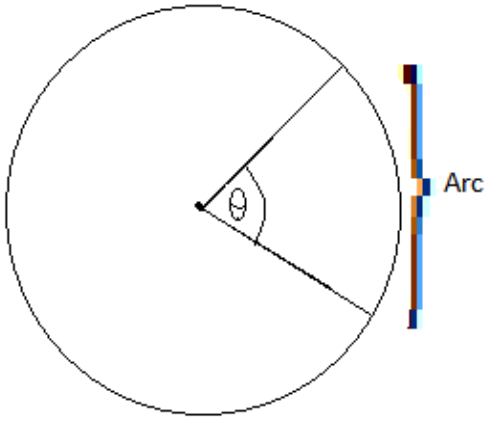
CHAPTER ELEVEN

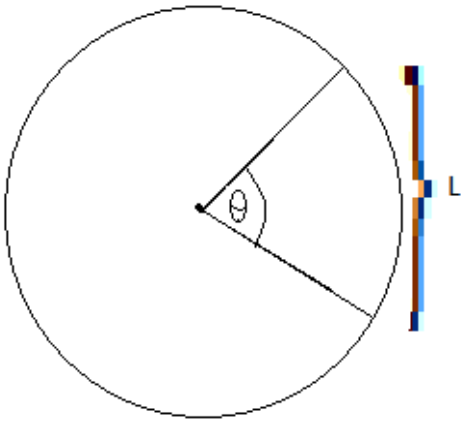
GLOBAL MATHEMATICS



- The figure shows an arc with angle θ at its centre.
- The length of an arc with angle θ at its centre = $\frac{\theta}{360}$ x 2πr, where r = the radius.

(Q1) Find the length of an arc which has an angle of 60^0 at the centre, and a radius of 10cm.

Soln:



Let the length of the arc = L, and $\theta = 60^0$.

Since L = $\frac{\theta}{360}$ x 2πr => L = $\frac{60}{360}$ x 2 x 3.14 x 10 = 1.04cm.

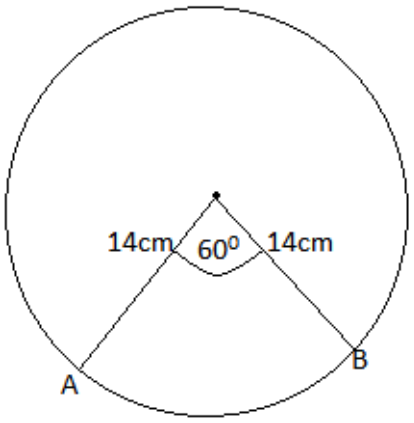
(Q2)An arc AB subtends an angle of 60^0 at the centre of a circle of radius 14cm.

Find (i) the length of the arc AB.

ii) the length of the chord AB. (Take π = 3.142 or $\frac{22}{7}$).

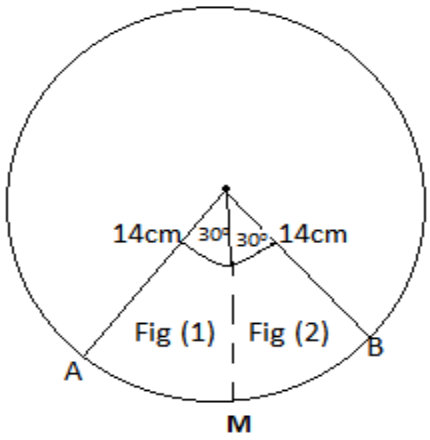
Soln:

(i)



Length of arc AB = $\frac{\theta}{360}$ x 2πr = $\frac{60}{360}$ x 2 x 3.14 x 14 = 15cm.

(II)



Considering Fig.(1), Sin $30^0 = \frac{AM}{14}$

=> AM = 14 x sin 30^0, => AM = 14 x 0.5 = 7cm.

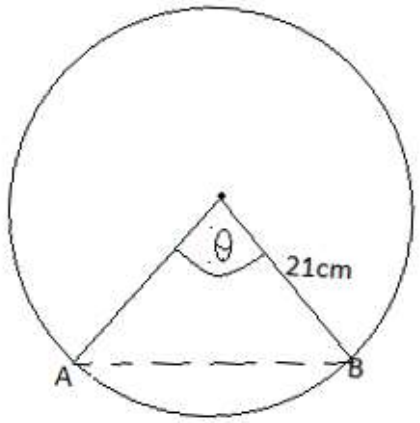
But AB = 2AM = 2(7) = 14cm.

Length of chord AB = AB = 14cm.

(Q3) An arc AB is of length 28.5cm, and the diameter of the circle is 42cm. Find θ the angle subtended at the centre of the circle.

Soln:

Length of arc = 28.5cm. Since diameter = 42cm => radius = 21cm.



