

Plans and Elevations

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 solid has a plan that is a circle and a front elevation that is a triangle.
Circle the solid.

Options: cylinder, cone, sphere, pyramid

The plan is the view from above. A cone looks like a circle from above.

The front elevation is the view from the front. A cone looks like a triangle from the front.

Answer: cone

2 (2 marks)

(a) Here are the front elevation, side elevation and plan of a solid.

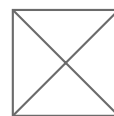
Front elevation



Side elevation



Plan



Write down the name of the solid.

The plan (view from above) is a square, so the base is a square.

The lines across the plan are edges that meet at a point in the middle, at the top.

From the front and from the side it looks like a triangle.

The solid is a square-based pyramid.

Answer: Square-based pyramid

Tip: A cone would have a circle as its plan. The square plan tells you the base is a square.

(b) Here are the front elevation, side elevation and plan of a different solid.

Front elevation



Side elevation



Plan



Write down the name of the solid.

The front elevation is a triangle, so the front face of the solid is a triangle.

The side elevation and the plan are rectangles, so the triangle goes all the way back.

The line down the middle of the plan is the top edge where the two sloping faces meet.

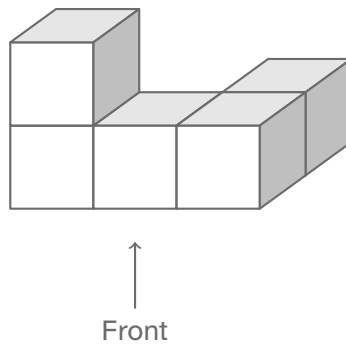
The solid is a triangular prism.

Answer: Triangular prism

Tip: A pyramid would look like a triangle from the side as well. Here the side view is a rectangle, so it is a prism.

3 (3 marks)

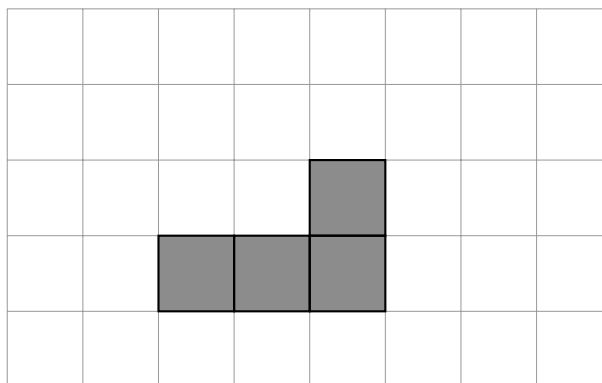
The solid is made from five centimetre cubes.



- (a) On the centimetre grid, draw the plan of the solid (the view from above).

The plan is the view from directly above.

From above you see 4 squares:



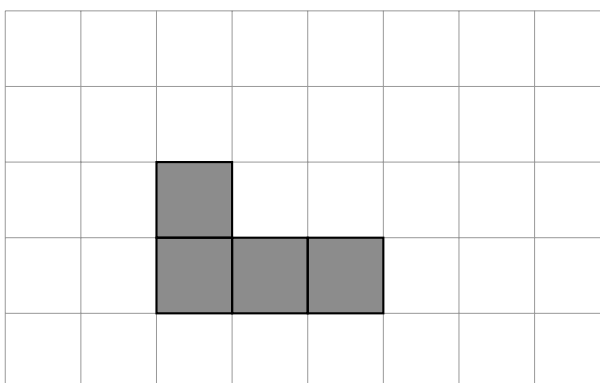
Answer: See diagram

Tip: Draw a flat 2D view on the grid, not a 3D picture. Each cube you can see is one square.

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

The front elevation is the view from the front.

