

Particles in Motion: Understanding the Particle Model of Matter

30 minutes, 3 stages

Understanding the particle model of matter helps you explain why solids, liquids, and gases behave so differently. All matter is made of tiny particles that are always moving and have spaces between them ([Knowledge](#)). The way these particles are arranged and how fast they move determines whether something is solid, liquid, or gas ([Skills](#), [Understanding](#)).

Stage 1: Draw and Label Particle Arrangements (10 min)

You will draw three diagrams showing how particles are arranged in each state of matter.

On a sheet of paper, draw three large circles side by side. Label them "Solid," "Liquid," and "Gas."

Inside each circle, draw small dots to represent particles. Use these rules:

For the solid: Draw the dots very close together in a neat, tight pattern. The particles are close together and vibrate in place ([Knowledge](#)).

For the liquid: Draw the dots closer together than in the gas, but with some space between them. The particles can slide past each other ([Knowledge](#)).

For the gas: Draw the dots spread far apart with lots of empty space. The particles are separated by large spaces and move in all directions ([Knowledge](#)).

Below each diagram, write one sentence describing how the particles move. For example: "In a solid, particles vibrate but stay in the same place."

Stage 2: Match States to Properties (10 min)

Read each statement below. Write whether it describes a solid, liquid, or gas. Then explain your answer using what you know about particles.

1. This substance keeps its shape and does not spread out. Its particles are held tightly together by attractive forces.
2. This substance flows and takes the shape of its container. Its particles have spaces between them and can slide past each other.
3. This substance spreads to fill any space. Its particles are far apart and move constantly in all directions.
4. You can squeeze this substance into a smaller space. Its particles have large spaces between them that can be compressed.
5. This substance is hard and cannot be compressed. Its particles vibrate in place but do not move around.

Stage 3: Apply the Particle Model (10 min)

Answer the following questions in your own words.

1. Explain why a gas spreads out to fill a room while a solid keeps its shape. Use the particle model in your answer.
2. Why do you think attractive forces between particles are strongest in solids and weakest in gases? (Hint: Think about how close together the particles are.)

3. A sponge is a solid, but you can squeeze it and it gets smaller. Does this mean the particle model is wrong? Explain.

Self-check

Ask yourself these questions to see if you understand:

1. Can you draw and label how particles are arranged differently in solids, liquids, and gases?
2. Can you explain why particles in a gas move more freely than particles in a liquid?
3. Can you describe how attractive forces between particles change from solids to gases?