

The Particle Model of Matter

Discover the tiny moving particles that make up everything around you, from your desk to the air you breathe.

Learning intentions

We are learning to:

- explain that all matter is made of tiny moving particles with spaces between them
- describe how particles are arranged and how they move in solids, liquids, and gases
- explain how attractive forces between particles differ across the three states of matter

Success criteria

I can:

- state the three main ideas of the particle model of matter
- draw particles to represent a solid, a liquid, and a gas
- explain why particles in a solid stay close together while particles in a gas spread far apart
- describe attractive forces as strongest in solids and weakest in gases

Curriculum alignment

- Students investigate the particle model of matter in relation to the physical properties of solids, liquids, and gases ([Outcome](#), [Outcome](#)).
- All matter is made of small, always-moving particles with spaces between them; particle arrangement and movement differ in solids, liquids, and gases; attractive forces are strongest in solids and weakest in gases ([Knowledge](#), [Knowledge](#)).
- The particle model of matter explains the behaviour of particles in matter ([Understanding](#), [Understanding](#)).
- The movement and arrangement of particles affect the physical properties of matter ([Understanding](#), [Understanding](#)).
- Represent solids, liquids, and gases using the particle model, and relate particle movement and arrangement to state and to attractive forces ([Skills](#), [Skills](#)).

Materials

- Whiteboard or chart paper and markers
- Three labelled hoops or taped circles on the floor, marked "Solid," "Liquid," and "Gas"
- One small ball, cube, or bean bag per student (to represent a particle)
- Particle model diagram handout (three empty boxes labelled Solid, Liquid, Gas) for each student
- Coloured pencils or markers
- Optional: device to play [Resource](#)

Lesson sequence

1. Hook (5 minutes)

Say to the class: "Everything in this room, your chair, the water in your bottle, the air you're breathing right now, is made of the same basic thing: tiny particles too small to see. Today we're going to become

those particles."

Ask: "If I told you that particles in a rock and particles in the air are doing something completely different, what do you think that difference might be?" Take two or three quick guesses without confirming or correcting yet.

2. Direct instruction (8 minutes)

Explain the three big ideas of the particle model on the board, writing each as you say it:

- All matter is made up of small particles.
- Particles of matter are always moving.
- Particles of matter have spaces between them.

([Knowledge](#), [PDF p.1](#))

Then draw three simple box diagrams on the board, dots close together and neat for a solid, dots a bit spread out for a liquid, and dots far apart and scattered for a gas. Say: "In a solid, particles are packed close together and they vibrate in place, like they're jiggling but staying put. In a liquid, particles have more space and can slide past each other. In a gas, particles have huge amounts of space and zoom around in every direction." ([Knowledge](#))

Ask: "Which state do you think has the strongest pull between its particles, holding them together?"

Confirm: "Solids have the strongest attractive forces. Gases have the weakest, which is why gas particles can spread out and fill a whole room." ([Knowledge](#))

If time allows, play the first two minutes of [Resource](#) to show particle movement in action.

3. Guided practice (10 minutes)

Move to the three floor hoops labelled Solid, Liquid, and Gas. Explain: "You are going to be particles. I'll call out a state of matter, and you need to move into that hoop and act like a particle in that state."

Call out "Solid!" Students crowd into the hoop, standing shoulder to shoulder, and jiggle in place without moving their feet.

Call out "Liquid!" Students spread into a looser cluster, allowed to slide slowly past each other but staying inside the hoop's general area.

Call out "Gas!" Students spread out across the whole space, moving quickly and freely, changing direction often.

After each round, pause and ask: "How close are you to your neighbours right now? How much are you moving? Do you feel a strong pull to stay near the people beside you, or not much of a pull at all?"

Run through all three states twice, then bring students back together.

4. Independent practice (12 minutes)

Hand out the particle model diagram sheet with three empty boxes labelled Solid, Liquid, and Gas.

Instruct: "In each box, draw dots to show how particles are arranged. Remember: solid particles are packed close and neat, liquid particles have some space and can slide, gas particles are spread far apart. Under each box, write one sentence describing how the particles move."

Circulate and prompt students who are stuck with questions like: "Would the dots in your solid box be touching or spaced out?" and "In your gas box, are the particles moving fast or staying still?"

When drawings are done, ask students to add one more label to each box: write "strong pull," "medium pull," or "weak pull" to show the attractive force between particles in that state. ([Skills](#))

5. Consolidation (5 minutes)

Bring the class together. Ask two or three students to hold up their diagrams and explain one box to the class in their own words.

Ask the whole class: "Why can you pour a liquid but you can't pour a solid?" Listen for answers connecting to particle spacing and movement, such as "because liquid particles can slide past each other but solid particles are stuck close together."

Close with: "Tomorrow we'll use what we know about particles to explain properties like mass, volume, and density."

Differentiation

Extension: Ask students to predict what happens to the particle arrangement when a solid melts into a liquid, or a liquid boils into a gas, and to sketch a fourth box showing the "in-between" moment. Have them explain, in writing, why gas is easiest to compress and solid is hardest, connecting this to particle spacing.

Support: Provide a partially completed diagram sheet with the solid box already drawn as a model. Pair students with a peer buddy for the floor movement activity so they have a partner to mirror. Allow verbal description instead of written sentences for the independent practice, recording student explanations directly on their sheet.

Assessment

Formative check: collect or circulate to review the completed particle diagrams during independent practice.

Look for:

- correct relative spacing between dots across the three states (solid closest, gas farthest apart)
- a sentence or label that connects particle movement to the state (for example, "gas particles move fast in all directions")
- correct labelling of attractive force strength (strong for solid, weak for gas)

Students who reverse the spacing (for example, drawing gas particles close together) or who cannot describe movement in their own words need a follow-up small-group review before the next lesson on mass, volume, and density.