

The Particle Model of Matter

30 minutes, 3 stages

Every solid, liquid, and gas around you, your desk, your water bottle, the air in your room, is made of tiny particles that are always moving. Understanding how those particles are arranged and how fast they move helps explain why ice is hard, why juice pours, and why air can be squeezed into a bike tire ([Guiding question](#), [Outcome](#)). Tonight you will practice describing and drawing that model.

Stage 1: Warm-up (8 min)

Answer these in full sentences in your notebook.

- Write the three big ideas of the particle model of matter ([Knowledge](#), [PDF p.1](#)):
 - All matter is made up of _____.
 - Particles of matter are always _____.
 - Particles of matter have _____ between them.
- Fill in the blanks:
 - In solids, particles are close together and _____ in place.
 - In liquids, particles have spaces between them and can _____ past each other.
 - In gases, particles are spread far apart and move _____ in all directions.
([Knowledge](#))
- In one sentence, explain where the attractive forces between particles are strongest and where they are weakest ([Knowledge](#)).

Stage 2: Draw and label (14 min)

Get three empty boxes ready on a page, side by side. Label them Solid, Liquid, and Gas.

- In each box, draw dots to represent particles. Show the correct spacing and arrangement for that state: particles packed tightly in the solid box, particles with small gaps in the liquid box, and particles spread far apart in the gas box ([Skills](#), [Skills](#)).
- Under each box, write one sentence describing how the particles move in that state (vibrating in place, sliding past each other, or moving freely in all directions) ([Knowledge](#)).
- Pick one everyday object for each state and write its name under the matching box. For example: an ice cube for solid, orange juice for liquid, the air you breathe for gas.
- Answer this question in a sentence or two: If you compare a solid and a gas, which one has stronger attractive forces holding its particles together, and how do you know from the way the particles are arranged? ([Skills](#), [Understanding](#))

Stage 3: Apply it (8 min)

Use what you know about particle arrangement to answer these.

- A balloon full of air can be squeezed and it gets a little smaller, but a balloon full of water barely changes shape when you squeeze it. Using the particle model, explain why gases are easier to compress than liquids. Think about how much space is between the particles in each state ([Knowledge](#), [Skills](#)).
- Imagine you have a block of solid butter on the counter. Over time it softens and eventually melts into a liquid. Describe what happens to the particles, their spacing, and their movement as the butter changes from solid to liquid ([Understanding](#), [Understanding](#)).

3. Choose one word to complete this sentence and explain your choice: A gas is _____ (denser / less dense) than a liquid, because its particles are spread much farther apart ([Knowledge](#)).

Self-check

1. Can you name all three ideas of the particle model of matter without looking at your notes?
2. Can you explain, in your own words, how particle arrangement is different in a solid, a liquid, and a gas?
3. Can you explain why a gas is easier to squeeze (compress) than a liquid, using the word "particles" and "spaces" in your answer?