

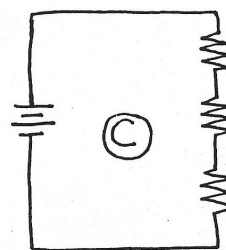
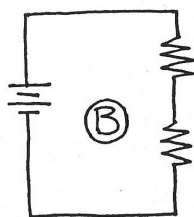
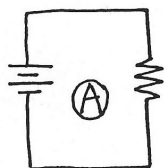
How Many Physics Students Does it Take to Screw in a Light Bulb? * Lab

Purpose

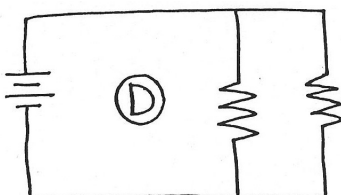
This lab investigates simple electrical circuits containing flashlight bulbs, wire and a battery to see how different arrangements affect the brightness of the bulbs, etc. **Before** beginning the lab, **record** what you already know or can guess about how to connect light bulbs to a battery in order to get them to light up brightly.

Procedure

1. Remove one bulb from its holder. Arrange the bulb, the battery and lengths of wire in as many ways as possible to make the bulb emit light. **Sketch** the arrangements for at least 2 failures and 2 successes. **Warning:** test each arrangement fairly quickly, avoiding prolonged connections to both terminals of the battery in particular. **Describe** the similarities between your successful trials.
2. Arrange a bulb in a bulb holder (instead of a bare bulb), the battery and lengths of wire in as many ways as possible to make the bulb emit light. **Describe** the two parts of the bulb that the holder makes contact with.
3. Using arrangements of your own design, light as many bulbs (in holders) as you can. **Sketch** at least two of your arrangements, noting which bulbs emit light. Compare your results with those of some other students. **Describe** the arrangement(s) that make the most bulbs glow.
4. Connect the bulbs (in holders), battery and wire as shown in each of the circuit diagrams below (the bulbs are the resistors.) Circuits like these are examples of **series circuits**. **Record** whether the bulbs light in each of the series circuits. **Carefully describe** the brightness of each bulb in each circuit.



5. Unscrew one of the bulbs in **Circuit C** and **describe** what happens. Screw the bulb back in, unscrew a different bulb, and **describe** what happens.
6. Set up **Circuit D** in the diagram below. This circuit is called a **parallel circuit**. **Describe** the brightness of each bulb in the parallel circuit, as compared to the brightness of the bulbs in each of the series circuits. Check the series circuits again if you're unsure.



7. Unscrew one of the bulbs in **Circuit D**. **Describe** what happens to the other bulb.

Analysis and Conclusions

- A1. In your own words, describe the differences between **series** and **parallel** circuits. Note any results that surprise you.
- A2. Predict what would have happened to the total amount of light generated if a third parallel bulb had been added to Circuit D.
- A3. Describe what's going on within the two kinds of circuits and how this explains your results. Make sure your description refers specifically to the pathways available for the current in each kind as well as the effect of the resistors on that current.
- A4. Describe how the total power drawn from the battery is affected when bulbs are added to series and parallel circuits.

* 3 or 4 - one to forge ahead without reading directions and the rest to ignore the bold text.