

Name:

Series and Parallel Circuits (32 Points)

Objective

Students will discover the differences between series and parallel circuits

Pre-Lab Questions (1 point each)

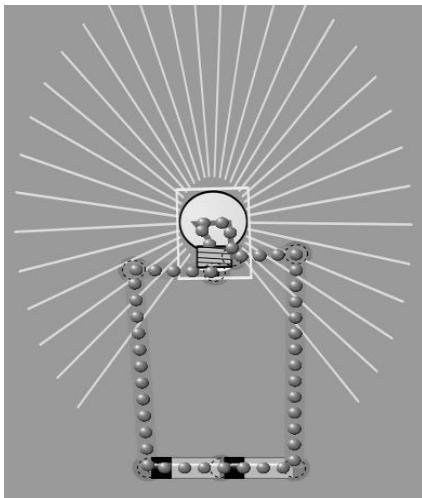
1. What is an electric circuit?
2. What items are necessary to create an electric circuit?

Procedure

1. Log on to your computer
2. Go to the following website: <http://phet.colorado.edu/index.php>
3. Click the button that says "Play with sims..."
4. Click on the application that says Circuit Construction Kit (DC only). It should be the first box.
5. Click "Run now."

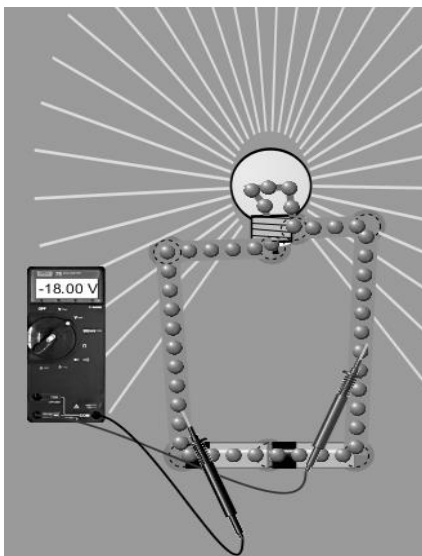
Assignment #1 – One Light Bulb in SERIES CIRCUIT (1 point each)

Build this circuit:



1. What do the blue dots represent?
2. From which end of the batteries are they flowing?

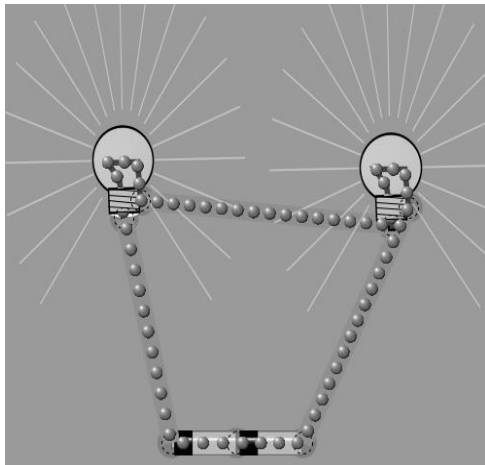
Select the "Voltmeter" tool from the right side and connect it to your circuit as shown below.



3. What does the voltmeter read? (Use proper units)
4. Take one of the batteries away. What happens to the brightness of the bulb?
5. What happens to the voltmeter reading?

Assignment #2 – Two Light Bulbs in **SERIES CIRCUIT (1 point each)**

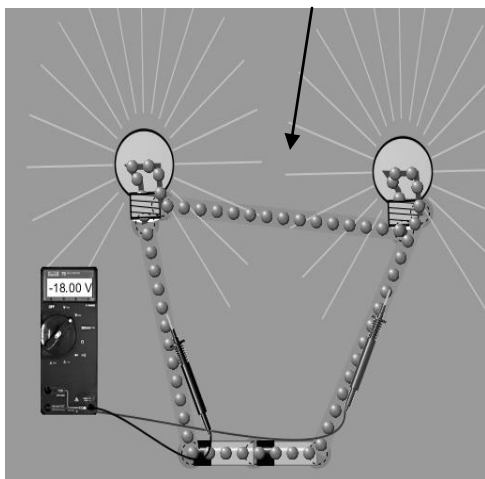
Build this circuit:



6. When you add a bulb to a series circuit, what happened to the brightness of the bulbs?

7. **Why do you think this happened?**

Test your circuit with the voltmeter as shown below. 8. What does the voltmeter read?



