What is a series circuit?

Picture a one-way circular road. All the cars on this road travel in the same direction in a line. This is how a series circuit works. In a **series circuit**, all the electrical charges flow in the same direction along a single path.

The parts of a series circuit are connected in one loop. The electric current moves along one path. The current moves from the power source through the wires to one load. It then moves through another load. Finally, the current returns through a wire to the power source.

The photo below shows a series circuit. You could add another battery and a wire to the circuit. Then the batteries would also be connected in series. A circuit is a series circuit as long as all of the parts are connected one after another.

Series Circuit

In a series circuit, the parts are connected like links in a chain. The electric current passes through each part one at a time.

Reading Diagrams

List the parts of a series circuit in order of the flow of electric current.

Clue: Start with the battery and follow the arrows.

If any part of a series circuit is removed or broken, the circuit is open. None of the parts will work because current cannot flow in an open circuit.

Quick Check

Cause and Effect One bulb in a series circuit burns out. Will current flow in the circuit?

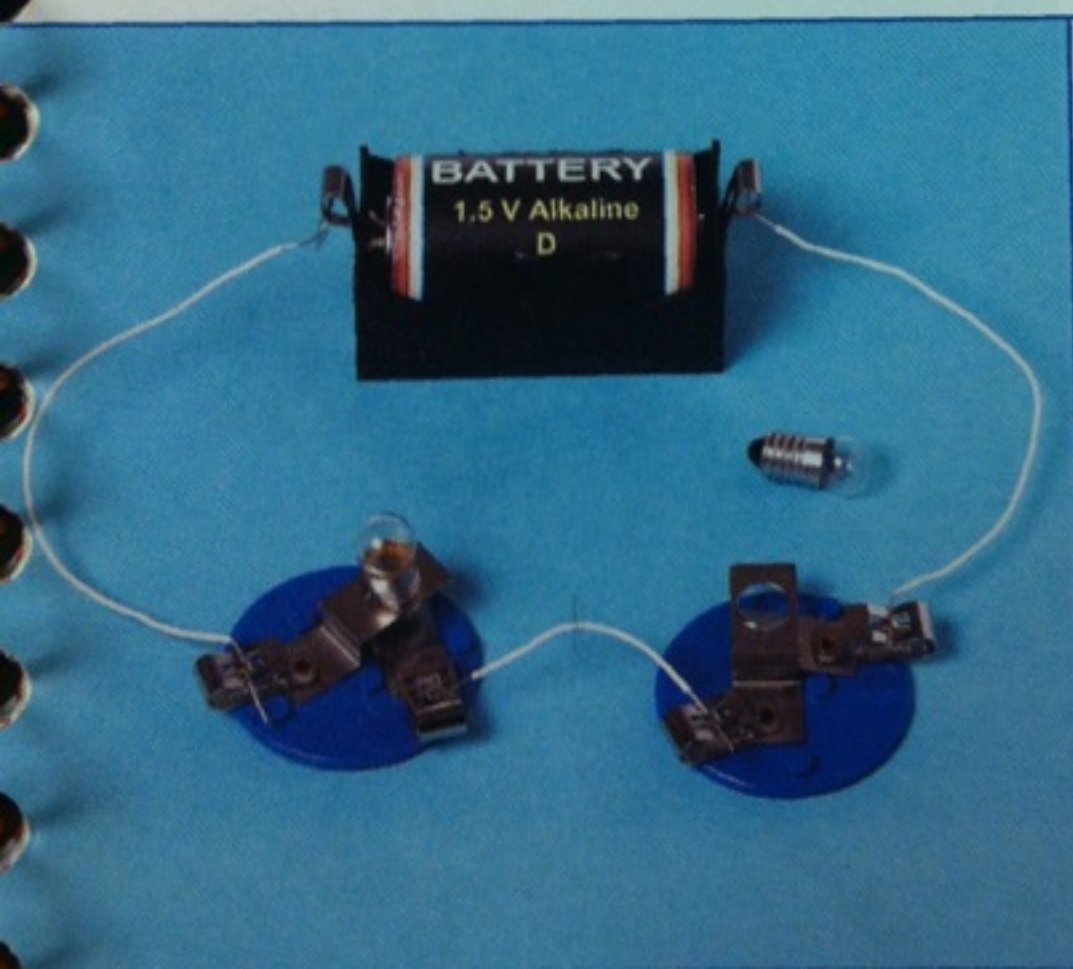
Critical Thinking A string of small lights are a series circuit. If the first light in the string burns out, what happens to the others? What if the last light burns out?

Quick Lab

Make a Series Circuit

1. Screw two light bulbs into sockets.
2. Use a wire to connect one socket to a battery's positive terminal.
3. Use another wire to connect the second socket to the first socket.
4. **Observe** Use a third wire to connect the second socket to the battery's negative terminal. What happens?
5. **Experiment** What happens if you remove one of the light bulbs?

Be Careful. The light bulbs may become hot.



If one part of a series circuit is removed or broken, electric current cannot flow in the circuit.

