Exercise 7.2

Q.1 Find θ, when

(i) $l = 2cm, r = 3.5cm \quad \theta =$?

Solution:

Since $\theta = \frac{l}{r}$

$= \frac{2}{3.5} \quad = 0.5714\, radians$

(ii) $l = 4.5m, r = 2.5m \quad \theta =$?

Solution:

Since $\theta = \frac{l}{r}$

$= \frac{4.5}{2.5} \quad = 1.8\, radians$

Q.2 Find l, when

(i) $\theta = 180^\circ, r = 4.9cm, \quad l =$?

Solution:

$\theta = 180^\circ \times \frac{\pi}{180} \quad = \pi\, radians$

$l = \theta r \quad = (\pi)(4.9)$

$= \frac{22}{7} \times \frac{49}{10} \quad = \frac{154}{10} \quad = 15.4\, cm$

(ii) $\theta = 60^\circ 30', r = 15mm, \quad l =$?

Solution:

$\theta = 60^\circ 30'$

$= 60^\circ + 30'$

$= 60^\circ + \left(\frac{30' \times 1}{60}\right)^\circ \quad = 60^\circ + 0.5^\circ$

$= 60.5^\circ$

$= 60.5 \times \frac{\pi}{180} radian$

$= \frac{605}{10} \times \frac{\pi}{180} radian$

$\theta = \frac{121\,\pi}{2 \times 180}$

$now\ l = \theta r$

$= \left(\frac{121\pi}{2 \times 180}\right)(15) \quad = \frac{121 \times 22 \times 15}{2 \times 180 \times 7}$

$= \frac{121 \times 11}{12 \times 7} \qquad = \frac{1331}{84}$

$= 15.84\ mm$

Q.3 Find r, when

(i) $l = 4\ cm, \theta = \frac{1}{4} radian,\ r = ?$

$\theta = \frac{l}{r}$

$r = \frac{l}{\theta}$

$= \frac{4}{\frac{1}{4}} \quad = 4 \times 4 = 16\ cm$

(ii) $l = 52\ cm, \theta = 45^\circ,\ r = ?$

Solution:

$\theta = 45 \times \frac{\pi}{180}$

$= \frac{\pi}{4}$ radians

$r = \frac{l}{\theta}$

$= \frac{52}{\frac{\pi}{4}}$

$= \frac{52 \times 4}{\frac{22}{7}} \quad = \frac{52 \times 4 \times 7}{22} \quad = \frac{728}{11}$

$= 66.21\ cm$

Q.4 **In a circle of radius 12 m, find the length of an arc which subtends a central angle $\theta = 1.5$ radian.**

Solution:

$r = 12\,m$

$\theta = 1.5\,radians$

$l = ?$

$l = \theta r$

$= (1.5)(12)$

$= 18\,m$

Q.5 **In a circle of radius 10 m, find the distance travelled by a point moving on this circle if the point makes 3.5 revolution.** (3.5 revolution=7π)

Solution: $r = 10m$

$\theta = 3.5\,revolutions$

$1\,revolution = 2\pi\,radians$

$3.5\,revolution = 2\pi \times 3.5 = 7\pi\,radians$

$Distance\ travelled = l = \theta r = 7\pi \times 10$

$= 7 \times \frac{22}{7} \times 10 = 220m$

Q.6 **What is the circular measure of the angle between the hands of the watch at 3 o'clock?**

Solution: The angle between the hands of the watch at 3 o' clock is given by

$= \left(\frac{360}{12} \times 3\right)^{o}$

$Measure\ of\ angle = 90^{\circ}$

$90^{\circ} = 90 \times \frac{\pi}{180} = \frac{\pi}{2}\ radians$

Q.7 **What is the length of the arc APB.**

Solution:

$\theta = 90^{\circ}$

$= 90 \times \frac{\pi}{180}$

$= \frac{\pi}{2} radians$

$r = 8cm$

$l = ?$

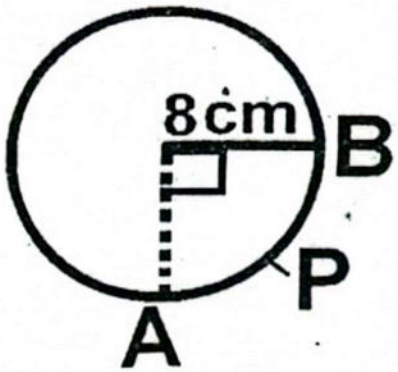
$l = \theta r$

$= \frac{\pi}{2} \times 8$

$= 4\pi\ cm$

$= 4 \times \frac{22}{7}$

$= 12.57\ cm$



Q.8 In a circle of radius 12 cm, how long an arc Subtends a central angle of 84°.

