

Name \_\_\_\_\_  
Physics  
Period \_\_\_\_\_

Date \_\_\_\_\_  
Lab #23  
Mrs. Nadworny

Partners:  
(1 pt)

Due Date: \_\_\_\_\_

## The Power of Light Bulbs

**NO Lab Write-Up Required**

### Research Problem

To observe the power output of single and multiple light bulbs using two different techniques for connecting them: series and parallel.

### Materials

- Battery Pack
- Connecting Wires
- Eyes and Brain
- 3 small light bulbs
- 3 light bulb bases

### Procedure

• **Part One - Series Connections** (Observations 3 pts each)

1. Connect one light bulb to the batteries and observe its brightness.  
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2. Connect a second light bulb *in series* with the first. This means that the bulbs are connected sequentially, "in a series" one after the other. Observe the brightness of the bulbs now
  - a. Compare the brightness of both bulbs to each other  
\_\_\_\_\_
  - b. Compare the brightness of one bulb in this circuit to the single bulb from step 1.  
\_\_\_\_\_
3. Connect a third light bulb in series with the first two. Observe the brightness of the bulbs now.
  - a. Compare the brightness of the three bulbs to each other.  
\_\_\_\_\_
  - b. Compare the brightness of one bulb in this circuit to the single bulb in step 1.  
\_\_\_\_\_
  - c. Compare the brightness of one bulb in this circuit to one of the bulbs in the double-bulb circuit in step 2.  
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4. Sketch a circuit schematic for the three bulb circuit in the space below. Remember to use the correct circuit symbols. (5 pts)

5. Think about this three bulb series circuit.

a. Compare the current that comes out of the battery with the current that goes through each bulb.

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b. Compare the voltage of the battery with the voltage of each bulb.

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6. Unscrew one bulb from its base (but do not remove the base from the circuit.) What happens to the brightness of the other two bulbs?

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7. Why do you think this happens?

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• **Part Two - Parallel Connections**

8. Disconnect all the bulbs and wires and begin again. Connect one bulb to the battery and observe its brightness.

9. Connect a second bulb *in parallel* with the first. This means to connect it to each side of the first light bulb so that it has its own separate circuit “in parallel” with the first bulb. Observe the brightness of the bulbs now.

a. Compare the brightness of both bulbs to each other

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b. Compare the brightness of one bulb in this circuit to the single bulb from step 8.

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10. Connect a third bulb in parallel with the first two. This means connecting it to each side of the second light bulb. Observe the brightness of the bulbs.

a. Compare the brightness of the three bulbs to each other.

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b. Compare the brightness of one bulb in this circuit to the single bulb in step 8.

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c. Compare the brightness of one bulb in this circuit to one of the bulbs in the double-bulb circuit in step 9.

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11. Sketch a circuit schematic for the three bulb circuit in the space below. Remember to use the correct circuit symbols. (5 pts)

12. Think about this three bulb parallel circuit.

a. Compare the current that comes out of the battery with the current that goes through each bulb.

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b. Compare the voltage of the battery with the voltage of each bulb.

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13. Unscrew one bulb from its base (but do not remove the base from the circuit.) What happens to the brightness of the other two bulbs?

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14. Why do you think this happens?

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**Post-Lab Questions** (5 pts each)

1. As more bulbs are added in series, explain what happens to the:

a. Current that passes through each individual light bulb?

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b. Voltage that each individual light bulb uses?

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c. Power (brightness) of an individual light bulb after more bulbs are added in series.

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2. As more bulbs are added in parallel, explain what happens to the:

a. Current that passes through each individual light bulb?

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b. Voltage that each individual light bulb uses?

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c. Power (brightness) of an individual light bulb after more bulbs are added in parallel.

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3. If the bulbs were not all identical, that is, their resistances were not the same, what difference do you think that would make in their brightness?

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