

Test, improve and present

Lesson at a glance

Groups reopen their Design Brief and name the success criteria their prototype must meet. After a quick teacher model of testing against criteria and gathering evidence, they run a first fair test with shared kit (weights, water stations, soft balls, timers), jotting results on the Prototype Evaluation testing page. They make one evidence-based improvement, re-test the weak criterion the same way, record on the results page, then present problem, evidence, change and re-test to a partner group.

Learning objectives

- Test a prototype against agreed success criteria and record the evidence
- Make one improvement, re-test, and present an analysis of the design process and result

Before the bell: prep

Have each group's prototype and Design Brief on tables before the bell. Centralise shared kit: small weights, two water stations (jug, tray, teaspoon), two soft balls, two stopwatches, rulers, a book pool, plus scrap card, tape and string held back until improve. Add a third tray (roasting tin or lunchbox lid) if many shelters share water.

**Materials**

Item	Qty	Per	Source	Low-cost substitute
group prototypes built earlier in this project	1	group	classroom	none: the prototypes are essential to this lesson
completed Design Brief pages from earlier in this project	1	group	classroom	a quick rewrite of the success criteria on scrap paper if a brief is missing
Investigation Journal testing page	1	pupil	provided printable	plain paper with teacher-led headings spoken aloud
Investigation Journal results page	1	pupil	provided printable	reverse of the testing page or plain paper with spoken headings for re-test and conclusion
small weights (washers, coins or 100 g masses)	20	class	school kit	small sealed bags of rice or dried beans
jug of water and shallow tray	2	class	classroom	large bottles of water and roasting tins or lunchbox lids
teaspoon for counted water pours	2	class	classroom	tablespoon used as the same counted scoop every pour
classroom books for stand or holder load tests	6	class	classroom	the same stack of exercise copies or reading-scheme books each time
soft ball	2	class	school kit	pairs of rolled socks
stopwatch or class timer	2	class	school kit	classroom clocks with a second hand, or a phone timer used by the teacher only
metre stick or 30 cm ruler	1	group	classroom	a marked piece of string 30 cm or 1 m long
masking tape	1	group	classroom	clear tape or string ties
scrap card offcuts	5	group	classroom	cereal-box card brought from home
string	1	group	classroom	wool or elastic bands
tissues or paper towels (for dry-check under shelters)	1	group	classroom	scrap paper
cloths for spills	4	class	classroom	old tea towels





Safety watch-point

Stand clear if a structure collapses; no throwing weights; wipe water at once; adult makes any difficult cuts; keep floor routes clear of prototypes.

Teaching moves

- **Getting Started:** Prototypes and Design Briefs are already on tables; do not hand out test kit yet. Ask two or three groups to read one success criterion aloud. Key question: if we only say “it looks good”, have we really tested it?
- **What counts as a fair test of our design?:** Name success criteria, evidence, one improvement and design process in under a minute, then live-model with a spare mini stand or barrier: wonder, predict, time 10 seconds free-standing, note rock on a desk tap, and name one base change. Push “looks neat” back to written criteria.
- **First test against the criteria:** Sort groups by problem type (shelter / barrier / stand / draught) and run short shared-kit turns. Circulate asking which criterion, what counts as a pass, and what stays the same. Waiters watch fairness, not chat. No design changes mid-test; jot on the testing page as they go.
- **Record the evidence:** Five-minute checkpoint only: fill gaps, separate observation from opinion, star the weakest criterion. If a group wrote only “it was good”, send them back for one concrete measure or observation, then move straight to improve.
- **Improve once and re-test:** Enforce one change only (widen base, one brace, tape a roof gap, raise a lip). About nine minutes improve at tables, nine re-test on the same stations with the same method. Note re-test and short conclusion on the results page. Honest re-test fails still count as engineering evidence.
- **Present the design and the evidence:** Pair groups for one-minute shares each (problem and user, one criterion, first-test evidence, one improvement, re-test). Keep the presentation-card prompts on screen. Invite two or three pairs for a 30–40 second whole-class share, then ask whether they used evidence or only opinion.

What it should show

A strong outcome meets (or moves closer to) the brief’s written criteria with honest met/not-met notes plus a measure or clear observation, one change linked to the weakest criterion, and a same-method re-test. Surprising “passes” often come from a changed pour height, load or push; re-run with the first-test method. A clear fail after one change is valid evidence, not a poor project.



Misconceptions & interventions

- **“It looks neat / pretty, so it passes.”** Point back to the Design Brief: which written criterion did that meet, and what did you see, count or time? Have them re-test that check before calling it a pass.
- **“We’ll fix the base, the roof and the sides all at once.”** Stop the rebuild. Ask which single part the first-test evidence blames, allow only that change, then re-test so they know what helped.
- **“Evidence is what we hoped would happen.”** Hold up a sample journal line: “held 8 washers before it bent” versus “I think it’s strong”. Send opinion-only groups back for one concrete observation.



Differentiation

Emerging	Developing	Proficient
• Tick each criterion met / not met with one short observation note; teacher table helps set the same pour, load or timing method.	• Add a measured result (time, count, distance) where the criterion allows, and name one fair-test detail kept the same.	• Critique whether the re-test truly matched the first method, and suggest what an engineer would try as the next single change.



Cross-curricular hook

Link to English oral language: structured one-minute evidence talks using the presentation-card prompts.