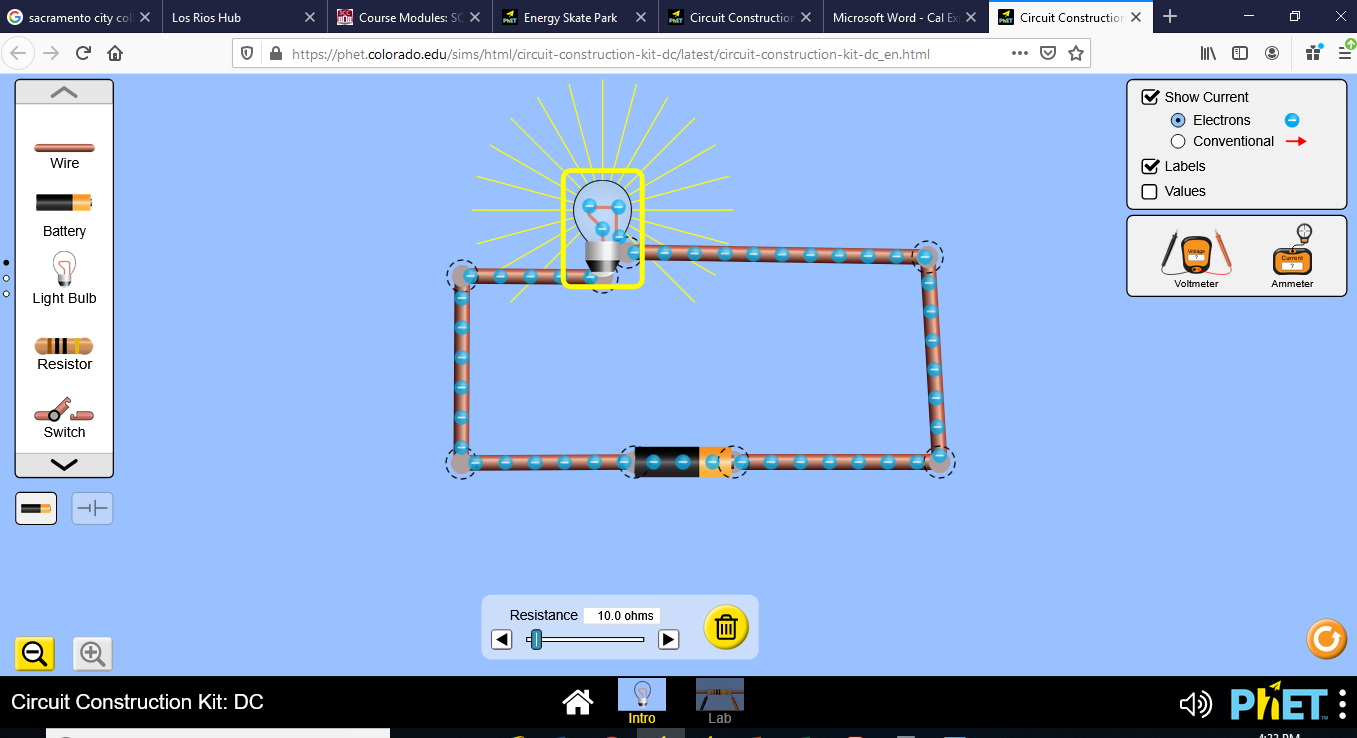
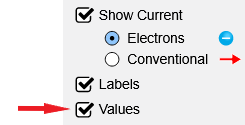
**DC Circuits I**

Open [Circuit Construction Kit DC](https://phet.colorado.edu/sims/html/circuit-construction-kit-dc/latest/circuit-construction-kit-dc_en.html).

[](https://phet.colorado.edu/sims/html/circuit-construction-kit-dc/latest/circuit-construction-kit-dc_en.html)

Build a simple circuit with a battery, light bulb (resistance) and wires. Click on “Values” so you can see the voltage and the resistances.

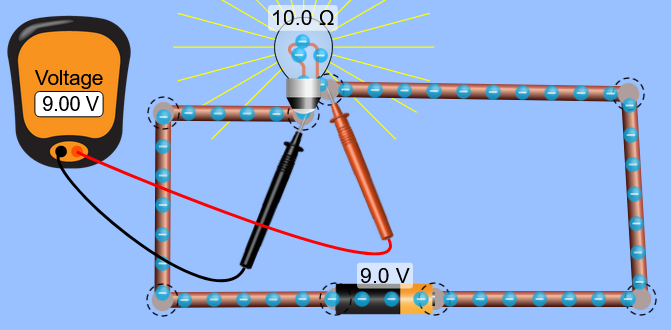


Use the voltmeter to measure the voltage across the battery and then across the light bulb. What are the values? Are they equal?

Voltage across battery =9V

Voltage across light bulb=9V

Yes, they are equal.



Note the resistance of the light bulb. What is it?

