

## engineering

## Ask, imagine and plan

## Lesson at a glance

Open with four Irish garden birds—robin, blackbird, blue tit, chaffinch—and pin three user needs on the board: hold seed, keep seed dry, stable perch. Groups brainstorm feeder ideas, choose one design, then sketch a labelled plan on the Design Brief and Plan page with materials listed. Close by locking three shared success criteria for later testing and storing the plans for the build.

## Learning objectives

- Define the user need for a feeder that serves Irish garden birds
- Brainstorm ideas and choose one design to develop as a group
- Sketch a labelled plan with materials and agree success criteria for testing

## Before the bell – prep

Print one class set of bird fact cards or open the four-bird panel on the IWB. Push desks for groups of 3–4. Have Investigation Journal Design Brief and Plan pages ready for the sketch step only—not at the start. No build materials today.

## Materials

| Item                                                                 | Qty | Per   | Source    | Low-cost substitute                                                                  |
|----------------------------------------------------------------------|-----|-------|-----------|--------------------------------------------------------------------------------------|
| Irish garden bird fact cards (robin, blackbird, blue tit, chaffinch) | 1   | class | classroom | project the four-bird panel and short traits full-screen on the IWB with no printing |
| Investigation Journal Design Brief pages                             | 1   | pupil | classroom | one shared Design Brief page per group                                               |
| plain paper for extra group sketches                                 | 1   | group | classroom | use the Design Brief page only                                                       |
| pencils and coloured pencils for labelling plans                     | 1   | pupil | classroom | pencil only                                                                          |

## Safety watch-point

No cutting or building today. Remind pupils scissors and construction come next lesson with adult help for hard cuts; plans and materials lists only.

**Teaching moves**

- **Getting Started:** Project the four bird names and short traits, or hold up the fact cards. Ask which might visit your grounds and what each needs from a feeder. Keep it light—no materials, no sketching yet.
- **What engineers do first:** Introduce user need only. Draw out and write three needs on the IWB: hold seed, keep seed dry, stable perch. Leave them up all lesson. Hold back ‘success criteria’ until the Agree step. Model aloud thinking about a blue tit and wet seed.
- **Imagine: feeder ideas:** Whole-class brainstorm ~4 minutes onto a simple IWB list (hanging bottle, tray, milk-carton hopper). Then ~3 minutes groups shortlist and ~3 minutes each names one idea to take forward. Do not assign designs; same type across groups is fine.
- **Sketch your design plan:** Hand out Design Brief and Plan pages now. Model a hanging-bottle sketch live for 2–3 minutes—labels, seed hole mid-way, perch, string—then send groups to their own idea. Circulate: ‘Point to dry seed. Point to the perch.’ Stop once if you see shading with no labels.
- **Agree how we will test:** Whole class turns the three needs into locked checks: seed stays in; seed not soaked after a light watering-can shower; gentle finger press on the perch does not tip wildly. Pupils copy the agreed wording onto their plan page. Stress same checks for every group later.
- **Reflect and set up the build:** Take two or three group voices linking their choice to a bird need. Store plans for the build. List common materials on the IWB and invite clean empties from home. Thumbs exit: seed store, rain protection, perch.

**What it should show**

Each group leaves with one chosen feeder idea, a labelled sketch showing seed store, rain protection and perch, a short materials list, and the three class success criteria written on the Design Brief and Plan page. A thin plan with pretty shading but no labels is unfinished—engineers must label so a stranger could build from it.

**Misconceptions & interventions**

- **Pupils jump to a fancy shape or ‘as big as possible’ instead of what the birds need.** — Point back at the three user needs on the board. Ask: ‘Which need does that idea help?’ Pretty is not the test; useful for the birds is.
- **‘The prettiest feeder wins.’** — Revoice: engineers judge against user need and the agreed checks—holds seed, keeps dry, stable perch—not decoration.
- **Groups draw a beautiful shaded picture with no labels or materials list.** — Stop the class once: ‘Engineers label. If a stranger cannot build from your page, the plan is not finished.’ Have them add at least four labels and a materials list.

## Differentiation

| Emerging                                                                                                                                                                                                                                                                                                     | Developing                                                                                                                                                                                                                                                                  | Proficient                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Offer sticky-note stems: ‘A hanging bottle with...’ or ‘A tray with a roof that...’ and sit briefly at the teacher table to name one idea.</li> <li>• Allow one shared Design Brief and Plan page per group so a confident peer leads the sketch labels.</li> </ul> | <ul style="list-style-type: none"> <li>• Prompt groups to point on the sketch to seed store, rain protection and perch before they leave the Plan step.</li> <li>• If the core idea is solid, invite one extra feature such as a drainage hole or easier refill.</li> </ul> | <ul style="list-style-type: none"> <li>• Add a second small side-view on the plan or note how the design suits their chosen bird (e.g. platform for blackbird vs thin perch for blue tit).</li> <li>• Critique fairness: what would make the ‘keeps seed dry’ check unfair between groups?</li> </ul> |

## Cross-curricular hook

Link to Geography local environment—which of these Irish garden birds visit your school grounds or nearby hedges?