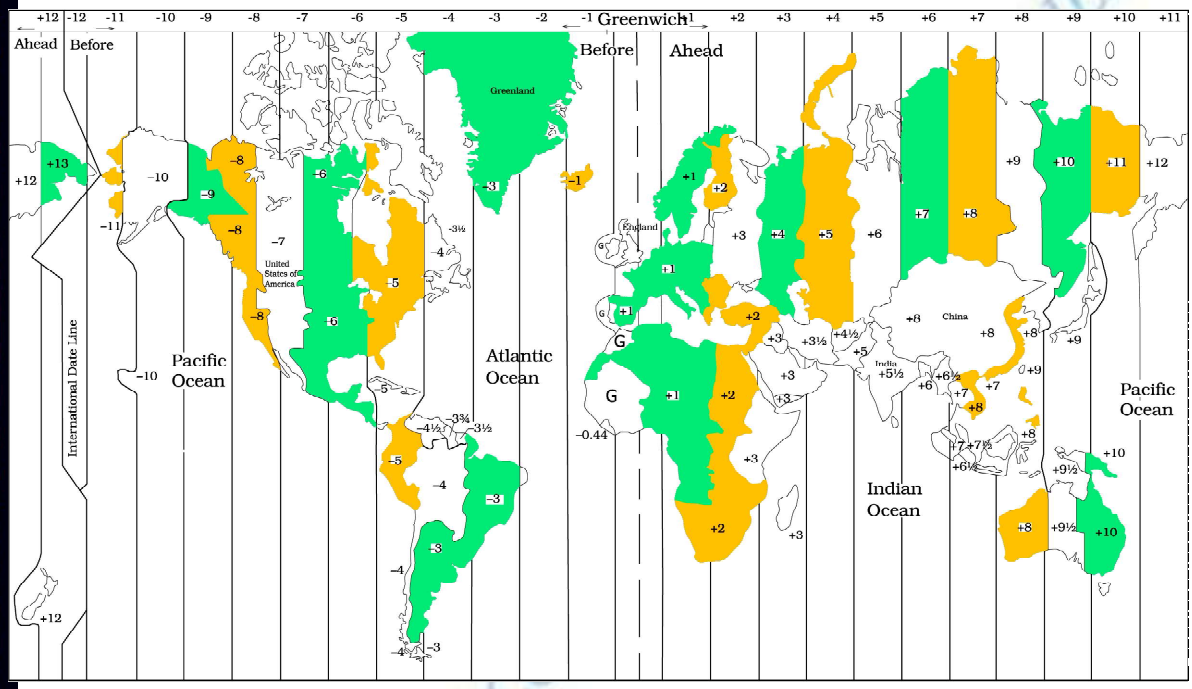
Unlike the parallels of latitude which are circles, the meridians of longitude are semi-circles that converge at the poles. If opposite meridians are taken together, they complete a circle, but, they are valued separately as two meridians.

The meridians intersect the equator at right angles. Unlike the parallels of latitude, they are all equal in length. For convenience of numbering, the meridian of longitude passing through the Greenwich observatory (near London) has been adopted as the *Prime Meridian* by an international agreement and has been given the value of 0°.

The *longitude* of a place is its angular distance east or west of the Prime Meridian. It is also measured in degrees. The longitudes vary from 0° to 180° eastward and westward of the Prime Meridian (Fig. 3.3). The

part of the earth east of the Prime Meridian is called the eastern hemisphere and in its west referred to as the western hemisphere.

Drawing the Meridians of Longitude



How to draw the lines of longitude? Draw a circle whose centre represents the North Pole. The circumference will represent the equator. Draw a vertical line through the centre of the circle, i.e. crossing the North Pole. This represents the 0° and 180° meridians, which meet at the North Pole (Fig. 3.4).

When you look at a map, the east is towards your right and the west is towards your left. However, to draw a longitude, imagine that you are on the North Pole, i.e. at the centre of the circle as shown in Fig. 3.4. Observe now that the relative directions of east and west would reverse in this case and east would be towards your left while west would be towards your right. Now, draw 45° E and W as shown in Fig. 3.5 For this, place your protractor along the vertical line, coinciding with the 0° and 180° meridians and then measure 45° on both the sides, which will denote 45° E meridian and 45° W meridian on your left and right, respectively. The diagram will represent the appearance of the earth if we look at it from directly above the North Pole.

(i)
(ii)
(iii)
(iv)
(v)

Longitude and Time

We all know that the earth rotates from west to east over its axis. It makes the sun rise in the east and set in the west. The rotation of the earth over its axis takes 24 hours to complete one circle or 360° of longitudes. As 180° of longitudes fall both east and west of the Prime Meridian, the sun, thus takes 12 hours' time to traverse the eastern and western hemispheres. In other words, the sun traverses 15⁰ of longitudes per hour or one degree of longitude in every four minutes of time. It may further be noted that the time decreases when we move from west to east and increases with our westward movement.

(i)
(ii)
(iii)
(iv)
(v)
(vi)
(vii)
(viii)

The rate of the time at which the sun traverses over certain degrees of longitudes is used to determine the local time of an area with respect to the time at the Prime Meridian (0°Longitude). Let us try to understand the question of the determination of time with respect to the Prime Meridian with the following set of examples :

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 increases at a rate of 4 minutes per one degree of longitude, east of the Prime Meridian.

Solution :

(i)

(ii)

(iii) Difference between Greenwich and Thimpu = 90° of longitudes

(iv) Total Time difference = 90 x 4 = 360 minutes

(v) = 360 / 60 hours

(vi) = 6 hours\Local time of Thimpu is 6 hours more than that at Greenwich, i.e. 6.00 p.m.

© BSTB WEB COPY, NOT TO BE PUBLISHED