Solar Energy

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Target Grade: 5th grade

Time Required: 3 days

Standards:

S3CS1. Students will be aware of the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.

- Keep records of investigations and observations and do not alter the records later.
- Carefully distinguish observations from ideas and speculation about those observations.
- Offer reasons for findings and consider reasons suggested by others.

S4E3. Students will differentiate between the states of water and how they relate to the water cycle and weather.

- Demonstrate how water changes states from solid (ice) to liquid (water) to gas (water vapor/steam) and changes from gas to liquid to solid.
- Identify the temperatures at which water becomes a solid and at which water becomes a gas.

Lesson Objectives:

Students will:

- Keep records of investigations and distinguish observations from ideas.
- Offer reasons for findings and consider other possibilities.
- Demonstrate how water changes from solid to liquid to gas.

Central Focus:

In this lesson, students will investigate and record how water is cleaned through thermal energy over the course of 3 days. Students will be given the materials to build their own display of water and how it gets dirty. They will be given time to work in groups and observe how thermal energy has many benefits including cleaning water.

Background Information:

Prior to this lesson students should understand how water on Earth begins as rain and then water evaporates into the sky. They should know this cycle continues and is called the water cycle. This includes evaporation and how it is related to heat of solar energy. Even though most rain water is clean, there is dirty water on Earth. How does the water get clean?

Materials

- Large clear mixing bowl
- 1 small cup (coffee cup will work)
- Spoon
- Plastic kitchen wrap
- Rubber bands
- Small rock
- Water
- TBSP of soil/dirt
- Different types of spices (ex. Pepper flakes, meat spices, etc)
- Access to BrainPOP videos

Instruction

Introduction Day 1:

Step 1. Teacher will show a picture of a solar panel and a solar calculator. The teacher will ask the students if anyone has ever seen a solar panel before and why it is used. The teacher will then show the solar calculator with a discussion about how the solar calculator works.

Step 2. Students will view "Solar Energy" video on BrainPOP. After viewing, the class will complete the online quiz.

Step 3. Teacher will give each child a sticky note with either a question or an answer to a question. Students will walk around and look for their match.

Question: Why are fossil fuels more widely used than solar energy?

Answer: Fossil fuels are much cheaper.

Question: Why is solar energy considered a renewable energy source?

Answer: The sun's energy will not run out for a billion years.

Question: What device might you use to heat a building?

Answer: A thermal collector

Question: Photovoltaic cells convert sunlight into:

Answer: electricity

Question: In the term "photovoltaic cell," what can you infer about the prefix "photo?"

Answer: It refers to light.

Step 4. The teacher will then show a glass of water and ask the students which is older the sun or water? "Well, Earth's water is older than the sun, about 4.6 billion years". The Teacher will allow students to discuss that we are drinking water that the dinosaurs' drank billions of years ago. "Well, if we are drinking the same water, how do we get our water clean?", the teacher will allow several students to answer.

Step 5. The teacher will show students the materials that they will use for the activity. Discuss whether the students think the sun (solar energy) could possibly clean water. This activity could be completed in small groups or just one for the class to observe daily.

Activity set-up:

(If completing in small groups, the teacher could show an example of how to set up the materials.)

1. Place the cup/mug inside the large bowl.
2. Fill the large bowl with water and spices/dirt (anything to make the water unclean).
3. Put plastic wrap on top of the large bowl.
4. Last, place a small rock on top of the plastic wrap and on top of the mug.
5. Place in the sun or a window that receives light from the sun.

After observing the effects of the sun on the dirty water, discuss other ways solar energy could be beneficial. Watch the YouTube video: https://www.youtube.com/watch?v=L5jpCY3BO4k

Differentiation

Due to the activity being completed in groups, special needs students will be paired with regular education students to complete the activity. Additional time is allowed if it is needed. The teacher will walk around and assist students as needed throughout the activity.

Assessment

Formative

Informal: Via questioning daily, teacher checks for understanding that students are able to see that there are changes each day with the experiment. During class discussion, teacher checks for understanding that groups can verbally communicate their findings.

Formal: The reflection worksheet assesses whether students can communicate in writing the process of solar energy creating clean water.

Extension Activities

Students will conduct research on ways solar energy can be used.

Name:

Group Members:

Date:

The Power of the Sun

Directions: Answer the questions below in complete sentences.

Day 1

1. Make a hypothesis. Do you think that the power of the sun will be able to clean the water in the bowl? Why or why not?

Day 2

2. Observe the bowl of water. What did you observe?

3. Was your hypothesis correct?

What are benefits of using solar energy?