

electricity and magnetism

Series and Parallel Circuits

Electrical current is manipulated in the construction of parallel and series circuits. A **series** circuit is one in which the current has only one path to take from the negative terminal of the battery through the load and back to the positive terminal. The circuit no longer works if one bulb or battery is disconnected.

A **parallel** circuit is one in which each bulb and/or battery is in its own circuit. It receives the same current independent of the other components in the circuit. If one bulb or battery is unscrewed or no longer works, the other bulb and/or batteries are not effected. The advantages of a parallel circuit is that all devices in the circuit get equal amounts of strong currents and work independently of each other.

Batteries connected in series will cause the bulb to glow brighter and the current must flow through both batteries to the load and back. Any opening of a connection will cause the bulb to go out. When batteries are connected in series, they produce more power.

Batteries connected in parallel will not affect the brightness of the bulb and when one battery is taken out the bulb will continue to glow. When batteries are connected in parallel, they will last longer, but do not produce more power.

Bulbs connected in series will be of equal brightness, but dimmer than normal. This is due to the decrease in electricity. The more bulbs in series the dimmer the light. Removing a bulb causes the entire circuit to shut off.

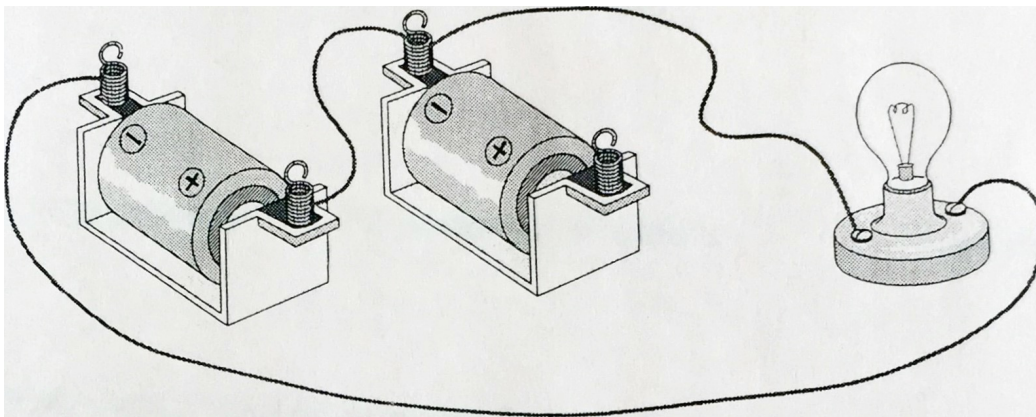
Bulbs connected in parallel will be lit with the same brightness because they each receive the same amount of electricity. Removing a bulb does not cause the others to go out.

electricity and magnetism

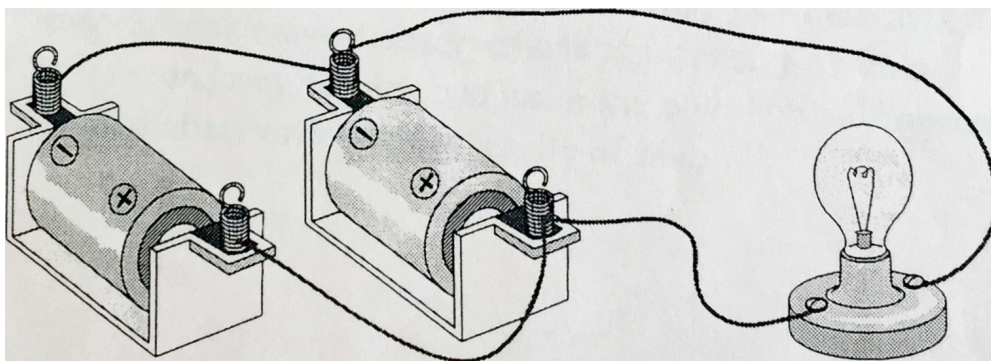
Series vs Parallel Circuits

In the old days, Christmas lights were wired in **series** and the burning out of one bulb caused the whole string to go out. Lights are now wired in parallel which means that the current has more than one path to follow so if one bulb burns out, the rest of the string will continue to burn. The same principle holds for batteries in series and parallel. In **series** there is **only one path** for the current to follow. In **parallel** the current has **more than one path** to follow.

Series Wiring



Parallel Wiring:



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Batteries in Series and Parallel

Series

1. When you wire the batteries in series, what happens to the bulb's brightness?

2. In the series connection the positive terminal on one battery connects to the _____ terminal of the next battery.

3. What happens when one of the batteries is removed from the circuit?

4. Describe the flow of electricity through the circuit.

5. Does connecting two or more batteries in series provide more current than one battery? _____

Parallel

1. When you wire batteries in parallel, what happens to the bulb's brightness?

2. In the parallel circuit the positive terminal of one battery connects to the _____ terminal of the next battery and the negative terminal connects to the _____.

3. What happens when one of the batteries is removed from the circuit?

4. Describe the flow of electricity through the circuit.

5. Does connecting two batteries in parallel give more electricity than one battery? Explain.
