Plans and elevations

G13 · Geometry and measures · revision notes

A plan is the view of a 3D solid from directly above, and an elevation is the view from the front or the side. You draw plans and elevations on squared paper, draw solids on isometric paper, and work out a solid (and sometimes its volume) from its views.

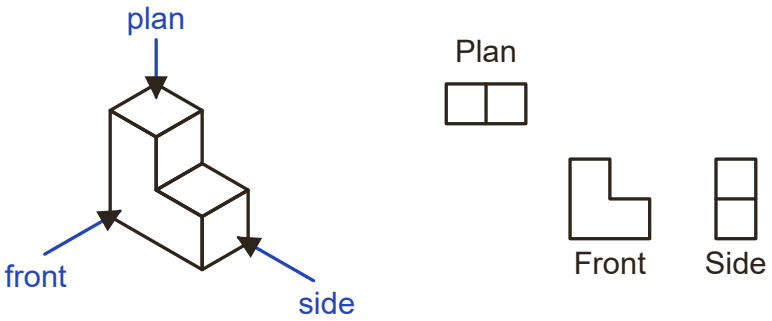
Key facts

- Plan = view from above
- Front elevation = view from the front
- Side elevation = view from the side
- Plan: width and depth; front elevation: width and height; side elevation: depth and height
- Isometric paper: dots in vertical columns; vertical edges stay vertical
- Prism: the cross-section appears in one view; the other views are rectangles

Notes

The three views

- **Plan**: the view from directly above.
- **Front elevation**: the view from the front. **Side elevation**: the view from the side (the question says which side).



Each view is flat. A line shows where the height changes, e.g. across the plan and the side view.

- Each view is a flat 2D drawing: no perspective and no slanted '3D' lines.
- Draw a line wherever two faces meet or the height or depth changes, e.g. a step in the solid shows as a line on the plan.

Drawing views accurately

- Think of three directions: width (left to right), depth (front to back) and height.
- The plan shows width and depth; the front elevation shows width and height; the side elevation shows depth and height.
- Lengths must match between views: the width of the plan equals the width of the front elevation.
- Use a ruler and a sharp pencil, and follow the grid lines on squared paper.

Isometric drawings

- Isometric paper has dots in a triangular pattern. Turn it so that the dots form vertical columns.
- Vertical edges stay vertical; the other edges go along the two sets of sloping lines of dots.
- Lengths along these three directions are true lengths, so a 3 cm edge is 3 spaces long on 1 cm isometric paper.

From views to a solid

- Use the plan for the shape of the base, then the elevations for the heights.
- For a prism, one view shows the cross-section and the other two views are rectangles (sometimes with a line across).
- Once you know the solid, you can work out its volume or surface area.

How to answer each type of question

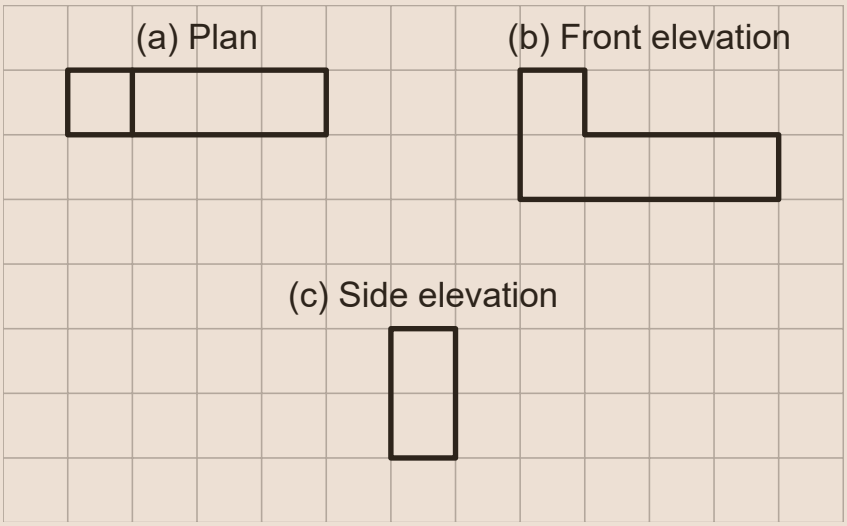
M = method mark, A = answer mark, B = a mark on its own.

Draw the plan, front elevation and side elevation 1 mark each **Grade 3**

1. Picture yourself looking from above, from the front and from the side in turn.
2. Count cubes or use the measurements to get each width and height right.
3. Draw lines where the height or depth changes.

Example. A solid is made from five centimetre cubes. Four cubes are in a row from left to right on a table. The fifth cube is on top of the cube at the left-hand end.
On a centimetre grid, draw (a) the plan, (b) the front elevation, (c) the side elevation seen from the left.

