

Perimeter

Solutions

For AQA GCSE Mathematics (8300) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (1 mark)

A regular octagon has sides of length 5 cm.

Circle the perimeter of the octagon.

Options: 13 cm, 25 cm, 30 cm, 40 cm

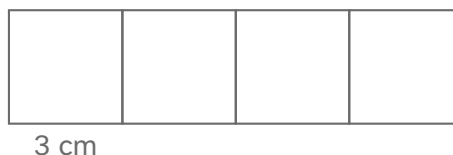
A regular octagon has 8 equal sides.

Perimeter: $8 \times 5 = 40$ cm

Answer: 40 cm

2 (2 marks)

Here is a shape made from squares.



Four squares, each with side length 3 cm, are joined in a row.

Work out the perimeter of the shape.

The shape is a rectangle.

Length: $4 \times 3 = 12$ cm

Height: 3 cm

Perimeter: $12 + 3 + 12 + 3 = 30$ cm

(Or count the edges round the outside: 10 edges, and $10 \times 3 = 30$.)

Answer: 30 cm

Tip: Only count the edges round the **outside**. The lines where two squares join are inside the shape, so don't count them.

Marks: 1 mark for seeing a 12 cm by 3 cm rectangle, or counting 10 outside edges. 1 mark for 30.

3 (2 marks)

A rectangle is drawn on the centimetre grid.

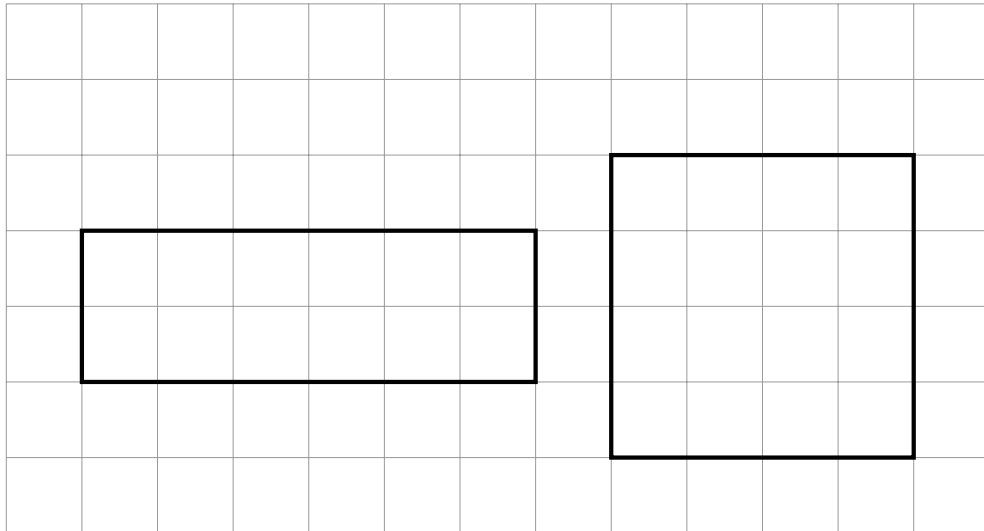
On the grid, draw a square that has the same perimeter as the rectangle.

The rectangle is 6 cm long and 2 cm wide.

Perimeter of the rectangle: $6 + 2 + 6 + 2 = 16$ cm

A square has 4 equal sides.

Side of the square: $16 \div 4 = 4$ cm



Answer: A 4 cm by 4 cm square

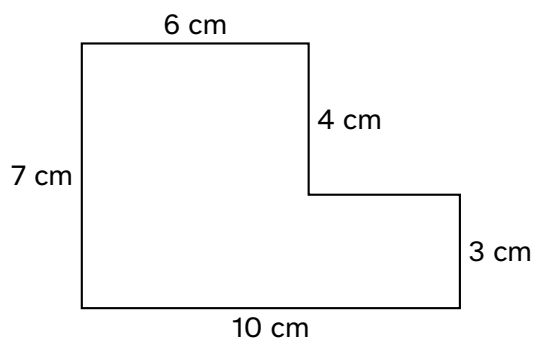
Tip: The square needs the same **perimeter**, not the same area. Check: $4 + 4 + 4 + 4 = 16$ and $6 + 2 + 6 + 2 = 16$.

