The angle subtended at the centre of a unit circle of arc length 1 is 1^c

radians

After the unit is left off.

$$C = 2\pi R \rightarrow R = 1$$
$$= 2\pi$$

A circle contains 2π radians

$$\therefore 360° = 2\pi^c$$

$$\boxed{\pi^c = 180°}$$

$30°$ to radians

$$\frac{30}{180} \times \pi = \frac{\pi}{6}$$

Example 1   Convert to Radians

$$45° = \frac{\pi}{4}$$

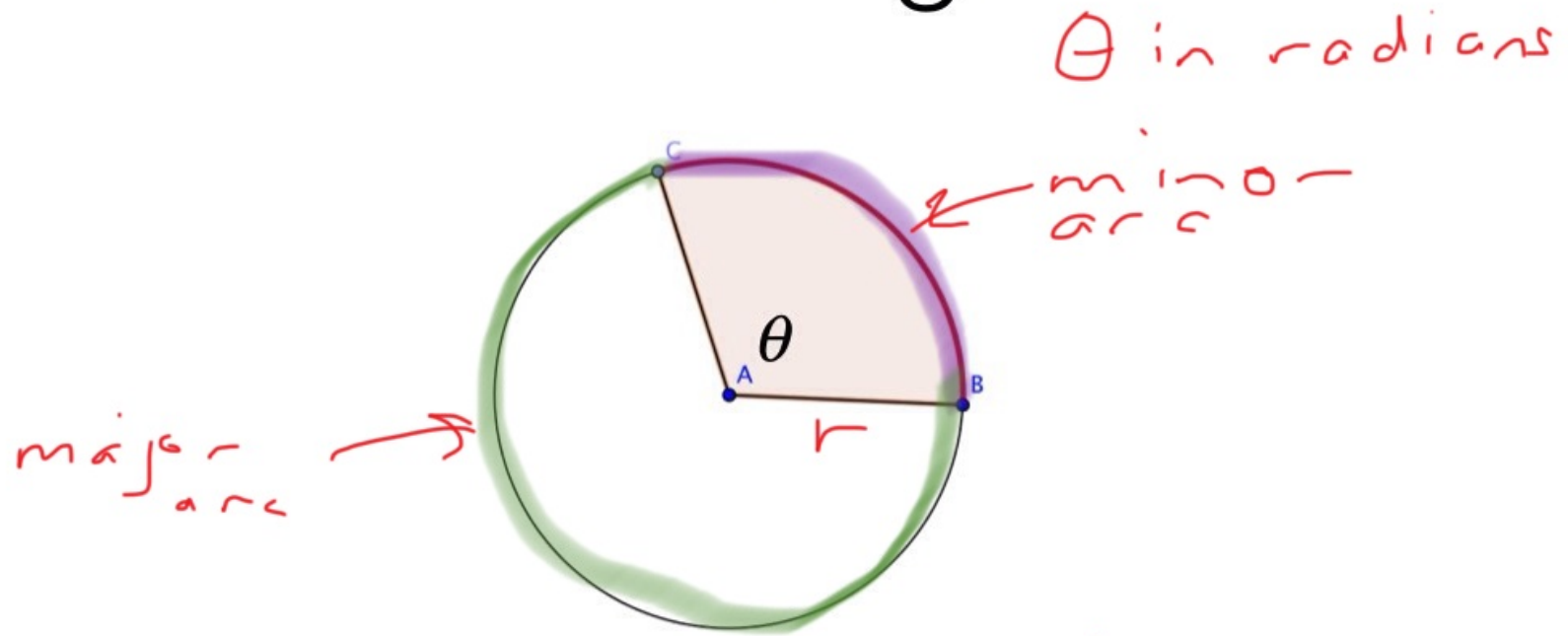$$110° = \frac{110}{180} \times \pi = \frac{11\pi}{18}$$

$$93°25' = 1.63^c$$

Example 2 Convert to degrees

$$\frac{\pi}{3} = 60^\circ$$

$$\frac{5\pi}{6} = 150^\circ \qquad \left(\frac{5\pi}{6} \times \frac{180}{\pi} \right)$$

$$2.39^c = \left(2.39 \times \frac{180}{\pi} \right) = 136^\circ 56'$$
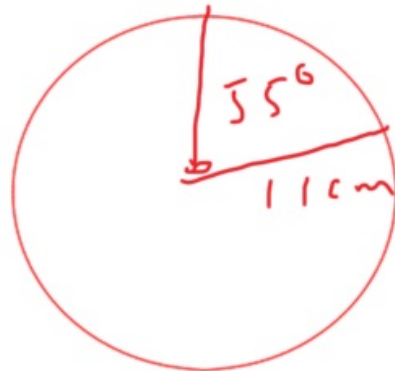
Arc Length

