

Exercise walk-through

E5.2

Area and perimeter

IGCSE Mathematics

You must be able to

- calculate the area of a rectangle, triangle, parallelogram, trapezium and circle
- calculate the perimeter of a shape and the circumference of a circle
- rearrange an area formula to find a missing length

1

The method

Method — Perpendicular height every time, never the slant side

shape	area
rectangle	$l \times w$
triangle	$\frac{1}{2} \times b \times h$
parallelogram	$b \times h$
trapezium	$\frac{1}{2}(a + b) \times h$
circle	πr^2

Method — Perpendicular height every time, never the slant side

- **Circumference** $= 2\pi r = \pi d$. Do not confuse it with the area formula.
- **Work backwards** by rearranging: if a rectangle has area 84 cm^2 and length 12 cm, the width is $84 \div 12 = 7 \text{ cm}$.
- **Circle backwards**: from $A = \pi r^2$, $r = \sqrt{A/\pi}$.
- **Units**: area answers carry cm^2 or m^2 ; a perimeter carries cm or m.

Answer shapes (marked by **method marks** — M1 for a correct method, A1 for the correct answer): the substituted formula is the method mark.

Method — Perpendicular height every time, never the slant side

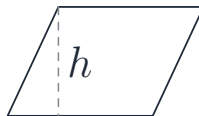
center Answer shapes (marked by method marks — M1 for a correct method, A1 for the correct answer): the...



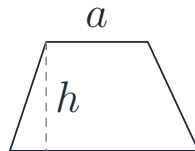
$$\ell \times w$$



$$\frac{1}{2} b h$$



$$b h$$

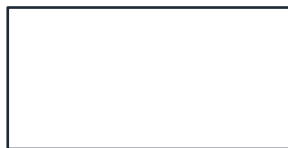


$$\frac{1}{2} (a + b) h$$

The area formulae for the standard shapes

Method — Perpendicular height every time, never the slant side

center Answer shapes (marked by method marks — M1 for a correct method, A1 for the correct answer): the...



$$\begin{aligned}\text{perimeter} \\ &= 5 + 3 + 5 + 3 \\ &= 16 \text{ cm}\end{aligned}$$

The perimeter of a shape traced around its edge

2

Practice

Practice 2.1 ■ 2 marks

Find the area of a triangle with base 12 cm and perpendicular height 7 cm.

Solution 2.1

Method: Perpendicular height every time, never the slant side — p.4

Worked steps

$$\blacksquare \frac{1}{2} \times 12 \times 7 \quad \text{M1}$$

$$= 42 \text{ cm}^2$$

A1

Practice 2.2 ■ 2 marks

Find the area of a trapezium whose parallel sides are 8 cm and 14 cm and whose height is 6 cm.

Solution 2.2

Method: Perpendicular height every time, never the slant side — p.4

Worked steps

$$\blacksquare \frac{1}{2}(8 + 14) \times 6 = \frac{1}{2} \times 22 \times 6 \quad \text{M1}$$

$$= 66 \text{ cm}^2$$

A1

Practice 2.3 ■ 2 marks

Find the circumference of a circle of radius 9 cm, correct to 3 significant figures.

Solution 2.3

Method: Perpendicular height every time, never the slant side — p.4

Worked steps

$$\blacksquare C = 2\pi r = 2 \times \pi \times 9 \quad \text{M1}$$

$$= 56.548 \dots = \mathbf{56.5 \text{ cm}}$$

A1

3

Exam-style

Exam-style 3.1 ■ 4 marks

A rectangle has an area of 84 cm^2 and a length of 12 cm.

Exam-style 3.1 (a) ■ 2 marks

Find its width.

Solution 3.1 (a)

Method: Perpendicular height every time, never the slant side — p.4

Worked steps

■ width = $84 \div 12$ **M1**

= 7 cm

A1

Exam-style 3.1 (b) ■ 2 marks

Find its perimeter.

Solution 3.1 (b)

Worked steps

$$\blacksquare \text{ perimeter} = 2(12 + 7) \quad \text{M1}$$

$$= 38 \text{ cm}$$

A1

Exam-style 3.2 ■ 3 marks

A circle has an area of 154 cm^2 . Find its radius, correct to 3 significant figures.

Solution 3.2

Method: Perpendicular height every time, never the slant side — p.4

Worked steps

■ $154 = \pi r^2$, so $r^2 = 154 \div \pi = 49.02\dots$ M1 M1

$$r = \sqrt{49.02\dots} = \mathbf{7.00 \text{ cm}}$$
 A1

- keep the full value in the calculator and round only at the end

Exam-style 3.3 ■ 2 marks

A parallelogram has a base of 15 cm and an area of 97.5 cm^2 . Find its perpendicular height.

Solution 3.3

Method: Perpendicular height every time, never the slant side — p.4

Worked steps

$$\blacksquare 97.5 = 15 \times h \quad \text{M1}$$

$$h = 6.5 \text{ cm}$$

A1