

## Lesson 13 • materials

# Solids, liquids and gases

## Lesson at a glance

Open with a wooden block, a clear cup of water and a sealed bag of air and ask which keeps its shape, pours, or fills every corner. Groups rotate three stations checking shape, pour, fill and gentle press, banking a quick note or sketch on the Investigation Journal page at each stop. They finish a solid–liquid–gas comparison table, then you drive the states-of-matter interactive on the IWB so particles in ice, water and gas explain the behaviours they just saw.

## Learning objectives

- Describe how solids, liquids and gases behave differently when poured, filled or shaped
- Link each state to how its particles move and arrange

## Before the bell – prep

Set three fixed stations before the bell, not a kit per table: solid (blocks/pebbles, dry sand tray, spoons, empty cup), liquid (jug of water, two different-shaped clear cups, spill tray, cloths), gas (2–3 sealed clear air bags). Have the three hook objects ready to show only. Wipe cloths and a floor-spill plan to hand.



**Materials**

| Item                                                                            | Qty | Per   | Source      | Low-cost substitute                                          |
|---------------------------------------------------------------------------------|-----|-------|-------------|--------------------------------------------------------------|
| clear plastic cups or small jars                                                | 6   | class | classroom   | clean yoghurt pots or jam jars                               |
| jug of water                                                                    | 1   | class | classroom   | large bottle of water                                        |
| dry sand in a shallow tray                                                      | 1   | class | school kit  | dry rice or uncooked lentils                                 |
| wooden block or smooth pebble                                                   | 2   | class | classroom   | eraser or solid building brick                               |
| sealed clear zip bag of air                                                     | 3   | class | supermarket | sealed sandwich bag inflated gently                          |
| optional extra sealed clear bag of air (fuller or less full for squash compare) | 1   | class | supermarket | the three station bags alone are enough if stock is short    |
| plastic spoons                                                                  | 2   | class | classroom   | teaspoons from the staffroom                                 |
| trays to catch spills                                                           | 3   | class | classroom   | plastic lids or baking trays                                 |
| cloths or paper towels for spills                                               | 1   | class | classroom   | old tea towels                                               |
| Investigation Journal page                                                      | 1   | pupil | classroom   | ruled paper with three labelled sections: solid, liquid, gas |

**Safety watch-point**

Water on trays; wipe floor spills at once; no tasting. Bags stay sealed at stations — only the teacher may open one for a whole-class moment. Wash hands if wet or sandy.

## Teaching moves

- **Getting Started:** Show only the block, cup of water and sealed air bag. Take two or three quick answers on keep-shape / pour / fill-every-corner. Do not name particles yet — hold curiosity on how three everyday things can behave so differently.
- **Today's words and our question:** Read the board lines for solid, liquid and gas behaviour only. Ask each pair for one predicted difference about pour, shape or fill using the three hook objects. Accept all predictions; do not invite particle guesses yet.
- **Explore the three states:** Live-model the liquid station in about five minutes with the wonder-predict-test-observe-think script, then send groups on a timed circuit (about 4–5 minutes per station). Call rotations yourself. Bags stay sealed and press-and-look only; if you open one bag, do it once at the front so the class sees it go flat. Watch for sand talk — grains are solid, the pile changes shape.
- **Record how each state behaves:** Turn the light station notes into the Investigation Journal comparison: shape, pour and fill for each state, plus one clear observation. Push evidence language — 'I noticed... when I...' — and keep this to about ten minutes so the particle step is protected.
- **What are the particles doing?:** Drive the states-of-matter interactive in guided mode on the IWB with water as the substance. Start on ice, warm through melt to gas, then cool back. Narrate each step and link wobble / slide / race-apart to the block, poured water and air bag. Pupils watch; no devices.
- **Why each state behaves that way:** Whole-class display-only talk. Bank at least one evidence-to-particle line per state before any extra prompts: solid keeps shape because particles stay and wobble; liquid pours because particles slide; gas fills space because particles race apart. Revoice everyday wording into clear science language.
- **What we learnt and tidy:** Two quick oral checks — one behaviour fact, one particle link — then tidy: empty water, dry trays, reseal bags, return sand, wipe drips. Hands washed if wet or sandy.

## What it should show

Solid block keeps shape and does not pour; water pours, takes the cup's shape and keeps a level surface; sealed air fills the bag and squashes a little then springs back. Sand pours as a pile but each grain is solid — expect some groups to call sand a liquid; affirm the pour, then name solid grains that slide. If a bag seems 'empty', it was likely opened or under-filled — reseal a full bag and re-press.

**Misconceptions & interventions**

- **Sand must be a liquid because it pours.** — At the solid station, hold a single grain idea: each grain keeps its own shape; the pile changes because grains slide over each other, unlike water which has no separate solid pieces.
- **Gas is nothing / air weighs nothing and isn't real stuff.** — Press the sealed bag together: it fills the space, squishes a little and springs back. If you open one bag at the front, the bag goes flat as the air spreads into the room — still real, just invisible.
- **When water becomes a gas the particles disappear or turn into new stuff, or the particle dots are alive.** — On the interactive, cool back from gas to liquid to solid and stress same water particles, different movement only. Say clearly: the dots are a model; real particles are far too small to see and are not alive.

**Differentiation**

| Emerging                                                                                                                                                                                                                                                                                                                                                               | Developing                                                                                                                                                                                                                                                            | Proficient                                                                                                                                                                                                                                                                                                             |
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| <ul style="list-style-type: none"> <li>• Give the four board prompts (shape / pour or flow / fill / gentle press) as the only checks at each station and accept a tiny sketch instead of a full sentence on the Journal page.</li> <li>• Pair at the teacher table for the liquid pour so they see level surface and container shape before rotating alone.</li> </ul> | <ul style="list-style-type: none"> <li>• After the main table, add one sand-versus-water observation on the same Journal page using evidence language.</li> <li>• At the gas station, compare a fuller bag with a less-full bag on how much each squashes.</li> </ul> | <ul style="list-style-type: none"> <li>• Ask why sand and water can both be poured but only one is a liquid — push them to separate grain slide from particle slide.</li> <li>• In the science-talk, have them explain cooling as well as heating: same particles, movement changes, substance stays water.</li> </ul> |

**Cross-curricular hook**

Link to Maths measures: same volume of water in two different-shaped cups still fills to a level surface.