

Electricity 1 - Circuits Activity

In this activity you will measure the current and voltage of various arrangements of lamps.

Materials

- 3 Lamps
- 1 Multimeter
- 6 Wires
- 1 Power supply

WARNINGS

- IF YOU SEE THE RED LIGHT ON THE POWER SUPPLY IMMEDIATELY TURN IT OFF!!!
- You must only use the power supply on the 1.5V setting.
- IF YOU SEE THE RED LIGHT ON THE POWER SUPPLY IMMEDIATELY TURN IT OFF!!!

Instructions for your Labbook

For EACH of the sections that follow, you should have:

- EVERY schematic copied into your lab notebook
- Any and ALL measured values
- A description of what that circuit did.

There is a separate handout that describes how to use multi-meters. There is a DIFFERENT connection for DIFFERENT measurements with a multi-meter so make sure to refer to the handout.

Single bulb - 1.5V, 3V, and 6V

Set the power supply to 1.5V and leave it OFF until you have made and double checked your circuit.

Once you have the circuit completed:

- Turn on the power supply
- IF YOU SEE THE RED LIGHT IMMEDIATELY SHUT OFF THE POWER SUPPLY AND DOUBLE CHECK YOUR CIRCUIT BEFORE TRYING AGAIN

Put the following information into your lab notebook.



Single light bulb

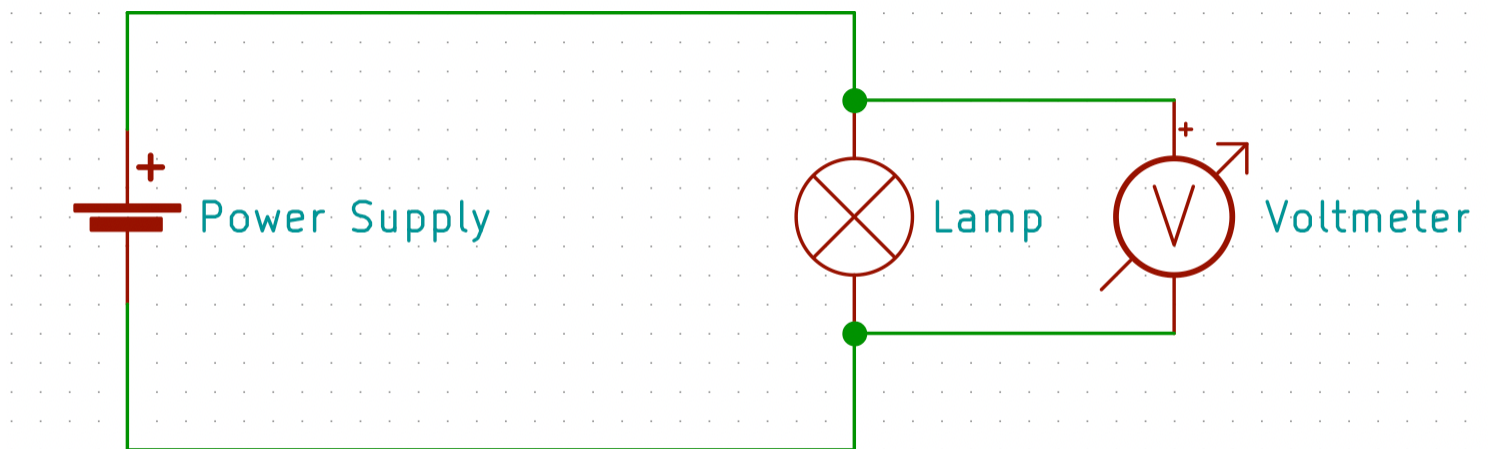
insert sketch of circuit

Observations for different power supply voltages

Voltage	Observations
1.5V	
3.0V	
6.0V	

Single bulb - Voltage measurement

Set the power supply to 1.5V and leave it OFF until you have made and double checked your circuit.



Once you have the circuit completed:

- Turn on the power supply
- IF YOU SEE THE RED LIGHT IMMEDIATELY SHUT OFF THE POWER SUPPLY AND DOUBLE CHECK YOUR CIRCUIT BEFORE TRYING AGAIN

Put the following information into your lab notebook.

