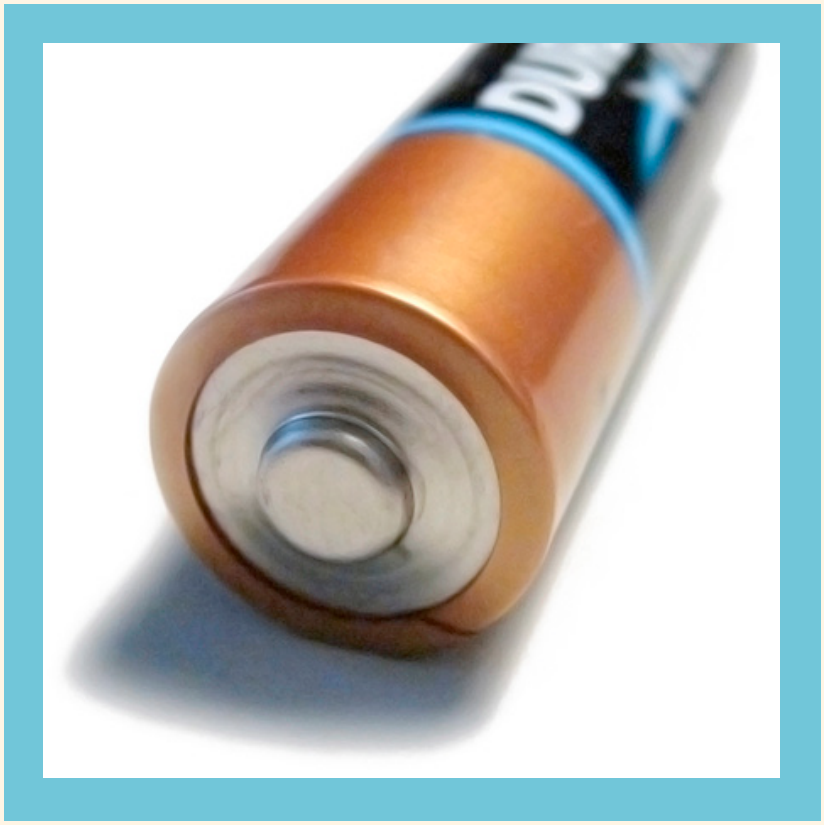
STEM Sims™

Super Cells



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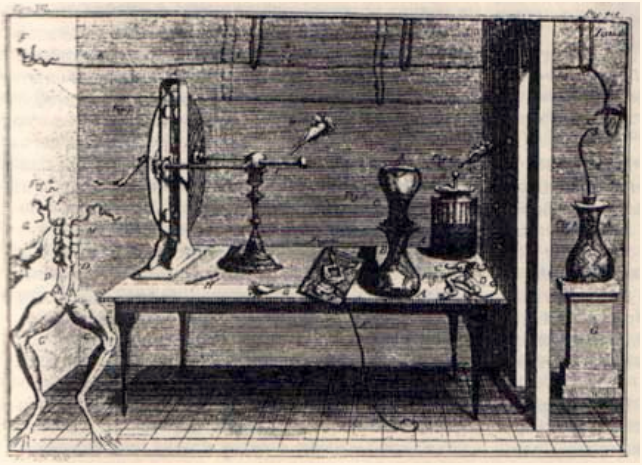
Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.

Start learning about the history of batteries and how they impact the environment. Take the following brief quiz to see how much you already know about batteries.
See the bottom of page 4 to check your answers.

1. Who is credited as inventing the first electrochemical battery?
   a. Alessandro Volta
   b. Luigi Galvani
   c. Pieter Leyden
   d. Michael Faraday

2. Which famous piece of literature was inspired by Luigi Galvani's experiment that showed that electricity could make a frog's leg twitch?
   a. The Island of Dr. Moreau by H.G. Wells
   b. Dracula by Bram Stoker
   c. Frankenstein by Mary Shelley
   d. The Wind in the Willows by Kenneth Grahame

3. According to the Guinness Book of World Records, where is the most powerful battery in the world housed?
   a. Tokyo, Japan
   b. California, United States
   c. Geneva, Switzerland
   d. Paris, France



4. According to the Guinness Book of World Records, what is the highest voltage obtained from a potato battery?
   a. 90 V
   b. 250 V
   c. 950 V
   d. 1,950 V

