**Ohm's Law and Resistance**

For a fixed resistance the voltage change across the ends of a conductor increase current. More voltage results in more charge moving not faster moving charge. The size of the current depends on the conducting ability of the conductor as well as the voltage change across it. Some conductors offer more resistance to a current flow than others.

**Ohm's Law**

Georg Ohm carried out experiments with different metal wires to discover how the current through each depended on the voltage change applied across its ends. Ohm found that if the temperature is kept constant and a graph of current against voltage change is plotted, all the usual features of a simple proportion are seen:

1 The graph is a straight line passing through the origin.

2 Doubling the voltage change doubles the current.

1. Dividing the voltage change by the current always gives the same value.

The current flowing through a metal conductor is directly proportional to the voltage change across its ends provided the temperature and other physical conditions remain constant.

This can be shown as

|  |
| --- |
| I (current) = Voltage (V) Resistance (R) |

## Activity: Ohm’s Law Relationship

**Aim:** To determine the relationship between current through a resistor and the voltage across a resistor, while maintaining a constant temperature.

Note: small currents don’t heat up resistors much. So keeping the current small will maintain a reasonably constant temperature.

**Equipment:** power supply (0 – 12V) six electrical leads

 voltmeter ammeter

 2 ohm or 5 ohm resistor rheostat (variable resistance)

**Method:**

1. Set up the equipment as shown in the diagram below (or use <https://dcaclab.com/en/lab>)

voltmeter

rheostat

power supply

ammeter

resistor

1. Set the power supply to 4 V
2. Set the rheostat (variable resistance) to a maximum resistance.
3. Record the reading on the ammeter and the voltmeter.
4. Adjust the rheostat (variable resistance) to give a lower resistance and repeat the readings.
5. Repeat until four sets of readings have been recorded.

**Results:**

Copy and complete the following table:

|  |  |  |
| --- | --- | --- |
| Resistance (ohms) | Reading of Voltage across the resistor (V) | Reading of Current through the resistor (mA) |
|  |  |  |

Now graph the data.

**Conclusion and questions:**

What do you notice about the slope (gradient) of the graph and the value of the resistor? Can you write a formula that indicates the relationship between current, voltage and resistance (i.e. between I, V and R)