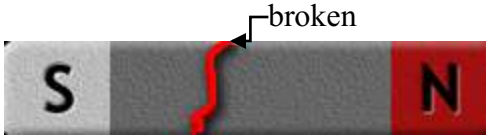


PHET Magnetism

Part I:

1. Go to <http://phet.colorado.edu/en/simulation/magnets-and-electromagnets> or google “PHET magnets and electromagnets”
RED is NORTH POLE WHITE is SOUTH POLE
2. Move the compass slowly along a semicircular path above the bar magnet until you’ve put it on the opposite side of the bar magnet. Describe what happens to the compass needle.
3. Move the magnet slowly around the compass. Describe what happens to the compass needle.
4. Why are the small compasses all over the screen darker by the magnet and more transparent far from the magnet?
5. Place the compass by the south pole of the magnet. *A compass is really a small magnet floating on water.* Use the knowledge to explain why the RED part of the compass points toward the south pole of the magnet.
6. Place the compass by the south pole of the magnet. *A compass is really a small magnet floating on water.* Use the knowledge to explain why the WHITE part of the compass points toward the north pole of the magnet.
7. Click to “see inside magnet”. Describe what is inside the magnet.
8. Predict what would happen inside the magnet if the magnet were to break in half. Sketch the result below.

9. Click on “show earth”. The magnet that is inside the earth has the south pole of the magnet at the geographic north pole of the earth (magnetic south is above Canada).
 - a. Use the compass needle to understand. Is the diagram on PHET true? [yes / no]
 - b. Explain your answer.
10. Click on the electromagnet tab. Place the compass on the left side of the coil so that the compass center lies along the axis of the coil. (The y-component of the magnetic field is zero along the axis of the coil.)

11. Move the compass along a semicircular path above the coil until you've put it on the opposite side of the coil. Describe what happens to the compass needle.
12. Explain the behavior of a compass near a bar magnet and an electromagnet are similar.
13. Inside a bar magnets are little magnets. The electromagnet does not have little magnets in it. What causes the magnetic field for an electromagnet?
14. Notice the moving blue dots in the wire are moving electrons. Use the voltage slider to make the battery voltage 0 V.
 - a. What happens to the motion of the electrons when the voltage is zero?
 - b. Move the compass around the battery and wire. Does the compass move? [yes / no]
 - c. Is there a magnetic field around a system without moving electrons? [yes / no]
 - d. Explain why an electromagnet produces a magnetic field?
15. Change the current source from DC to AC. An alternating current is changing all the time, what does this do to the magnetic field?

Part II:

1. Go to <http://phet.colorado.edu/en/simulation/faraday> or google "PHET faraday"
2. Select the "pickup coil" tab.
3. Make the light bulb light. Describe what you have to do to keep the light bulb glowing.
4. To make the bulb light you must have moving electrons. What do you have to do with the magnet to make the electrons move?
5. A generator "makes" electricity. Click on the "generator" tab.
 - a. Turn on the water. What does the water do to the magnet?
 - b. Turning on the water does cause the light bulb to light, but is water necessary to "make" electricity? [yes / no]
 - c. If there is no water but you have a magnet, a coil of wire, and a light bulb what would you do to make the bulb light?
 - d. Explain and draw a possible set up for what the power company has at the power plant to "make" electricity for this school.