

materials

Heating and cooling: what melts, what stays?

Lesson at a glance

Open by holding up an ice cube, a chocolate square and a butter lump and take hand-count predictions on which will change first. Pupils record warm and cool predictions on the Investigation Journal page, then watch a teacher-only warm-water tray demo with the three foil dishes. After the tray is moved to cool, they jot what firms or stays liquid, finish the predict–observe–compare record, and close with a display-only talk on melt, cool and reversible change.

Learning objectives

- Predict and observe which materials melt with gentle heat
- Describe how cooling can let some melted materials firm up or set again
- Use the words melt, cool and reversible change to talk about what they saw

Before the bell – prep

Night before: freeze same-size ice cubes; break plain chocolate into equal squares; cut equal butter lumps. Morning: jug of warm hand-safe water, basin or roasting tin, shallow tray, three small foil dishes. Print the Investigation Journal page. Keep the warm set-up off pupil tables until the demo.

**Materials**

Item	Qty	Per	Source	Low-cost substitute
same-size ice cubes	3	class	school kit	freeze water in identical bottle caps the night before
plain chocolate squares (equal size)	3	class	supermarket	equal chips of a cooking chocolate bar
small equal lumps of butter	3	class	supermarket	equal scrapes of a butter spread from a block
small foil dishes or clean bottle caps	3	class	supermarket	three identical jar lids lined with baking paper
basin or large roasting tin (for warm water)	1	class	classroom	a deep baking dish that can hold warm water safely
shallow tray or baking sheet (to hold the three dishes; underside in contact with the warm water)	1	class	classroom	a sturdy metal baking tray
jug of warm hand-safe water	1	class	classroom	a kettle boiled earlier then left until comfortably warm to the touch, teacher only
Investigation Journal page	1	pupil	provided printable	a ruled page headed Predict / Observe warm / Observe cool / I think

Safety watch-point

Teacher-only warm (hand-safe, not hot) water and tray handling; pupils stay in a viewing arc. No tasting. Wipe melt-water drips at once; empty and dry the basin at pack-away.

Teaching moves

- **Getting Started:** Hold up the three materials so everyone can see them; keep the warm-water kit hidden. Take three quick hand counts (ice, chocolate, butter) and leave tallies on the board—do not correct anyone yet.
- **Today's words: melt and cool:** Board only melt and cool before the demo. Hold reversible change until after the cooling watch, when pupils have seen something firm or heard why water needs a freezer.
- **Question and predict:** Agree today's question on the board. Circulate while pupils write or draw a quick prediction for each material; offer stems (I think the ice will... because...). Invite three volunteers and fold the class in with Do you agree?
- **Watch the warm tray:** Set the three foil dishes on the tray over warm hand-safe water yourself—pupils stay in a viewing arc, no pouring. Model the cycle aloud (wonder, predict, test, observe). Call pencils ready mid-watch for a 1–2 minute solid/soft/puddle jot. If change is slow, refresh warmer water and teach from soft edges; wipe drips at once.
- **Cooling: what sets again?:** Lift the tray off the warm water. Pace the wait with timed look-fors (butter edges, chocolate top, which still looks like a puddle). Say results and the word reversible change aloud only after looking—do not put typical outcomes on the board first or pupils will copy instead of observe.
- **Record: predict, observe, compare:** Keep this in-class, not homework. Coach predict / warm / cool notes kept separate from meaning; drawings count. Check for a before prediction, warm notes on at least two materials, one cool note, and one try at reversible (stem allowed).
- **Making sense of what we saw:** Give the full discussion slot. Echo pupil ideas in clearer words and tie melt, cool and reversible change to their journal evidence. Link to everyday Irish cooking (butter for soda bread, chocolate setting, freezer ice trays). Light fair-test prompt only if time: what would make the demo unfair?

What it should show

Ice almost always melts first into clear water; chocolate softens then pools; butter softens and may melt to a yellow liquid. On cooling, butter often firms at the edges and chocolate may thicken or dull on top; melted ice stays liquid in a normal classroom and will not refreeze without a freezer. Soft edges alone count as melting evidence if full puddles are slow.

Misconceptions & interventions

- **Pupils say the melted chocolate has “gone” or been destroyed.** — Point at the pool in the dish: it is still chocolate, only liquid. Trace solid → soft → puddle and ask what material is in the dish now.
- **Pupils think only ice is “allowed” to reverse, or that reversible means it always happens by itself in the room.** — Name butter or chocolate firming on the cool tray as reversible too. For the ice water, say the reverse step needs colder conditions (a freezer)—the change can still reverse even when the classroom cannot finish it.

**Differentiation**

Emerging	Developing	Proficient
• Allow symbol drawings (solid block → puddle) instead of sentences, and sentence stems at the teacher table for the reversible line. • Pair for the mid-demo jot so one partner watches while the other ticks solid/soft/puddle.	• Prompt a second cool look-for on one material and a short because... under their warm observation. • Ask which prediction matched and which did not, using only what is on their journal page.	• Add a light fair-test critique: what would make comparing the three materials unfair (dish size, amount, heat). • Link one home example of melting or setting (butter in a pan, ice lolly) to the reversible-change sentence—no tasting talk as a competition.

Cross-curricular hook

Link to Irish cooking—melting butter for soda bread, setting chocolate, and ice trays in the freezer—as everyday reversible changes.