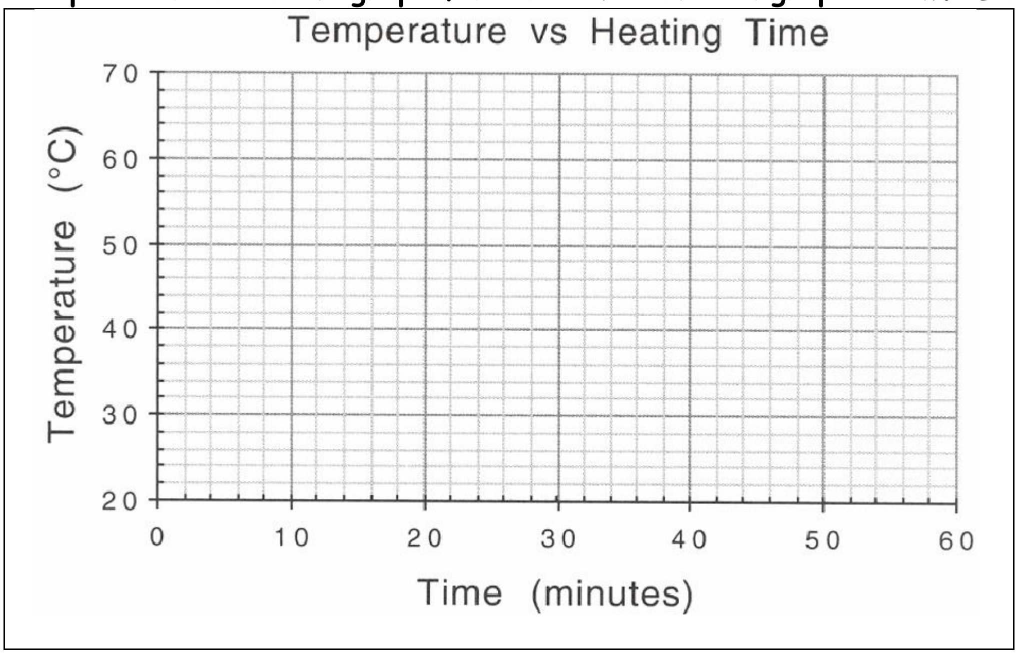
Name:_________________________ Per:_____

Worksheet- Introduction to Specific Heat Capacities

Heating substances in the sun: The following table shows the temperature after 10.0 g of 4 different substances have been in direct sunlight for up to 60 minutes.

Time (minutes)	Air (° C)	Water (° C)	Sand (° C)	Metal (° C)
O (initial)	25°C	25°C	25°C	25°C
15.0 min	28.9°C	26.2°C	30°C	35°C
30.0 min	32.5°C	27.5°C	35°C	45°C
45.0 min	36.2°C	28.8°C	40°C	55°C
60.0 min	40°C	30°C	45°C	65°C

Step 1: Create a line graph for each substance on graph below. Label the substances.



Step 2: Answer questions

1. Order the substances based on the time required to heat them from :
   slowest

   fastest

2. Which do you think will cool the fastest? Explain

3. When you boil water in a pot on the stove, which heats faster, the metal or the water? Explain.

4. Why do you think different substances heat up and cool down at different rates?

*****<u>Specific heat capacity</u> = the amount of heat needed to raise the temperature of 1 g of a substance by 1 degree. *****

5. Based on the definition above, which of the 4 substances do you think has:
   a) the highest specific heat capacity? b) the lowest heat capacity?

6. Here are the heat capacities of the four substances: **4.18 J/g °c, 1.00 J/g °c, 0.80 J/g °c, & 0.60 J/g °c**. ***Match & then label*** *each substance with its specific heat capacity on the graph.*

7. If something has a **high specific heat capacity** will it take a lot of heat or a little heat to change its temperature? Explain. (careful! Use the definition, your graph, and the data from #6)

8. Assuming they both start at the same temperature, which will heat up faster, a swimming pool or a bath tub? Explain your thinking.

<u>Worksheet- Calculations involving Specific Heat</u>

1. For **$q = m \cdot c \cdot \Delta T$** : identify each variables by <u>name</u> & <u>the units</u> associated with it.

2. Heat is not the same as temperature, yet they are related. Explain how they differ from each other.

a. Perform calculations using: *($q = m \cdot c \cdot \Delta T$)* ***b. Determine if it's endothermic or exothermic***

1. Gold has a specific heat of 0.129 J/(g×°C). How many joules of heat energy are required to raise the temperature of 15 grams of gold from 22 °C to 85 °C?

*Endothermic or exothermic?*_______________

2. An unknown substance with a mass of 100 grams absorbs 1000 J while undergoing a temperature increase of 15 °C. What is the specific heat of the substance?

*Endothermic or exothermic?*_______________

3. If the temperature of 34.4 g of ethanol increases from 25 °C to 78.8 °C, how much heat has been absorbed by the ethanol? The specific heat of ethanol is 2.44 J/(g×°C)

*Endothermic or exothermic?*_______________

4. Graphite has a specific heat of 0.709 J/(g×°C). If a 25 gram piece of graphite is cooled from 35 °C to 18 °C, how much energy was lost by the graphite?

*Endothermic or exothermic?*_______________

5. Copper has a specific heat of 0.385 J/(g×°C). A piece of copper absorbs 5000 J of energy and undergoes a temperature change from 100 °C to 200 °C. What is the mass of the piece of copper?

*Endothermic or exothermic?*_______________

6. 45 grams of an unknown substance undergoes a temperature increase of 38 °C after absorbing 4172.4 Joules. What is the specific heat of the substance? **Look at the table on page 513 of your book, and identify the substance.**

*Endothermic or exothermic?*_______________

7. A 40 g sample of water absorbs 500 Joules of energy. How much did the water temperature change? The specific heat of water (liquid) is 4.18 J/(g×°C).

*Endothermic or exothermic?*_______________

8. If 335 g of water at 65.5 °C loses 9750 J of heat, what is the final temperature of the water? Liquid water has a specific heat of 4.18 J/(g×°C).

*Endothermic or exothermic?*_______________