

Name\_\_\_\_\_

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

### Convection

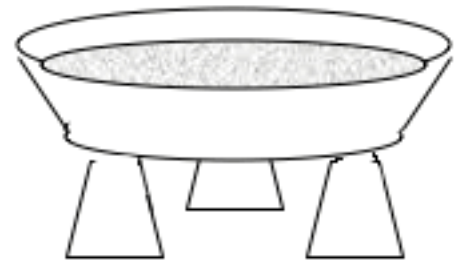
**Introduction:** In this activity you will investigate how convection currents are created and how they move through a liquid. To understand how energy moves in the Earth system, it is important to understand convection. Convection currents affect many of Earth's systems including weather and climate, the movement of the ocean, and plate tectonics. The Theory of Plate Tectonics was not complete until scientists understood convection. You will test ways of creating convection currents in a liquid.

### **Materials:**

1 glass bread pan, 4 cups, food coloring, water, paper towels

### **Procedure:**

1. Place the bread-pan on top of at least three cups as shown in the figure to the right..
2. Place cups of water under the pan as directed in each observation set. Make sure that the water in the cup is touching the bottom of the pan.
3. Fill the pan halfway with water.
4. Carefully place one drop of dye in the pan as directed for each trial.
5. Observe for 3 minutes and draw and record your observations in the data section.
6. You will repeat this 4 times changing the temperatures of the water in the cup. Change out the water in the pan each time.
7. There is ice available to add a cooling source as well.



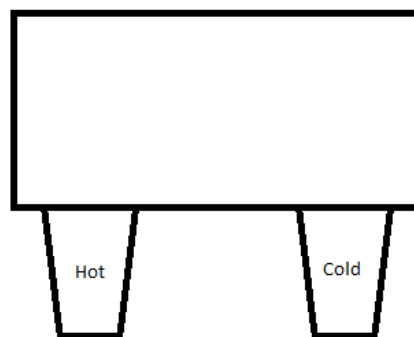
**Sketch each setup labeling temperatures of water and arrows showing any movement:**

### **Written Observations**

Trial 1

(Place dye over the hot)

### **Side View**



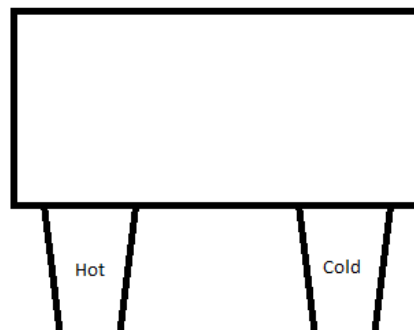
### **Top View**



### **Written Observations**

Trial 2

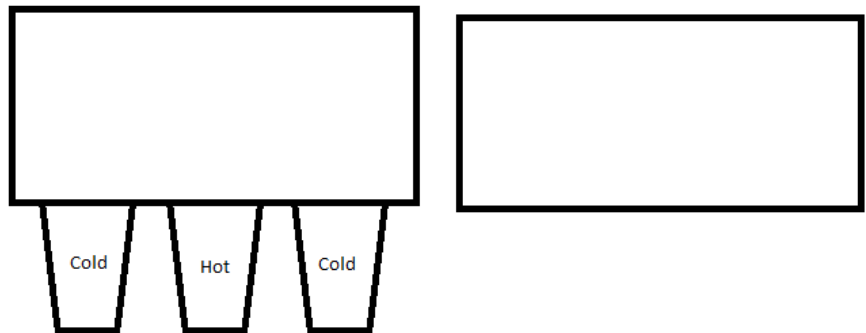
(Place dye over the cold)



### Written Observations

Trial 3

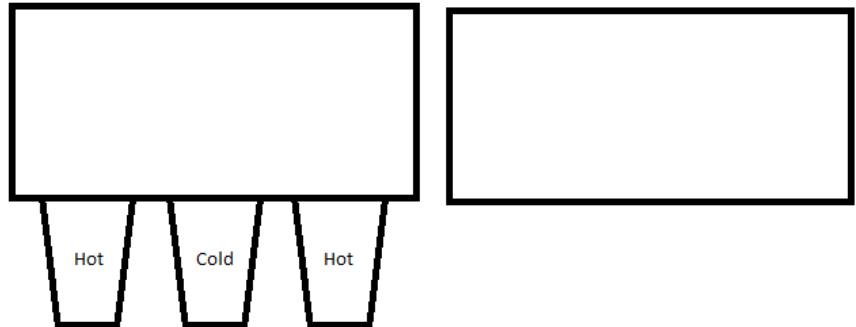
(Place dye over the hot)



### Written Observations

Trial 4

(Place dye over the cold)



### Analysis:

1. What factor determines if something sinks or floats?

If the warmer water wants to float, what do we know about it?

If the cooler water wants to sink, what do we know about it?

2. Create a diagram of a convection current. (*Show water movement, temperatures, and heat and cooling sources.*) Explain what is happening in your diagram on a molecular level:

Diagram:

Explanation:

5. Convection currents can happen in any fluid. Make a list of where you would likely find them occurring naturally on earth?

6. Using what you have learned about convection currents, **explain** why the furnace in your house is in the basement and not in the attic?

Earth Systems  
Standard III, Objective 2

Title: Convection Lab

Description: Students will model and observe the process of convection.

Time Needed: 50 minutes

Materials: per group: 1 clear plastic or glass pan, 5 Styrofoam cups, pipettes, food coloring, hot and cold water, paper towels, heat source

Procedures:

- 1. Collect the materials including finding a source of hot water. Very hot tap water will work great.
- 2. Ask students if they have ever swum in a lake. Ask where the coldest water is and see if students know why. Ask students if their feet are ever cold indoors in the winter and why that might be.
- 3. Read the introduction and directions with the students and show them where materials are located.
- 4. Allow time for students to work in groups to complete the tasks.
- 5. Ask a representative from different groups to come to the board and draw their results on the different tests. Discuss what happened on each and why.
- 6. Allow time for students to finish the analysis questions.

Scoring Guide:

- 1. Students set up and test their apparatus.....4
- 2. Students record data accurately.....4
- 3. Students participate in post lab discussion.....4
- 4. Analysis questions are correctly answered .....4
- 5. Conclusion thoughtfully written.....4