

Stack, roll or both: building with solids

CURRICULUM ALIGNMENT

SHA.SHP.2 examine, categorise and model 3-D and 2-D shapes.

INTERACTIVES Drag Sort · challenge, display, explore

WHAT THIS LESSON TEACHES

A solid stacks if it rests steady on a flat face so you can build a tower. A solid rolls if it has a curved face. Some solids can do both.

- A cube or cuboid sits still because every face is flat.
- A sphere rolls in any direction.
- A cylinder stands on a flat end but rolls on its curved side.

MODEL THIS ON THE BOARD

TIN AND FOOTBALL IN THE SHOP

- 1 Look at the tin of beans (a cylinder). It has two flat circular ends and one curved side.
- 2 Stand the tin on a flat end: it sits steady on the shelf so it **stacks**.
- 3 Lay the tin on its curved side: it can **roll** along the counter.
- 4 A cylinder can do **both**. A football (sphere) has no flat face so it only rolls.

LESSON ARC

Open with stacked food tins on the IWB (or a ten-second sketch) and pause on the contrast of a tower of footballs. Reveal photo cards one at a time—cube, sphere, cylinder, cuboid—asking what face each rests on before naming stacks, rolls, or both. Sort the four solids together on the board with the cylinder last. Pupils write one stacker and one roller in their copybook from the word bank. Class Challenge runs two brisk sorts: named solids, then shop objects. Maths-talk asks why builders love flat faces before the Student Activity Book hand-off.

TEACHING MOVES

1. **Getting Started.** Point at the tin-can tower image, or sketch three stacked tins in about ten seconds. Pause a few seconds on 'a tower of footballs' so the class feels the wobble. Take two or three short notices only—save the full 'why' for the maths-talk close.
2. **Watch and Notice.** Reveal one photo card at a time. Before you name the group, ask 'flat face or curved?' Cube stacks, sphere rolls, cylinder both, cuboid stacks. Revoice the rule: flat face for stacking, curved face for rolling. If real solids are to hand, tip or stand one briefly so the class sees the face that does the job.
3. **Try It Together.** Call solids in this order so the cylinder arrives last as the wrinkle: cube, sphere, cuboid, cylinder. Before each drop, silent think-time, then two hands-up answers naming Stacks well, Rolls, or Both. Revoice wrong answers with the face rule, not a bare correction. Rotate a few pupils at the board.
4. **Write one that stacks and one that rolls.** Leave the word bank on the IWB for the whole copybook step. Walk the rows glancing at the two names—accept cube or cuboid for stacks, sphere for rolls. Copying from the bank is fine; the mathematical choice is the demand. If a pupil writes cylinder and can say it does both, that is fine too.

5. **Class Challenge.** Run two brisk in-class rounds only: the four named solids, then the shop objects. Pupils take turns at the board; class confirms before moving on. On any tower talk, listen for pupils naming a flat face, not just 'the cube'. Narrate the Check tick: 'yes, flat faces hold the tower.'
6. **What Did We Notice?.** Ask 'Why do builders love flat faces?' Listen for sitting steady and building towers. Revoice: a flat face holds still, so the wall stays up. If someone only says 'cubes are good', nudge back to the face. Head off 'balls are bad'—sphere is right for rolling games, wrong for walls. Now give the full explanation of the opening tin tower.

COMMON MISCONCEPTIONS

- ⚠ Pupils name the solid instead of the face: 'cubes are good for towers' or 'balls are bad'. Nudge back to the face rule on the photo card or real solid: 'Which face is it resting on?' Revoice: flat face holds still; curved face moves away. Sphere is right for games, wrong for walls.
- ⚠ Pupils put the cylinder in only one group—Stacks or Rolls—and miss that it can do both. Stand the tin on its flat end, then lay it on its curved side. 'Same solid, two jobs.' Revoice Both: flat ends stack, curved side rolls.
- ⚠ Pupils sort by how a solid looks or how heavy it feels, not by flat versus curved faces. Before the next drop, freeze and ask only: 'Is it resting on a flat face, or is every side curved?' Sort from that answer alone.

DIFFERENTIATION

EMERGING

- Stay with cube versus sphere on the IWB first—one clear stacker, one clear roller—before adding cuboid and cylinder.
- During the copybook step, point to the matching photo card as the pupil chooses each word-bank name.

DEVELOPING

- After each Class Challenge sort, ask 'which face told you?' before the next solid moves.
- On the copybook line, invite a pupil who chose cylinder to add the word Both and say which face does each job.

PROFICIENT

- Stretch the tower talk: 'Which face would you put at the bottom of a three-solid tower—and why that face?' Keep it oral at the board.
- Fast finishers move into the Student Activity Book page while the class finishes the shop-object round.

✂ **Cross-curricular:** Link to PE: sort the PE-cupboard kit into stackers (cones, mats) and rollers (balls) using the same face rule.

ANSWER KEY

Q1: stack

Q2: roll

Q3: stack

Q4: stack

Q5: roll

Q6: cube and cuboid

a) **Never** : A cube has six flat square faces and no curved face.

b) **Never** : A sphere has no flat face so it cannot sit steady.

c) **Always** : Its two ends are flat circles.

d) **Always** : Flat ends let it stack; the curved side lets it roll.

EXTENSION SHEET · STRETCH ANSWERS

S1: both

S2: roll

S3: stack

S4: a cube, because its flat faces stack

Investigation: Build a tower — open-ended; scan pupils' working for valid solution paths rather than a single answer.