

# Exercise walk-through

Circles, arcs and sectors ■ E5.3

eXercise

## You must be able to

- find the circumference and area of a circle
- find an arc length and a sector area
- find the perimeter of a sector

## Method — Arcs and sectors

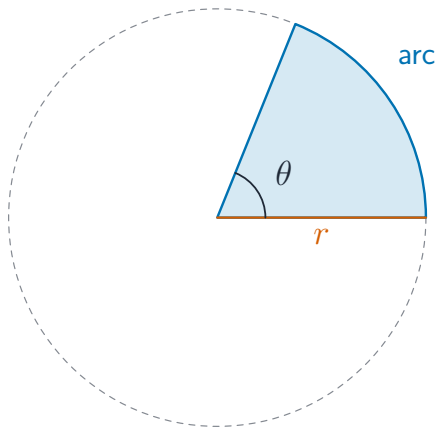
$$\text{circumference} = 2\pi r \quad \text{area} = \pi r^2$$

$$\text{arc} = \frac{\theta}{360} \times 2\pi r \quad \text{sector area} = \frac{\theta}{360} \times \pi r^2$$

- **Worked** ( $\theta = 90^\circ$ ,  $r = 8$ ): fraction  $\frac{1}{4} \rightarrow \text{arc} = \frac{1}{4} \times 16\pi = 4\pi$  cm; sector area  $= \frac{1}{4} \times 64\pi = 16\pi$  cm<sup>2</sup>.

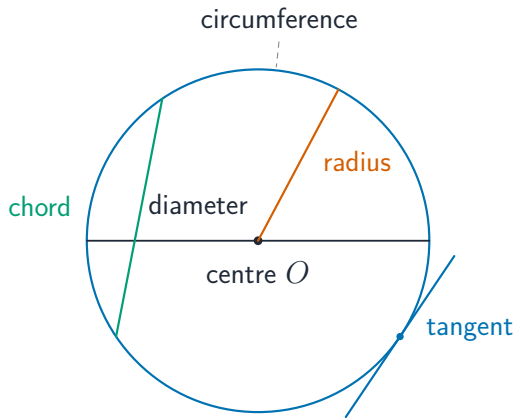
**Answer shapes:** **M1** a correct method, **A1** the correct answer.

## Method — Arcs and sectors



*A sector is the fraction  $\theta/360$  of the whole circle*

## Method — Arcs and sectors



*The named parts of a circle used in arc and sector work*

## Practice 2.1 ■ 1 mark

Find the circumference of a circle of radius 5 cm, in terms of  $\pi$ .

## Solution 2.1

Method: Arcs and sectors

### Worked steps

$$2\pi \times 5 = 10\pi \text{ cm } \text{B1}.$$

## Practice 2.2 ■ 2 marks

Find the area of a circle of radius 6 cm, in terms of  $\pi$ .



## Solution 2.2

Method: Arcs and sectors

### Worked steps

$$\pi \times 6^2 = 36\pi \text{ cm}^2 \quad \text{M1} \quad \text{A1} \quad \text{for } \pi r^2; \text{ for } 36\pi.$$

## Practice 2.3 ■ 2 marks

Find the arc length of a sector with angle  $90^\circ$  and radius 12 cm, in terms of  $\pi$ .

## Solution 2.3

Method: Arcs and sectors

### Worked steps

$$\frac{90}{360} \times 2\pi \times 12 = \frac{1}{4} \times 24\pi = 6\pi \text{ cm}$$
 M1 A1 *for the fraction; for  $6\pi$ .*

## Exam-style 3.1 ■ 2 marks

A sector has angle  $120^\circ$  and radius 9 cm.

- (a) Find its area, in terms of  $\pi$ .
- (b) Find its perimeter, in terms of  $\pi$ .

## Solution 3.1

Method: Arcs and sectors

**Worked steps**

(a)  $\frac{120}{360} \times \pi \times 9^2 = \frac{1}{3} \times 81\pi = 27\pi \text{ cm}^2$  **M1** **A1** for  $27\pi$ . (b) arc =  $\frac{1}{3} \times 2\pi \times 9 = 6\pi$ ;  
perimeter = arc +  $2r = 6\pi + 18 \text{ cm}$  **M1** **M1** **A1** for the arc; for  $+2r$ ; for  $6\pi + 18$ .

## Exam-style 3.2 ■ 2 marks

A circle has area  $36\pi \text{ cm}^2$ . Find its radius.

## Solution 3.2

Method: Arcs and sectors

### Worked steps

$$\pi r^2 = 36\pi \rightarrow r^2 = 36 \rightarrow r = 6 \text{ cm} \quad \text{M1} \quad \text{A1} \quad \text{for } r^2 = 36; \text{ for } 6.$$