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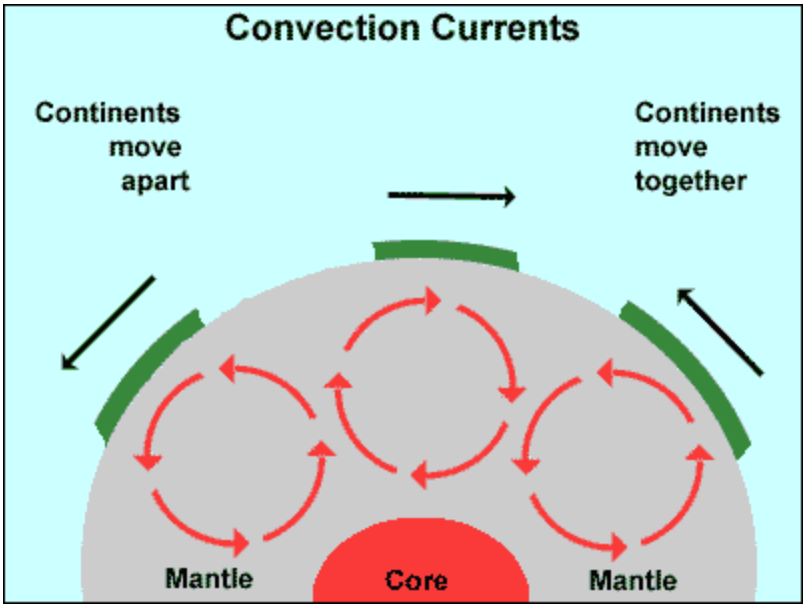
Dynamic Earth Mini-Unit

Modeling Convection Currents Lab #5

Learning Objective: Students will be able to describe how _____ cause _____ by analyzing an informational text and engaging in a lab exercise.

Pre-Lab:

Directions:
1. Read the following passage.
2. Annotate the reading (highlight and underline).
3. Re-state and answer the questions below.



Convection takes place when heated matter moves from one place to another (Heated matter becomes more buoyant and “rises” while cooler material “sinks”). Convection is common in both the atmosphere as well as in the oceans.

Convection currents in the Earth’s mantle are caused by very hot material at the deepest part of the mantle (next to the core) rising to the crust, cooling, then sinking again towards the mantle. Then, the cycle repeats! When the convection currents flow in the mantle they also move the crust, which floats above the mantle. The crust gets a free ride with these currents. If a portionof the mantle moves in one direction, then the plate on top of that portion willmovethat way as well.

1. Where do convection currents occur inside of the earth?

2. Which layer of the Earth provides the heat energy for the convection currents?

3. Describe the convection currents in a pot of boiling rice. How does a pot of boiling rice relate to convection currents in Earth’s mantle?

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Scientific Question: How does a heat source affect the path of paper dots in a glass beaker filled with water?

Materials:
• 2 250 mL glass beakers
• 1 hotplate
• 600 mL of tap water
• 10 Paper dots

Procedure:
1. Pour water up to the highest measurement into each beaker
2. Sprinkle 5 paper dots over the top of the water in each beaker* (If the dots do not sink, push them under the water with a pencil until they rest on the bottom of the beaker)
3. Place one beaker on the hot plate. Turn on the hot plate and place the beaker of water on the hot plate. DO NOT TOUCH ANY PART OF THE MODEL.
4. Leave the other beaker on the table. DO NOT TOUCH ANY PART OF THE MODEL.
5. Observe the beaker of water on the table. Record your observations in Table 1's column labeled: "Beaker without heat source." Then, draw a labeled illustration of the model in Table 2's column labeled: "Beaker without heat source."
6. Observe the beaker of water as it heats up. Wait until the water is boiling to record your observations in Table 1's column labeled: "Beaker with active heat source." Then, draw a labeled illustration of the model in Table 2's column labeled: "Beaker with active heat source."

Results:
Table 1

	Beaker without heat source	Beaker with active heat source
Record your observations. (What do you see/ what do you notice?)		

Table 2

	Beaker without heat source	Beaker with active heat source
Draw a labeled illustration of the model. Be sure to label the heat source and the path of the paper dots using arrows.		

Analysis:

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1. Develop a conclusion (3-5 sentences) that answers the scientific question. Defend your answer using qualitative evidence (descriptive) evidence from your results in Table 1 and 2. **4 points**

2. In a short paragraph (3-5 sentences) with a topic sentence explain how this controlled experiment relates to convection currents, the mantle, the core, and the crust. Be sure to use the words listed above and the information from the pre-lab text as textual evidence to support your answer. **4 points**

3. **Extra Credit:** In this model there is no representation of tectonic plates. To include them, what material be added to this experiment, and where would they be placed? **2 points**

Displaying Effort and Thoroughness	_____ / 2 points
Analysis Question 1	_____ / 4 points
Analysis Question 2	_____ / 4 points

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Extra Credit Analysis Question 3	_____ / 2 points
Total:	_____ / = _____ %