**Thread NSTA Electric Circuits Activity Question**

From: Amy Becker [abeckernsta@gmail.com]

Sent: Saturday, October 24, 2012 9:11 PM

To: physics@list.nsta.org

Subject: electricity and magnetism

I teach a freshman/sophomore conceptual physical science class and am in the

market for a good student activities. I will be teaching electricity

and magnetism for the next month or so so this topic would be ideal.

I have the students build series and parallel circuits in lab, talk

about ohm's law and what current, voltage, and resistance is for our

electricity topics and spend a couple of days talking about what a

magnet is and how a magnet works for our magnetism unit.

any suggestions or past project ideas would be appreciated.

Thanks in advance!

Amy

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Electricity activities and PowerPoints

<http://web.cvcaroyals.org/~rheckathorn/OPElectricity.htm>

Greetings,

If you go to my website listed below

Select: Middle School Physics

Select: Electricity

Open the first item: Electricity Unit

Go to page 123: You will find a project for Wiring

a House.

This is a great activity to have available for an

open house.

Feel free to use this or anything on my site.

Enjoy

Dick

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Physics is learning how to communicate with ones

environment so that it will talk back.

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I also have my kids build simple motors, using the instructions found in the Exploratorium "snackbook" of old, which I suppose is still available from theose folks.  Similar to the one on Ed Engelman's link.  One thing which makes lots of difference in the kids' success - - along with all of the more obvious, stated requirements for the motor - -is that the coil should spin very smoothly, as balanced as possible.  The line between success and failure can be rather fine, and a bigger battery won't overcome a lopsided motor.

You might also try a simple solenoid as a lead-in to the motor.

And before that, to show the relationship between a current-carrying wire and magnetic field, I have the kids build a simple DC circuit, and hold one wire directly over a compass, to see the deflection of the needle.  [The first time we do this, about half of the kids' compasses will deflect clockwise, the other groups' will deflect counterclockwise, and you can make up some ridiculous story about magic, lingering equinox effects, induction fairies... until someone realizes that the orientation of the wire (positive to negative terminal or v.v.) is responsible.] Then get the kids to quantify the degree of deflection depending upon current? voltage? etc.  Check out the CASTLE curriculum, if you're not familiar.

One of my main labs I do in this area is to have the kids **build the strongest electromagnet** they can. I show them a very simple one like I used to make as a kid - - a few turns of wire around a screwdriver handle hooked up to a single cell.  Not too mindblowing; it lifts a few paperclips.  Then we brainstorm about what we could try, to make a stronger one.   It's relatively inexpensive to provide a bunch of solid wire of various gauges, including magnet wire, different diameter iron or steel rods - - it's surprising what you can find at hardware stores or the bigger building centers.  Everything from big to really big nails to various diameter iron rod.  They keep track of which variable they're testing (diameter of rod, # of coils, gauge of wire, single row of coils vs. stacked, different voltages, different current - - whatever reasonable variable they can think of). And they account for what factors they're trying to control, too. We use 6V lantern batteries, and include a switch in the circuit, with a 10-second rule for each trial, so that they don't affact the results with dying batteries.  You can have them lift various mass, but if it's something like paperclips, these will become magnetized and cling to the nail or whatever even after the power is cut.  So just use one clip as a hanger, and your other masses can dangle from that, and avoid direct contact with the electromagnet.  The student groups can plot the results and look for patterns, and they can present their approach and results in a whiteboard session. It's a good opportunity for them to "do science".

Just for fun, at the end, I got one of those electromagnets available from various educational / science supple companies, which run off a single D cell.  We lifted kids weighing over 120 pounds with that single 1.5 V cell. And no, our home-built ones were not as good as that.

Went on too long, apologies

Bob Shaw, McGehee School, New Orleans

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I build simple motors with my Junior/Senior Auto Technology students using a permanent magnet and a coil that students form. The directions show you how to build one with a 1.5 V battery. Students are more successful when a 6V or 9V battery is used. Over the last two years each lab group has been able to get their motor to spin.

I have also led a class in making a motor with two coils and no permanent magnets. Success rate is about 60%.

<http://www.sciencebuddies.org/mentoring/project_ideas/Elec_p009.shtml?from=Home>

Ed

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