Exploring Electricity and Energy

Student Pack

TeacherVision

Table of Contents

Milestone #1 Resources

Milestone #2 Resources

Milestone #3 Resources

Milestone #4 Resources

Milestone #5 Resources

Name ..... Date .....

You Wouldn't Want to Live Without Electricity

Directions: Listen to the book **You Wouldn't Want to Live Without Electricity**. Use it to answer the questions.

What are four things that require electricity to work?

1. ..... 2. .....

3. ..... 4. .....

Which electric invention do you think is the most useful? Why?

.....

.....

.....

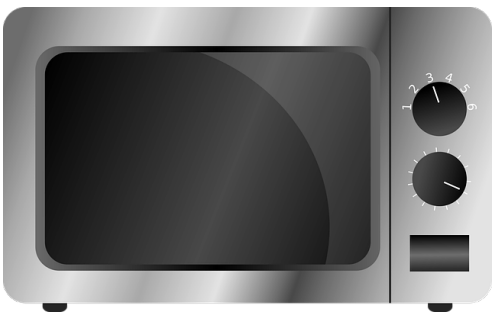
Would you want to live without electricity? Why or why not?

.....

.....

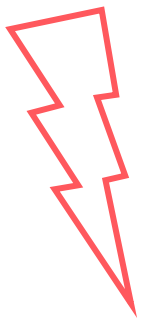
.....

.....



Name ..... Date .....

Powering the Planet



Directions: Answer these questions as you watch the virtual field trip "Powering the Planet".

1. What are two ways you use energy every day?

....

2. What are two renewable energy resources?

....

3. Answer the question from the video: How do we get energy?

.....

.....

4. How do they use renewable energy on the Palmyra Atoll?

.....

.....

5. How do they use renewable energy in the Mojave Desert?

.....

.....

6. Answer the question from the video: What items in your home or school use energy?

.....

.....

7. Why is it important to use more renewable resources to create energy?

.....

.....

Name ..... Date .....

A Time Without Power Writing

Directions: In the space below, write about a time when you were without power, either by choice (such as a camping trip) or due to an event (such as a weather-related power outage). How did you feel? What did you do while you were waiting for the electricity to come back on? How long did the power outage last? Why was it important to have a charged cell phone.

Name ..... Date .....

Milestone #1 Inquiry Question

Directions: Use what you learned in this milestone to answer the question.

What are three things that require electricity to work, and why is it hard to live without them?

.....

.....

.....

.....

.....

How to Do Good Research

Follow these steps when you are doing research online.

1. Open your search engine and type in your keywords. These should be as specific as possible. For example, type in “phone chargers that don’t use electricity” instead of just “phone chargers”.
2. Click on the top link. Read the article and look for useful information to answer your questions.
3. When you find an answer, put the information in your own words. You can’t just copy what the author wrote. This is called plagiarism, and it can get you in trouble.
4. Keep reading the first website to find the answers to more questions.
5. When you get to the end of the article, click the back arrow to go back to your search results. Click on the second article and read it to find the answers to more of your questions.
6. Repeat these steps until you find all of the answers you need.

Name ..... Date .....

Electric Spaghetti, Please

Making the Connection: Sometimes understanding science involves looking at everyday things in a new light, in order to learn how things work.

Pretend you can put on a special pair of "Science Sensor" goggles to see how some of the things we do everyday actually work. Start by putting on the goggles before you get up in the morning. As you wake up, list the first five things you do that use some form of stored energy. Also list where that energy has come from.

....

....

.....

First thing in the morning, ask yourself: Is your house warm? Is the milk for your cereal cold? Are the red-yellow-green street signals working? Where is all that energy coming from?

.....

.....

.....

Most of us live in areas where the electricity is created by a large power plant. That power can be generated by the force of a river, or by burning coal, or any number of other ways. But who decides how much you and your family get to use? In America, people pay the electric company for power based on how much they use. The more electricity consumed in your house, the more money you pay every month.

Electricity makes life a lot easier. One hundred years ago, dishes were all washed by hand. So were clothes. There was music only when someone sang or played an instrument. There was no television to watch. Kids did their homework by candlelight, or gas light. It took a lot more human energy to get through the day, because we were not able to use nature's energy so easily to help us out.

Now we are all wired, one way or another, to that power plant. Most of us do not think about that when we turn on the light. Once in a while, however, there is not enough power to go around. Sometimes during summer heat waves, or after big storms, power has to be lowered and spread around from area to area. If that happened in your area, who do you think should have power restored first?

Make a list of the most important five users of power in your town. Do not forget about hospitals, grocery stores, the police station, and other places that keep the town going.

....

....

.....

