

The Mystery of the Three Containers

This brain teaser uses the particle model of matter, which explains how tiny particles behave in solids, liquids, and gases ([Guiding question](#), [Understanding](#)). You will use clues about particle spacing, movement, and attractive forces to figure out which container holds which state of matter ([Knowledge](#), [Skills](#)).



Figure 1: Three clear containers of the same size sitting on a wooden classroom table, each showing a different swirling pattern of tiny dots inside

The puzzle

A scientist labels three sealed containers A, B, and C. Each one holds matter in a different state: solid, liquid, or gas. She writes down three clues about the particles inside, but she mixes up the container letters. Use her clues to match each container to its correct state.

Clue 1: In container A, the particles are packed close together and only vibrate in place. They do not slide or spread out.

Clue 2: In container B, the particles have the weakest attractive forces of the three containers, and they move constantly in all directions, spreading out to fill the whole space.

Clue 3: In container C, the particles are close enough to slide past each other, but they are not locked into a fixed pattern the way container A's particles are.

Which container is the solid? Which is the liquid? Which is the gas?

Hints

Hint 1: Think about which state has particles that barely move from their spot. That matches only one of the three clues.

Hint 2: Attractive forces are strongest in solids and weakest in gases ([Knowledge](#)). Use that fact to sort container B right away.

Hint 3: Once you know the solid and the gas, the container that is left over, the one where particles slide past each other, must be the third state.

Answer key

Container A is the solid. Its particles are close together and vibrate in place without sliding, which matches the description of a solid ([Knowledge](#), [Knowledge](#)).

Container B is the gas. Its particles have the weakest attractive forces and move constantly in all directions, spreading to fill the whole container, which matches the description of a gas ([Knowledge](#)).

Container C is the liquid. Its particles are close enough to slide past each other but are not fixed in place like a solid's, which matches the description of a liquid ([Knowledge](#), [Skills](#)).

The reasoning uses the particle model idea that attractive forces are strongest in solids and weakest in gases, with liquids falling in between ([Knowledge](#), [Understanding](#)). Sorting by attractive force strength first, then by whether particles vibrate in place or slide past each other, solves the puzzle in three steps.