**Electromagnet Lab**

Name: Date: Period:

**Background:**

Electricity and magnetism are related. In fact, they are actually the same thing: Electromagnetism. In this lab you will make a device that uses electricity flowing through a circuit to make a magnet. When electricity is flowing through the circuit, we have a magnet. If we stop the electric current, we will no longer have a magnet. This is an electromagnet – a magnet created and controlled by electricity. You are going to make an electromagnet and determine what is able to make it stronger. You will investigate how the number of times you wrap the wire around the metal core affects the strength of the electromagnet. You will also investigate how the size of the metal core affects the strength of the electromagnet.

**Materials:**

* wire
* D Cell
* 3 nails
* bolt
* paper clips

***Part 1: Investigating the # of wrapped coils***

**Testable Question:** (Read the procedure for this part. What question are you trying to answer?)

**Procedure:**

1. Wrap the wire around one metal nail a small number of times.
2. Attach each end of the wire to D cell to send current through the wire, creating a magnetic field, and making the nail magnetized.
3. Determine how strong the electromagnet is by seeing how many paperclips it can pick up. Record the number in the data table below.
4. Wrap the wire around the nail more times and test how strong this electromagnet is.
5. Wrap the wire around the nail as many times as possible and test how strong this electromagnet it.

|  |  |
| --- | --- |
| # of wraps (coils) | Strength of the Magnetic Field (# paperclips picked up) |
| Small (5) |  |
| Medium (15) |  |
| Large (25) |  |

***Part 2: Size of the metal core***

**Testable Question:** (Read the procedure for this part. What question are you trying to answer?)

**Procedure:**

1. Wrap one nail with a medium number of coils, remember the number of coils, and attach it to cell to create an electromagnet. Test its strength with the paperclips. Record the number you are able to pick up in the data table below.
2. Wrap two nails with the same number of coils, connect the cell, and test the strength.
3. Wrap three nails with the same number of coils, connect the cell, and test the strength.
4. Wrap the metal bolt with the same number of coils, connect the cell, and test the strength.

|  |  |
| --- | --- |
| Size of the Core | Strength of the Magnetic Field (# paperclips picked up) |
| 1 Nail |  |
| 2 Nails |  |
| 3 Nails |  |
| Bolt |  |

**Results:**

1. Explain how the number of times you wrapped the wire around the metal core affected the strength of the electromagnet.

2. Explain how the size of the metal core affected the strength of the magnetic field.

3. Which had are larger affect on the strength of the electromagnet, the number of times you wrapped the wire or the size of the metal core?