**Thread NSTA Electric Unit Question**

**From:** physicalscience-request@list.nsta.org [mailto:physicalscience-request@list.nsta.org] **On Behalf Of** Mandi Schooley
**Sent:** Monday, April 19, 2010 12:09 PM
**To:** physicalscience@list.nsta.org
**Subject:** Electricity Unit

I am a first year teacher teaching a 9th grade physical science class (and my background is life science).  My school is on block scheduling and I am struggling to find ways to keep my kids busy for 90 minutes everyday.  The next unit I am covering is "Electricity" and I could really use some good resources.  **Would anyone be willing to share some activities that your students enjoy about electricity?**  The activities don't necessarily have to be very long, just something to break up the monotony of notes all the time.  Also, if you know of any go-to websites that help you out in your class I'd appreciate it.  I've been googling information every night, but I end up spending so many hours just sifting through junk that I waste **a lot** of time.

I'll be covering waves after electricity, so anything you have for that could be useful as well.  I really appreciate any help you are willing to give.  Thanks so much!

Mandi Schooley
Bishop Kelley High School
Tulsa, OK

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A short (5-10 minute) activity I do at the start of the chapter is to give each student (if possible) one wire, one battery and a small lightbulb (I use 1.5 amp bulbs). They each need to figure out how to make a complete circuit with only the one wire--it takes a while.  I try to get it so that when students figure it out they show me but not their classmates.  When they are done they need to write a summary of what they did/how it worked/etc in their lab journal for the chapter.

I have attached 2 labs that could be used:

The first is a lab I do this lab with my students in my freshman physical science class.  The reading the lab refers to is a section in our textbook that defines and describes parallel and series circuits.  I do this lab after I have introduced what electricity, simple circuits and Ohm's law.  There is no math involved in their analysis of the changes occurring but it could easily be incorporated with meters.

The second file what I do with my conceptual physics students.  They have learned what electricity is and about simple circuits but have not been introduced to Ohm's law.  We have no textbook so a very brief explanation of parallel and series is in the lab itself.  Again they are not taking numerical measurements but that could be added.

For all students to complete the entire lab it takes a little less than a class and a half (52 minute classes).  To fit it in one period and keep everyone occupied for the entire class period I generally make the last section in each about switches a small extra credit opportunity.

Paula

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NSTA has a really nice Electricity Virtual Lab that lets you create all kinds of circuits. Go to ftp://ftp.nsta.org/VLabsWin/ (for Windows) or ftp://ftp.nsta.org/VLabsMac/ (for mac) to download it for free.

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**From:** physicalscience-request@list.nsta.org [mailto:physicalscience-request@list.nsta.org] **On Behalf Of** Klingenfus, Emily
**Sent:** Monday, April 19, 2010 11:13 AM
**To:** Mandi Schooley; physicalscience@list.nsta.org
**Subject:** RE: Electricity Unit

I am currently doing my electricity unit with my Physics students. I have found some good simulations on the University of Colorado’s website that students like because it helps show the flow of electrons.

<http://phet.colorado.edu/index.php>

I also really like the Snap Circuits if you can get a set. They work consistently and students can try different types of circuit combinations.

Emily Klingenfus

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**Good program for simple high school circuit diagrams?**

ExpressPCB.com is an interesting option. They provide 2 free programs, one

for preparing schematic diagrams and another for designing the physical

layout of printed circuit boards. Both are easy to use and they have the

advantage of showing students how "real" engineers, technicians and

researchers design and produce printed circuit boards. If you want to go the

final step to "reality," you can order the boards online for as little as

$51 for 3 boards. Obviously, the company wants to sell boards, but the

design software is still free and there is no requirement that you actually

buy anything.

Dr. Fred Thomas

Learning with Math Machines, Inc.

1014 Merrywood Drive

Englewood, OH 45322

Voice phone: 937-832-0792

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Email: fred.thomas@mathmachines.net

Web: [www.mathmachines.net](http://www.mathmachines.net)

-----Original Message-----

From: physicalscience-request@list.nsta.org

[mailto:physicalscience-request@list.nsta.org] On Behalf Of Steve Cooperman

Sent: Friday, June 06, 2008 12:35 AM

To: 'physical science listserve'; 'physics list serv'

Subject: Good program for simple high school circuit diagrams?

