Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_

**CLASSWORK: Introduction to Specific Heat**

**Heating Substances in the sun:** The following table shows the temperature after 10.0 g of 4 different substances have been in direction 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 the graph below. Label the substances.**

**Step 2: Answer Questions**

1. Order the substance 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 substance heat up and cool down at different rates?

**\*\*\*Specific heat capacity = the amount of heat energy 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 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 and 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.

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_

**NOTES: Specific Heat**

**Equation for Specific Heat: Q**

**C = m x ΔT**

What does specific heat tell us?

**Other ways to write the equation:**

|  |  |  |
| --- | --- | --- |
| To solve for amount of heat: | To solve for mass: | To solve for temperature change: |

**Practice**:

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

Q=

C=

m=

ΔT=

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

Q=

C=

m=

ΔT=

1. If the temperature of a 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)

Q=

C=

m=

ΔT=

1. 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?

Q=

C=

m=

ΔT=