

E5.2 Area and perimeter

Name: _____ Class: _____ Date: _____

Total: 15 marks

KEY WORDS perpendicular height 高 • trapezium 梯形 • parallelogram 平行四边形
• circumference 圆周长 • rearrange 变形

Objective

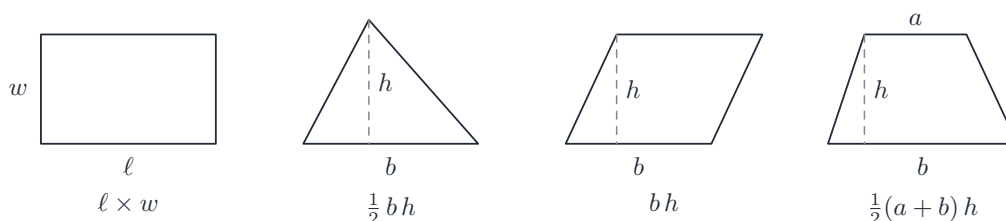
Build the skills to answer Extended exam questions on **area and perimeter** 面积与周长 — the area formulae for a **triangle** 三角形, **parallelogram** 平行四边形, **trapezium** 梯形 and **circle** 圆, and working backwards from a given area to a missing length.

You must be able to:

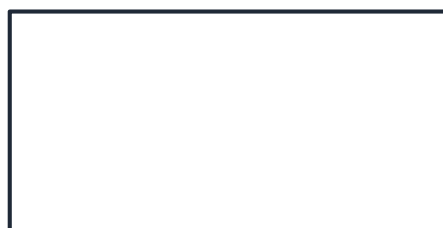
- calculate the area of a rectangle, triangle, parallelogram, trapezium and circle
- calculate the perimeter of a shape and the circumference of a circle
- rearrange an area formula to find a missing length

1 Worked examples

■ Perpendicular height every time, never the slant side



The height must be at right angles to the base



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

Perimeter is a length; area is a length squared

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

- **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.

2 Practice

2.1 Find the area of a triangle with base 12 cm and perpendicular height 7 cm . [2]

2.2 Find the area of a trapezium whose parallel sides are 8 cm and 14 cm and whose height is 6 cm . [2]

2.3 Find the circumference of a circle of radius 9 cm, correct to 3 significant figures. [2]

3 Exam-style questions

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

(a) Find its width. [2]

(b) Find its perimeter. [2]

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

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

Solutions

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

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

2.1

$$\begin{aligned} \bullet \quad \frac{1}{2} \times 12 \times 7 \\ = \mathbf{42 \text{ cm}^2} \end{aligned}$$

2.2

$$\begin{aligned} \bullet \quad \frac{1}{2}(8 + 14) \times 6 = \frac{1}{2} \times 22 \times 6 \\ = \mathbf{66 \text{ cm}^2} \end{aligned}$$

2.3

$$\begin{aligned} \bullet \quad C = 2\pi r = 2 \times \pi \times 9 \\ = 56.548 \dots = \mathbf{56.5 \text{ cm}} \end{aligned}$$

3.1

(a)

$$\begin{aligned} \bullet \quad \text{width} = 84 \div 12 \\ = \mathbf{7 \text{ cm}} \end{aligned}$$

(b)

$$\begin{aligned} \bullet \quad \text{perimeter} = 2(12 + 7) \\ = \mathbf{38 \text{ cm}} \end{aligned}$$

3.2

$$\begin{aligned} \bullet \quad 154 = \pi r^2, \text{ so } r^2 = 154 \div \pi = 49.02 \dots \\ r = \sqrt{49.02 \dots} = \mathbf{7.00 \text{ cm}} \end{aligned}$$

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

3.3

$$\begin{aligned} \bullet \quad 97.5 = 15 \times h \\ h = \mathbf{6.5 \text{ cm}} \end{aligned}$$