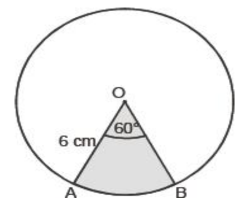
Exercise 12.2

Q.1. Find the area of a sector of a circle with radius 6 cm if angle of the sector is 60°.

Sol. Here, r = 6 cm

$\theta = 60°$



$\therefore$ Using, the Area of a sector $= \frac{\theta}{360} \times \pi r^2$

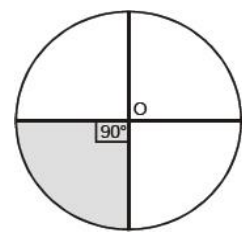
We have,
Area of the sector with r = 6 cm and θ = 60°

$$= \frac{60}{360} \times \frac{22}{7} \times 6 \times 6 \text{ cm}^2 = \frac{22}{7} \times 6 \text{ cm}^2 = \frac{132}{7} \text{cm}^2.$$

Q.2. Find the area of a quadrant of a circle whose circumference is 22 cm.

Sol. Let radius of the circle = r

$\therefore 2\pi r = 22$



$\Rightarrow 2 \times \frac{22}{7} r = 22$

$\Rightarrow r = 2 \times \frac{22}{7} \times \frac{1}{2} = \frac{7}{2}$ cm

$\therefore$ Area of the quadrant $\left(\frac{1}{4}\text{th}\right)$ of the circle,

$$= \frac{\theta}{360} \times \pi r^2 = \frac{90}{360°} \times \frac{22}{7} \times \left(\frac{7}{2}\right)^2 \text{cm}^2 = \frac{1 \times 11 \times 7}{4 \times 2} \text{cm}^2 = \frac{77}{8} \text{cm}^2.$$

Q.3. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.

Sol. [Length of minute hand] = [radius of the circle]

$\Rightarrow r = 14$ cm

θ Angle swept by the minute hand in 60 minutes = 360°

$\therefore$ Angle swept by the minute hand in 5 minutes $= \frac{360°}{60°} \times 5 = 30°$

Now, area of the sector with r = 14 cm and θ = 30°

$$\frac{\theta}{360} \times \pi r^2 = \frac{30}{360} \times \frac{22}{7} \times 14 \times 14 \text{ cm}^2 = \frac{11 \times 14}{3} \text{cm}^2 = \frac{154}{3} \text{cm}^2$$

Thus, the required area swept by the minute hand by 5 minutes $= \frac{154}{3} \text{cm}^2.$

Q.4. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the area of the corresponding (i) minor segment (ii) major sector.

Sol. Length of the radius (r) = 10 cm

Sector angle θ = 90°

Area of the sector with θ = 90° and r = 10 cm

$$= \frac{90}{360} \times 10 \times 10 \times \frac{314}{100} \text{cm}^2 = \frac{1}{4} \times 314 \text{ cm}_2 = \frac{157}{2} \text{cm}^2 = 78.5 \text{ cm}^2$$

Now,

(i) Area of the minor segment

= [Area of minor sector] – [Area of rt. ΔAOB]

$= [78.5\ cm^2] - [\frac{1}{2} \times 10 \times 10\ cm^2] = 78.5\ cm^2 - 50\ cm^2 = 28.5\ cm^2.$

(ii) Area of major segment

= [Area of the circle] – [Area of the minor segment]

$= \pi r^2 - 78.5\ cm^2$

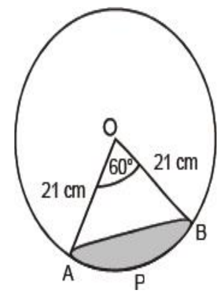
$= [\frac{314}{100} \times 10 \times 10 - 78.5]\ cm^2 = (314 - 78.5)\ cm^2 = 235.5\ cm^2.$

Q.5. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find:

(i) the length of the arc

(ii) area of the sector formed by the arc

(iii) area of the segment formed by the corresponding chord



Sol. Here, radius = 21 cm and θ = 60°

(i) Circumference of the circle = 2 πr

$= 2 \times \frac{22}{7} \times 21\ cm = 2 \times 22 \times 3\ cm = 132\ cm$

$\therefore$ Length of $\widehat{APB} = \frac{60}{360} \times 132\ cm$

$= \frac{1}{6} \times 132\ cm = 22\ cm$

(ii) Area of the sector with sector angle 60°

$= \frac{60°}{360°} \times \pi r^2 = \frac{60}{360} \times \frac{22}{7} \times 21 \times 21\ cm^2 = 11 \times 21\ cm^2 = 231\ cm^2$

(iii) Area of the segment APQ

= [Area of the sector AOB] – [Area of ΔAOB] ...(1)

In ΔAOB, OA = OB = 21 cm

∴∠A = ∠B = 60° [θ∠O = 60°]

⇒AOB is an equilateral Δ,

∴AB = 21 cm

Draw OM ⊥ AB such that

$\frac{OM}{OA} = \sin 60° = \frac{\sqrt{3}}{2} \Rightarrow OM = 21 \times \frac{\sqrt{3}}{2} cm$

Now area of a $\Delta OAB = \frac{1}{2} \times AB \times OM = \frac{1}{2} \times 21 \times 21 \times \frac{\sqrt{3}}{2}\ cm^2$

$= \frac{441\sqrt{3}}{4} cm^2$

From (1) and (2), we have:

Area of segment $= [231\ cm^2] - \left[\frac{441\sqrt{3}}{4} cm^2\right] = \left(231 - \frac{441\sqrt{3}}{4}\right) cm^2.$