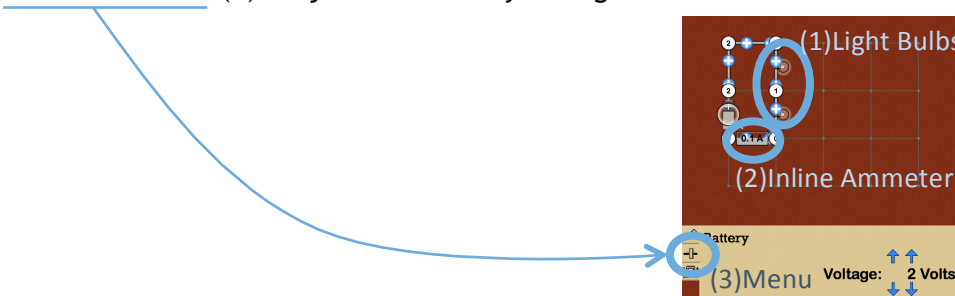


www.simbucket.com -> simulations -> DC Circuit Builder

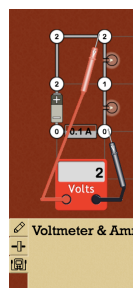
Part I - What Does the Slope of the Current vs Voltage Graph Tell You?

- Using "DC Circuit Builder", create Circuit #2 below with two series light bulbs(1) and an inline ammeter(2).
- Go to the "slider" menu tab(3). Adjust the battery voltage to 10 Volts.



Circuit #2:
2 Series Light Bulbs

- Go to the "Voltmeter & Ammeter" menu tab. Use the voltmeter to measure the voltage drop across BOTH resistors.



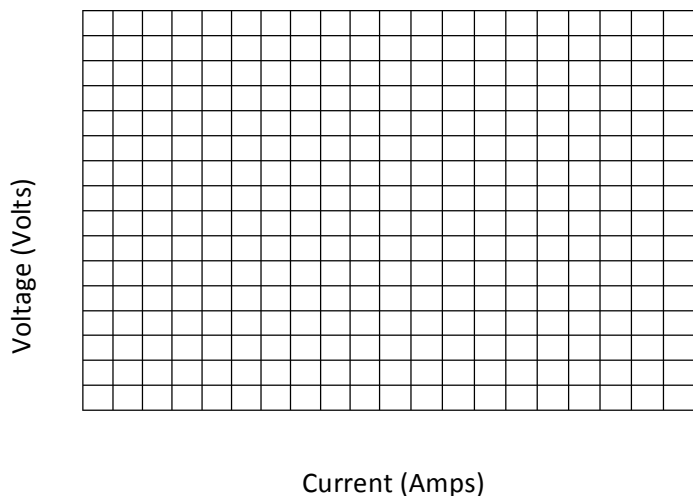
Circuit #2:
2 Series Light Bulbs

- Repeat Steps #1-3 to complete the data table for current through the bulbs and voltage across the bulbs for Circuit #2.
- Repeat steps #1-4 to complete the data table for all of the circuits.

Circuit #1		Circuit #2		Circuit #3		Circuit #4		Circuit #5		Circuit #6	
1 bulb		2 series bulbs		3 series bulbs		1 resistor		2 series resistors		3 series resistors	
Voltage	Current	Voltage	Current	Voltage	Current	Current	Voltage	Voltage	Current	Voltage	Current
10		10		10		10		10		10	
20		20		20		20		20		20	
30		30		30		30		30		30	
40		40		40		40		40		40	
50		50		50		50		50		50	
60		60		60		60		60		60	
70		60		70		70		70		70	
80		70		80		80		80		80	

6. Use the data to create a graph of current vs voltage for each circuit. Plot each set of data on the graph below, draw a best fit line for each data set. For each data set, compute a best fit slope.

Relationship Between Current and Voltage for Different Combinations of Resistors and Bulbs in Series



Legend

Symbol	Circuit	$best\ fit\ slope = \frac{\Delta voltage}{\Delta current}$
+	1 bulb	$\frac{Volts}{Amp}$
×	2 bulbs	$\frac{Volts}{Amp}$
•	3 bulbs	$\frac{Volts}{Amp}$
□	1 resistor	$\frac{Volts}{Amp}$
Δ	2 resistors	$\frac{Volts}{Amp}$
O	3 resistors	$\frac{Volts}{Amp}$

7. As more voltage is applied across the bulbs, more current flows through the resistors. This is called “Ohm’s Law”. You might notice, however that for some circuits, less current flows for a given amount of voltage. This “resistance” to current flow is called resistance. Resistance is measured in units called “Ohms”:

$$1\ Ohm = \frac{1\ Volt}{1\ Ampere}$$

- Which circuits had the most resistance? How much resistance did they have?
- Which circuits had the least resistance? How much resistance did they have?
- What is the resistance of a single light bulb in the simulation? What is the resistance of a single resistor?

Part II -Determine the Resistance of “DC Circuit Builder” Wires and Ammeters

In real life, all circuit elements have some internal resistance. Wires have a small resistance value, light bulbs have a larger resistance value, and even batteries, voltmeters, and ammeters have resistance. In Part I, you determined the resistance of the light bulbs and the resistors in the “DC Circuit Builder” simulation. In the simulation the battery has zero resistance (which isn’t realistic, but it makes the numbers easier), while the ammeter and the wires actually have some very small resistance.

Your task in Part II is to design and conduct an investigation to determine the resistance of a wire and the resistance of an ammeter within the simulation. Think carefully about what data you will need to collect and how you will analyze it. Good luck!

My Procedure:

My Trials and Data:

My Results:

ammeter resistance: _____ Ohms

wire resistance: _____ Ohms