Lesson 78 SHAPE & SPACE

Nets and construction of 3-D solids

CURRICULUM ALIGNMENT

SHA.SHP.4a construct 3-D and 2-D models or structures given defined measurements and/or specific conditions.

INTERACTIVES Net Folder · display, explore

WHAT THIS LESSON TEACHES

A net is a flat arrangement of joined shapes that folds up to make the surface of a solid.

→ Six squares joined edge-to-edge fold up into a cube.

→ A cube has six square faces, so its net has six squares.

MODEL THIS ON THE BOARD

FOLDING A VALID CUBE NET

1. Count the six squares arranged in a cross.
2. Check that opposite faces will meet when folded.
3. Fold along the edges to form the cube.

LESSON ARC

Open with a flattened box on the IWB — pupils count the flat panels before guessing the solid. Fold the cube, cuboid, T-shape, prism and a failing block on screen, holding out for pupils to say why the block fails. The class then builds and folds nets at the board, predicting before each fold. Pupils sketch a valid cube net and a prism net in their copy, then cut, fold and tape a printed net at their seats, with a second-net stretch for finishers.

TEACHING MOVES

1. **Getting Started.** Take three hands-up answers, not open call-outs. Don't accept the guess alone — push for the clue: 'how many flat panels can you count?' The panel-count is what gets pupils into net thinking.
2. **Watch and Notice.** Trace one square from the flat net to its folded face so pupils see the colour move. Name the T-shape surprise out loud — 'same solid, different-looking net'. On the failing block, pause before folding and take a prediction; then hold out for a pupil to say two squares land on the same face — don't announce it yourself.
3. **Try It Together.** Before each fold, take the whole class's prediction with hands up for 'folds' or 'does not fold', then let the pupil at the board tap Fold. When the straight line and the block fail, let the class watch the gap or overlap appear and draw the reasoning out of them rather than stating it.
4. **Sketch Two Nets in Your Copy.** Circulate glancing for six squares on the cube net and the two triangle ends plus three rectangles on the prism net. This is practice, not marking — flag a missing triangle end quietly rather than stopping the class.
5. **Class Challenge.** Keep it brisk while pupils cut, fold and tape at their seats. Praise a neat fold in passing; nudge a stuck pupil by asking which square will end up on top. Don't re-teach the fold — the demo already covered it.
6. **What Did We Notice?.** Listen for pupils naming that the six squares are joined in a different order but each still becomes a face. Revoice a strong answer: 'so it's not the shape of the net that decides the solid — every face is there and each edge finds a partner.'

COMMON MISCONCEPTIONS

⚠ Pupils count six squares and assume any six-square arrangement makes a cube — 'it's got six, so it folds'.

Run the 2×3 block prediction on the IWB net-folder before folding. Let the class watch two squares land on the same face while another is left open. The rule is not just 'six squares' — every face must be present and every edge must meet a partner.

⚠ Pupils think the T-shape and the cross are different solids because the nets look different.

Fold both on screen and trace one matching face in each. Name it explicitly: same cube, differently arranged net. Return to this in the maths-talk step so it lands, not just passes by.

⚠ On the prism net pupils draw all rectangles or forget the two triangle ends.

As you circulate the copybook sketches, ask the pupil to point to the two ends of the prism you left folded on display, then check their sketch has two triangles and three rectangles between them.

DIFFERENTIATION

EMERGING

- Give the printed cross-of-six-squares net to cut and fold first — a known valid net — before attempting the sketch, so the fold succeeds and builds confidence.
- For the copybook sketch, let the pupil trace round one printed square repeatedly to build the six-square cross rather than drawing freehand.

DEVELOPING

- After the first printed solid, ask: move one square to a new edge — predict whether it still folds, then cut and test.
- Challenge them to sketch the prism net from memory with the display cube covered, then uncover to self-check the two ends.

PROFICIENT

- Set the open hunt: there are eleven different nets that fold into a cube — how many distinct ones can you sketch and justify? Ask them to explain to you how they know two of their sketches are genuinely different, not the same net rotated.

↗ **Cross-curricular:** Tie to Visual Arts — pupils design and fold a small net into a gift box or dice, decorating each face before it folds up.

ANSWER KEY

Scaffold: visual check on the page

Q1: 6

Q2: cuboid

Q3: Any valid cube net ≠ cross (e.g. T)

a) Always — A cube has six faces so its net must have six squares.

b) Never — Some arrangements like a straight line will not fold into a cube.

c) Always — Cuboids have rectangular faces so their nets use rectangles.

d) Sometimes — The cross is one common shape but other valid nets exist.

EXTENSION SHEET · STRETCH ANSWERS

S1: a cone

S2: a square-based pyramid

S3: a square-based pyramid

S4: a tetrahedron

S5: a cuboid

Investigation: How many nets make a cube? — open-ended; scan pupils' working for valid solution paths rather than a single answer.