

Let's Explore Energy Electricity History and Sources



Instructor Guide

Subject Area	Unit	Grade	Time
Science	Earth Science	K -1st grade	45 minutes

Overview

This lesson provides a background and history of the making of electricity. It provides reinforcement of the concept that the sun provides energy in the form of light and heat.

Learning Objectives

This lesson plan meets the typical state criteria for Earth Science in the Kindergarten and First grade level.

Extension Activities

1. Science Experiment: Let's Make a Solar Cooker
2. Science Experiment: Sun or Shade?
3. Connect the dots activity sheet
4. Power Maze

What You'll Need

Teacher Lesson Plan Notes
Extension Activity Supplies
Access to **Kids Korner** Website
Student Activity Sheet

Steps

1. Review **Let's Explore Energy** teacher lecture notes with students.
2. Visit **Kids Korner** Website **Electric Journey** to show demonstration of how electricity gets to your home.
3. Choose one of the extension activities to reinforce the concept that the sun provides light and heat.

Evaluation

Ask the students to explain what energy we get from the sun. Ask what other sources help us get energy and electricity.

Teacher Lecture Notes

There are lots of types of energy that produce power to operate machines, heat and cool your homes and light up your schools. We need energy to make things GO!

Electricity is the most widely used form of energy. Its uses range from the miniature batteries that operate your wristwatch to huge motors that power trains and ships. Electricity operates our lights, runs our refrigerators and powers motors. You can't see electricity but you can see what it does like when you turn on a light.

Let's Explore Electricity!

Electric History

For hundreds of years electricity has fascinated many scientists. Around 600 BC, Greek philosophers discovered that by rubbing amber against a cloth, lightweight objects would stick to it. Just like rubbing a balloon on a cloth makes the balloon stick to other objects. It was not until around the year 1600, that any real research was done on this phenomenon

Meet the Scientists

Meet some of our most famous scientists and inventors, who by their curiosity, knowledge, experimentation and pure genius, changed the world with electricity.

Ben Franklin was born in 1706 in Boston, Massachusetts. He was not only a scientist and inventor, but also noted as being a statesman, a printer, philosopher, postmaster, musician and economist. Ben was even one of the founding fathers of our country signing the Declaration of Independence. Franklin is most famous for his curiosity and experimentation with electricity and other natural occurrences. He became more interested in the effects of lightning. As an inventor Ben was most noted for his famous kite flight experiment. Franklin did not invent electricity, but as a result of his experiments, he did invent the lightning rod which protects buildings, homes and ships from lightning damage from a strike.

Thomas Edison was born in 1847 in Milan, Ohio, and like Ben Franklin, was both a scientist and an inventor. In fact, Edison patented 1,093 inventions in his lifetime including the kinetoscope, the phonograph, and his most famous - the incandescent lightbulb. These inventions earned him the nickname "The Wizard of Menlo Park."

In 1879, after 1,200 experiments, Edison made a lightbulb using carbonized filaments from cotton that burned for two days. With the help of an associate, **Lewis Howard Latimer**, who was responsible for inventing the process for manufacturing the carbon filament, the light bulb was one of Edison's greatest achievements and it changed the world. The first light bulbs were installed in a steamship and later in a New York factory.

The Electric Journey: How Does Electricity Get to My House?

Check out the Kid Korner for an on line demonstration.

Energy comes from a Power Source Types of Power Sources: Natural Gas, Hydropower, Coal and Solar

What is Natural Gas?

Natural gas is a fossil fuel like oil and coal. It is a “nonrenewable” fuel because it takes millions of years to form deep in the earth before it can be used again. When microorganisms, sea plants and animals died over 300 million years ago, even before the dinosaurs, they settled on the bottom of the oceans which covered most of the earth. Layers of dead sea plants, animals, sand, mud, and other debris built up over time and the pressure and heat from the earth turned them into petroleum and natural gas. The natural gas would get trapped in pockets of underground rocks. Sometimes the gas would seep up to the earth’s surface and dissipate into the air or ignite from lightning strikes.

Natural gas in it’s pure form is colorless, odorless and shapeless. Only after processing is the “rotten egg” odor added for safety. It is a combination of several gases like propane, butane, carbon dioxide, ethane, oxygen, nitrogen and hydrogen sulfide, but primarily made up of methane gas so when you burn it it gives off **heat energy**. There are some renewable sources for methane like garbage in landfills that produce some gas.

For more information on Natural Gas visit www.naturalgas.org.

What is Hydropower?

