Particles at the Picnic

Use observations to explain how particles behave in each state of matter.

PHS.1.1 "Use contextual evidence to describe particle theory of matter. Examine the particle properties of solids, liquids, and gases."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline one observation about each state of matter, then circle a particle explanation that accounts for it. Label each matched pair S, L, or G.

Ice, Water, and Trapped Air

1. At the start of a picnic, Maya tips an ice cube from a tray onto a plate. It keeps its shape even after she moves it to a different spot. When she presses it lightly, it resists changing shape. Ice is a solid made of particles that are close together. Attractions hold the particles in a stable arrangement, although they still vibrate. The cube's steady shape is evidence of that arrangement, not proof that its particles have stopped moving. Maya leaves the plate in the sun and checks it again later.

2. The ice has melted into water, which spreads across the plate. Maya pours the water into a narrow cup, where it takes the cup's shape instead. The amount of water stays the same, even though its shape changes. In a liquid, particles remain close together, but they are not locked into fixed positions. They move past one another, allowing the liquid to flow. Pouring does not make the particles shrink or disappear. If Maya could transfer every drop without spilling, the water would occupy about the same volume in either container.

3. To test a gas, Maya traps air inside a syringe and covers its tip. She pushes the plunger and sees the trapped air take up less space. When she lets go, the plunger moves back. Gas particles are much farther apart than particles in a liquid or solid, so there is room to push them closer together. They move freely and collide with the syringe walls and plunger. Those collisions exert pressure, helping push the plunger back. The air has not changed into a liquid: it is still a gas, even when compressed.

2 ANSWER WITH EVIDENCE

Use the passage

1. What does the ice cube do when Maya moves it? Explain what that behavior suggests about its particles.

2. What happens to the water's shape when Maya pours it into the cup? Use particle movement to explain why.

3. Maya pushes the syringe plunger, but pouring the water into a narrower cup does not reduce its volume much. What difference in particle spacing explains this?

4. When Maya lets go of the syringe plunger, it moves back. What are the air particles doing that helps cause this movement?

3 YOUR TURN

Your own words

Choose a material not named in the passage that you have seen as both a solid and a liquid. Describe one behavior you can observe in each state, then explain each behavior using particle arrangement and movement.

ANSWER KEY

Particles at the Picnic

PART 1 · READ AND MARK

Underline one observation about each state of matter, then circle a particle explanation that accounts for it. Label each matched pair S, L, or G. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What does the ice cube do when Maya moves it? Explain what that behavior suggests about its particles.	**The cube keeps its shape. Its close particles are held in a stable arrangement and vibrate rather than moving past one another.**
2	What happens to the water's shape when Maya pours it into the cup? Use particle movement to explain why.	**The water takes the cup's shape because its particles can move past one another, allowing it to flow.**
3	Maya pushes the syringe plunger, but pouring the water into a narrower cup does not reduce its volume much. What difference in particle spacing explains this?	**Gas particles are far apart, leaving room to push them closer together. Liquid particles are already close together, so changing containers does not reduce the water's volume much.**
4	When Maya lets go of the syringe plunger, it moves back. What are the air particles doing that helps cause this movement?	**The air particles move freely and collide with the plunger. Their collisions exert pressure that helps push it back.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

A solid piece of candle wax keeps its shape when moved to a dish because its particles vibrate in relatively fixed positions. Melted wax flows and takes the dish's shape because its particles remain close together but can move past one another.

Accept any suitable material observed in both states. The response should connect each observable behavior to particle arrangement or movement, not merely name the states.