Name:

Class:

Period:

Group #:

Lab # and Title

Laboratory Report

Purpose

The purpose of the lab is to understand the relationship between coils, electric fields, and magnetic fields

Equipment Used

PASCO Circuit board kit, PASCO Voltmeter, Sparkvue App, disc magnets, paper, and Red/Black Cables.

Background

A capacitor is a device used to store an electric charge, consisting of one or more pairs of conductors separated by an insulator. In a way, a capacitor is a little like a battery: it is used to store a charge. Although they work in completely different ways, capacitors and batteries both store electrical energy. Understanding this and further thinking about how the capacitance of a parallel-plate capacitor has variations when the plate separation is changed. Today, we will be using this equation to help understand how the distance and area of the parallel-plate capacitor is in relation.

$$\boldsymbol{C = \frac{\epsilon_0 A}{d}}$$

$$\boldsymbol{C = \frac{Q}{V}}$$

C = Capacitance

ϵ_0= Electrostatic constant

A=Area

d=Distance

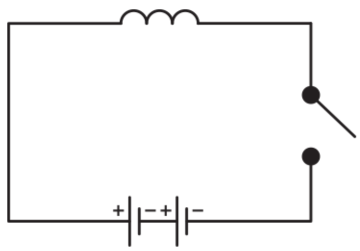
Q= Charge

V= Voltage

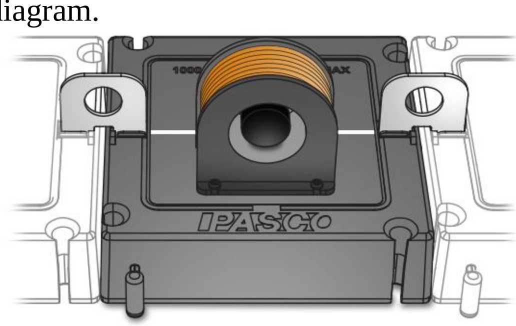
Procedures

Part 1: Magnetic field strength

1. Build the circuit shown in the diagram



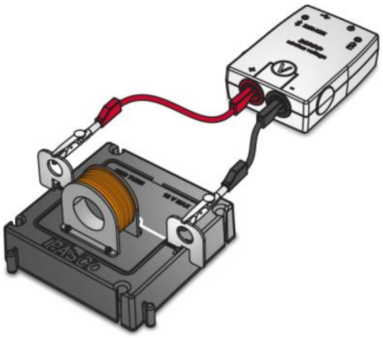
2. Place a single disk magnet in the coil, sitting up on the rounded side, as shown in the diagram.



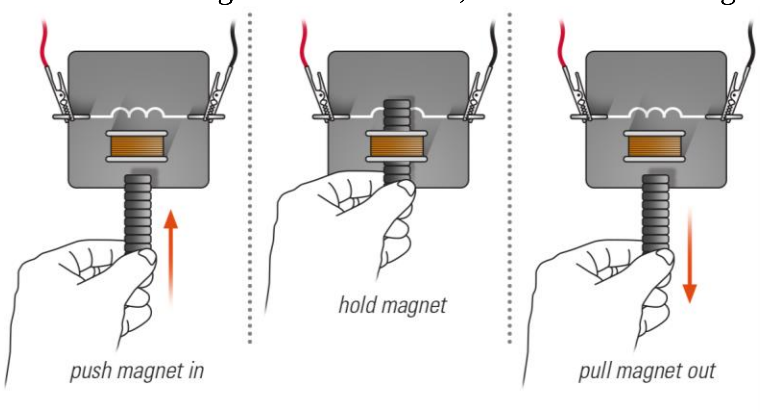
3. Close the switch and observe the magnet.
4. Rotate the magnet 90 degrees and repeat the experiment. Repeat this two more times to experiment with a different side of the magnet facing out from the coil.
5. Place the magnet at various locations around the coil and repeat the experiment.
6. Remove one battery from the circuit and replace it with a 100 ohm resistor to reduce the current through the coil. Repeat the experiment.
7. Record how the magnet responds when current is flowing through the coil

Part 2: Generating current

1. Connect the voltage sensor to a coil as shown.

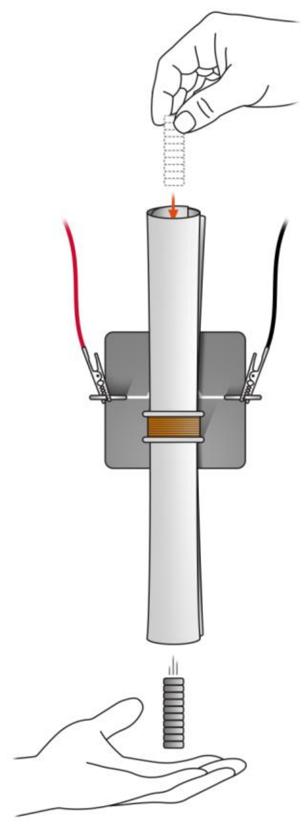


2. Begin recording data. Move the north end of the magnet into the coil, hold it in the coil, and then move the magnet out of the coil, as shown in the diagram.



3. Repeat the experiment, but flip the magnet so that the south end of the magnet is inserted in the coil.
4. Repeat the experiment, but move the magnet in and out of the coil at different speeds.
5. Record and describe the voltage measured under the following conditions:

    1. The north end of the magnet is moved into the coil.
    2. The magnet is held in the coil.
    3. The north end of the magnet is moved out of the coil.



Part 3: Magnetic Flux

1. Hold the coil on its side, so that the hole faces downward.
2. Roll a piece of paper to create a tube and insert it in the coil.
3. Drop the stack of magnets in the tube and let it fall through the other end, catching the magnets as they fall through.
4. Record the changes in voltage as the magnets pass through the coil