

88 Ohm, Ohm on the Range—Part I

Purpose

To demonstrate the relationship between the current and the voltage across a resistance in a completed circuit.

Required Equipment/Supplies

milliammeter
6-V voltage source
3 resistors of 3 to 15 ohms
connecting wires
knife switch

Discussion

Water in a pipe requires a pressure difference in order to flow. How much water flows also depends on the resistance offered by the pipe. The rate of water flow through the pipe, the pressure difference between the ends of the pipe, and the resistance of the walls of the pipe are related. In this lab you will be exploring a similar relationship for the rate of flow of electrons in a wire, the voltage difference between the ends of the wire, and the resistance of the wire. You will use a technique similar to the one Georg Simon Ohm used more than a hundred years ago.

Procedure

Measure the current **Step 1:** Select the resistor with the lowest resistance. If you do not know how to use the resistor code to determine the manufacturer's value of the resistance, consult your teacher. Connect the resistor, a switch, and an ammeter in series with a 6-volt voltage source, as shown in Figure A. Close the switch.

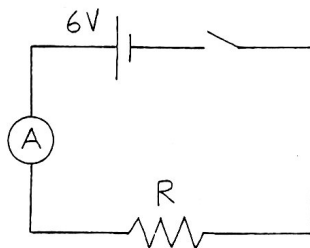


Fig. A

1. What is the current as measured by the ammeter?

Replace resistor Step 2: Open the switch. Replace the resistor with a resistor that has twice the original resistance. Keep the voltage the same as in Step 1.

2. Predict whether the current reading will be greater than, less than, or the same as the current reading in Step 1.

Close the switch.

3. What is the current reading?

Replace resistor again Step 3: Open the switch. Replace the resistor of Step 2 with an even larger resistor. Maintain the same voltage as in Step 1.

4. Predict whether the current reading will be greater than, less than, or the same as the current reading in Step 2.

Close the switch.

5. What is the current reading?

Analysis

6. You have now produced three different currents with three different resistances and a constant voltage. Apparently there is some relationship between the voltage V , the current I , and the resistance R . What is the relationship?