

materials

Heating and cooling: what melts, what stays?

Lesson at a glance

Open by holding up ice, chocolate and butter and taking a show-of-hands on which will change first under gentle warmth. Pupils predict on the Investigation Journal page, then watch a teacher-only warm-tray demo (foil dishes over hand-safe warm water) and jot solid / soft / puddle as change appears. Move the tray off the heat so they can watch cooling and firming, then finish predict-observe-compare notes and land melt, cool and reversible change in a display-only talk.

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. Ready a jug of hand-safe warm water, basin/roasting tin, shallow tray and three small foil dishes. Keep the warm set-up off tables until the demo. Print the Investigation Journal page.

**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	classroom	a ruled page headed Predict / Observe warm / Observe cool / I think

Safety watch-point

Teacher-only warm water and tray — hand-safe, never hot. Pupils do not pour, touch or taste. Wipe melt-water drips at once; bin or wash foil dishes after.

Teaching moves

- **Getting Started:** Hold up one ice cube, one chocolate square and a butter lump so all can see. Keep the warm-water kit hidden. Take three quick hand tallies (ice / chocolate / butter) on the board and leave them — do not correct yet.
- **Today's words: melt and cool:** Board only melt and cool before the demo. Save reversible change until after the cooling watch. Link briefly to ice turning to water on a warm day so the words feel familiar.
- **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 shares and fold the class in with Do you agree?
- **Watch the warm tray:** You alone pour warm water into the basin, seat the tray so its underside touches the water, and place one material per dry foil dish. Pupils stand in a viewing arc with pencils ready for a 1–2 minute mid-demo jot. Voice the cycle aloud: wonder, predict, same tray/same time, observe. If slow, refresh with warmer hand-safe water and teach from soft edges — full puddles are not required.
- **Cooling: what sets again?:** Lift the tray off the warm water. Pace the wait with timed look-fors (butter edges, chocolate surface, which dish is still a puddle, has ice water gone solid?). Only after they have looked, land that butter/chocolate may firm and that water staying liquid here is planned evidence — reverse for ice needs a freezer.
- **Record: predict, observe, compare:** Keep this as the in-class paper beat. Coach predict / warm / cool columns kept separate from meaning. Look for two warm observations, one cool note, and one reversible-change attempt (stem allowed). Early finishers add a home melting example without tasting talk.
- **Making sense of what we saw:** Display-only science talk. Revoice pupil ideas onto evidence: what melted, what firmed, water needs colder conditions. Attach reversible change to butter or chocolate setting. Light link to Irish cooking (butter for soda bread, ice trays) if time.

What it should show

Ice usually melts first into clear water; chocolate softens then pools; butter softens and may melt yellow. On cooling, butter often firms at the edges and chocolate may thicken or dull on top; melt water stays liquid in a normal classroom. If little changes, water may be too cool or pieces too large — refresh hand-safe warm water and teach from soft edges rather than waiting for full puddles.



Misconceptions & interventions

- **Melted chocolate has 'gone' or been destroyed.** — Point at the shiny pool: 'Is it still chocolate — only runny?' Name that the material is still there; it changed from solid to liquid.
- **Reversible means it always goes back by itself in the classroom, so the ice water should freeze on the desk.** — Agree water stayed liquid here, then say the reverse step for ice needs a freezer or very cold place — that is still a reversible change, just not finished in this room.
- **Only ice is 'allowed' to reverse; butter and chocolate setting do not count.** — Have them look at firmer butter edges or a dulling chocolate top: solid → liquid → more solid again is reversible even if the new shape is different.

Differentiation

Emerging	Developing	Proficient
• Accept symbol drawings (block → puddle) plus a spoken idea; sit them where the tray is clearly visible and use the sentence stems on the journal page.	• Prompt a because phrase on one prediction and a clear warm vs cool note for at least two materials.	• Ask which everyday melt/cool they would class as reversible, or what would make the demo unfair (different dish sizes or amounts) using only what they watched.

Cross-curricular hook

Link to Home Economics-style Irish cooking talk — melting butter for soda bread and ice trays in the freezer.