Since length of arc AB = $\frac{\theta}{360}$ x 2πr,

=>28.5 = $\frac{\theta}{360}$ x 2 x $\frac{22}{7}$ x 21

=>28.5 = $\frac{132\theta}{360}$

=>132θ = 28.5 x 360,

=>132θ = 10260, => $\theta = \frac{10260}{132}$, => θ = 78^0

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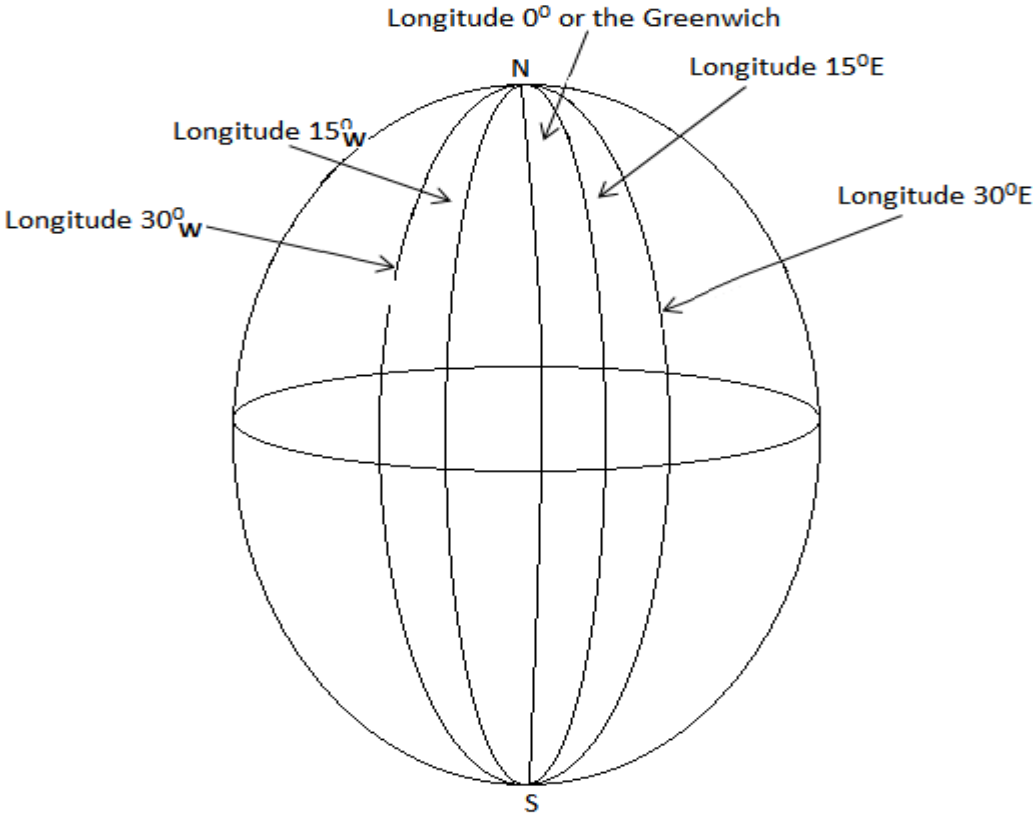
The Earth:



N/B:

- Longitude 180^0W always meets longitude 180^0E.

- When two longitudes have a similar direction, i.e either East or West, then their difference is used in calculation.

- For example longitude 10^0E and longitude 25^0E have a similar direction, which is East.

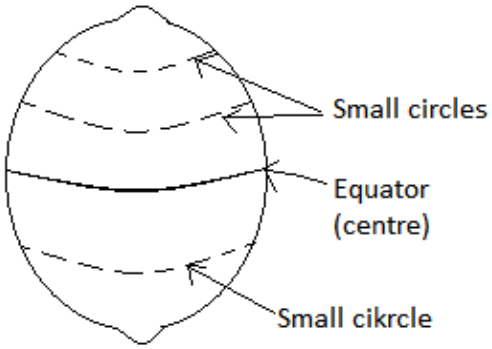
- Therefore their difference i.e 25 – 10 = 15^0 must be used in calculation.

- When the two longitudes differ in direction, then their sum is used.

- For example, considering longitude 25^0W and longitude 15^0E, their sum i.e. 15 + 25 = 40^0, must be used in calculation.

Small and great circles:

- A small circle is obtained when the line of longitude or the line of latitude does not through the centre of the earth.



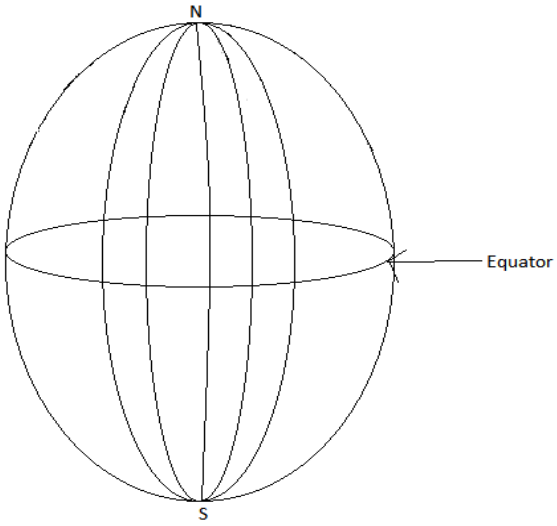
- A great circle is obtained when the line of latitude or the line of longitude passes though the centre of the earth.

- All longitudes are great circles, since they all pass through the centre of the earth.

- The equator is the only latitude which passes through the centre of the earth.

- For this reason, it is the only latitude which is a great circle.

- It must be noted that every longitude passes through the north pole and the south pole.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Equator
S