Single bulb - Voltage Measurement

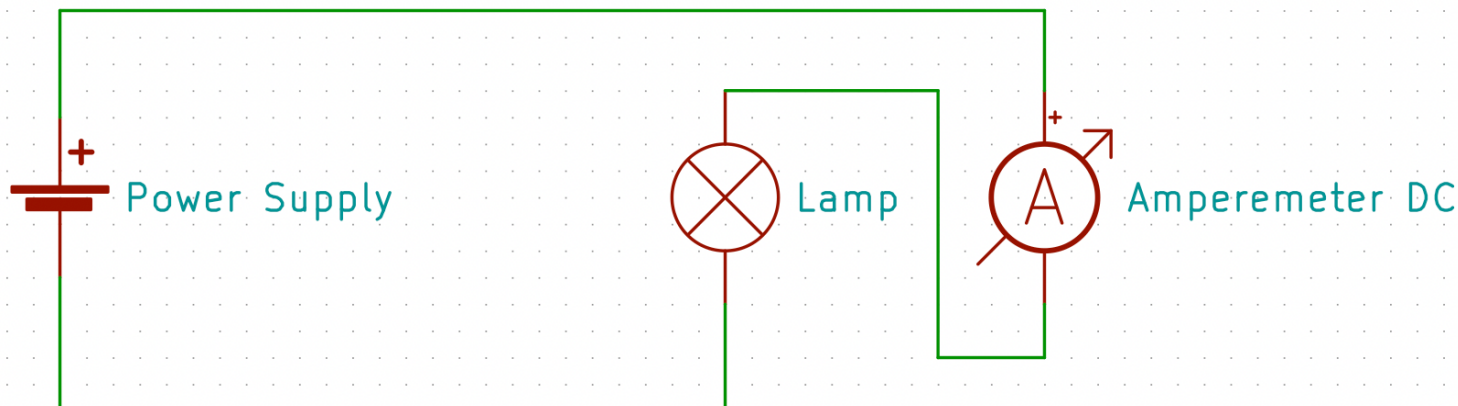
insert sketch of circuit

Observations for different power supply voltages

Voltage	Measured Voltage	Observations
1.5V		
3.0V		
6.0V		

Single bulb - Current Measurement - A

Set the power supply to 1.5V and leave it OFF until you have made and double checked your circuit.



Once you have the circuit completed:

- Turn on the power supply
- IF YOU SEE THE RED LIGHT IMMEDIATELY SHUT OFF THE POWER SUPPLY AND DOUBLE CHECK YOUR CIRCUIT BEFORE TRYING AGAIN

Put the following information into your lab notebook.

Single bulb - Current Measurement A

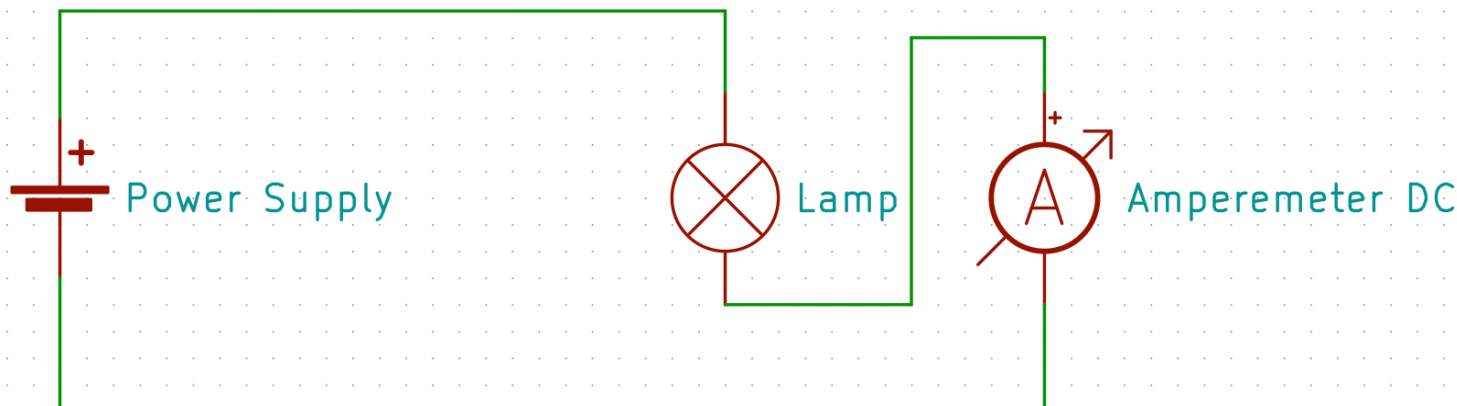
insert sketch of circuit

Observations for different power supply voltages

Voltage	Measured Current	Observations
1.5V		
3.0V		
6.0V		

Single bulb - Current Measurement - B

Set the power supply to 1.5V and leave it OFF until you have made and double checked your circuit.



