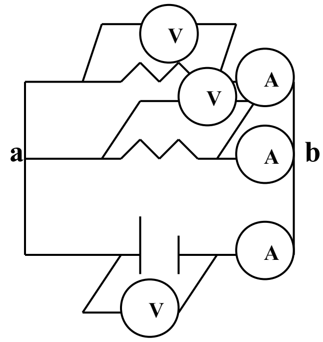
NAME________________ # Parallel Circuit Lab

When resistors are connected in parallel, each resistor provides a path for the electrons to follow, and therefore, reduces the total resistance to the current. In diagram below, two resistors are connected in parallel across the voltage source. There are two paths by which the current may pass from junction **a** to junction **b**. It follows that more current will flow between these junctions than would be the case if one resistor was connected between them. Each time a resistance is connected in parallel with other resistors, the total resistance decreases. The total resistance in a parallel circuit is found by:

$$\mathbf{1 / R_{tot} = 1 / R_1 + 1 / R_2 + \ldots}$$

Follow the circuit diagrams shown, however, **there are several meters shown and you will have only one ammeter and one voltmeter with which to obtain readings**. For example, you can take I_{tot} and V_{tot} readings, move the meters to positions I_1 and V_1, and so on, until you have all the readings.



OBJECTIVES:

During this investigation you will apply Ohm's law to a parallel circuit.

PROCEDURES:

Two Resistors

1) Set up the circuit as shown in the diagram, wait for me to check your set-up, plug in, and obtain your readings.

Printed value of R_1_____Ω R$_2$_____Ω
Calculated R_{tot} [1/(1/R_1 + 1/R_2)] _____ Ω
Measured V_1_____V Measured V_2_____V Measured V_{tot}_____V
Measured I_1_____A Measured I_2_____A Measured I_{tot}_____A

Measured R_{tot} (divide V_{tot} by I_{tot}) = _____Ω
Measured I_{tot} (add I_1 and I_2) = _____A
Measured resistance of R_1 (V_1 / I_1) = _____Ω
Measured resistance of R_2 (V_2 / I_2) = _____Ω

Three Resistors

2) Set up the circuit as shown but add a third resistor in parallel with the other two. Plug in and obtain your readings.

Printed value of R_1_____Ω R$_2$_____ Ω R$_3$_____Ω
Calculated R_{tot} [1/(1/R_1 + 1/R_2 + 1/R_3)]_____ Ω
Measured V_1_____V Measured V_2_____V Measured V_3_____V Measured V_{tot}_____V
Measured I_1_____A Measured I_2_____A Measured I_3_____A Measured I_{tot}_____A

Measured R_{tot} (divide V_{tot} by I_{tot}) = _____Ω
Measured I_{tot} (add I_1 to I_2 and I_3) = _____A
Measured resistance of R_1 (V_1/I_1) = _____Ω
Measured resistance of R_2 (V_2/I_2) = _____Ω
Measured resistance of R_3 (V_3/I_3) = _____Ω

INTERPRETATION & CONCLUSION:

1. Discuss specifically how your values for measured and calculated resistances compare and offer a reasonable explanation of why the values might differ.

2. Explain Kirchoff's Loop Rule and Kirchoff's Junction Rule. Which of these is simply a restatement of the Law of Conservation of Energy? Which is a restatement of the Law of Conservation of Charge?

3. What happens to the total current as additional resistors were added to your circuit? Explain this in terms of the fire hazard we see by overloading an outlet at home. What safety measures are put in place in the home to counter such hazards?