

Test, improve and re-test

Lesson at a glance

Open with the group's finished bird feeder on its tray and a hands-up poll on which of the three jobs it already does well. Agree the shared fair-test method and 0-2 rubric, then practise a dry ten-second countdown on the fair-test-timer interactive. Groups score holds-seed and stable-perch at the table, queue for the fixed-height shower, and record totals out of 6 on the Investigation Journal page. Pool first-test totals on the data-recorder interactive, make one evidence-based change in a tight build window, re-test the same way, and close on what the score change shows.

Learning objectives

- Fair-test the feeder against agreed success criteria and record results
- Make one evidence-based improvement to the prototype
- Re-test and compare with the first test results

Before the bell – prep

Have every group's feeder on a tray before the bell. Write the 0-2 rubric strip on the board (or pin a printout) and leave it up for both tests. Set two pour stations with watering can/jug, tray, and a marked 30 cm spout height. Stock one spoon and seed pot per group plus spare tops, sticks, tape and card on a supply table.

Materials

Item	Qty	Per	Source	Low-cost substitute
group bird-feeder prototype from earlier in this project	1	group	classroom	a simple bottle-and-stick feeder made quickly as a demo if a group's prototype was lost
watering can or large jug with water (pour station)	2	class	classroom	two large jugs used as watering cans
shallow plastic tray	1	group	classroom	roasting tin or deep-sided lunch tray
metre stick	1	class	classroom	30 cm ruler used twice to mark pour height
bird seed	1	class	supermarket	dry rice or dried lentils for the indoor test only (not for real birds afterwards)
tablespoon	1	group	classroom	same-size bottle cap used as a scoop
paper towels	1	class	classroom	old tea towels designated for spills
spare improvement kit (bottle tops, string, lollipop or garden sticks, tape, card offcuts)	1	class	classroom	clean recycling scraps and masking tape only
scissors	1	group	classroom	one shared scissors station with an adult
Investigation Journal page	1	pupil	provided printable	plain paper ruled into first-test / improve / re-test sections

Safety watch-point

Mop spills at once and bar running on wet floors; adult pours for unsteady groups; wash hands after bird seed; no tasting seed; scissors supervised on the supply table.

Teaching moves

- **Getting Started:** Prototypes already on trays; no test kit out yet. Run a quick hands-up on the strongest of the three jobs only. Point groups back to the success criteria on their Design Brief if anyone has forgotten the three jobs, and voice the key question: how will we know if a change actually helped?
- **How we will test fairly:** Project the short board rubric and keep the talk tight: name the shared method, attach holds seed / stays dry / stable perch, then run one live scored demo on a sturdy class feeder. Think aloud once through wonder–predict–test–observe–think, scoring stays-dry as 1 out of 2 if edge seeds damp. Head off multi-change redesigns now.
- **Keep the shower fair:** Open the fair-test-timer interactive on a 10-second countdown. Practise one dry run with no feeder and no water so the class hears the rhythm. Stress that the timer is the control, not a race, and that the same pour will be used on first test and re-test.
- **First test of the feeders:** Groups finish holds-seed and the two-finger perch check at the table first, then join a pour-station queue. One adult starts each ten-second countdown. Press for observation language separate from meaning, and insist first-test scores are written on the Investigation Journal page before any rebuild. If a feeder collapses, score honestly and plan one repair.
- **Pool the first-test scores:** Drive the data-recorder interactive with Group and First-test total out of 6. Fill the table as totals are called, show the bar chart, then run a quick hands-up tally of weakest criterion beside it. Ask what a short bar tells an engineer to work on first — do not enter re-test scores yet.
- **One improvement, then re-test:** Enforce one change only, linked to the weakest score. Freeze every build at 7 minutes — half-on tape is fine — and move straight into the full three-check re-test at the same two pour stations. New scores go on the Investigation Journal improve section. Praise an honest unchanged or lower total as real evidence.
- **What the evidence shows:** Whole-class design talk: take three or four groups on whether the total rose, stayed or fell and what that means. Reframe any 'we failed if it is not a 6' talk — today's goal was a fair test, one reasoned change, and an honest comparison. Keep prototypes with Journal pages for the presentation later in the project.

What it should show

First-test totals typically spread across 2–5 out of 6; stays-dry and stable perch most often pull scores down. After one linked change, the weak criterion often rises by 1 point and the total follows; an unchanged or lower total is still valid if the re-test method matched. Odd jumps usually mean a longer pour, a push on the perch, or several changes at once — re-run with the agreed controls.

**Misconceptions & interventions**

- **Pupils change the roof, the perch and the seed lip together and call the whole rebuild an improvement.** — Stop the group and ask which single criterion scored lowest. Make them name one change linked to that score before any tape comes out, then remind them iteration means one change then a re-test.
- **Pupils say 'we failed' if the re-test is not a perfect 6, or treat an unchanged score as worthless.** — Point back to the two totals on the Investigation Journal page and reframe: today's job was fair evidence and one reasoned try, not a perfect product. Ask what they would try next from the data.
- **Pupils think a longer or heavier shower on the re-test still lets them claim the feeder improved.** — Hold the metre-stick mark and restart the ten-second timer together. Ask why a harder pour would make the comparison about the test, not the change.

Differentiation

Emerging	Developing	Proficient
• Complete holds-seed and stable-perch at the table first with teacher support on the 0–2 language, then join the pour queue; teacher scribes the three scores if writing stalls. • If the build freezes incomplete, re-test the original design and record that the total stayed the same — still valid evidence.	• Add a short note on the Investigation Journal page on why a score was 1 rather than 2, still using the board rubric. • Name the change in one sentence linked to the weakest first-test observation before building.	• Critique another group's fair-test method: same seed, time, height and two-finger check? • If the total fell, propose the single next change they would try and why, without rebuilding now.

Cross-curricular hook

Tie to Maths Data — pool first-test totals out of 6, read the bar chart, and name the class middle value aloud.