

Exercise walk-through

# C5.2

## Area and perimeter

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IGCSE Mathematics

## You must be able to

- Choose area formulas using perpendicular heights
- Distinguish boundary length from enclosed area
- Compare equal-area shapes and interpret units

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The method

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## Method — Key knowledge: Area and perimeter

Perimeter is the distance around the boundary; area measures the region inside. Rectangle:  $A = lw$ ,  $P = 2(l + w)$ . Triangle:  $A = bh/2$ . Parallelogram:  $A = bh$ , using perpendicular height, not the sloping side. Trapezium:  $A = (a + b)h/2$ , where  $a, b$  are the parallel sides. Add all boundary edges for a nonrectangular perimeter.

## Exercises 2.1·2.3

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**2.1** Find the area and perimeter of a  $7 \times 4$  cm rectangle. [2]

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**2.2** Find the area of a triangle with base 12 cm and perpendicular height 5 cm. [2]

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**2.3** A parallelogram has base 8 cm, perpendicular height 3 cm and sloping side 4 cm.  
Find its area. [2]

## Exercises 2.1·2.3

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**2.1** Find the area and perimeter of a  $7 \times 4$  cm rectangle. [2]

**2.1**

- $A = lw = 7(4) = \mathbf{28} \text{ cm}^2$ ;  $P = 2(7 + 4) = \mathbf{22} \text{ cm}$ .
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**2.2** Find the area of a triangle with base 12 cm and perpendicular height 5 cm. [2]

**2.2**

- $A = bh/2 = 12(5)/2 = \mathbf{30} \text{ cm}^2$ .
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**2.3** A parallelogram has base 8 cm, perpendicular height 3 cm and sloping side 4 cm.  
Find its area. [2]

**2.3**

- Use perpendicular height:  $A = bh = 8(3) = \mathbf{24} \text{ cm}^2$ .

## Exercise 2.4

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**2.4** A trapezium has parallel sides 7 and 13 cm and height 6 cm. Find its area. [2]

### 3 Exam-style questions

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## Exercise 2.4

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**2.4** A trapezium has parallel sides 7 and 13 cm and height 6 cm. Find its area. [2]

### 3 Exam-style questions

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**2.4**

- $A = (a + b)h/2 = (7 + 13)6/2 = \mathbf{60} \text{ cm}^2$ .

## Exercise 3.1 (a)

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**3.1** Apply the area and perimeter methods below. Show working and include units where appropriate.

(a) A rectangle is 12 m by 7 m. Find its perimeter.

[2]

## Exercise 3.1 (a)

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**3.1** Apply the area and perimeter methods below. Show working and include units where appropriate.

(a) A rectangle is 12 m by 7 m. Find its perimeter.

[2]

(a)

- $P = 2(l + w) = 2(12 + 7) = \mathbf{38 \text{ m.}}$

## Exercise 3.1 (b)

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**3.1** Apply the area and perimeter methods below. Show working and include units where appropriate.

(b) A triangular garden has base 12 m and perpendicular height 4 m. Find its area. [2]

## Exercise 3.1 (b)

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**3.1** Apply the area and perimeter methods below. Show working and include units where appropriate.

(b) A triangular garden has base 12 m and perpendicular height 4 m. Find its area. [2]

(b)

- $A = bh/2 = 12(4)/2 = \mathbf{24 \text{ m}^2}.$

## Exercise 3.1 (c)

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**3.1** Apply the area and perimeter methods below. Show working and include units where appropriate.

(c) A parallelogram has the same area as that triangle and base 8 m. Find its perpendicular height. [2]

## Exercise 3.1 (c)

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**3.1** Apply the area and perimeter methods below. Show working and include units where appropriate.

(c) A parallelogram has the same area as that triangle and base 8 m. Find its perpendicular height. [2]

(c)

- $A = bh$  gives  $h = A/b = 24/8 = \mathbf{3}$  m.

## Exercise 3.2 (a)

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**3.2** A rectangle measures 12 m by 8 m. A square has the same area.

(a) Find the rectangle's area and perimeter.

[3]

## Exercise 3.2 (a)

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**3.2** A rectangle measures 12 m by 8 m. A square has the same area.

(a) Find the rectangle's area and perimeter.

[3]

(a)

- Use  $A = lw = 12(8) = \mathbf{96 \text{ m}^2}$ .
- Perimeter  $P = 2(l + w) = 2(12 + 8) = \mathbf{40 \text{ m}}$ .

## Exercise 3.2 (b)

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**3.2** A rectangle measures 12 m by 8 m. A square has the same area.

(b) Find the square side and perimeter, giving the perimeter to one decimal place. Which shape needs less boundary fencing? [3]

## Exercise 3.2 (b)

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**3.2** A rectangle measures 12 m by 8 m. A square has the same area.

(b) Find the square side and perimeter, giving the perimeter to one decimal place. Which shape needs less boundary fencing? [3]

(b)

- Equal area gives  $s = \sqrt{96}$  m.
- Square perimeter  $P_s = 4\sqrt{96} \approx \mathbf{39.2}$  m.
- The square needs less fencing, since its perimeter is below 40 m.