

VIII. Getting warmer

Key Question: How to make things warmer?



Student name:

Class:

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Activity 1 - Which color gets hotter?

- Take two pieces of fabric, one white and one black. Place one hand under the white fabric and the other under the black fabric. Find a sunny place. Let sunlight or strong lamp warm the fabrics.

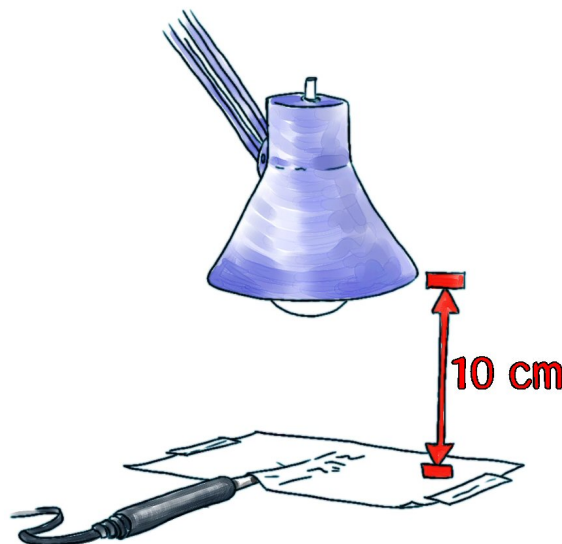
1. Do your hands feel the same?

2. Describe what each hand feels:

The hand under the white fabric:

The hand under the black fabric:

- Tape a piece of white paper to the table surface. Leave one side of the paper not taped.
- Place the temperature sensor under the white paper as shown in the picture.
- Place a lamp about 10 cm above the paper.



- Turn the lamp on and start the measurement.

- Record the begin temperature and the end temperature in the table below.
- Repeat the experiment but now replace the white piece of paper by a black piece of paper.
- Place the temperature sensor under the black paper in the similar way as for the white paper. Keep the lamp in exactly the same position, 10 cm above the paper.
- Start the measurement again. Write the begin temperature and the end temperature in the table below.
- Calculate the temperature difference for each colour.

COLOUR	BEGIN TEMPERATURE (°C)	END TEMPERATURE (°C)	TEMPERATURE DIFFERENCE IN 5 MINUTES (°C)
White			
Black			

3. Which colour does get warmer? Explain how you know that.

Activity 2 – What does get warmer, sand or water?

How fast land and water heat and cool influences our weather. In this investigation you will heat sand and water, and see which warms faster.

- Fill a test tube 2/3 full with sand.
- Place a one-hole stopper into the temperature sensor as shown in the picture. Carefully place the sensor in the sand.
- Place a lamp about 10 cm from the test tube.
- Turn the lamp on and start the measurement.
- Record the begin temperature and the end temperature in the table below.
- Fill another test tube of the same size 2/3 full with water and repeat the experiment.
- Keep the lamp in exactly the same position as in the previous experiment, 10 cm from the test tube.
- Turn the lamp on and start the measurement again.
- Record the begin temperature and the end temperature in the table below.
- Calculate the temperature difference for each substance.



SUBSTANCE	BEGIN TEMPERATURE (°C)	END TEMPERATURE (°C)	TEMPERATURE DIFFERENCE IN 5 MINUTES (°C)
Sand			
Water			

4. What does it get warmer, sand or water? Explain how you know that.

Activity 3 - Greenhouse effect

5. In a greenhouse we can grow plants even in cold weather. What do you think is the temperature inside the greenhouse compared to outside air?

In this experiment you are going to measure temperatures in a greenhouse model and in a control model as they are heated.

- First you are going to measure the temperature in a control model. Take a beaker. Place a black paper (this is like a layer of soil) at the bottom of the beaker.
- Place the temperature sensor in the beaker.
- Place a lamp about 10 cm above the beaker.
- Turn the lamp on and start the measurement.
- Record the begin temperature and the end temperature in the table below.
- Now close the beaker tightly with plastic wrap as shown in the picture. This is now a model greenhouse.
- Keep the lamp in exactly the same position as in the control experiment, 10 cm above the beaker.
- Turn on the lamp and start your measurement.
- Write the beginning and the end temperature in the data table below.
- Calculate the temperature difference for each model.



SUBSTANCE	BEGIN TEMPERATURE (°C)	END TEMPERATURE (°C)	TEMPERATURE DIFFERENCE IN 5 MINUTES (°C)
Control model			
Greenhouse model			

6. Did the model greenhouse warm faster or slower than the control model? What do you think caused the difference?

Questions

A. Which colour clothes would you wear to stay cool on a hot sunny day?

B. Which colour clothes would you wear to stay warm on a bright winter's day?

C. On a sunny day at the beach, which heats faster, the sea or the sand?

D. Explain why a closed automobile heats up in the sun.