

How Does Electricity Flow?

Objective: Students will understand the flow of electricity through a circuit

Materials:

1. Steve Spangler's Energy Stick

Time: 20-30 minutes



The Activity:

1. Propose the following question to the class “How does electricity flow?” Discuss as a class
2. “What would occur to the flow of electricity if the circuit was broken?” Discuss as a class
3. Have students form a large circle with their hands linked
4. Have two students(beside each other) grab the energy stick. Ensure all students are holding hands.
5. Observe the energy stick glow
6. Have two students unlink hands
7. Observe the energy stick
8. Discuss as a class what occurred to the energy stick

Renewable and Non-Renewable Energy

Objective: Students will investigate renewable and non-renewable energy

Materials:

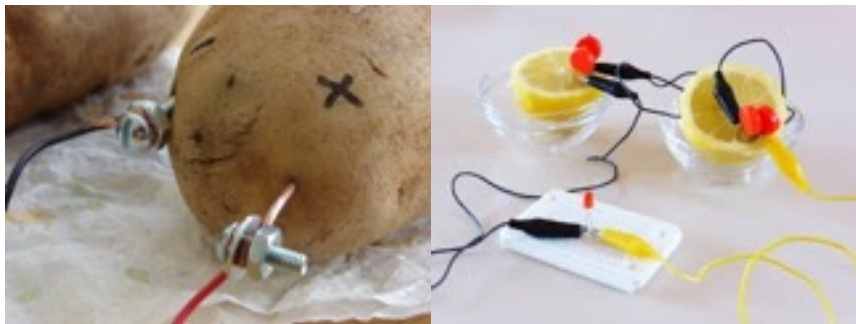
1. Materials to Test:
 - Battery
 - Lemon
 - Potato
2. Insulated Wire
3. Multimeter

Time: 60-75 minutes



The Activity:

1. Propose the following question to the class “What is the difference between Renewable and Non-Renewable Energy. What are a few examples?” Discuss as a class
2. Instruct students to use the materials to create a circuit to observe the energy output of each material. (battery, potato battery, lemon battery).
3. Discuss as a class how food can be used to create energy.



Conserving Energy vs Wasting Energy

Objective: Students will discuss methods in their homes that conserve energy and that waste energy

Materials:

1. Large Chart Paper
2. Markers
3. Laptops/I-pads

Time: 60-75 minutes



The Activity:

1. In groups of 3 or 4, students will create a table that has examples of methods that conserve energy and waste energy in their homes
2. The teacher can provide probing questions to help spark discussions among students
3. Students can use their laptops if ideas are difficult to think of
4. Students are to present their chart-paper to their peers
5. As a class create a table of methods that conserve energy and waste energy in the school

Efficiency of Electricity



Objective: Students will investigate various conductors and insulators to create an efficient circuit.

Materials:

1. Materials to test
 - Aluminum wire
 - Copper Wire
 - Wooden stick
 - Saltwater
 - Water
 - Pencil Lead
 - Plastic Ruler
 - Potato
 - Lemon
2. Insulated Wire
3. Multimeter
4. Battery
5. Batter holder

Time: 60-75 minutes

The Activity:

1. Propose the following question to the class “What makes a wire efficient at conducting electricity?” Discuss as a class
2. Have students predict which material will be best for their circuit before they begin their investigation
3. Provide students with the materials and allow them to begin their investigation
4. For older students, you may want to allow them to create their own procedure. For younger students, more instruction may be required.
5. Procedure for the investigation
 - a. Place the battery into the battery holder
 - b. Connect an insulated wire to one end(-) of the battery holder
 - c. Connect another insulated wire to the other end(+) of the battery holder
 - d. Connect the wires to the multimeter
 - e. Measure the voltage
 - f. Insert one of the objects into the circuit and measure the voltage
6. Discuss as a class what worked best

Create an Efficient Electrical Wire

Objective: Students will create their own efficient electrical wire through an inquiry investigation

Materials:

1. Materials to test
 - Aluminum wire
 - Copper Wire
 - Wooden stick
 - Saltwater
 - Water
 - Pencil Lead
 - Plastic Ruler
 - Cloth
 - Paper
 - Clay
 - Aluminum Foil
 - Parchment Paper
2. Insulated Wire
3. Multimeter
4. Battery
5. Batter holder

Time: 60-75 minutes

The Activity:

1. Propose the following question to the class “Why should electrical wires be efficient at conducting electricity?” Discuss as a class
2. Instruct students to create an electrical wire with the materials provided that will be the most efficient at conducting electricity
3. Students can create wires that are insulated with the materials provided
4. Discuss as a class what worked and what didn't. Compare the voltage that was produced from the wires created in the class to an insulated wire



Efficiency of Lightbulbs

Objective: Students will investigate the efficiency of lightbulbs

Materials:

