Name: _____

Generating Electricity

SPH4C

Go to http://phet.colorado.edu/en/simulation/generator and click on the green "Run Now!" button to start the simulation.

Click on the "Bar Magnet" tab at the top of the simulation window.

You can see the strength and direction of the magnetic field indicated by the little compass needles near the magnet. (The strength is indicated by the brightness of the compass needles.) Note that you can also click on the box beside "See Inside Magnet" to see the field within the magnet itself.

Click and hold the bar magnet to move it around and note how the magnetic field in the window changes as the magnet is moved.

Click on the "Pickup Coil" tab at the top of the simulation window.

Electric current can be affected by a magnetic field. To see this, click and hold the bar magnet to move it around. What happens to the blue electrons in the coil of wire?

_____

What happens to the light bulb? Explain why.

_____

_____

What happens to the electrons in the coil of wire when the magnet stops moving?

_____

What happens to the light bulb when the magnet stops moving? Explain why.

_____

_____

What two things can you do to increase the brightness of the bulb?

You can move the magnet _____

or you can move the magnet _____.

Conclusion: A current can be induced by a _____ magnetic field.

This is called **Faraday's law of electromagnetic induction**.

Click on the “Generator” tab at the top of the simulation window.

Start the flow of water using the slider on top of the tap. In your own words, explain why the bulb lights up. (You should use the words “magnetic field” in your explanation.)

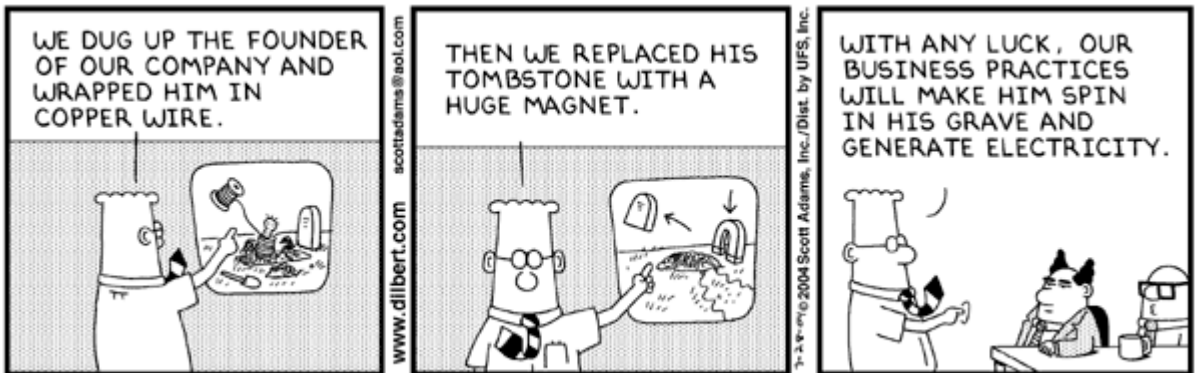
_____

_____

_____

Not all power is produced by the flow of water (hydroelectric power), but many means of production – even nuclear power – contain a rotating wheel called a turbine as part of the process.

Is the current produced by the generator DC (direct current) or AC (alternating current)? ____



Click on the “Electromagnet” tab at the top of the simulation window.

Just as a moving magnet can induce a current, a current can induce a magnetic field.

These current-induced magnets, called electromagnets, are useful because they can be turned off by stopping the flow of electricity, which you can see by reducing the potential difference supplied by the source to 0 V.

The magnetic field produced by a DC current source is _____.

Click on the AC Current Source in the upper left corner of the window.

The magnetic field produced by an AC current source is _____.

Click on the “Transformer” tab at the top of the simulation window.

You should see two coils of wire: one connected to a battery and one connected to a light bulb. The light bulb is not lighting up. What two things could you do to cause the light bulb to light up?

_____

_____

Explain why each of these would work.

_____

_____

Which is more practical? _____

An electrical device in which current flow through one coil of wire causes current flow in another coil of wire is called a transformer. Transformers are commonly used to either increase ("step up") or decrease ("step down") the potential difference in the second loop.

Where, in our electrical distribution system, are step up transformers commonly used? *(You will need to look this up.)*

_____

_____

How do you step up the potential difference? *(What is the difference between the coils?)*

_____

_____

Where, in our electrical distribution system, are step down transformers commonly used?

_____

_____

How do you step up the potential difference? *(What is the difference between the coils?)*

_____

_____

And finally, refer to the ideas discussed in this simulation and identify <u>two</u> reasons why our homes are wired for AC instead of DC current:

_____

_____

_____

Extend your thinking *(bonus)*: There are other reasons why our homes are wired for AC. What are they?

_____

_____