

2. Exploring Environmental Temperatures

Under a Rock, Up a Tree

Driving Question

Does the temperature vary at different places in my local environment?

Materials and Equipment

For each student or group:

Mobile data collection system

Temperature sensor

Safety

Add this important safety precaution to your normal laboratory procedures:

- Care should be taken to not disturb the environment.

Thinking about the Question

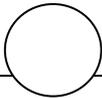
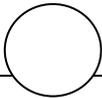
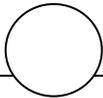
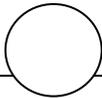
Is the temperature in an attic the same as in a basement? What is the difference between the temperature in the shade versus that in direct sunlight? How does the surface temperature of the ground differ from areas below the surface? How different are the temperatures next to a window and next to a heating duct? Is the temperature warmer above or underneath a rock?

As various environmental conditions change in your surroundings, the temperature measured by your sensor changes. Humidity, pressure, airflow, and time of day are just a few of the factors that can alter your readings.

Discuss with the group members areas in your local environment that vary in temperature.

Sequencing Challenge

The steps below are part of the Procedure for this lab activity. They are not in the right order. Determine the proper order and write numbers in the circles that put the steps in the correct sequence.

			
Decide on some locations in the room, the building, or outdoors to investigate.	Make sure each lab group member is aware of safety rules and procedures for this lab.	Collect temperature data from the different locations on your list.	In your lab notebook or worksheet, name and describe the locations you will test.

Investigating the Question

Note: When you see the symbol "♦" with a superscripted number following a step, refer to the numbered Tech Tips listed in the Tech Tips appendix that corresponds to your PASCO data collection system. There you will find detailed technical instructions for performing that step. Your teacher will provide you with a copy of the instructions for these operations.

Part 1 – Selecting the locations

- Choose at least ten sites to investigate that will provide you with different temperature readings as a result of changing conditions or factors in the surrounding environment. These sites could include various parts of rooms and buildings, open and wooded areas, and locations around buildings. List them in Table 1.

Table 1: Locations

Locations	
1.	6.
2.	7.
3.	8.
4.	9.
5.	10.

2. Write your observations and descriptions for each location in Table 2. Include the following in your description if you feel they will affect the temperature reading:

Is the site in full sunlight?

How protected is the location by surrounding objects, trees, or buildings?

What is the material covering the site?

Does the location have a certain color?

What were the local weather conditions?

Table 2: Locations with observations and descriptions

Locations	Observations and descriptions
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Part 2 – Making predictions

3. Predict the temperatures of each selected location. Record your predictions in Table 3.

2. Exploring Environmental Temperatures

Table 3: Predicted temperatures for each location

Locations	Predicted temperature (°C)
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

4. Explain your predictions in Table 4.

Table 4: Predicted temperatures with explanations for each location

Locations	Predicted temperature (°C)	Explanations
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Part 3 – Taking temperature measurements

5. Start a new experiment on the data collection system. ♦^(1.2)
6. Connect a temperature sensor to the data collection system. ♦^(2.1)
7. Display Temperature in a digits display. ♦^(7.3.1)
8. Go to your first location and monitor data without recording. ♦^(6.1) After the temperature reading stabilizes, record the temperature in Table 5.
9. Repeat the previous step, recording the temperature reading taken at each site in Table 5.

Table 5: Temperature readings for each location

Locations	Predicted temperature (°C)	Temperature reading (°C)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

10. Discuss with your lab partners how temperatures vary from location to location. List any patterns or findings below.

Answering the Question

Analysis

1. How did your temperature predictions compare to the actual temperatures? If there were differences, explain why you think they occurred.

2. How does the amount of sunlight affect the temperature of a location?

3. How does the amount of protection from surrounding objects, buildings, or trees affect the temperature of the location?

4. How does the type of material covering the location affect the temperature?

5. How does the color of the location affect the temperature?

6. How did local weather conditions affect the temperature of each location?

7. Discuss with your lab partners how temperatures vary from location to location. List any patterns or findings below. Be prepared to share your findings with the class.

True or False

Enter a "T" if the statement is true or an "F" if it is false.

- _____ 1. Temperatures in the environment depend on many factors, including exposure to the sun.
- _____ 2. The area underneath a rock can be warmer than the area near the rock, on a very cold day.
- _____ 3. Generally, the upper part of a room is warmer than down at the floor.
- _____ 4. On a hot, sunny day, a dark colored object will absorb less energy from the sun than a light colored object.
- _____ 5. The coolest time of the day is just before dawn.
- _____ 6. On a very hot day, the outdoor temperatures at different locations around the outside of a building will all be the same.

2. Exploring Environmental Temperatures

Key Term Challenge

Fill in the blanks from the randomly ordered words below:

energy	sun	light	wind
dark	temperature	surface	degrees Celsius

1. The _____ sun _____ is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle.
2. In the SI system, temperature is measured in _____.
3. Surfaces that are _____ in color tend to absorb more energy from the sun than surfaces that are _____ in color.
4. _____ is a measure of the average kinetic energy of the particles that make up a substance.
5. Light and heat are both a form of _____ provided by the sun.
6. Any _____ protected from frost or sunlight will not register the same temperature as a nearby exposed area.
7. Whether or not an area is sheltered from _____ is a factor affecting its temperature.