1. Materials to test
 - Incandescent Light Bulb
 - Compact Florescent Bulb
 - LED
 - Appliance Bulb
 - Halogen
2. Thermometer
3. Desk Lamp
4. Stop Watch

The Activity:

1. Propose the following question to the class “How can lightbulbs be more efficient?” Discuss as a class
2. Instruct students to predict the efficiency of various light bulbs.
3. Procedure for investigation
 - a. Measure the initial temperature of the lightbulb before turning the light on. (hold the thermometer 3-5cm away from the lightbulb)
 - b. Turn on the lightbulb, measure the temperature of the light at 1sec, 30 sec, 1 min, 1.5min, 2min. (holding the thermometer 3-5cm away)
 - c. Turn off the lightbulb, measure the temperature of the light at 30sec, 1min, 1.5min, 2min
 - d. Repeat for each lightbulb
 - e. Record the heat output by (Heat Output = Highest Temp. - Before Temp.)
 - f. Determine which lightbulb reached the highest temp. the fastest and the slowest.
4. Discuss as a class what occurred and why they think it happened. Compare the cost/lifetime of each lightbulb to its efficiency.

Time: 60-75 minutes



How can WE be more Energy Efficient?



Objective: Students will investigate methods to become more energy efficient in their everyday life

Materials:

1. Poster Boards
2. Marker/Crayons
3. Scissors
4. Coloured Paper
5. Tape
6. Glue
7. Laptops/l-pads

Time: 60-75 minutes

The Activity:

1. Propose the following question to the class “How can becoming energy efficient help the Earth?” Discuss as a class
2. Instruct students to calculate the amount of energy that is used in their everyday life. (Watts of lightbulbs, common household appliances, etc. can be found online)
3. Students are to determine how they can reduce energy usage in their daily life.
4. Once students individually have decided upon ONE method to reduce the amount of energy in their lives, they are to perform that task for a month to examine how plausible their method is and how much energy is saved.
5. After one month, have students discuss with their peers the efficiency of their method and how plausible it was.
6. Instruct students to create a poster to help advocate energy efficiency and possible actions their schoolmates can take to reduce energy usage.



Town Hall Debate- Energy Efficiency



Objective: Students will investigate methods to become more energy efficient in their everyday life

Time: 2-3 class periods (2-3hours)

The Activity:

1. As a class, determine the energy usage of the school. Allow students to walk around the school investigating the lights, appliances, and electronics that consume energy in their school.
2. In groups of 3-4, research and design a proposal of a method the school can take to reduce the energy usage.
 - The method is hypothetical, but students are to determine the amount of energy saved if it were implemented
 - Students are to create strong argument for their method to promote to the class
3. Class Town Hall
 - Each group will have 10 minutes to pitch their proposal to the class
 - Following the presentations, the class will have a debate to decide the best proposal for the school
 - The teacher can assist the debate through probing questions



Nuclear Energy Debate



Objective: Students will discuss with their peers the advantages and disadvantages of nuclear energy

Materials:

1. Projector
2. Laptop

Time: 60-75 minutes



The Activity:

1. Propose the following question to the class “What is nuclear energy? Does the world need it?” Discuss as a class
2. Allow students to view the “Debate: Does the world need nuclear energy?” <https://www.youtube.com/watch?v=UK8ccWSZkic>
3. Propose the question again “Does the world need nuclear energy?” Allow students to discuss their opinions to their peers
4. Instruct students to conduct further research about nuclear energy to formulate a strong argument for or against nuclear energy
5. Allow students to develop a one page argument about nuclear energy with their own opinions and research found.

The Insulation Investigation

Objective: Students investigate various insulation methods that allows energy to be conserved

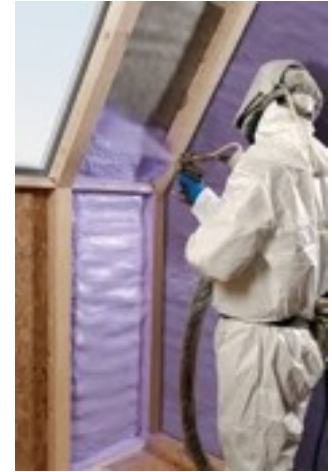
Materials:

1. Plastic Water Bottles
2. Hot Water
3. Thermometer
4. Tape
5. Possible Materials to be tested:
 - Newspaper
 - Wool Sock
 - Aluminum Foil
 - Plastic Bag
 - Cardboard
 - Nylon Stocking
 - Silicon Mat

Time: 60-75 minutes

The Activity:

1. Propose the following question to the class “What is insulation? How can insulation help with energy efficiency?” Discuss as a class
2. Instruct students to predict which material they believe will be the best insulator
3. Students are to investigate each material
4. Investigation procedure:
 - a. Wrap plastic bottles with each material
 - b. Pour equal amounts of hot water into each bottle
 - c. Measure the initial temperature of each water, record findings
 - d. At 5mins, 10mins, 15mins measure the temperature of each water, record findings. Calculate the temperature change
5. Discuss as a class, “What material was the best insulator? How can insulating our homes save energy?”