Water is another very important energy resource. People, plants and animals all depend on water. Hydropower is energy that comes from the force of moving water. The word “hydro” means water. Hydropower is a renewable energy source too. The sun heats the oceans turning it into water vapor. This is called *evaporation*. When the water vapor rises it turns into clouds. The cold air above the earth mixes with the clouds and releases rain or snow called *precipitation*. This water cycle goes on forever making this a renewable energy source.

Hydropower is also a clean and environmentally friendly source of energy. There is no fuel to burn so there are no harmful emissions put into the air.

What is coal?

Coal is the **most abundant fossil fuel resource** in the United States. Almost half of our electricity comes from coal-fired plants and provides almost a quarter of America’s energy needs. Coal is also the least expensive fossil fuel to use and is cleaner burning today than ever before by reducing the sulfur dioxide emission (air pollution) by 71% since 1999.

Before the first settlers arrived, the North American Indians used coal to bake their clay pottery. By the 1800's coal was used for manufacturing goods, to make iron and steel, and later to power steam engines for ships and trains. By the end of the 1800's coal was used to produce electricity.

Today coal is used to make electricity and for smelting metals in the iron and steel industry; (metallurgical coal is used for steel making). The paper, brick, cement and limestone industries also use coal to make products.

Alternative Energy - Solar

Alternative Energy comes from resources like the sun (solar), the earth (geothermal), the wind (wind power), wood, agricultural crops and animal waste (biomass), landfill or methane gasses (biogas), and other sources like fuel cells. These resources are abundant and are renewable fuels. By using alternative fuel sources we can conserve our non-renewable fuel sources like natural gas and oil. By doing this we can be more energy efficient in producing electricity and heat while protecting our environment

How It Works

Sun Power (solar energy) gives us heat and light energy.

Energy comes from a **power source**. For example, we get heat and light energy from the sun. The sun is an energy source.

Solar Power is energy produced by the sun in the form of heat and light. The sun is 93 million miles from the earth and is 4 to 5 billion years old. The temperature of the sun ranges from 10,000 degrees Fahrenheit at its surface to more than 18 million degrees Fahrenheit at its center. That's HOT! It takes about 8 minutes for this energy to reach the earth. The sun itself is a star made up of mostly hydrogen and helium gas and it radiates an enormous amount of energy every day.



Extension Activities - Experiments

To demonstrate that we get heat from the Sun **Let's Make a Solar Cooker**

You will need:

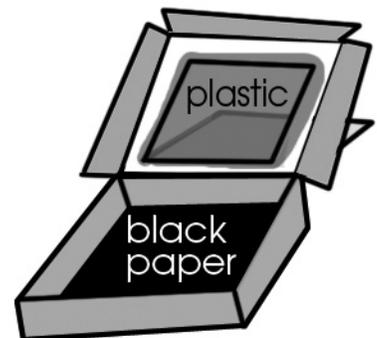
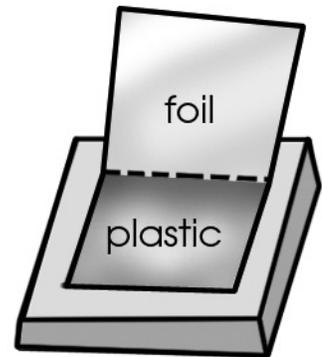
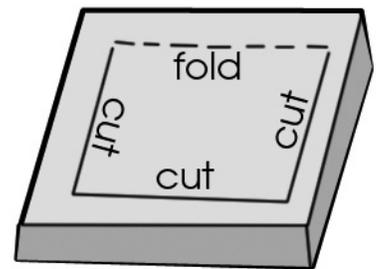
- A sunny day
- 1 empty pizza box
- Black construction paper
- Aluminum foil
- Sheet of clear plastic laminate
- Non-toxic glue
- Tape and scissors
- Ruler and magic marker
- One wood dowel rod
- Food to bake-nachos and cheese

Build Your Solar Box:

1. Draw and cut a window in the top of the pizza box leaving one side for folding.
2. Cut two pieces of foil to fit on the inside of the lid and to line the inside of the box. Smooth out wrinkles and glue in place.
3. Tape a piece of plastic to the underside of the opening you cut. Make sure the plastic is tightly sealed around all the edges. This makes your oven window.
4. Glue corners of a piece of black construction paper to the bottom of the inside of the box on top of the foil.

Your Solar Oven is now ready!

Just place your food to be cooked on the inside the box. Close the box and prop open the window lid using the dowel rod. Position your oven in the sun so that the foil lid reflects the maximum amount of sunlight through the window. Try heating up s'mores, hot dogs, melt some cheese on nachos, or even try baking a cookie



Experiment:

Sun or Shade?

Background questions:

When it is a hot sunny day, where might we go to get cool?
Are we really cooler in the shade?

