

MiSP Thermal Conduction Worksheet #1 L1

Name _____

Date _____

HEAT TRANSFER

Introduction:

Areas that have heat energy are called *heat sources*. Areas that have little or less heat energy are called *heat sinks*.

In this lab activity, you will determine which direction heat energy flows between a heat source and heat sink and how the temperature changes.

Problems: In which direction does heat energy flow: *source to sink*, or *sink to source*? What happens to the temperature of hot and cold water connected with an aluminum bar?

Hypothesis:

If a container of hot water (heat source) is connected to a container of cold water (heat sink) with an aluminum bar, the heat will transfer from the **heat source / heat sink (circle one)** to the **heat source / heat sink (circle one)**.

Materials:

Goggles

2 insulated containers with lids with aluminum connecting bar

Warm water (approximately 100 degrees)

Cold water

2 thermometers

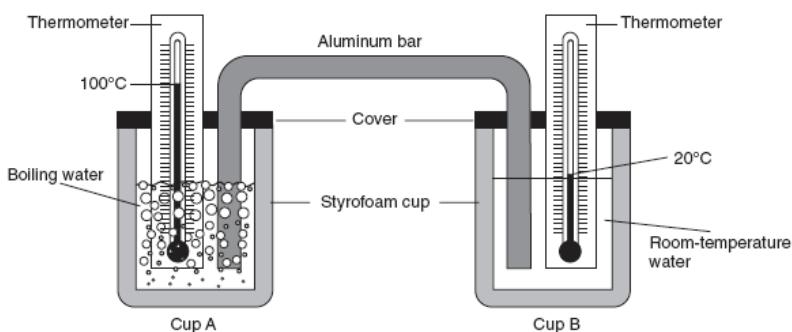
Color pencils

Timer

Safety - Wear goggles.

Use caution when handling the hot water.

Procedure: (Note - your teacher may supply water with temperatures different than those in this diagram.)



Check off each step as you complete it.

- Set up the heat transfer kit as in the diagram above. The thermometer bulbs and bottom of the aluminum bar should be near but NOT touch the bottom of the Styrofoam insulated container.
- Measure 150 mL of hot and cold water and add hot to one insulated cup and cold to the other
- Gently place the lids with aluminum bar and thermometers on the cups at the same time. (be careful not to submerge the lids)
- Wait 15 seconds for the thermometer to get a reading. Then, record the initial temperature (time 0) of the water in each cup on the data table
- Continue to record on the data table temperatures for both cups each minute for 15 minutes (or longer if your teacher indicates a different time)

Data:

Graph the data on the next page to show the relationship between time (minutes) and the temperature ($^{\circ}\text{C}$) in each cup

- Label the x axis with time (minutes)
 - Label the y axis with temperature ($^{\circ}\text{C}$)
 - Connect the dots for each cup's data set (Hot water cup, cold water cup). Use two different colors and write a key for the graph.

Title: _____

Key

Warm water line:

Cold water line:



Discussion L1-3

1. Which container is the heat source? _____

2. Which container is the heat sink? _____

3a. Which container 'lost' heat energy? _____

3b. Since energy is never lost or created', where did the heat energy go?

4. In this experiment, the heat energy moved from the _____ container to the _____ container or from the **heat source / heat sink (circle one)** to the **heat source / heat sink (circle one)**.

5. What method of energy transfer occurred in this experiment (*circle one*)?

Conduction

Convection

Radiation

6. How did the graph of the cold water cup temperatures compare to the graph of the hot water cup temperatures.

7. Predict how the temperature in the cold water cup would compare to the temperature in the hot water cup if the experiment was allowed to continue for a longer time.
