

Engineer of the year: show what holds and why

Lesson at a glance

Open by asking how we know which change really made a build stronger when two groups both claim success. Coach one volunteer group through a full evidence cycle aloud, then give groups seven minutes to lock before-and-after load numbers from the Investigation Journal and name one structural idea. Each group live-loads its build in a short front-table showcase. Pupils walk other builds, steal one reusable idea on the journal page, then rank triangles/bracing, span shape, and joins by how often they rescued builds under load.

Learning objectives

- Demonstrate a load-bearing build live with measured evidence rather than assertion
- Explain the one shape or join that made the difference using before-and-after numbers
- Identify structural ideas worth reusing and rank them by how often they rescued builds

Before the bell – prep

Before the bell, place every finished group build with its real project load (books, tablet, coats, or weights) on side tables. Clear a front table or floor space. Have journals open to the design-build pages. Pre-write three board headings: Triangles/bracing, Span shape, Joins that hold.

Materials

Item	Qty	Per	Source	Low-cost substitute
group load-bearing builds from earlier in this project	1	group	classroom	photographs of the builds plus the real load for a partial demo if a build cannot be moved
real loads for each build (books, tablet, coats, or the weights used in testing)	1	group	classroom	1c coins or classroom counting weights in a small tub
Investigation Journal pages from the design-build project	1	pupil	classroom	one shared group journal copy if a pupil page is missing
wall or noticeboard space for the class ranking tally	1	class	classroom	IWB list only



Safety watch-point

Load low and slowly; stand clear of a failing edge; an adult steadies any tall or tippy build. Agree a lighter safe load openly if a build is too fragile for a full demo.



Teaching moves

- **Getting Started:** Keep the hook under a minute. Have one volunteer rest a light load on their build, then take it off. Ask: if two groups both say their build is strong, how do we know which change really worked? Steer any 'it looks neat' talk straight back to before-and-after numbers.
- **Evidence, not opinion:** Coach one volunteer group through the full cycle on their real build: I wonder, I predict, I test, I observed, I think. Do not build a separate teacher demo. Press for one named shape or join plus a before number and an after number the class can hear.
- **Prepare your evidence:** Run the seven minutes in strict order: numbers first, one idea second, practise load last and only if numbers are written. If numbers are missing, allow one careful load now and an honest memory note for before—do not let a full re-test eat the slot. Check every pupil can say the numbers, not only the spokesperson.
- **Live load showcase:** Groups come up one at a time; hard ceiling about 90 seconds plus one quick class question. Offer the stems if a group freezes. After each load ask watchers: What was the structural idea? Did the numbers match the claim? If a build fails, treat it as data—what gave way first?—not embarrassment. With more than six groups, drop the question to every second pair.
- **Walk and steal one idea:** Leave builds on tables with a light safe load or the after number visible. Ban vague praise such as 'it looks nice'; push load-path language—triangle brace, arch, gusset, rolled tube, firm slot. Pupils answer only the three Investigation Journal questions; no sticky notes or second sheet. Hear three stolen ideas aloud on the carpet.
- **Rank what rescued builds:** Under each of the three board headings give one quick example from today's showcase, then tally show-of-hands for how often each idea rescued a build or was stolen. Add the check: did any idea appear less often but show a bigger before-and-after jump? Ties are fine; ask which jobs each idea suits.



What it should show

A strong showcase names one shape or join, states before and after load figures, and points to the working part while the load is still on. Ranking should follow how often an idea rescued builds and any clear measured gain, not tidiness. Odd results usually mean missing journal numbers, a push instead of a slow place, or several ideas claimed at once—recover one honest after figure and one named idea.



Misconceptions & interventions

- **Pupils treat a neat finish or a confident voice as proof the build is strong.** — Ask for the before number and the after number from the journal. If they cannot show both, the claim is opinion until a careful load produces a measured result.
- **Pupils list every material they used instead of the one change that moved the number.** — Hold up the build and ask which single shape or join stopped the lean, sag, or peel. Press until only one structural idea is named.
- **On the walk, pupils copy decorations or colour rather than the load path.** — Redirect: where does the weight go, and what stops the lean, sag, or peel? Accept only reusable structure words such as triangle brace, gusset, or arch.

Differentiation

Emerging	Developing	Proficient
• Pair with the teacher table to find before/after figures in the journal and script the five sentence stems before they present. • If the build is fragile, agree a lighter safe load and say the limit aloud so the group can still show evidence.	• After their load, ask why that one join or brace beat the lean, sag, or peel on this job. • On the walk, require the stolen idea to name both the structure word and the number that proved it.	• After the hand tally, have them argue most-common fix versus biggest before-and-after gain using today's numbers. • Challenge them to say which other group's idea they would combine with their own for a stronger next build.

Cross-curricular hook

Tie to Maths Data—tally the three idea types, rank by frequency, and compare biggest measured gain.