SNC1D

Lab Investigation: Ohm's Law

Name: _____ Date: _____

Purpose

The purpose of this investigation is to determine the quantitative relationship between voltage and current in a circuit with constant resistance.

Hypothesis /2

If the voltage of my circuit increases, I think that the current through the circuit will _____. This is because:

Variables /3

The independent variable that I am in control of is the circuit's _____.

The dependent variable that I am measuring is the circuit's _____.

The main controlled variable has to be:

Materials

- 5 x 1.5 volt (AA, C or D) batteries
- gator-clipped wires
- resistor (10 Ohms)
- switch
- ammeter

Note: *Your teacher may decide to complete this investigation virtually in a computer lab using a simulation. If this is the case, the above materials list will all be virtual!*

If this is the case, you will most likely be using the following circuit simulator:

https://phet.colorado.edu/en/simulation/circuit-construction-kit-dc
https://bit.ly/34GtKrz

(Copy and paste this link into your web browser)

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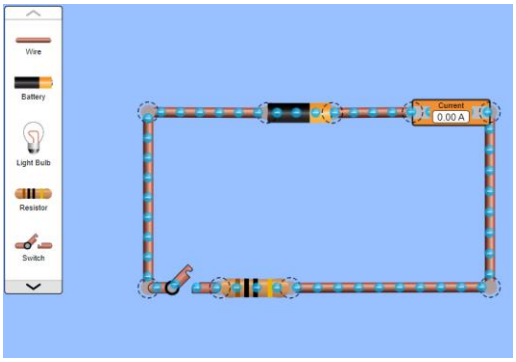
Apparatus Diagram

The above materials will be arranged based on the following circuit diagrams:

- Resistor shown is **10 ohms** but similar values can be substituted as long as they are all the same!
- The meter in the above circuits is an **ammeter**.
- **Note** that if you are doing this investigation virtually, you don't need to keep adding batteries. **Simply change the voltage of the battery for each trial.**
- **CAUTION!** The resistor may get very hot during this experiment! Be sure to shut off the switch every after every trial.



Procedure

1. Create the above circuit with a 1.5V battery and a 10 Ohm resistor.
2. Record the voltage across the resistor for each trial in the chart below.
3. Measure the current going through the circuit at any point and record the value in the table below for each trial.
4. Click on the battery and increase the voltage by 1.5V. Record the voltage over the resistor and the current in the circuit.
5. Repeat this increase in voltage to complete the chart.

Observations /2

Complete the following chart.

The constant resistance of my circuit is: _____

Trial #	Battery Voltage (V)	Current through circuit (A)
1		
2		
3		
4		
5		

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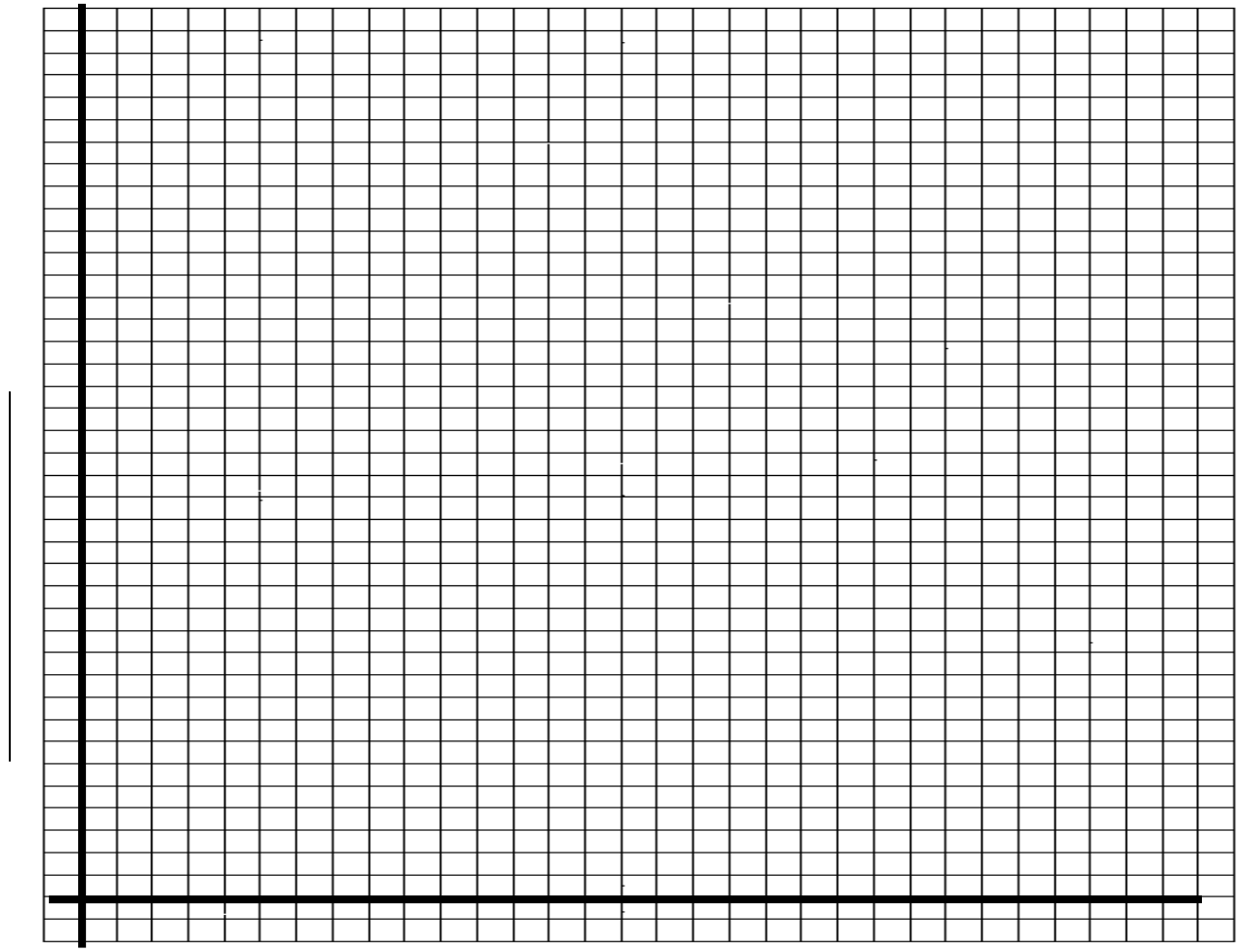
Analysis

1. Graph the data from your observation table. Remember, your independent variable goes on the x axis and the dependent variable goes on the y-axis. Also remember to label your axes and give the graph an overall title. Refer to your graphing guidelines for full requirements. /1

   Note: You can complete the graph using computer software like Excel, Google Sheets, etc. Print it off and attach it to the back of this report.



2. Place a line of best fit through your data, and determine the slope of the line. If you do the graph electronically, make sure that you show the equation of the automatically-generated line of best fit.

   The slope of my line of best fit is: /1

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Conclusions

1. Was your hypothesis correct? Justify your response. /2

2. What value of your circuit does your slope of the best-fit line correspond to (within a reasonable amount of error)? /1

3. Knowing that slope = (change in Y-variable) / (change in X-variable), come up with an equation relating current, voltage and resistance within a circuit. Show your work. This equation is OHM'S LAW! /3

   OHM'S LAW:

4. Use your equation to predict the current in the circuit if you are using seven 1.5V batteries, and the resistor is 150 Ohms. Show your work. /2

5. How many 1.5V batteries would you predict to be in the circuit if you are using a 30 ohm resistor and the current is 0.5 amps? Show your work. /2