Once you have the circuit completed:

- Turn on the power supply
- IF YOU SEE THE RED LIGHT IMMEDIATELY SHUT OFF THE POWER SUPPLY AND DOUBLE CHECK YOUR CIRCUIT BEFORE TRYING AGAIN

Put the following information into your lab notebook.

Single bulb - Current Measurement B

insert sketch of the circuit

Observations for different power supply voltages

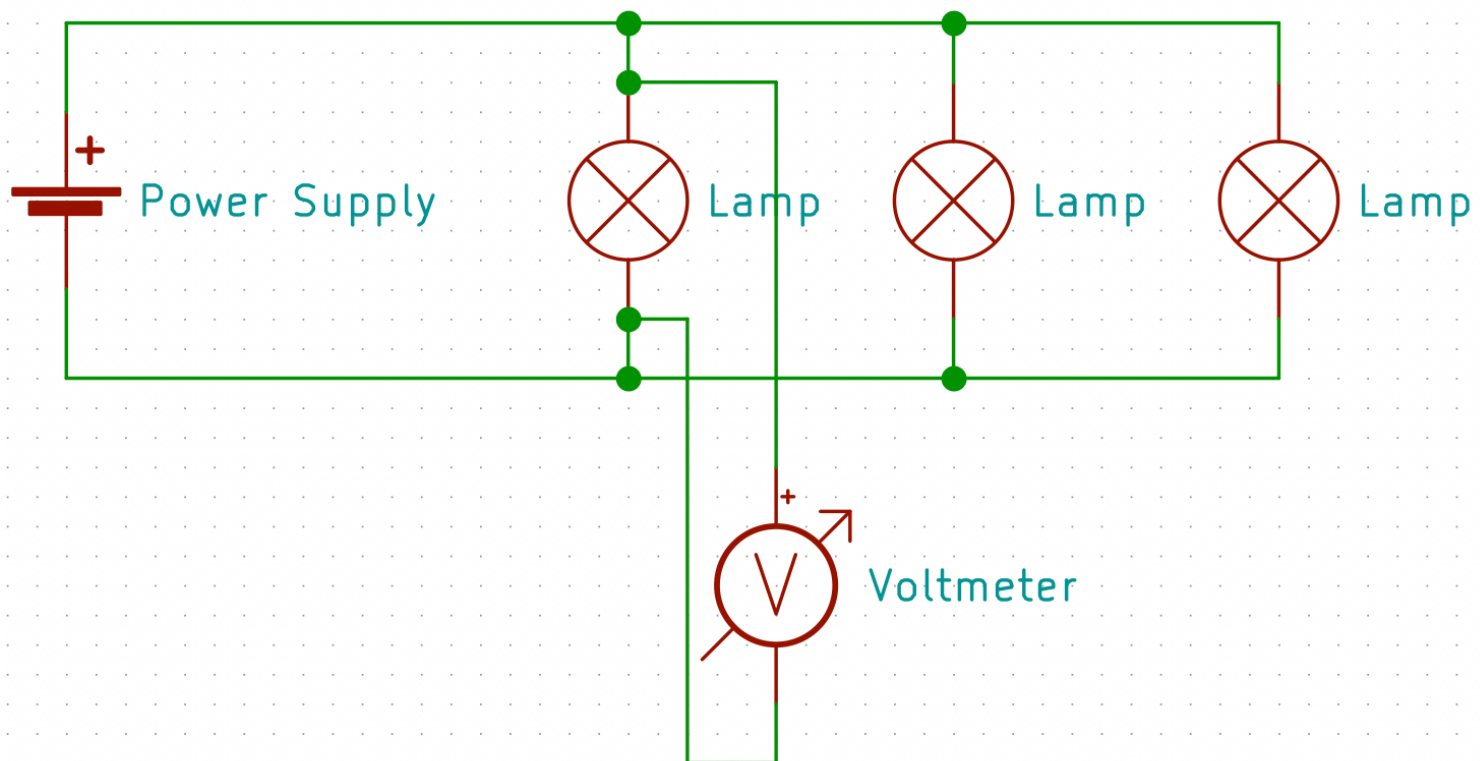
Voltage	Measured Current	Observations
1.5V		
3.0V		
6.0V		

Comparison with Single light bulb - current measurement A

Was there a difference between the two current measurements? If so what? If there was no difference, why do you think that was the case?

