Solar Panel Seasons

Summary

The influence of Earth's tilt on seasons is a difficult subject for students to grasp. This lesson will provide evidence that changes in angle towards sun can impact total energy.

Time Frame

1 class periods of 30 minutes each

Group Size

Small Groups

Materials

multimeter(s)
mini solar panels
angled blocks
graph paper
globe

Background for Teachers

Many students have misconceptions about what causes the seasons. This lessons provides evidence that the more direct the angle of the suns rays, the more energy is generated. This relates directly to the increase in solar energy (warmer temperatures) experienced during summer months. This activity can be done outside or inside with bright flashlights.

Student Prior Knowledge

It is helpful to do this activity in the context of students knowing how the earth orbits and rotates around the sun, as well as the fact that 4 seasons exist.

Intended Learning Outcomes

1. Use Science Process and Thinking Skills
    a. Observe simple objects, patterns, and events, and report their observations.
    c. Given the appropriate instrument, measure length, temperature, volume, and mass in metric units as specified.
    d. Compare things, processes, and events.
    3. Understand Science Concepts and Principles
    a. Know and explain science information specified for the grade level.
    4. Communicate Effectively Using Science Language and Reasoning
    a. Record data accurately when given the appropriate form (e.g., table, graph, chart).
    b. Describe or explain observations carefully and report with pictures, sentences, and models.
    5. Demonstrate Awareness of Social and Historical Aspects of Science
    a. Cite examples of how science affects life

Instructional Procedures

Part I:
Discuss what the students already know about the seasons, and the why we have 4 seasons. This discussion needs to lead to the following question: "Is the tilt of the earth the only factor which influences the seasons?"

Part II:
1) Distribute 1 multimeter, 3 blocks (each a different angle), and solar panel to the students. 2) Demonstrate how to use the multimeters (ONLY SET TO VOLTS): show them how to connect the leads. 3) Explain how to set up their data table. This table should include angle and the voltage read by the 'meter.
4) Explain how to set up the experiments: set the blocks on the ground with the angled edge on the top. Place the solar panel on the angled face. Record the volts from the multimeter. Repeat for each block. 5) Head outside and collect the data.
Part III:
When all the students have a few readings for each angle, go back inside for discussion.
Go over variations in data, focusing on discussing OVERALL trends. Use the globe to illustrate that the sun shines more directly on the equator (more like the 45o block) than the northern and southern parts of the globe (like the 15o block).

Extensions

The students can roam the yard collecting data at different angles (stacking the blocks), in the shade, facing away from the direction of the sun, etc.

Assessment Plan

Check student's Journals or Interactive Notebooks to determine student's understanding. Quiz is included in the lesson

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