

3D shapes: faces, edges and vertices

CURRICULUM ALIGNMENT

SHA.SHP.3a

investigate and analyse the properties of 3-D and 2-D shapes and identify classes of shapes based on these properties.

INTERACTIVES 3D Shape Inspector · challenge, display, explore

WHAT THIS LESSON TEACHES

A face is a flat surface of a solid shape. An edge is the straight line where two faces meet, and a vertex is a pointy corner where edges meet. A cube has 6 square faces, 12 edges and 8 vertices.

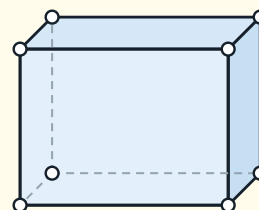
→ A cube has 6 faces, 12 edges and 8 vertices.

→ A square-based pyramid has 5 faces, 8 edges and 5 vertices.

MODEL THIS ON THE BOARD

FACES, EDGES AND VERTICES OF A CUBOID

- 1 A cuboid has a top, bottom, front, back and two ends: that makes **6** faces.
- 2 Where two faces meet there is a straight edge: there are **12** edges.
- 3 Where edges meet there is a pointy corner (vertex): there are **8** vertices.



4 x 3 x 2 cm

DISCUSSION STARTER

REFLECT

Which was trickier to count on a solid — faces, edges or vertices — and why?

LESSON ARC

Open with three real solids in hand — a cereal box, a bean tin, a dice — running a finger along one edge and touching a corner before either word is on screen. Watch and Notice takes four solids up on the shape-inspector-3d interactive, tallying faces, edges, vertices and holding out on the cylinder. Pupils rule a four-column table in their copy for a cube and pyramid. Class Challenge is property questions with the basket passed round; the Student Activity Book page follows for solo practice.

TEACHING MOVES

1. **Getting Started.** Take three hands-up answers, not open call-outs. Hold up a real cereal box, run your finger slowly along one edge, then press one corner — say nothing yet, just let them see the line and the point before the words 'edge' and 'vertex' appear on screen.
2. **Watch and Notice.** As the cube and cuboid come up, land the point that they share the same counts — 6, 12, 8 — a cuboid is a stretched cube. Pause hard on the cylinder: ask 'where could a corner be?' and hold the silence before revealing there is none. Don't rush past this.
3. **Try It Together.** Rotate each shape on the interactive before tallying so no face hides at the back — pupils double-count edges and miss back faces most often here. Have the pupil at the board tap each face, then edges, then vertices, saying the total aloud, and the class agrees or corrects before you check.

4. **Build Your Shape Table in Your Copy.** Walk the room glancing for tidy columns and the right counts — cube 6/12/8, pyramid 5/8/5. No marking; this is copybook practice. If a pyramid vertex count comes out as 4, remind them the point on top counts too.
5. **Class Challenge.** Keep it brisk — pupils take turns tapping chips, the class confirms, move on. Pass real solids from the basket round so the rest hold and check the shape in their hands. Expect a wrong guess on the cylinder-vertices question and use it, don't pre-empt it.
6. **What Did We Notice?.** Listen for a pupil naming that a vertex needs edges meeting at a point, and that the cylinder's curved surface just rolls with nowhere to make one. Revoice the strong answer: 'so no corner means no vertex — even though it still has two flat faces'.

COMMON MISCONCEPTIONS

⚠ Pupils say the cylinder has 2 vertices — they point at the two circle edges, top and bottom, and call them corners.

Pass a real tin round and ask the pupil to press for a sharp point. There isn't one — the rim is a curved edge, not a point where edges meet. Revoice: a corner needs edges to meet, and the curved surface just rolls past.

⚠ Pupils count only the front faces they can see on the board and give a cube 3 or 4 faces instead of 6. Slow the rotation on the shape-inspector-3d interactive and re-tap the hidden back faces together, counting aloud. A real dice in hand helps — pupils turn it and find the faces they'd forgotten.

⚠ Pupils give the square-based pyramid 4 vertices, forgetting the apex.

Touch the point on top and ask how many edges run up to it — four. That meeting point is a vertex too, so it's five in total, not four.

DIFFERENTIATION

EMERGING

- Give these pupils the real cube and cuboid to hold and turn while the class tallies on the board — they count faces on the solid in their hands rather than the rotating screen model.
- Pre-rule the four-column table in their copy so they only write the counts, not build the grid.

DEVELOPING

- After the copybook table, add a cylinder row and ask them to write '0' in the vertices column and explain in one sentence why.
- Ask them to spot what the cube and cuboid rows have in common before you point it out.

PROFICIENT

- Narrate a harder variant at the board: 'find two solids that share the same number of vertices but a different number of faces' — cube and cuboid both have 8 vertices but that's the same faces too, so push them to a genuine pair.
- Send fast finishers ahead to their Student Activity Book page while the class finishes the Class Challenge.

✂ **Cross-curricular:** Tie to visual art — pupils hunt the classroom for a cuboid, a cylinder and a pyramid, naming faces and edges on each real object.

ANSWER KEY

b) 12

c) 8

Q1: 6

Q2: 8

Q3: 12

Spot: A cube has 8 vertices (one at each corner), not 6.
Faces = 6, edges = 12, vertices = 8.

EXTENSION SHEET · STRETCH ANSWERS

S1: a square-based pyramid

S2: a triangular prism

S3: a cylinder

S4: a cube

S5: a cuboid