

Plans and Elevations

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • 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)

The plan of a solid is a circle.

The front elevation and the side elevation are both rectangles.

Write down the name of the solid.

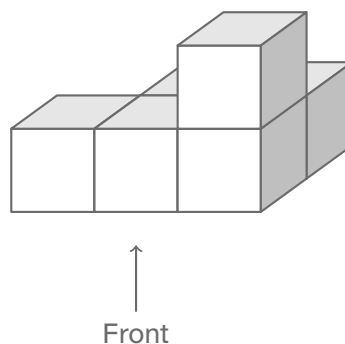
The plan is the view from above. A cylinder standing upright looks like a circle from above.

From the front and from the side, a cylinder looks like a rectangle.

Answer: Cylinder

2 (6 marks)

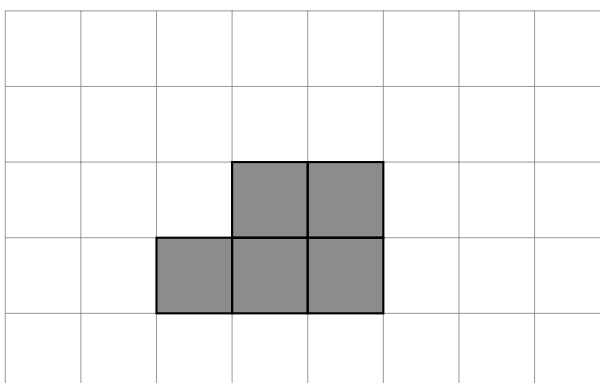
The diagram shows a solid shape made from six centimetre cubes.



(a) On the centimetre grid, draw the plan of the solid shape.

The plan is the view from directly above.

Each column of cubes shows as one square:



Answer: See diagram

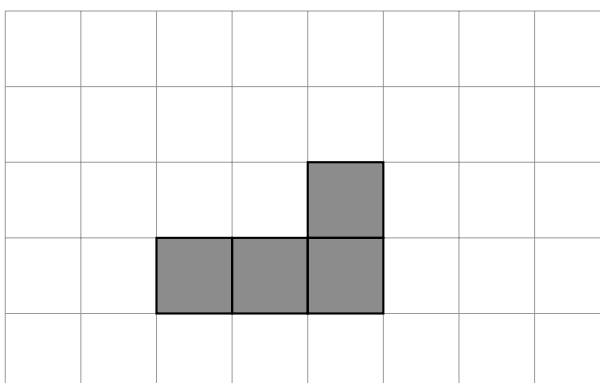
Tip: Draw flat 2D views on the grid, not 3D pictures. Draw each view separately.

Marks: 2 marks for a fully correct plan. 1 mark for 4 correct squares.

- (b) On the centimetre grid, draw the front elevation of the solid shape.

The front elevation is the view from the front.

You see 3 squares along the bottom and 1 on top at the right:



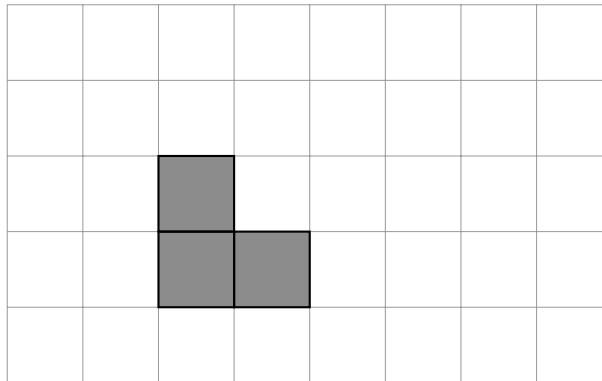
Answer: See diagram

Marks: 2 marks for a fully correct front elevation. 1 mark for 3 correct squares.

- (c) On the centimetre grid, draw the side elevation of the solid shape (the view from the right).

The side elevation is the view from the right.

You see two squares along the bottom and one on top at the front (on the left of this view):



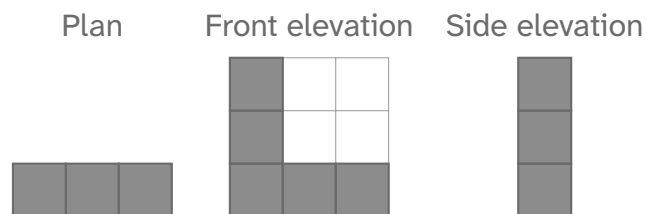
Answer: See diagram

Marks: 2 marks for a fully correct side elevation. 1 mark for 2 correct squares.

3 (2 marks)

A solid is made from centimetre cubes.

Here are its plan, front elevation and side elevation.



How many cubes are in the solid?

The plan shows 3 squares in a row, so there are 3 columns of cubes.

