Name:

Specific Heat Lab

**Objective**

- to understand that water and land absorb energy at different rates.

**Pre-reading**

Land and water. When you’re talking about surfaces of the earth, those are pretty much your only two choices. The thing is, they behave very differently when struck by sunlight. This be for a number of reasons – surface texture, color, permeability, and something called specific heat.

Specific heat is the amount of heat it takes to raise 1 gram of a substance by 1 degree Celsius. You may have noticed when making lunch that it takes a very long time for water to boil. This is because water has a very high specific heat. You may also have noticed that he sand at the beach gets very hot, very quickly when the sun comes out. By noon, it hurts to stand on! This is because land tends to have a very low specific heat, making it heat up very fast.

Today, you will be gathering data to examine the phenomenon of specific heat. You will be tracking the temperature of samples of water and of land when exposed to a heat lamp over time. You will then graph the changes and analyze your findings.

**Pre-questions**

1. What is specific heat?
2. Do metals have a high specific heat, or a low specific heat? Explain your decision.
3. What is the specific heat of water? (Look on the cover of your reference table.)

**Materials**

-cups (2)

-timer

-heat lamp

-thermometer

-ruler

**Procedure**

1. Grab your materials.
2. Measure out 150 mL of water into the beaker.
3. Record the starting temperature of the water.
4. Place the water as close to the heat lamp bulb as you comfortably can, and measure the distance. Distance = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Every minute, take the water temperature in degrees Celsius, and record it.
6. Do this for 15 minutes (this might be a good time to start tonight’s homework.)
7. Repeat steps 2-6, but with 150 mL of earth materials (soil or sand). YOU MUST USE THE SAME DISTANCE.
8. Once you have all your data, construct a double-line graph of it, with time on the X-axis. One line is water, the other is earth material.

**Post-lab Analysis**

1. Which substance gained more heat over the course of the experiment?
2. If you had let the experiment go on for another 5 minutes, predict the temperatures which would have resulted.
3. Specific heat works both ways. If a substance heats up fast, it will also cool fast. Based on this information, which substance will cool down the fastest if put in a dark room?
4. Application: pretend you are at the beach. The sun is coming up. Which surface will end up warmer by noon – the land of the beach, or the water? Why?
5. Based on your answer to question 5, where would you expect low barometric pressure during the day, over the land or the water? Why?

**Data**

|  |  |  |
| --- | --- | --- |
| Minutes | Water  Temp oC | Soil  Temp oC |
| Start |  |  |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| 10 |  |  |
| 11 |  |  |
| 12 |  |  |
| 13 |  |  |
| 14 |  |  |
| 15 |  |  |