Solution:

$r = 12\ cm$

$\theta = 84^\circ$

$= 84 \times \frac{\pi}{180}$

$= \frac{7\pi}{15} radians$

$l = ?$

$l = \theta r$

$= \frac{7\pi}{15} \times 12$

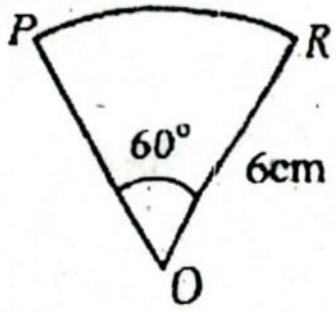
$= \frac{7}{15} \times \frac{22}{7} \times 12$

$= \frac{88}{5}$

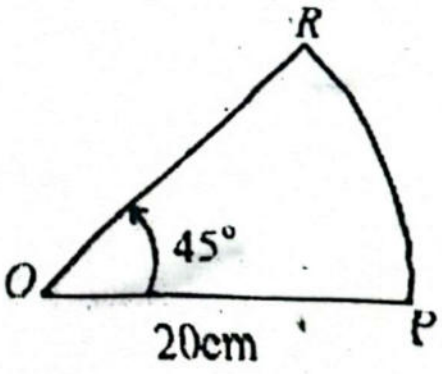
$= 17.6\ cm$

Q.9 Find the area of the sector OPR.

(a)



(b)



Solution: (a) $Area\ of\ the\ sector = \frac{1}{2}r^2\theta$

$Here,\ r = 6\ cm$

$\theta = 60^\circ = 60 \times \frac{\pi}{180}$

$\theta = \frac{\pi}{3}\ radians$

$Area\ of\ the\ sector = \frac{1}{2}r^2\theta$

$= \frac{1}{2}(6)^2\left(\frac{\pi}{3}\right)$

$= \frac{1}{2} \times 36 \times \frac{1}{3} \times \frac{22}{7}$

$= 6 \times \frac{22}{7} = \frac{132}{7}$

$= 18.85\ cm^2$

(b) $Area\ of\ the\ sector = \frac{1}{2}r^2\theta$

$Here,\ r = 20\ cm$

$\theta = 45^\circ = 45 \times \frac{\pi}{180}$

$\theta = \frac{\pi}{4}\ radians$

$Area\ of\ the\ sector = \frac{1}{2}\ r^2\theta$

$= \frac{1}{2}(2\theta)^2\left(\frac{\pi}{4}\right)$

$= \frac{1}{2} \times 400 \times \frac{\pi}{4} = 50\,\pi$

$= 50 \times \frac{22}{7} = \frac{1100}{7}$

$= 157.08\ cm^2$

Q.10 Find area of the sector inside a central angle of 20° in a circle of radius 7 m.

