



Sun Tea

Grade Level: K-6
Length: 1 Hour, divided into short segments
throughout 1 day
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By Bonnie Jason, adapted from Energy- It's Everywhere curriculum. Used with permission

NGSS Standards

K-PS3-1 Make observations to determine the effect of sunlight on Earth's surface.

Crosscutting Concepts

Patterns Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.

Energy & Matter Tracking energy and matter flows, into, out of, and within systems helps one understand their system's behavior.

Overview

The sun is a very important source of energy.

Objectives

- Students will understand the importance of the sun as an energy source.
- Students will practice good observation techniques and collect data.
- Students will demonstrate group cooperation skills.

Materials

- 6 Large Glass jars with Lids (jars must be the same size and clean)
- Box of 100 Tea Bags (preferably herbal or decaffeinated, local wild-harvested edible plants can be used instead)
- Enough Room Temperature Water to Fill Jars
- Carboard Piece at least 1 Square Foot
- Tinfoil
- Thermometers
- Journals or Paper
- Pencils
- Spoons
- Optional: Honey
- Optional: Lemon Juice
- Optional: Cups
- Optional: Ice
- Graph Paper
- A Sunny Day

Notes

Background

This is a very simple experiment in which students use the energy of the sun to make tea. Before beginning this activity, you may want to discuss the concept of energy as defined by something that causes light, heat, and movement. The students will probably be very aware of the sun as a form of energy, but the clues for detection may seem subtle.

Introducing the Lesson

Have a brainstorming session in which students list ways they can prove the sun produces energy (they see plants grow, people get hot when they sit in the sun, it causes the wind to blow, warms the water in their pools, makes the hood of the car hot, etc.). Ask them about examples that illustrate that energy from the sun affects the Earth's surface.

Activity

1. Divide the class into 6 small groups. Give each group one jar of water and six tea bags (more or less depending on the size of the jars).
2. Explain to the groups that they will be making tea, each using a slightly different procedure. Assign one group to place their jar in direct sunlight out of doors, place the tea bags into the jar and secure the top. The second group should place their jar in the shade out of doors. The third should place theirs on the windowsill. The fourth, in a dark cabinet free from light. The fifth, in the classroom away from sunlight. And the sixth, should make a reflector from the tinfoil and cardboard, place their jar in direct sunlight, and position the reflector beside it.
3. Once their jar is in the correct place, have students observe their tea and write their observations into their journals.
4. They should focus on the color and the movement of the tea and water. Ask them to take the temperature of the water and record this in their journals.
5. Using spoons have them sip the tea and record their description of the taste. Encourage them to do these procedures very rapidly, so as to minimize disruption of the experiment.
6. Let the group see where each jar is set up. Ask them to make a prediction, with their small group, as to which jar will have the strongest tea. Check in with each group as they do this, asking probing questions about their predictions and reasoning.

7. Repeat this process once every half hour or forty-five minutes. Be sure to have the students mark down the time of their journal entries. Take the last reading approximately forty-five minutes prior to the end of the day. If age-appropriate, create simple line or bar graphs as a class to reflect the results. Display graphs where children can easily see them.
8. Split the successful sun tea between students, allowing them to flavor with lemon juice and honey. While you are enjoying your iced tea, discuss the results of the experiment. Compare the taste of the different teas. To help generate conversation ask questions similar to these: Which group's tea is the strongest? Why do you think that is? Which group's tea is the next strongest? Why? Which group's tea is the weakest? What caused the water to turn to tea at different rates?

Ask students to complete the following sentence stems or explain in their own words. This can be done in writing or verbally:

The jar(s) in the most sunlight had _____
(stronger/weaker) tea than the jars in the shade because energy
from the sun _____ (warms/ cools) the water.

Wrap-up

Explain that energy from the sun affects the Earth surface in many ways. One way is that it warms the Earth (water, soil, air) similar to how it warmed the jars of tea. Ask students, "How else do we use the sun's energy?" Create a list of ways energy from the sun is used by humans and other animals. If age-appropriate, introduce the terms renewable and non-renewable energy.

Assessment

Include formative assessment when you check in as the students are making predictions. Pay attention to how the students support their reasoning. Assess how students follow directions during lab.

During the wrap-up, evaluate how students use evidence from their observations to explain the simple relationship between energy from the sun and the tea that was created. Students who successfully meet this performance expectation will be able to explain that tea in greater sunlight was stronger because energy from the sun heats the water.