

AIM | Which heats faster, land or 10 | water?

Have you ever walked on the beach on a hot day? The sand can burn your feet. But the water can sure make you shiver! Why is this?

Different materials heat up differently. It takes the ocean water a longer time to warm up than the sand.

When the sun goes down, the sand becomes cool. It loses heat quickly. Meanwhile, the water stays at about the same temperature. If something takes a long time to heat up, it usually takes a long time to cool down. If something heats up quickly, it cools down quickly, too.

Did you ever wonder why many people wear white clothing in the summer? It helps keep them cooler. Different colored materials take in (absorb) heat differently. Usually darker colors absorb more heat than light colors. Darker colors absorb heat faster, too.

Later on in this Aim, you can see for yourself how different materials absorb heat at different rates. Knowing this will help you understand how different parts of the earth are heated.

EXPERIMENTING WITH HEAT

PURPOSE: To find out which heats faster, land or water

What You Need

- beaker of sand
- beaker of water
- thermometers (2)
- tripods (2)
- alcohol burners (2)
- blocks of wood (2)
- wire screens
- ring stand
- clamp

How To Do the Experiment

1. Set up the materials. (Figure A shows how to do it.)

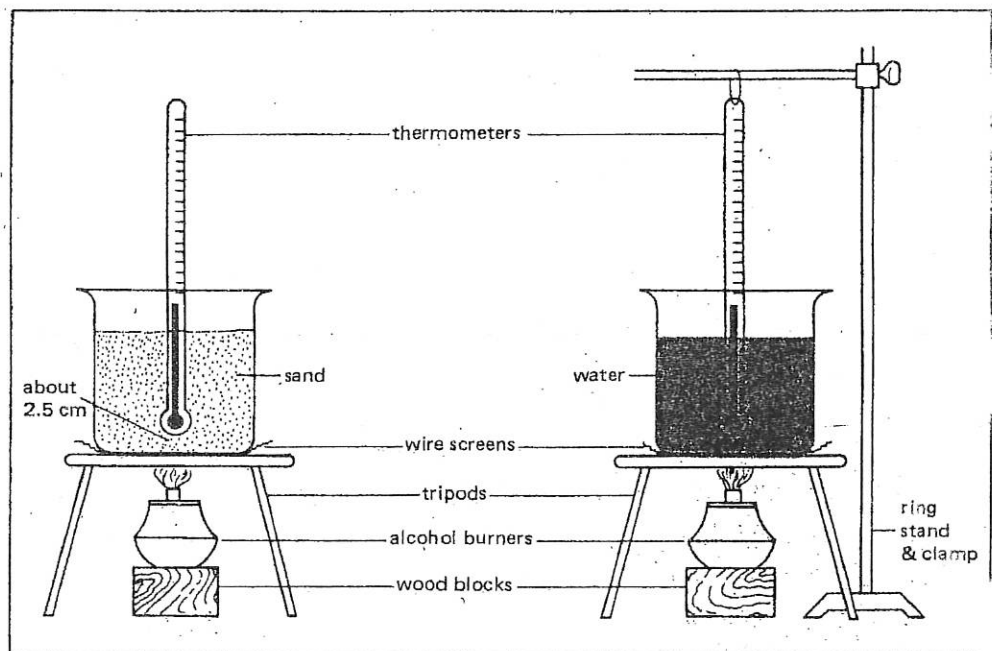


Figure A

2. Read the thermometers *before* you light the burners. Write the temperatures down on the chart at 0 minutes. (The chart is on page 58.)
3. Light the burners.
4. After one minute, read the thermometers. Write down the temperatures on the chart.
5. Repeat step 4 six times. Write down the temperature at the end of each of the next 6 minutes.
6. Put out the flames.

NOTE: If the sand reaches a temperature of about 68° C (150° F) before 7 minutes, put out both flames. Use the temperature readings up to that point.

Minutes	Temperature—Sand	Temperature—Water
0		
1		
2		
3		
4		
5		
6		
7		

What You Learned

1. a) What was the temperature of the sand before it was heated? _____
 b) What was the temperature of the sand after it was heated for 7 minutes?

 c) How many degrees hotter did the sand become? _____
2. a) What was the temperature of the water before it was heated? _____
 b) What was the temperature of the water after it was heated for 7 minutes?

 c) How many degrees hotter did the water become? _____
3. This experiment shows that sand heats up _____ than water.
slower, faster
4. From this experiment we now can deduce that land heats up _____ than water.
slower, faster

EXPERIMENTING WITH HEAT USING SAND AND SOIL

PURPOSE: To find out which heats up faster, dark or light objects

What You Need

- flat pan
- white sand
- dark dry soil
- thermometers (2)
- light bulb

How To Do the Experiment

(Start this experiment at the beginning of a class period.)

1. Set up the materials. Place the white sand on one half of the flat pan and the dark soil on the other half. Put the bulb ends of both thermometers under the surface of the sand and soil. Do not light the light bulb yet. (Figure B shows how to set up the experiment.)

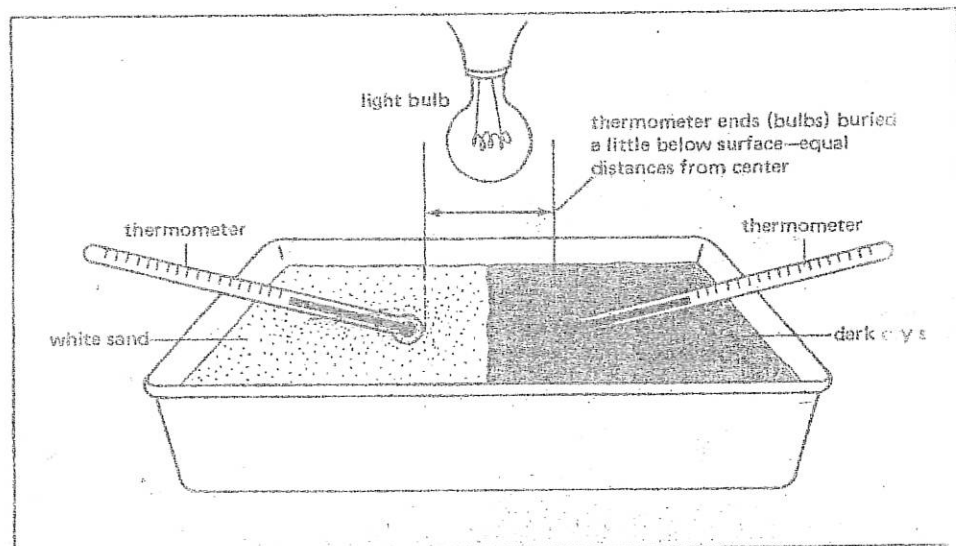


Figure B

2. Read the temperatures of both thermometers. Write the temperatures on the chart at 0 minutes.
3. Light the light bulb.
4. After about 20 minutes, read the thermometers again. Write the temperatures in the chart below.

Minutes	Temperature—Light Sand	Temperature—Dark Soil
0		
20		

What You Learned

1. a) What was the temperature of the white sand before it was heated?

- b) What was its temperature after it was heated for 20 minutes?

- c) How many degrees hotter did the sand become? _____
2. a) What was the temperature of the dark soil before it was heated?

- b) What was its temperature after it was heated for 20 minutes? _____
- c) How many degrees hotter did the dark soil become? _____
3. This experiment shows that dark-colored soil heats up _____ than light-colored sand.
slower, faster
4. In general, dark-colored objects heat up _____ than light-colored objects.
slower, faster

**REACHING
OUT**

How would you show that water cools slower than land?

(Hint: Use the same materials as you did in the first experiment.)