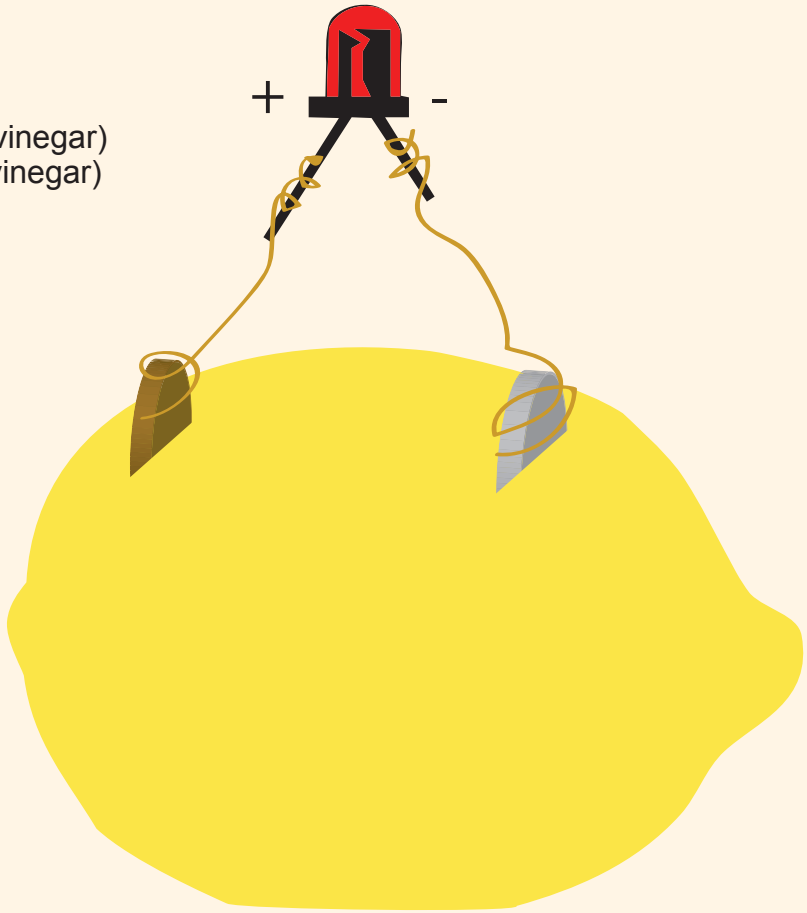
5. How many tons of batteries do Americans throw in landfills every year?
   a. 179
   b. 1,790
   c. 17,900
   d. 179,000

A Sour Battery

Batteries come in all shapes and sizes. Did you know they even come in different tastes? Learn how to make an LED light up with just a few common materials!

Supplies Needed:

- a lemon
- a knife (and adult supervision)
- a shiny new penny (or one cleaned in vinegar)
- a shiny new nickel (or one cleaned in vinegar)
- copper wire
- an LED



Instructions:

1. If your coins are not already clean, make sure to clean them well with vinegar and water. Be sure to dry them completely afterwards.
2. Next wrap a piece of wire around each coin.
3. Squeeze the lemon without breaking it to activate the lemon juice.
4. Then cut two coin slits at opposite ends of the lemon.
5. Put the penny (+cathode) in the left slot and the nickel (-anode) in the right slot.
6. Finally, connect the long lead on the LED with the wire connected to the penny, and the short lead with the wire connected to the nickel and watch your LED light up!

Questions:

1. How long does your lemon battery light up the LED?

2. What improvements do you think you could make to get more voltage out of your battery?

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Battery Types

The most common type of battery is an electrochemical battery. An electrochemical battery relies on a chemical process to generate electricity. Electrochemical batteries can be classified in two ways: primary or secondary. Primary batteries rely on an irreversible chemical reaction to produce electricity and are useless once the chemical reaction is exhausted. Secondary batteries are rechargeable and are often considered the more eco-friendly option because they can be used far more times before being disposed.

Choosing a battery for your device is going to depend on whether you have a high-draw or low-drain device. The initial cost of alkaline batteries is the cheapest, yet some larger electronics like digital cameras drain batteries so quickly that you end up spending a lot of money on the batteries and adding lots of toxic electronic waste (e-waste) to landfills. On the other hand, lithium Ion batteries are much more expensive and require discharge and recharge time. Since they are rechargeable, however, you do not have to buy many.

Another factor to consider when choosing a battery is metal type. Nickel cadmium is not recommended by certain environmental groups because cadmium is a highly toxic metal. Despite its high toxicity, some users are unaware of the special disposal requirements, and they end up throwing it away with the regular trash.

An interesting fact about a fourth type of battery, the nickel metal hydride, is that if you put a newly charged one in a tightly sealed bag in the freezer, you can preserve about 90% of the charge.

Please visit our site for more helpful information:

STEMsims.com

Answers: Page 2 Answers: 1) a. 2) c. 3) b. 4) d. 5) d. **Page 3 Answers**: 1) Answers will vary. 2) Answers will vary. Possible answers include squeezing the lemon to increase the acidity, or to move the coins closer together on the lemon.

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