

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 cardboard box on the IWB and take three hands-up guesses at the solid, pushing for the clue of how many panels. Run the five fold animations, dwelling on the T-net cube and the failed six-square block. Pupils then build cross, staircase, line and 2×3 nets on the board and predict before each fold. Sketch a cube net and a triangular-prism net in copybooks, then cut and tape the printable cube net at seats.

TEACHING MOVES

1. **Getting Started.** Show the flattened cardboard and take three hands-up answers only. After each guess, ask ‘how many flat panels can you count?’ so the class names the clue, not just the solid.
2. **Watch and Notice.** Run the five animations in order, about ten minutes. On the first cube, point to one square on the flat net and track it to its face. On the cuboid, name that opposite faces match in size. Dwell on the T-net: ‘what is the same about this net and the cross?’ Pause the six-square block before it folds and take a prediction; wait for a pupil to say two squares land on the same face.
3. **Try It Together.** Pupils take turns placing six squares on the grid. Before Fold, hands up for ‘folds’ or ‘does not fold’. Cross and staircase close; the straight line and the 2×3 block fail. Let the class watch the gap or overlap appear, then draw the reason from them rather than announcing it.
4. **Sketch Two Nets in Your Copy.** Walk the room glancing for six squares on the cube net and two triangle ends plus three rectangles on the prism net. Ask each pupil to label which face becomes the top once folded. This is whole-class copybook practice, not marking.
5. **Class Challenge.** Pupils cut, fold and tape the printable cube net at their seats while you circulate. Praise a neat fold; ask a stuck pupil which square will be the top. Everyone finishes the first solid. The stretch is a second, different cube net — eleven exist, so no two need match. Polydron groups can build alongside if sets are out.

6. What Did We Notice?. Pose: two nets can look completely different yet fold into the same cube — how? Listen for ‘the six squares are joined in a different order, but each still becomes a face.’ Re-voice: it is not the outline of the net that decides the solid; every face must be there and each edge must find a partner.

COMMON MISCONCEPTIONS

⚠ Pupils think any arrangement of six squares is a cube net, so they expect the 2×3 block and the straight line of six to fold.

Pause before Fold on those two arrangements and take a class prediction. After the overlap or open face appears, ask ‘which face is missing, or which two squares tried to share one face?’ Rebuild the failed net next to a working cross so the join pattern is visible.

⚠ Pupils sketch a triangular-prism net with three triangles and two rectangles, or forget the two triangle ends entirely.

Return to the prism animation and name aloud: two triangle ends, three rectangles between them. Have them count the five shapes on the screen before they redraw in copy.

⚠ Pupils say two nets that look different cannot make the same solid — ‘the T is not a cube net because it is not a cross.’

Fold the cross and the T side by side on the interactive. Point to each square in turn and name the face it becomes. Re-voice: same six faces, different joining order.

DIFFERENTIATION

EMERGING

- Pre-place five of the six squares on the board grid so the pupil only chooses where the last square goes, then predicts fold or no-fold.
- On the printable, pre-crease the fold lines and mark one square ‘base’ so the pupil tapes the remaining faces up from a fixed bottom.

DEVELOPING

- After the first taped cube, move one square to a new edge on a sketch and predict before checking whether the new arrangement still folds.
- Ask: name two faces that end up opposite each other on your cube — how did the net tell you that?

PROFICIENT

- Challenge: find a third distinct cube net and explain why a 3×2 rectangle of squares can never work even though it has six faces.
- Sketch a net for a square-based pyramid from the faces alone, then predict which edges will meet before any fold check.

✂ **Cross-curricular:** Link to art and design — unfold a cereal box flat, trace its net, and redesign the print layout so every face still meets cleanly when re-folded.

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 square faces, so the net needs six squares.

b) Never : The flaps overlap when you fold; a cross shape of six squares works instead.

c) Always : Cuboid faces are rectangles, so the net uses rectangles.

d) Sometimes : True for the cross net; false for a zigzag or T-shaped net.

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.