Parallel Circuit - Voltage Measurement

Set the power supply to 1.5V and leave it OFF until you have made and double checked your circuit.



Once you have the circuit completed:

- Turn on the power supply
- IF YOU SEE THE RED LIGHT IMMEDIATELY SHUT OFF THE POWER SUPPLY AND DOUBLE CHECK YOUR CIRCUIT BEFORE TRYING AGAIN

Put the following information into your lab notebook.

Parallel circuit - Voltage Measurement

insert sketch of the circuit

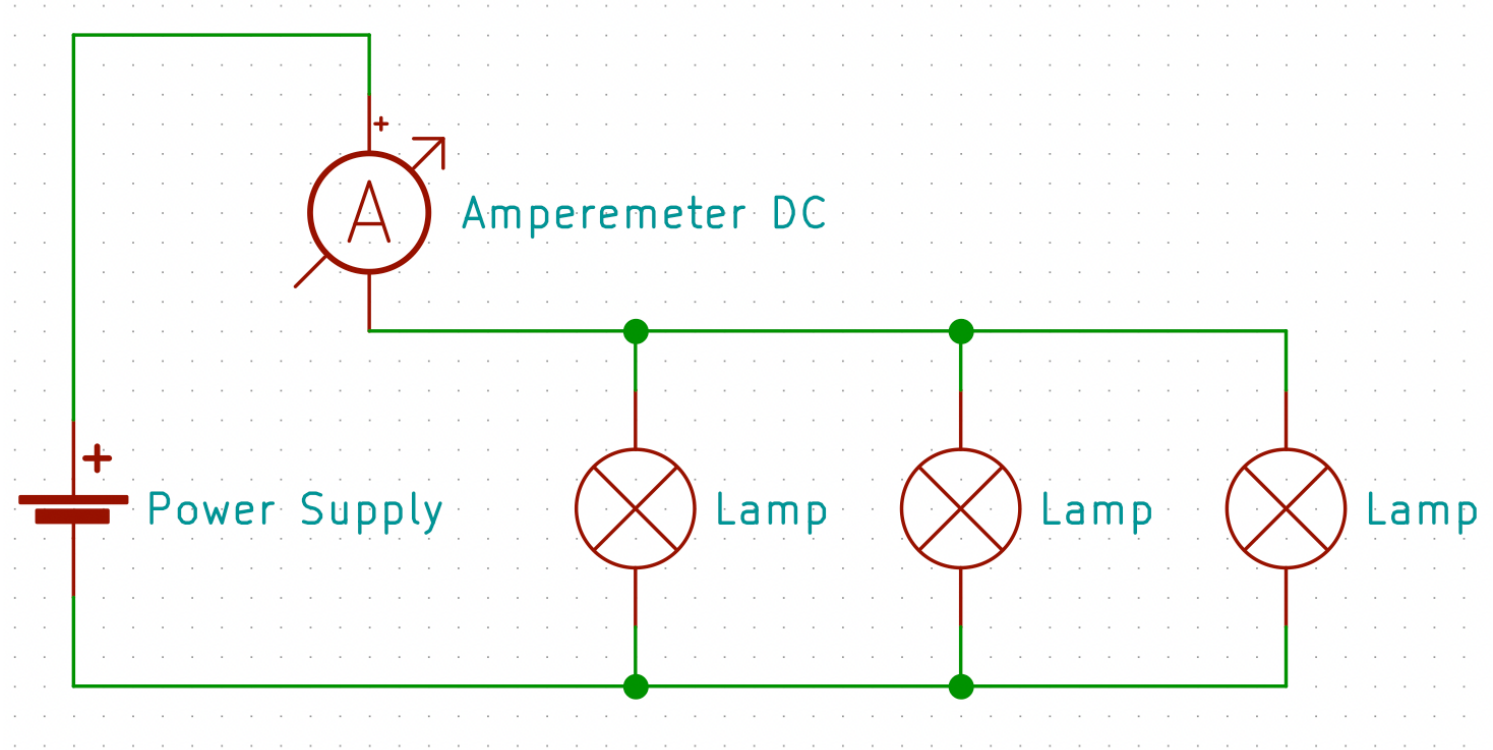
Measured voltages and Observations

	Lamp 1	Lamp 2	Lamp 3
Measured Voltage			

What did you notice about the three voltages? Explain what you have measured and observed.

