

Investigation: Rates of Heating and Cooling

Materials Per Group:

- Heat Lamp
- container filled with sand
- container filled with soil
- container filled with rock
- container filled with water
- empty container
- 5 Thermometers
- Poster paper
- Markers

Investigation Questions:

- How do rates of heating and cooling affect the earth's systems?
- How can we explain the behavior using a conceptual model?

Procedure (what we will do, after predicting what will happen):

- Half fill four containers with sand, soil, black rock and water.
- Place the thermometers in the air slightly above the materials in the 4 plastic bottles using items from the junk pile.
- Place the heat lamp above all 4 of the containers for a period of 10 minutes and record the temperature at 1 minute intervals.
- After 10 minutes with the lamp on, turn the lamp off and record the temperatures at 1 minute intervals for the next ten minutes.
- Record data, observations, and any questions that arise during the investigation.

Predict - Write down your answers in your individual science notebook:

- What will happen when we place the heat lamp over the different materials for a period of 10 minutes? Explain your reasoning.
- What will happen to the materials when the heat lamp is turned off for a period of 10 minutes? Explain your reasoning.

Briefly compare and discuss your predictions within your small group.

Investigate:

Execute the procedure and observe the results.

Individual Reflection:

In your science notebook, write down the answers to the following questions/prompts:

- How would you describe what you observed? (What was the behavior?)
- How would you explain what you observed, using a conceptual model? (What caused the behavior?)

Small Group Discussion:

- As a group, how would you represent this situation using a conceptual model?
What parts of the system would you include in your model?
Would there be a part of your model that is able to move? If so which part and why?
What parts would change in your model and what parts would stay the same throughout the process you just conducted?
- How would you explain what you observed to someone that has not conducted this investigation?
- Remembering that scientific models must include rules, can you think of rules that might need to be included within a conceptual model of this investigation?

Small Group Model:

- Using the small group discussion as a guide, create a conceptual model that explains what you observed throughout this investigation. Remember to incorporate the criteria that all scientific models must have.

Whole Group Discussion:

- Each small group will post and present their models to the whole class. The group presentations should include an explanation of why the group made the model they did and what the rules in the models are.