Student Lab Sheet Answer Key

Name_____ Date: _____

Are HEAT and TEMPERATURE the same thing? YES **NO**

Heat and Temperature are not the same thing. They have different units. Heat is energy that spontaneously passes between a system and its surroundings in some way other than through work or the transfer of matter. Temperature is a measure of the internal energy of a system.

Vocabulary Words

Heat Transfer – The movement of thermal energy from one object to another of a different temperature.

Conduction – The transfer of heat from one particle of matter to another.

Convection – The transfer of heat by movement of a fluid.

Radiation – The direct transfer of energy by electromagnetic waves.

Insulator – A material that does not conduct heat well.

Conductor – A material that conducts heat well.

Experiment 1 Data Collection

READING	Cup A ^{o}C	Cup B ^{o}C
1		
2		
3		
4		
5		
6		

Observations:

1. Describe how the metal bar feels before experiment 1.

   The metal bar feels the same temperature on both ends of the bar.

2. Hypothesis: What do you think will happen to the metal bar during experiment 1?

   It will get warmer on the side that starts cool.

   Describe how the metal bar feels during experiment 1:
   a. Before Reading 1?

      The metal bar was hot near the end that was in the hot water and was cold near the end that was in the cold water.

   b. After Reading 2?

      Feel heat moving from the hot side of the metal bar to the cold side.

   c. After Reading 4?

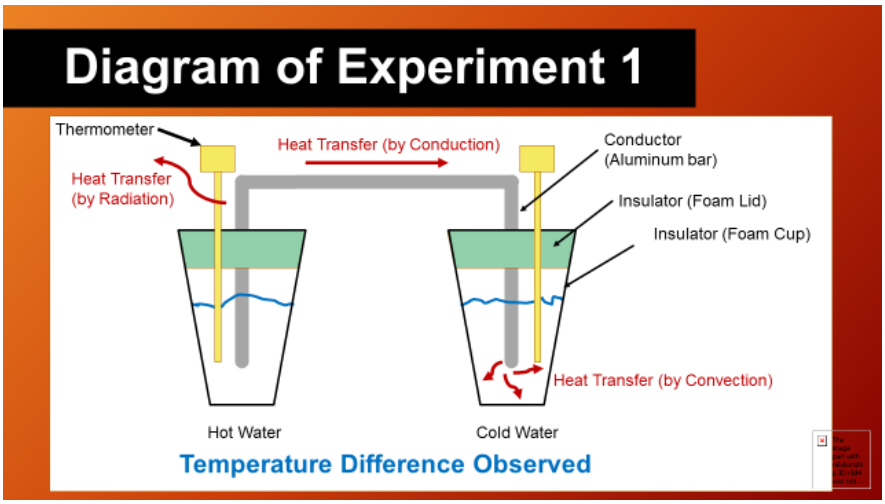
      The side that was cold now feels warmer.

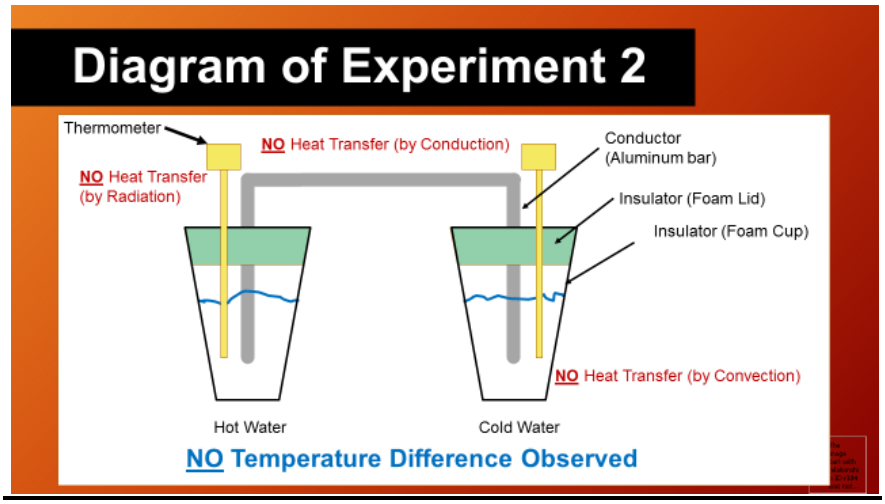
3. Summarize your observations made during experiment 1. Did the temperature of the bar change? Did the temperature of the water change? If so, how?

   The temperature of the bar got warmer on the side that started cool. The hot water temperature decreased, and the cool water temperature increased. The heat from hot water Cup A transferred to the cooler water in cup B, which raised the temperature in Cup B, and decreased the temperature in Cup A.

Use your vocabulary words to label diagram for experiment 1 below (use arrows to represent the direction of heat flow).

<u>Vocabulary Word Bank:</u> conduction, convection, radiation, insulator, conductor, thermometer, hot water, cold water.





Experiment 2 Data Collection

READING	Cup C ^{o}C	Cup D ^{o}C
1		
2		
3		
4		
5		
6		

Observations:

4. Hypothesis: What do you think will happen to the metal bar during experiment 2?

   The temperature will stay the same throughout the experiment.

   Describe how the metal bar feels during experiment 1:
   a. After Reading 2?

      The metal bar feels the same temperature on both ends of the bar.

   b. After Reading 4?

      The metal bar feels the same temperature on both ends of the bar.

5. Summarize your observations made during experiment 2. Did the temperature of the bar change? Did the temperature of the water change? If so, how?

   The temperature of the bar did not change. The temperature of the water in both cups stayed the same.

6. Why are the results in experiment 2 different from experiment 1?

   There is no temperature difference in the water in the second experiment.

7. Was there heat transferred in experiment 2? Why? Was there an insulator or a conductor present? Was there conduction, convection or radiation?

   No. There was no temperature difference. There was an insulator (cup) and conductor (bar). But there was no heat difference.

Use your vocabulary words to label diagram for experiment 2 above (use arrows to represent the direction of heat flow).

Vocabulary Word Bank: conduction, convection, radiation, insulator, conductor, thermometer, hot water, cold water.

Knowledge Check (KC):

KC1. What **must** be present for heat to flow (transfer) from one thing to another one?

A temperature difference.

KC2. Did experiments 1 and 2 prove the answer to KC1? Yes or No. How did you prove it?

Yes. *There was a temperature difference in experiment 1, but not in experiment 2. Heat was transferred. This was proven by the change in temperatures of the Hot and Cold water using thermometers.*

KC3. Are heat and temperature the same thing? Why? What are the units of heat, and temperature?

Heat and Temperature are not the same thing. They have different units. Heat is energy that spontaneously passes between a system and its surroundings in some way other than through work or the transfer of matter. Temperature is a measure of the internal energy of a system.

KC4. In what direction does heat transfer?

From higher temperature to lower temperature