

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 would stay coolest in a pot of soup. After naming heat conductors and insulators, groups predict which spoon warms fastest and plan a fair test. You pour warm water into three identical cups per group; the named judge times how long each handle takes to feel warm across three trials. Pupils find the middle value on the Investigation Journal results table, pool class figures into the data-recorder bar chart, then link the ranking to pot handles, oven gloves and attic insulation in Irish homes.

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: match one metal, one wooden and one plastic spoon of similar handle length per group, plus three identical cups and a timer each. Prepare a large jug of hand-safe warm water and a kettle top-up for three full pour rounds. Never boiling. Check the Investigation Journal has space for Change / Measure / Keep the same.

**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	provided printable	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

Water warm to the touch only—never hot or boiling. You pour all water; pupils do not carry jugs. Wipe spills at once; nothing is tasted; handwash after handling warm cups.



Teaching moves

- **Getting Started:** Hold up the three spoons side by side—do not put them in water yet. Take a quick hands-up tally for metal, wood and plastic and jot it on the board. Keep the hook light: ask only why a cook might want a handle that stays cool.
- **Heat that travels fast, heat that travels slowly:** Give the two definitions from the key-concepts table, then send pupils looking around the room for one likely conductor and one insulator. Cap it at six minutes. If someone says metal makes heat or wood never gets heat, answer in one line and move on—save the fuller check for the evidence talk.
- **Our question and prediction:** Use think-pair-share, then take three or four group predictions aloud without correcting them. Model the inquiry frame with blanks open so the class does not copy your ranking. Write the agreed class question on the board and keep the water unpoured.
- **Plan how we will measure:** Draw out Change (material only), Measure (time until handle feels warm) and Keep the same (cups, water amount and warmth, spoon depth, same judge and finger). Agree the 60-second stop rule once. Name one judge per group. Do not advertise thermometers or extra materials to the whole room.
- **Test the spoons:** You pour every cup. One brisk pour pass, then call "Spoons in — go!" so all groups start together. Top up from the warm kettle before each of the three rounds. Circulate asking: still only changing the material? Same judge each time? Wipe spills at once; step in if anyone tips a cup.
- **Record our results:** Model ordering three sample times on the board and circle the middle value before groups touch their own numbers. Pupils circle middle values on the Investigation Journal results table; you type one class middle value per material into the data-recorder. Show the bar chart and say aloud: taller bar means longer to warm, so better insulator. Jot the three-word ranking on the board before the chart closes.
- **What does the evidence show?:** Work from the board ranking. Revoice better conductor, poorer conductor, insulator, then spend most of the five minutes on everyday links: metal pans, wooden or plastic handles, oven gloves, attic insulation and radiator foil in Irish homes. Finish with a one-minute oral exit check: conductor or insulator for each spoon, then one everyday insulator use.



What it should show

Metal handle usually warms first (best conductor), plastic next, wood stays cool longest (best insulator of the three). Trust the ranking more than exact seconds—times vary with water warmth and spoon thickness. Muddled results often mean the judge changed finger or "feels warm" rule, uneven spoon depth, or cooled water; re-run that material once from a fresh pour.





Misconceptions & interventions

- **"Metal makes heat" or "metal is cold, so it can't be a conductor."** — Revoice: metal feels cold because it takes heat from your skin quickly. Point to their short metal times—heat travelled fast into the handle.
- **"Wood never gets heat" or "wood can't warm up."** — Say heat does travel through wood, just more slowly. Link to any long wood time or "not warm yet" note as evidence of a good insulator, not zero heat.
- **Pupils read the tallest bar as the hottest or best conductor.** — State it once while the chart is up: taller bar means longer to feel warm, so that material is the better insulator.

Differentiation

Emerging	Developing	Proficient
• Provide a results table already ruled with material rows and three trial columns; pair the pupil as timer or recorder rather than judge. • Stay with fingertip-and-timer and the 60-second stop rule; teacher sits with the group for the first pour round.	• After three fair trials, ask why the ranking matches or differs from their prediction, using the board middle values. • Prompt one keep-the-same check they might have missed (spoon depth or same fingertip).	• If time allows after three fair trials, quietly offer a fourth material from the tray (e.g. silicone spatula) at that table only. • Ask them to critique fairness: what would make the test unfair, and how attic insulation links to their best insulator.

Cross-curricular hook

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