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

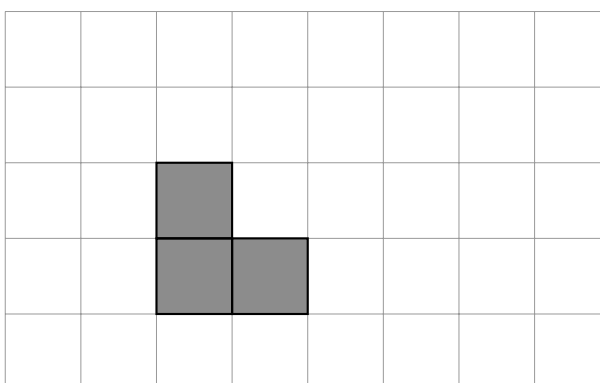


Answer: See diagram

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

The side elevation is the view from the right.

You see a base 2 squares wide, with one square on top at the front (on the left of this view):



Answer: See diagram

4 (2 marks)

Here are the plan, front elevation and side elevation of a solid.



The solid is made from centimetre cubes.

How many cubes are in the solid?

The plan shows 4 squares, so there are 4 columns of cubes.

The front elevation shows only the left side is 2 cubes high.

The side elevation shows only the front is 2 cubes high.

So only the front-left column has 2 cubes. The other 3 columns have 1 cube.

Total = $4 + 1 = 5$ cubes

Answer: 5

Marks: 1 mark for a correct method, e.g. 4 on the bottom layer and 1 on top. 1 mark for 5.

5 (2 marks)

The plan of a cuboid is a rectangle 4 cm by 3 cm.

The front elevation is a rectangle 4 cm by 2 cm.

Work out the volume of the cuboid.

The plan (view from above) gives the length and width: 4 cm and 3 cm.

The front elevation gives the length and height: 4 cm and 2 cm.

So the cuboid is 4 cm by 3 cm by 2 cm.

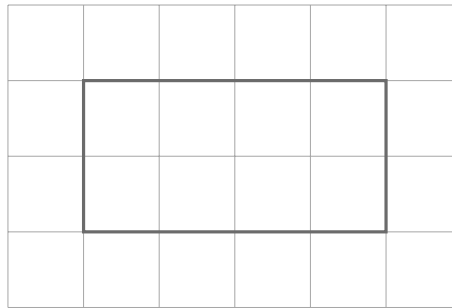
Volume = $4 \times 3 \times 2 = 24 \text{ cm}^3$

Answer: 24 cm^3

Marks: 1 mark for $4 \times 3 \times 2$. 1 mark for 24.

6 (2 marks)

The plan of a cuboid is shown on the centimetre grid.



The height of the cuboid is half of its length.

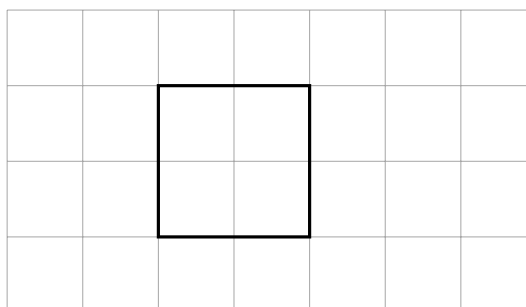
Draw the side elevation of the cuboid on the centimetre grid below.

From the plan, the cuboid is 4 cm long and 2 cm deep.

The height is half of the length: $4 \div 2 = 2$ cm

The side elevation shows the depth and the height.

So it is a square, 2 cm by 2 cm:



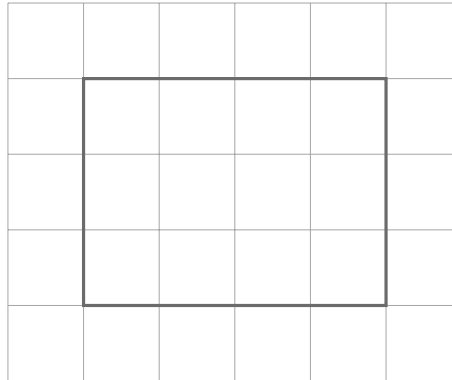
Answer: Square 2 cm by 2 cm

Tip: The side elevation uses the depth (2 cm), not the length (4 cm). Many students draw a 4 cm by 2 cm rectangle.

