

Heating Rates of Earth Substances-Inquiry lab

In this lab, students heat different substances like water, dirt, and sand, then measure the temperature change for each. The results are surprising!

Materials per student group: thermometer, lamp, water, dirt, sand, small dish/container/cup for each substance

Day 1

I gave my students very little structure. They were simply told to heat the different substances (water, sand, dirt) and measure the temperature change using the materials provided. I said nothing else, and then spent the rest of class observing them.

Results: about half of the groups did “ok”, and the other half did not.

Day 2

We reviewed day 1. I asked leading questions to help them realize any mistakes/errors they made. Examples-

- “Does it matter how much of each substance you put into each container?” (*problem- not equal amounts*)
- “Is there a problem with where this lamp is located?” (*problem-heat not evenly distributed*)
- Temperature-related questions:
 - “Where does the tip of the thermometer need to be?”
 - “How often should you check it?”
 - “Did anyone think to take a reading before switching on the lamp?”
- “Did anyone write anything down?”

You don't have to memorize all those questions. Just go into what I call “observation mode”. Have a setup of materials in front of you, and go through it piece by piece, noticing every-thing.

Notes:

- Results- dirt heats a little quicker than light brown sand, which heat a lot quicker than water.
- This lab, by the way, is an excellent springboard into the topics of Land Breezes and Sea Breezes, since it act like mini-model.
- Consider doing a Day 3 where you measure cooling rates of the substances. Warm the substances to the same temperature by putting a sample of each into a test tube, and then all test tubes into warm water for several minutes. Take a periodic temp. readings.

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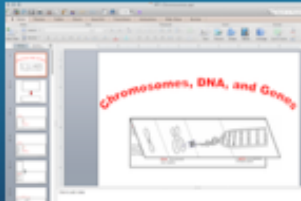
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