

materials

What Stays the Same When a Material Changes State?

Lesson at a glance

Hold up a sealed tub of crushed ice and ask whether the melted puddle will read more, less or the same on the balance. Groups (or the front bench) wipe the tub dry, weigh it, then set it in a warm spot to melt while the lesson runs. An IWB particle interactive shows solid, liquid and gas. Pupils re-weigh, record both readings on their Investigation Journal page, and close with a talk on why the mass held steady.

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 sealed tubs with crushed ice or shavings, not one block, so they visibly melt inside 40 minutes; seal lids tight. Have a balance or kitchen scales — either does the job here — along with a cloth to dry tubs before each weighing, and one clear zip bag with a little warm water sealed inside for the gas demo. Set melting tubs on a warm radiator shelf or sunny sill.

Materials

Item	Qty	Per	Source	Low-cost substitute
clear sealable tub with crushed ice	1	group	brought from home	a clear zip bag of crushed ice, sealed tight
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**

Keep tubs sealed and wipe up melt-water spills promptly to avoid slips. You pour any warm water for the sealed bag yourself.

**Teaching moves**

- **Getting Started:** Hold up the sealed tub and take a fast show of hands for more/less/same. Leave the guesses hanging — say you'll settle it by reading the balance, not by looking. Take the first weighing right away so there's time to melt.
- **Weigh, Melt and Weigh Again:** State up front whether each group weighs its own tub or you weigh each at the front bench aloud. Wipe every tub dry with the cloth just before weighing — droplets on the cold outside are room moisture and would add mass. Model the full I-wonder/predict/test cycle once, reading the number out, before groups record.
- **What Are the Particles Doing?:** Drive the particle interactive on the IWB: solid particles wobble in a pattern, liquid slide and pool, gas race everywhere. Tie it straight back — the same particles are always there, which is why the balance never moved. If it won't render, have a cluster of pupils shuffle, then slide, then spread; the number never changes.
- **Record What You Found:** Quiet time to write both readings and one sentence on what actually changed. If the class shared one balance, check everyone has copied the two front-bench numbers first. Steer them to keep the two readings (what we measured) apart from the meaning (same material, new state).

**What it should show**

The sealed tub reads the same before and after melting — a small balance wobble is fine. A big drop means the seal is leaking, so check the lid. A noticeably higher second reading is usually room-air moisture condensed on the cold outside of the tub: wipe it dry both times and re-weigh. The key finding is that no water left the sealed tub, so the amount of material — the mass — did not change.

**Misconceptions & interventions**

- **Pupils say the puddle 'weighs less than the ice' because it looks flatter and smaller.** — Point at the sealed lid and ask where the water could possibly have gone. Show the second balance reading matching the first — the look changed, the mass didn't, because nothing left the tub.
- **Pupils think melting destroys the ice or makes new water.** — Use the particle interactive: the same particles stay the whole time, they only move differently. Link it to the unchanged reading — nothing was made or lost.





Differentiation

Emerging	Developing	Proficient
• Pair with the teacher bench and give a journal page with the two reading boxes pre-labelled 'before' and 'after' to fill in. • Let them physically wipe and place the tub on the scales rather than read the number alone.	• Ask them to predict and check what happens to the reading if you wipe the tub dry versus leave the droplets on. • Have them add their group's own chosen second prediction and report how it turned out.	• Ask why an open tub left overnight really would read less, using the sealed-bag gas idea. • Have them critique what would break the fair before/after comparison — a wet outer tub, a different balance.

Cross-curricular hook

Links to the Maths Number strand — pupils compare the two balance readings and judge whether the difference is a real change or just a small wobble.