Tennessee 4-H Energy Project

Advanced

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UTEXTENSION
INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

Understanding Energy

Outcome: Choose a career in energy and research the education and training required to enter that career.

EXPLORE: Step Out Activity

Create a bingo game to lead at a 4-H Club meeting to share your knowledge about different careers in energy.

Sample careers that work with energy

Appliance Repairer
Chemical Engineer
Civil Engineer Technologist
Coal Mining Operative
Electrician
Home Design Consultant
HVAC Mechanic
Industrial Designer
Iron Worker
Meteorologist
Nuclear Power Reactor Operator
Petroleum Engineer
Petroleum Refining Worker
Petrologist
Plastics Technician
Power Plant Operator
Pyrotechnician
Renovation Contractor
Solar Energy Systems Designer
Surveying Technician
Transmission Systems Operator
Water Treatment Instrumentation Technician
Welders Petroleum Drilling Occupation
Urban and Regional Planner
Welder
Wind Turbine Technician

Sample things to share about the career:

- Education/certification requirements
- What a typical day looks like
- Typical pay scale ?

EXPAND & APPLY

Reflect upon this experience. Who did you reach? What did you learn from this experience? What surprised you about teaching this to others? Did you find a career you might be interested in?

UNDERSTANDING ENERGY

Outcome: Choose a career in energy and research the education and training required to enter that career.

EXPLORE: Step Out Activity

Seek an opportunity to shadow a career field in energy.

Job Shadow Report

Name of Company:
Address of Company:
Date of visit:
Time Started:
Time of Departure:
Name of Contact person:
Contact person phone number:
Name of Career shadowing:

Sample Questions to ask during job shadowing experience:

- How did you get interested in this work?
- What kind of education or training did you need for this work?
- What other skills do you need?
- Describe how your occupation is related to energy development or use.
- Describe a typical day on the job.
- What do you like the most about your job?
- What do you least like about your job?
- When entering this field of work approximately, what pay scale can one expect?
- Describe the general setting and the working conditions of your job.

EXPAND & APPLY

Did you enjoy this job shadowing experience? Why or why not? Is this a career you feel you might pursue in the future? Why or why not?

Source: https://www3.uwsp.edu/cnr-ap/KEEP/Documents/Activities/CareersinEnergy.pdf

UNDERSTANDING ENERGY

Outcome: Acquire knowledge regarding efficient utilization of electric energy through the production of heat, light, power communications and computers.

EXPLORE: Step Out Activity

After acquiring an understanding, lead the activity called sentence-to-story game. The object of this game is for the group to make a story by adding sentences using the words provided. Youth sit in a circle with partners. You as the game leader announce a general situation for everyone to use as a frame of reference and then hand out a different word card to each pair. For example, you might ask the group to pretend they are shopping in the electrical section of a large hardware store. Partners are given a minute to figure out what their word means, the definition may be provided. One pair makes up a beginning sentence for the story, using their word in the sentence. Each pair then makes up a sentence using their provided word and adds it to the story. It's more fun if each pair repeats the story before adding their own sentence. The procedure is repeated until each pair has had an opportunity to add to the story. Follow with these questions:

- How did you decide how to use the word in a sentence?
- How did discussing and repeating the previous pair's sentence help you remember the words?

Atom – Smallest part of element that can't be changed; made of protons, neutrons and electrons.

Electricity – A form of energy, the flow of electrons, typically to produce light, heat or to power a motor.

Battery – A device for storing electricity.

Neutron – A part of an atom that has no electrical charge.

Conductor – A material that allows electrons to flow easily, with little resistance.

Proton – A part of an atom that carries a positive charge of electricity.

Electron – Everything in the world is made of tiny particles called atoms. Have a negative charge.

Static Electricity – An electric charge contained within an object, often the result of friction.

Energy – The capacity or ability to do work. Electric energy is often measured in kilowatt-hours.

Voltage – The amount of force causing an electrical current to flow, usually measured as volts.

