

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	classroom	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. Circulate and coach—do not rebuild. First minute: check main sketch shape. Ask which brief part they are on, whether a join pushes or pulls, and what would make tomorrow's test unfair. Cue sticky jots mid-way: what changed + why. Stuck groups go back to success criteria; offer one known structure (wide base, triangle brace, tube) and let them choose.
- **Build notes and plan changes:** Paper only—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, then send them off. Prompt vague lines: which join, what next. Leave labelled prototypes on tables for the next session.
- **Progress check:** Display-only talk—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.