Parallel Circuit - Current Measurement

Set the power supply to 1.5V and leave it OFF until you have made and double checked your circuit.



SAFETY WARNING

You will have to SHUT OFF THE POWER SUPPLY EACH TIME YOU RECONFIGURE THE CIRCUIT. In order to measure the current through each lamp, you have to insert the multimeter in-between the lamp and the junction. You should only re-wire circuits when the power is shut off.

Put the following information into your lab notebook.

Parallel circuit - Current Measurement

insert sketch of the circuit

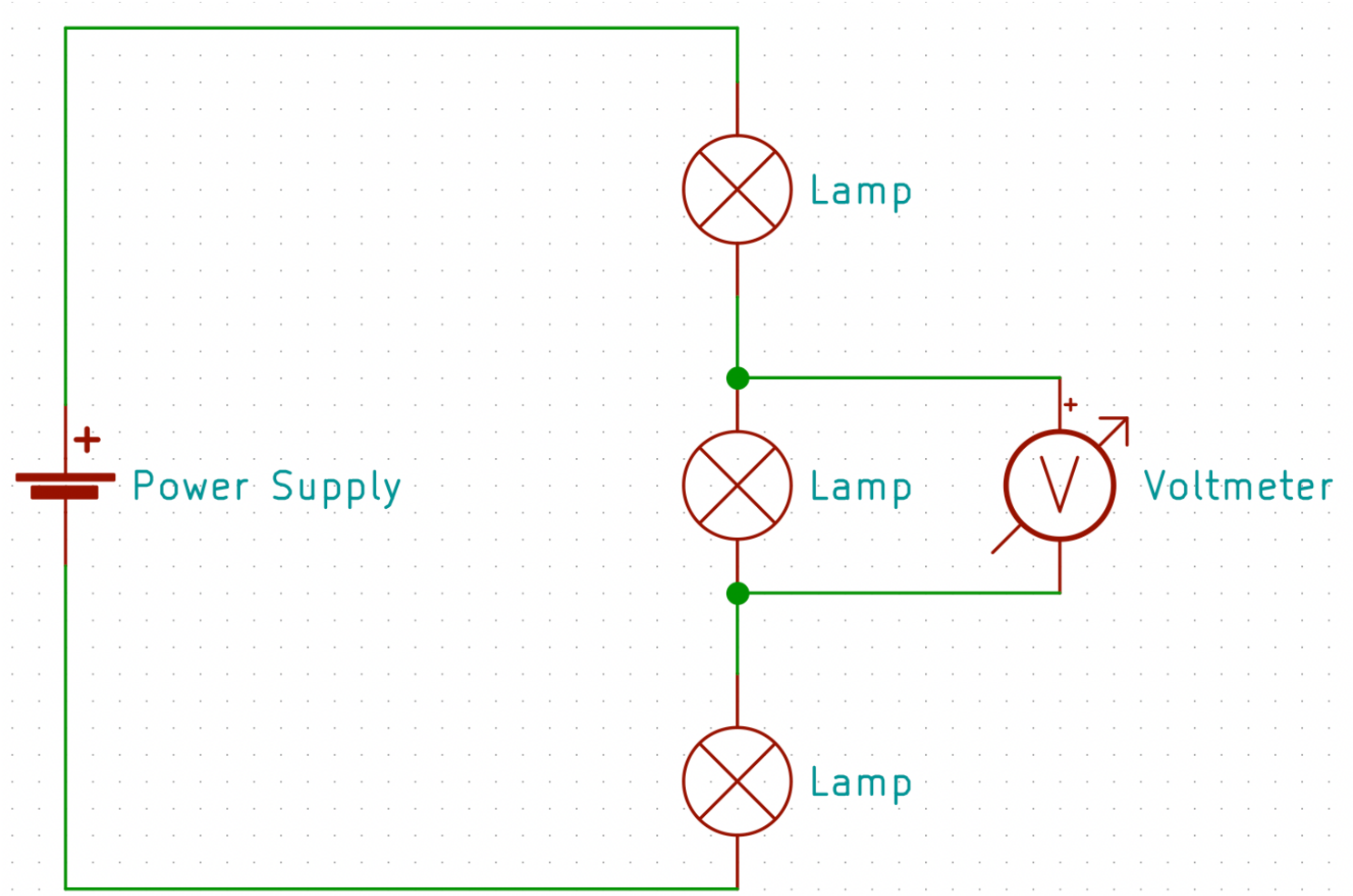
Measured currents and Observations

	All Lamps	Lamp 1	Lamp 2	Lamp 3
Measured Current				

What did you notice about the four currents? Did you observe any relationships between the currents?

