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Introduction to Temperature in the Sun or Shade of the Desert

Abstract: Students will use thermometers to measure the air temperature in several places around the school and then return to the classroom to record the data. They will then create a bar graph and discuss their findings about the air temperature in the sun and shade. Students will then write in their science journal about what they have learned.

Grade: 3rd

Utah Core:
Science Benchmark

For any particular environment, some types of plants and animals survive well, some survive less well and some cannot survive at all. Organisms in an environment interact with their environment. Models can be used to investigate these interactions.

Standard II:

Students will understand that organisms depend on living and nonliving things within their environment.

Objective 2: Describe the interactions between living and nonliving things in a small environment.

c. Observe and record the effect of changes (e.g., temperature, amount of water, light) upon the living organisms and nonliving things in a small-scale environment.

Instructional Time: 45-60 min.

Materials:

Science journal	Pencils	White paper
Thermometers	Rulers	Markers

Terminology:

Thermometer- tool used to measure temperature.

Sun- Earth's source of heat.

Intended Learning Outcomes:

Students will understand science process of collecting data

Students will understand temperature differences in light and shade

Background Information:

When a temperature is reported on the news it is an official reading taken at a weather observing station. At these stations, thermometers are shielded from sunshine inside specially constructed shelters that allow air in but not direct sunlight. This is necessary if you want to measure the temperature of air. If a thermometer sits out in the sun the thermometer itself, the glass, and the liquid inside will absorb sunlight and heat up. You wouldn't be measuring the temperature of the air anymore but rather the temperature of a heated thermometer. On a sunny day that could be about 30 degrees higher than the actual air temperature. So the next time you hear a temperature of 80 degrees and your backyard thermometer reads 110 you'll know the reason for the difference.

Students should receive instruction on reading and using thermometers as part of a math lesson before doing this activity.

Invitation to Learn:

What jobs can the sun do? Discuss this question with students. Divide class into groups of two or three and assign each group to make and illustrate a page for a class book of the sun's jobs. Following is an example of how pages may look.



Prior Knowledge Assessment:

Ask students questions about whether or not they think it is hotter in the sun or the shade and ask why. Also ask how the jobs the sun does, that they created above, actually works. It is also important to review thermometer skills and bar graphs. Depending on the review, teachers may want to save the following activity for the following day. Review the above skills until students can prove an understanding by answering questions during class discussion.

Procedures:

1. Begin by introducing the new terms. Check for understanding by asking questions. Then have students create a chart like the following example.

Location	Temperature	Sun	Shade
Ex. Play ground	86 degrees	X	
Ex. Under tree	82 degrees		X

1. Put students in partners, go outside and have students measure three places in the sun and three places in the shade. Have them fill in the chart as they go, like the above example. Hold thermometer in place until it stops moving. Record temperature on chart, along with the location and mark whether the place was in the sun or shade.
2. Return to classroom. Have students create a bar graph of their findings.
3. Have a class discussion of following questions: Why is there a difference in temperature? Is the air really warmer in the sun? Why does it feel warmer in the sun? How do you think the sun affects the desert?
4. Have students write a paragraph in their science journals explaining what they have learned.

Adaptations and Modifications for Special Learning Needs:

If the weather is bad, check out the archive weather records for that day from local newspaper. Have non-English speaking students work with English speaking students. Early finishers may test other areas or help the other groups catch up.

Assessment:

Check student's temperature charts, graphs, and science journals for the following:

Completeness: Make sure that students have covered all of the required sections by looking at their charts, graphs, and science journal. For this section, teacher could grade on a scale of 15 points. 5 points for their data chart made for the experiment outside, 5 points for the bar graph that they created from their data, and 5 points for their answer in their science journal about what they have learned.

Accuracy: This is incorporated into the 15 points explained above. Teachers will need to factor in the accuracy of filling in the chart for the experiment, also the accuracy of the bar graph. For the section in the science journal, teachers will need to look for thought and effort. Also, the relevance to the lesson.

Informal Assessment:

Teacher could walk around with a clip board with all of the students and put a check if the student was observed doing the following:

Filled in the data chart; Made a bar graph; wrote in their science journal; participated;
Team building skills

Source: uen.org

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“It’s Getting Hot Out Here!”

Abstract: This lesson plan focuses on the effects the sun has on biomes such as the desert. Students will test the differences in temperature based on surrounding environments.

Grade Level: 3rd

Utah State Core Curriculum Standards:

Benchmark: Light is produced by the sun and observed on Earth. Living organisms use heat and light from the sun. Heat is also produced from motion when one thing rubs against another. Things that give off heat often give off light. While operating, mechanical and electrical machines produce heat and or light.

Standard V: Students will understand that the sun is the main source of heat and light for things living on Earth. They will also understand that the motion of rubbing objects together may produce heat.

Objective 1: Provide evidence showing that the sun is the source of heat and light for Earth.

- a: Compare temperatures in sunny and shady places.
- b: Observe and report how sunlight affects plant growth.
- c: Provide examples of how sunlight affects people and animals by providing heat and light.

Instructional Time: 20-30 minutes for 5 days (observations made each day)

Materials: Thermometers for students to check temperature with at least three for each group of students working together depending on how students are divided, observation worksheets for students to record their results with.

Terminology:

Fahrenheit: Of or relating to a temperature scale that registers the freezing point of water as 32° and the boiling point as 212° at one atmosphere of pressure

Celsius: Of or relating to a temperature scale that registers the freezing point of water as 0° and the boiling point as 100° under normal atmospheric pressure

Temperature: The degree of hotness or coldness of a body or environment

Degrees: A unit division of a temperature scale

Heat: The transfer of energy from one body to another as a result of a difference in temperature or a change in phase.

