

Name _____ # _____

Date _____

Name _____ # _____

Section # _____

Name _____ # _____

Series Circuit Lab

Assign a group member to one of the following roles:

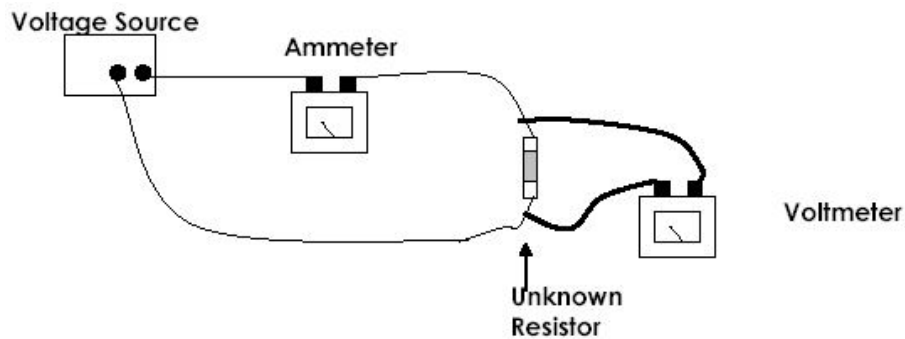
- Recorder (Records data) _____
- Reader (Reads instructions and checks off each procedure upon completion)

- Circuit Constructor and Meter Reader _____

I. Constructing Series Circuit #1 – One Unknown Resistor

Check off each procedure upon completion

___ Construct the series circuit pictured below.



**** Important:

Reverse terminal connections if meter needle moves backward

Calculating the value of the unknown resistor –

Do you have the F or TS resistor?

- ___ Plug in the voltage source and turn on the power.
- ___ Turn the dial on the voltage source until you reach the maximum voltage
- ___ Read the current and voltage and record it in the data table
- ___ Calculate the resistance using the Ohm's Law equation. Record the resistance.
- ___ Record voltage measurements of 3 other current readings (include a wide range of numbers)
- ___ Unplug your voltage source

***** Important!! Reading the scales: *****

Voltmeter - Read middle scale**Ammeter** - Read lower scale

Small divisions on Voltmeter = _____ Small divisions on Ammeter = _____

Ohm's Law: Voltage = Current X Resistance ($V = I R$)**(3 points each)**

Voltage (volts)	Current (Amperes)	Calculation of Unknown Resistance (Ohms)
6 V		
5 V		
4 V		
3 V		

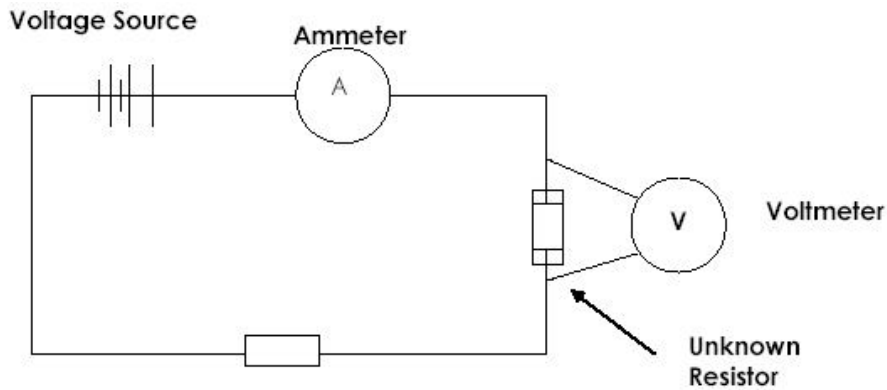
Average Resistance Value: _____ ohms (2 points)**Follow-up Questions**

- According to Ohm's Law, what is the mathematical relationship between voltage and current? **(4 points)**
 Direct? Direct Square? Inverse? Inverse Square?
- Explain why you think your voltage and current readings support or reject the mathematical relationship you gave in the question above. **Refer to your numbers in your explanation.** **(4 points)**
- If you plotted your Voltage versus Current data what do you predict the general shape of your plot would be? **(4 points)**

**II. Constructing Series Circuit #2 – 2 Resistors in connected in series**

What is the size of the resistance of your second resistor? _____ ohms

- ___ Return your voltage source to the side of the room (You'll be using the source on lab desk)
- ___ Open up your circuit and add your other resistor to your circuit.



30 ohms resistor

Voltage and Current Readings

_____ Look up the series circuit equations in your reference table. Write them below. (4 points)

_____ Plug in the voltage source that is built into your lab desk.

_____ Use your ammeter to fill out the table below

Current Readings (3 points each)

Total Current from Ammeter (I_T) (amps)	Current in Unknown Resistor (I_1) (amps)	Current in 30 ohm resistor (I_2) (amps)

B. Voltage Readings

_____ Measure the voltages in both resistors. Find the total voltage using the appropriate series circuit equation.

DON'T MEASURE THE TOTAL VOLTAGE WITH METER – USE A SERIES CIRCUIT EQUATION!!!!

(4 points each)

Measured Voltage in Unknown Resistor (V_1)	Measured Voltage in 30 ohm Resistor (V_2)	Total Voltage from Source (V_T) (Calculated from <u>Equation on your reference table</u>)
_____ volts	_____ volts	_____ volts

C. Finding total resistance using 2 methods

Method #1 - Use $V_T = I_T R_T$ to find R_T (4 points) (Show all work)

Total Voltage from Source (V_T) (See Table Above)	Total Current from Source (I_T) (See previous page)	Total Resistance (R_T) (Calculate) (4 points)
_____volts	_____ amps	_____ ohms

Method #2 - Use $R_T = R_1 + R_2$ to find R_T _____ ohms (4 points) (Show all work)

1) If you added another resistor to this circuit, what effect would it have on the size of the total current? (3 points)

a) Use a relevant equation to explain why (6 points)

2) If the total voltage supplied to your circuit remained unchanged, how much **resistance must be added** to your circuit to achieve a total current of .1 amperes? (Show all work) (6 points)