Name Date

Section 7.1 Summary

States of Matter

Textbook pages 246–253

Before You Read

Water can be found in three forms called states. One state is liquid. Ice is what we call water when it is a solid. Water vapour is what we call water when it is a gas. How are these three states of water alike and different? Write your thoughts below.

_____

_____

Mark the Text

Identify Concepts
Highlight each question head in this section. Then use a different colour to highlight the answers to the questions.

What is matter?

Mass is the amount of material that makes up an object. **Volume** is the amount of space that a material takes up. Anything that has mass and volume is called **matter.**

What are the states of matter?

The three common states of matter are solid, liquid, and gas. A solid has a distinct volume and shape. A liquid has a distinct volume and a shape that depends on the shape of its container. The volume and the shape of a gas depend on the size and shape of its container.

What happens to matter when its temperature changes?

When you add energy to matter, its temperature rises. This causes matter to expand. **Expansion** is an increase in the volume of something when its temperature rises. For instance, if the temperature of the air in a balloon rises, the volume of the air increases. The balloon gets a bit bigger.

When you take energy away from matter, its temperature falls. This causes matter to contract. **Contraction** is a decrease in the volume of something when its temperature falls. If you lower the temperature of the air in a balloon, the volume of the air decreases. The balloon gets a bit smaller.

If the temperature of matter keeps rising or falling, the state of the matter can change. The table on the next page shows how the state of matter changes.

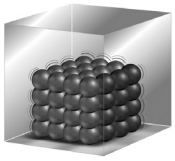
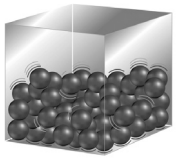
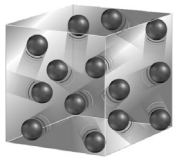
Reading Check

1. What happens to the volume of matter when it expands?

_____

_____

_____

State of matter	Change of state when you add enough energy (raise the temperature)	Change of state when you take away enough energy (lower the temperature)
solid 	**melting**: changes from solid to the liquid **sublimation**: changes from solid directly to gas	no change of state (stays solid)
liquid 	**evaporation**: changes from liquid to gas	**solidification**: changes from liquid to solid
gas 	no change of state (stays a gas)	**condensation**: changes from gas to liquid **deposition:** changes from gas directly to solid

Why does matter change volume or state?

Matter is made up of tiny particles. The particles have kinetic energy. This means they are always moving.

- Particles of a solid are packed close together. They are so close that they cannot move freely. They can only vibrate.
- Particles of a liquid are spaced a bit farther apart. They can slide past each other.
- Particles of a gas are spaced very far apart. They move around quickly.

The kinetic molecular theory explains how these particles act when energy is added or removed. When energy is added to particles, they move faster. This makes them move farther apart, and the matter expands. When energy is removed from particles, they move more slowly. This brings them closer together, and the matter contracts.

Adding energy to a solid can make its particles move faster and far enough apart for it to become a liquid. Adding energy to a liquid can make the particles move faster and far enough apart for it to become a gas. ✔

✔ *Reading Check*

2. Explain what happens to the particles of a solid as it changes to a liquid.

Use with textbook pages 246–253.

Solids, liquids, and gases

Complete the following table to describe three states of matter. The table has been partially completed to help you.

	Solid	Liquid	Gas
shape		not fixed; takes the shape of the container	
volume	fixed volume		
spaces between particles			
movement of particles			can move freely and quickly in all directions in the container

In each of the jars below draw the particles in a gas, a liquid, and a solid. Make sure to indicate whether the particles are moving or vibrating in your diagrams.

solid

liquid

gas

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Use with textbook pages 246–253.

Expand and contract

Vocabulary	
condensation	melting
contracts	move around quickly
deposition	rises
evaporation	slide past each other
expands	slower
falls	solidification
faster	state of matter
kinetic molecular theory	sublimation
mass	vibrate
matter	volume

Use the terms in the vocabulary box to fill in the blanks. Use each term only once. You do not need to use all the terms.

1. _____ is the amount of material that makes up something. _____ is the amount of space that a material takes up. Anything that has mass and volume is called _____.

2. When you add energy to matter, its temperature _____.

3. _____ is the process of a solid changing to a liquid. _____ is the process of a solid changing directly to a gas.

4. _____ is the process of a liquid changing to a gas. _____ is the process of a liquid changing to a solid.

