Name _____ Date _____

AP Physics Lab Activity #23 (50 pts)

Period _____ Mrs. Nadworny

Partners: Due Date _____

Magnetic Field of a Slinky

NO Lab Write-Up Required

Purpose

To determine the relationship between

- location along a solenoid and magnetic field strength
- number of coils in a solenoid and magnetic field strength
- current through a solenoid and magnetic field strength

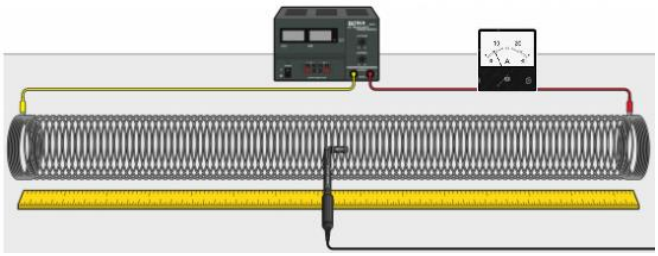
Materials

Include any other materials you will need to achieve the purpose. (2)

- DC Power Supply
- Slinky
- Magnetic Field Sensor
- LabQuest Mini
-
-
-
-

Diagram (3)

Add appropriate labels to the diagram.



Part 1 – Location along Solenoid

Variables (3 pts)

Independent Variable –

Dependent Variable –

Constants/Control –

Hypothesis (2 pts)

Procedure

1. Clamp the slinky to the lab table. Measure the length of the slinky.
2. Count the number of coils in the slinky.
3. Turn on the DC Power supply to provide a constant current of 2.0 amperes.
    - Large currents will flow through the slinky. Connect the current only briefly to avoid damaging the power supply or the meter.
4. Measure approximately 10 cm from the positive end of the solenoid and insert the magnetic field sensor in between coils of the slinky to measure the magnetic field "inside" the solenoid.
5. Repeat increasing the distance from the positive end of the solenoid.

Data Collection (5)

Make a clearly labeled table for organizing the raw and processed data that you collect.

Conclusion (5)

What is the relationship between Magnetic Field Strength and Location Along a Solenoid?

Claim:	
Evidence:	Reasoning:

Part 2 – Number of Coils

Variables (3 pts)

Independent Variable –

Dependent Variable –

Constants/Control –

Hypothesis (2 pts)

Procedure

1. Clamp the slinky to the lab table. Measure the length of the slinky.
2. Count the number of coils in the slinky.

3. Turn on the DC Power supply to provide a constant current of 2.0 amperes.
    - Large currents will flow through the slinky. Connect the current only briefly to avoid damaging the power supply or the meter.
4. Measure approximately halfway from the positive end of the solenoid and insert the magnetic field sensor in between coils of the slinky to measure the magnetic field "inside" the solenoid.
5. Repeat decreasing the number of coils in the solenoid. (Adjust the clamp so fewer coils are connected in the solenoid.

Data Collection (5)

Make a clearly labeled table for organizing the raw and processed data that you collect.

Conclusion (5)

What is the relationship between Magnetic Field Strength and Number of Coils in a Solenoid?

Claim:	
Evidence:	Reasoning:

Part 3 – Current

Variables (3 pts)

Independent Variable –

Dependent Variable –

Constants/Control –

Hypothesis (2 pts)

Procedure

1. Clamp the slinky to the lab table. Measure the length of the slinky.
2. Count the number of coils in the slinky.
3. Turn on the DC Power supply to provide a current of 0.5 amperes.
    - Large currents will flow through the slinky. Connect the current only briefly to avoid damaging the power supply or the meter.
4. Measure approximately halfway from the positive end of the solenoid and insert the magnetic field sensor in between coils of the slinky to measure the magnetic field "inside" the solenoid.
5. Repeat increasing the current in the solenoid.

Data Collection (5)

Make a clearly labeled table for organizing the raw and processed data that you collect.

Conclusion (5)

What is the relationship between Magnetic Field Strength and Current through a Solenoid?

Claim:	
Evidence:	Reasoning: