

engineering

A helper for a friend: plan and make

Lesson at a glance

Open by framing a kind classroom helper for a friend who has a small desk problem. Pairs invent or pick one problem, then watch you think aloud a live problem-plan-materials sketch. They draw their helper on the Investigation Journal page and name two junk materials before trays open. They build a first junk model (boxes, tubes, card, tape), fixing as they go, then label and store it with the journal page for the next project part.

Learning objectives

- Choose a small problem that would help a friend and sketch a plan
- Make a first model from junk-modelling materials, fixing it as they go

Before the bell – prep

Pre-load one shared junk tray per table (base boxes, short tubes, card strips, lolly sticks, tape, glue). Set a project tray or shelf and name labels ready. Clear one adult cutting station. Keep junk packed until plans are clear.

**Materials**

Item	Qty	Per	Source	Low-cost substitute
Investigation Journal page	1	pupil	classroom	a blank A4 sheet with headings the teacher reads aloud: who it is for, the problem, my drawing, materials
cardboard boxes and card offcuts (clean cereal boxes, small delivery boxes; shared table tray for the pairs at that table)	3	group	brought from home	folded newspaper bricks taped into block shapes
paper tubes (kitchen or wrapping-paper tubes cut to short lengths; shared table tray for the pairs at that table)	4	group	brought from home	rolled sheets of scrap paper taped into tubes
paper and card scraps (shared table tray for the pairs at that table)	1	group	classroom	used worksheets cut into large pieces
lolly sticks (shared table tray for the pairs at that table)	10	group	school kit	strips of stiff card
masking tape (shared table tray for the pairs at that table)	1	group	classroom	sticky tape or glue sticks (weaker joins)
glue sticks (shared table tray for the pairs at that table)	2	group	classroom	masking tape only
round-tip scissors	1	pair	classroom	teacher pre-cuts openings and slots pupils request at one cutting station
name labels or sticky notes for finished models	1	pair	classroom	masking-tape name tags
project tray or shelf space to store models until the next part of this project	1	class	classroom	a large cardboard box lid as a store tray

Safety watch-point

Round-tip scissors only; adult makes sharp or thick cuts at one station. Mind eyes when tape snaps; keep walkways clear of boxes.

Teaching moves

- **Getting Started:** Sit the class with junk still packed. Frame kind helpers only with the stem ‘a friend who...’ (e.g. dropping crayons). Invite small desk problems only — not playground redesigns. Names stay optional and kind.
- **Imagine: a friend and a problem:** Think-pair-share: 30 seconds quiet, one minute partner talk, then four or five ideas on the board. If stuck, offer crayons rolling, books snapping shut, tipping bottles, lost pencils. Steer huge ideas back to one pair and junk materials today.
- **What makers do first:** Board shows only Problem, Plan, Model. Live-sketch one plan on blank paper for about a minute (e.g. book prop from folded card): problem, labelled parts, two materials, how you will know it helps. Do not build the model yet.
- **Plan on your journal page:** Hold up box, tube, card, lolly stick and tape so choices are real. Pairs share one idea; each child draws on their own journal page. Circulate: Who is it for? One problem? Wide/strong part? Two materials? Cue transition only when most plans work: Plans down. Trays open. Biggest piece first.
- **Make the first model:** State three rules: scissors stay; adult does tricky cuts at the station; if it topples, fix the base. Hand stuck pairs one base box and two tubes first. Praise fixing mid-build. Early finishers test the one job and add one improvement only.
- **Keep it safe for next time:** Protect pack over tidy: show the project tray, names on every label, model in, journal page with it. Optional one-breath hold-up only if time remains. Tell them the full share with their friend is next time in this project.

What it should show

Successful outcomes show a named friend or ‘a friend who...’, one small desk problem, a drawing with at least two parts and two materials, and a holdable first model that aims at that one job (crayon tray, book prop, bottle stand). Wobbly joins and mid-build fixes are normal. A pair with a neat but purposeless build usually skipped the person — send them back to the plan and ask who it helps.

Misconceptions & interventions

- **Pupils pick a huge problem like ‘make the whole school quieter’ that junk materials cannot fix today.** — Point back to the board examples and ask: ‘What one small desk problem can two of you build from a box and tape before the bell?’
- **They draw a pretty finished picture with no parts or materials named.** — Ask them to point to the base or strong part and name two materials from the tray they will pick first before any junk is opened.
- **They treat a flopping model as failure and want to start a brand-new invention.** — Name fixing as the work: ‘Stand back, strengthen the base with one more piece of tape, then try the one job again.’

**Differentiation**

Emerging	Developing	Proficient
• Offer three ready problems (crayons roll, book snaps shut, pencils need a home) and let them draw-and-tell while you scribe a short phrase. • Start them with one base box and two tubes so joining begins without a cutting queue.	• Prompt them to point to the wide or strong part on the plan and check the model still matches who it is for.	• After a quick job-check, add one improvement only (stronger base, clearer label) and say what changed from the plan.

Cross-curricular hook

Links to SPHE friendship and kindness — helpers solve a real classmate need without teasing.