

# Electricity and Magnetism Lab

Name \_\_\_\_\_ Date \_\_\_\_\_ Group \_\_\_\_\_ Period \_\_\_\_\_

**Background:** When electricity (moving electrons) flows through a wire, and the wire is then wrapped around a compass, it makes the compass needle move (deflect) in response to something that is produced by the electricity.

**Problem:** What effect will more turns of wire around a compass have on the amount that the compass needle deflects?

**Hypothesis:** \_\_\_\_\_

**Variables:** By the time you finish this experiment, you will need to identify the different types of variables present in this investigation. Consult your notes for definitions of the types of variables.

**Independent Variables:** 2 variables; number of turns of wire around a compass and ...

**Dependent Variables:** 2 variables; amount that the compass needle deflects and ...

**Controlled Variables:** \_\_\_\_\_

**Materials:** Genecon generator kit, compass and wire kit.

**Special Note:** Do not rotate the handle too fast during this experiment. The setup is almost a completely shorted circuit and can draw enough current to overload the generator.

Occasionally the compass needle may "stick" in a particular direction. This can be eliminated by briefly reversing the direction of handle rotation

**Procedures:** Do exactly what is written, or your answers will be the opposite of the correct answer!

1-Connect the plug into the generator so the copper colored wire is in the top position.

2- Connect the generator to the two leads of the wrapping wire and lay a single length of wire coming from the copper colored wire across the top of the compass.

(Refer to the diagram at right) Have your partner hold it in place. Have the other end of the wrapping wire connected to the silver colored wire going back to the generator. Keep the placement and location of the wires on the compass and desk the same for steps #2 – #12. Always make sure that the red north end of the compass needle faces away from you! You may have to sit on the other side of your table to do this.

3-Now turn the compass around until the compass needle is parallel to (in line with) the wire.

4- Turn the handle clockwise 1/4 turn, as viewed when looking at the handle from the back.

5-In what direction did the compass needle deflect ( cw /ccw ) ?

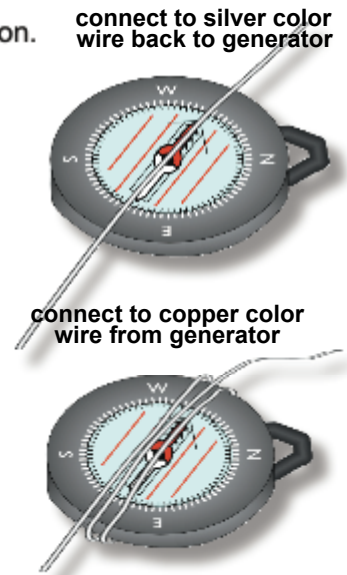
6-Repeat the above steps exactly, but turn the handle counterclockwise. In what direction did the compass needle deflect this time ? ( cw /ccw )

7- Now wrap the wire around the compass 3 times as shown at right and secure it by having your partner hold it in place. Connect the wrapping wire as previously done.

8-Now turn the wrapped compass around until the compass needle is parallel to (in line with) the wire loops.

9-Turn the handle clockwise 1/4 turn, as viewed when looking at the handle.

10-Which direction ( cw /ccw ) does the needle deflect now **and** how was it different this time as compared to step 5 above?



11-Now turn the handle counterclockwise. What direction does the needle deflect now ( cw /ccw )?

12-Try varying the speed of turning the handle from slow to faster for 1/4 turn.(Just not too fast) What effect does the speed of turning the handle have on the distance the needle moves ? Explain what happens.

13-Since a compass needle is actually a small permanent magnet, what must a current-carrying wire produce, in the space around the wire, that would cause a compass needle to move ?

14.-Unwrap the wire from around the compass,and place the compass and wire neatly back into the case. **Do Not** wrap the wires around the compass.

15.-Working with another group,connect the same color wires from one generator to the same color wires from another generator . Slowly turn the handles of the first generator clockwise 2 or 3 turns. Repeat but this time turn the generator counterclockwise. Describe what happened in both situations.

16. Return the generator and its wires to the plastic bag. **Do Not** wrap the wires around the generator.

**Overall Conclusion:** State if your original hypothesis was correct or incorrect using specific references from the lab to support your answer.

**Sources of Error:** Identify two things that people may have done incorrectly that would have caused them to get totally different answers from the rest of the class. These errors must be unique,in other words they have not been applicable in previous labs. They must be new sources of error. Be specific about what might have been done.