

78 XI 30/4 **STUDY MATERIAL BASED ON**
3. A wheel makes 360 revolutions in one minute. Through
how many radians does it turn in one second ?

Sol. Angle rotated in one revolution = 2π radians
 \therefore Angle rotated in 360 revolutions = $360 \times 2\pi$ radians
 \Rightarrow Angle turned in one minute or 60 sec = $360 \times 2\pi$.

EX- Hence, angle turned in 1 sec = $\frac{360 \times 2\pi}{60}$
 $= 12\pi$ radians.

3.1

4. Find the degree measure of the angle subtended at the centre of a circle of radius 100 cm by an arc of length 22 cm.

(Use $\pi = \frac{22}{7}$)

Sol. We know that :

where $l = r\theta$,
 l = length of arc = 20 cm,
 r = radius of circle = 100 cm
and θ = angle subtended at the centre

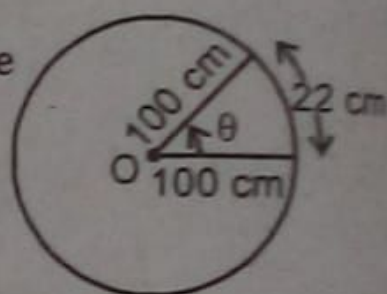
$\therefore \theta = \frac{l}{r} = \frac{22}{100} = 0.22$ radians

$= 0.22 \times \frac{180^\circ}{\pi}$

$= \left(\frac{0.22 \times 180 \times 7}{22} \right)^\circ$

$= \left(\frac{22}{100} \times \frac{180 \times 7}{22} \right)^\circ$

$= \left(\frac{126}{10} \right)^\circ = 12^\circ 36'$



radius = 100 cm

12 $\overline{) 126}$ (12 degrees

120
 6

$\times 60$

10 $\overline{) 360}$ (36 minutes

360

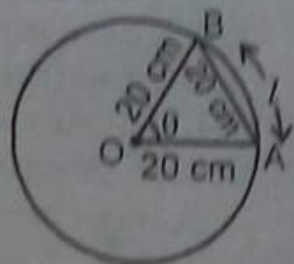
\times

5. In a circle of diameter 40 cm, the length of a chord is 20 cm. Find the length of the minor arc corresponding to the chord.

Sol. Since radius = length of chord = 20 cm, so ΔOAB is equilateral triangle
 $\Rightarrow \theta = 60^\circ$.

Now, $l = r\theta$.

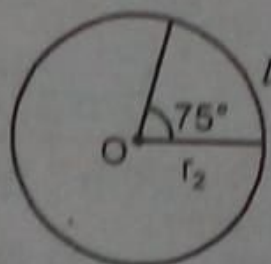
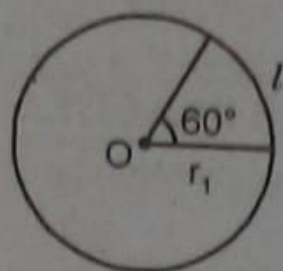
So, $l = 20 \times 60^\circ \times \frac{\pi}{180^\circ} = \frac{20\pi}{3}$



Thus, $l = \frac{20\pi}{3}$ cm.

6. If, in two circles, arcs of the same length subtend angles of 60° and 75° at their centres, find the ratio of their radii.

Sol.



$$\begin{aligned}
 l &= r_1\theta & \text{and} & & l &= r_2\theta \\
 &= r_1 \times 60 \times \frac{\pi}{180} & & & &= r_2 \times 75 \times \frac{\pi}{180} \\
 &= \frac{\pi r_1}{3} & & & &= \frac{5\pi r_2}{12}
 \end{aligned}$$

Since l is same for both the circles, therefore

$$\frac{\pi}{3}r_1 = \frac{5\pi}{12}r_2$$

$$\Rightarrow r_1 : r_2 = 5 : 4$$

7. Find the angle in radians through which a pendulum swings, if its length is 75 cm and the tip describes an arc of length :

(i) 10 cm

(ii) 15 cm

(iii) 21 cm.

Sol. (i)

$$r = 75 \text{ cm,}$$

$$l = 10 \text{ cm,}$$

$$\theta = ?$$

$$\Rightarrow \theta = \frac{l}{r} = \frac{10}{75} \text{ radians.}$$