



materials

What Stays the Same When a Material Changes State?

Lesson at a glance

Hold up a sealed tub of crushed ice and take a hands-up guess: will melting make it weigh more, less, or the same? Name state, mass and particles, then wipe the tub dry and weigh it. While it melts, show the sealed bag of warm water turning to droplets on a cold surface, and drive the particle model on the IWB (solid → liquid → gas). Weigh the dry tub again, record both balance readings on the Investigation Journal page, and close by linking the unchanged mass to particles rearranging without being made or lost.

Learning objectives

- Show from balance readings that mass does not change when a material changes state
- Explain that changing state rearranges the particles without changing the material itself

Before the bell: prep

Make the ice in the staffroom freezer the day before (two ice-cube trays is plenty) or buy a bag on the way in, and seal a small handful of crushed or small cubes in a tub per group so they melt within the hour. With ice for one tub only, weigh it at the front. Gather a balance or kitchen scales, dry cloths, one sealed clear zip bag with a little warm water, and a cold tray or window. Place tubs on a radiator or sunny sill if the room is cool.



**Materials**

Item	Qty	Per	Source	Low-cost substitute
clear sealable tub with crushed ice	1	group	staffroom freezer, or a bag of ice from a shop	a sealed zip bag instead of a tub; with ice for only one, weigh it at the front with the whole class watching
kitchen scales or beam balance	1	group	school kit	one set of scales shared by the class, with each group's tub weighed at the front bench and both numbers read aloud for pupils to copy
clear zip bag with a little warm water sealed inside	1	group	classroom	one bag demonstrated at the front for the whole class
cold metal tray (or a cold window)	1	group	classroom	hold the sealed bag against a cold windowpane
dry cloth for wiping the tub before weighing	1	group	classroom	a few sheets of kitchen paper

Safety watch-point

Teacher pours any warm water. Keep bags and tubs sealed; wipe spills promptly; supervise balances so tubs are not tipped or forced open.

Teaching moves

- **Getting Started:** Hold up the sealed ice tub and take a quick show of hands for more, less or the same. Leave the guesses hanging: say out loud that the balance, not the look of the tub, will settle it.
- **Reading the Balance, Not the Look:** Spend two or three minutes on the three words only: state, mass, particles. Say each definition aloud and write just the word on the board. Head off 'a puddle looks lighter' by asking where the water could go if it cannot leave the sealed tub.
- **Weigh, Melt and Weigh Again:** State grouping first: own scales per group, or one front-bench balance with numbers read aloud. Model the full cycle out loud: wonder, predict, wipe dry, weigh, melt, wipe dry, weigh again. Wipe the outside before every reading so room-air condensation does not fake a higher mass. Use the sealed warm-water bag on a cold surface to show liquid-to-gas without escape.
- **What Are the Particles Doing?:** Drive the IWB model: solid particles wobble in a pattern, liquid particles slide and pool, gas particles race the whole container. Tie each change back to the tub: same particles, different movement, which is why the balance never changed. If the interactive fails, use a pupil cluster (shuffle / slide / spread) with the headcount fixed.
- **Record What You Found:** Quiet journal time. If the class shared one balance, ensure every pupil has copied the two front-bench numbers first. Steer them to write the actual readings, not 'heavier/lighter', and keep measured facts separate from the meaning sentence.
- **Making Sense of It:** Revoice: particles rearrange; nothing is made or lost, so mass stays the same. Ask groups what they predicted and whether the two readings matched. Finish with the open-tub thought: water would evaporate and the reading really would drop. Wipe any spills.

What it should show

Expect the sealed tub to read the same mass before and after melting; a small balance wobble is fine. A large drop usually means a leaky seal. Check the lid. A higher second reading is almost always condensation on the cold outside; wipe dry and re-weigh. The sealed warm-water bag should show droplets reforming on the cold side with no escape of material.

Misconceptions & interventions

- **'The puddle weighs less than the ice because it looks flatter and smaller.'** Point at the sealed tub and ask where the water could go. Then show the two matching balance readings side by side so the look and the mass are separated.
- **'When ice melts, some of the material disappears or turns into a different stuff.'** Replay the particle model: same particles, only their movement changes. Link it to the unchanged reading: nothing was made and nothing was lost.
- **Pupils write 'heavier' or 'lighter' instead of the actual balance numbers.** Stop the class and re-voice: argue from the reading. Have them copy the two numbers exactly before writing the conclusion sentence.

**Differentiation**

Emerging	Developing	Proficient
• Pair at the teacher table for the two weighings; supply the two readings already written so the pupil only completes the meaning sentence. • Accept a short cloze: 'The mass stayed ____, so it is still the same material.'	• Prompt: 'Why must we wipe the tub dry before each weighing?' • Ask them to state one thing that stayed the same and one thing that changed.	• Challenge: 'What would the second reading do if the lid were loose, and why?' • Ask them to explain the sealed warm-water bag using the particle idea in one sentence.

Cross-curricular hook

Tie to Maths measures: pupils read the scale in grams, compare the two values, and argue from the numbers.