

E5.5 Compound shapes and parts of shapes

Name: _____ Class: _____ Date: _____ **Total: 20 marks**

KEY WORDS sector 扇形 • arc length 弧长 • compound shape 组合图形 • semicircle 半圆
• segment 弓形

Objective

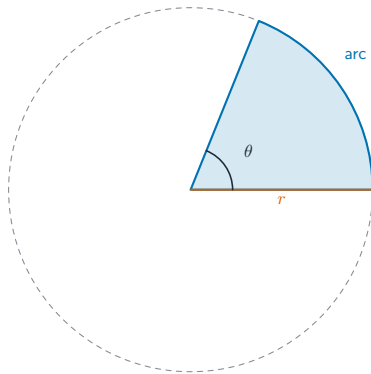
Build the skills to answer Extended exam questions on **compound shapes and parts of shapes** 组合图形与图形的一部分 — finding the **arc length** 弧长 and **sector area** 扇形面积, splitting a **compound shape** 组合图形 into pieces, and working backwards to find a sector angle.

You must be able to:

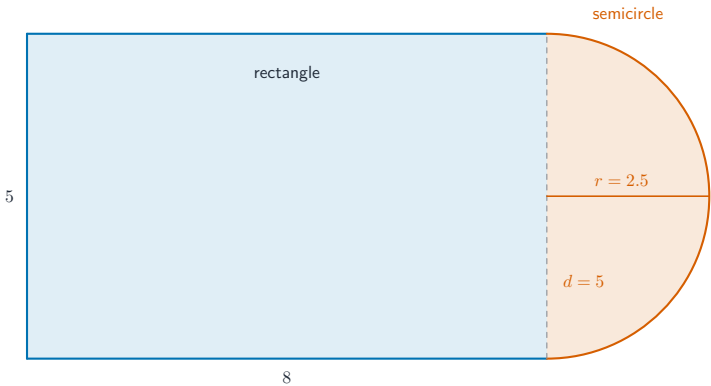
- find an arc length and a sector area using the fraction $\frac{\theta}{360}$
- split a compound shape into rectangles, triangles and parts of circles
- work backwards from a given arc length or sector area to the angle or the radius

1 Worked examples

■ A sector is a fraction of the whole circle



The fraction $\theta/360$ scales both the circumference and the area



Split it, work out each piece, then add — or subtract if a piece is cut out

- **Arc length** $= \frac{\theta}{360} \times 2\pi r$. For $r = 10$ and $\theta = 72^\circ$ that is 12.6 cm.
- **Sector area** $= \frac{\theta}{360} \times \pi r^2$. Same fraction, different formula.
- **Compound shapes:** draw the split lines on the diagram and label each piece. A perimeter follows only the OUTSIDE edge, so the internal split lines are not counted.
- **Backwards:** from a sector area, $\theta = \frac{A \times 360}{\pi r^2}$.

Answer shapes (marked by **method marks** — M1 for a correct method, A1 for

the correct answer): the fraction $\theta/360$ and the circle formula are separate method marks, so show both.

2 Practice

2.1 A sector of a circle has radius 10 cm and angle 72° . Find its arc length, correct to 3 significant figures. [3]

2.2 Find the area of the same sector, correct to 3 significant figures. [3]

2.3 A shape is made from a rectangle 10 cm by 6 cm with a semicircle of diameter 6 cm joined to one short end. Find the total area, correct to 3 significant figures. [3]

3 Exam-style questions

3.1 A running track is made from a rectangle 84 m long and 70 m wide, with a semicircle of diameter 70 m at each end.

(a) Find the perimeter of the track, correct to 3 significant figures. [4]

(b) Find the area enclosed, correct to 3 significant figures. [4]

3.2 A sector of a circle of radius 8 cm has an area of 33.5 cm^2 . Find the angle of the sector, correct to the nearest degree. [3]
