materials

Comparing properties

Lesson at a glance

Open by holding up a cotton sock and a plastic lunch box and asking which bends and which would hold soup. Name property and compare, then take spoken bend predictions for card, plastic, cotton and foil. Model the desk-edge bend test with card and plastic, then groups measure drop in centimetres, glance at see-through and gentle pull, and rank the strips. Pool bend numbers on the data-recorder interactive bar chart and finish with Investigation Journal ranks plus a short natural-versus-made-by-people note.

Learning objectives

- Compare and contrast materials by testing the same property across several samples
- Rank materials and say how natural materials and materials made by people compare

Before the bell — prep

Night before, cut and label four matching strips per group (about 20 cm × 3 cm): card, clear document-wallet plastic, cotton cloth, foil folded once lengthways. Tray each group a ruler, hardback book, pencil and scrap note. Keep the full tray hidden during the sock/lunch-box hook.

Lesson 10

Materials

Item	Qty	Per	Source	Low-cost substitute
soft everyday fabric item for the hook (cotton sock or tea towel)	1	class	classroom	any soft clean cotton cloth from the classroom
stiff everyday plastic item for the hook (opaque plastic lunch box or bottle)	1	class	classroom	any stiff empty opaque plastic container from the classroom
card strip (about 20 cm by 3 cm, cut from a cereal box or scrap card)	1	group	classroom	strip cut from a corrugated cardboard box
plastic sheet strip (cut from a clear document wallet or empty water bottle)	1	group	classroom	strip from a clear food bag (thicker freezer bag works best)
cotton cloth strip (about 20 cm by 3 cm)	1	group	classroom	strip from an old clean tea towel or cotton t-shirt
aluminium foil strip (about 20 cm by 3 cm, folded once lengthways for strength)	1	group	supermarket	foil from a clean used food tray, flattened and cut
30 cm ruler	1	group	classroom	a marked paper strip with centimetres copied from the board
hardback book (to pin one end of each strip at the desk edge)	1	group	classroom	a ring-binder or several stacked reading books
label stickers or masking-tape labels (card, plastic, cotton, foil)	4	group	classroom	write names in pencil on the strips themselves
pencil and scrap note for bend numbers	1	group	classroom	one sticky note or the back of a spare label strip
Investigation Journal page	1	pupil	classroom	plain paper for bend ranks and one short comparison note

Safety watch-point

Gentle pull only, away from faces; no snapping strips toward eyes. Stop if a sample starts to tear. Collect foil scraps at pack-away.

Teaching moves

- **Getting Started:** Hold only the cotton sock (or tea towel) and opaque plastic lunch box. Ask which bends, which would hold water, and why the makers chose those materials. Accept every idea; do not name the full property list or show the tray yet.
- **Properties we can compare:** Board-copy short definitions of property and compare. Link back to the sock and lunch box. Head off 'better overall' talk — guide children to say better for a job or better at bending.
- **What do we think will happen?:** Flash the four labelled strips. Take spoken bend predictions with stems like 'I think the ... will bend most because...'. Note two or three ideas in the children's words. Add one line only: card and cotton are natural; plastic and foil are made by people.
- **Test the materials:** Live-model card then plastic: same overhang under the book, measure drop in cm, think aloud. Send groups to test all four the same way; jot bend numbers on the scrap note only. See-through and gentle pull are glance-and-go. If all readings match, lengthen the free overhang; floppy strips that hang straight down are a real result — record free length or 'hangs fully'.
- **Rank the materials:** Groups lay the four physical strips most-to-least bendy, scrap note still with the tray. Spot-check: 'Show me how you know foil is more bendy than card.' Equals may sit side by side. Only if time, add a one-minute see-through then strength order.
- **Chart our bend results:** Open the data-recorder interactive. Groups call numbers from scrap notes; you type one agreed cm figure per material (middle value if they differ; free length for 'hangs fully'). Show the bar chart and ask which bar is tallest/shortest and whether natural versus made-by-people looks patterned or mixed.
- **Record on your journal page:** Leave sentence starters on the board. Children write bend ranks that match the class chart and one short natural-versus-made-by-people note. Fuller see-through or strength notes only if a group finishes early.
- **What did we find out?:** Which bent most, how natural compared with made-by-people, and why everyday objects use different materials. Glance around the room — window, jumper, chair — then pack strips into the class tray and check for foil scraps.

What it should show

Expect cotton (and often foil) to bend most — many hang fully — and card to bend least; plastic usually sits between. See-through: clear plastic highest; card, cotton and foil low. Strength: card and plastic firmer; foil and cotton stretch or tear more easily. Natural versus made-by-people is often mixed. Oddly equal bend readings usually mean the overhang was too short.

Lesson 10

Misconceptions & interventions

- **Children say one material is 'better' overall instead of better at a job or at bending.** — Point at the sock and lunch box: 'Better for what?' Revoice as better at bending, holding shape, or keeping soup in.
- **Groups change how far the strip sticks out, so the drop is about the hold, not the material.** — Stop and re-model the book hold with the same free length. Ask: 'Did you hold each one the same way?' before they re-measure.
- **Children think a strip that hangs straight down is a failed test and invent a mid-air number.** — Affirm it: hanging fully is a real bendy result. Record the free length in cm or write 'hangs fully' on the scrap note.

Differentiation

Emerging	Developing	Proficient
• Pair at the teacher table for the bend hold; adult steadies the book while the child reads the ruler. • Offer rank-by-laying-strips first; adult scribes the four bend numbers on the scrap note.	• After bend ranks, add the quick see-through or strength order if the group is ready. • Prompt: 'Why might makers choose foil for wrapping and card for a folder?'	• Stretch journal line: name one job a material would suit, linked to a tested property. • Fair-compare critique: 'What did we keep the same so the bend test was fair?'

Cross-curricular hook

Tie to Maths measures and data — centimetre readings feed the class bar chart of bend results.