Marks: 1 mark for a height of 2 cm. 1 mark for a correct 2 cm by 2 cm square.

7 (2 marks)

The front elevation of a cuboid is shown on this centimetre grid.



The volume of the cuboid is 36 cm^3

Sam says,

“The plan of the cuboid is a square.”

Is Sam correct?

You must show your working.

The front elevation is 4 cm wide and 3 cm high.

Area of the front = $4 \times 3 = 12 \text{ cm}^2$

Volume = area of front $\times$ depth, so depth = $36 \div 12 = 3 \text{ cm}$

The plan shows the width and the depth: 4 cm by 3 cm.

4 cm by 3 cm is not a square, so Sam is not correct.

Answer: No, the plan is 4 cm by 3 cm

Tip: Use the volume to find the missing length: volume $\div$ area of the front. Then think about which two lengths the plan shows.

Marks: 1 mark for $36 \div (4 \times 3)$ or a depth of 3 cm. 1 mark for No with the plan 4 cm by 3 cm.

8 (4 marks)

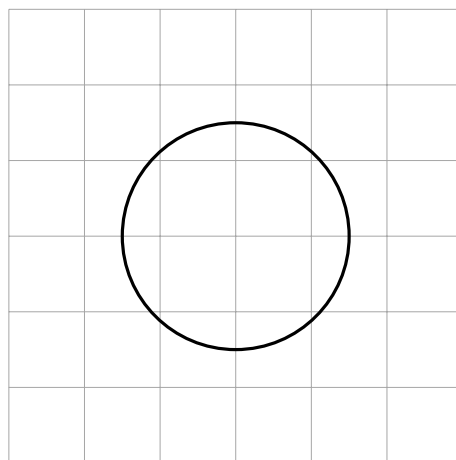
A building is in the shape of a cylinder.
It has diameter 30 m and height 45 m.

- (a) On the centimetre grid, draw a plan of the building.
Use a scale of 1 cm to 10 m

From above, a cylinder looks like a circle.

Scale 1 cm to 10 m, so the diameter 30 m becomes $30 \div 10 = 3$ cm.

Draw a circle with diameter 3 cm (radius 1.5 cm):



Answer: Circle, diameter 3 cm

Tip: The plan of a cylinder standing upright is a **circle**, not a rectangle.

Marks: 2 marks for a circle with diameter 3 cm. 1 mark for a circle of the wrong size, or a different shape 3 cm across.

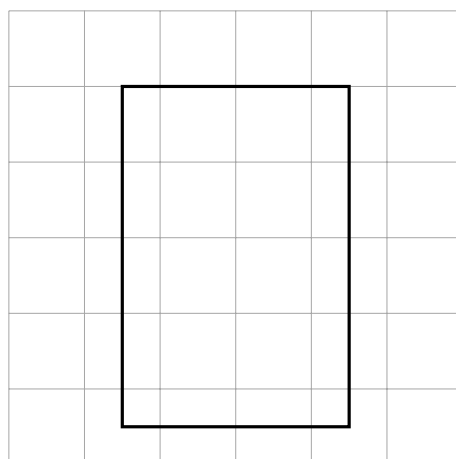
- (b) On this centimetre grid, draw the front elevation of the building.
Use a scale of 1 cm to 10 m

From the front, a cylinder looks like a rectangle.

Width: 30 m becomes 3 cm.

Height: 45 m becomes $45 \div 10 = 4.5$ cm.

Draw a rectangle 3 cm wide and 4.5 cm high:



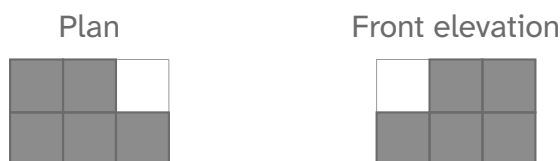
Answer: Rectangle 3 cm wide and 4.5 cm high

Marks: 2 marks for a correct rectangle. 1 mark for a rectangle with one correct side.

9 (3 marks)

A solid shape is made from centimetre cubes.

Here are the plan and front elevation of the shape.