Solution: $Here,\ r = 7\ cm$

$\theta = 20^\circ$

$= 20 \times \frac{\pi}{180}$

$\theta = \frac{\pi}{9}\ radians$

$Area\ of\ the\ sector = \frac{1}{2}r^2\theta$

$$= \frac{1}{2}(7)^2\left(\frac{\pi}{9}\right)$$

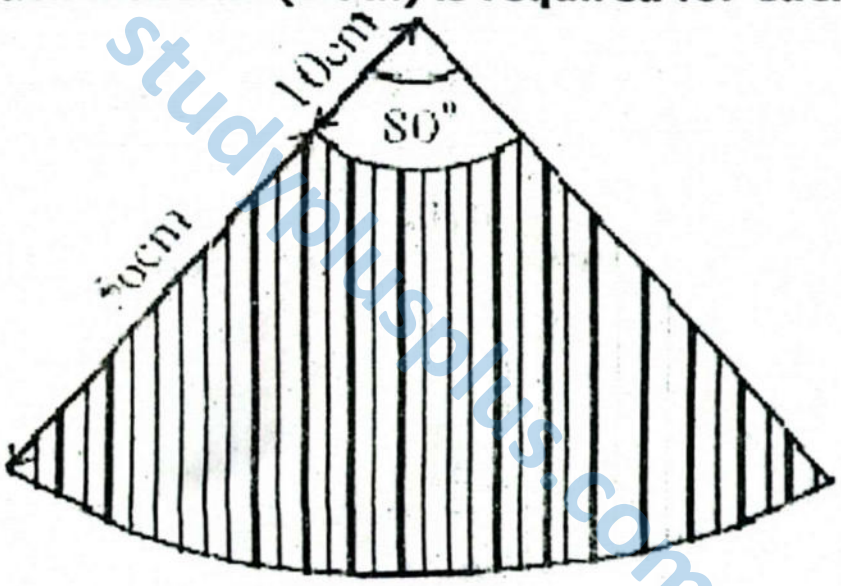
$$= \frac{1}{2} \times 49 \times \frac{\pi}{9}$$

$$= \frac{49}{18}\pi \ m^2$$

$$= \frac{49}{18} \times \frac{22}{7}$$

$$= \frac{77}{9} \quad = 8.55\ m^2$$

Q.11 Sehar is making a skirt. Each panel of this skirt is of the shape shown shaded in the diagram. How much material (cloth) is required for each panel?



Solution:

Here, $r = 56 + 10 = 66\ cm$

$\theta = 80^\circ$

$$= 80 \times \frac{\pi}{180}$$

$$\theta = \frac{4\pi}{9}\ radians$$

Area of the upper sector $= \frac{1}{2}r^2\theta$

$$= \frac{1}{2}(66)^2\left(\frac{4\pi}{9}\right)$$

$$= \frac{1}{2} \times 66 \times 66 \times \frac{4\pi}{9}$$

$$= 11 \times 22 \times 4\pi$$

$$= 968\,\pi\ cm^2.$$

$$\text{Area of the sector} = \frac{1}{2}r^2\theta$$
$$= \frac{1}{2}(10)^2\left(\frac{4\pi}{9}\right)$$
$$= \frac{1}{2}(10)(10)\left(\frac{4\pi}{9}\right)$$
$$= \frac{200\,\pi}{9}$$

$$\text{Area of each panel} = 968\pi - \frac{200\,\pi}{9}$$
$$= \frac{8712\pi - 200\pi}{9}$$
$$= \frac{8512\pi}{9}$$
$$= \frac{8512}{9} \times \frac{22}{7}$$
$$= 2972.39\ cm^2$$

Q.12 Find the area of the sector with central angle of $\frac{\pi}{5}$ radius in a circle of radius 10 cm.

Solution:

$$\text{Area of the sector} = ?$$

Here, $r = 10\ cm$

$\theta = \frac{\pi}{5}\ radians$

$$\text{Area of the sector} = \frac{1}{2}r^2\theta$$
$$= \frac{1}{2}(10)^2\left(\frac{\pi}{5}\right)$$
$$= \frac{1}{2} \times 10 \times 10 \times \frac{\pi}{5}$$
$$= 10\pi$$
$$= 10 \times \frac{22}{7}$$
$$= 31.42\ cm^2$$

Q.13 The area of the sector with central angle θ in a circle of radius 2m is 10 square meter. Find θ in radians.

