Arc Length and Sector Area - Lesson 5

Arc Length and Sector Area (Angle and Radius)

LI

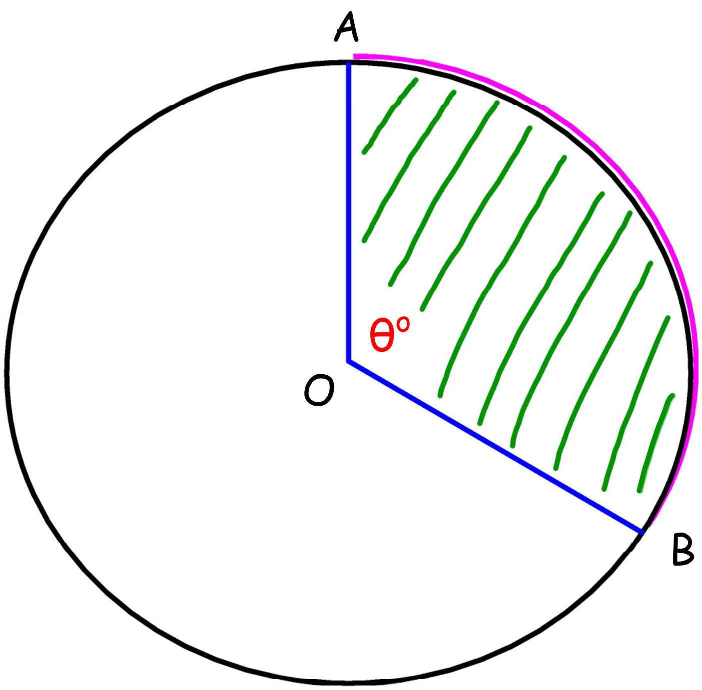
- Calculate radius and angle.

SC

- Arc length and Sector area formulae.

Oct 26-07:57

Reminders



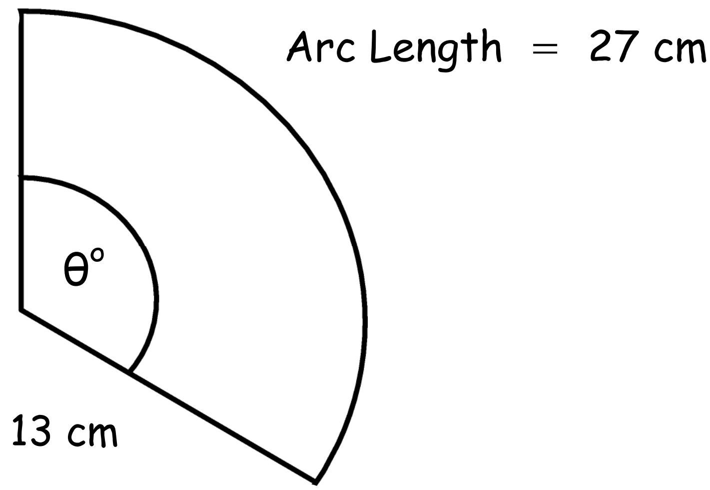
To work out Arc Length

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

To work out Sector Area

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

Example 1 (Working out Angle when told Arc Length and Radius)



$L = 27 \text{ cm}, \; r = 13 \text{ cm}$

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

$$\therefore \quad 27 = \frac{\theta^\circ}{360^\circ} \times 2 \times \pi \times 13$$

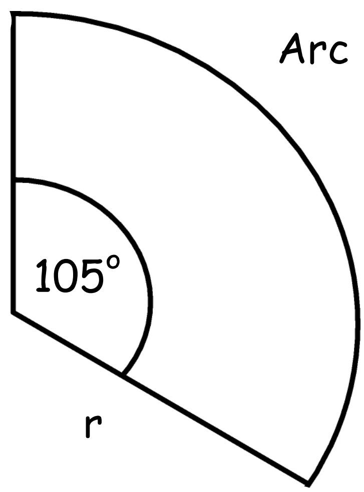
$$\Rightarrow \quad 27 = \frac{26\pi\,\theta^\circ}{360^\circ}$$

$$\Rightarrow \quad \theta^\circ = \frac{(27 \times 360^\circ)}{(26 \times \pi)}$$

$$\Rightarrow \quad \theta^\circ = 118.99\ldots^\circ$$

$$\therefore \quad \boxed{\theta^\circ = 119^\circ \text{ (nearest degree)}}$$

Example 2 (Working out Radius when told Arc Length and Angle)



