

Investigation Two – Thermometers

Standard II Students will understand that the elements of weather can be observed, measured, and recorded to make predictions and determine simple weather patterns.
Objective 1 Observe, measure, and record the basic elements of weather.
Intended Learning Outcomes <ol style="list-style-type: none">1. Use science process and thinking skills4. Communicate effectively using science and language and reasoning

Standard II

Objective 1

Background Information

A thermometer is a delicate instrument used for measuring temperature. It needs to be handled carefully so that it doesn't break. The liquid inside the glass tube expands as it is heated and rises up a thin tube. A scale next to the tube reads in Fahrenheit or Celsius or both. Soil generally absorbs heat from the sun faster than water, so it is usually warmer. Shiny or light-colored surfaces reflect more of the sun's energy than dark colors, so they are cooler. Heat rises in a room, so temperatures taken at the ceiling level are generally warmer than at floor level. Communicate with necessary school personnel to let them know that students will be measuring temperatures around the building. Students should be asked not to measure the temperature of certain areas such as fish aquariums and restrooms. They should also let the thermometer rest on a surface for at least two minutes before reading the temperature.

Pre-Assessment/Invitation to Learn

Tell students that each one of them or each group will be given a thermometer and a baggie with ice cubes. Ask them to see if they can make the temperature rise and fall without leaving their seats. After a few minutes, ask them how they were able to make the temperature of their thermometers rise and fall.

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| Materials <ul style="list-style-type: none"><input type="checkbox"/> Thermometer<input type="checkbox"/> Sandwich Zip-lock baggie with ice in it. |
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Instructional Procedure

Activity 1 – Hot Hands on Science

Materials

- Thermometer
- Recording sheet
- Pencil
- Graph paper
- Crayons, markers, or colored pencils

1. Assess the students' understanding of the use and care of a thermometer.
2. Assign them to take a recording sheet, a thermometer, and their pencil outside or somewhere in the school. Tell them to take five minutes to measure the temperature of any surface and write down the location and the temperature on their recording sheet. Then they are to return to the classroom. (This can be done in groups if you don't have enough thermometers for each student.)
3. Ask them upon their arrival to share their findings. At this point, the data can be written on the board or on a weather chart in their journals.
4. As a class, have them graph results of their findings.
5. Have the students write why the thermometer readings are different throughout the room, school, or playground. Read them in class and have a discussion about the differences.

Activity 2 – Making a Class Thermometer

Review that the students learned about the thermometers and the uses of thermometers. Show them a thermometer and have them explain how they think they work to measure temperature. Explain to them that when the water in the bulb begins to heat up it expands and goes up the tube. The warmer it gets the higher it goes. Tell them that they are going to make thermometers today to see how they work on a larger scale. (Teachers can make one as a class demonstration or have groups of students make one.)

Materials

- Water bottle with lid
- Hollow balloon stick (party store)
- Food coloring
- 4 x 6 Cards
- White glue
- Hammer
- Nail
- Tape
- Marker
- Large classroom thermometer

1. Pass out materials and provide directions to make homemade thermometers.
2. Fill the containers with cold water. Add two drops of red food coloring to the water.
3. Punch holes in the center of the lids with a nail and hammer.
4. Place the lids on the containers and slide the balloon sticks through the hole.
5. Place white glue around the balloon sticks to seal them in place and make them airtight.
6. Have students write their names on the back of their index cards. Carefully tape the cards vertically to the balloon sticks.
7. Have the bottles stand for a day for the water to adjust to the temperature of the room. As the water in the containers get warmer, the water will rise in the balloon sticks.
8. After the water has adjusted to the temperature of the room, mark the height of the column of water on the card. Use a thermometer to find the current room temperature and write it next to the mark you made.

9. Place the containers on the plate (in case of spills) in different places throughout the classroom, school, and/or outside where the air temperature can be measured.
10. Check regularly to see if the liquid in the balloon sticks change over the next few days. Have the students record any changes in their journals.

Activity 3 – Observing and Recording Temperature Data

Tell the students we will observe the temperature each day with a thermometer just like a meteorologist. We will record the temperature each day for a few days.

1. Go outside and observe the temperature (same time each day). Have the students enter the data in their journals.
2. Discuss the observations.
3. Keep a daily chart of the temperature for several days.

Materials

- Thermometer
- Paper to record temperature

Curriculum Extensions

Fine Arts/Visual Arts –

- Have pictures of different places from around the world that have different climates that show different temperatures. Have students tell what effects the temperature has on plants, animals, and people. Can they predict what type of activities people will be doing or the clothes they would be wearing at certain outside temperatures? Can they make observations about where people may choose to live because of the temperature? Do they notice changes in the temperature outside as it becomes windy, cloudy, or starts to rain or snow? (Standard IV, Objective 2)

Science –

- Explain to students that people in other parts of the world use the Celsius scale. Ask them to make comparisons to temperature on the Fahrenheit scale. (ILO 1)
- The sun is responsible for the weather on planet Earth. One kind of energy we get from the sun is heat. The sun does not directly heat up the air. Air is heated by the land or water beneath the air. Land and water heat up and cool down at different rates, the air, therefore, heats unevenly. This uneven heating of the air causes wind and changes the weather. Try the following experiment to see the difference between the cooling of soil and water. (ILOs 1, 2, 4)
 1. Get two cups and fill one cup half full of water and one cup half full of soil.
 2. Let the cups sit in a room for a couple of hours without sunlight on them to get them to room temperature.
 3. Place the thermometers deep into each cup. After three to five minutes record the beginning temperatures of the water and soil.

4. Place both cups in the direct sun or under a bright lamp.
5. After 15 minutes, record the temperatures of both thermometers.
6. Now place both cups in a refrigerator
7. After 15 minutes, record the temperatures of the thermometers.
8. Explain your findings.

Assessment Suggestions

- Observe students for accuracy as they take measurements of temperature.
- Evaluate their success at making a homemade thermometer.

Resources

Newspapers:

- Students can bring in newspapers with daily weather maps and forecasts.

Web sites:

- www.ksl.com (For current temperature reading and forecasts)

Phone Numbers:

- Some communities provide a current time and temperature phone number that students can call.

Homework & Family Connections

- Students with Internet connections at home can be asked to visit weather Web sites.
- Students can be assigned to watch the evening weather forecast on one of the TV news channels.
- Some students may be able to purchase a thermometer to place outside at their home to check the daily temperature.
- Students could investigate experiments dealing with temperature as part of a school science fair.