



Name _____

Period _____

Background Information: Heat from the sun reaches the Earth by radiation. When radiant energy from the sun is absorbed by the Earth, it is changed into heat. Variations in the weather occur because the sun's heat is unevenly transferred over the Earth's surface. The earth is made up of different surfaces such as

_____.

In this lab you will investigate how various surfaces of the Earth heat and cool at different rates. You will expose sand, soil, and water to a heat (light) source representing the sun. You will monitor the temperature and compare their warming behaviors. Then you will monitor the temperatures as warm sand, soil, and water cool. This simulates the situation when the sun goes down in the evening. You will then apply your results to local weather patterns.

Problem: Which surface will heat up the fastest? Which surface will cool down the fastest?

Hypothesis:

If (soil/sand/water) are exposed to a heat source, then (soil/sand/water) will heat up the fastest because _____

_____.

If (soil/sand/water) are taken away from the heat source, then (soil/sand/water) will cool down the fastest because _____

_____.

Materials:

goggles
soil
sand
water

Graph paper
lamp with a 150 W bulb
3 thermometers
Stop watch

In this experiment: Water represents _____

Soil represents _____

Sand represents the _____

Procedure:

1. Place the thermometers in each container. Place each container 20 cm from the light.
2. Read the temperature of each thermometer (C) and record it under 0 on the "Light On" data table.
3. Plug in the lamp.
4. Record the temperature every two minutes for 10 minutes and then turn the light off.
5. Record the initial temperature for each container under 0 on the "Light Off" data table. Put your containers on the "Light Off" mat away from the heat source.
6. Record every minute for the next 10 minutes on the "Light Off" table.

Data Tables:

"Light On"

Time in minutes

Container	0	2	4	6	8	10
Sand						
Soil						
Water						

"Light Off"

Time in minutes

Container	Starting Temp	2	4	6	8	10
Sand						
Soil						
Water						

I observed that _____ heats up the fastest and _____ cools down the fastest. How does this relate to winds?

Create a graph with your results.

Analysis:

1. According to your data, which material was warmed faster by the "sun", the water, soil, or the sand? Why did this happen?
2. As surface materials are warmed by the sun, they in turn warm the air above them. As the sun shines, is the air above the sand, soil, or the water warmer?
3. In this experiment, why was it important to use the same size container and to have the containers the same distance from the heat lamp?

Extensions:

1. Brainstorm with your group other factors that might contribute to the uneven heating of Earth's surface?
 - _____
 - _____
 - _____
 - _____
2. Scientists use models to make predictions and describe real world phenomena. Using a shoebox, create a model that can represent the many reasons why the earth is heated unevenly by the sun. Be creative!
3. Suggest further experiments we can do on this topic.
 - _____

