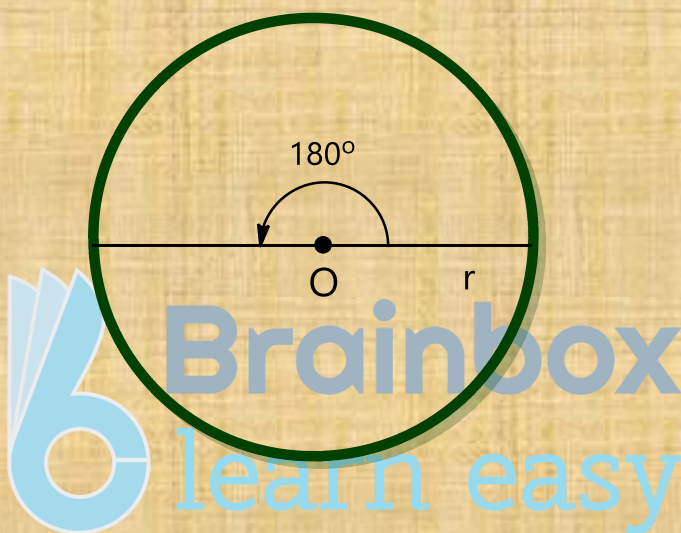


CHAPTER 09

Area of Plane Figures

Area of a sector:

If the arc subtends an angle of 180° , then the length of the arc / is given by,



$$l = \frac{180}{360} \times 2\pi r$$

$$\Rightarrow l = \pi r$$

The arc of the corresponding sector is equal to the area of a

semicircle is $\frac{\pi r^2}{2}$.

$$\text{If the area } A = \frac{1}{2}(\pi r)r$$

$$= \frac{1}{2}lr$$

Thus the area of a sector of angle θ in a circle of radius r .

Area of sector and its angle are in direct proportion.

$$\therefore \text{Area of sector} : \text{Area of circle} = \theta : 360$$

$$\Rightarrow \text{Area of sector OAB} = \frac{\theta}{360} \times (\text{Area of the circle})$$

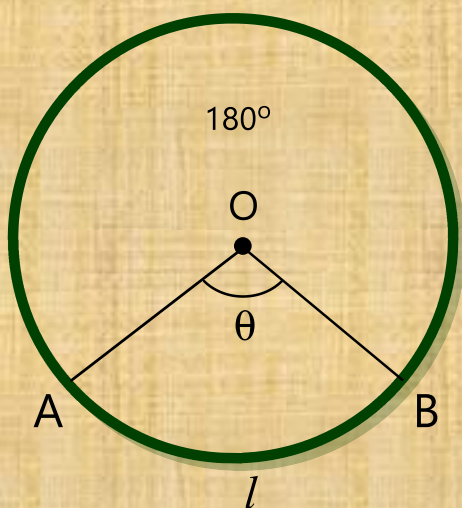
$$\Rightarrow A = \frac{\theta}{360} \times \pi r^2$$

$$\Rightarrow A = \left(\frac{\theta}{360} \times \pi r \right) r$$

$$\Rightarrow A = \left(\frac{\theta}{360} \times 2\pi r \right) \frac{r}{2}$$

$$\Rightarrow A = \frac{lr}{2}$$

$$\Rightarrow A = \frac{1}{2}lr$$



Where 'l' is the length of the arc.

$$\Rightarrow 2 \times \frac{22}{7} \times r = 44 \text{ cm}$$

$$\Rightarrow r = 7 \text{ cm}$$

The area of the circle = πr^2

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

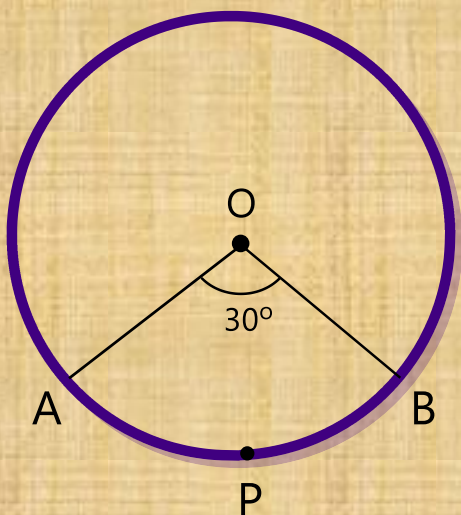
$$= 154 \text{ cm}^2$$

Example:

Find the length of its arc and area of the sector of a circle with radius 4 cm and of angle 30° . Also, find the area of major sector.

(Use $\pi = 3.14$)

Sol.



Given,

Radius (r) = 4 cm

Angle (θ) = 30°

Length of arc (l) = $\frac{\theta}{360^\circ} \times 2\pi r$

$$= \frac{\cancel{30}^\circ}{\cancel{360}^\circ} \times \cancel{2} \times \overset{1.57}{\cancel{3.14}} \times 4$$

Length of arc = 2.093 (Approx.)

Area of the sector (Minor sector) = $\frac{\theta}{360^\circ} \times \pi r^2$

$$= \frac{\cancel{30}^\circ}{\cancel{360}^\circ} \times 3.14 \times \overset{2}{\cancel{4}} \times 4$$

$$= \frac{12.56}{3}$$

Area of the sector = 4.19 cm² (Approx.)

Area of the corresponding major sector

$$= \pi r^2 - \text{Area of sector OAPB}$$

$$= 3.14 \times 4 \times 4 - (4.19)$$

$$= 50.24 - 4.19$$

$$= 46.05 \text{ cm}^2$$

Area of the corresponding major sector = 46.1 cm² (Approx.)

