engineering

Engineer of the year: show what holds and why

Lesson at a glance

Open by resting a light load on one volunteer build so the class sees measured proof beats a confident claim. Coach that group through a full evidence cycle aloud, then give every group seven minutes to find before-and-after load numbers in the Investigation Journal and name one difference-making shape or join. Groups load live at the front table, walk other builds to steal a reusable idea on the journal page, and rank triangles/bracing, span shape and joins by how often they rescued a build.

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, set every group's finished build and its real load (books, tablet, coats or project weights) on side tables with Investigation Journal design and evaluation pages. Clear a front demo table or floor space. Have board space ready for three ranking headings.

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

Lesson 36

Safety watch-point

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

Teaching moves

- **Getting Started:** Keep this to one or two minutes. Invite one volunteer group to 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 neat-finish claims straight back to before-and-after numbers.
- **Evidence, not opinion:** Use the volunteer group's real build and load — do not build a teacher model. Coach them through the cycle aloud so the class hears: I wonder, I predict, I test, I observed (after vs before number), I think (named shape or join). Press for one idea, not a materials list.
- **Prepare your evidence:** Triage hard: numbers first (2–3 min), one idea next (1–2 min), practise load only if numbers are already written. If before figures are missing, allow one careful recovery load and an honest memory note — no full re-test. Check every pupil can say the numbers, not only the spokesperson.
- **Live load showcase:** Ninety seconds per group plus one class question; stop even if they want more so all get through in about 18 minutes. After each load ask watchers: What was the structural idea? Did the numbers match the claim? Offer the sentence stems if a group freezes. A fail under load is useful data — ask what gave way first.
- **Walk and steal one idea:** Leave builds on tables with a light safe load or the after number visible. Ban 'it looks nice' — push triangle brace, arch feet, gusset, rolled tube, firm fix. Pupils answer the three Investigation Journal questions only; no sticky notes. Carpet share of three stolen ideas in the last two minutes.
- **Rank what rescued builds:** Pin three headings: Triangles/bracing, Span shape, Joins that hold. Give one quick showcase example under each, then hand-tally how often each rescued a build. Check whether a rarer idea still showed the biggest before-and-after jump, and name 'most common fix' beside 'biggest gain' if both appear.

What it should show

A strong showcase names one job, one before number, one change, one after number, and points to the working shape or join while the load is still on. Ranking should follow frequency and measured gain, not tidy looks; ties are fine. A group with a missing before figure may recover one careful after load and note the gap honestly — that is still valid evidence, not a failed lesson.

Misconceptions & interventions

- **Pupils treat a neat finish or a confident voice as proof the build is strong.** — Ask for the two journal numbers: what did it hold before the change, and after? If they cannot show both, the claim is still an opinion.
- **Pupils list every material they used instead of the single idea that changed the result.** — Hold up the build under load and ask which one shape or join stopped the lean, sag or peel — triangles, span shape, or a join that holds.
- **On the walk-around, pupils copy decorations or say 'it looks nice' rather than stealing a structural idea.** — Redirect to the load path: where does the weight go, and what stops the lean, sag or peel? Demand reusable language such as triangle brace or gusset.

Differentiation

Emerging	Developing	Proficient
• Offer the sentence stems during the showcase and let the group use a lighter agreed safe load said openly to the class. • Pair at the teacher table to find the two journal numbers first before naming the idea.	• After their load, ask whether the numbers fully match the claim and which small-test clue led them to that brace or join.	• Stretch them to name a 'most common fix' versus a 'biggest gain' idea in the class rank, using before-and-after jumps not just hand-tally frequency.

Cross-curricular hook

Link to Maths Data and Measures — before-and-after load counts become the evidence tally that ranks which structural idea rescued builds most often.