Materials:

Thermometer
String

Procedure:

1. Hang a thermometer in the shade. After 5 minutes tell the class what the temperature is.
2. Next hang the thermometer in the sun. After 5 minutes check the temperature and report to the class.

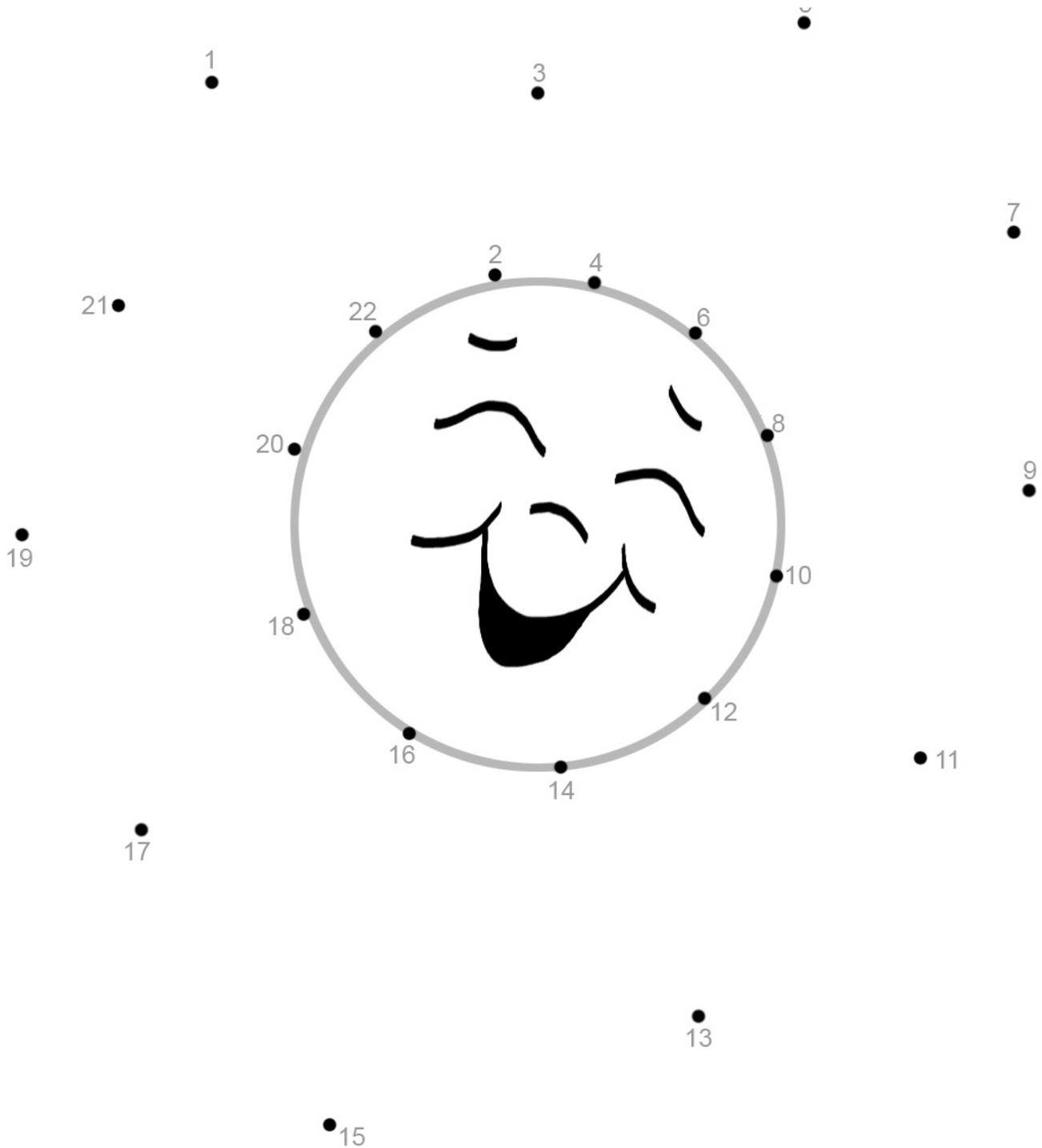
Ask questions:

Which area is warmer?
Why does it feel warmer in the sun?
When you are outside is the sun's energy hitting your skin? How do you know?

Activities Page: Connect the Dots

Heat and Light Comes from the _____?

Connect the dots to find the answer.



Activities Page - Power Maze

Help the house get the energy it needs by following through the maze.

This maze helps you to understand how we get energy we need in our daily lives. It starts with an energy source, which then goes to a power plant. This power plant turns to energy into electricity that we can use at home and at school.

