Name_____

Observing Phase Changes

Purpose: To observe changes in energy as water changes state

Background Information: Heat changes the temperature of a substance. When heat is absorbed by a substance, the kinetic energy is of the substance is increased; the particles (atoms and molecules) of the substance begin to speed up and move faster.

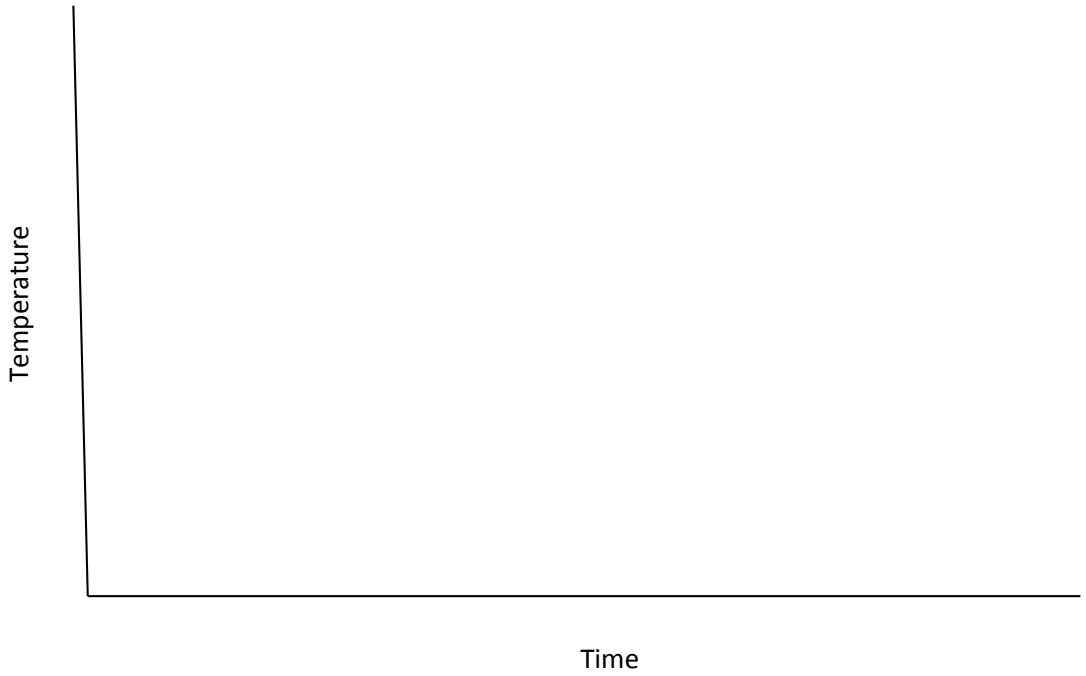
The reverse is also true. When a substance cools off, it releases, or loses, heat and the kinetic energy decreases. The particles slow down.

Heat changes the state of matter. A substance will change from one state or phase to another at specific combinations of temperature and surrounding pressure. Usually, the pressure is atmospheric pressure, so temperature is the determining factor to the change in state in those cases.
There are 3 states of water which are liquid, solid and gas. All three states exist on earth.

There are names for each of the phase changes of water. They are:

- Water going from a solid to a liquid: **Melting** – absorbs heat
- Water going from a liquid to a gas: **Evaporation** – absorbs heat
- Water going from a solid to a gas: **Sublimation** – absorbs heat
- Water going from a liquid to a solid: **Freezing** – releases heat
- Water going from a gas to a liquid: **Condensation** – releases heat
- Water going from a gas to a solid: **Deposition** – releases heat

Prediction: When heat is added to ice, the ice will change state from solid, to liquid, to gas. What do you think a graph of this data will show? Sketch it below.



Materials:

Thermometer	Map pencils	Hot plate	Beaker	Ice

Procedure:

SAFETY FIRST!

Wear your goggles.

