

Nets: flat to 3D and back

CURRICULUM ALIGNMENT

SHA.SHP.4a

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

INTERACTIVES

3D Shape Inspector · display

Net Folder · challenge, display, explore

WHAT THIS LESSON TEACHES

A net is the flat shape that folds up into a 3D solid. It shows every face of the solid laid out side by side.

→ Three pairs of rectangles joined edge to edge fold into a cuboid box.

→ A cross-shaped net of squares folds into a cube with no gaps.

MODEL THIS ON THE BOARD

NET OF A CUBOID BOX

- 1 Lay out 3 pairs of rectangles flat, edge to edge.
- 2 Fold one pair up to become the front and back faces.
- 3 Fold the next pair to become the two end faces.
- 4 Close the last pair as top and bottom so every face meets with no gap.

LESSON ARC

Open by slowly unfolding a real cereal box at the front until pupils name the flat layout as the box's net. On the interactive, unfold and refold a cube then a cuboid while tracking named faces (top, front, side). Fold the cross-shaped six-square net together on the board, then pupils fold their own pre-cut cube and cuboid nets at desks. Sketch a labelled cuboid net with matching pairs marked in copybooks. Class Challenge tests which six-square layouts fold, revealing gaps or overlaps on screen.

TEACHING MOVES

1. **Getting Started.** Unfold a real cereal box slowly edge by edge as pupils settle. Take two or three hands-up answers to 'what shape is it now?' before offering the word net — let them describe the flat layout in their own words first.
2. **Watch and Notice.** Start with the cube and cuboid on the interactive as a light recap: name top, front and one side. On the cube net, pause Fold and have pupils track one square aloud as it becomes a face. On the cuboid net, trace the three matching pairs on screen — long top/bottom, tall front/back, narrow ends — and fold a real cuboid net in your hand alongside so they see pairs differ in size.
3. **Try It Together.** Hands-up prediction first: will the cross fold into a cube? Fold it on the interactive so the class watches each square close with no gap. Then desks out — pupils fold their pre-cut cube and cuboid nets and lay a finger on a square to name the face it becomes. Keep this beat on nets that work; failed layouts wait for Class Challenge.
4. **Sketch the Cuboid Net in Your Copy.** Walk the room glancing at labels and matched-pair marks — whole-class copybook practice, not marking. Watch for six identical rectangles and nudge those pupils to check that top matches bottom, front matches back, and the two ends match.
5. **Class Challenge.** Brisk board practice: one pupil works each arrangement, class predicts folds / does not fold, then check. Keep pre-cut folded cubes on desks so pupils can argue from what they hold. Let the

straight line and the 2×3 block reveal their own gap or overlap — don't pre-tell. Close on the reasoning question, not a count.

6. **What Did We Notice?** Ask what must be true for six squares to close. Listen for 'no more than four in a straight line' and 'two squares must not land on the same face'. Re-voice: every face needs exactly one square, placed so each reaches a different face when folded.

COMMON MISCONCEPTIONS

⚠ Pupils say any six squares joined edge-to-edge will fold into a cube — 'six faces, six squares, done'. Hold the straight-line arrangement on the interactive next to their folded cube net. Fold (or try to) so the gap appears on screen, then re-voice: six squares are necessary but the joins have to let each square reach a different face.

⚠ When sketching the cuboid net, pupils draw six rectangles all the same size — they treat it like a cube net with stretched squares.

Point back to the three pairs on the interactive and the real cuboid net in your hand. 'Top and bottom match each other — but they don't match the ends.' Have them mark same-size pairs before labelling faces.

⚠ Pupils think a failed net is 'wrong because it doesn't look like a cross' — they fixate on one good shape instead of the no-gap, no-overlap rule.

Show a second valid layout if one appears in the bank, or re-fold the cross and ask what actually made it work. Push the rule: every face gets exactly one square; nothing lands twice; nothing is missing.

DIFFERENTIATION

EMERGING

- Stay on the cube net only for the desk fold and the first Class Challenge items; leave cuboid pairs and failed layouts until they can name top, front and side on the cube.
- Give a cuboid net sketch with the three pair outlines already drawn — pupils only label faces and tick the matching pairs.

DEVELOPING

- After a successful fold, ask: if I move one square from the cross arm to the opposite arm, will it still close? Predict before testing on the interactive.
- On the copybook cuboid net, add one extra label — which rectangle becomes the base when the net sits this way up — and justify from the pairs.

PROFICIENT

- Pose the closing challenge early for fast finishers: 'why can no more than four squares sit in one straight line?' — they write a one-sentence rule in the copybook from the gap they saw.
- Invite a design stretch: sketch a different six-square layout you think will fold, then test the claim when that arrangement (or a near one) appears on the board.

✂ **Cross-curricular:** Tie to Design — sketch the net of a real food packet (cereal, crackers) brought from home and label the face pairs.

ANSWER KEY

Scaffold: visual check on the page

Q1: 6

Q2: yes

Q3: no

Q4: the back (opposite faces equal)

a) Always : That is exactly what a net is.

b) Sometimes : Only when the cuboid is a cube. Any other cuboid has rectangle pairs that are not square.

c) Sometimes : Only 11 of the arrangements of six squares are cube nets; a straight line of six is not.

d) Never : A straight line cannot bring all faces together to form a cube.

EXTENSION SHEET · STRETCH ANSWERS

S1: a square-based pyramid

S3: a cuboid

S2: a cuboid

S4: a tetrahedron

S5: a square-based pyramid