Lab 34-1: Introduction to Circuit Measurements

Purpose: To use a simple circuit to determine

a. the potential difference in various parts of the circuit.
b. the current at different places in the circuit.
c. to see how to use an ammeter and a voltmeter.

Vocabulary:

Term	*Definition*	*Circuit Diagram Symbol*
Potential Difference/Voltage		
Current		
Power Supply		
Resistor		
Switch		
Ammeter		
Voltmeter		

Equipment: 6 wires 1 switch 1 resistor 1 voltmeter 1 ammeter 4 clips

Making a Circuit:

1. Locate your power supply on your lab bench. This will be your source of energy that will compel the electrons to move through the wire. It sets up an energy difference between the black and red terminals on the front. According to where you set the dial, you give each coulomb of electrons a certain amount of energy (J/C=volts). This energy is called the terminal voltage.

2. Set up the circuit shown below:

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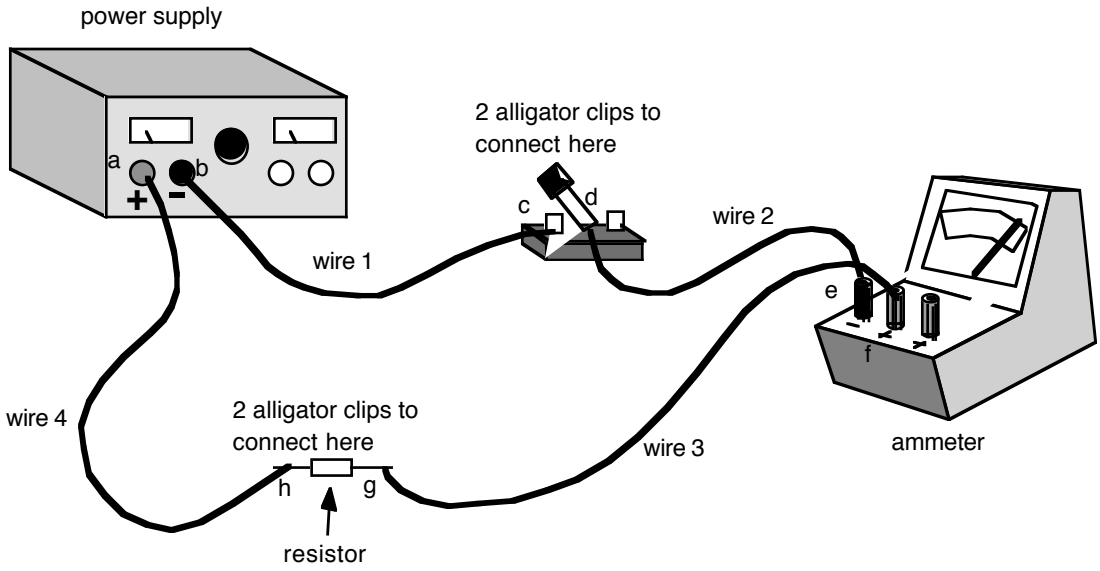
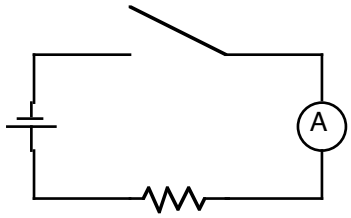


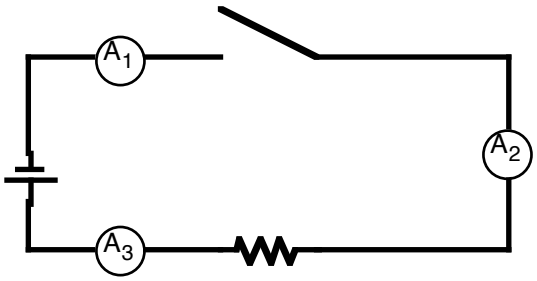
Drawn as a circuit diagram.



Measuring Current:

1. Set your voltage at the power supply to 2 V. (Remember to close the switch when setting the voltage.)

2. Place the ammeter at the three locations shown in the circuit below and measure the current at these locations. In order to measure the rate of flow of charge through the circuit, the ammeter must be wired into the circuit.



A_1 = _____ A

A_2 = _____ A

A_3 = _____ A

Question:

1. Does it matter where you put the ammeter in the circuit? Explain.

2. What happens if you flip/reverse the leads on the wires of the ammeter?

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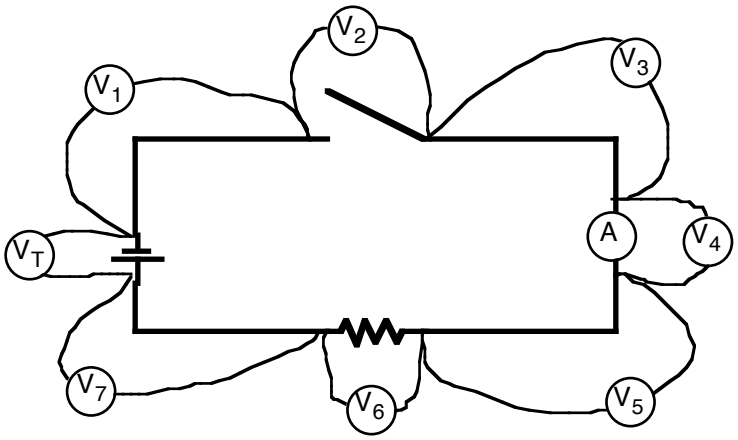
Measuring Voltage:

3. Attach two wires to the voltmeter. One goes in the red and the other goes in the black 3 V hole. Don't let the red/black colors take on much meaning. If the wires are backwards, the meter reading will go below zero and you'll know to switch them around.

4. Plug the wires from the voltmeter into the back of the circuit wires that plug into the power supply. With the switch closed, set the voltage of the power supply to 2 V. Open the switch and remove the voltmeter from the circuit. Do not touch the dial again.

5. Measure the voltmeter reading when it is attached across each part of the circuit as shown below. The voltmeter is never placed in the circuit, but always attaches across two points in the circuit so that it can measure the energy difference per coulomb of charge. Be sure to close the switch before you take your reading. Close the switch only long enough to take a reading.

In some cases the voltage reading will be zero. Try hard to notice if there is even the slightest movement of the needle when you close the switch. If there is and you can't read the value, just note a slight voltage.



V_T = _____ V
V_1 = _____ V
V_2 = _____ V
V_3 = _____ V
V_4 = _____ V
V_5 = _____ V
V_6 = _____ V
V_7 = _____ V

Questions:

1. How much energy difference per coulomb of charge (volts) is there between the terminals of the power supply?

2. How much energy must be lost per coulomb of charge (volts) as the electrons move through the circuit?

3. Add up all the "numbered" voltages from above ($V_1 + V_2 + ...$).

4. How does your answer to question 2 compare to your answer to question 3?

5. Is there much energy lost per coulomb (volts) in the connecting wires? Why?

6. Where was most of the energy lost? What form did this "lost" energy take?