**Identifying Melting and Boiling Points**

1. Using the graph below, identify:

a. the boiling point of substance A: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Justify your response\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. the melting point of substance A: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Justify your response\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Indicate the state of matter of substance A at

a. point #1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. point #2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. point #3: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Substance A: Temperature Versus Time**

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**Temperature (°C)**

60 **3**

50

40 **2**

30

20 **1**

10

**0** 10 20 30 40 50 60 70

**Time (min.)**

Vocabulary Check in:

Make sure you can **describe what is happening to the heat and temperature** in each of the following:

 ***Condensation***

 ***Melting***

 ***Boiling***

 ***Freezing***

 ***Sublimation\**** (two uses of word)

**Temperature Vs. Heat – Page 85**

• *Temperature* measures how hot or cold something is and depends on how fast its particles are moving. Materials that have fast-moving particles have higher kinetic energy, and therefore, a higher temperature.

• *Heat* energy is the energy that is transferred from materials with a high temperature to materials with a low temperature.

**Brainstorm: How can we create heat?**

**List examples below:**

**Different forms of energy can be transformed into heat: (p. 114-115)**

* **Electrical**
* **Mechanical (friction)**
* **Chemical**
* **Nuclear**
* **Solar**
* **Hydro (electric)**

**Which Has More Heat Energy?**



Study the following diagrams. Both are a temperature of 50°C, but one cup is a large cup of water and the smaller cup of water.

Which container has more energy in it? Why –Explain your thinking.

A 100 ML and 200 ML beaker of water are exposed to heat over a period of time. Using the following graph, determine which sample had more heat energy when both beakers had reached 100°C.

**Volume Comparison: Heat Versus Temperature**

**Temperature (°C)**

100

80 100 mL

60

200 mL

40

20

 **0**

 30 60 90 120 150 180 210 240 270 300

**Time (seconds)**

Explain your answer using the particle theory of matter. (Hint: think about which had more particles that were vibrating due to the added heat energy)

**Heat Transfer –p. 90-91, 95-95, 98-99**

**Note:** More than one type of heat transmission may take place at the same time. A **light bulb**, for example, radiates heat and also transmits heat through convection (air particles).

**There are many different ways heat energy can be transferred:**

* *Conduction:* Heat transfer occurs in **solids** by conduction. As each particle of matter **collides** with another particle of matter, heat energy is transferred.

*Example:*

* *Convection:* Heat transfer in **fluids (liquids and gases)** is called convection. In convection, the particles of matter **collide** as fluids move. Convection currents are caused by warm fluids rising.

*Example:*

* *Radiation:* Radiation is the transfer of heat energy by means of **waves**. These waves can travel across empty space (meaning they **do not need particles** to move through).

*Example:*

**Demonstrate** ***convection***by conducting the following experiment: using two identical clear bottles a pan, index cards, and blue food colouring.

• Fill one bottle with hot water and the other with cold water.

• Add blue food colouring to the bottle of hot water.

• Place an index card on the opening of the bottle of cold water, then invert it so that the bottle of cold water rests on top of the bottle of hot water.

• Slowly pull out the index card from between the two bottles, and observe the movement of the coloured water.

**Questions:**

1. Was the movement of water from hot to cold or from cold to hot?
2. What evidence is there to show this?
3. At what point do you think the heat transfer stopped?
4. How do you know?

**Heating It Up! – Exit slip**

Fill in the blanks below, using one of the following terms: ***conduction*, *convection*, *radiation***.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ does not need particles to transfer heat.

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the transfer of heat in solids.

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the transfer of heat as particles rise and collide.

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