

materials

Solids, liquids and gases

Lesson at a glance

Open with a wooden block, a cup of water and a sealed bag of air and ask which keeps shape, pours, or fills its container. Groups rotate four shared stations (blocks, water, sand, air bag) asking the same three questions at each. Capture a class table, then run the states-of-matter interactive on water particles before groups sort six everyday items into solid, liquid or gas. Pupils record the three states, behaviours and one example each on the Investigation Journal page.

Learning objectives

- Describe how solids, liquids and gases behave differently
- Sort everyday examples into solid, liquid or gas
- Explain in simple terms that particles are packed and move differently in each state

Before the bell – prep

Night before: dry sand trays, sealed clear air bags, wooden blocks, jugs, clear cups, small stones, sealed oil pots, ice picture cards, Solid/Liquid/Gas mats. For 24–28 pupils run two identical sets of the four stations; cluster both water and both sand stations in one spill zone. Fetch real ice only at the sort step if using it.



**Materials**

Item	Qty	Per	Source	Low-cost substitute
wooden or building blocks (station trays)	8	class	classroom	smooth stones or corks of similar size
clear plastic cups (station water set-ups)	2	class	classroom	any clear food containers from recycling
jug of water (station)	1	class	classroom	a large bottle of tap water
dry sand in a shallow tray	1	class	school kit	dry rice or uncooked lentils in a tray
small cup for pouring sand	1	class	classroom	a clean yoghurt pot
clear sealable bags puffed with air and sealed (station)	3	class	supermarket	a sealed empty clear drinks bottle with the lid on (air inside)
wooden or building block (sort kit)	1	group	classroom	a smooth stone or cork
clear plastic cup of water (sort kit)	1	group	classroom	any small clear food container from recycling
small stone (sort kit)	1	group	outdoors/ nature	a large button, cork or wooden bead
small sealed bottle or pot of cooking oil (sort kit)	1	group	supermarket	picture sticky note labelled Cooking oil (liquid)
ice cube card or late-fetched ice cube (sort kit)	1	group	classroom	sticky note labelled Ice cube (solid water)
clear sealable bag puffed with air and sealed (sort kit)	1	group	supermarket	a sealed empty clear drinks bottle with the lid on (air inside)
sorting trays or mats labelled Solid, Liquid, Gas	1	group	classroom	three sheets of paper with the state names written large
party balloon picture card (gas inside)	1	class	provided printable	one sticky note labelled Balloon (gas inside)
Investigation Journal page	1	pupil	classroom	a ruled A4 page with three rows labelled solid, liquid and gas





Safety watch-point

Stand in the water-and-sand pouring zone the whole station block. Calm pours only; wipe spills straight away; reseal air bags without popping.



Teaching moves



- **Getting Started:** Hold up the block, water cup and sealed air bag in turn. Take two or three quick answers on shape, pour and fill — do not name solid, liquid or gas yet. Note any 'air is nothing' or 'sand is a liquid' comments without correcting.
- **Three ways materials behave:** Project only the short key point naming solid, liquid and gas. Model one full wonder–predict–observe cycle aloud on the block only, then send groups to run the same three questions at every station.
- **Station exploration:** Stand in the pouring zone for the full fifteen minutes. Signal a brisk move every three minutes. At sand ask whether each grain keeps its shape; at the air bag have them gently squeeze and notice it still feels full.
- **Hold, pour or fill?:** Build a four-row class table on the board. Leave the sand row open for a phrase like 'pile pours / each grain solid' — do not force a bare yes/no. If the class votes sand a liquid, pinch a few grains and ask whether one grain keeps its shape.
- **What the particles are doing:** Open the states-of-matter interactive in guided mode on water. Walk solid (packed, wobbling) → liquid (sliding, low) → gas (racing, fills space) yourself before anyone touches the slider. Key line: still water in all three; heating changes how particles move, not what they are.
- **Sort everyday things by state:** Give each group its own six-item sort kit and Solid/Liquid/Gas mat — do not strip station stock. Circulate for justifications on oil, ice and the air bag. Finish with a 30-second show of hands on the party-balloon card: rubber skin solid, contents gas.
- **Record on your journal page:** Model one solid row on the IWB outline, then pupils complete three rows on paper: holds shape / pours / fills whole container / one everyday example. Block sand as a liquid example; steer gas examples back to the air bag or balloon contents.
- **Make sense together:** Keep the three particle summary lines visible. Ask one pupil who changed their mind about sand or air to name the evidence that shifted them — celebrate the change of mind as good science.

What it should show

Block: holds shape yes, pours no, does not fill the container. Water: holds shape no, pours yes, takes the container's shape. Sand: pile pours but each grain is a solid — not a fourth state. Air bag: does not hold its own shape, fills the whole bag. Sort sticky points: oil is liquid; ice is solid water; balloon contents are gas. A white kettle cloud is tiny liquid droplets, not gas.



Misconceptions & interventions

- **Sand pours, so it must be a liquid.** — Pinch a few grains and ask whether one grain keeps its own shape. Write 'pile pours / each grain solid' on the board so the longer answer is visible.
- **Air is nothing — the bag is empty.** — Have them gently squeeze the sealed bag and notice it still feels full. Name air as a real material that fills its whole container.
- **The white cloud above a kettle is a gas.** — Redirect: true water vapour is invisible; the white cloud is tiny liquid droplets. Keep gas examples to the air bag, balloon contents and room air.

Differentiation

Emerging	Developing	Proficient
• Answer the three station questions aloud only while you stand at their pouring turn — no written capture until the modelled journal row. • Offer sentence starters on the journal: 'A solid... A liquid... A gas...' and 'One example is...'.	• At water, pour into a differently shaped clear cup and say what stayed the same about the liquid. • Justify one sort placement aloud to you before the class balloon show of hands.	• Explain why sand is many tiny solids rather than a liquid, using the three tests. • Link ice, liquid water and invisible vapour as the same material with particles moving differently.

Cross-curricular hook

Link to Maths sorting and classifying — three labelled groups with a rule justified by the hold / pour / fill tests.