Source: The point at which something springs into being or from which it derives or is obtained

Thermometer: An instrument for measuring temperature, especially one having a graduated glass tube with a bulb containing a liquid, typically mercury or colored alcohol, that expands and rises in the tube as the temperature increases

Intended Learning Outcomes:

1. Use Science Process and Thinking Skills
 - a. Observe simple objects and patterns and report their observations.
 - b. Sort and sequence data according to a given criterion.
 - c. Make simple predictions and inferences based upon observations.
 - d. Compare things and events.
 - e. Use instruments to measure length, temperature, volume, and weight using appropriate units.
 - f. Conduct a simple investigation
 - h. Use observations to construct a reasonable explanation.

Background Information:

When a temperature is reported on the news it is an official reading taken at a weather observing station. At these stations, thermometers are shielded from sunshine inside specially constructed shelters that allow air in but not direct sunlight. This is necessary if you want to measure the temperature of air. If a thermometer sits out in the sun the thermometer itself, the glass, and the liquid inside will absorb sunlight and heat up. You wouldn't be measuring the temperature of the air anymore but rather the temperature of a heated thermometer. On a sunny day that could be about 30 degrees higher than the actual air temperature. So the next time you hear a temperature of 80 degrees and your backyard thermometer reads 110 you'll know the reason for the difference. (uen.org)

The Sun gives us heat, light, our food, and the air that we breathe. It powers the atmosphere to give us the winds and rain. Even the coal and oil that generate electricity for light and power come from plants and animals that lived hundreds of millions of years ago and depended on the Sun for life.

http://observe.arc.nasa.gov/nasa/exhibits/sun/sun_3.html

Careful observation and measuring are important steps in scientific investigations. Students at this age are usually encouraged to observe similarities and differences or even changes in objects. Good observations include using as many of the senses as possible - sight, touch, hearing, taste, and smell. It includes picking things up and touching them, feeling them, etc. Challenge students to observe carefully, so they can notice when changes are happening.

Learning to use a thermometer will help students make quantitative observations, in which they will be able to tell exactly what the temperature is, or whether something is becoming warmer or colder. Students should practice holding the thermometer by the edges, and not on the glass bulb, to get an accurate reading. (uen.org)

Invitation to Learn: Ask students the question; is it the same temperature in the sun as it is in the shade? We have talked about this before, so why do you think...? Well, this

week we will look into some of the factors that may affect the differences in temperatures.

Prior Knowledge Assessment: I would assess for prior knowledge by playing a game of bingo where the instructor has the definition, and the students have the term. This would be used as a review, and also if students have a hard time with any of the words or concepts, they are to write them down, or put a star on their paper next to that word so we can review it.

Procedures:

1. Begin by explaining to students that they will be observing temperature in different conditions and at different times of the day. They will record their observations and at the end we will discuss our findings as a group.
2. Students will be put into small groups of two to four students. With their partner(s), they will need to create a hypothesis. The hypothesis does not have to be the same as the other members of their group, but they have to have a rational for their hypothesis. Pass out worksheet that students can use as a record of their observation. Students will need to get their hypothesis checked by all of the members in their group to assure that it is written in the correct format. Students will hypothesize if there is a difference of temperature in places in the direct sunlight, partial sunlight, or in the shade. How do differences in temperature affect plants?
3. Once all of the students have completed their hypothesis, as a class, all the students will go out side and place their thermometers in a completely sunny place, a completely shady place, and if there is, a partially sunny and shady place.
4. Allow thermometers to remain outside for about 10 minutes. As a class, go out and record the temperatures and collect the equipment. After students have found their information have them determine if it was warmer in the sun, shade, or it was the same. Collect the students' worksheets each day so that they do not loose them. When they are collected, scan through them to make sure that students are recording their information properly.
5. Repeat these steps for an entire school week. At the end of the week, have students determine if their hypothesis was correct or incorrect. As a class, students can share what their group found as a result of the experiment.
6. Once students have completed their results, we will then go into a discussion about the results we found. How does temperature affect plants? In the desert are there certain plants that can only live there? Are there plants not in the desert that could not live in the desert? Then, I would read, The Magic School Bus: All Dried Up, by Joanna Cole and Bruce Degan.

7. After the book, we would discuss what the students in Ms. Frizzle's class learned about the desert, about plants and animals and how they survive in the desert.

8. Next, I would have students look at live examples of plants that only live in the desert, and plants that cannot live in the desert. I would have them list some characteristics that they see that are unique to each one or some characteristics that they both share if any.

9. Finally, we would discuss what the students observed by looking at the plants. Does the temperature of the surroundings affect plants? What are some adaptations that plants have that help them survive in hot temperatures of the desert?

10. To close the lesson, we would play bingo again, with the same words that were used during the first game as well as some new vocabulary words from the lesson.

Adaptations and Modifications for Special Learning Needs: Students will be placed in groups. Therefore students who may not be as strong with science or ELL students could be placed with someone who is a little more efficient in science, or can speak their native language as well. Also, rather than putting students in groups, just do the same experiment with the whole class. Therefore you can work through all of the information together and see if students are struggling

Assessment: Students could be assessed on their ability to record their information correctly in all sections of the experiment. Students could be assessed on their ability and cooperation while working with their groups. .

Worksheet: <http://www.teachervision.fen.com/tv/printables/SE-22.pdf>