9. Move the right prong so it is on the wire in between the 2 bulbs. What happened to the voltmeter reading? *Why do you suppose this happened?*

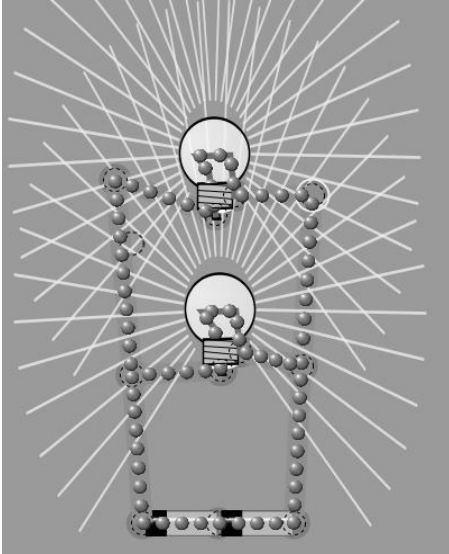
Assignment #3 – Adding a **Switch** in a Two Light Bulb **SERIES CIRCUIT(1 point each)**

10. Insert a “switch” between the negative end of the batteries and the first light bulb. What happens to the two light bulbs when the switch is open?

11. What happens to the two light bulbs when the switch is closed?

Assignment # 4 – Two Light Bulbs in **PARALLEL CIRCUIT**(1 point each)

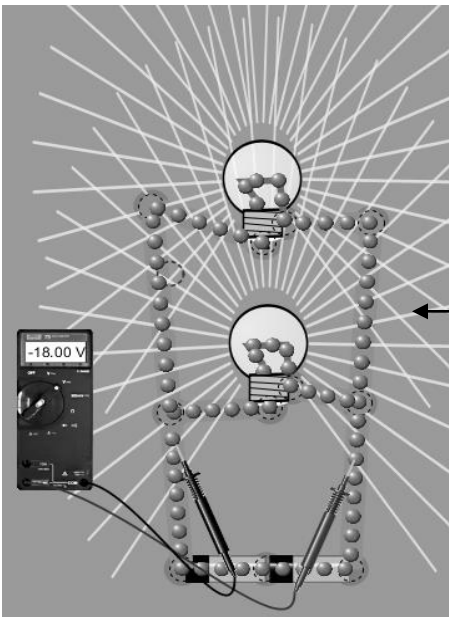
Construct this circuit:



12. Compare the brightness of these two bulbs in the **parallel circuit** to the brightness of the two bulbs in the **series circuit**.

13. Why do you think the brightness is different?

Test your circuit with the voltmeter as shown below.



14. What does the voltmeter read?

15. Move the right prong so that it, again, is on the wire in between the 2 bulbs. What does the voltmeter read?

16. Explain why you think both readings are the same.

Assignment #5 – Adding a **Switch** to Two Light Bulbs in a **PARALLEL CIRCUIT**(1 point each)

17. Insert a switch in **between the negative end** of the batteries and the **first light bulb**. What happens to the light bulbs when the switch is open?

18. What happens when that switch is closed?

19. Move the switch so that it is **in between the two light bulbs**. (You may have to add another wire) What happens to the light bulbs when the switch is open?

20. What happens when the switch is closed?

Assignment #6 – Reflection Questions: (2 point each)

1. Draw a series circuit with two light bulbs. Using “light ray lines” indicate light brightness of the two bulbs.
2. Draw a series circuit with two light bulbs and an **OPEN switch** (where ever you want to put it). Using “light ray lines” indicate light brightness of both lights.
3. Draw a parallel circuit with two light bulbs and NO switch. Using “light ray lines” indicate light brightness of both lights.
4. Draw a parallel circuit using two light bulbs and an **OPEN switch** (where ever you want to put it). Using “light ray lines” indicate light brightness of both lights.
5. How does the type of circuit affect the brightness of two light bulbs?

Assignment #7 – Experiment!

Try changing around the position of the bulbs. Add bulbs. Add batteries. Change the positions of the batteries in the circuits. **EXPLORE!!!**