Energy Usage in your School

Objective: Students will investigate the energy usage within the school to determine areas energy can be saved

Materials:

1. CircuitMeter
2. Laptop

Time: 2-3 periods (2-3hours)



The Activity:

1. Propose the following question to the class “Where do you think the most energy usage occurs within the school? What electronics do you think have the most energy usage within the school? What time of day do you believe the most energy is used?”
2. Allow students to investigate the energy usage of the school through the CircuitMeter Program. Students will be able to look at the historical data and real-time data that was previously recorded through CircuitMeter to investigate areas of the school that use the most energy, times of day of energy use, and appliances/electronics with the highest energy usage.
3. After the investigation, students are to develop an action plan that the school can implement to become more energy efficient(i.e. turn off the gym lights when not in use, use certain appliances only during off-peak times). Students will then implement their action, either through posters, announcements or word of mouth.
4. One month after, have students investigate the energy usage change using the CircuitMeter Program to determine if their school-wide initiatives played a role in a more energy efficient school.

Energy Usage of Lights within the School

Objective: Students will investigate the energy usage of lights within the school to determine the energy efficiency of different lightbulbs

Materials:

1. CircuitMeter
2. Laptop
3. Various Types of Lightbulbs

Time: 60-75 minutes



The Activity:

1. Propose the following question to the class “How much energy do you believe lightbulbs use? Which lightbulb do you believe are the most energy efficient?” Discuss as a class
2. Using the CircuitMeter Program in real-time, determine the energy usage of the lights within your classroom
3. Investigate the lightbulbs installed in your classroom. What type of lightbulb is used? Which lightbulb can we install to be more energy efficient?
4. Install lightbulbs within the class that the students agree will be most energy efficient
5. In the real-time function, examine the CircuitMeter Program to determine the energy usage of the new lightbulbs installed. Did it use more/less energy?
6. Test different lightbulbs and analyze the real-time data within the CircuitMeter Program to see the energy usage of each lightbulb
7. Determine the cost efficiency of the each lightbulb used

Lights ON/OFF

Objective: Students will investigate the energy usage of lights within the school to determine the energy efficiency of turning lights off

Materials:

1. CircuitMeter
2. Laptop

Time: 60-75 minutes

The Activity:

1. Propose the following question to the class “How much energy do you believe lightbulbs use? How much energy can be saved by turning the lights off?” Discuss as a class
2. Using the CircuitMeter Program in real-time, determine the energy usage of the lights within your classroom OR in the hallway OR in the gym OR in the library (allow students to choose which location in the school they want to investigate)
3. Turn off a few of the lights within these locations, observe on the CircuitMeter Program the energy usage in real-time. How much energy was saved by turning off a few lights? Can we still use these locations with a few lights on?
4. Create Posters or News Announcements for the school to promote turning off lights or the usage of less lights within classrooms, the gym, halls or library.



Energy Usage of Computers

Objective: Students will investigate the energy usage of technology within the school to determine areas energy can be saved within the school

Materials:

1. CircuitMeter
2. Laptop

Time: 60-75 minutes



The Activity:

1. Propose the following question to the class “How much energy do you believe computers use?” Discuss as a class
2. Using the CircuitMeter Program in real-time, determine the energy usage of the the computers when they are on within the library or the computer lab
3. Turn off all the computers within these locations, observe on the CircuitMeter Program the energy usage in real-time. How much energy was saved by turning off all the computers?
4. Create an Action Plan for students/teachers to use to reduce the energy usage within the computer labs and library to save energy.
5. Create Posters reminding students/teachers to turn off the computers when not in use

Business Plan



Objective: Students will develop a design plan of a local company, to ensure energy efficiency

Materials:

1. CircuitMeter
2. Laptop
3. Big Chart Paper
4. Markers
5. Coloured Paper
6. Tape

The Activity:

1. In groups of 3 or 4, students will act as CEOs of local companies that have a plan to reduce the energy efficiency of the building
2. Using the CircuitMeter Program, analyze the “Peak Analysis” data of the schools energy usage
 - When is energy used the most?
 - What appliances use the most energy?
3. Investigate a local company in the area and estimate the energy usage that is currently used by the company
 - Machines used, # of lights within the building etc.
4. Design a new building for the company to reduce the amount of energy used. State within your design, which appliances/electronics will be used and when these appliances/electronics will run.
5. Present your design to the class

Time: 60-75 minutes

