Areas Related to Circles Ex 15.3 Q3

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 the chord of the circle of radius $r=14\text{ cm}$ makes right angle at the centre.

So, $\theta=90^\circ$

Substituting the value of r and angle θ in above formula,

Area of minor segment

$$A=\left\{\frac{90^\circ\pi}{360^\circ}-\sin\frac{90^\circ}{2}\cos\frac{90^\circ}{2}\right\}\times14\times14$$

$$=\left\{\frac{\pi}{4}-\sin45^\circ\cos45^\circ\right\}\times196$$

$$=\frac{22\times196}{7\times4}-\frac{1}{\sqrt{2}}\times\frac{1}{\sqrt{2}}\times196$$

$$=154-98$$

$$=\boxed{56\text{ cm}^2}$$

Hence, area of minor segment is $\boxed{56\text{ cm}^2}$

$$\text{Area of circle}=\pi r^2$$

$$=\frac{22}{7}\times14\times14$$

$$=616\text{ cm}^2$$

$$\text{Area of major segment}=\text{Area of circle}-\text{Area of minor segment}$$

$$=616-56$$

$$=\boxed{560\text{ cm}^2}$$

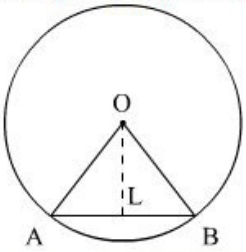
Areas Related to Circles Ex 15.3 Q4

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 the chord AB divides the circle in two segments.



We have $OA=5\sqrt{2}$ cm and $AB=10$ cm. So,

$$AL=\frac{AB}{2}\text{ cm}$$
$$=\frac{10}{2}\text{ cm}$$
$$=5\text{ cm}$$

Let $\angle AOB=2\theta$. Then,

$$\angle AOL=\angle BOL$$
$$=\theta$$

In ΔOLA, we have

$$\sin\theta=\frac{AL}{OA}$$
$$=\frac{5}{5\sqrt{2}}$$
$$=\frac{1}{\sqrt{2}}$$
$$\theta=\sin^{-1}\frac{1}{\sqrt{2}}$$
$$=45^\circ$$

Hence, $\angle AOB=90^\circ$

Now using the value of r and θ, we will find the area of minor segment

$$A=\left\{\frac{90^\circ\pi}{360^\circ}-\sin\frac{90^\circ}{2}\cos\frac{90^\circ}{2}\right\}\times5\sqrt{2}\times5\sqrt{2}$$
$$=\left\{\frac{\pi}{4}-\sin45^\circ\cos45^\circ\right\}\times50$$
$$=\frac{3.14\times50}{4}-\frac{1}{\sqrt{2}}\times\frac{1}{\sqrt{2}}\times50$$
$$=39.25-25$$
$$\boxed{A=14.25\text{ cm}^2}$$

$$\text{Area of circle}=\pi r^2$$
$$=3.14\times5\sqrt{2}\times5\sqrt{2}$$
$$=157.15\text{ cm}^2$$

$$\text{Area of major segment}=\text{Area of circle}-\text{Area of minor segment}$$
$$=157-14.25$$
$$=\boxed{142.75\text{ cm}^2}$$

********** END **********