Does anyone know of a good (and inexpensive, if possible)

circuit-drawing program for the PC?

 --- Steve >>>>

**Response to 1st question**

This project is not really high level, but students have fun with it. They get the chance to be creative.
<http://www.champaignschools.org/staffwebsites/mcleanji/546/project/e-m/QuizBoard2005.html>

Jill McLean
Centennial HS, Champaign, IL

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**Response to 2nd question**

Hello Everyone,

I most highly recommend the site <http://furryelephant.com/> for instruction

and practice. ELECTRICITY AND NUCLEAR ONLY AS OF YET

The end of section quizzes are intelligent (that's the quiz question are

adjusted based on how the student answers the question before)

The quiz also asks and determines the level of confidence (falsely over

confident or if the student is not as confident as they should be) THIS IS

THE ONLY!!! QUIZ that I have ever seen do this.

The online science misconceptions quiz is a must!!!

Looking towards the future with you,

Rob Radnich

Physics, physical science, computer programming

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I always like using some of the activities from the TOPS electricity book...and my students seem to enjoy them too :)  (They're 8th graders...)

[www.topscience.org](http://www.topscience.org)

On Mon, Apr 19, 2010 at 9:57 PM, Jennifer Rahn <jjs.rahn@gmail.com> wrote:

Likewise, I had a group of ninth grade students who really appreciated the Jason Project. Geared toward middle school, they have a lot of activities that are fun for students, and great for the majority that did not understand the material the first time.

<http://www.jason.org/public/WhatIs/CurrOIPIndex.aspx>

Jennifer Rahn

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If your students read at or slightly below grade level, or if it’s their very first exposure to electricity, I would suggest you take a look at the “Electroworks” unit from the NEED Project ([www.need.org](http://www.need.org)).  It’s targeted to grades 4-7 which I know sounds babyish but my high schoolers appreciate the simplicity of the text when they’re reading it to grasp new concepts.  It’s also online in pdf format (go to website, click on “For Educators” and then “Curriculum Resources”).  Many of the NEED curricula discuss electrical power generation, too, so when you’re ready to move from “what is electricity” to “where do we get our electricity” you can bring those in for good lessons on energy efficiency and conservation.

Caryn Turrel

Greenwood, IN

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My favorite project, when I was teaching the topic, was to challenge the kids to **design a game** (like Operation) that would be based on electricity. This project was very open-ended and allowed kids of all levels to participate. A steady hand game was a regular...but the kids also came up with "Home for the Holidays" (it was near Christmas)...the car drove into the drive way, made a connection and the holiday lights turned on. Another year, girls took their old dolls (Barbie or maybe smaller) and had some type of maze...that looked like the doll was going shopping. When certain connections were made the stores either made a buzz sound, a light went on, etc. Another group made a box look like a small refrigerator and used tongs. The object was to try and steal a "midnight snack" without getting caught. I've also seen putting ramps where a light (or buzzer, etc) goes off when the golf ball (wrapped in foil) completes the circuit as it drops into the hole. Some kids have tried to build simple pinball machines. Using magnetism to repel a car up a road; around a course, etc. My own daughter (YEARS AGO) built a boat. She and her partner floated it in a shallow container of water and used the magnet to drag it across the water. When it docked, the lighthouse lit up. They timed the participants.

I've done this with 6th graders and 8th graders. It is always amazing to see how many variations of basic games they can come up with. At our school, we have a time to allow the younger students to come in and play the games. Some years, kids showed up on Saturday and we created a "Santa's Workshop"...where the little ones, waiting for their turn at "Breakfast with Santa", could pass time without complaint. The "big" kids all wore Santa hats...and the PTA fed them bagels, donuts, etc.

We used Christmas lights...and kids often were willing to purchase small motors, buzzers, etc. from RadioShack. We also would break down the projects and save pieces.

A good base for these games is foam core board--available in stores like Michaels. The art dept may have pieces left over that could be taped together. Also, art stores (framing stores) often have lots of odd-sized pieces of matte board and/or foam core board that they throw away. If you are really strapped for funds (or parents aren't willing to buy)...good ole' cardboard boxes work well, too. Especially the ones copy paper comes in. The lids, especially are good to use.

kdelgado@embarqmail.com

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Just a quick demo to visualize resistance and the conversion of electrical energy into thermal/radiant energy:  Touch a 9V battery to a clump of fine steel wool.  Immediately the steel wool begins to burn due to the current flowing through the "wires".  Careful--this fire can get very hot!   Also--blowing on the embers will greatly increase the rate of combustion!

