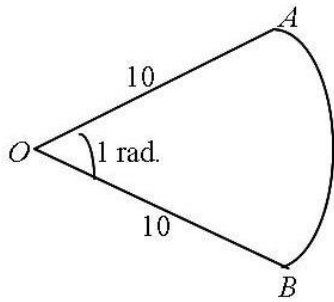


CHAPTER 8 : CIRCULAR MEASURES (Sukatan Membulat)

Topic 8 Circular Measures :::::::::: v 8.1 Length Of Arcs (Panjang Lengkok)



eg1:

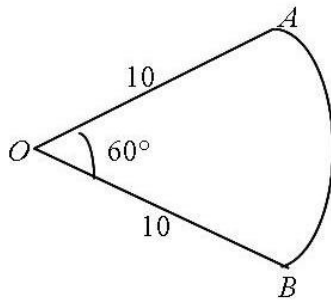
Length Of Arc $AB = r\theta$

$\widehat{AB} = 10 \times 1 \text{ rad.}$

$\widehat{AB} = 10 \text{ cm \#}$

the value of θ must in radian
except the infront of the θ have
sign of sine, cosine, tangent

****Note:**
Length Of Arc AB can be written as \widehat{AB}



eg2:

$\widehat{AB} = r\theta$

$\widehat{AB} = 10 \times \left(\frac{60^\circ}{180^\circ} \times \pi \text{ rad.} \right)$

$\widehat{AB} = 10.47 \text{ cm (2d.p.) \#}$

 $\pi \text{ rad.} = 180^\circ$

$\theta = \frac{360}{180} \times \pi \text{ rad.}$
 $\theta = 2\pi$
Circumference = $r\theta$
 $= r(2\pi)$
 $= 2\pi r \#$

Note:

(i) Convert degrees ($^\circ$) and minutes ($'$) to radian

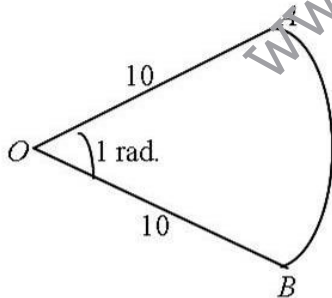
$68^\circ 27' = \frac{68^\circ 27'}{180^\circ} \times \pi \text{ rad.}$
 $= 1.195 \text{ (3d.p.) \#}$

(ii) Convert radian to degrees ($^\circ$) and minutes ($'$)

$2 \text{ rad.} = \frac{2 \text{ rad.}}{\pi \text{ rad.}} \times 180^\circ$
 $= 114^\circ 35' \#$

 $180^\circ = \pi \text{ rad.}$
 $1^\circ = \frac{\pi \text{ rad.}}{180^\circ}$

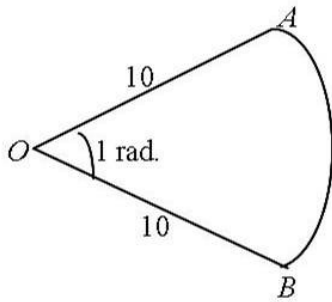
Topic 8 Circular Measures :::::::::: v 8.2 Area Of Sector (Luas Sektor)



eg1:

Area Of Sector = $\frac{1}{2} r^2 (\theta \text{ rad.})$

Area Of Sector = $\frac{1}{2} (10)^2 (1 \text{ rad.})$
 $= 50 \text{ cm}^2 \#$



eg2:

Radian Method :

$$\begin{aligned} \text{Area Of Sector} &= \frac{1}{2}(10)^2 \left(\frac{60^\circ}{180^\circ} \times \pi \text{ rad.} \right) \\ &= 50 \text{ cm}^2 \# \end{aligned}$$

Degrees Method :

use the formula = $\frac{\theta^\circ}{360^\circ} \times \pi r^2$

$$\begin{aligned} \text{Area Of Sector} &= \frac{60^\circ}{360^\circ} \times \pi r^2 \\ &= \frac{1}{6} \times \pi (10)^2 \\ &= 52.35987756 \\ &= 52.36(4s.f.) \# \end{aligned}$$

