STEM CAREER ADVENTURES

High School

Electrical Engineer: Generating Electricity from Fruit

Adventure Description:

In this adventure, students will think like an electrical engineer to perform an experiment to use fruits and vegetables as an emergency power source.

Activity

Step One: Background Information on Electrical Engineers and Power Sources (5-10 minutes)

- Explain to students that electrical engineers are responsible for solving problems related to electricity. Electricity is a valuable resource that is still not available all over the world.
- Ask students to brainstorm reasons why electricity is not available everywhere. Have them shout out answers and write them on the board.
    - If students are having trouble, discuss the cost of generating electricity, affordability for families, and location of rural homes and outbuildings.
- Explain that people who live in rural areas might have electricity in their main house, but they may not have electricity in the buildings that are on their farm, like their barn or shop. A lot of the work that is done on a farm is performed in these buildings.
- Electrical engineers want to provide people who live in these rural areas a way to create electricity using materials that are already available on the farm! Many fruits and vegetables can be turned into batteries that produce electricity. Show Handout: Generating Electricity with Produce. Discuss how electricity can be generated using simple items, like spare produce.
- Explain to students that they will think like an electrical engineer and determine a new method for providing electricity for rural areas using produce.

Step Two: Activity Set Up (5-10 minutes)

- Explain to students that they will perform an experiment with two parts. At the end of the experiment, they will be able to explain how electricity is generated by produce, which produce is the best for producing electricity, and how much produce it takes to light a light bulb.
    - In part one of the experiment, students will test different fruits to determine which fruits are best for producing electricity.
    - In part two of the experiment, students will test to determine how many produce items it takes to light a light bulb.
- Divide students into pairs or small groups.
- Provide students with Handout: Testing Produce. Walk through the steps together as a class.

Please contact Allison Bischoff, Director of Teacher Support, at allison@rozzylearningcompany.com or 314-272-2560 with questions.

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Step Three: Testing Produce Batteries (30-35 minutes)

- Explain to students that they will first create batteries with different fruits and vegetables to determine which produce items are best for generating electricity.
- Have students complete Part One of the experiment and create batteries with produce.
- While students are working, ask them the following questions:
  - Why do you think you need two different kinds of metal as the electrodes? (The two metals create a chemical reaction when they are added to the produce.)
  - What objects other than pennies and galvanized screws do you think would work? (Anything made out of copper and zinc. For example; a copper wire and a piece of zinc coated trashcan.)
  - Which of your vegetables created the highest voltage? (Answers will vary.)

Step Four: Lighting a Light Bulb (30-35 minutes)

- Explain to students that they will now perform part two of their experiment and determine how many produce items are required to light a light bulb. A light bulb needs 1.5 volts of electricity.
- Have students complete Part Two of the experiment.
- While students are working, ask them the following questions:
  - Which combination of produce items created the highest voltage? (Answers will vary.)
  - Why do you think we are using a combination of produce items? (Because one piece of fruit cannot generate enough electricity to power an LED bulb on its own.)

Step Five: Discussion (10 minutes)

- Have students discuss their results with the class. Student groups should discuss which produce item they found produced the most electricity, and how many pieces of that produce item were required to light a light bulb. Have groups show that their produce batteries can light the light bulb.
- As a class, discuss which produce items were the best for creating electricity.
- Have a concluding discussion about how produce can be used to create batteries. These batteries can in turn be used for electricity to light a light bulb.
- Extra Time? Have groups design a kit that could be provided to farmers to help them create light using produce. Kits should include instructions and a table showing how many of each type of produce is necessary to light an LED bulb.

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6-8 grade

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Materials List

Provided online:

- Handout: Generating Electricity with Produce
- Handout: Testing Produce
- Handout: Teacher Key

Not provided (Each group needs):

- 3 galvanized screw (like this)
- 3 clean pennies (newer pennies or older pennies that have been cleaned)
- Multi-meter (or voltmeter) and battery for testing (9V, D, C, AA, AAA or AAAA)
- Two green wires with alligator clips
- 1 black wire with alligator clip
- 1 red wire with alligator clip
- 1 LED light bulb
- At least 3 pieces of fruits and vegetables such as:
  - lemon
  - orange
  - tomato
  - apple
  - banana
  - potato

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