Solids and Nets

Name: _____

Date: _____

Instructions: No answer bank: show your working for the shape maths. Number the steps in order, answer the case study questions, explain the key terms, then write full-sentence answers and plan the extended answer.

1. Shape maths (show your working)

Question	Working and answer
Surface area of a 6 × 4 × 3 cm cuboid	
Volume of a cube with 7 cm edges	
A cuboid tank 50 × 20 × 30 cm holds how many litres?	
Edges on a hexagonal prism	
A polyhedron has 8 faces and 12 vertices. Edges?	

Did you know?

- Euler's rule was published by Leonhard Euler in the 1750s.
- There are only five regular polyhedra, called Platonic solids.
- A cube with double the edge has 4 times the surface area and 8 times the volume.
- A cylinder's rectangle in its net is as long as the circumference.

Background

A solid (3D shape) takes up space. Flat surfaces are faces, the lines where faces meet are edges, and the corners are vertices. A cube has 6 faces, 12 edges and 8 vertices.A solid with only flat polygon faces is a polyhedron. Spheres, cylinders and cones have curved surfaces, so they are not polyhedra.

2. Steps in order

Number the steps 1 to 5 (1 = first).

	Count faces: Count the flat faces and their shapes
	Add areas: Add all face areas for the surface area
	Draw a net: Sketch the faces joined edge to edge
	Identify: Name the solid
	Check folding: Make sure no faces overlap when folded

3. Case study

> *Tayo designs a gift box: a cuboid 10 cm long, 8 cm wide and 5 cm high, with no glue tabs. He has a sheet of card 30 cm by 20 cm.*

Case study: Tayo's gift box

1. What is the surface area of the box?

2. What is its volume?

3. Is the sheet big enough in area? Explain.

4. Key terms

Key term	What does it mean? Give an example.
Face	
Edge	
Vertex	
Net	
Prism	

5. Think it through

1. Explain why some arrangements of six squares are not cube nets.

2. Explain why volume uses cubic units.

6. Longer answers (full sentences)

1. Check Euler's rule for a square-based pyramid.

2. Find the surface area and volume of a cube with 4 cm edges.

3. Compare a prism and a pyramid with the same base.

4. Explain in your own words: How is surface area different from volume?

7. Extended answer

Extended answer: 'A net is the best way to understand a 3D shape.' How far do you agree?

Plan: introduction · point for (example) · point against (example) · conclusion with your judgement.