Proof the $A = \frac{1}{2}r^2(\theta \text{ rad.})$ and $A = \frac{x}{360^\circ} \times \pi r^2$

$$A = \frac{x}{360} \times \pi r^2 \dots\dots\dots [1]$$

Angle in radian, $\theta = \frac{x \times \pi}{180^\circ}$

$$x = \frac{\theta \times 180^\circ}{\pi} \dots\dots\dots [2]$$

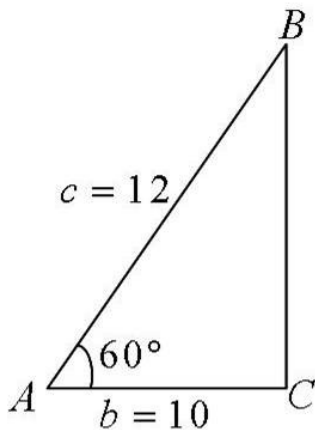
Substitute [2] into [1],

$$A = \left(\frac{\theta \times 180^\circ}{\pi} \right) \times \pi r^2$$

$$A = \frac{\theta \times 180^\circ}{\pi} \times \frac{1}{360^\circ} \times \pi r^2$$

$$A = \frac{1}{2} \theta r^2 \text{ [area of sector in radian]}$$

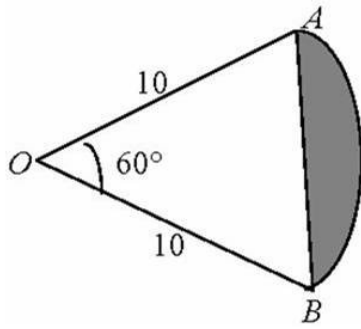
Topic 8 Circular Measures :::::::::: v 8.4 Area Of Triangles & Area Of a Segments (Luas Segitiga & Luas Tembereng)



eg :

$$\text{Area Of Triangle} = \frac{1}{2} bc \sin A$$

$$\begin{aligned} \text{Area Of Triangle} &= \frac{1}{2} (10)(12) \sin(60^\circ) \\ &= 51.96 \text{ cm}^2(2d.p.) \# \end{aligned}$$



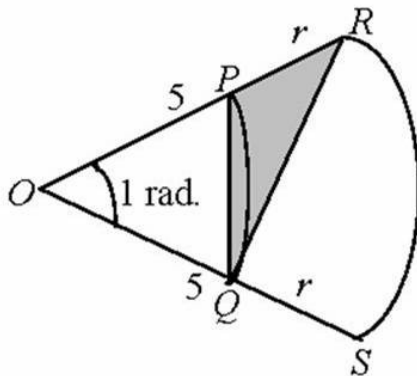
eg:

Area Of A Segments = Area Of Sector – Area Of Triangles

$$= \frac{1}{2}r^2(\theta \text{ rad.}) - \frac{1}{2}r^2 \sin \theta^\circ$$

$$\text{Area Of A Segments} = \frac{1}{2}r^2 [\theta \text{ rad.} - \sin \theta^\circ]$$

$$\begin{aligned} \text{Area Of A Segments} &= \frac{1}{2}(10)^2 \left[\left(\frac{60 \times \pi}{180} \right) - \sin 60^\circ \right] \\ &= 9.06 \text{ cm}^2 (2d.p.) \# \end{aligned}$$



eg:

The diagram shows a arcs PQ and RS for 2 circle with centre O . Given that $OP = OQ = 5$ cm, $PR = QS$ and RQ are perpendicular with the OQ . If the length of arc RS : the length of $PQ = 3:1$ and $\theta = 1$ rad.. Find the length of PR .

Solution:

$$\frac{\widehat{RS}}{\widehat{PQ}} = \frac{3}{1}$$

$$\frac{(5+r)(1)}{(5)(1)} = \frac{3}{1}$$

$$5+r=15$$

$$r=10 \text{ cm}$$

$$PR = QS = 10 \text{ cm}$$

END OF TOPIC 8: CIRCULAR MEASURES