Series Circuit - Voltage Measurement

Set the power supply to 3.0V and leave it OFF until you have made and double checked your circuit.



Put the following information into your lab notebook.

Series circuit - Voltage Measurement

insert sketch of the circuit

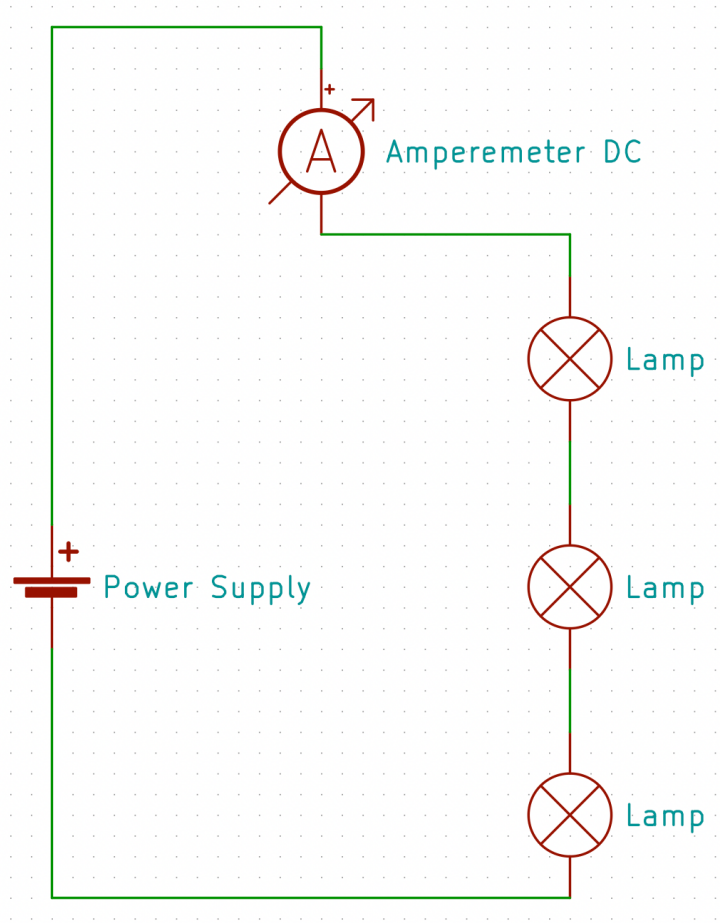
Measured voltages and observations

	All Lamps	Lamp 1	Lamp 2	Lamp 3
Measured Voltage				

What did you notice about the four voltages? Did you observe any relationships between the voltages?

Series Circuit - Current Measurement

Set the power supply to 3.0V and leave it OFF until you have made and double checked your circuit.



SAFETY WARNING

You will have to SHUT OFF THE POWER SUPPLY EACH TIME YOU RECONFIGURE THE CIRCUIT. In order to measure the current through each lamp, you have to insert the multimeter in-between the lamp and the junction. You should only re-wire circuits when the power is shut off.

Put the following information into your lab notebook.

Series circuit - Current Measurement

insert sketch of the circuit

Measured currents and Observations

	All Lamps	Lamp 1	Lamp 2	Lamp 3
Measured Current				

What did you notice about the four currents? Did you observe any relationships between the currents?

Challenge Circuit

Make a circuit with three light bulbs where:

- 2 bulbs have the same brightness
- A 3rd bulb has a different brightness

Once you have a working circuit, copy the schematic into your lab notebook and measure the voltage for all three bulbs.

Challenge Circuit

insert sketch of the circuit

Voltage measurements and reasoning

	Lamp 1	Lamp 2	Lamp 3
Measured Voltage			

Describe your circuit. What reasoning did you use to meet your goal?