EXPAND & APPLY

What new electric words did you learn? Why is learning with others sometimes more fun than learning alone? How might you try to learn new things in the future based upon this game you played today?

CIRCUITS

Outcome: Develop a model (sketch, CAD drawing, etc.) of a resistor circuit or capacitor circuit and use it to illustrate the behavior of electrons, electrical charge, and energy transfer.

EXPLORE: Step Out Activity

Making A Flashlight

1. Cut the aluminum foil into a strip about 2 inches by 6 inches.
2. Fold foil over and over along the long edge, until you have a piece that is still six inches long, but only a quarter of an inch wide.
3. Touch one end of the battery to the bottom end of the bulb, and then connect the side of the bulb to the strip of aluminum foil.
4. Connect the strip of foil to the other end of the battery.
5. You have built a circuit! A circuit needs three things:
    1. Something to push electrons (in this case, a battery)
    2. A path for the electrons to follow (aluminum foil and light bulb)
    3. Something for the electrons to do (like light up a light bulb)

Step Further

- See what happens when you connect the foil to both ends of the battery and then put the bulb on top of the foil strip. Does the bulb light up? Why?

EXPAND & APPLY

What was the source of electricity used to make the bulb light?

How is your imitation flashlight different than one you would buy at the store?

Why is it important to understand how electricity works?

What is another time that you experimented to solve a problem?

When faced with a new problem, like fixing a flashlight describe some ways that you could figure out the answer.

Describe how technology can help us organize our thoughts and solve problems.

CIRCUITS

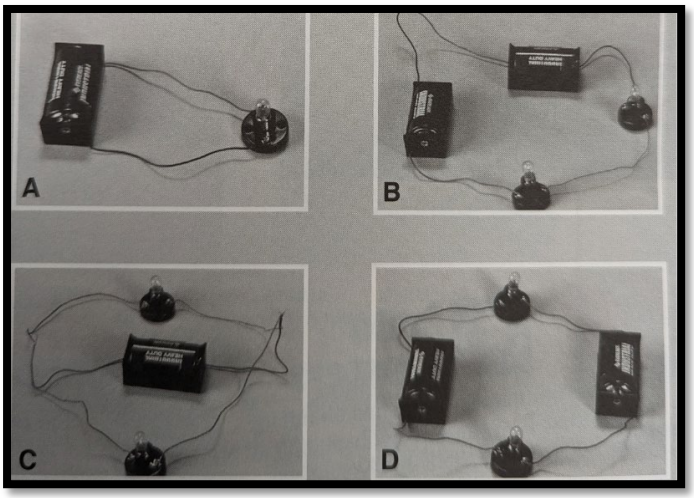
Outcome: Demonstrate Ohm's Law through the design and construction of simple series and parallel circuits.

EXPLORE: Step Out Activity

Is there a fork in the road?

To make electricity do all the things it does for us, scientists and engineers have discovered different ways to connect electrical components together. In this activity you will explore two types of circuits-parallel circuits and series circuits. For each of the diagrams shown, trace the line from the negative end of the battery back to the positive end. Does the path ever branch so that you have to choose one line to follow over another? If it does branch, is there a complete path back to the positive terminal through each branch? If the path never branches it is called a series circuit. If it does branch it is called a parallel circuit. For each diagram, record below the number of complete paths you find. Next, based on the number of paths you find, record whether each is a series or parallel circuit. Finally guess how many lights would be in the circuit. Test your prediction (hypothesis) by building each circuit.

Series or Parallel Circuit			
Diagram	Number of Paths	Series or Parallel	Number Lights On
A			
B			
C			
D			



EXPAND & APPLY

Do you think the circuits in your house are series circuits or parallel circuits? Why?

Ask your parents to show you the electric bill for your house for the past year. Ask your parents to explain the bill to you. Find out how much energy was used each month and think about how the amount may be different for certain months. How will you change your energy usage after reviewing your bill?

Source: Marsh, L. S., Duncan, G. A., Tormoehlen, R. L., Newhart, W., DeMarco, L. W., & Jamison, K. (2008). Magic of Electricity. National 4-H Council.