

materials

Properties and the right material for a job

Lesson at a glance

Hook with a soggy lunch bag or cracked egg and ask what property failed. Groups take a job card (keep a sandwich dry, protect an egg, or make a strong bag handle), predict which tray materials will win, then run a fair test changing only the material. They sort by property evidence, fill the ComparisonTable in the Investigation Journal, and justify one chosen and one rejected material with test proof.

Learning objectives

- Test materials against a real job and match properties to the job's needs
- Justify material choices with evidence from simple tests
- Explain how new materials change what people can make

Before the bell – prep

Print ComparisonTable pages and job cards. Set shared trays (paper, cloth, foil, plastic, card, string). Half-fill water trays and spoons for sandwich groups only; cool hard-boiled eggs and towels for egg groups; bag equal weights and one card bag shell per handle group. Paper towels for spills.

**Materials**

Item	Qty	Per	Source	Low-cost substitute
assorted material samples (foil, paper, card, cloth scraps, plastic bag pieces, bubble wrap, kitchen towel, string)	1	group	classroom	scrap packaging and fabric from home collections
shallow water tray	1	sandwich-job group	classroom	a deep plate or lunchbox lid
spoon for water tests	1	sandwich-job group	classroom	a bottle cap used as a scoop
paper towels for sandwich stand-ins and spills	6	group	supermarket	scrap paper or old tea towels for drying only
hard-boiled egg (or raw egg if preferred)	1	egg-job group	supermarket	a small ball of plasticine or playdough marked as the fragile object
folded cloth or towel drop zone	1	egg-job group	classroom	a folded jumper or stacked newspaper
small identical weights (coins in bags, metal washers, or small books)	5	handle-job group	classroom	identical wooden blocks or unopened food tins of the same size
card bag shell or stiff card frame for handle tests	1	handle-job group	classroom	a small empty tub or yoghurt pot with two punched holes for handle ends
job cards with fair-test starter (keep a sandwich dry; protect a fragile egg; make a strong bag handle)	1	group	provided printable	jobs and starter lines written on sticky notes
blank property label cards or sticky notes	8	group	classroom	scrap paper strips
Investigation Journal page	1	pupil	provided printable	plain paper ruled into a simple table by the pupil



Safety watch-point

Teacher/SNA nearby for egg drops; hard-boiled only; wipe spills at once; wash hands after egg contact; no tasting; keep weights low and feet clear of loads.

Teaching moves

- **Properties that matter:** Project the short board text only. Lead with ‘keep lunch dry — soft, strong or waterproof?’ then model one breath-cycle aloud for sandwich, egg and handle so groups hear wonder–predict–test–observe–think before they start.
- **Our jobs and predictions:** Hand one job card per group so the three jobs spread around the room. Place job-specific kits only with matching groups. Think-pair-share: press for a property word (waterproof, cushioning, strong) before any material name.
- **Test materials for the job:** Circulate asking ‘What did you keep the same? What property are you really testing?’ Coach only that job’s controls — water amount and wait time, drop height, or same weights and fixings. If two things change at once, stop and reset.
- **Sort by the properties that matter:** Sorting comes after testing. Insist every pile has a property label tied to the job, not a vague ‘good’ heap. Ask: ‘Are you sorting by how it looks, or by what your test showed?’
- **Record our choices:** Pupils write on the paper ComparisonTable: material, property noticed, chosen or not, short reason from the test. Push ‘Point to what you saw.’ Fast finishers add a second-choice material and when it might still help.
- **Justify our choices:** Two or three groups present first; others challenge with ‘Do you agree with their property? What would make their test unfair?’ Draw out that foil can win waterproofing and fail cushioning. Close with the partner sentence before tidy.

What it should show

Sandwich groups: foil/plastic keep the towel dry; paper and kitchen towel soak. Egg groups: soft cushioning (cloth, bubble-style wrap if on tray) beats stiff card or foil. Handle groups: strong cloth/string/folded card hold load; thin paper tears. Odd fails usually mean unequal water, uneven wrap, or different fixings — re-run with only the material changed.

Misconceptions & interventions

- **Thicker always means better for the job.** — Hold up thick kitchen towel beside thin plastic: spoon the same water on both. Towel soaks; thin plastic keeps dry — property beats thickness.
- **We should pick the material that looks nicest or strongest.** — Ask them to point to the test evidence on their tray or journal. Re-voice: match to the job means properties that fit the need, not looks alone.
- **Plastic is always the best material.** — Compare jobs: plastic may win waterproofing but lose at cushioning an egg. Say the job decides; impact comes in later work.

**Differentiation**

Emerging	Developing	Proficient
• Board stems: ‘Our job needs a material that... We predict ... because...’ • Sort into two piles only: helps the job / does not help, with one property label each.	• Name two materials to compare and which property they will watch during the test. • Three-way sort: best / partly useful / not useful with a property note on each pile.	• Add a second-choice material on the ComparisonTable and say when it might still be useful. • Challenge another group: name one change that would make their test unfair.

Cross-curricular hook

Link to English oral language: groups justify a choice with one evidence sentence, not a long guess.