On another sheet of paper, make a rough map and put down the five most important power users. Use string to connect them to each other and the power plant to complete the circuit.

Where does that leave the rest of us? Sitting in the dark, eating food out of a can? How long could we manage without electricity?

.....

.....

.....

Maybe it would be more fair if the town took turns, section by section, each one getting power for a couple of hours every day. How would your family use its couple of hours?

.....

.....

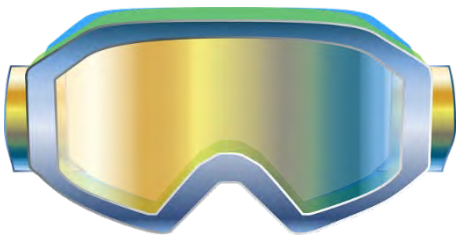
.....

Ok. The crisis is over. Draw some houses and other less important power users on your map and reconnect the rest of the town with string. Look at your map. If you could really see all of the power lines in your town, it would look like a plate of wire spaghetti with the power plant being the meatball in the middle.

Now take off the science sensor goggles. You have restored the power, and it is time for a break. Name the first two things you want to do with the power on again. You earned them!

.....

.....



Name ..... Date .....

Power Map

Directions: Use this page to draw your map for the "Electric Spaghetti, Please" activity.

Name ..... Date .....

Energy Video

Directions: Watch the "Energy" video. Use the information to answer the questions.

What is energy? .....

.....

What are two ways that your body gets energy? .....

.....

What is the difference between kinetic and potential energy? .....

.....

Energy can neither be ..... **nor** ..... **,**

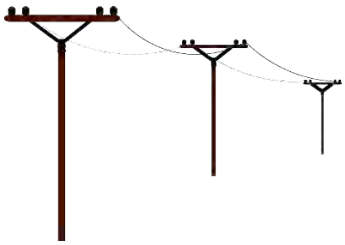
but it can ..... **from one form of** .....

to another.

Directions: Work with your teacher to fill in the blanks.

..... **energy is important to our everyday life and can be converted into many useful forms of energy, such as** ..... **energy, or heat.**

Electric energy can be stored in ..... **as chemical energy, and then used at a later time.**



Electricity and Energy Project Guidelines

Project Requirements:

- [ ] Research ways people have created cell phone chargers without using any electricity. Write about 5 of them.
- [ ] Invent and build a model of your own cell phone charger using your knowledge of energy transfer and power sources.
  - [ ] Draw a design for the phone charger.
  - [ ] Use feedback to improve your design.
  - [ ] Use craft supplies to represent the actual materials.
  - [ ] Label all of the parts.
  - [ ] Present your project and explain how the phone charger would work.

Name ..... Date .....

Need for Inventions

Directions: Answer the question about inventions.

It is thought that perhaps Plato first used the phrase, "Necessity is the mother of invention." What do you think Plato meant?

.....

.....

.....

.....

Crazy Chargers

Use the Internet to research ways people charge their cell phones without electricity.

Write your 5 favorite ways on the lines.

1. .....

.....

2. .....

.....

3. .....

.....

4. .....

.....

5. .....

.....

Name ..... Date .....

Milestone #2 Inquiry Question

Directions: Use what you learned in this milestone to answer the question.

What are two things at your house that use energy? What types of energy do they use? How do you know?

.....

.....

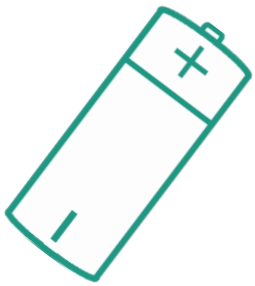
.....

.....

.....

Name ..... Date .....

Types of Energy



Directions: Watch the "Types of Energy for Kids" video. Use the information to answer the questions.

1. What are three renewable sources of energy?

....

2. What are the advantages of using renewable energy?

.....

.....

3. What are the disadvantages of renewable energy sources?

.....

.....

4. What are four nonrenewable sources of energy?

....

....

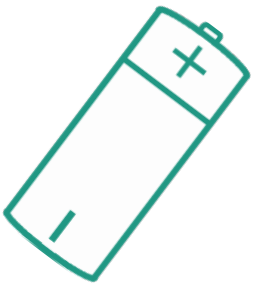
5. What are the disadvantages of nonrenewable energy sources?

.....

.....

Name ..... Date .....

Inside a Battery



Directions: Read the information about batteries. Color the battery according to the color key. Then, fill in the blanks.

The batteries used in flashlights are called dry cells. Dry cells also run most battery-powered toys.

Dry cells work because of a chemical reaction. Zinc has more electrons than carbon. When you use a battery, electrons move from zinc to carbon. The electrons move through your lightbulb or toy and make it work. This is the flow of electricity.

