



Watts On Your Mind?

Solar energy educational activities for schools

Activity Overview

Grade Level: 3-5

Activity: UE-4

General Description

Students will conduct activities to learn about energy concepts such as solar energy, cooling, heating, gravity, physical energy, insulation and wind (7 activities total).

Learning Outcome

Students will conduct experiments to learn about how energy works in our world; observe changes that occur due to the forces of energy; and work in groups to explain the phenomena they observe.

Subjects

Science, environmental science, language arts

Process Skills

Hands-on manipulation, teamwork, verbal communication, following directions

Duration

1 hour

Key Vocabulary

Gravity, force, electricity, solar, hydroelectric, windmill

Curriculum Standards

Texas (TEKS):

112.5.b.3.11, 112.6.a.2, 112.6.a.5, 112.7.b.5.8, 112.6.b.4.11

Louisiana (LSCS):

PS-E-C6, PS-M-C1, PS-M-C3

Arkansas (ASCF):

3.1.4, 3.1.20, , 3.1.25

National (AAAS Project 2016):

The Designed World – 5th

Energy Activities

Materials

Energy Experiments:

- Watch or clock with second hand
- 2 thermometers
- 6 tart pans, 3 inches in diameter (one pan painted black)
- Solar calculator
- Desk lamp

Gravity, Physical Energy and Insulation Experiments:

- Rock, about 4 inches high
- Flat board, about 1 foot by 18 inches long
- Toy car
- Newspaper
- 2 cups of ice

Wind Experiment:

- Paper cut into 3-inch by 6-inch strips
- Paper cut into 3-inch by 2-inch squares (4 per experiment)
- Tape
- Unused pencil
- Paper
- Paper clips
- String
- Handout

Method

This activity is best conducted outdoors in an area protected from the wind.

1. After a discussion of energy and its various forms, direct your students in these energy experiments. Divide the class into two groups. Hand out the Energy Experiments worksheet.
2. Have one group perform the solar, cooling and heat experiments. Have the second group perform the gravity, physical, insulation and wind experiments. Hand out the necessary materials to each group. You may want to



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instruct the groups to divide the activities so that one or two students conduct each experiment, or have the whole group go through each experiment together. Some experiments take longer than others. Have the students plan their time so that they can complete the experiments in the time allotted for the activity.

3. Be available to assist your students in their experiments or in their explanations of what happened. Guide them through difficult explanations.
4. When all the experiments are completed, take a few minutes and have your students explain the experiments to each other. Have each group explain to the others what experiments they conducted and how they worked. Be sure they clean up the remains of the experiments.
5. When everyone is back in their seats, use this period to test for knowledge. Randomly ask students about each of the different experiments. If they communicated well with each other, each student should know the answer, or be able to guess at the answer. If necessary, explain the concepts again at this time.

Group 1:

Solar:

1. Solar energy creates electricity using solar cells. A solar calculator provides an example of this. Using the calculator, make a simple calculation. Then find the solar cells and cover them with your finger for 30 seconds. Keep your finger on the solar cells and try to make the calculation again. What happens?

2. Set out an unpainted aluminum pie tin and a second tin, painted with black paint. Fill both pans with exactly the same amount of water. After ten minutes, check the temperature of both pans. What are the differences? Why did this occur?

Cooling:

3. Place one aluminum pan with water in it in the sun. Place another under a shady tree. After ten minutes, check the temperatures of the water in the pans. Which is warmer? Why?

Heat:

4. Place a desk lamp over an aluminum pan with water in it. Set a second one, with the same amount of water, away from the lamp. After ten minutes, check the temperature of each. Which is warmer? Why?

Group 2:

Gravity:

1. Place a board over a rock so one end is higher than the other. Place a toy car on the incline. What happens? Why? Try placing the board flat. Does the car move? Why not?

Physical:

2. Place a rock on the ground. What happens? Now place your hand behind the rock and push gently. The rock moves. What makes the rock move?



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Insulation:

3. Place a cup filled with ice in the sun. Wrap newspaper around a second cup of ice, and place it in the sun. The ice in which cup melts faster? Why?

Wind:

1. Wrap the large piece of paper around the pencil. Tape it. Make sure it fits loosely. Tape the four squares to the paper. Tie the paper clip to the string and tape the other end of the string to the paper tube. Blow on the blades of paper. You have created a windmill! The wind from your blowing on it should cause the tube to turn, and it should wind the string with the paper clip up the tube. Why does the windmill turn?

Background Information

Everything that occurs in the world comes about as an exchange of energy. But energy cannot be seen, heard, felt or touched. It is invisible, yet it's the force that makes life possible. Trying to explain energy can be very difficult. These simple activities allow children to observe the effects of energy. With some guidance, the students can develop their own explanations for how these events happened, and, in the process, gain greater understanding of the nature of energy.

Assessments

Students cooperatively work in groups to build experiments.

Students analyze and communicate results within and among their groups.

Source: This activity adapted from The National Wildlife Federation's Animal Tracks Activity Guide for Educators. Copyright © National Wildlife Federation 1995.