Lesson 34

engineering

Make a boat that holds things

Lesson at a glance

Open with a toy boat or picture of a boat carrying boxes and ask what a boat needs to stay up and hold things. Pairs share one idea, then make one foil-and-stick boat with turned-up sides and a space for counters. At shared water trays they float gently, add counters one by one in the middle, and leave a first-count pile on their towel. They raise the sides once, retest, leave a second pile, and compare both numbers in show-and-tell.

Learning objectives

- Make a simple foil-and-stick boat that floats
- Add counters gently and notice how many it carries before tipping
- Change the shape once to try to hold more counters

Before the bell — prep

Before the bell, set 3–5 shallow basins a few centimetres deep (2 for a tiny class), towels, and A5 foil sheets (one per pair). Put lolly sticks, modelling clay and counters at making tables. Pre-fold one simple foil boat for the hook if you have no toy boat.

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Materials

Item	Qty	Per	Source	Low-cost substitute
aluminium foil sheets (about A5 size)	1	pair	supermarket	reuse clean foil from sandwiches or baking, smoothed flat
lolly sticks	3	pair	classroom	short strips of stiff card
modelling clay	1	pair	classroom	a small ball of play-dough
water tray or large basin with a few centimetres of water	enough for about 1 minute per pair (typically 3–5 trays; 2 only for a very small class)	class	school kit	washing-up basins or deep roasting trays
counters or large buttons	20	station	classroom	identical bottle tops or large coins supervised by an adult
towels	2	station	classroom	old tea towels or a roll of paper towels

Safety watch-point

Foil edges can cut if scrunched hard — model gentle folding. Clay stays on the table, not near mouths. Sleeves up; wipe spills straight away; wash hands after tidy.

Teaching moves

- **Look at the problem:** Hold up a toy boat or your pre-made foil boat and point to what it carries. Ask only: what does a boat need so it can hold things and stay up on the water? Accept all ideas in plain words — stay up, hold things, not fall over.
- **Talk and share ideas:** Give pairs about one minute to share one idea each. Capture two or three on the board as pictures or short words — flat bottom, high sides, stick for a seat. Board word only: shape. Head off 'bigger is always better' by noting a wide shallow boat can tip more easily.
- **Make our boat:** Model for about two minutes: fold foil into an open boat with sides up, press a lolly stick as a brace, and a pea-sized bit of clay if needed. Then pairs make one shared boat. Look for turned-up sides and a space inside; if it is a flat raft, show pinching the corners up.
- **Float and add counters:** Sleeves up. Model one full cycle at the class tray — wonder, guess, place gently, add counters slowly in the middle, notice. Run short rotations so each pair gets about one minute. As they leave, say their number once and have them pile that many counters on their towel beside the boat.
- **Improve the shape once:** Dry at tables first. Keep to one change: turn the sides up higher. Quick re-float and count on the same station model. Say the new number once and make a second counter pile separate from the first. Ask: more, fewer, or the same? Unexpected results are useful — say so out loud.
- **Show and tell:** Every pair whispers both numbers from their two piles first so all practise the oral outcome. Then sample two or three boats with stems: My boat held ___ counters. I changed the sides. I noticed ___. Revoice that boat-builders change shape on purpose so boats stay up and hold things.

What it should show

Most boats with turned-up sides float and hold a few counters before tipping or taking water. After raising the sides, many hold more or stay drier; some tip sooner if the reshape went wrong — affirm honest noticing either way. A boat that sinks at once is often a flat sheet or open corner; pinch sides and corners up and try again.

Misconceptions & interventions

- **Bigger is always better — a huge wide boat will hold the most.** — Point to a wide shallow boat tipping as counters go in. Compare with a neat boat that has higher sides and say shape, not just size, helps it stay up.
- **A flat foil raft is fine — sides do not matter.** — At the tray or table, pinch the corners up so water stays out. Have them try the flat sheet then the turned-up shape and notice the difference.
- **Counters can go anywhere, including stacked at one end.** — Ask where they are putting the counters. Model adding slowly in the middle and let watchers predict whether one more will stay up.

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Differentiation

Emerging	Developing	Proficient
• Sit at the teacher table and help fold sides up together; they place and count while you steady the boat. • Offer a partly folded foil boat so the pair only pinches corners and adds the stick.	• Prompt: where are you putting the counters, and did higher sides hold more, fewer, or the same? • Have watchers at the tray predict aloud before each next counter goes in.	• Ask them to point to the higher sides and say one clear notice (more counters, tipped sooner, stayed drier). • If sides are already high, prompt one careful middle placement on the retest and compare the two piles.

Cross-curricular hook

Tie to Maths counting — pairs build two counter piles and say both numbers aloud in show-and-tell.