2. Energy Activities

Background

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.

Subjects:

Science, Environmental Science, Language Arts

Process Skills:

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

Grades: 3—4

Cognitive Task Level: Average

Time for Activity:

30 minutes

Key Vocabulary:

Gravity, force, electricity, solar, hydroelectric, windmill

Intended Learning Outcomes:

Completing this activity will allow students to:

- Conduct experiments to learn about how energy works in our world
- Observe changes that occur due to the forces of energy
- Work in groups to explain the phenomena they observe.

Materials

- Watch or clock with second hand
- 2 thermometers
- 6 tart pans, 3 inches in diameter (one pan painted black)
- Solar calculator
- Desk lamp
- Rock, about 4 inches high
- Flat board, about 1 foot by 18 inches long
- Toy car
- Newspaper
- 2 cups of ice
- 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

Procedure

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 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.

Extensions/Modifications

- To expand this activity or make it more difficult, look up more energy experiments in books and curricula.
- To simplify this activity, you may choose to conduct the experiments as part of a demonstration and discussion activity.

Energy Experiments

Name_____

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

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?

Materials

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

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? _____

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?

Materials

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

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?