

Plans and elevations

Topic cliff notes / objectives, key ideas and examples

Learning objectives

- Interpret views of a solid from above, the front and the side.
- Draw elevations of stacks using the correct viewing direction.

Key ideas

- Plan means above: keep width and depth. Front elevation keeps width and height.
- A side elevation keeps depth and height. Use the stated side, not a perspective sketch.
- For stacks, an elevation uses the greatest height along each line of sight; do not add hidden heights.
- A plan shows the footprint. It does not by itself give the number of cubes.

Worked example

A cuboid is 5 cm wide, 3 cm deep and 2 cm high. State the dimensions of its three views. For each view, keep only the two dimensions visible from that direction.

$$\text{plan : } 5 \times 3, \quad \text{front : } 5 \times 2, \quad \text{right side : } 3 \times 2$$

Answer

$$5 \times 3, \quad 5 \times 2, \quad 3 \times 2 \quad (\text{all lengths in cm})$$

Quick example

Stack heights are front row 2, 1, 0 and back row 1, 3, 1, both read left to right. Find the front heights and total cubes.

$$\text{front heights} = (\max(2, 1), \max(1, 3), \max(0, 1))$$

$$\text{cubes} = 2 + 1 + 0 + 1 + 3 + 1 = 8$$

Answer

$$\text{front heights} = (2, 3, 1), \quad 8 \text{ cubes}$$

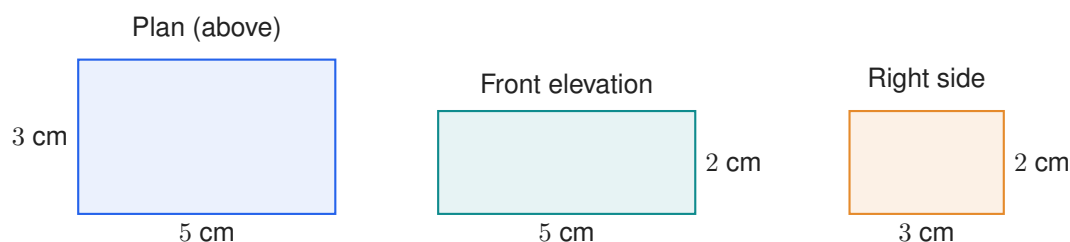
Watch out

Choose the viewing direction first. An elevation records visible height, not the sum of the cubes behind one another.



Visual guide: look straight at the solid

A cuboid is 5 cm wide, 3 cm deep and 2 cm high. Orthographic views keep two dimensions; they do not use perspective.

**Stacks: use the greatest visible height**

The numbered plan below gives the height of each stack of unit cubes. An empty cell has height zero. Both rows are read left to right. The front is the bottom edge of this plan.



The front elevation looks through the depth. The right-side elevation is shown with the **front on the left and the back on the right**.

$$\text{front heights} = (\max(2, 1), \max(1, 3), \max(0, 1)) = (2, 3, 1)$$

$$\text{right-side heights} = (\max(2, 1, 0), \max(1, 3, 1)) = (2, 3)$$

Do not confuse footprint with cube count

There are five occupied squares in the plan, but the stacks contain eight cubes. The numbers in this particular plan provide extra height information; an ordinary unnumbered plan does not.

$$\text{number of cubes} = 2 + 1 + 0 + 1 + 3 + 1 = 8$$

Try it: make the front-middle stack two cubes high instead of one. The plan footprint and both elevations stay the same, but there are now nine cubes. Views need not determine a unique solid.

