STATES OF MATTER

Name: _____

Matter is all around you. It's anything you can touch or feel. Determine if each of the things listed at the right is or is not matter.

After you finish categorizing the 10 items, check your answers at the bottom of the next page. How did you do?

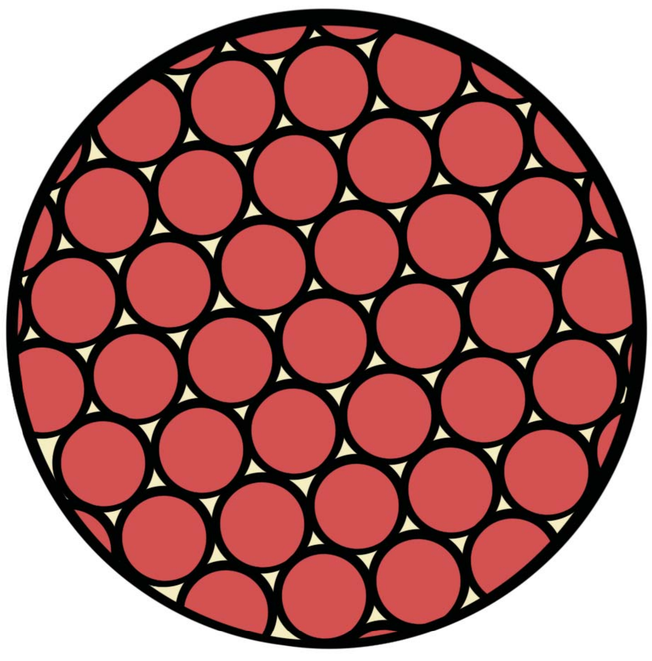
1. DESK	☐ YES or NO	☐
2. WATER	☐ YES or NO	☐
3. AIR	☐ YES or NO	☐
4. LIGHT	☐ YES or NO	☐
5. YOUR BODY	☐ YES or NO	☐
6. BACKPACK	☐ YES or NO	☐
7. DIRT	☐ YES or NO	☐
8. JUICE	☐ YES or NO	☐
9. PAPER	☐ YES or NO	☐
10. THE SUN	☐ YES or NO	☐

What is Matter?

Now that we know that matter can look a lot of different ways, let's dive deeper into what it is. Everything in the universe is either matter (things we can touch) or energy (the power to move or change matter). If you missed number 4, that's because light is an example of energy. You can't touch it. The rest of the things listed are all examples of matter.

Matter is made up of tiny particles called atoms. These particles can combine with other atoms to become molecules. For example, two hydrogen atoms and an oxygen atom can combine to create a water molecule! The qualities of the objects around you depend on what kind of atoms they are made of and how those atoms are arranged.

Your desk is firm while the water in your bottle is able to slosh around. The reason for these differences can be found at a molecular level. The desk and the water are made of different kinds of atoms. But what if we freeze the water to become as solid as the desk? How do you explain that?



SOLID

Matter Changes State

Heat is a measure of how fast the particles of a substance are moving. When particles are moving really fast, that substance can be called "hot." When particles are moving slow, we call it "cold." A **solid** has the lowest resting temperature of all the states of matter. That means that its particles are barely moving. For that reason, they can become very closely packed together. This gives the solid the tough quality that we expect from wood, glass, and other solid times.

As energy is added to the solid, the particles will begin to move faster. They will vibrate and shift around. Sometimes, they may even break out of the solid structure

