

E5.3 Circles, arcs and sectors

Name: _____ Class: _____ Date: _____

Total: 12 marks

KEY WORDS circle • radius • circumference • sector area
• arc length

Objective

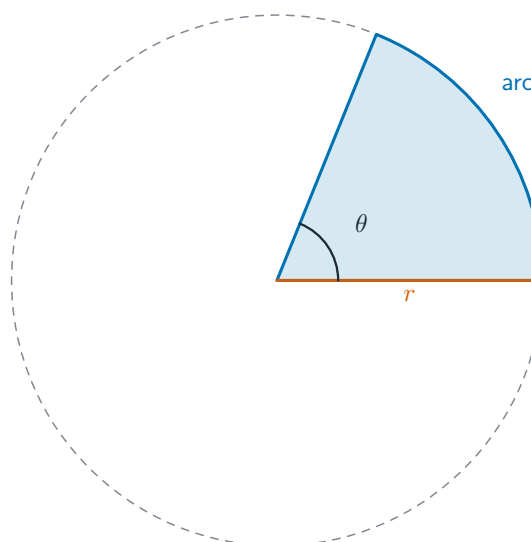
Build the skills to answer Extended exam questions on **circles, arcs and sectors** ,
– **circumference and area** , and the **arc length** and **sector area** .

You must be able to:

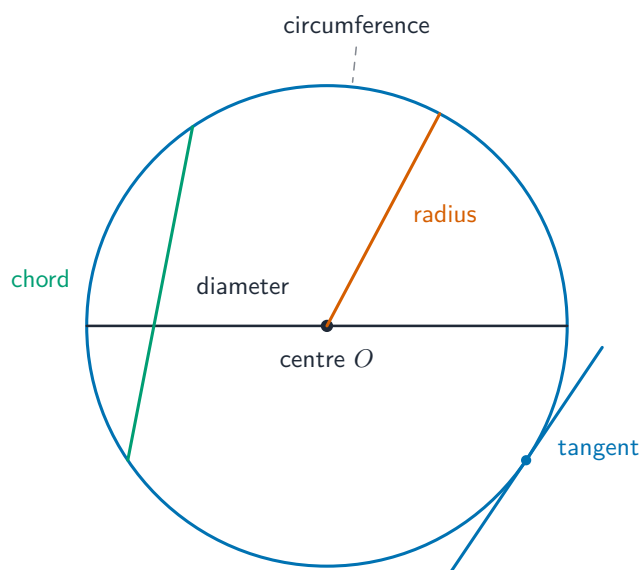
- find the circumference and area of a circle
- find an arc length and a sector area
- find the perimeter of a sector

1 Key knowledge and worked examples

■ Arcs and sectors



Take the fraction $\frac{\theta}{360}$ of the whole circle



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

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

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

- **Worked** ($\theta = 90^\circ$, $r = 8$): fraction $\frac{1}{4} \rightarrow \text{arc} = \frac{1}{4} \times 16\pi = 4\pi$ cm; sector area $= \frac{1}{4} \times 64\pi = 16\pi$ cm².

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

2 Practice

2.1 Find the circumference of a circle of radius 5 cm, in terms of π . [1]

2.2 Find the area of a circle of radius 6 cm, in terms of π . [2]

2.3 Find the arc length of a sector with angle 90° and radius 12 cm, in terms of π . [2]

3 Exam-style questions

3.1 A sector has angle 120° and radius 9 cm.

(a) Find its area, in terms of π . [2]

(b) Find its perimeter, in terms of π . [3]

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

Solutions

Marking: **M1** a correct method, **A1** the correct answer.

Each answer shows the steps, then the **result**.

2.1

- $C = 2\pi r = 2\pi \times 5 = \mathbf{10\pi}$ cm

2.2

- $A = \pi r^2$
- $\pi \times 6^2 = \mathbf{36\pi}$ cm²

2.3

$$\frac{90}{360} \times 2\pi \times 12 = \frac{1}{4} \times 24\pi = \mathbf{6\pi}$$
 cm

3.1

(a)

$$\frac{120}{360} \times \pi \times 9^2 = \frac{1}{3} \times 81\pi = \mathbf{27\pi}$$
 cm²

(b)

- $\text{arc} = \frac{1}{3} \times 2\pi \times 9 = 6\pi$
- $\text{perimeter} = \text{arc} + 2r = \mathbf{6\pi + 18}$ cm

3.2

- $\pi r^2 = 36\pi$ so $r^2 = 36$
- $\mathbf{r = 6}$ cm