

Build the Prototype

Lesson at a glance

Open by holding up a leaning taped card stand and asking what went wrong and what they'd change. Name two words — prototype and iteration — then model one build out loud: read the plan, fold, spot the tip, widen the base, mark the change. Groups then build their own prototype from the Design Brief they drew earlier in this project, marking each change on the brief as they go, and write up what they built, what they changed and why on the Investigation Journal build-log page.

Learning objectives

- Build a working model from the plan on your Design Brief
- Problem-solve as the build progresses and choose sensible fixes
- Record any changes you make to the original plan and say why

Before the bell – prep

Build your own half-built card stand ahead — a strip of card and tape that leans, for the hook and the worked model. Sort one build kit per group (card, tape, split pins, dowels, blunt scissors) and have each group's own Design Brief ready to hand back. Set a tray for split pins and scissors to check back in.

**Materials**

Item	Qty	Per	Source	Low-cost substitute
the group's own Design Brief	1	group	classroom	if a group's brief was lost, that group sketches a quick fresh plan on plain paper before building
assorted cardboard sheets and tubes	1	group	brought from home	flattened cereal boxes only
split pins (paper fasteners)	10	group	classroom	masking tape to make a hinge instead
masking tape roll	1	group	classroom	any sticky tape from the classroom store
glue stick	1	group	classroom	PVA glue shared between two groups
blunt-tip scissors	2	group	classroom	one shared pair per group with the teacher making harder cuts
paper strips and thin dowels or skewers	1	group	school kit	rolled paper tubes instead of dowels
Investigation Journal page	1	pupil	classroom	a lined page in the copybook laid out in the same three sections

Safety watch-point

Blunt scissors only — an adult makes any difficult cut. Watch for split pins and pointed dowels; check both back into the tray at tidy-up.



Teaching moves

- **Getting Started:** Hold up your leaning card stand and ask "what went wrong here, and what would you change?" Keep it light — you're only priming that plans change when they meet real materials. Don't hand out any build kit yet.
- **Two Ideas Before We Build:** Read the Key Concepts table with the class and read the Example cells aloud — they carry the detail. Head off the idea that changing a plan means they planned badly: say clearly that professional engineers iterate every prototype.
- **Watch the Plan Meet the Materials:** With card and tape in hand, build a small stand while thinking out loud through all four beats: read the plan, build it, name the problem ("the base is too narrow, so it tips"), make one change and — crucially — write that change on your plan. The recorded change is the bit they must copy.
- **Build Your Prototype:** Hand each group its Design Brief and kit. Circulate coaching with questions, not answers: "what will you build first?", "what's the problem here?", "if you change that, what else has to change?" About halfway, call a 30-second whole-class freeze — hands off builds, mark any change on the brief now. This catches groups building without recording.
- **Record: Your Build Log:** Stop the build for the Investigation Journal page. Insist on three columns: what they built, what they changed and why, one problem left to solve. A group that changed nothing writes "no changes — built as planned" — a valid, honest entry. Watch for groups filling only the built column and skipping the change.

What it should show

There is no single right build — a successful prototype is one that stands or works well enough to test, with at least one change from the plan marked on the Design Brief and logged in the journal. Expect narrow bases that tip, tape that won't grip and legs of uneven length. A group with a perfect, unchanged build usually built a very simple version — that's fine if their journal honestly says "no changes."

Misconceptions & interventions

- **Pupils think changing the plan means they planned badly — "we did it wrong."** — Revoice it at the worked model and again in the make-sense talk: professional engineers iterate every prototype. A build that taught them something is a good prototype, even unfinished.
- **Pupils think the log is only for what they built, so they skip the change column.** — At the mid-build freeze and again at the recording beat, name the change column as the whole point — an engineer's log lets anyone pick it up and carry on. Prompt them to fill it before moving on.

**Differentiation**

Emerging	Developing	Proficient
• Point the group to the one part of the plan they're surest about and let them start there, then build outward.	• Ask them to test each part as they attach it, not just at the end, and log the change straight away.	• Have them predict which part will fail before building it, then check whether they were right; ask what they'd change on the Design Brief for the test day.

Cross-curricular hook

Links to the Maths Shape and Space strand — a wider triangular base is more stable than a narrow one.