



Virtual Series Circuit Lab

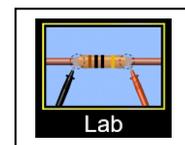
Do the following problems using StickManPhysics.com for support and for checking work.

<https://www.stickmanphysics.com/unit-8-current-and-circuits/series-circuit/>

<p>Example 1</p>	<p>Example 2</p>
<p>Example 3</p>	<p>Example 4</p>

Now move on to the bottom of the page where you see the PhET Circuit Construction Kit.

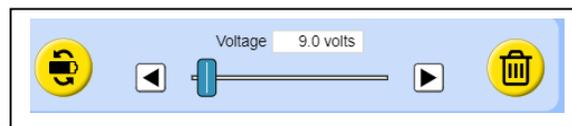
1. Double click on Lab to get to the work area.



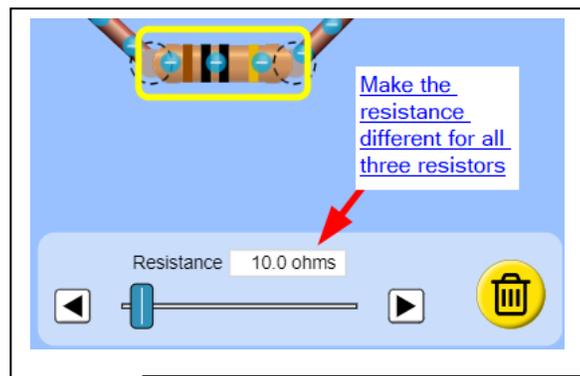
2. You can create a circuit by dragging items into the work area

3. Build the circuit shown with the following:

- a. A **9V battery** (it should default to 9V: double click on the battery and you should see a window open up that shows this picture but keep it at 9.0 volts unless it's another magnitude).
- b. Place three resistors **creating a series circuit** in the work area and close the circuit so current will flow. Be aware you will be seeing electrons flowing from the part of the battery that has more electrons to where there is less. The convention is to draw current the opposite way from the positive terminal of the battery to the negative terminal. Stick to the convention as seen in the problems above for the numbering of your resistors.

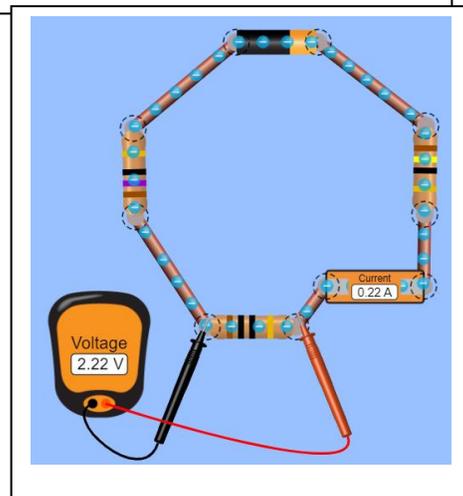


- c. Make the 3 resistors have **3 DIFFERENT resistances** (double click on them to see a window where this can be changed)
4. Draw the circuit you built using the correct symbols and write V, I, and R with the right subscript for its location below



Note: To test voltage you must bring in the voltmeter, without breaking the circuit and touch either side of the resistor or battery to get a reading of voltage drop for the resistor or battery, which would be the voltage drop for the entire circuit.

To test current you must open the circuit and place the ammeter in the circuit so current runs through it. This will give you the reading of current in the wire, which would be the current for the resistor before it and after it since in series there is only one path that current must follow. In the picture to the right, the current reading is for both the first resistor and the second since the ammeter is placed in a pathway flowing between the two.



Complete the table below using the lab workspace with the voltmeter and ammeter.

Solve for the total resistance of the series circuit here:

Component	Electric Potential Difference (V)	Current (I)	Resistance (R)
Battery (Total)			
Resistor 1			
Resistor 2			
Resistor 3			

5. What mathematical relationship does the total voltage drop of the circuit (read at the battery (V_T)) have to the voltage drop of all the resistors (V_1 , V_2 , and V_3)

6. What mathematical relationship does the total current of the circuit (read at the battery (I_T)) have to the current of all the resistors (I_1 , I_2 , and I_3)

7. Now place three lightbulbs in a series as seen here. After the lights go on double click on one and trash it. This is the same as a lightbulb burning out in a series circuit. What happens to the rest of the bulbs in a series circuit? Do they stay on or go off?

8. Using a separate sheet of paper: build a circuit with three different resistors as you did before. Next, draw the circuit diagram. This time solve for all the components mathematically. Then use the lab to check your work. Attach it to this lab sheet.

