

engineering

Make a boat that holds things

Lesson at a glance

Open by showing a toy or foil boat that carries things and ask what a boat needs to stay up and hold a load. Pairs share shape ideas, then fold one foil-and-stick boat with turned-up sides. At shared water trays they float it, add counters one by one in the middle, and pile the first count on a towel. Back at tables they change one thing—higher sides, wider floor, or stick place—retest, then whisper both counts and show a few boats.

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

Night before: tear one A5 foil sheet per pair; set 3–5 shallow basins a few cm deep (2 for a tiny class), plus lolly sticks, pea-sized modelling clay, counters and towels at making tables. Have one demo foil boat or toy boat ready for the hook.

**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. Sleeves up; wipe floor spills at once. Modelling clay stays on the table, not near mouths. 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:** Pairs share one idea for about a minute. Capture two or three on the board as pictures or short words (flat bottom, high sides, stick seat). When sides or bottoms come up, say once: the way the sides and bottom are formed helps it stay up and hold things. If someone says bigger is always better, ask what stops water coming in over the side.
- **Make our boat:** Model for two minutes: fold foil into an open boat with sides up, press a lolly stick as a brace, add a pea of clay if needed. Then one boat per pair—help with folds, do not build it for them. 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 first. Model one full cycle at the class tray: wonder, guess a number, place gently, add counters slowly in the middle, notice when water comes in. Rotate pairs for about one minute each; watchers count aloud. As each pair leaves, say their first number once and have them pile that many counters on their towel beside the boat. Wipe spills straight away.
- **Change one thing:** Dry the boat on the towel. Do not tell them which change—they choose higher sides, wider flatter floor, or move the stick. Ask why they picked that; any reason counts. Retest and keep both counter piles. Say plainly: a boat that holds fewer is not a failure—we found something out either way.
- **Show and tell:** Every pair whispers both pile numbers to each other first. Sample several pairs so all practise the numbers aloud. Invite two or three to hold the boat up with stems: My boat held ___ counters. I changed the sides. I noticed ___. Revoice: shape helps boats stay up and hold things; changing shape can help.

What it should show

Most first boats float empty and hold a few counters before tipping or shipping water; counters in the middle last longer than stacked at one end. Higher turned-up sides usually hold more; a very wide shallow change often holds fewer or tips sooner. Affirm both outcomes—holding fewer still taught them something about shape.

Misconceptions & interventions

- **Bigger always means better—so a huge flat boat will hold the most.** — Ask what will stop water coming in over the side. Point at a neat boat with turned-up sides and a wide shallow one side by side if you can, and let them see which ships water first.
- **Stacking all the counters at one end or on the rim is fine.** — At the tray ask where they are putting them. Model adding slowly in the middle and have watchers notice when an end-heavy boat tips first.

**Differentiation**

Emerging	Developing	Proficient
• Sit the pair at the teacher table and help pinch corners up so the first boat is an open dish with a counter space, not a flat sheet. • Offer the stem 'sides up' and place the first few counters with them at the tray.	• After the second float, ask why they think the count went up or down—point at the sides or the stick. • Have watchers predict 'one more?' before each counter lands.	• Ask which of the three changes they would try next and why, still using only foil, stick and clay. • Invite them to revoice for the class: boats need a good shape to stay up and hold things.

**Cross-curricular hook**

Tie to early Maths counting—oral tallies and comparing the two counter piles: more, fewer, or the same.