

Build the prototype

Lesson at a glance

Hand each group the Design Brief they wrote earlier in this project and reconnect to user, problem and success criteria. Model a live plan change with card and string, then groups build a working prototype from the shared junk-modelling kit—shelter, barrier, book stand or draught-stopper. Sticky-note jots capture what changed and why mid-build. Pupils transfer build notes, plan change or plan held, and a user-need line onto their Investigation Journal page, then share one short sentence before packing labelled prototypes safely.

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 thick pieces (wide bases, door-length card, started tube slits) into a labelled tray so adult cuts don't eat circulating time. Sticky-note pad per group; 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	supermarket	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 under adult eye-line; adult makes remaining thick card/plastic cuts. No running with materials; stand clear if a tall build tips. Scissors count-back before anyone leaves.

Teaching moves

- **Revisit your Design Brief:** Project only the three board lines: name user and one success criterion; point to the main sketch shape; follow the brief and jot plan changes. Do the two-minute live model—tape peels, string holds—and show jotting the change on a sticky. Spot-check user and criterion quietly; only pause a group that cannot name them before kit leaves the tray.
- **Build the prototype:** Keep the ordered build list visible on the IWB, and circulate to coach rather than rebuild. In the first minute, check the main sketch shape, then ask which part of the brief they are on, whether a join pushes or pulls, and what would make tomorrow's test unfair. Mid-way, cue sticky jots: what changed + why. If a group is stuck, send them back to the success criteria and offer one known structure (wide base, triangle brace, tube) for them to choose from.
- **Build notes and plan changes:** Pupils write on paper: three Investigation Journal fields each—build notes, plan change or plan held, user-need line. Groups share sticky jots, then every pupil writes their own page. Model one board line if needed before sending them off, and prompt vague lines with: which join, what next. Leave labelled prototypes on tables for the next session.
- **Progress check:** Three or four quick group shares using the sentence frames. Revoice engineering language: a join change from material evidence is a plan change, not a mistake. Gently flag decorate-first, brief-abandon, or missing jots, and link back to the user.
- **Pack carefully:** Non-negotiables before the bell: label each prototype with group name and problem; store where it will not be crushed; count scissors back (two pairs per group). Secondary tidy can finish after the bell.

What it should show

Each group should have a standing working model from the shared kit that still matches the brief's job and user—not a finished product. Expect at least one recorded plan change (e.g. tape to string, flat base to triangle brace) or clear evidence the plan held. A group with only decoration and a wobbly structure likely skipped stability checks; send them back to the main join before pack-away.

**Misconceptions & interventions**

- **Pupils treat the sketch as a picture they must copy exactly, even when the real material will not hold.** — Point back to the brief's user and success criteria: a recorded change that still meets the user need is good engineering. Re-show the tape-to-string model if needed.
- **Pupils think a plan change means they failed or built badly.** — Revoice: engineers almost never get a first build right—jotting what changed and why is how the next plan gets stronger.
- **Groups decorate or add extras before the main structure stands and does the job.** — Stop them gently and ask the look-for: does it stand, and does it do the main job? Structure and joins first; extras only once it works.

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 build against tomorrow's test: name one join or measure that could make the test unfair, and one improvement they would try first.

Cross-curricular hook

English oral language: rehearse the share frames so every pupil can state a plan change or user link in one clear sentence.