

TRB 3:5 - Investigation 1 - Is It Hot in the Light?

Summary

In this activity, students will make observations that things in direct sunlight are warmer than things that are not in as much sunlight. Also, they may notice that there may be more heat near asphalt, brick, or cement because heat can be stored and radiated from these, also.

Group Size

Small Groups

Materials

- shells, peanuts, etc. for observations
- 2 UV beads and a pipe cleaner per student
- 8 thermometers (1 per group)
- 8 cups of ice water
- ["How Hot or Cold Is It?" Worksheet](#) (pdf)
- Clipboard per student or group
- ["From Hottest to Coldest" Worksheet](#) (pdf)
- per student
- ["Cave Hunt poem"](#) (pdf)
- per student (*optional*)

Additional Resources

Books:

- Byles, Monica, *Life in the Polar Lands*, "Crow Steals Some Daylight" p. 24-28, Scholastic Inc., ISBN 0-590-46130-3.
- Caduto, Michael J., and Bruchac, Joseph; *Keepers of the Earth*, "How Grandmother Spider Stole the Sun" p. 49-51, ISBN 1-55591-027-0. (This is a Muskogee Indian legend. Included are the story, discussion information, questions, and an activity.)
- *The Magic School Bus in the Arctic: A Book about Heat*, ISBN 0-590-18724-4.
- Troughton, Joana, *Who Will Be the Sun?* The Wright Group, ISBN 0-1-5524-498-3
- Solor Folklore and Art
<http://solar-center.stanford.edu/folklore/folklore.html>
- Tolman, Marvin N., Activity 15.3, "What Other Type of Energy Accompanies Light from the Sun?"
Hand's-On Science Activities for Grades 3-4, Parker Publishing Co., ISBN 0-13-011339-5

Videos:

- Jordan District Media Minder on the Web
- All about the Sun VH, Catalog Number 15623
- Aesop's Fables III VH, Catalog Number 5451
- All About Food Chain VH, Catalog Number 15606

Background for Teachers

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.

Heat is the name given to the flow of energy from hotter to cooler objects. Temperature is the measurement of how hot or cold something is. In hotter substances, the molecules are moving very rapidly, while in colder substances, the molecules slow down.

Most of the heat found on Earth comes from the sun, and is used by all living things. This heat travels by radiation through invisible rays from the sun.

In this activity, students will make observations that things in direct sunlight are warmer than things that are not in as much sunlight. Also, they may notice that there may be more heat near asphalt, brick, or cement because heat can be stored and radiated from these also.

Intended Learning Outcomes

1. Use a Science Process and Thinking Skills
4. Communicate Effectively Using Science Language and Reasoning

Instructional Procedures

Pre-Assessment/Invitation to Learn - Option 1

Before Handing out Thermometers: Start a game of I Spy in the classroom, in which students are given clues to certain things in the room, which they identify. (For example: I spy something that is a round sphere. It can spin around. One of its colors is blue. Can anyone guess what it is? You're right - it's the globe.) Tell students that one of the things scientists do very well is to make good observations.

Hand out material to be observed to students (peanuts, shells, buttons, types of cereal, etc.).

Encourage students to make observations.

Hand out two UV beads per student. Do not tell them what they are, but ask students to make observations about them. Tell students you would like them to make a bracelet for these, and they can wear them all day while they make observations. At the end of the school day, you will ask them what observations they made.

Pre-Assessment/Invitation to Learn - Option 2

Have the students go on an imaginary hike to a cave with you (an [optional script - Cave Hunt](#) (pdf) - is attached, or just tell the students about going in a cave). Have students imagine they are hiking up the trail with you, and it is a long, hot hike. Then describe how cold it is in the cave. When the lights are turned off, have the students close their eyes and shiver with you. With their eyes closed, they can't see anything. They can rub their hands together to try to get warm, but it is cold and dark. When they are finally through the cave, they can open their eyes, and stretch out their arms to the sun to get warm. Ask how many have been in caves. Is it hard to see? Is it cold? It is so nice to have light!

Where do our lights come from?

Instructional Procedures

While writing on a poster or on the board, have students share examples of light sources.

Do we get heat from light sources? What are some examples? Could it be cold in the light?

What are some examples?

Tell students they will be going outside as a class to find some warm places in the light and some cool places. Divide the groups in half, and have half try to find the coolest place they can on the school grounds, and the other half try to find the warmest.

Instruct students how to use thermometers. You may want to have them practice taking the temperature of the room, cold water, etc. to be sure that they know how to read the thermometer. Each group will be given a thermometer and a worksheet, and they must stay together as a group. After a few minutes of exploring, they must choose a spot, set out the

thermometer, and wait several minutes for an accurate thermometer reading.

Some suggested rules while students are outside:

They must stay within sight of the teacher.

They must choose a spot in five minutes.

The teacher will call off each minute, so everyone is taking a temperature reading each minute for 3 to 4 minutes.

While they are waiting, they may draw on their worksheet where they are relative to the school building.

Students will make how much sunlight is by their spot: not colored in at all for full sun, or partially/fully colored in if in partial sunlight or shade.

They should write down the temperature each time the teacher calls out a minute.

Everyone in the group should agree on the final temperature.

Return with students to the classroom, and write down each group number along with their recorded temperature(s) and amount(s) of sunlight.

Students will draw on their thermometers what the temperature and sunlight was for each group, then place the temperature in order on the chart from hottest to coldest.

Discuss with students what might have made the difference in temperature and discuss how things in direct sunlight are usually warmer than those not in direct sunlight.

Extensions

Math-

Read and record the temperature to the nearest ten degrees using a Fahrenheit thermometer.

(Standard IV, Objective 2)

Collect, read, represent, and interpret data using tables, graphs, and charts. Make predictions based on a data display. *(Standard V, Objective 1)*

Science-

If students are wearing UV bracelets during this activity, discuss what is happening when they observe the changes in the beads. Are the beads as bright in the shade as they are in the direct sunlight? Are they all the same color? Students

may want to experiment with putting sunscreen on some to see if it changes the bead color.

(ILOs 1, 3, 4)

Discuss the different temperatures found in ecosystems around the world. What do animals that live in a hot desert do to survive the heat? Does the temperature effect cold-blooded animals differently than warm-blooded animals? How? *(ILOs 2, 3)*

Homework & Family Connections

Mention in a parent letter that students are learning to measure with thermometers, and ask parents to point out thermometers around the house.

Assessment Plan

Check student worksheets to see if students correctly drew the temperature for each group, and correctly put the temperatures in order from highest to lowest.

Authors

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