

[55] Heating Earth Surfaces

Purpose: In this lab, we were investigating the differences in heating and cooling between sand and water. The purpose is to model the differences between land and sea on the Earth.

Procedure - these are the instructions to follow

Your lab and equipment should be set up. Please see Mr. W if you need help with this.

You will be collecting data together, but each one of you needs to get the data.

1. Make sure your thermometers are reading about the same starting temperature.
2. Take your initial temperatures of the sand and water and add it to the data table (0 min.).
3. Choose somebody to keep the time. Set the timer for 10 minutes.
4. Turn on the lamp and start the timer.
5. Collect temperature readings for both sand and water every 2 minutes.
6. At 10 minutes, turn off the lamp and remove it from the ring stand.
7. Set the timer for 14 minutes and start it.
8. Transfer your 10 minute (heating) temperatures to the 0 minutes in the cooling table.
9. Collect temperature readings for both sand and water every 2 minutes.
10. Collect your final temperature at 14 minutes.
11. Take the plastic film off of the trays.
 - a. Dump the water out
 - b. Mix the sand around to get rid of excess heat.
 - c. Leave the plastic film off.

Heating

Minute	0	2	4	6	8	10 (0 cooling)
Sand temp. (°C)	30°	30°	33°	35°	35°	37°
Water Temp. (°C)	27°	27°	28°	28°	28°	29°

Cooling

Minute	0	2	4	6	8	10	12	14
Sand temp. (°C)	37°	37°	36°	35°	35°	34°	34°	33°
Water temp. (°C)	29°	28°	27°	27°	27°	27°	27°	27°

	Temperature Change (heating)	Temperature Change (cooling)
sand		
water		

Analysis

1. Complete these sentences. Use the words:

sand water

- a. _____ heats up faster than _____ .
- b. It takes longer for _____ to cool down than _____.

2. Using data to support your answers.

- a. Show the data that supports your answers for #1. Try to write it into sentences.

3. (Thinking Question) Why do you think one heats and cools faster than the other?

Variables

Variables are different types of data, information and conditions in an experiment

Dependent variable- this is what we measure in the experiment

1. What did we measure in the experiment?
2. What units did we use?
3. How did the data change over time in our experiment?

Independent - this is what we change in the experiment

1. What was constantly changing during the experiment? (not your dependent variable)
2. What units did we use?

Control - this is what we want to keep the same in the experiment

1. What did we try to not change in the experiment?
2. What did we keep the same between the sand and the water?
3. What was challenging to keep the same in the experiment?

Procedure

The procedure is the list of instructions for the experiment.

1. Was there any important information left out of the procedure?
2. How can the procedure be improved?

Graphing your data

On a separate piece of graph paper, graph the change in temperature over time. Attach your graph to the back of this packet.

- a. What kind of graph will you use (bar or line)
- b. What will be on your x-axis?
- c. What will be on your y-axis?
- d. Graph both the heating and cooling on the same graph.

Highly Proficient

Our lab is modeling the differences between the land and large bodies of water such as oceans and seas. Land and Sea breezes are one effect of the differences between the two.

1. Why are sea breezes during the day? Explain in detail.

2. Why does the breeze shift to a land breeze at night? Explain in detail and use evidence from the lab.

Learning Target: I can explain the causes of patterns of atmospheric and oceanic movement and the effects on weather and climate.

4 Highly Proficient	3 Proficient	2 Close to Proficient	1 Developing
<ul style="list-style-type: none"><input type="checkbox"/> Answers are complete and show thought.<input type="checkbox"/> The graph is correct and detailed<input type="checkbox"/> The results of the investigation are used to <u>explain</u> land and sea breezes.	<ul style="list-style-type: none"><input type="checkbox"/> The lab is complete and mostly correct.<input type="checkbox"/> I use data from the investigation as evidence.<input type="checkbox"/> My graph is complete and mostly correct.	<ul style="list-style-type: none"><input type="checkbox"/> I can describe the differences in heating and cooling between sand and water.<input type="checkbox"/> My answers need more detail.<input type="checkbox"/> Data from the investigation is missing.<input type="checkbox"/> Some of my information may be incorrect.	<ul style="list-style-type: none"><input type="checkbox"/> I am missing my graph<input type="checkbox"/> I show no understanding of the results of the investigation