DC Circuit Builder – Parallel Circuit

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

Getting Ready: Using your computer, tablet or phone and navigate to:
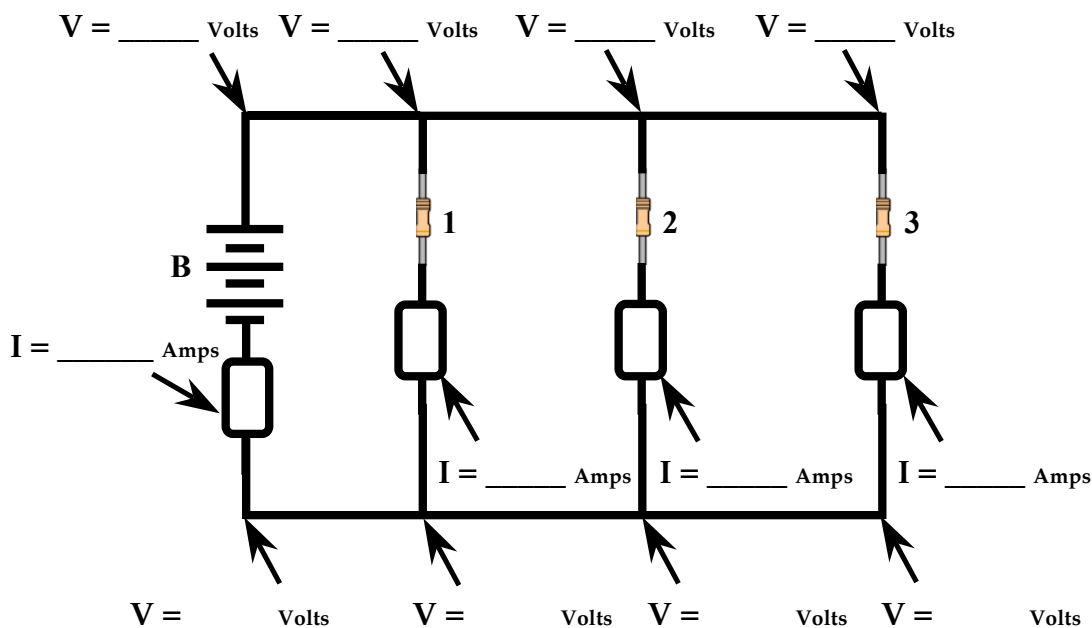
http://goo.gl/M4Ewmh

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.

V = _____ Volts   V = _____ Volts   V = _____ Volts   V = _____ Volts

I = _____ Amps

I = _____ Amps   I = _____ Amps   I = _____ Amps

V = _____ Volts   V = _____ Volts   V = _____ Volts   V = _____ Volts

1. 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			

2. How does the electric potential difference across each resistor (ΔV_1, ΔV_2, ΔV_3) compare to one another and to the electric potential difference across the battery (ΔV_B)?

3. How does the current in the battery (I_B) compare to the *summative* current in the three resistors ($I_1 + I_2 + I_3$)?

4. Write the above relationship as an equation: _____

5. Calculate the ratio of electric potential difference to current for the battery.

$$\Delta V_B / I_B = \text{_____}$$

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. (This is a challenge!)

6. 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			

7. Using values from the circuit analyzed in Question #6, identify as many mathematical equations as you can that relate ΔV, 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.	