TEACHER RESOURCE BOOK · MATHS · 5TH CLASS

Lesson 74 SHAPE & SPACE

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

Isometric paper is a triangular grid (instead of squares). It lets you draw 3-D shapes that look realistic on a flat page: **vertical edges** stay vertical, and **horizontal edges** slope along the grid lines (at 30° from the horizontal).

→ A **cube** drawn on isometric paper shows three of its faces — top, left, and right — meeting at one corner.

→ Edges that are equal length on the real cube are equal length on the isometric drawing too — count grid steps to keep them matching.

LESSON ARC

Unfold a real cereal box at the front so pupils see the flat net appear, then plant the word 'net'. Watch the net-folder interactive open and close a cube and a cuboid, tracking one face at a time. Pupils predict and fold a cross arrangement on the board, then fold real card nets at their desks. They sketch a cuboid net in copybook marking the three matching pairs, then work through folding and non-folding six-square arrangements in the Class Challenge before reasoning out why some fail.

TEACHING MOVES

1. **Getting Started.** Unfold a real cereal box slowly as pupils settle and ask what shape the flat box became. Take two or three hands-up answers, not call-outs, and let a pupil reach 'net' before you name it.
2. **Watch and Notice.** Recap cube and cuboid faces lightly — name top, front and a side, don't drill the count. On the cube net, pause at the Fold control and have the class track ONE square and call out which face it becomes. On the cuboid net, trace the long, tall and narrow pairs on screen and hold a real folded cuboid net so the paper fold mirrors the screen.
3. **Try It Together.** Beat one: take a hands-up prediction — cube or not? — then fold the cross on the IWB so the class watches it close with no gap. Beat two: hand out a cube net and cuboid net per group and have pupils lay a finger on a square to name the face it becomes. Keep this beat on the folding case — the non-folders come later.
4. **Sketch the Cuboid Net in Your Copy.** Walk the room glancing at labels and matched-pair marks — this is practice, not marking. Watch for pupils drawing six equal rectangles and nudge them: 'check your three pairs — which two ends match?'
5. **Class Challenge.** Keep the board brisk — a pupil predicts folds / does not fold, the class checks, then move on. Run the printed cut-outs alongside so pupils verify each prediction with their hands; let them discover the gap or overlap on the straight line and the 2×3 block rather than telling them.
6. **What Did We Notice?.** Listen for pupils noticing no more than four squares can sit in one straight line and that two squares must not land on the same face. Revoice a strong answer: 'so every face needs exactly one square, placed so each reaches a different face when we fold.'

COMMON MISCONCEPTIONS

⚠ Pupils assume any six squares joined edge to edge will fold into a cube — 'they're all connected, so it has to close'.

Don't correct it verbally — fold the straight line of six on the board so they watch two squares land on the same face and overlap. Then hand them the printed cut-out to fold themselves; the failed close is more convincing in their hands than on screen.

⚠ Pupils draw the cuboid net as six rectangles all the same size, missing that it needs three matching pairs.

At the copybook step, hold up the real folded cuboid net beside their sketch and ask which two faces are the top and bottom. Have them lay a finger on each pair and check the partner is the same size — top matches bottom, front matches back, the two ends match.

DIFFERENTIATION

EMERGING

- Give the cube net first and only — let these pupils master one closing fold before they meet the cuboid's three different pairs.
- For the copybook sketch, let pupils trace round the real folded cuboid net opened flat rather than draw it freehand, then add the pair marks.

DEVELOPING

- After the cross folds, ask them to fold a different working cube net from the cut-outs and explain how it's different from the cross but still closes.
- Before the board reveals a non-folder, ask them to point to which square will overlap or where the gap will be — predict the failure, not just the pass.

PROFICIENT

- During the Class Challenge, narrate a harder variant from the front: hand a confident pupil a blank set of six squares and ask them to design one new arrangement that folds and one that doesn't, then justify each to the class before folding to check.

Cross-curricular: Tie to Visual Arts — pupils design and decorate a net for a small gift box at home, then fold it to check every face closes.

ANSWER KEY

a) Visual check: three faces visible (front + right + top), vertical edges vertical, horizontal edges along the 30°/60° grid lines.

Q1: a cuboid

Q2: a tetrahedron

Q3: a cone

Q4: a square-based pyramid

EXTENSION SHEET · STRETCH ANSWERS

S1: a square-based pyramid

S2: a cuboid

S3: a square-based pyramid