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# Conceptual Physics

**Chapter 34: Electric Current**

**Lab 34-1 Ohm’s Law (Simulator Version)**

**Purpose:**

To investigate the relationship among current, voltage and resistance.

**Link: phet.colorado.edu 🡪 Try Our New HTML 5 🡪 Ohm’s Law** (InterActive Simulations: University of Colorado at Boulder)

**Procedure:**

**Part A:** Voltage is set at 4.5 and Resistance is set at 500 **Ω**

Note the equation. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

How does the size of the current (I) compare to the size of the Voltage and Resistance? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part B: Data Collection: Constant Resistance, Changing Voltage**

In the first experiment, you will change the voltage to see the effect it has on the current. The resistance will stay the same (500 Ω).

Move the Voltage values to those listed in the Data Table I and record the current for each setting. Current is recorded in milliamps (mA).

What happened to the size of the current (I) in the equation as the voltage increased? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **Data Table 1:**  **Constant Resistance (500 Ω), Changing Voltage** | |
| **Voltage (v)** | **Current (mA)** |
| **1.0** |  |
| **3.0** |  |
| **6.0** |  |
| **7.5** |  |
| **9.0** |  |

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| **Data Table 2:**  **Constant Voltage (12 v), Changing Resistance** | |
| **Resistance (Ω)** | **Current (mA)** |
| **99** |  |
| **300** |  |
| **500** |  |
| **800** |  |
| **1000** |  |

**Part C: Data Collection: Constant Voltage, Changing Resistance**

In the second experiment, you will change the resistance to see the effect it has on the current. The Voltage will stay the same (3.0 V).

Move the Resistance values to those listed in Data Table 2 and record the current for each setting. Current is recorded in milliamps (mA).

What happened to the size of the current (I) in the equations as the resistance increased? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Analysis and Questions:**

1. Make a graph of changing voltage v. current. Remember to use the rules for completing your graph.
2. What is the independent variable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ How was it measured (units)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ This will be graphed on the \_\_\_\_\_\_\_\_\_\_\_\_ exis.
3. What is the dependent variable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ How was it measured (units)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Describe the pattern of the graph. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What effect does increasing the voltage have on the amount of current through a circuit?

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1. Is this a direct or inverse relationship? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. How is this type of relationship shown by the graph? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. If the voltage is tripled, the amount of current will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Make a graph of changing resistance v. current.
5. What is the independent variable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ How was it measured (units)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ This will be graphed on the \_\_\_\_\_\_\_\_\_\_\_ axis.
6. What is the dependent variable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ How was it measured (units)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. What effect does increasing the resistance have on the amount of current through a circuit?

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3. If the resistance is tripled, the amount of current will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. What happened to the current when the Resistance was as low as possible (10 **Ω)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
5. Explain how this lab supports Ohm’s Law.

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