Marks: 1 mark for 16. 1 mark for a correct 4 cm by 4 cm square.

4 (2 marks)

The shape is made from rectangles.

All the corners are right angles.



Not drawn accurately

Work out the perimeter of the shape.

One side is not labelled: the short horizontal side on the right.

The bottom is 10 cm and the top is 6 cm.

So the missing side is $10 - 6 = 4$ cm.

Add all six sides: $10 + 3 + 4 + 4 + 6 + 7 = 34$ cm

Answer: 34 cm

Tip: Count the sides before you add. An L-shape has 6 sides, so you need 6 lengths.

Marks: 1 mark for finding the missing length (4 cm). 1 mark for 34.

5 (2 marks)

A square has an area of 49 cm^2
Work out the perimeter of the square.

Area of a square = side $\times$ side

So side = $\sqrt{49} = 7$ cm

A square has 4 equal sides.

Perimeter: $4 \times 7 = 28$ cm

Answer: 28 cm

Marks: 1 mark for 7. 1 mark for 28.

6 (2 marks)

A rectangle has a perimeter of 30 cm.
The length of the rectangle is 9 cm.
Work out the width of the rectangle.

A rectangle has two lengths and two widths.

Two lengths: $9 + 9 = 18$ cm

The two widths make $30 - 18 = 12$ cm

One width: $12 \div 2 = 6$ cm

Answer: 6 cm

Tip: Subtract **both** lengths. $30 - 9 = 21$ only takes away one of them.

Marks: 1 mark for $30 - 9 - 9$ or $30 \div 2 - 9$. 1 mark for 6.

7 (2 marks)

A square and an equilateral triangle have the same perimeter.

The square has sides of length 6 cm.

Work out the length of one side of the triangle.

Perimeter of the square: $4 \times 6 = 24$ cm

The triangle also has perimeter 24 cm.

An equilateral triangle has 3 equal sides.

One side: $24 \div 3 = 8$ cm

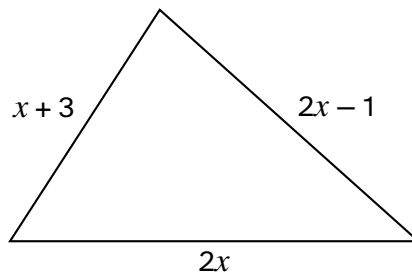
Answer: 8 cm

Marks: 1 mark for $4 \times 6 \div 3$. 1 mark for 8.

8 (3 marks)

Here is a triangle.

The lengths are in centimetres.



Not drawn accurately

The perimeter of the triangle is 32 cm.

Work out the length of the longest side.

Add the three sides and set them equal to 32:

$$2x + (2x - 1) + (x + 3) = 32$$

$$5x + 2 = 32$$

$$5x = 30$$

$$x = 6$$

Now find the sides:

$$2x = 12 \text{ cm}$$

$$2x - 1 = 11 \text{ cm}$$

$$x + 3 = 9 \text{ cm}$$

$$\text{Check: } 12 + 11 + 9 = 32 \quad \checkmark$$

The longest side is 12 cm.

Answer: 12 cm

Tip: Finding $x = 6$ is not the answer. Put $x = 6$ back into each side to find the longest.

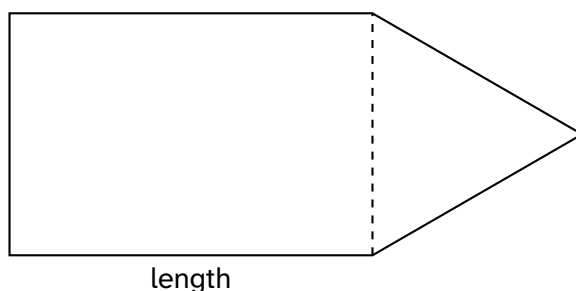
Marks: 1 mark for $5x + 2 = 32$. 1 mark for $x = 6$. 1 mark for 12.

