

Build the prototype

Lesson at a glance

Hand each group their Design Brief and name the user and one success criterion before any materials leave the tray. Model a live plan change with scrap card and string, then groups build a working prototype from the shared junk-modelling kit while jotting changes on sticky notes. Each pupil records build notes, plan change or plan held, and a user-need line on the Investigation Journal page. Close with three or four quick shares and a labelled pack-away.

Learning objectives

- Build a working prototype from a Design Brief using the shared build kit
- Record build notes and any plan changes made during making

Before the bell: prep

Return each group's Design Brief. Set one shared junk-modelling kit and two pairs of scissors per table. Pre-cut common thick pieces (wide bases, door-length card, started tube slots) into a labelled tray so adult cuts do not eat circulating time. Put sticky notes with each group and clear floor space for tall builds.

**Materials**

Item	Qty	Per	Source	Low-cost substitute
Design Brief pages completed earlier in this project	1	group	classroom	a clear photo of the group's sketch if the original page is missing
cardboard sheets and box offcuts	6	group	brought from home	cereal boxes and parcel cardboard
cardboard tubes (kitchen-roll or wrapping-paper tubes)	4	group	brought from home	rolled newspaper tubes taped along the seam
masking tape	1	group	classroom	packing tape used sparingly, or strips of glued paper
string	2	group	classroom	wool or thin garden twine
elastic bands	8	group	classroom	string ties
lolly sticks	12	group	classroom	strips of stiff card
newspaper	4	group	classroom	scrap printer paper
clean plastic containers (tubs or bottles)	2	group	brought from home	extra cardboard boxes
glue sticks	2	group	classroom	masking tape joins only
scissors	2	group	classroom	adult pre-cuts card strips to common widths
30 cm ruler	1	group	classroom	marked strip of card as a measuring guide
group name labels or sticky notes	1	group	classroom	masking-tape labels written in pencil
sticky notes for mid-build plan-change jots	1	group	classroom	scribble on the edge of the Investigation Journal page or a scrap of paper
Investigation Journal page	1	pupil	provided printable	plain paper with three pupil-ruled sections: build notes, plan change or plan held, user-need line





Safety watch-point

Two pairs of scissors per group stay on the table under adult eye-line; an adult makes remaining difficult cuts in thick card or plastic. Count scissors back before anyone leaves. Stand clear if a tall structure tips.

Teaching moves

- **Getting Started:** Hand each group their Design Brief with the kit already on the table but no building yet. Keep it to three warm minutes: What problem is this solving? Who is it for? What will count as success next time? Leave the kit briefing for the build step.
- **Revisit your Design Brief:** Project only three board lines: name the user and one success criterion; point to the main sketch shape; jot any plan change. Live-model a two-minute plan change with scrap card and string. Try tape, let it peel, switch to string, sticky-note the change. Spot-check user and success criterion as you pass; pause only with groups who cannot find both on the brief.
- **Build the prototype:** Circulate and coach; do not rebuild for them. In the first minute check main-sketch shape. Cue twice: each plan change gets a sticky jot of what changed + why. Ask which brief part they are on, whether the join pushes or pulls, and what would make a test unfair. If stuck, send them back to success criteria and offer one known structure idea (wide base, triangle brace, tube) for them to choose.
- **Build notes and plan changes:** Each pupil completes their own Investigation Journal page from the sticky jots and group talk: build notes, plan change or plan held, user-need line. Model one board line only if needed, then send them to their pages. Prompt vague lines with Which join? What did you try next?
- **Progress check:** Take three or four quick group shares using the sentence frames. Revoice engineering language: a join change from evidence is a plan change, not a mistake. Gently redirect groups that decorated before the structure stood or drifted off the brief.
- **Pack carefully:** Before the bell: label every prototype with group name and problem, store where it will not be crushed, and count scissors back to match the two pairs issued per group. Secondary tidy can finish after the bell.

What it should show

A successful prototype matches the brief's main job and user, stands with deliberate joins (tape, string, slots), and has at least one sticky jot of a plan change or confirmed plan held. Common drift: decorating before the structure stands, or inventing a new idea mid-build. Send them back to the success criteria, not a fresh invention.

**Misconceptions & interventions**

- **Pupils treat the sketch as a picture to copy exactly, even when the real material will not hold.** Point back to the brief: a recorded change that still meets the user need is good engineering. Replay the card-and-string model: tape peeled, string held, sticky note written.
- **Pupils think a plan change means they failed or built the wrong thing.** Revoice: engineers adjust when materials behave differently from the sketch. That is normal professional work. Have them jot what changed and why so the change becomes evidence, not a mistake.
- **Groups decorate or add extras before the main structure stands and meets a success criterion.** Stop at the table and ask which success criterion this part serves. Direct them to test stability gently first; decoration waits until the structure holds.

**Differentiation**

Emerging	Developing	Proficient
• Allow a simpler version that still meets one success criterion; accept drawing plus short labels on the journal, with board stems (We changed ____ because ____ / The plan held because ____).	• Once the main structure stands, add a second feature already on their brief (hinge, removable lid, wider base) and jot why it helps the user.	• Critique their own joins against tomorrow's test: What would make this unfair to the success criteria? Note one improvement to try after the first test.

**Cross-curricular hook**

Links to English procedural writing: the plan-change jot is a because-clause that explains a real making decision.