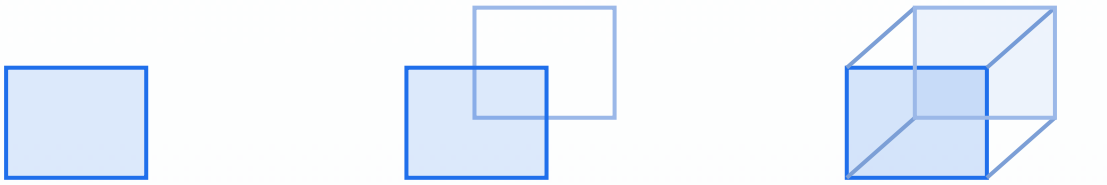
Sketching & Visualising 3D Objects

Sketching & visualising prisms

A clear drawing helps you see all of a solid — including the parts hidden at the back. One easy way to draw a rectangular prism is **oblique projection**: draw the front face, copy it shifted up and across for the back, then join matching corners.

Sketching a rectangular prism (oblique projection)



1. Draw the front
2. Copy it, shifted back
3. Join the corners

Three steps: front face → shifted copy → join the corners.

> The hidden edges at the back can be drawn as dashed lines so you remember they are there.

Sketch

Q1. Following the three steps above, sketch a rectangular prism that is 3 wide, 2 high and 2 deep. Show the hidden edges as dashed lines.

Q2. Sketch a cube. How is sketching a cube the same as sketching any other rectangular prism? _____

Visualise the hidden cubes

Q3. A prism is drawn as a solid block 3 long, 2 wide and 2 high. In the drawing you can only see the cubes on the outside. How many unit cubes are **hidden** inside or behind, and how many are there **altogether**?

Q4. Look at a solid built from a 4×3 base, 2 layers high. Without building it, how many cubes touch the table (the bottom layer)? How many cubes are in the whole solid?

Q5. **Reasoning.** Why is it easy to miss cubes when you only look at a drawing of a solid? Describe one thing you can do to make sure you count them all.

Answer key (teacher use)

Suggested answers for the questions in this worksheet. Sketching answers are examples — accept any correct, clearly drawn equivalent.

> **Teacher answer key.** Sketches will vary; check that prisms use the front-copy-join method with hidden edges dashed.

Q1. A correct oblique sketch of a $3 \times 2 \times 2$ prism: a 3-wide by 2-high front rectangle, an identical rectangle shifted up and to the right, and four lines joining matching corners. The three hidden edges (the back-left vertical and the two edges meeting the hidden back-bottom corner) should be dashed.

Q2. A cube is sketched exactly the same way; the only difference is that all three dimensions (length, width, height) are equal, so the front face is a square and the depth shift equals the side length.

Q3. The solid is $3 \times 2 \times 2 = 12$ cubes altogether. The number hidden depends on the viewpoint, but in a standard oblique view roughly 3–4 cubes are fully hidden (the back-bottom corner cubes); accept any answer that reasons "total 12 minus the ones I can see." The key understanding is total $= 12$.

Q4. Bottom layer (touching the table) $= 4 \times 3 = 12$ cubes. Whole solid $= 12 \times 2 = 24$ cubes.

Q5. A drawing only shows the faces pointing toward you, so cubes at the back, underneath, or in the middle are hidden. Sample strategy: count one layer and multiply by the number of layers, or build the solid with real cubes to reveal the hidden ones.