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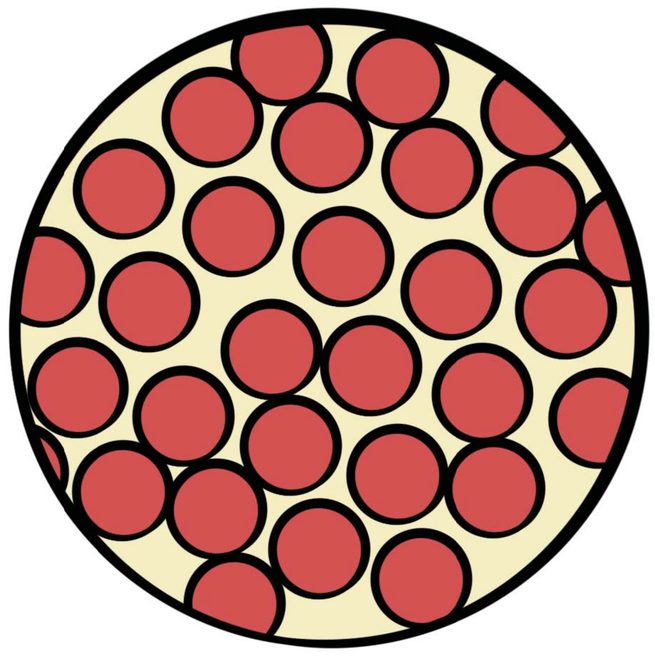
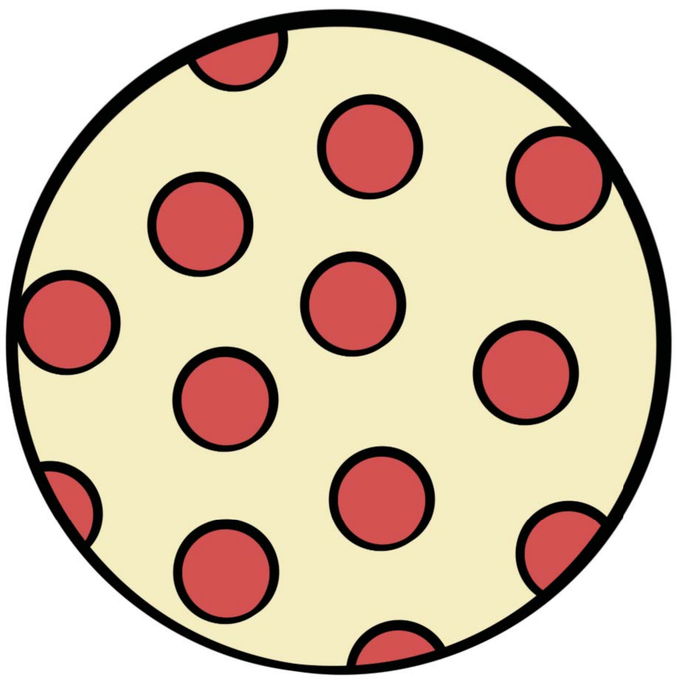
they had formed, and enter into a more flexible, or fluid state. The process we are describing is called **melting**. Melting happens whenever a solid is heated to the point that its particles become so active that they no longer hold their shape. Different substances melt at different temperatures. Scientists call this its **melting point.**

Liquids are in a state of matter with a mid level range of heat. Their particles are freely moving around, and are defined by their tendency to take the shape of whatever object they are contained in. The atoms and molecules of a liquid are still not moving fast enough to escape gravity, though.



LIQUID

When enough heat is added to liquid, the particles speed up even more. Eventually, they may break free from gravity's grip and float freely around whatever container they are in.



GAS

This process of turning liquid to gas is known as **evaporation**. A **gas** has the most energy of all the states of matter, and that means that its particles are moving the fastest. The particles move so fast and they expand to completely fill any container they are in.

Matter can change state in the other direction as well. When as gas is cooled enough it will return to a liquid state in a process known as **condensation**. This is the process that is responsible for turning clouds to rain.

Liquid, when cooled, can return to a solid state as well. As its particles slow down they eventually reform a solid structure. This process is known as **freezing**.

How Common are State Changes?

Every substance can become all 3 states. Even rock can become liquid, which we see happen naturally in volcanoes! If we heated them even more, they would become a gas too. Usually, in nature, temperatures don't get high or low enough for many common items to change states.

Water, on the other hand, easily changes state even at common Earth temperatures. It's not unlikely to encounter solid, liquid, and gas water all in the same day! It's considered a special quality of water that it can change state so easily. Without it, the water cycle (which supports all life on Earth) would cease to exist.

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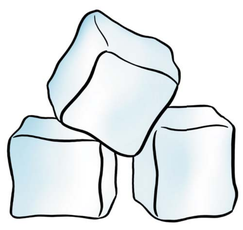
Give the correct definition for the following changes in state of matter.

GAS → **LIQUID**

_____



SOLID → **LIQUID**

_____

LIQUID → **SOLID**

_____

LIQUID → **GAS**

_____

Draw the behavior of the particles in each state.

Click on Tools and click on Comment and Markup.

SOLID **LIQUID** **GAS**

STATES OF MATTER

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Cut out the examples below. Glue the objects under their correct state of matter.

