materials

Conductors and insulators of heat: which spoon stays cool?

Lesson at a glance

Open by holding up metal, wood and plastic spoons and asking which handle stays cool longest in a pot of soup. Groups predict, then plan a fair test on the Investigation Journal DataTable page: change only the material, measure time until the handle feels warm, keep cups, water and judge the same. The teacher pours hand-safe warm water for three trials per spoon. Pupils circle middle values, pool three class figures into the data-recorder bar chart, and rank conductors and insulators against everyday Irish home uses.

Learning objectives

- Design a simple test of how quickly different materials carry heat
- Rank materials as better or poorer heat conductors using repeated evidence
- Link conductors and insulators to everyday objects and energy use in Irish homes

Before the bell — prep

Night before: print DataTable and ResultsAndConclusion pages; gather one metal, wooden and plastic spoon plus three identical cups and a timer per group. Prep a large jug of hand-safe warm water and a kettle top-up for three pour rounds. Never boiling.

Lesson 14

Materials

Item	Qty	Per	Source	Low-cost substitute
metal teaspoon or dessert spoon	1	group	classroom	any clean metal cutlery handle of similar length
wooden spoon	1	group	classroom	lolly stick bundle taped into a thick handle shape, or a wooden ruler end (not ideal but works for ranking)
plastic spoon	1	group	supermarket	sturdy plastic teaspoon from a packed-lunch set
identical plastic or paper cups	3	group	classroom	same-size yoghurt pots, washed
large jug of warm hand-safe water plus kettle top-up	1	class	classroom	water from the hot tap mixed with cold until comfortably warm on your wrist; refill the jug between rounds
stopwatch or classroom timer	1	group	school kit	timer on the classroom clock or teacher's phone operated by the teacher for the group
cloths or paper towels for spills	2	group	classroom	a shared class roll of paper towels
Investigation Journal pages	1	pupil	classroom	ruled paper with a simple 3-by-3 results grid and three plan lines above it (Change / Measure / Keep the same)
optional digital thermometer (extension method only; not required)	1	group	school kit	standard path needs no thermometer: one named pupil judges every spoon with the same fingertip and times how long until the handle feels warm

Safety watch-point

Teacher pours all water — warm to the touch, never hot. Pupils do not carry jugs. Wipe spills at once; no tasting; handwash after handling warm cups.

Teaching moves

- **Heat that travels fast, heat that travels slowly:** Teach conductor and insulator from the key-concepts table only, then have pupils point to one of each in the room. Keep it short — no spoon rankings and no middle-value talk yet.
- **Our question and prediction:** Run think-pair-share on which handle warms fastest. Accept every prediction; push only for a reason. Model the blank inquiry frame aloud without stating a ranking, then write the class question on the board.
- **Plan how we will measure:** Show the three-line frame on the IWB — Change / Measure / Keep the same — and have groups copy it above the DataTable grid. Agree the 60-second stop-rule and three trials now. Do not pour water.
- **Test the spoons:** You pour every cup. Run the hard rhythm: set-up, one brisk class pour pass, simultaneous 'spoons in — go', record, reset for three rounds. Circulate for same judge, same depth and same fingertip rule. Wipe spills at once.
- **Record our results:** Board-model middle value with 8 s, 12 s, 9 s before anyone touches their own numbers. Pupils circle middle values on paper only; you enter one pooled middle value per material into the data-recorder and show the bar chart. Say aloud: taller bar means slower warm-up, better insulator.
- **What does the evidence show?:** Drive ranking from the chart, then everyday links — pot handles, oven gloves, attic insulation saving energy in Irish homes. Finish with a one-minute oral exit: conductor or insulator for each spoon, plus one everyday insulator use.

What it should show

Metal handle usually warms first (best conductor); plastic often next; wood stays cool longest (best insulator). Exact times vary with water warmth and spoon thickness — trust the ranking. Odd results often mean a changing judge, uneven depth, or cooled water; stop, refill warm, and re-run one clean round.

Misconceptions & interventions

- **Metal feels cold so it must be a 'cold material' or it 'makes cold'.** — Have them touch the metal spoon briefly: heat is leaving their skin quickly into the metal. Revoice — metal conducts heat away fast; it is not producing cold.
- **Wood and plastic 'don't get heat' or block it completely.** — Point at any long wood time or 'not warm yet' result: heat still moved, just slowly. Insulators slow heat; they do not stop it forever.
- **The tallest bar on the chart means the hottest or best conductor.** — Re-read the axis aloud: time to feel warm. Longer time means heat travelled slowly — that material is the better insulator.

Lesson 14

Differentiation

Emerging	Developing	Proficient
• Provide a DataTable already ruled with Change / Measure / Keep the same filled in; pupil is timer or recorder while a partner is judge.	• After three fair trials, ask why three readings beat one, and what a 'not warm yet' result tells them about ranking.	• If time allows after three fair trials, add a fourth tray material (e.g. silicone spatula) and critique whether thickness made the comparison less fair.

Cross-curricular hook

Tie to Maths Data — order three trial times, circle the middle value, and read the class bar chart.