Temperature Activity 2

In the Shade of the Old Oak Tree

Objectives and Standards
- To understand the effects of shade, trees, wind, and other parameters on local temperature.

NSTA Standards Addressed
Content Standards
A, B, D, F, G

4-H SET Abilities Addressed
Predict
Hypothesize
Test
Measure
Use Tools
Observe
Interpret/Analyze/Reason
Model/Graph/Use numbers
Compare

Supplies Needed

- Thermometers
-pencil
-worksheet

Background

As a species, people have been able to survive in a number of different habitats despite the terribly hot, dry temperatures of the desert or the freezing temperatures of the arctic. This is due, in part, to information we have learned about weather, temperature, and the number one heat producer, the Sun. In this activity, we examine how slightly different environments within the same climate zone have different temperatures.

CoCoRaHS Extension Ideas

Discuss as a group the location of your rain gauge, hail pad, and snow plate. What characteristics make a good location for collecting weather data? Is temperature the only thing that is affected by buildings, trees, and hills? How could your data collecting location be better situated? How could it be more poorly situated? Take different precipitation measurements in different areas of the yard for a period of time and compare them. How were different areas affected by things like buildings and trees? Does this have an impact on a regional or global scale?

Preparation Needed

Before the activity, select at least five locations outside for youth to take temperature readings. Pick at least one location near a building, one far from a building, one in a shady area or near a tree, and one in direct sunlight. If available, measure temperature directly above an asphalt or other very dark surface directly in the Sun.

Activity

1. Give youth the worksheet and ask them to complete the hypothesis section. Explain that we will go outside and measure the temperature in various places, and direct youth to those places in groups of 2 or 3.
2. At each location, students place their thermometers on a sheet of paper or a clipboard to find the temperature. Youth should NOT hold the thermometer in their hand, as the thermometer will then measure the temperature of their hand. Remind youth that it may take a couple minutes for the thermometer to calibrate to the temperature of the new location.
3. Youth list the place and temperature on their data chart worksheet.
4. Using all data points collected by each group, the youth calculate an average temperature for that time and place. To do so, they add all temperature values up and divide by the total number of temperature readings that they collected.
5. Look up the National Weather Service (NWS) recorded temperature for your area for the day at www.nws.noaa.gov, or look in your local newspaper for the day's expected temperature.

Discussion

Discuss the difference between the group's recorded temperature average and the NWS or newspaper temperature. The NWS temperature is collected at different times throughout the day and averaged together to form a daily temperature.

Were the temperatures exactly the same at each location? Why or why not? What was the role of the shaded environment? Of the location near the building? What was the biggest role in the change in temperature? What are some other factors that might affect temperature?

Land use plays a huge role in the temperature of an area. Since the Sun heats Earth, places that are shaded from the Sun are cooler than places that are not. Also, the Sun's rays reflect differently on different types of surfaces. This is called albedo, and high albedo means high reflectiveness, less light absorbtion and more reflected, and therefore cooler temperatures, while low albedo means low reflectiveness, more light absorbtion, and therefore warmer temperature. This is why you wear a light shirt in the summer to stay cooler.

Trees, grass, cement, building material, and asphalt all have different albedos, and therefore absorb different amounts of the Sun's energy. Based on your experiences in this activity, talk about what types of land use are good for keeping your community cooler, and what types of land use make your community warmer. Do you think how we use land matters in how warm the global temperature is? Do you think the small changes you saw in this activity are enough to impact animals and plants in your area? What about globally?

In the Shade of the Old Oak Tree Worksheet

Question Tested: Will temperatures taken at the same time in various places throughout this yard be the same or will they be different based on other things present in the yard?

Hypothesis (Question Tested): Temperatures recorded in various places in the yard will mostly be _____ (the same/different).

Experiment: Take your thermometers, worksheets, and pencils out to each location set up by your leader. For each location, place the thermometer on a flat surface and let it sit for AT LEAST 2 minutes so that the thermometer can get an accurate reading. Record the temperatures at each location in the chart below. If you go to more locations, record the data below the chart. Remember to record the units you're measuring temperature in!!

Reading #	Location	Temperature
1		
2		
3		
4		
5		

Analysis of Data:

1. The temperatures recorded in the chart are mostly _____ (the same/different).
2. The average temperature for today, recorded by the National Weather Servicec (or other agency) is _____.
3. The average temperature of every group's readings together is _____.
4. Our temperature readings are _____ (the same/different) than the National Weather Service temperature.
5. Explain why there might be a difference in the two readings.

6. Was your hypothesis proven or disproven? _____
7. Why might temperatures measured in different places within a small area be different?

Please send us your feedback!

As a 4-H Educator, you know what has worked well, what has not, and how we can improve the *Tracking Climate in Your Backyard* curriculum. Please share your feedback about the curriculum. We'd love to receive copies of any reports or newspaper coverage about completed *Tracking Climate in Your Backyard* projects.

Fax or mail your completed feedback to Trisha Smrecak, Museum of the Earth, 1259 Trumansburg Rd., Ithaca, NY, 14850 or fax to: 607-273-6620.

Check the activity completed	Suggestions for improving the activity
Rainfall Activities ☐ Make It Rain ☐ Where Does the Rain Come From? ☐ Stormy Weather	
Snowfall Activities ☐ Confetti Snow Maps ☐ How Much Water? ☐ Edible Education ☐ The Snowflake Game ☐ Snow Journaling	
Temperature Activities ☐ Energetic Weather ☐ Shade of the Old Oak Tree ☐ Temperature Through Time	
Wind Activities ☐ Why Does the Wind Blow? ☐ Make Your Own Wind Dial	
Hydrologic Cycle Activities ☐ The Incredible Journey ☐ Understanding Evapotranspiration ☐ Pinecones: Mother Nature's Weather Forecasters ☐ What is a Watershed?	
Climate Activities ☐ Where is My Backyard? ☐ Soak up the CO_2 ☐ Buckets O' CO_2 : How Your Backyard Can Change the Ocean ☐ Raise the Waters	
CoCoRaHS Participation ☐ Precipitation measurements and other activities	

Please share your suggestions for improving the Tracking Climate in Your Backyard curriculum.

How have you used Tracking Climate in Your Backyard in your community?

Thank you for completing the Tracking Climate in Your Backyard curriculum feedback. We appreciate learning about how you are using the curriculum and receiving your suggestions for improving it.

Organization _____ **Contact Person** _____

Email _____ **Date** _____