

Lab 35-4: Light Bulb Circuits

- Purpose:**
- To develop a conceptual understanding of basic circuits.
 - To define the terms *series circuit*, *parallel circuit*, *short circuit*, and *open circuit*.

Materials:

- | | | |
|-------------------------|-----------|-------------|
| 3 light bulbs & holders | 1 ammeter | 1 voltmeter |
| 6 alligator clips | 10 wires | |

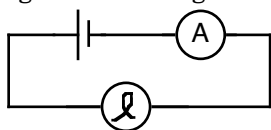
Procedure:

You will be asked to make several simple circuits and alter them a number of times. Each time, record your observations of all the light bulbs and any meters that you are using. Be very careful to note whenever something changes. Make note of the brightness of the bulbs and any meter readings.

Make sure you have three identical lightbulbs by making a series circuit with all three and turning on the power supply. The bulbs are identical if they are all the same brightness.

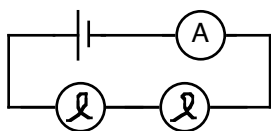
Part I: Series Circuits

- Hook up a light bulb and ammeter as shown in the diagram. Adjust the power supply until the light bulb is bright. Record the current passing through the light bulb.

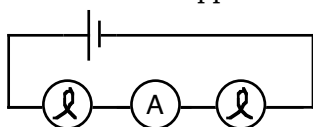


V = _____ & I = _____

- Unscrew the light bulb. What happens to the bulb and the current?
- Screw the bulb back in. Without adjusting the power supply, add a second light bulb to your circuit as shown. What happens to the brightness of the bulbs and the current?



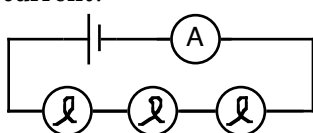
- Unscrew one of the light bulbs. What happens?
- Screw the bulb back in. Remove the ammeter and connect it so that it is in between the two light bulbs. What happens?



- Put the ammeter back to where it started. Adjust the power supply until both light bulbs are as bright as the first one was (step 1). Record the current passing through the bulbs.

V = _____ & I = _____

- Add a third light bulb to your circuit. What happens to the brightness of the bulbs and the current?



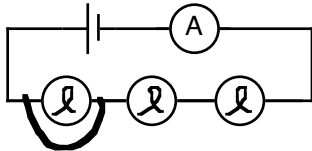
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8. Adjust the power supply until both light bulbs are as bright as the first one was (step 1). Record the current passing through the bulbs.

V = _____ & I = _____

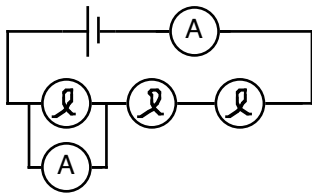
9. Unscrew one of the light bulbs. What happens? Screw the bulb back in. Unscrew a different bulb. What happens?

10. Screw the bulb back in. Take a wire and connect it around a light bulb as shown. What happens to the brightness of each bulb and the current?



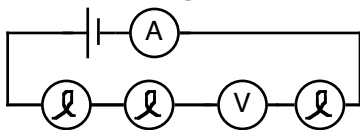
11. Repeat step 10 by short circuiting the other two bulbs, one at a time. NOTE: do not short out the entire circuit!

12. Borrow a second ammeter and connect it around a light bulb, as you did with the wire in step 10. What happens to the brightness of each bulb and the current?



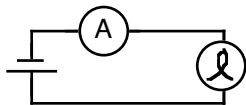
13. Remove the ammeter from the circuit. With a voltmeter, record the total voltage for your circuit.

14. Connect the voltmeter as shown in the diagram. What happens to the brightness of each bulb and the readings on the ammeter and voltmeter?



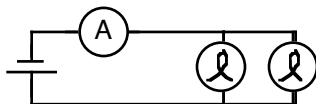
Part II: Parallel Circuits

1. Hook up a light bulb and ammeter as shown in the diagram. Adjust the power supply until the light bulb is bright. Record the current passing through the light bulb.



V = _____ & I = _____

2. Without adjusting the power supply, add a second light bulb to your circuit as shown. What happens to the brightness of the bulbs and the current?

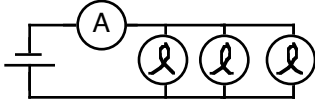


V = _____ & I = _____

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3. Unscrew one of the light bulbs. What happens? Screw the bulb back in. Unscrew a different bulb. What happens?

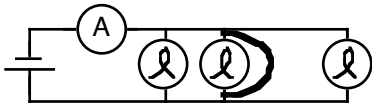
5. Add a third light bulb as shown. What happens?



$$V = \underline{\hspace{2cm}} \text{ \& } I = \underline{\hspace{2cm}}$$

6. One at a time, unscrew each light bulb. What happens?

7. Make sure all the bulbs are lit. Take a wire and **briefly** connect it around one of the bulbs as shown in the diagram. What happens?



8. Repeat step 7 with the other two bulbs.

Questions:

- Define the following terms:
 series circuit

 parallel circuit

 short circuit

 open circuit
- Which would be brighter, a light bulb with more current passing through it or less current?
- Which meter acts like a short circuit?
- Which meter acts like an open circuit?
- If you were to keep the power supply set to the same voltage all the time and kept adding light bulbs in *series*, what would happen to the brightness of the light bulbs? What would happen to the total current leaving the power supply?
- If you were to keep the power supply set to the same voltage all the time and kept adding light bulbs in *parallel*, what would happen to the brightness of the light bulbs? What would happen to the total current leaving the power supply?
- Are the outlets in your house connected in *series* or in *parallel*? How can you tell?