Model answer.



(a) A 4 cm by 1 cm rectangle, with a line across it 1 cm from the left-hand end, where the height changes (B1)

(b) An L shape: 4 cm wide and 1 cm high, with a 1 cm square on top at the left-hand end (B1)

(c) A rectangle 1 cm wide and 2 cm high (B1)

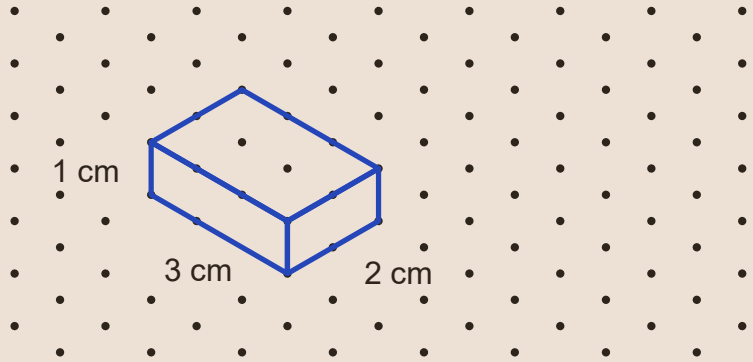
Draw a solid on isometric paper

2 marks | Grade 4

1. Check the dots form vertical columns.
2. Draw the vertical edges first, then the edges along each sloping direction.
3. Count dot spaces carefully for each length.

Example. On isometric paper (dots 1 cm apart), draw a cuboid 3 cm long, 2 cm wide and 1 cm high.

Model answer.



Vertical edges 1 space long; edges of 3 spaces along one set of sloping dot lines and edges of 2 spaces along the other set, with the 9 visible edges drawn (B2)

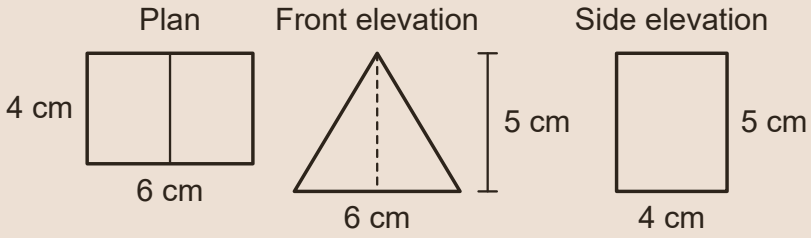
(B1 for a cuboid drawn on the grid with two of the three lengths correct)

Work out the solid from its views, then its volume

3 to 4 marks | **Grade 5**

1. Use the plan for the base and the elevations for the heights.
2. Name or sketch the solid.
3. Use the right formula, e.g. cross-section × length for a prism.

Example. The plan of a solid is a rectangle 6 cm wide and 4 cm deep, with a line joining the midpoints of its two 6 cm sides. The front elevation is an isosceles triangle with base 6 cm and height 5 cm. The side elevation is a rectangle 4 cm wide and 5 cm high.



(a) Name the solid. (1 mark)
(b) Work out its volume. (2 marks)

Model answer.

(a) A triangular prism (B1)

(b) Cross-section = ½ × 6 × 5 = 15 cm²; volume = 15 × 4 (M1) = 60 cm³ (A1)

Don't lose marks

- Drawing a view in 3D with perspective; each view must be a flat 2D shape.
- Missing the line where two parts of the solid are at different heights or depths.
- Drawing the side elevation from the wrong side.
- Using isometric paper the wrong way round (dots in horizontal rows instead of vertical columns).
- Counting squares wrongly, so a view is one square too wide or too tall.

More tips

Memory tricks

- Plan: the view a bird flying over sees. Elevations: the views you see standing in front of it or beside it.
- Before you finish, check that matching lengths agree across all your views.
- Imagine walking around the solid (or turn the page) to picture each view.

Exam technique

- Use a ruler and pencil; freehand views can lose marks.
- If you draw more than one view on the same grid, label each one (plan, front, side).
- When a question asks for a volume from the views, sketch the 3D solid first.

What each grade needs

What you need to be able to do, from the first marks up to the top grade.

Grade 2

Draw and recognise nets of 3D shapes

Know which arrangements of faces fold up into cubes, cuboids, prisms and pyramids.

Grade 3

Draw the plan of a 3D solid

Draw the view from directly above, full size or to scale, on squared paper.

Grade 3

Draw front and side elevations

Draw the views from the front and from the side, showing the correct heights.

Grade 4

Draw a solid on isometric paper

Keep vertical edges vertical and draw the other edges along the sloping lines of dots.

Grade 5

Work out a solid from its views

Combine the plan and elevations to sketch the solid, then use it, e.g. to find its volume.

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