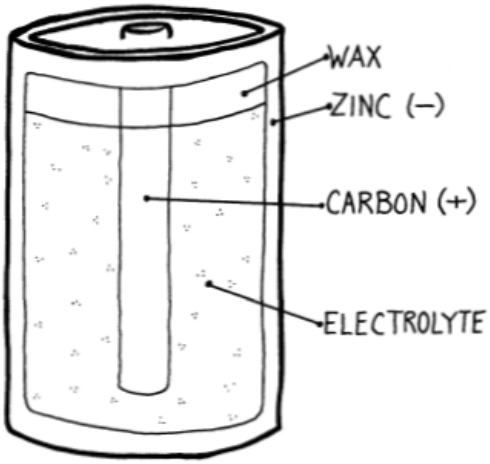
Color:

Carbon – black

Zinc – blue

Electrolyte – red

Wax – yellow



1. A dry cell works because of a ..... reaction inside.

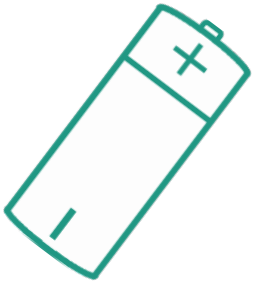
2. Electrons move from ..... to .....

3. Name two things that use dry cell batteries.

....

Name ..... Date .....

Invent a Charger



Directions: You and your group members need to invent a charger for the next time there is a widespread power outage. Think of things that are readily available in and around your home. Using your knowledge of energy transfer and the ideas you found while searching the internet, think of how you could create a charger for your cell phone. Think about what you learned about renewable resources. Write your group's ideas below:

List your materials in the box.

Explain how you would create the charger. Be sure to explain how you will put the parts together and how it will work.

.....

.....

.....

.....

.....

.....

.....

Name ..... Date .....

Milestone #3 Inquiry Question

Directions: Use what you learned in this milestone to answer the question.

What is something you own that uses batteries? How do the batteries work to power it?

.....

.....

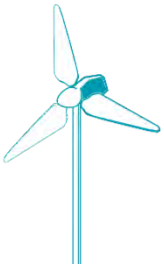
.....

.....

.....

Name ..... Date .....

Emergency Supply Kit



Directions: Read the article "How to Build a Kit for Emergencies". In the box, draw and label at least 5 items you would put in an emergency kit for your family. At the bottom of the page, write a sentence explaining why you would include each item.

1. .....

.....

2. .....

.....

3. .....

.....

4. .....

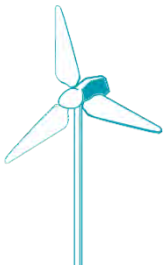
.....

5. .....

.....

Name ..... Date .....

Design Your Charger



Directions: In the box, draw a picture of your phone charger. Label the parts to show what craft material you will use to make it and what real item it represents.

Share your phone charger design with your group. Have them offer suggestions to improve it. What is one thing you could change to make it better?

.....

.....

.....

.....

.....

Name ..... Date .....

Milestone #4 Inquiry Question

Directions: Use what you learned from this milestone to answer the question.

How does your group's cell phone charger work?

.....

.....

.....

.....

.....

Name ..... Date .....

Invention Reflection

Directions: Think about the phone charger you invented. Answer these questions about how it could help in an emergency.

1. If you built your model with real materials, do you think it would work? Explain.

.....

.....

.....

.....

2. In an emergency situation, such as a hurricane, sometimes it takes days or weeks to restore power. How could your group's invention help emergency personnel and private citizens?

.....

.....

.....

.....

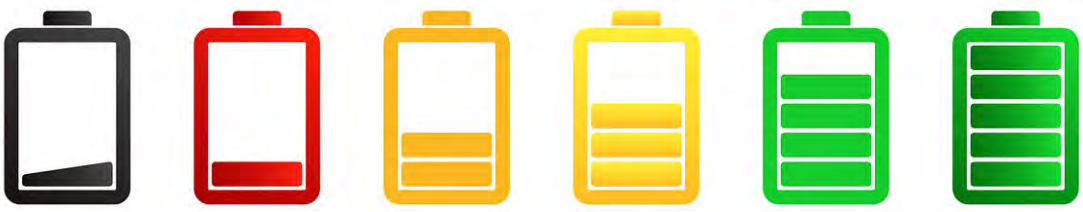
3. What else could your group's invention be used for?

.....

.....

.....

.....



Name ..... Date .....

Milestone #5 Inquiry Question

Directions: Use what you learned during this unit to answer the question.

What other inventions would be helpful to have on hand in the event of a widespread power outage? Name at least 3 and explain why they would be helpful.

.....

.....

.....

.....

.....