

# Observations and measurements about heat transfer and heat content

## ACTIVITY 1 How well does the Sun heat the Earth?

### Prediction

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Which heats up the fastest, land or sea?

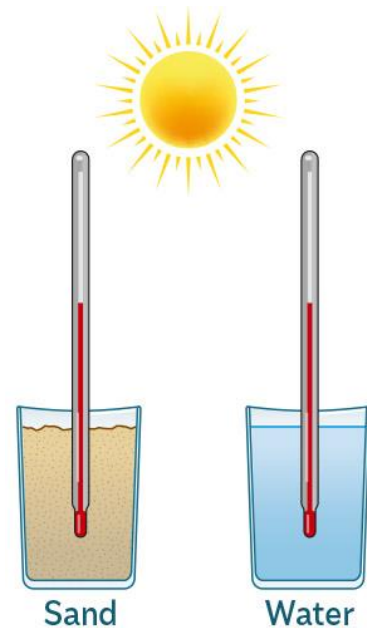
### Materials

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- 2 jars or buckets
- Sand/soil
- Water
- 2 thermometers

### Instructions

1. Fill up the two jars; one with sand, the other one with water.
2. Put a thermometer into the jar of sand. The bulb of the thermometer should be about 3-4cm into the sand.
3. Put the thermometer into the jar of water. The bulb of the thermometer should be held at about 3-4cm into the water. Make sure the thermometers are not touching the sides or base of the container.
4. Place the jars in the sun.



### Observations

1. Record the temperature at the start.
2. Record the temperature after 10 minutes.
3. Continue to take measurements every 10 minutes until the temperature is constant.
4. Collect the results from other groups and find the average at each 10 minute interval.
5. Graph the class results – which heated faster, earth or water?

### Question

Which one had the greatest increase in temperature?

### Something extra:

What effect do you think this would have on our climate, particularly places by the sea?

## ACTIVITY 2 How fast does earth and water cool?

### Prediction

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If the buckets are moved into the shade or somewhere cool, which one will show the greatest drop in temperature?

### Observations

1. Move them to a shady place and record the temperature of the two buckets.
2. Measure the temperature every 10 minutes.
3. Do this again a couple more times, so they have been left for 30 minutes.

### Questions

1. Which one held the heat for the longest time?
2. What are some of the consequences of these results if air temperature continues to rise due to climate change for the land? For the ocean?

### Explanation

1. Was your prediction correct?
2. Can you explain what has happened and why?
3. What effect do you think this would have on our climate, particularly places by the sea?

### What we want participants to learn

- Water can hold more heat energy than sand or soil.
- This is the reason why water heats up more slowly and cools more slowly.
- The oceans hold a lot of heat energy. In fact the amount of heat energy in the top 3 metres of ocean is roughly equivalent to the same amount of heat energy in the whole of the atmosphere.