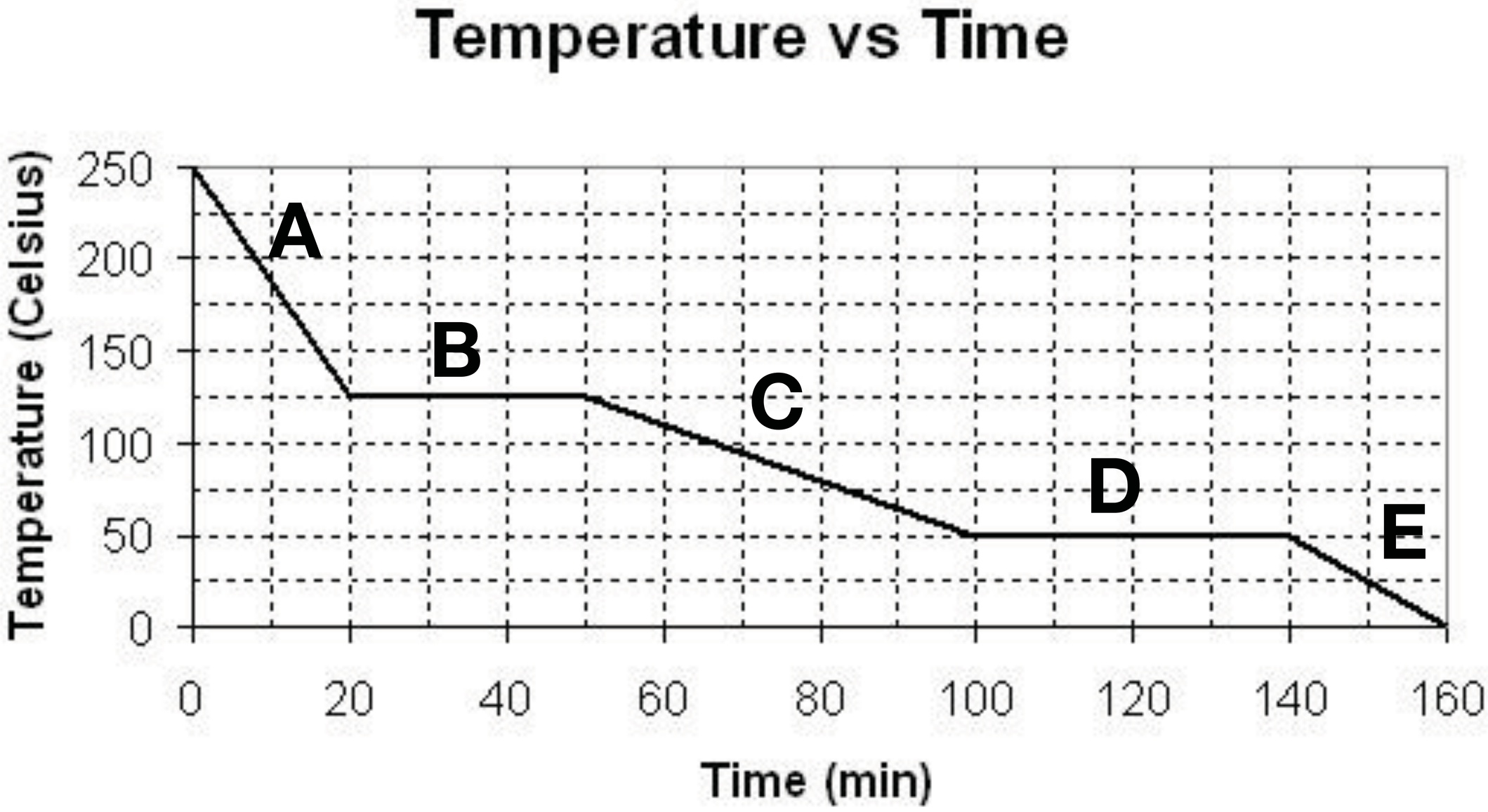
SOLID	LIQUID	GAS

WATER VAPOR	OCEAN	DIAMOND
ICE CREAM	OXYGEN	BLOOD
SMOKE	SNOW	BONE
MILK	JUICE	HELIUM
RAIN	AIR	GLASS

STATES OF MATTER

Name: _____

The graph below shows a substance changing state as the temperature drops. Study the graph to answer the questions below.



1. At which point in the graph is the substance a gas?

2. At which point is it a liquid?

3. At which point is it a solid?

4. Where is condensation happening?

5. At what temperature does this substance begin to condense?

6. Where is freezing happening?

7. At what temperature does this substance begin to freeze?