Ryan Lenz

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On Mon, Apr 19, 2010 at 3:20 PM, Andrew Bennett <bennandy@gmail.com> wrote:

Christmas lights do, indeed, work very well to show when a complete circuit is made.  I like to mention that when I moved into my new house, and was trying to map speaker wires for the surround sound, I used Christmas lights and a AA battery to figure out which wires were connected.

Rather than telling them the difference between series and parallel, I have students come up with a way to make two light bulbs both light on there own.  Then they have to make a circuit such that when one bulb is removed from the socket, both lights go out.  Then they make another one such that when one bulb is removed from its socket, the other light stays on.  This makes for a good intro of series vs. parallel, and what is required for a bunch of wires, batteries, lights, etc. to form a "circuit".

Andrew Bennett
Physics and Physical Science Teacher
North High School, Davenport, IA
bennandy@gmail.com
[www.bennettscience.com](http://www.bennettscience.com)

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On Mon, Apr 19, 2010 at 3:31 PM, <soccerballz110@hotmail.com> wrote:

I cut down plastic canvas as the circuit boards and use christmas lights, paper clips and brads. You can make series and parallel easily then keep the materials for the next year.Sent on the Sprint® Now Network from my BlackBerry

This is a simple circuit board they can make using manila folders, paper, and aluminum foil. Once they complete the board, you can use it for reviews of parts of circuits, electricity in general or other topics during the year.   You can challenge the students to make the board "better." This will take your students about an hour to complete. If you let them struggle with making each circuit separate, it will take longer and I think they learn more.  You can also have them discover how they can make two answers light up the bulb.

See <http://wetheteachers.com/viewfiles.php?fid=2410>   You will have to sign in but it is free and no spam.

VA

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I want to second using old Xmas tree lights. I have used the challenge of how many lights students can get to light using a lemon as a battery.  Choosing the right electrodes to get the maxium current is fun for the kids. Also limes do not work as well as lemons. Does adding lemon's in series or parallel light more lights?  This activity is well documented on the net.

I also echo the reply that referenced the Virtual Lab at the NSTA web site.  The excellent book by Dr. Roberison - Stop Faking It: Electricity and Magnetism from NSTA Press is an excellent complement to the topic and the virtual lab as he makes generous use of it.

Paul Mollinger, Ph.D

Memphis, TN

----- Original Message -----
From: "Peggy WILSON" <PeggyWILSON@aseschool.org>
To: "Alex Mendralla" <alex.mendralla@gmail.com>, "Mandi Schooley" <mschooley@bkelleyhs.org>
Cc: physicalscience@list.nsta.org
Sent: Monday, April 19, 2010 1:33:05 PM GMT -06:00 US/Canada Central
Subject: RE: Electricity Unit

One of the best tips I picked up at NSTA conference in Florida is to use cut apart strands of Christmas lights for my lightbulbs.  They work very well.

***Peggy Wilson***

***Physical Science***

***All Saints' Episcopal School***

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**From:** physicalscience-request@list.nsta.org [mailto:physicalscience-request@list.nsta.org] **On Behalf Of** Alex Mendralla
**Sent:** Monday, April 19, 2010 1:30 PM
**To:** Mandi Schooley
**Cc:** physicalscience@list.nsta.org
**Subject:** Re: Electricity Unit

I covered a very basic electricity unit with my 8th Grade Engineering class.  We made homemade circuits using aluminum foil, cheap LEDs, and basic resistors.  Both the LEDs and Resistors can be purchased for pretty cheap  at Radio Shack.  The students brought in old cereal boxes and we used the cardboard as our circuits.  Masking tape can insulate the aluminum foil and help it stick the the cardboard.  We used a 9v Battery to illuminate the LEDs.

You can take it a step further by having the students poke the LEDs through the board and draw a picture on the back that incorporated a light  - we got a lot of glowing eyes, Christmas trees, and other nifty pictures that integrated the lights.

You can easily talk about series and parallel circuits as well using the same circuit board idea.

Alex Mendralla

Palombi Middle School

Lake Villa, IL