

DC Circuit Builder – Series Circuit

Goal: To analyze mathematical relationships between quantities for series circuits.

Getting Ready: Using your computer, tablet or phone and navigate to:

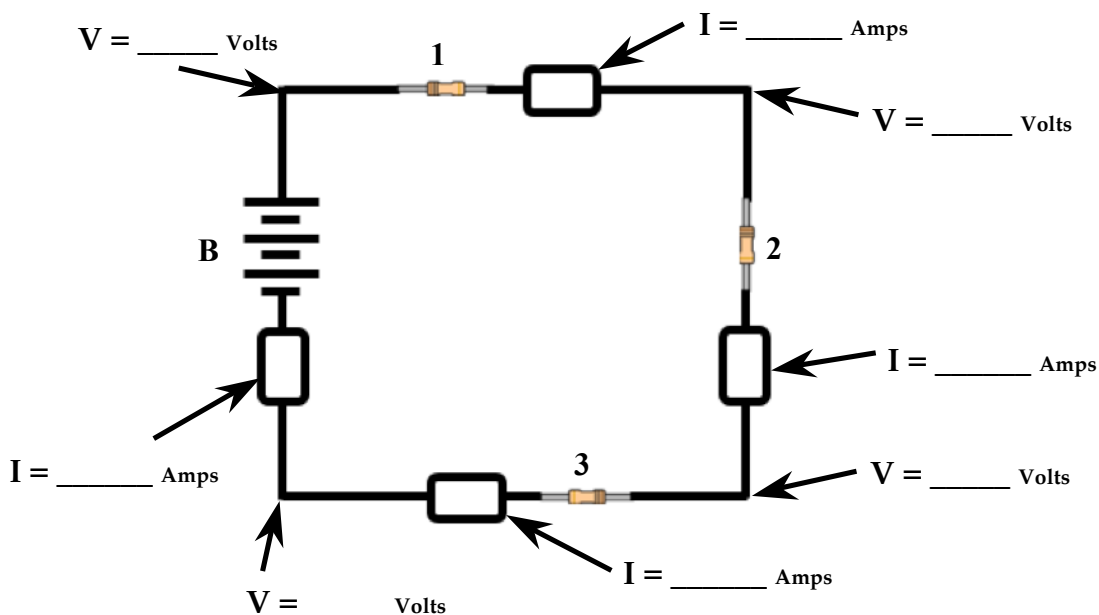
<http://goo.gl/M4Ewmh>

Tap or click the link to open the DC Circuit Builder. Once opened, select the pencil icon and use the tools (at the bottom of the screen) to build a circuit. Simply select a bulb, resistor, wire or ammeter (the rectangular box) and tap or click in the workspace where you wish it to be located. You'll get the hang of it quite quickly.

Note that the electric potential values are listed on the diagram at the corner of every *square* on the grid. Current values are listed on the ammeters. To change a battery voltage or a resistor value, select the second icon at the bottom of the screen; a magnifying glass appears above the circuit element. Adjust the voltage or the resistance using the up/down arrows next to the digital meter.

Build, Measure, Analyze:

Build the circuit shown with three resistors, four ammeters and a battery. Determine the values of current (amps) and electric pressure (volts) at the indicated locations.



- For resistors 1, 2, and 3 and for the battery (B), calculate the electric potential difference and fill in the table below.

Element	Electric Potential Difference (ΔV)	Current (I)	Resistance (R)
B			--
1			
2			
3			

- How does the current in each resistor (I_1, I_2, I_3) compare to one another and to the current in the battery (I_B)?
- How does the electric potential difference across the battery (ΔV_B) compare to the *summative* electric potential differences of the three resistors ($\Delta V_1 + \Delta V_2 + \Delta V_3$)?
- Write the above relationship as an equation: _____
- Calculate the ratio of electric potential difference to current for the battery.

$$\Delta V_B / I_B = \underline{\hspace{2cm}}$$

How does this ratio compare to the resistance values of the resistor? Attempt to write an equation relating the $\Delta V_B / I_B$ ratio to $R_1, R_2,$ and R_3 values.

- Alter the values of the battery voltage and the resistance of the resistors so that each resistor has a different resistance. Then make measurements and complete the table.

Element	Electric Potential Difference (ΔV)	Current (I)	Resistance (R)
B			--
1			
2			
3			

- Using values from the circuit analyzed in Question #6, identify as many mathematical equations as you can that relate $\Delta V, I$ and R for individual circuit elements or for the circuit as a whole. For each equation that you write, demonstrate its validity by substituting in values from the table above.

Equation	Demonstration of Equation's Validity
a.	
b.	
c.	
d.	
e.	