materials

Warming and cooling materials

Lesson at a glance

Open by holding up a firm chocolate square and cold butter and asking what gentle warming might change. Pupils predict on the Investigation Journal page, then watch a teacher-only warm-water tray demo as each material softens, followed by a quiet cool-plate watch for firming. Revoice shared warm/cool words on the board before pupils finish the observe section and close with a partner talk on what changed.

Learning objectives

- Predict and observe how gentle warming and cooling can change some materials
- Describe what changed when chocolate and butter were warmed and then cooled

Before the bell — prep

Day before: chocolate squares, cold butter pieces, two small foil dishes, a shallow tray, jug, and a cool plate or ceramic tile (fridge-chilled if possible). Just before the lesson, fill the jug with hand-warm water only — never hot or boiling. Keep tasting materials sealed away from snack time.

Materials

Item	Qty	Per	Source	Low-cost substitute
chocolate squares	2	class	supermarket	a few squares broken from a plain cooking-chocolate bar
butter pieces	2	class	supermarket	a small knob of margarine or a dairy-free spread that softens with gentle warmth
small foil dishes or bottle-cap dishes	2	class	supermarket	clean metal bottle caps or small jam-jar lids
shallow tray for warm water	1	class	classroom	a clean roasting tin or deep baking tray
jug of warm water	1	class	classroom	a large mug of warm tap water poured carefully into the tray
cool plate or mat for the cooling step	1	class	classroom	a ceramic tile or upturned clean lid kept in a cool spot
Investigation Journal page	1	pupil	classroom	a plain A4 page with space to draw and write a prediction and observations

Lesson 12

Safety watch-point

Teacher handles the tray and dishes only. Use warm, never hot or boiling, water; no flame; no tasting; keep hands and faces back; wipe spills at once.

Teaching moves

- **Getting Started:** Hold up one solid chocolate square and a cold butter piece so the whole class can see. Take three or four quick predictions without correcting; cue everyday links such as a warm schoolbag or butter on a sunny windowsill.
- **Our question and predictions:** Read the class question aloud. Pupils complete only the prediction half of the Investigation Journal page using the stems 'I think the chocolate will... because...' and the same for butter. Invite two or three shares; do not confirm outcomes.
- **Warming on the tray:** Pupils stay back; only you handle the tray. Think aloud the chocolate cycle first (wonder–predict–set on warm water–observe–still chocolate, just softer), then warm the butter the same way. Every 30–60 seconds take thumbs-up or one-word judgements: soft, shiny, runny, still firm.
- **Watching them cool:** Lift both dishes onto a cool plate away from the tray. Name the signals — thicker edge, less shine, slower drip — then give about two minutes of eyes-only watching with short whole-class prompts. Do not ask pupils to write yet.
- **Record what we noticed:** Bring the cool dishes back into view and build two short oral lists on the board (when warmed / as they cool) before anyone writes. Pupils then record two short observations plus a quick prediction match using the shared words soft, shiny, runny, firmer.
- **What did we notice?:** Think–pair–share on what changed when warmed and when cooled. Revoice three class contributions with the words warming and cooling, then ask where else they have noticed this (schoolbag chocolate, sunny windowsill butter, ice lolly on a warm day).

What it should show

Both materials soften and look shinier or runnier on the warm tray; butter often melts into a pool faster than chocolate. On the cool plate, edges thicken, shine fades and drips slow — butter firms to a softer solid, chocolate thickens and may dull. If little warms, the water is too cool: refresh with slightly warmer (still hand-warm) water and wait.

Misconceptions & interventions

- **Pupils say the chocolate or butter 'disappeared' or 'went away' when it melted.** — Point to the runny pool in the foil dish and say 'it is still chocolate/butter — only how it looks and feels has changed.' Have them use soft, shiny or runny instead of gone.
- **Pupils think only fire or something very hot can change materials.** — Name the gentle source out loud: hand-warm water, not a flame. Link back to everyday warmth — a coat pocket or sunny windowsill — so they see small warmth still counts.

Differentiation

Emerging	Developing	Proficient
• Allow a drawing of the prediction and take the 'because' aloud at the teacher table. • Supply the shared board words (soft, shiny, runny, firmer) as a short oral bank before they record.	• Prompt a second look: 'Is the edge the same as the middle?' or 'Which material changed first?' • Ask them to finish the stem 'My prediction was close / not close because…' with one clear reason.	• After recording, sketch one everyday place they have noticed warming or cooling change a material. • Challenge: 'Did chocolate and butter behave the same way? Name one difference you saw.'

Cross-curricular hook

Link to everyday home science and SPHE food safety: warm schoolbags, sunny windowsills, and why we keep butter cool.