Solution: Here, $A = 10\ m^2$

$r = 2\,m, \quad \theta = ?$

$A = \frac{1}{2}r^2\theta$

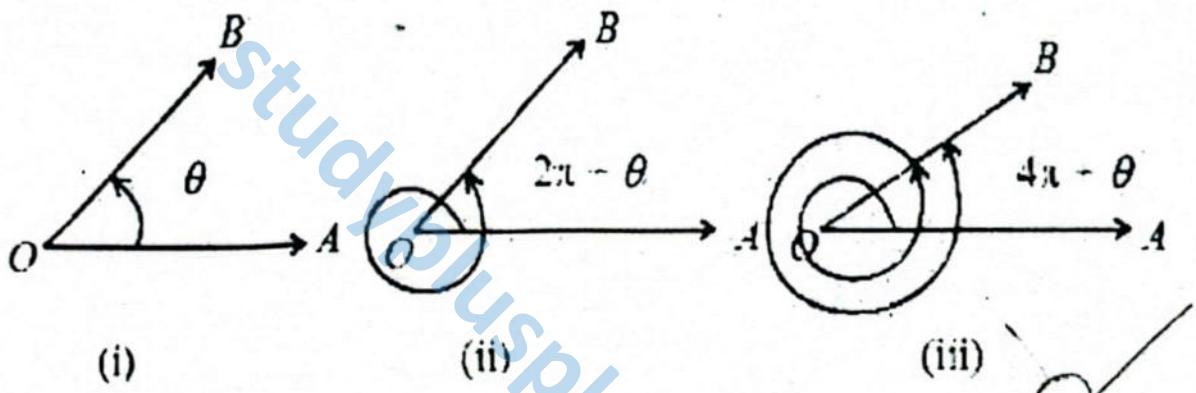
$10 = \frac{1}{2}(2)^2(\theta)$

$10 = \frac{4}{2}(\theta)$

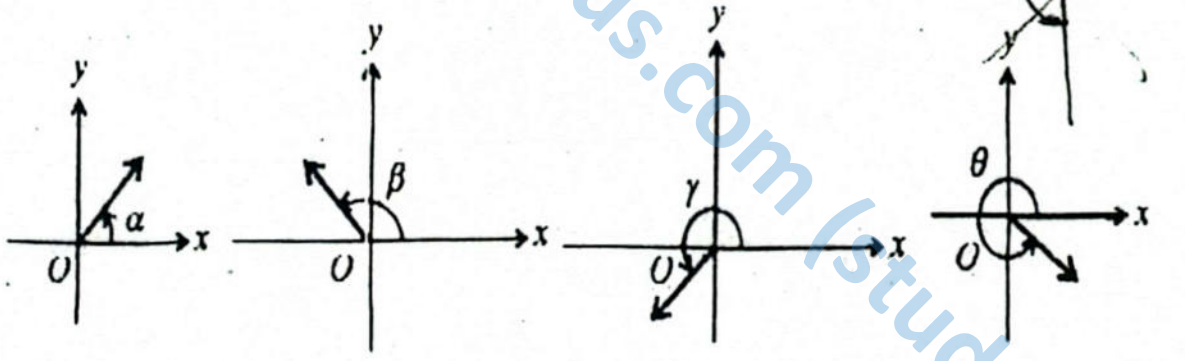
$10 = 2\theta$

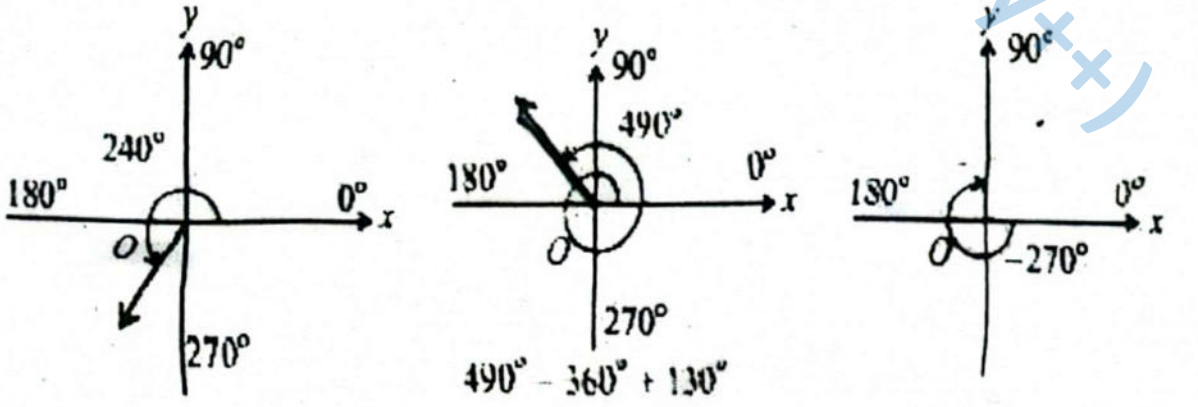
$\theta = 5\,radians$

Important Figures of the Chapter



(i) (ii) (iii)





(i) (ii) (iii)