

The Particle Model of Matter

Matter is made up of tiny particles that are always moving, and the spaces between particles help explain why solids, liquids, and gases behave differently ([Outcome](#), [Details](#)). By understanding how particles are arranged and how they move, you can predict what will happen to matter under different conditions ([Guiding question](#)).

Exercises

1. Draw a diagram of the particle model for each state of matter. Use small circles to represent particles.

State	Your diagram
Solid	
Liquid	
Gas	

2. In a solid, particles vibrate in place and are held closely together by strong attractive forces. In a gas, particles move freely in all directions and are separated by large spaces. Which state of matter has weaker attractive forces between its particles?

- A) Solid
- B) Liquid
- C) Gas
- D) They are equal

3. A student has two identical containers. One holds 100 mL of water and has a mass of 100 g. The other holds 100 mL of oil and has a mass of 92 g. Which liquid is denser?

Answer: _____

Explain your thinking using the particle model of matter.

4. Match each physical property to its correct definition.

Property	Definition
A. Mass	1. The ability of a gas or liquid to reduce in volume when squeezed
B. Volume	2. The amount of matter in an object
C. Density	3. A comparison of how much matter fits into a certain amount of space
D. Compressibility	4. The amount of space an object takes up

Write the letter and number pairs: _____

5. A balloon filled with air can be squeezed smaller, but a balloon filled with water cannot be squeezed much at all. Use the particle model of matter to explain why air is more compressible than water.

6. A piece of wood floats in water, but a rock sinks. Which object is less dense than water?

- A) Wood
- B) Rock
- C) Both are equally dense
- D) Cannot be determined from the information given

Answer Key

1. Solid: particles drawn close together in a fixed pattern, vibrating in place. Liquid: particles drawn with small spaces between them, able to slide past each other. Gas: particles drawn far apart, scattered throughout the container.
2. C
3. Water is denser. Water has 100 g of mass in 100 mL of volume, while oil has 92 g in 100 mL. In water, particles are packed more tightly together (or have stronger attractive forces), so more matter fits in the same space.
4. A, 2, B, 4, C, 3, D, 1
5. Air particles are separated by large spaces and move freely in all directions. Water particles are close together with only small spaces between them. When you squeeze the balloon, air particles can move closer together because there is room for them to move. Water particles are already so close that they cannot be pushed much closer together.
6. A