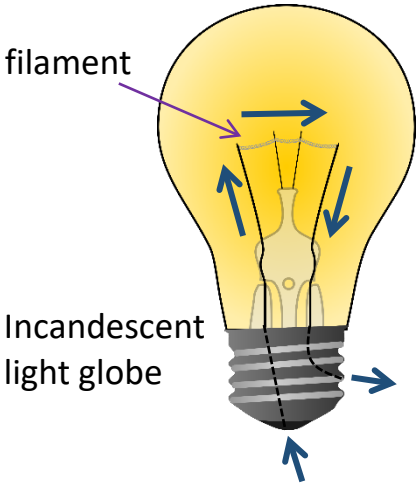
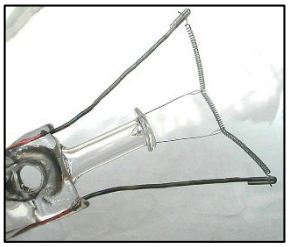
Series and Parallel Circuits Name: _____

Aim: To compare the operation of a series circuit with the operation of a parallel circuit.





Introduction:

For a light globe (or any component of an electrical circuit) to work, electricity has to flow through it. When connected properly, the electricity flows in through the base of the light globe, up the connecting wire to the filament, through the filament, and then out through the side. (Of course, the electricity can also flow the other way.) The filament is really, really thin (it's a coiled coil), and gets hot because all the electricity flowing through is concentrated in a small area. It gets so hot that it gives off light. Other types of light globes, like fluorescent lamps and LEDs, produce light in a different way and without producing much heat, but electricity still has to flow into them and then out of them again.

Equipment: Powerpack or battery, 5 wires, 2 light globes

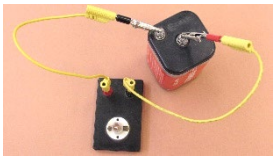


Figure 1: Single light globe

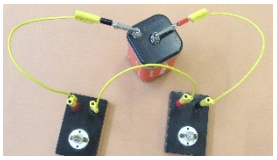


Figure 2: two light globes in series.

A. Series Circuits

A1. Connect a single light globe to a battery as shown in Figure 1.

A2. Connect two light globes to a battery as shown in Figure 2.
These light globes are said to be connected "in series".

A3. Draw "Circuit Diagrams" for the two circuits using circuit symbols.

Circuit Diagrams	

A4. How does the brightness of the single light globe in the first circuit compare to the brightness of the 2 light globes in the second circuit (which are connected in series)?

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_____

A5. Disconnect one light globe (or unscrew it from its holder). What happens? Why?

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A6. After reconnecting the first globe, disconnect (or unscrew) the other light globe. What happens? Why?

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_____

B. Parallel Circuits

B1. Connect two light globes to a battery as shown.
These light globes are said to be connected "in parallel".

B2. Draw a circuit diagram using circuit symbols.

B3. How does the brightness of the two light globes connected in parallel compare to the brightness of a single light globe connected on its own?

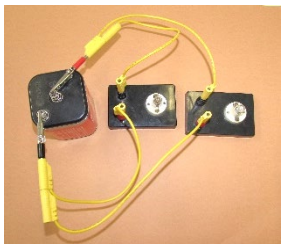


Figure 3: two light globes in parallel

Circuit Diagram

B4. Disconnect (or unscrew) one of the light globes. What happens? Why?

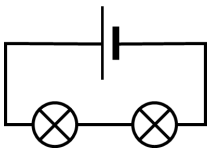
B5. After reconnecting the first light globe, disconnect (or unscrew) the other light globe. What happens? Why?

B6. The lights in your house are connected in parallel. Suggest two reasons for this and explain why the lights are not connected in series.

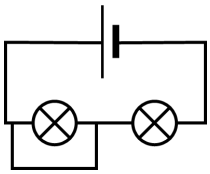
C. Short Circuits

Connecting a wire in parallel with a light globe (or any component) creates what is called a "short circuit" (or simply a "short"). More electricity flows through the thick shorting wire than through the very, very thin filament wire in the light globe. Short circuits can be dangerous because if too much electricity flows, wires can get so hot that they can start fires. In Part C, you will set up a working circuit and then deliberately, but safely, introduce a "short".

C1. Set up the circuit with two light globes connected in series as shown in the circuit diagram on the right.



C2. Connect a wire across the first light globe as shown. What happens? Why?



C3. Disconnect the wire that you connected in C2 and connect it across the other light globe. What happens? Why?

C4. Disconnect the shorting wire (from C3) and connect a switch across the battery as shown. What happens when you press the switch? What is wrong with this circuit?