



## Concept:

This demonstration verifies the relation  $V = IR$ , where  $V$  is potential difference,  $I$  is current, and  $R$  the resistance. Some texts quibble with this as simply a definition of resistance, and claim that the correct statement of Ohm's Law is  $\mathbf{J} = \sigma \mathbf{E}$ , where  $\mathbf{J}$  is the current density,  $\sigma$  is conductivity, and  $\mathbf{E}$  the electric field. Perhaps more importantly, only certain materials, called ohmic, obey these relations. Examples of *nonohmic* materials abound in modern microelectronics; many of the semiconductor components of a computer are prime examples.

## Equipment:

1. DMM - Voltmeter
2. Battery Eliminator (1.5, 3, 4.5, 6, 9, 12 V)
3. DMM - Ammeter
4. (3) 3 ft, Red Banana-Banana Cables
5. Variable Resistor
6. (2) 3ft, Black Banana-Banana Cables
7. (2) Alligator Clips

## Procedure:

1. Using one of the DMMs as an ohmmeter, verify that the variable resistor is set to  $10 \Omega$  and the circuit is wired as shown in the picture above.
2. Tell the class that the resistor is set to  $\sim 10 \Omega$  and the voltage is set to  $\sim 1.5 \text{ V}$ .
3. Ask the class to use ohm's law to predict what the current should be.
4. Turn the battery eliminator on and reveal the measured current and voltage.
5. Repeat steps 2-4 after varying the voltage.
6. Repeat steps 2-4 after varying the resistance (be careful not to exceed 1 A as this could blow the battery eliminator's fuse).