The front elevation shows the left column is 3 cubes high.

The other two columns are 1 cube high.

Total = $3 + 1 + 1 = 5$ cubes

Answer: 5

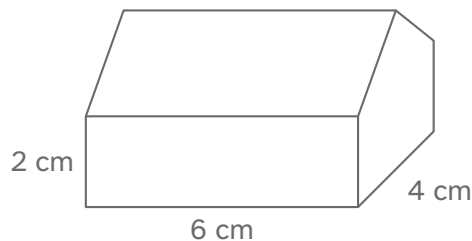
Marks: 1 mark for a correct method, e.g. $3 + 1 + 1$. 1 mark for 5.

4 (2 marks)

Here is a solid made from a cuboid with a roof in the shape of a triangular prism on top.

The cuboid is 6 cm long, 4 cm wide and 2 cm high.

The top edge of the roof is directly above the middle of the cuboid, along its length.

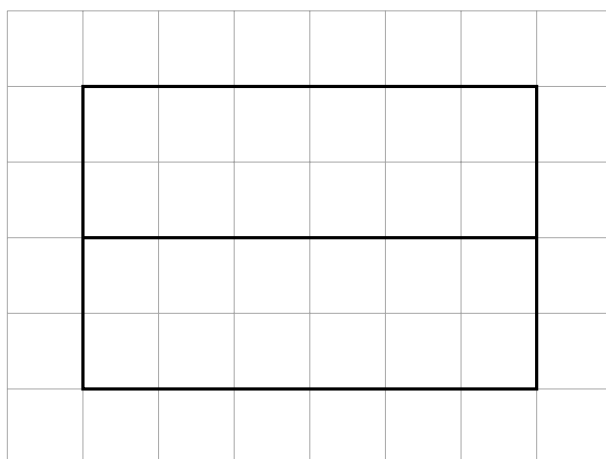


On the centimetre grid, draw the plan of this solid.

The plan is the view from directly above.

From above, the outline is the rectangle under the roof: 6 cm by 4 cm.

The top edge of the roof runs along the length, halfway across, so it shows as a line across the middle of the rectangle.



Answer: Rectangle 6 cm by 4 cm with a line along the middle

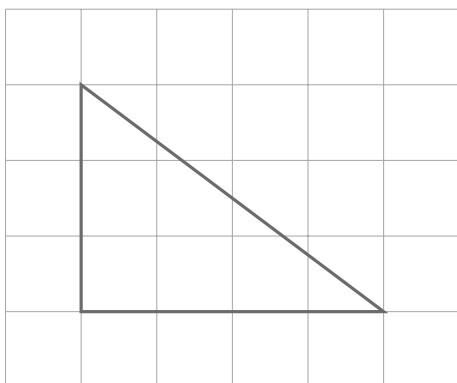
Tip: The top edge of the roof is seen from above, so it must be drawn on the plan. A rectangle on its own is not enough.

Marks: 1 mark for a 6 cm by 4 cm rectangle. 1 mark for the line along the middle, parallel to the 6 cm sides.

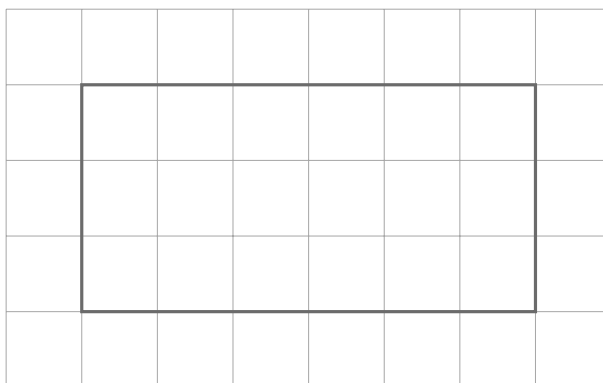
5 (3 marks)

The centimetre grid shows the front elevation and the side elevation of a triangular prism.

Front elevation



Side elevation



Work out the volume of the prism.

The front elevation is the cross-section: a right-angled triangle with base 4 cm and height 3 cm.

$$\text{Area of the triangle} = \frac{1}{2} \times 4 \times 3 = 6 \text{ cm}^2$$

The side elevation shows that the prism is 6 cm long (from front to back).

Volume of a prism = area of cross-section $\times$ length

$$= 6 \times 6 = 36 \text{ cm}^3$$

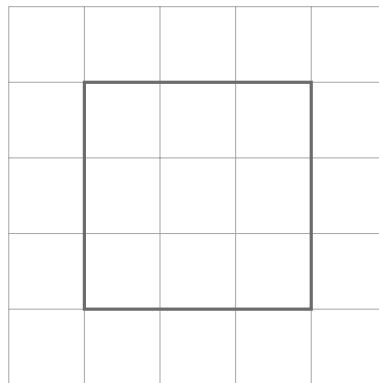
Answer: 36 cm^3

Tip: The area of a triangle is **half** of base $\times$ height. Forgetting the $\frac{1}{2}$ gives 72, which is wrong.