$$L = 934 \text{ cm}, \ \theta^\circ = 105^\circ$$

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

$$\therefore \quad 934 = \frac{105^\circ}{360^\circ} \times 2\pi r$$

$$\Rightarrow \quad 934 = \frac{210^\circ \pi r}{360^\circ}$$

$$\Rightarrow \quad r = \frac{(934 \times 360^\circ)}{(210^\circ \times \pi)}$$

$$\Rightarrow \quad r = 509.65\ldots$$

$$\therefore \quad \boxed{r = 509.7 \text{ cm } (1 \text{ d. p.})}$$

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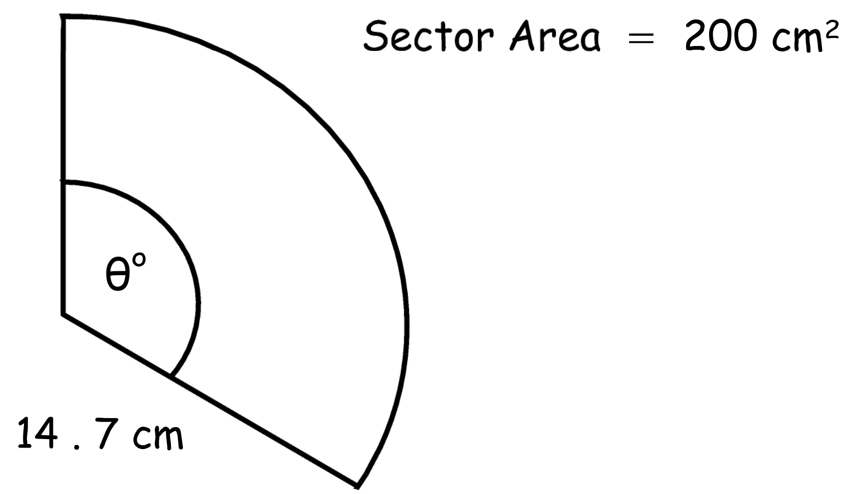
Example 3 (Working out Angle when told Sector Area and Radius)



$A = 200 \text{ cm}^2, \ r = 14.7 \text{ cm}$

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

$$\therefore \quad 200 = \frac{\theta^\circ}{360^\circ} \times \pi \times 14.7^2$$

$$\Rightarrow \quad 200 = \frac{216.09 \pi \theta^\circ}{360^\circ}$$

$$\Rightarrow \quad \theta^\circ = \frac{(200 \times 360^\circ)}{(216.09^\circ \times \pi)}$$

$$\Rightarrow \quad \theta^\circ = 106.05\ldots^\circ$$

$$\therefore \quad \boxed{\theta^\circ = 106.1^\circ \text{ (1 d. p.)}}$$

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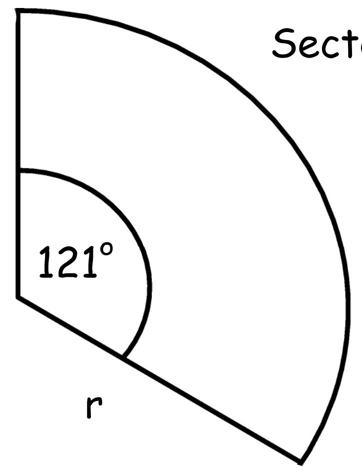
Example 4 (Working out Radius when told Sector Area and Angle)



Sector Area = 563 cm²

$$A = 563 \text{ cm}^2, \ \theta^\circ = 121^\circ$$

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

$$\therefore \quad 563 = \frac{121^\circ}{360^\circ} \times \pi r^2$$

$$\Rightarrow \quad 563 = \frac{121^\circ \pi r^2}{360^\circ}$$

$$\Rightarrow \quad r^2 = \frac{(563 \times 360^\circ)}{(121^\circ \times \pi)}$$

$$\Rightarrow \quad r^2 = 533.182\ldots$$

$$\Rightarrow \quad r^2 = \sqrt{533.182\ldots}$$

$$\Rightarrow \quad r = 23.09\ldots$$

$$\therefore \quad \boxed{r = 23 \text{ cm (nearest cm)}}$$

1) A sector of a circle has a diameter of 36 cm and a sector area of 275 cm^2. Find the sector angle (1 d.p.).

2) A sector of a circle has a sector angle of 61° and an arc length of 200.43 cm. Find the radius (2 d.p.).

3) A sector of a circle has a diameter of 20 cm and an arc length of 50 cm. Find the sector angle (nearest degree).

4) A sector of a circle has a sector angle of 231° and a sector area of $1\,000$ cm^2. Find the radius (3 s.f.).

Answers

1) A sector of a circle has a diameter of 36 cm and a sector area of 275 cm^2. Find the sector angle (1 d.p.). 97 . 3°

2) A sector of a circle has a sector angle of 61° and an arc length of 200 . 43 cm. Find the radius (2 d.p.). 188 . 26 cm

3) A sector of a circle has a diameter of 20 cm and an arc length of 50 cm. Find the sector angle (nearest degree). 286°

4) A sector of a circle has a sector angle of 231° and a sector area of 1 000 cm^2. Find the radius (3 s.f.). 22 . 3 cm