

# Circumference / Arc Length

What is  $\pi$ ? (Not the number; use words.)

Ratio of circumference to diameter of every circle.

$$\pi = \frac{C}{D}$$

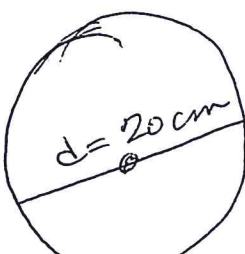
Use the definition & algebra to write a Circumference formula.

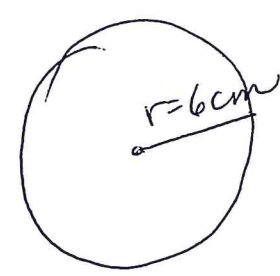
$$D \cdot \pi = \frac{C}{D} \cdot D \quad C = \pi D$$

Re-write the formula with  $r$  instead of  $D$ :

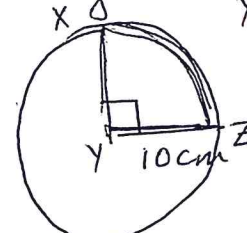
$$D = 2r \quad C = 2\pi r$$

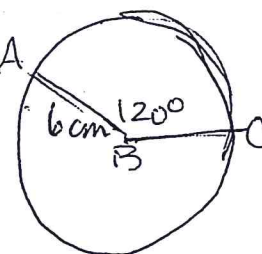
Find circumference in terms of  $\pi$ :

1)   $C = 20\pi$  cm

2)   $C = 12\pi$  cm

Find the part of the circumference intercepted by the central angle.

3)   $\widehat{XZ} = \frac{1}{4}C$   
 $= \frac{20\pi}{4}$   
 $= 5\pi$  cm

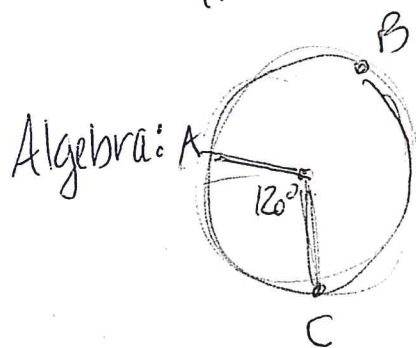
4)   $\frac{1}{3} \cdot 12\pi = 4\pi$  cm

What if the angle were  $85^\circ$ ?

Write a formula for circumference (arc length) of the intercepted arc.

$$\frac{\text{arc measure}}{360} \cdot C = \text{arc length}$$

$$\frac{\text{radians} \cdot \text{radius}}{2\pi r} = \text{arc length}$$



length  $\widehat{ABC} = 116\pi$   
 $r = ?$

$$\frac{116\pi}{\pi} = \frac{240}{360} \cdot \frac{2\pi r}{\pi}$$

$$116 = \frac{2}{3} \cdot 2r \quad \frac{3}{4} \cdot 116 = \frac{1}{3} r \cdot \frac{3}{4}$$

$$87 = r$$