5. _____ is the process of a gas changing to a liquid. _____ is the process of a gas changing to a solid.

6. Particles in a solid are packed so close together they can only _____. Particles in a liquid can _____. Particles in a gas can _____.

7. When you remove energy from particles they move _____ and the matter _____.

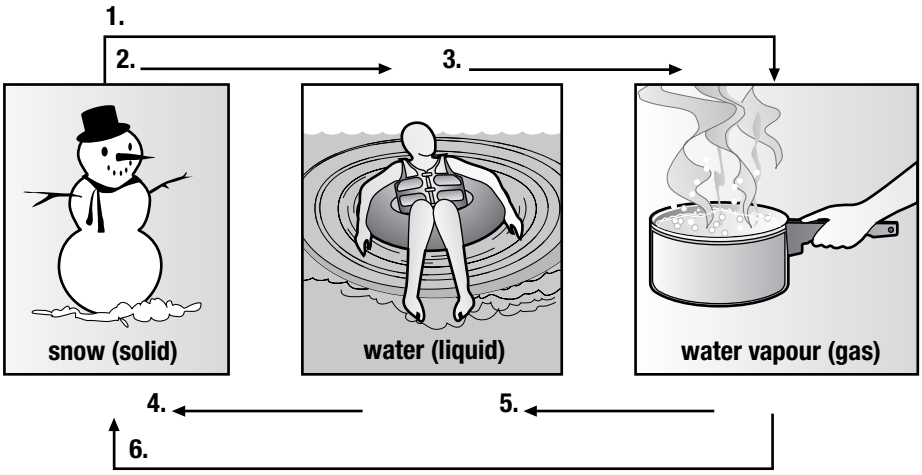
8. The _____ explains how particles act when their spacing and movement change.

Use with textbook pages 246–253.

What's the matter?

Vocabulary	
condensation	melting
deposition	solidification
evaporation	sublimation

Use the terms in the vocabulary box to label the diagram. Place the terms on the numbered arrows.



Complete the following table by describing the change of state. The table has been partially completed to help you.

	Change of state	Heat added or released
condensation		released
deposition		
evaporation	liquid to gas	
melting		added
solidification		
sublimation		

Use with textbook pages 246–253.

States of matter

Match each Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.	
Term	**Descriptor**
1. _____ mass **2.** _____ matter **3.** _____ volume	**A.** amount of matter in an object **B.** amount of space an object takes up **C.** anything that has mass and volume **D.** total energy of the particles in an object

Circle the letter of the best answer.

4. Which of the following is not an example of matter?

A. heat

B. solids

C. water

D. oxygen

5. What does the kinetic molecular theory explain?

A. how particles act when their spacing and movement change

B. how to determine the mass and volume of solids, liquids, and gases

C. how the kinetic energy in solids, liquids, and gases can be measured

D. how to find out the temperature of solids, liquids, and gases

6. What happens to matter when energy is added to it?

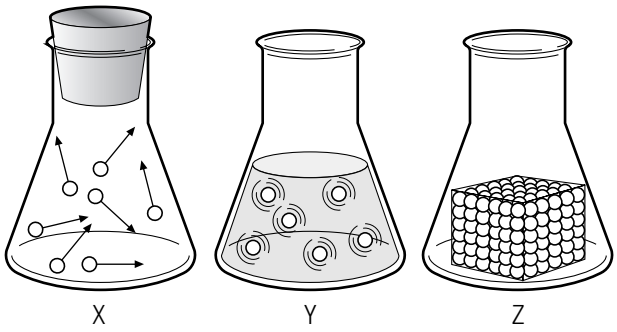
A. the particles take up less space

B. the particles decrease in volume

C. the particles move around faster

D. the particles move around slower

Use the following diagram to answer questions 7 to 9.



7. Both Y and Z have definite volume.

A. The statement is true.

B. The statement is false.

C. You cannot tell from the diagram.

8. The particles in Z can flow past each other.

A. The statement is true.

B. The statement is false.

C. You cannot tell from the diagram.

9. Which of the following correctly compares the amount of energy in the particles of X and Z?

A. The particles in X have less energy than the particles in Z.

B. The particles in X have more energy than the particles in Z.

C. The particles in both X and Z have the same amount of energy.

D. You cannot tell from the diagram.