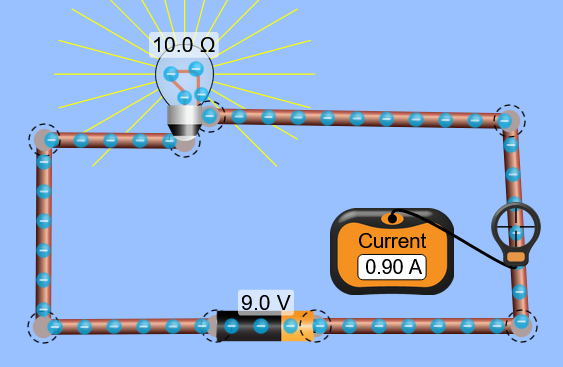
Resistance is 10 ohm.

Using Ohm’s Law V = IR find the current in this circuit.

I = V/R = 9/10 = 0.9A

Grab the ammeter and measure the current in the circuit. Does this measurement agree with the calculation you did above?

Yes the ammeter gave the same measurement. It measured 0.9 A.



Move the ammeter around the circuit. Does the current change or does it stay the same?

The current remains same around the circuit.

Click on the light bulb. The resistor slider should pop up at the bottom of the screen. Use the resistance slider to change the resistance of the light bulb to 20 Ω. What happens to the current?



Current becomes half to 0.45 A.

Use the resistance slider to change the resistance of the light bulb to 5.0 Ω. What happens to the current?

Current becomes 1.80 A.

Slide the resistance back to 10 Ω and add a second light bulb in series with the first. If you click on a junction a pair of scissors in a yellow circle will pop up. Click on the scissors to break the junction.

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| --- | --- |
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Measure the voltage across both light bulbs. What are they?

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| --- | --- |
| Light Bulb | Voltage (V) |
| 1 (10 Ω) | 4.5 V |
| 2 (10 Ω) | 4.5 V |

Are the voltages across the light bulbs equal to the battery voltage? Is the sum of the voltages equal to the battery voltage?

The voltage across the light bulbs are not equal to the battery voltage. But the sum of the voltages equal to the battery voltage.

Measure the current in the circuit. How does it compare to the current when there was only one light bulb?

The current in circuit became 0.45 A. It is equal to current when single bulb resistance was 20 ohm.

Increase Light Bulb 1 to 20 Ω. Measure the voltage across the two resistances. Is one voltage greater than the other? How do they relate to the voltage from the battery?

|  |  |
| --- | --- |
| Light Bulb | Voltage (V) |
| 1 (20 Ω) | 6 V |
| 2 (10 Ω) | 3 V |

The voltage across 20 ohm resistance is double of voltage across 10 ohm resistance. The sum of voltage across two resistor is equal to voltage from the battery.

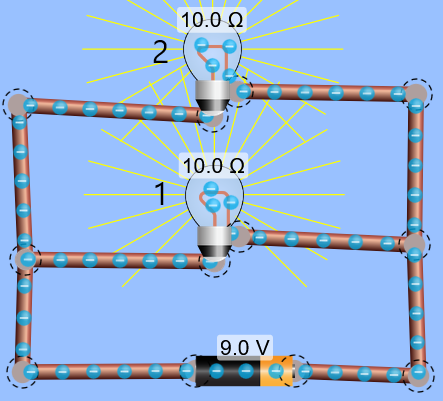
Which resistor had more voltage dropped across it, the 20 Ω or the 10 Ω? Why might this be?

The 20 ohm resistor had more voltage drop because both bulb are in series so current was same for both, so voltage drop is proportional to resistance.

Measure the current around the circuit. Does it change or does it stay the same?

The current is 0.3 A and it is constant throughout the circuit.

Set up a circuit with two 10 Ω resistors in parallel.



Measure the voltage across each. How do the compare to the voltage supplied by the battery?

|  |  |
| --- | --- |
| Light Bulb | Voltage (V) |
| 1 (10 Ω) | 9 V |
| 2 (10 Ω) | 9 V |

Measure the current as it leaves the battery. What is it?

The current is 1.8 A.

Measure the current through each resistor. How do they compare to the total current?

|  |  |
| --- | --- |
| Light Bulb | Current (A) |
| 1 (10 Ω) | 0.9 A |
| 2 (10 Ω) | 0.9 A |

The sum of current gave the total current.

Change Light Bulb 1’s resistance to 20 Ω. Measure the voltage across both resistors. Did they change?

No , the voltage across both resistors remain same.

Measure the current through the 10 Ω and the 20 Ω. Are they different. If so which resistor did more current pass through?

|  |  |
| --- | --- |
| Light Bulb | Current (A) |
| 1 (20 Ω) | 0.45 A |
| 2 (10 Ω) | 0.9 A |

Yes, they are different. 10 ohm resistor passed more current.

How do the two currents compare to the current from the battery?

The sum of two current gave the total current from battery which was 1.35 A.