

Build the prototype

Lesson at a glance

Open by recalling each group's Design Brief and the feeder's one job for Irish garden birds such as a robin or blue tit. Model thinking aloud with a bottle and a sample brief, then run the safety brief before trays of bottles, sticks, string, tape and seed go out. Groups build a rough prototype from their own plan, check matches and forced changes against the brief, and capture the trail on the Investigation Journal page before a short share and pack-away for the test session.

Learning objectives

- Build a feeder prototype from the planned Design Brief
- Use materials safely under adult supervision for cutting
- Record build notes and any changes made to the original plan

Before the bell: prep

Rinse and dry one or two plastic bottles per group and pre-start the main seed openings the night before so the class is not queued at one cutting station. Lay trays at the side (bottle, string, sticks, sticky tape, round-tip scissors, small seed cup) and set an adult-only cutting station; wet wipes or sink ready after seed.

Materials

Item	Qty	Per	Source	Low-cost substitute
clean empty plastic bottle (500 ml to 1 l)	2	group	brought from home	one larger bottle shared carefully, or a clean juice carton
garden string or strong twine	1	group	hardware shop	wool or leftover parcel string doubled for strength
lollipop sticks or thin garden sticks	6	group	supermarket	straight twigs collected and dried, or wooden coffee stirrers
sticky tape (roll)	1	group	classroom	masking tape or packing tape
scissors	1	group	classroom	one shared class set at a cutting station with the teacher
bird seed (small cup for dry fit)	1	group	supermarket	dry rice or dried lentils for indoor dry-fit only (not for outdoor feeding)
group Design Brief from earlier in this project	1	group	classroom	a quick labelled sketch remade at the start if a brief is missing



Safety watch-point

Adult-only hard cuts and bottle openings, bottle held still on the desk. Scissors closed when walking; seal seed and wash hands after handling; keep hanging string short on desks.



Teaching moves

- **How engineers build from a plan:** Board only the three short definitions: prototype, Design Brief, design change. Hold up one bottle and a sample brief and think aloud through wondering, predicting the body first, checking the brief, adult-helped cutting, and noticing a forced change: pupils must hear prediction, plan-checking and recording a change before they touch materials.
- **Safety and materials:** Say the rules while trays stay at the side: scissors closed when walking; only an adult makes hard bottle cuts; wash hands after seed. Have two pupils restate them, then hand out one tray per group and run the materials check. Flag seed allergies: dry rice as a stand-in fill if needed.
- **Build the feeder:** Circulate with scissors and craft knife for bottle mouths only; groups do tape, string, sticks and positioning. Pace roughly: body and opening, then perch and rain cover, then hang or base, then dry seed fit. Keep asking which brief part they are on and whether the perch sits below the hole for a robin or blue tit.
- **Check against your plan:** Run a short group desk check, not a fair test. Prompt perch position, dryness idea, and what forced a change. Cold-call three groups for one match and one change; separate unfinished work from deliberate design changes.
- **Record your build notes:** Pupils capture on the Investigation Journal page: the check question, expected vs materials-forced, one match, one design change (or none) with reason, and a short conclusion on what a robin or blue tit could already use. Push vague notes such as 'it broke' into clear ones; start pack-away cues in the last minute.

What it should show

Expect rough first prototypes: many lean, hang awkwardly, or place the perch too high for a robin or blue tit. That is useful evidence, not failure. A group whose build matches the brief exactly is fine; one whose stick would not fit should have a noted design change. Surprising collapses usually mean tape on a dirty or wet bottle. Wipe and re-join if time allows.

Misconceptions & interventions

- **Any change from the Design Brief is cheating or means we failed.** Name it as engineering: the plan guides you; evidence from the materials can improve it if you write the change down. Point to the worked model where the stick was too thick and a thinner one was noted.
- **It looks different from the sketch so the prototype is useless.** Reframe at the plan-check: a prototype that reveals a problem is doing its job. Ask what a robin or blue tit could already use, then what to try in the test session.

Differentiation

Emerging	Developing	Proficient
• Start from three must-haves only: container, seed hole, perch. Ignore extras until those stand. • Pair a careful taper with a peer while you finish their bottle opening at the cutting station.	• Prompt one fix still possible today if the perch sits too high or the join slips. • Ask them to say the design change out loud before writing it so the journal reason is clear.	• Add a simple rain lip or second perch if the core build is stable. • Sketch one improvement idea for the test session or hold parts for another group while tape sets: no second feeder.

Cross-curricular hook

Link to SESE Geography habitats: robin and blue tit as common Irish garden birds the feeder must serve.