

WORKSHEET 17

Activity - Getting Warmer

Print and copy this worksheet for use in the classroom.

Purpose

In this activity you will examine how different materials absorb energy from the sun.

Equipment

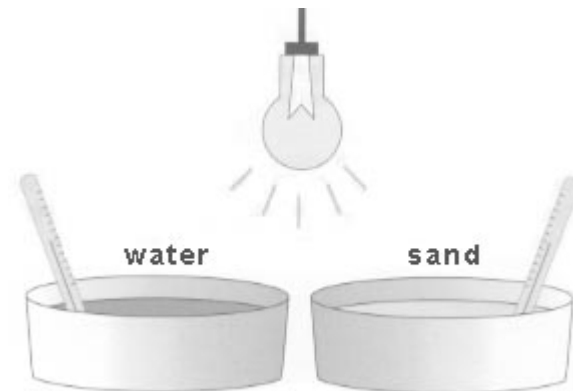
- desk lamp, reading light or 100 watt globe
- stand and clamp
- two shallow bowls or similar containers
- dry sand or soil
- two thermometers

Safety

Take care that you don't touch the hot globe.

Procedure

1. Pour water to a depth of about 2 cm into one bowl.
2. Put the same depth of dry sand in the other bowl.
3. Place a thermometer in each bowl, with the bulb just below the surface.
4. Put the bowls next to each other and clamp the globe about 5 cm above where the bowls touch.
5. Draw up a table and add data during the experiment.
6. Record the temperature in each bowl before the lamp is turned on.
7. Turn on the lamp. Leave it on for five minutes. Record the temperature in each bowl after each minute.



8. After five minutes, turn off the lamp. Continue to read the temperature in each bowl after each minute for another five minutes.
9. Draw a graph to show how the temperature changed in each of the bowls. You can plot the temperatures in both bowls on the same graph.

Time (minutes)	Temperature of water	Temperature of sand
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Questions

Answer the following questions in the spaces provided.

1. What was the temperature increase during heating in the:

A) Water?

B) Sand?

2. How did the temperature changes in the water compare with those in the sand?

3. Which heats up more quickly during the day - water (such as lakes or the sea) or land? Which cools more quickly when sunlight is absent - land or water?

4. Let's say you wanted to build a house that will store the energy of the sun in its walls so that it was warm during the night. What kind of walls could you build that would do this best, using the materials you tested in this activity? Why did you choose that material?

5. Use your graph to try to predict how long it would have taken the sand and the water to cool to their original temperatures

Explanation

Much of our weather is due to water and land absorbing different amounts of energy from the sun.

Different substances absorb heat at different rates. Even different colours absorb different amounts of heat. A black brick, for example, will warm more quickly in the sun than a lighter coloured brick made of the same material.

Ice and snow, for example, reflect a great deal of the sun's energy back into the atmosphere. Soil and sand absorb much of the sun's energy.

Extension activities

Repeat the experiment using soil. How does the temperature change compare with sand? Can you suggest an explanation if you notice any difference?

Repeat the experiment with the water bowl, this time gently stirring the water throughout the 10 minutes. How does stirring affect the temperature changes? Suggest an explanation for any change that you observe.

Why do people in hot countries favour light coloured clothes? Are dark clothes better in cold weather?