

Name _____ # _____

Date _____

Name _____ # _____

Section # _____

Name _____ # _____

Series Circuit Lab

Assign a group member to one of the following roles:

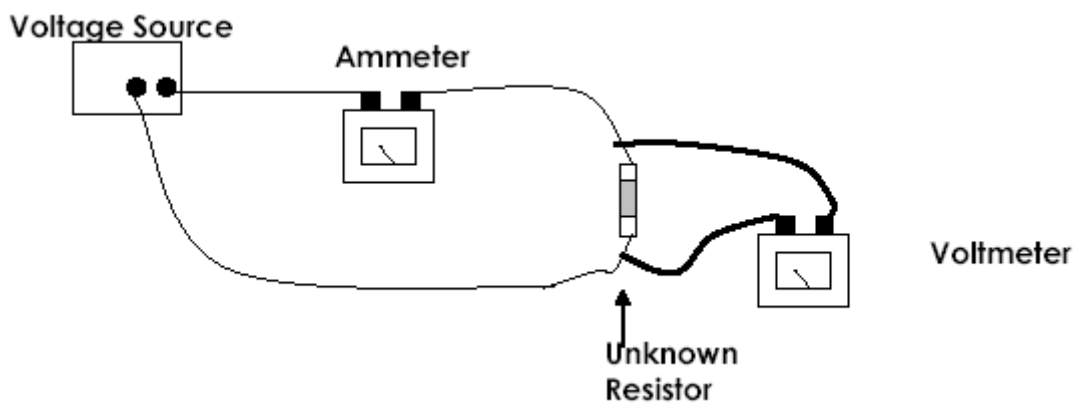
- Recorder (Records data) _____
- Reader (Reads instructions and checks off each procedure upon completion)

- 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 the ammeter reads about 1 amperes
- _____ 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)

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)**

I (Amps)



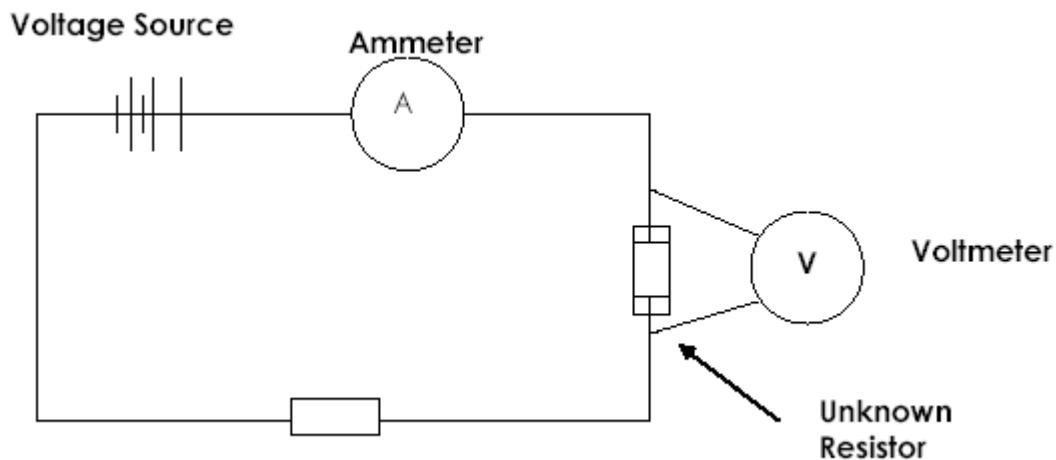
V (volts)

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 Equation on your reference table)
_____ volts	_____ volts	_____ volts

C. Finding total resistance using 2 methods

Method #1 - Use $V_T = I_T R_T$ to find R_T **(2 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? **(1 points)**

a) Explain why **(2 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)**