DragonflyTV: GPS Activity 8

More Power to You!

The Bakken Museum

Minneapolis, MN

thebakken.org

Body Electricity

I'm Rylee. My friend Kristin and I went to The Bakken Museum in Minneapolis, a cool place that focuses on electricity and the human body. It's of special interest to me because I use a myoelectric prosthetic arm. My arm works with electrodes, which sense electrical signals in my muscles. I want to know: How do the electrical signals in my body help my arm work?

The Bakken has over two thousand electricity gadgets, but the one we're interested in is BioPac. The BioPac is an electromyograph or EMG. It shows electrical signals in muscles. We each connected the electrodes from the BioPac to the muscles in one arm and then flexed our muscles. Our muscles made a signal that the BioPac could detect and display on a computer screen. This let us compare the size of the signal in different cases.

THE BAKKEN MUSEUM

Icebreaker

Get a charge out of this electrical activity!

10-15 minutes

DragonflyTV Skill: Observing

Guide your kids as they

1) Spread some cereal out on a table.
2) Blow up a balloon and tie it off.
3) Rub the balloon against your hair to give it an electric charge.
4) Slowly bring the balloon over the cereal. When you get close enough, watch the cereal jump and dance!
5) Develop an explanation for why rubbing the balloon is a necessary step, and why the cereal behaves as it does.

You'll need:

- breakfast cereal, such as crisped rice
- a balloon

DFTV Science Helper

Children learn the language of static electricity even before they truly understand the concepts. Encourage your kids to attempt to explain the dancing cereal phenomenon in their own words, not in words from a science book. Invite them to draw pictures to help communicate what they are saying with words.

For more information about this shockingly fun activity, visit http://pbskidsgo.org/dragonflytv/superdoit/dancing_cereal.html

Investigation
Make Your Own Batteries!

1 hour

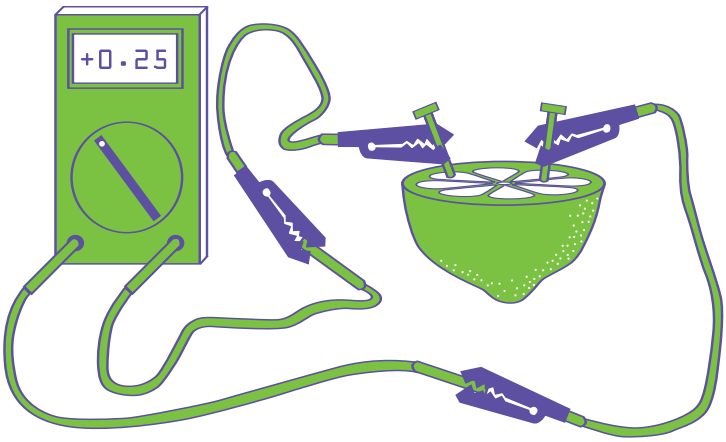
You'll need:

- One zinc nail (look for galvanized nails at the hardware store)
- One copper nail (a copper penny can be used if a copper nail isn't available)
- One steel nail (not the galvanized kind)
- One squishy lemon (roll it around on the table to make it really squishy) or a lemon cut in half
- Other fruit, such as an apple, orange, pear, or banana
- Alligator-clip wire connectors
- Voltage multimeter

Find electricity where you might not have expected it—in a lemon!

Guide your kids as they

1) Push the copper and zinc nails into one of the fruits.
2) Use an alligator-clip wire to connect the copper nail to one of the multimeter electrodes, say, the black one. Use a second clip wire to connect the zinc nail to the other electrode (red). Turn the multimeter to the Volts DC setting. Read and record the voltage that the meter detects.
3) Now switch the connections so the copper nail is connected to the red multimeter electrode and the zinc is connected to the black. Write down the multimeter reading. How does it compare to the first reading?
4) Make a series of fruit and veggie batteries and hook them together with aluminum foil strips to make more power.
5) Try different combinations of nails and fruit to achieve the largest voltage reading you can. Record all your data, and find the choice of fruit and nails that gives you the largest voltage.



DFTV Kids Synthesize
Data and Analysis

Here's an example data table kids can use with this investigation:

Fruit	Nail 1	Nail 2	Voltage Reading

DFTV Science Helper

In this activity, the maximum achievable voltage reading is largely a function of the choice of nails. The choice of fruit influences how close to that maximum you actually get. If the alligator-clip ends are properly sanitized, kids may touch the wires from the nails to their tongue. They will feel a slight tingle.

Keep Exploring!

Help your kids make a collection of fruit batteries and hook them together with additional alligator-clip wires to make a large battery. How do they have to make the connections in order to increase the voltage reading? Ask the kids to make a careful drawing that shows the proper connections.