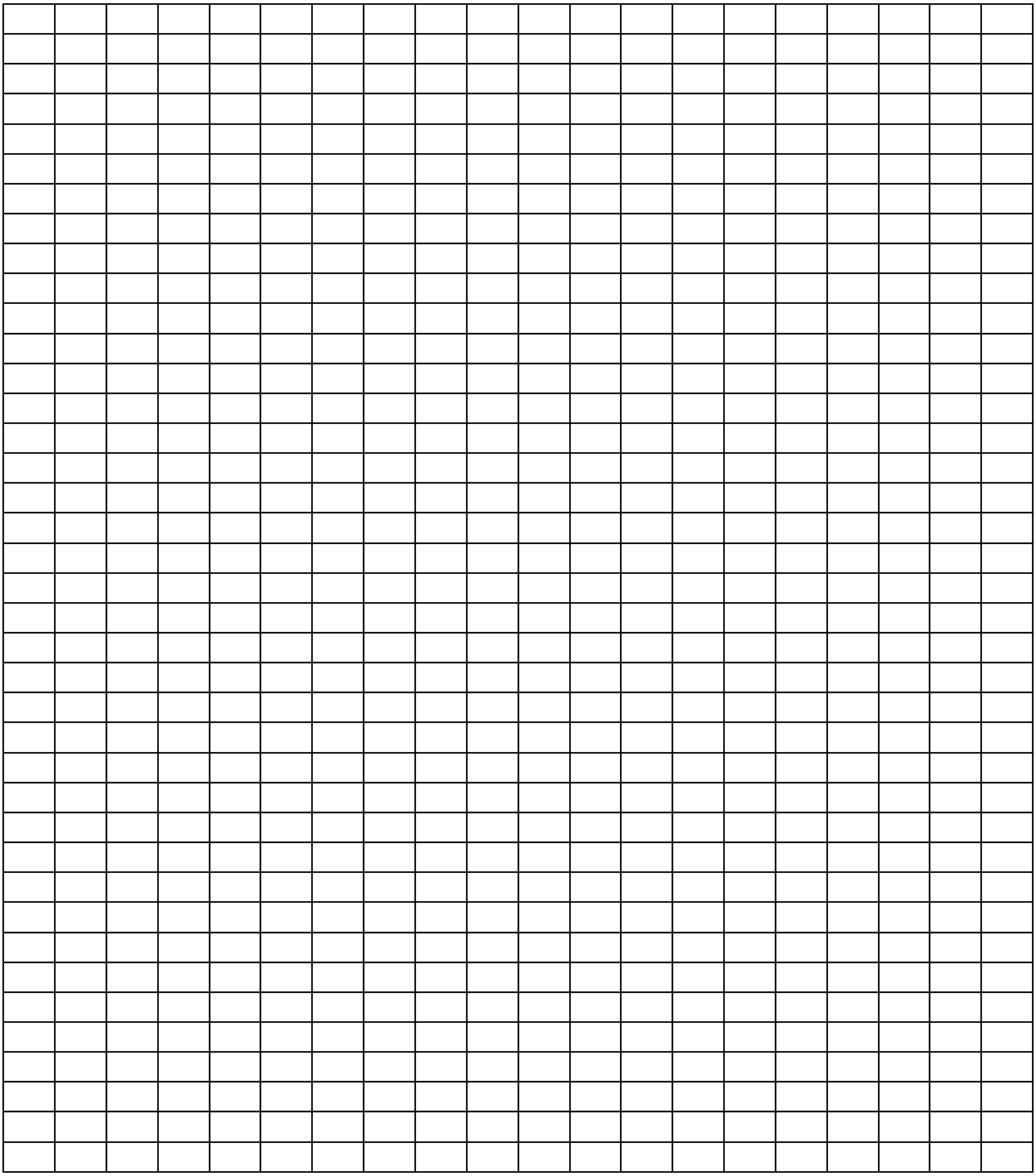
Do not touch the hot plate!

1. **Put on goggles.**
2. Read all of the directions first.
3. Fill a beaker with ice.
4. Put the thermometer sensor in the ice. Set the beaker on the hot plate. Keep it still for 2 minutes.
5. Record the temperature of the ice at time 0.
6. Turn the hot plate on. Set it at 7 or high.
7. Continue to observe record the temperature of the ice on the data chart every minute.
8. **Make a note of when the ice melts and when the water begins boiling.**

Data:

Time	Temperature (°C)	Time	Temperature (°C)
0		15	
1		16	
2		17	
3		18	
4		19	
5		20	
6		21	
7		22	
8		23	
9		24	
10		25	
11		26	
12		27	
13		28	
14		29	

- Graph this data.
  - What is the best kind of graph to use? _____
  - Why? _____
- Label the 5 areas on your graph: solid (S), liquid (L), gas (G), freezing point/melting point FP/MP and condensation/boiling point (CP/BP).
- Use map pencils to color the following parts of the line on your graph: slowest molecular motion (in one color), fastest molecular motion (in a different color). Make a key to distinguish the colors you used for labeling.



Data Analysis:

Describe the pattern or trend you see in your data.

_____

_____

_____

Conclusions: (*Answer using complete sentences*)

What happened to the temperature of the water as the ice melted?

_____

_____

As the water boiled?

_____

_____

Where do you think that the energy from the hot plate was going?

_____

_____

Explain what is happening to the water molecules in the flat areas of the line on your graph during the phase changes from solid to liquid and liquid to gas.

_____

_____

_____

_____

_____

When the ice is melting is it releasing heat or absorbing heat? Explain your answer.

_____

_____

If you put the liquid water into the freezer and recorded its temperature as it refroze, would it be absorbing heat or releasing heat? Explain your answer.

_____

_____

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