The solid is made from 8 centimetre cubes.

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

The plan shows 5 squares, so there are 5 columns of cubes: 3 at the front and 2 at the back.

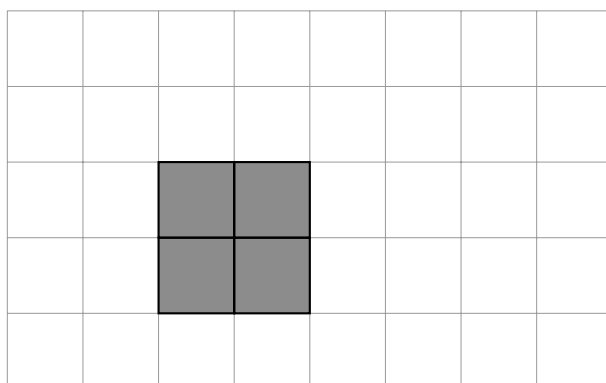
That uses 5 cubes on the bottom layer, so $8 - 5 = 3$ cubes are on the second layer.

The front elevation shows that only the middle and right columns are 2 cubes high.

The middle has a front and a back column. The right has only a front column.

So the 3 top cubes must be at the middle front, middle back and right front.

From the right, both the front row and the back row are 2 cubes high:



Answer: Square 2 cm by 2 cm (both rows 2 cubes high)

Tip: Use the number of cubes. The views alone do not tell you where the cubes are, but 8 cubes means every possible top position is filled.

Marks: 1 mark for 3 cubes on the top layer. 1 mark for working out where they are. 1 mark for the correct side elevation.

10 (3 marks)

A solid shape is made from centimetre cubes.

The plan shows how many cubes are in each column.

1	3	2
2	1	1

↑
Front

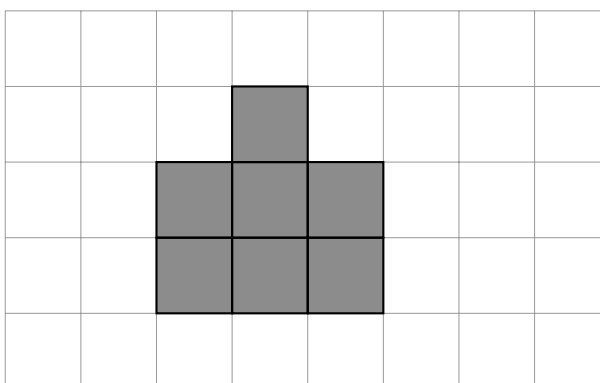
(a) On the centimetre grid, draw the front elevation of the solid.

From the front you see the tallest column in each of the 3 columns (left, middle, right).

Left: 2 and 1, so 2 high.

Middle: 1 and 3, so 3 high.

Right: 1 and 2, so 2 high.



Answer: See diagram (heights 2, 3, 2)

Tip: Only the tallest stack in each column can be seen from the front. Do not add the numbers together.

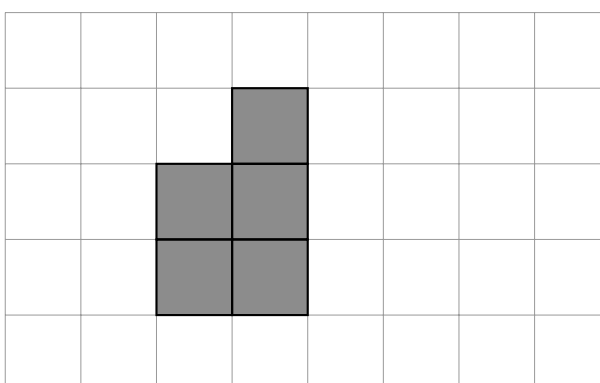
Marks: 2 marks for a fully correct front elevation. 1 mark for two columns correct.

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

From the right, the front row is on the left of the view and the back row is on the right.

Front row: 2, 1, 1, so the tallest is 2.

Back row: 1, 3, 2, so the tallest is 3.



Answer: See diagram (heights 2 then 3)