

Choosing materials for a build

Lesson at a glance

Open by holding a fabric scrap beside a plastic sheet and asking whether looking smart or staying dry matters more for a school-garden shelter roof. Pupils name the properties the brief needs, then agree fair-test controls as a class. Groups drip-test, bend-test and load-test plastic, foil, card and fabric, recording on the Investigation Journal page. They choose roof, sides or base, and one reject material with evidence why, then share one justified choice.

Learning objectives

- Test candidate materials against the properties a design brief needs
- Choose materials for a build and justify each choice from property evidence

Before the bell – prep

Print Investigation Journal pages. Per group: tray with plastic, foil, card and fabric samples; shallow tray with ~2 cm water; identical washers or coins. Mark a shared ~6 cm load-test gap between two books. Keep paper samples aside for extension only. Have dry cloths ready for spills.

**Materials**

Item	Qty	Per	Source	Low-cost substitute
plastic sheet samples (about 10 cm square)	1	group	classroom	cut-up clean plastic wallet or food bag
aluminium foil samples (about 10 cm square)	1	group	supermarket	foil from clean food trays, flattened
card samples (about 10 cm square)	1	group	classroom	cereal-box card
cotton fabric samples (about 10 cm square)	1	group	brought from home	clean old tea-towel scraps
paper samples (about 10 cm square) — extension only	1	group	classroom	scrap printer paper
shallow water tray	1	group	classroom	clean takeaway tray or baking tin
plastic dropper or teaspoon	1	group	school kit	teaspoon counted out the same way each time
identical metal washers or 1 cent / 2 cent coins	20	group	hardware shop	identical interlocking cubes or marbles counted out
hardback books to use as load-test supports	2	group	classroom	two identical wood blocks or pencil cases of equal height
cloths or paper towels for spills	2	group	classroom	scrap cloths from home
Investigation Journal page	1	pupil	provided printable	—

Safety watch-point

Wipe spills as they happen — wet floors are slip hazards. Keep washers off the floor trip zone; stop a load test as soon as the sample fails. No tasting materials.



Teaching moves

- **Getting Started:** Keep it light and curious. Hold up one soft fabric scrap and one plastic sheet if ready, but do not run a full test yet. Ask which matters more for a shelter roof — looking smart, or staying dry — and take one or two material examples from around the room.
- **What the brief needs:** Read the school-garden seed-tray shelter brief aloud. Invite pupils to name only the properties it needs (stays dry, stands steady, easy to cut and join). Park any testing-method ideas for the next step. Push anyone who names a favourite look back to the brief.
- **Keep the tests fair:** Map class property ideas onto the three tests: water for stay-dry; bend and load for hold-shape. Agree controls aloud — same sample size, three drops or one level teaspoon (drip only), same washers, same ~6 cm book gap. Predictions stay oral with a quick journal jot; do not fill a long form here.
- **Test the materials:** Model one full cycle on one sample first. Call the order aloud: water on every sample, then bend, then load. Walk the room for drip-count drift, dipped samples, and invented load spans — stop and restate the shared controls. At ~12 minutes, if groups are slow, finish water and load on three materials so Step 5 still has roof evidence.
- **Record your choices:** Keep everyone on the same Investigation Journal page. Finish missing result cells first, then add roof, side-or-base and reject choices with a short evidence why. If testing ran long, require at least water results, one other column started, one roof choice and one reject — enough for the share.
- **Share and justify:** Take three or four group shares. Ask for one material, its job, and the test result that backs it. Fold listeners in: Do you agree with their roof choice? What evidence would change your mind? Draw out that the brief decides which properties matter and evidence beats ‘I just like this one’.

What it should show

Plastic sheet or foil usually wins waterproof — water sits or beads; fabric darkens and soaks; card often holds shape better than soft fabric; thin foil may tear under load sooner than card. Odd water results often mean extra drops or dipping instead of dripping; re-run with the shared drip count over the tray.

Misconceptions & interventions

- **Pupils pick the material they like the look of rather than what the brief needs.** — Point back to the brief on the board: which property does the roof job need? Ask them to re-read their water results before they lock a choice.
- **‘It’s strong, so it’s fine for the roof’ — treating one good property as enough.** — Hold up a soaked fabric sample beside a dry plastic one: a material can hold shape and still fail if it soaks. Roof choice must link to the water column on the journal page.
- **Groups change sample size, drop count or load-gap mid-test and still call it fair.** — Stop the room and re-voice the agreed controls: same size, same three drops, same ~6 cm book gap. Ask: if one group uses a huge sheet and another a scrap, is that fair?

**Differentiation**

Emerging	Developing	Proficient
• Test three materials instead of four, still in order: water on all three, then bend, then load, with an adult or peer scribe on the journal page if needed.	• Complete all four samples, then add a short note on how easy each would be to join (e.g. 'easy with tape').	• Add the paper extension sample, or critique another group's fair-test controls and say what evidence would change their roof choice.

Cross-curricular hook

Tie to Maths measures and data — same sample span, drop count and load tally make results comparable across groups.