Marks: 1 mark for $\frac{1}{2} \times 4 \times 3 (= 6)$. 1 mark for multiplying by 6. 1 mark for 36.

6 (3 marks)

The side elevation of a cuboid is shown on the centimetre grid below.



The area of the plan of the cuboid is 21 cm^2

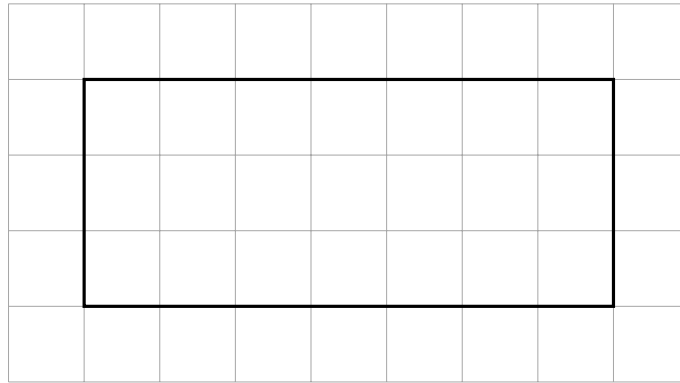
On the grid, draw the front elevation of the cuboid.

The side elevation shows the depth and the height: 3 cm and 3 cm.

The plan shows the length and the depth.

$$\text{Length} \times 3 = 21, \text{ so length} = 21 \div 3 = 7 \text{ cm}$$

The front elevation shows the length and the height: 7 cm by 3 cm.



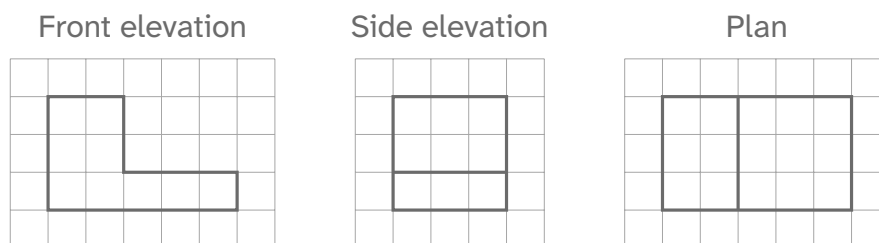
Answer: Rectangle 7 cm by 3 cm

Tip: Work out which lengths each view shows. The plan is length by depth, so divide 21 by the depth (3 cm).

Marks: 1 mark for $21 \div 3$. 1 mark for a length of 7 cm. 1 mark for the correct front elevation.

7 (4 marks)

Here are the front elevation, side elevation and plan of a prism, drawn on a centimetre grid.



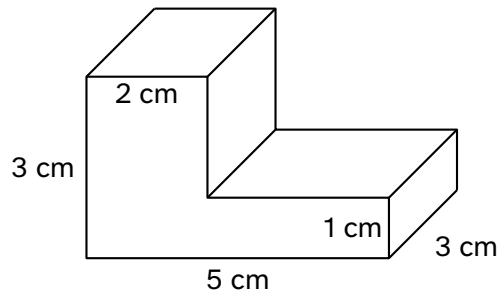
- (a) Sketch the prism.
Label the lengths of its edges on your sketch.

The front elevation is an L-shape, and the side elevation and plan are rectangles with a line across.

So the solid is a prism with an L-shaped cross-section.

From the front elevation: 5 cm wide, 3 cm high on the left, 1 cm high on the right, and the tall part is 2 cm wide.

From the plan and side elevation: the prism is 3 cm deep.



Answer: Sketch of an L-shaped prism: 5 cm wide, 3 cm and 1 cm high, tall part 2 cm wide, 3 cm deep

Tip: Draw one 3D solid, not the three views joined together. Use the grid to read every length.

Marks: 1 mark for a sketch of an L-shaped prism. 1 mark for the lengths (5, 3, 1, 2 and 3 cm deep) shown correctly.

(b) Work out the volume of the prism.

Volume of a prism = area of cross-section $\times$ depth

Split the L-shape into two rectangles:

$$5 \times 1 = 5 \text{ cm}^2 \text{ and } 2 \times 2 = 4 \text{ cm}^2$$

$$\text{Area of cross-section} = 5 + 4 = 9 \text{ cm}^2$$

$$\text{Volume} = 9 \times 3 = 27 \text{ cm}^3$$

Answer: 27 cm^3

Marks: 1 mark for the area 9 cm^2 (or a correct method for the volume). 1 mark for 27.