



Areas Related to Circles Ex 15.3 Q5

Answer :

We know that the area of minor segment of angle θ in a circle of radius r is,

$$A = \left\{ \frac{\pi\theta}{360^\circ} - \sin \frac{\theta}{2} \cos \frac{\theta}{2} \right\} r^2$$

It is given that,

$$r = 14 \text{ cm}$$

$$\theta = 60^\circ$$

Substituting these values in above formula

$$\begin{aligned} A &= \left\{ \frac{3.14 \times 60^\circ}{360^\circ} - \sin \frac{60^\circ}{2} \cos \frac{60^\circ}{2} \right\} \times 14 \times 14 \\ &= \left\{ \frac{3.14}{6} - \sin 30^\circ \cos 30^\circ \right\} \times 196 \\ &= \frac{3.14 \times 196}{6} - \frac{1}{2} \times \frac{\sqrt{3}}{2} \times 196 \\ &= 102.573 - 84.868 \\ \boxed{A = 17.70 \text{ cm}^2} \end{aligned}$$

Areas Related to Circles Ex 15.3 Q6

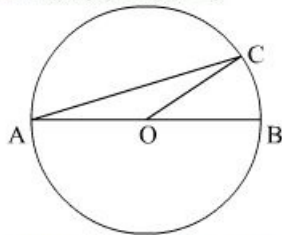
Answer :

We know that the area of minor segment of angle θ in a circle of radius r is,

$$A = \left\{ \frac{\pi\theta}{360^\circ} - \sin \frac{\theta}{2} \cos \frac{\theta}{2} \right\} r^2$$

It is given that, $\angle BOC = \theta$

So, $\angle AOC = 180^\circ - \theta$



Area, A of minor segment cutoff by AC at angle $\angle AOC = 180 - \theta$

$$A = \left\{ \frac{\pi(180^\circ - \theta)}{360^\circ} - \sin \frac{(180^\circ - \theta)}{2} \cos \frac{(180^\circ - \theta)}{2} \right\} r^2$$

Now, since $\sin(90^\circ - \alpha) = \cos \alpha$ and $\cos(90^\circ - \alpha) = \sin \alpha$

$$A = \left\{ \frac{\pi(180^\circ - \theta)}{360^\circ} - \sin \frac{\theta}{2} \cos \frac{\theta}{2} \right\} r^2$$

We know that the area of sector of a circle of radius r at an angle θ is

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

So, the area of sector BOC , $A' = \frac{\theta}{360^\circ} \times \pi r^2$

It is given that,

Area of minor segment cutoff by $AC = 2 \times$ Area of sector BOC

$$\left\{ \frac{\pi(180^\circ - \theta)}{360^\circ} - \cos \frac{\theta}{2} \sin \frac{\theta}{2} \right\} r^2 = \frac{2\theta}{360^\circ} \times \pi r^2$$

$$\frac{\pi(180^\circ - \theta)}{360^\circ} - \cos \frac{\theta}{2} \sin \frac{\theta}{2} = \frac{2\pi\theta}{360^\circ}$$

$$\frac{\pi 180^\circ}{360^\circ} - \frac{\pi\theta}{360^\circ} - \cos \frac{\theta}{2} \sin \frac{\theta}{2} = \frac{2\pi\theta}{360^\circ}$$

$$\cos \frac{\theta}{2} \sin \frac{\theta}{2} = \frac{\pi 180^\circ}{360^\circ} - \frac{\pi\theta}{360^\circ} - \frac{2\pi\theta}{360^\circ}$$

$$\cos \frac{\theta}{2} \sin \frac{\theta}{2} = \frac{\pi}{2} - \frac{3\pi\theta}{360^\circ}$$

$$\cos \frac{\theta}{2} \sin \frac{\theta}{2} = \frac{\pi}{2} - \frac{\pi\theta}{120^\circ}$$

$$\cos \frac{\theta}{2} \sin \frac{\theta}{2} = \pi \left(\frac{1}{2} - \frac{\theta}{120^\circ} \right)$$

Areas Related to Circles Ex 15.3 Q7

Answer :

We know that the area of circle and area of minor segment of angle θ in a circle of radius r is given by,

$$A' = \pi r^2 \text{ and } A = \left\{ \frac{\pi\theta}{360^\circ} - \sin \frac{\theta}{2} \cos \frac{\theta}{2} \right\} r^2 \text{ respectively.}$$

It is given that,

Area of minor segment = $\frac{1}{8} \times$ area of circle

$$\left\{ \frac{\pi\theta}{360^\circ} - \sin \frac{\theta}{2} \cos \frac{\theta}{2} \right\} r^2 = \frac{\pi r^2}{8}$$

$$\left\{ \frac{\pi\theta}{360^\circ} - \sin \frac{\theta}{2} \cos \frac{\theta}{2} \right\} \times 8 = \pi$$

$$\frac{8\pi\theta}{360^\circ} - 8 \sin \frac{\theta}{2} \cos \frac{\theta}{2} = \pi$$

$$\frac{\pi\theta}{45^\circ} - 8 \sin \frac{\theta}{2} \cos \frac{\theta}{2} = \pi$$

$$\boxed{\frac{\pi\theta}{45^\circ} = 8 \sin \frac{\theta}{2} \cos \frac{\theta}{2} + \pi}$$

***** END *****