engineering

# Test, present and reflect

## Lesson at a glance

Open by bringing out each group's pupil-built model and Design Brief from earlier in the project. Groups run the planned criterion-check twice without changing the set-up, jotting Trial 1 and Trial 2 on the brief. Results move to the Investigation Journal page, then every group calls out how many criteria it met for the data-recorder bar chart on the IWB. Close with a model-in-hand share of one unique design choice and a short process reflection.

## Learning objectives

- Test the model against the problem and record the result
- Present the result using a chart or demo and the model itself
- Look back over the whole STEM cycle: investigate, build, evaluate, and communicate

## Before the bell — prep

Have each group's model and Design Brief ready before the bell. Clear one test space per group; set out stopwatch or class clock, metre stick or tape, and only the loads or containers Part 1 already named. Open the data-recorder interactive in explore mode.

## Materials

| Item | Qty | Per | Source | Low-cost substitute |
|---|---|---|---|---|
| prototype model from Capstone Part 1 | 1 | group | classroom | photograph of the model plus the Design Brief if the physical build could not be stored |
| Design Brief from Capstone Part 1 (with success criteria) | 1 | group | classroom | a short list of the group's three success criteria on scrap paper |
| loads, water or other criterion-specific test kit from Capstone Part 1 | 1 | group | classroom | library books or filled water bottles as loads; a recycled yoghurt pot or ice-cream tub for any water test |
| stopwatch or class clock | 1 | group | classroom | the classroom wall clock counted aloud |
| metre stick or tape measure | 1 | group | school kit | a 30 cm ruler used end to end |
| tablet or laptop for optional photo or chart | 1 | group | school kit | present from the model and Investigation Journal only |

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### Safety watch-point

Supervise load tests and hanging bags so models and weights cannot fall on feet or fingers; keep water or loose loads away from the IWB and walkways.

### Teaching moves

- **Getting Started:** Hand out models and Design Briefs. Name the school problem this class actually chose and the success criteria they agreed. Keep it short — ask only 'How will we know if our model really solves the problem?' then move to testing.
- **Test the model:** Groups read their criteria aloud, then run the exact test planned earlier — change nothing mid-way. One pupil times or measures, one operates, one records Trial 1 and Trial 2 on the Design Brief or a scratch note. Model the full think-aloud at the front once. Stop anyone who tweaks the set-up to make the model look better.
- **Record the result:** Open the Investigation Journal page now. Push evidence language: 'The model held...' before 'So I think...'. Look for one clear result linked to a criterion, a conclusion that matches the data, and one realistic next-step. A failed criterion is useful evidence, not a failed project.
- **Show the class chart:** Drive the data-recorder interactive live: collect each group's 'criteria met' total first, then reveal the bar chart. Before the bars go up, remind the class groups had different problems and criteria — tall bars are not automatic winners. Run the talk prompts on design choices behind strong and short bars.
- **One choice nobody else made:** About 45 seconds a group, models in hand. Do not re-run results. Each group names one design choice they think no other group made and whether it helped. After every two models, take two or three 'what would you borrow, and why?' from listeners. If two groups claim the same choice, ask how the versions differed.
- **Reflect and close:** Take two or three spoken reflections on the full STEM cycle. Celebrate useful failures as strongly as clean passes. Pack away: store or photograph models if wanted for display; return measuring kit and loads; wipe desks.

### What it should show

Results will vary by brief — expect a mix of fully met, partly met and unmet criteria across the class. A successful outcome is honest criterion-checking with two consistent trials and a next-step that matches the weak point found. Odd results usually mean the load, surface or timing changed between trials; re-run from the same start conditions.

## Misconceptions & interventions

- **Changing the test halfway to make the model look better still counts as fair evidence.** — Stop the group and re-voice: evidence only counts if the test stays the same. Re-run both trials from the planned set-up with no mid-way tweaks.
- **A taller bar on the class chart means the best design.** — Point at the chart and remind them groups had different problems and different numbers of criteria. Ask whether a shorter bar could still be a strong result for a harder brief.
- **If the model failed a criterion, the whole project failed.** — Name the failure as useful evidence: 'The joint was the weak point — that is exactly what engineers need to know next.' Steer them to write one realistic improvement on the journal page.

## Differentiation

| Emerging | Developing | Proficient |
|---|---|---|
| • Give a simple yes/no checklist against each success criterion and pair the recorder with a confident peer at the teacher table. | • Add one measured reading (time, distance or mass held) beside the yes/no result and say why it meets or misses the criterion. | • Critique whether their own test was fair, then propose one sharper next-step improvement tied to the weakest joint or base they found. |

## Cross-curricular hook

Tie to the Maths Data strand — pupils read the class bar chart of criteria met and discuss mode and spread without crowning a winner.