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 its shape, pours, or fills its container. Name solid, liquid and gas, then send groups around four shared stations (blocks, water, sand, air bag) asking the same three questions. Build a class behaviour table, run the states-of-matter interactive on water particles, then sort six everyday items before pupils fill three Investigation Journal rows with behaviour notes and one example each.

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: set shared rotating stations — blocks tray, water jug with two clear cups, dry sand tray with pour cup, sealed clear air bags. For 24–28 pupils run two identical sets of four. Pack separate sort kits per group (block, water cup, stone, oil pot, ice card, air bag) plus Solid/Liquid/Gas mats. Ice cube only if fetched at sort time.

Lesson 10

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

Stay at water and sand stations for spill control; wipe floor spots straight away. Gentle squeezes only on air bags — no popping. Adult before any home examples are opened.

Teaching moves

- **Getting Started:** Hold up the block, water cup and sealed air bag one at a time. Take two or three hands-up answers on shape, pour and fill — do not name the three states yet. Note any 'air is nothing' or 'sand is a liquid' comments without correcting.
- **Three ways materials behave:** Project the short board key point only. Model one full think-aloud on the block: wonder, predict, observe, conclude it is a solid. Tell pupils they will run the same three questions at every station.
- **Station exploration:** Rotate groups of four to six for about three minutes per station; stay near water and sand for spills. At sand ask whether each grain keeps its shape; at the air bag have them gently squeeze and notice it still feels full. Talk only — no writing yet.
- **Hold, pour or fill?:** Build a four-row class table on the board (block, water, sand, air bag). For sand write a phrase such as 'pile pours / each grain solid', not a bare yes/no. Cold-call agreement and changes of mind across groups.
- **What the particles are doing:** Open the states-of-matter interactive in guided mode on water. Step solid (wobble in place) → liquid (slide and pool low) → gas (race and fill). Key line: it is still water; heating changes how particles move, not what they are. Sketch three boxes of dots if the interactive is down.
- **Sort everyday things by state:** Give each group its own six-item sort kit and Solid/Liquid/Gas mat. 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 paper rows: holds shape? / pours? / fills whole container? / one everyday example. Block sand as a liquid example; point stuck pupils to the air bag or balloon contents for gas.
- **Make sense together:** Talk with the three behaviour lines and particle sketches still visible. Ask how you tell the states from what a material does, then what particles do differently. Invite one pupil who changed their mind about sand or air to name the evidence.

What it should show

Block: holds shape, no pour, no whole-container fill. Water and oil: no own shape, pour, take container shape. Air bag: fills whole bag. Sand is many tiny solids that pour as a pile — not a liquid row. Ice sorts as solid; balloon contents as gas. A group calling sand a liquid usually judged the pile, not one grain — pinch a grain and re-ask.

Lesson 10

Misconceptions & interventions

- **Sand pours, so it must be a liquid.** — Pinch a few grains and ask whether each grain keeps its own shape. Write 'pile pours / each grain solid' on the class table 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. Link to the interactive gas view: particles race and fill the whole space.
- **The white cloud from a kettle is a gas.** — Name that cloud as tiny liquid water droplets. Keep gas examples to the air bag, balloon contents and invisible air in the room; true water vapour cannot be seen.

Differentiation

Emerging	Developing	Proficient
• Work the three station questions aloud only with an adult or peer; use sentence starters A solid… / A liquid… / A gas… on the journal rows.	• Pour water into a differently shaped cup and say what stayed the same; justify one sticky sort item (oil or ice) aloud to the group.	• Explain why sand is not a fourth state on the journal; critique a wrong gas example (kettle cloud) using the three behaviour tests.

Cross-curricular hook

Link to Maths sorting and classifying — three labelled groups with a clear rule for each placement.