KeScienceCube

Changes in the Temperature of Sand and Water

Learning Objectives

1. Observe and explain the temperature changes by turning a light on and off with sand and water.
2. Interpret the temperature change graphs of water and sand.

Should I think about it?

Which will heat up faster when a light is shone on water and sand?

Learning Content

1. Temperature Changes on Land and Water Surfaces

- The temperature changes on land are greater than on water surfaces.
- During the day, the land's temperature is higher, and at night, the water's temperature is higher.

2. Why Does the Wind Blow?

- Air moves from a cold area to a warm area when there is a temperature difference between two places.
- This movement of air is called "wind."

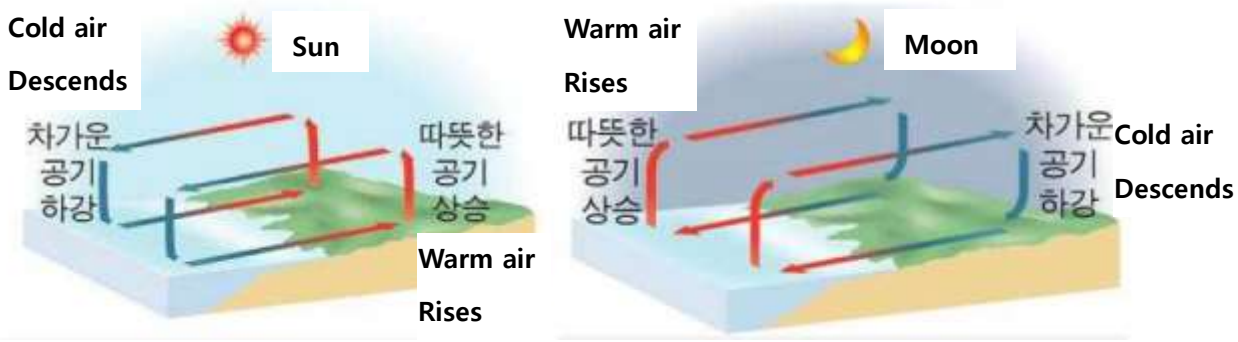
3. Wind Direction at the Seaside

1) Comparing the temperatures of land and sea during the day and night

- Day: Land > Sea

- Night: Land < Sea

2) Wind direction at the seaside



- During the day, the land heats up faster than the sea, causing cool air from the sea to move toward the land, creating a "sea breeze."

- At night, the land cools down faster than the sea, causing cool air from the land to move toward the sea, creating a "land breeze."

3) Reason why the land heats up faster than the water

When the same amount of heat is applied, sand heats up faster than water because water requires more energy to increase its temperature.

4. Temperature Sensor

- Can measure temperatures ranging from -50℃ to 180℃.
- The sensor's tip has a component whose resistance changes with temperature, and this change in resistance is displayed as the measurement value.
- Made of stainless steel.

Experimental Activities

Materials Needed

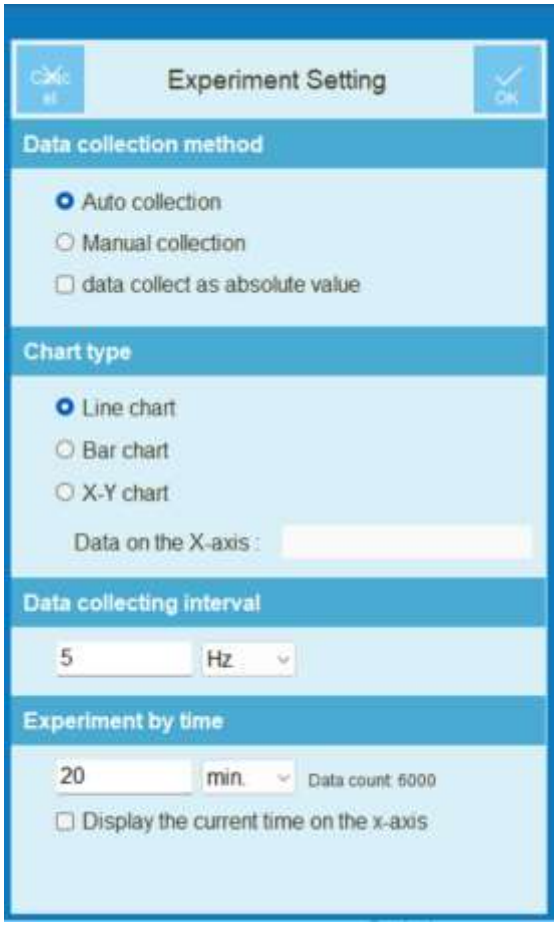
Interface, Science# program (smart device), 2 temperature sensors,

2 500mL beakers, stand, 2 clamp holders, lamp, water, sand

Experiment Procedure

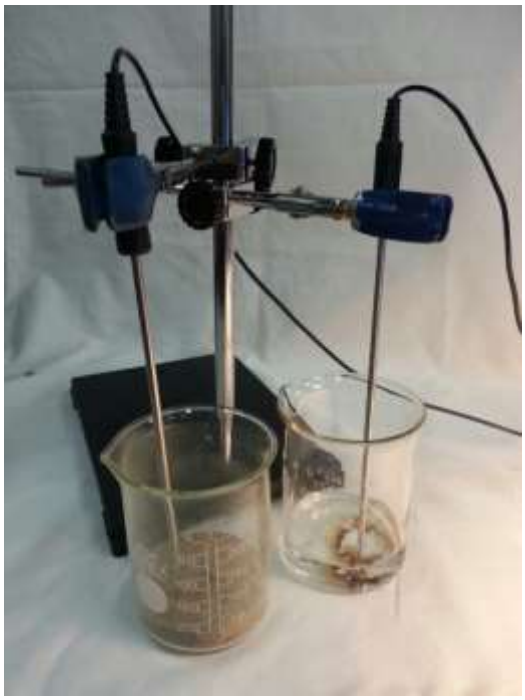
Preparing the Equipment

1. Run the Science# program on the smart device and connect it to the powered interface via Bluetooth or cable.
2. Connect two temperature sensors to the interface..
3. Press the button  on Science# to automatically set up the experimental environment as shown below.



Conducting the Experiment

1. Fill each of the two beakers with approximately 50mL of sand and water, respectively.
2. Secure two clamp holders on the stand, and attach each temperature sensor to a clamp.
3. Adjust the height so that the temperature sensors are inserted about 2cm deep into the sand and water.
4. Place a lamp in the middle of the sand and water, and turn on the lamp. (If you have additional lamps, you can place one lamp each for the sand and water to observe results more quickly.)



5. Press the button  and conduct the experiment with the lamp on for about 10 minutes. After 10 minutes, turn off the lamp and observe the temperature changes.
6. The experiment will automatically end after the set time.

Experimental contents

1. Graph the temperature changes of sand and water when the lamp is turned on and off, and compare them.

2. Record the temperature changes of sand and water in a table when the lamp is turned on and off, and calculate the temperature differences.

[When the lamp is on]

Category	Initial Temperature (℃)	Final Temperature (℃)	Temperature Difference (℃)
Sand			
Water			

[When the lamp is off]

Category	Initial Temperature (℃)	Final Temperature (℃)	Temperature Difference (℃)
Sand			
Water			

Experimental results

1. Explain the temperature changes of sand and water when the lamp is turned on and off.

Category	Explanation
When the lamp is on	
When the lamp is off	

2. Explain the temperature changes of land and sea on a clear day, and think about the wind direction.