θ in radians

minor arc

major arc

θ

r

$$l = r\theta$$

angle in radians

arc length

radius

Example 3 *mina*

Find the length of an arc of a circle radius 11 cm

if the arc subtends an angle of 55°

$$55° = \frac{55}{180}\,\pi$$

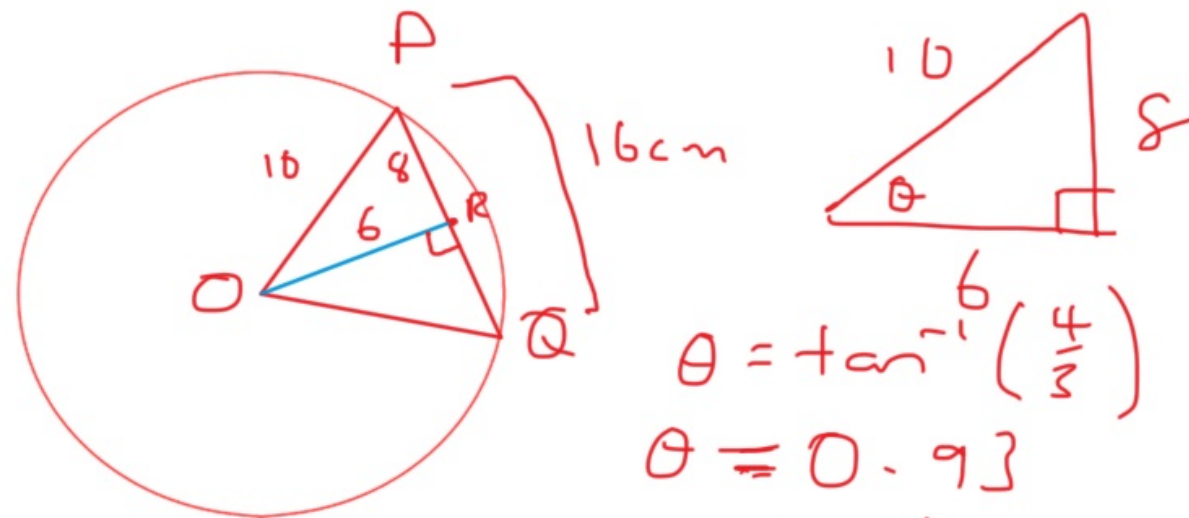$$= \frac{11}{36}\,\pi$$

$$\therefore l = r\theta$$

$$= \frac{121\,\pi}{36}$$

Example 4

A chord PQ 16 cm long is ~~5~~ 6 cm from the centre of a circle

Find the length of the ~~chord PQ~~ arc

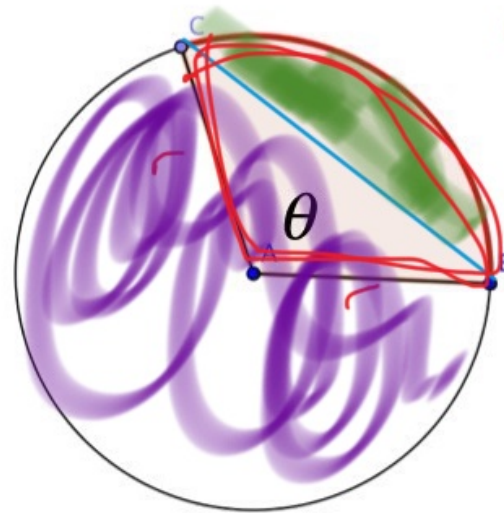$\theta = \tan^{-1}\left(\frac{4}{3}\right)$

$\theta = 0.93$

$\therefore \lambda = 10 \times \left(\tan^{-1}\left(\frac{4}{3}\right)\right) \times 2$

$= 18.5 \text{ cm}$

Area of the Segment of a circle

Segment

$A = A_S$ Sector
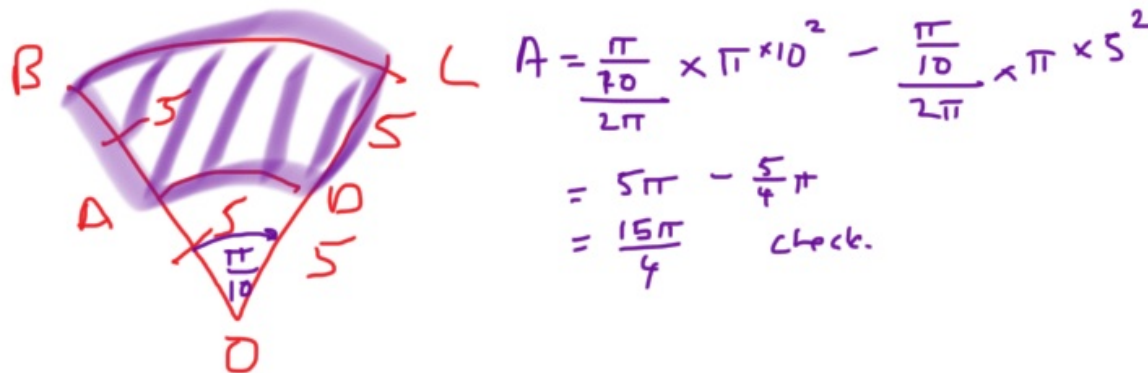
$$A = \frac{1}{2}r^2(\theta - \sin\theta)$$

θ in radians

Example 5

AD and BC are arcs of concentric circles with centre O

If $OA = AB$ and $OD = 5$ units, and angle $AOD = \dfrac{\pi}{10}$, find

i) The area of $ABCD$ to 3 sig. figures

ii) The perimeter of $ABCD$ to 3 sig. figures

$$A = \frac{\frac{\pi}{10}}{2\pi} \times \pi \times 10^2 - \frac{\frac{\pi}{10}}{2\pi} \times \pi \times 5^2$$

$$= 5\pi - \frac{5}{4}\pi$$

$$= \frac{15\pi}{4} \qquad \text{check.}$$