

Electromagnetism Simulation

Directions: Use the simulation “Faraday’s Electromagnetic Lab” (in the Electricity, Magnetism, and Circuits section) on the website <https://phet.colorado.edu/en/simulation/legacy/faraday> to complete this paper.

Bar Magnet Tab – General Magnetism

1. Click on the Bar Magnet Tab and you should see a bar magnet and compass on the screen. Please note that the color red refers to North and white refers to South. Place the compass at the North end of the bar magnet and observe which way the “red tip” of the compass points. Move the compass to the South end and observe where the “red tip” of the compass points. What can you say about where the north (red) tip of a compass points?

Pickup Coil Tab – General Electromagnetic Induction

2. Set the number of loops to “1” and note what happens to the light bulb when

The magnet is not moving and is not in the loop –

The magnet is moving and is not in the loop –

The magnet is not moving and is in the loop –

The magnet is moving and is in the loop -

3. Increase the number of loops to “3” and see if it affects your results from #2. If so, describe how.
4. Does the speed you move the magnet affect your results? If so, describe how.

Electromagnet Tab – Is Electromagnetism Reversible?

5. You should see a battery attached to a loop of coil (an electromagnet) and a compass on the screen. Move the electromagnet around the screen and describe what the compass does.
6. Move the compass around the electromagnet in order to determine the North and South poles. Draw a picture and label the North and South Poles.
7. Change your current source from DC (direct current) to AC (alternating current) and describe what the compass does.
8. Observe the electrons in the AC current source and compare their movement to those in the DC current source. Explain the difference between DC and AC in terms of electron movement.

Transformer Tab – Can We Use Electromagnetism?

9. The last tab showed us that current can create a magnetic field. Can this magnetic field generate electricity? That is, can we use electricity to generate more electricity? Move the electromagnetic back and forth and note what happens.
10. Change to an AC source. Note what happens while the electromagnet is not moving. Why does the light bulb light up? Do the electrons in the light bulb move as fast as the AC source?

Generator Tab – Can We Use Electromagnetism?

11. Describe the generator and explain how it works.