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# Virtual Lab- Ohm’s Law

**Chapter 34: Electric Current**

**Purpose:**

To investigate the relationship among current, voltage and resistance.

**Link:** [**https://phet.colorado.edu/en/simulation/ohms-law**](https://phet.colorado.edu/en/simulation/ohms-law)

**Procedure:**

**Part A:**

Voltage is set at 4.5 V and Resistance is set at 500 **Ω**

What’s the equation for Ohm’s Law? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Look at the equation on the screen, how does the size of the current (I) compare to the size of the Voltage and Resistance? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the current in (mA) originally set to? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**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 (4.5 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 \_\_\_\_\_\_\_\_\_\_\_\_ axis.
3. What is the dependent variable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ How was it measured (units)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. 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. If the voltage is tripled, the amount of current will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Make a graph of changing **resistance v. current.**
4. What is the independent variable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ How was it measured (units)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ This will be graphed on the \_\_\_\_\_\_\_\_\_\_\_ axis.
5. What is the dependent variable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ How was it measured (units)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

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1. Is this a direct or inverse relationship? Explain.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. If the resistance is tripled, the amount of current will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. If the voltage is tripled, the amount of current will be **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
4. Based on your results, how do you think the lab data supports Ohm’s Law? (Hint: remember Ohm’s Law discusses the relationship between current and voltage and the relationship between current and resistance)

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