

Name _____

Date _____

Constant Points

Key Words		
boiling point	condensation	constant
evaporation	freeze	freezing point
gas	liquid	matter
melt	melting point	phase
physical properties	solid	volume

Matter is anything that has mass and takes up space. The states of matter found on the Earth are **solid**, **liquid**, and **gas**. A solid has a definite shape and a definite **volume** (the amount of space the matter takes up). A liquid has a definite volume but takes the shape of its container. A gas has neither a definite shape nor volume, but rather spreads out to take up whatever space it can.

Matter has **physical properties** that you can observe with your five senses. Some properties of matter change, while other properties remain **constant**. For example, water can be found on the Earth as a liquid, a solid, or a gas—its state can change. Physical properties like the volume of water found in a particular place or its temperature can also change according to what happens around it. Other physical properties like boiling point, melting point, and freezing point are constant—they stay the same. Some other constant physical properties of matter include magnetism and the ability to conduct or insulate against heat, electricity, and sound. Unlike most metals and some minerals, water is not magnetic and does not conduct electricity well.

Water and iron are very different forms of matter which have different physical properties. For example, iron and water at room temperature are different states of matter. At room temperature, iron is a solid, while water is a liquid. A material's physical state of matter can be changed by adding or subtracting heat energy. When water is cooled below 0°C, it freezes to become a solid. When iron is heated to 1538°C, it melts to become a liquid. A change in state can also be called a **phase change**.

Water and iron also have constant properties that do not change. The temperature at which water **freezes** (called its **freezing point**) always remains constant, or the same. When enough heat energy is taken away, water freezes and changes from a liquid to a solid. Liquids other than water have different freezing points, but pure water always freezes at about 0°C.

Another constant point of matter is the temperature at which it **melts**—its **melting point**. The melting point of ice is also considered to be 0°C. Raising the temperature the least little bit above 0°C causes ice to melt. Adding heat energy causes the ice (a solid) to change to water (a liquid). Gold must be heated to a temperature of 1064°C before it will melt. When a solid such as ice or gold melts, its volume and mass will stay the same, while its shape, state of matter, and temperature all change.

Boiling point is also a constant point of matter. When enough heat energy is added to water, its temperature will increase until it reaches 100°C. At this temperature (100°C), water boils, and evaporation takes place. **Evaporation** is the process by which a liquid changes to a gas. No matter how much water there is and what its starting temperature is, pure water at sea level will always boil at about 100°C! The boiling point of a substance can be used to identify it. If a scientist has an unknown liquid that boils at about 100°C, chances are very good that the substance is water. All pure water has constant melting (0°C), freezing (0°C), and boiling points (100°C).

Water can also change phases during the water cycle. Water on the Earth's surface is warmed by solar energy from the sun. The water evaporates and rises into the atmosphere. As the water vapor rises higher and higher into the atmosphere, it cools. When the water vapor is cooled, **condensation** occurs. The gas (water vapor) condenses into liquid water droplets. More and more tiny droplets stick together, getting heavier and heavier. When the drops become heavy enough, they fall to the Earth as precipitation. Then the cycle begins again!

1. What is the meaning of the word *constant* in Paragraph 2?
 - A Changes
 - B Stays the same
 - C Physical property
 - D Type of Matter

2. Even though pure water is not a good conductor of electricity, some tap water is. What could explain this?
 - A The tap water contains oxygen.
 - B The tap water is magnetic.
 - C The tap water contains some minerals.
 - D The tap water has soil in it.

3. All pure water has the same—
 - A mass, volume, and color
 - B temperature, mass and weight
 - C freezing point, mass and color
 - D boiling, freezing and melting points

4. Two students measured exactly 200 mL of water in one beaker and 200 mL of ice in a second beaker. All of the following will be the same for the ice and the water EXCEPT the—
 - A volume
 - B boiling point
 - C melting point
 - D state of matter

5. What is the melting point of ice?
 - A -10°C
 - B 0°C
 - C 10°C
 - D 100°C

6. Which of the following characteristics will remain the same when a chocolate bar melts?
 - A Mass
 - B Shape
 - C Temperature
 - D State of matter

7. Which of the following processes takes place when warm air cools?
 - A Condensation
 - B Evaporation
 - C Precipitation
 - D Accumulation

Matter	Melting Point (at sea level)	Boiling Point (at sea level)
Lead	327°C	1749°C
Helium	-272°C	-269°C
Nickel	1455°C	2913°C
Mercury	-39°C	357°C
Copper	1084°C	2562°C

8. The table above shows the melting and boiling points for some different kinds of matter. At 85°C, nickel is a—
- A gas
 - B solid
 - C liquid
 - D plasma
9. Which type of matter shown in the table above has the lowest melting point?
- A Lead
 - B Nickel
 - C Helium
 - D Mercury
10. Which list below shows the matter in order from highest boiling point to lowest boiling point?
- A Nickel, Copper, Lead, Mercury, Helium
 - B Nickel, Mercury, Copper, Helium, Lead
 - C Helium, Mercury, Nickel, Lead, Copper
 - D Helium, Mercury, Lead, Copper, Nickel

boiling point	condensation
constant	evaporation
freeze	freezing point
gas	liquid
matter	melt
melting point	phase
physical properties	solid
volume	

<p>I have the first card.</p> <p>Who has the word that means to change from a liquid to a solid?</p>	<p>I have <u>freeze.</u></p> <p>Who has the word that names a state of matter with a definite shape and volume?</p>
<p>I have <u>solid.</u></p> <p>Who has the temperature at which a heated liquid changes into a gas?</p>	<p>I have <u>boiling point.</u></p> <p>Who has the process in which a liquid changes to a gas?</p>
<p>I have <u>evaporation.</u></p> <p>Who has the word that is defined as having mass and taking up space?</p>	<p>I have the word <u>matter.</u></p> <p>Who has the temperature at which a liquid changes to a solid?</p>
<p>I have <u>freezing point.</u></p> <p>Who has the state of matter that has a definite volume but no definite shape?</p>	<p>I have <u>liquid.</u></p> <p>Who has the temperature at which a solid changes to a liquid?</p>
<p>I have <u>melting point.</u></p> <p>Who has the word that means stays the same?</p>	<p>I have <u>constant.</u></p> <p>Who has the word that means the amount of space an object takes up?</p>

<p>I have the word <u>volume</u>. Who has the process in which a gas changes into a liquid?</p>	<p>I have the word <u>condensation</u>. Who has the word that means to change from a solid to a liquid?</p>
<p>I have the word <u>melt</u>. Who has the state of matter that has no definite shape and no definite volume?</p>	<p>I have <u>gas</u>. Who has the word that is a synonym for "state" as in state of matter?</p>
<p>I have the word <u>phase</u>. Who has the word that tells how an object looks, feels, or acts?</p>	<p>I have <u>physical properties</u>. Who has the first card?</p>

Name _____

Home Room _____

Constant Points

Directions: Highlight from word to word to complete the maze as your classmates read the clues.

START	Freeze	Solid	Boiling Point
Freezing point	Constant	Liquid	Evaporation
Boiling Point	Condensation	Freeze	Matter
Gas	Melt	Gas	Liquid
Phase	Condensation	Volume	Freezing point
Physical Properties	Evaporation	Constant	Melting Point
FINISH	Matter	Physical Properties	Volume

	Vocabulary Word	Definition
1		the process where a liquid changes to a solid
2		the temperature at which a liquid changes to a gas
3		the temperature at which a liquid changed to a solid
4		the process in which a gas changes to a liquid
5		the process in which a liquid changes to a gas
6		anything that has mass and takes up space