9 (4 marks)

An equilateral triangle has a perimeter of 24 cm.

The triangle is joined to a rectangle to make this shape.

One side of the triangle fits exactly along one of the shorter sides of the rectangle.



Not drawn accurately

The perimeter of the shape is 48 cm.

Work out the length of the rectangle.

An equilateral triangle has 3 equal sides.

Each side of the triangle: $24 \div 3 = 8$ cm

So the shorter sides of the rectangle are 8 cm too.

Go round the outside of the shape: two sides of the triangle, the short side of the rectangle on the left, and the two lengths.

Known sides: $8 + 8 + 8 = 24$ cm

The two lengths make $48 - 24 = 24$ cm

One length: $24 \div 2 = 12$ cm

Answer: 12 cm

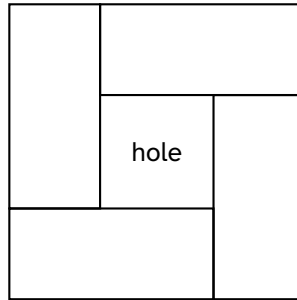
Tip: The dashed side, where the triangle and the rectangle join, is inside the shape. It is not part of the perimeter.

Marks: 1 mark for 8. 1 mark for $8 + 8 + 8$ or 24. 1 mark for $48 - 24$. 1 mark for 12.

10 (4 marks)

Four identical rectangles are put together to make a large square with a square hole in the middle, as shown.

Each rectangle has a perimeter of 26 cm and a length of 9 cm.



Not drawn accurately

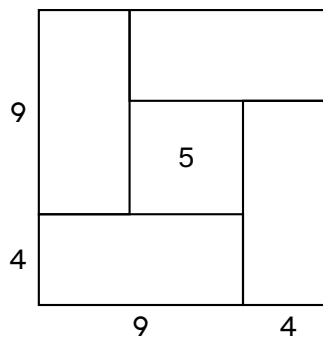
- (a) Work out the perimeter of the large square.

Perimeter of one rectangle = $2 \times \text{length} + 2 \times \text{width}$

Length + width = $26 \div 2 = 13$ cm

Width: $13 - 9 = 4$ cm

Each side of the large square is one length plus one width.



Side of the large square: $9 + 4 = 13$ cm

Perimeter: $4 \times 13 = 52$ cm

Answer: 52 cm

Marks: 1 mark for a width of 4 or a side of 13. 1 mark for 52.

- (b) Work out the perimeter of the square hole.

Each side of the hole is one length take away one width.

Side of the hole: $9 - 4 = 5$ cm

Perimeter: $4 \times 5 = 20$ cm

Answer: 20 cm

Tip: Look along one side of the hole: it is the long side of a rectangle with the width of the next rectangle taken off.

Marks: 1 mark for $9 - 4$ or 5. 1 mark for 20.

11 (4 marks)

A rectangular garden is 12 m long and 8.5 m wide.

A fence is put all the way round the edge of the garden.

Each fence panel is 1.8 m wide and costs £24

Work out the cost of the fence panels.

The fence goes all the way round, so find the perimeter.

Perimeter: $12 + 8.5 + 12 + 8.5 = 41$ m

Number of panels: $41 \div 1.8 = 22.77 \dots$

22 panels would not be enough, so round **up** to 23 panels.

Cost: $23 \times 24 = £552$

Answer: £552

Tip: You can't buy part of a panel, so always round the number of panels **up**. Even 22.1 panels would mean buying 23.

Marks: 1 mark for 41. 1 mark for $41 \div 1.8$. 1 mark for rounding up to 23. 1 mark for £552.
