

Experimental Techniques in Electric Circuit Analysis

Introduction

The purpose of this experiment is to acquaint the student with equipment that will be used in future experiments involving electric circuits. There are three pieces of equipment (See Figure 1.): the breadboard, the power supply, and the multimeter. The breadboard is used for constructing electric circuits. Its primary benefit is that circuit components can be connected without a confusing mass of wires obfuscating the basic structure of the circuit. The power supply provides energy to the circuit. The multimeter is a tool for measuring a variety of properties including potential difference, current, and resistance.

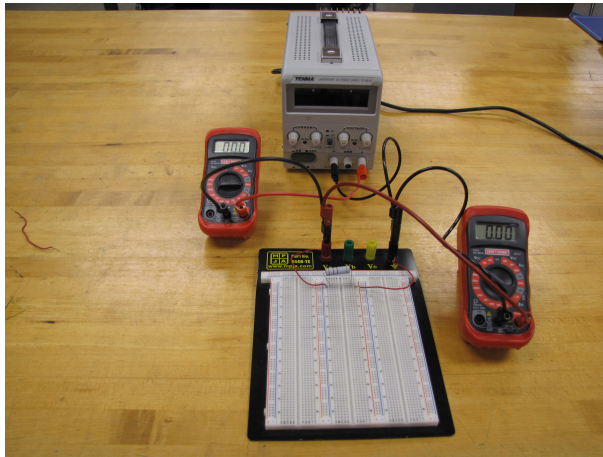


Figure 1: The equipment used in this experiment comprises two multimeters, a power supply, a breadboard, and a resistor whose resistance is 220Ω rated at 5 W.

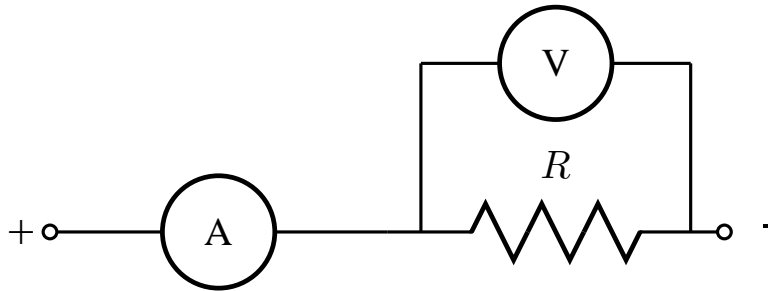


Figure 2: Electric Circuit.

Procedure

Using the breadboard construct a circuit consisting of a resistor, voltmeter, and ammeter. Connect the circuit to the power supply. The schematic of the circuit is shown in Figure 2, while the actual circuit is shown in Figure 1. Set the scales on the ammeter and voltmeter to 200 milliamps and 20 volts, respectively. Adjust the power supply to limit its maximum current output when there is, approximately, a 2.5 volt potential difference across the resistor. The current setting on the power supply will be left at this position for the duration of the experiment. The voltage setting on the power supply should now be set to zero. Set the power supply to a potential difference of approximately 0.20 volts. Using the multimeters measure the potential difference across the resistor and the current passing through the resistor. Perform additional measurements for potential difference settings of approximately 0.60, 1.00, 1.50, and 1.90 volts. Record all values in Table 1. Using Microsoft Excel plot a graph of current (milliamps) vs. potential difference (volts). Current is the ordinate, and potential difference is the abscissa. Does the relationship between current and potential difference appear to be linear?

Potential Difference (volts)	Current (milliamps)

Table 1: Data