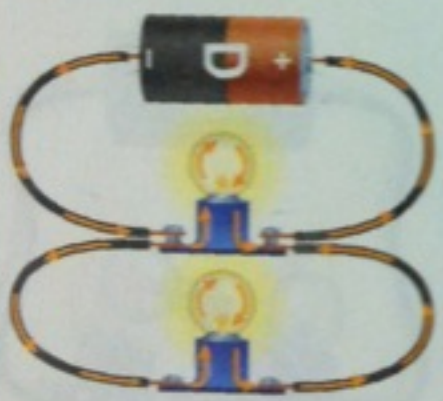
What is a parallel circuit?

A series circuit is like a circular road on which all the cars follow the same path. A parallel circuit is like a group of roads which all lead to the same place but along different paths.

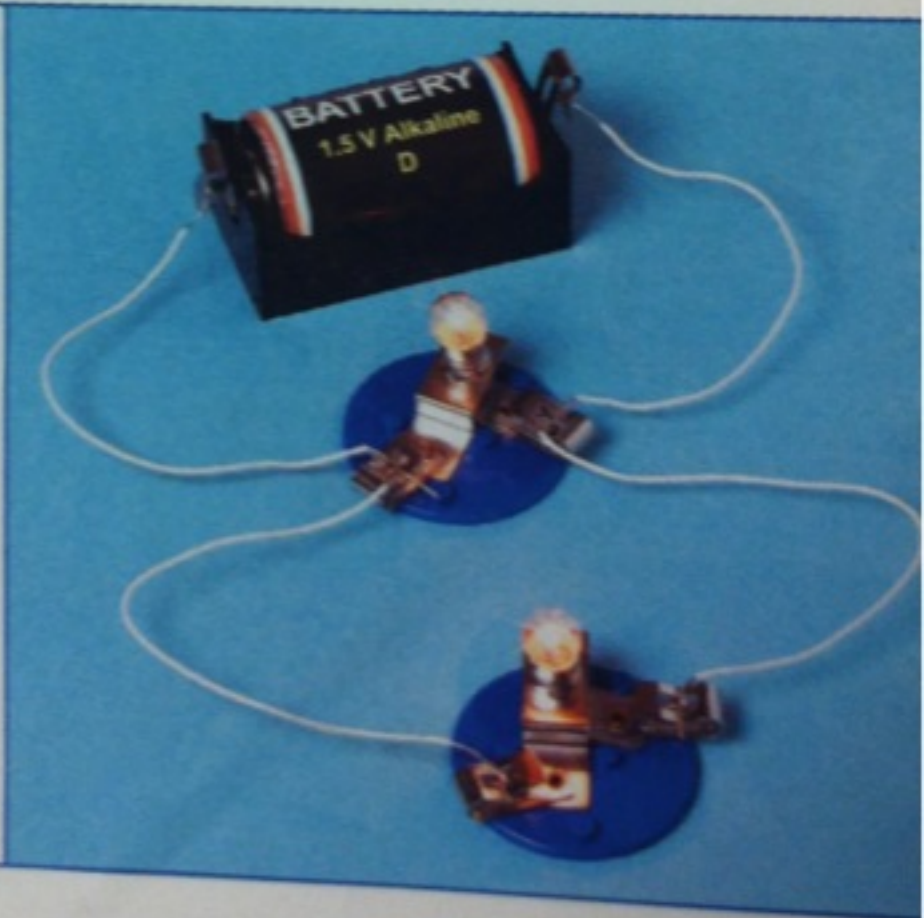
A **parallel circuit** is a circuit in which the electric current flows through more than one path. These different paths are often called *branches*. The branches of a parallel circuit divide the electric current between them. Some of the electric current flows through one branch, some flows through another branch.

The photo below shows a parallel circuit. Suppose that you connected two light bulbs on the bottom branch of the circuit. That branch would then be connected like a series circuit. Your circuit is no longer just a parallel circuit. It is a combination of a series and a parallel circuit. Many circuits in electrical devices, even the circuits in your home, are combination circuits.

Parallel Circuit



In a parallel circuit, each part, or branch, has its own path for electric current. The electric current passes through all of them at the same time.



If any branch of a parallel circuit is removed or breaks, current will still flow through the other branches. If a light bulb on one branch burns out, the light bulbs on other branches will still glow.

Quick Check

Cause and Effect A parallel circuit has two light bulbs. One of the bulbs burns out. What happens to the other bulb?

Critical Thinking If a light bulb in your home burns out, what happens to the other lights? Are the lights part of a series or a parallel circuit?

Quick Lab

Make a Parallel Circuit

1. Screw light bulbs into two sockets.
2. Look at the photograph. Connect one light bulb socket to the other socket using two wires.
3. **Observe** Connect one socket to the terminals of a battery with two more wires. What happens?
4. **Experiment** Remove one light bulb from its socket. Now what happens?

Be Careful. The light bulbs may become hot.

If one branch of a parallel circuit is removed or broken, current will still flow in other branches.

Reading Diagrams

Does current flow through the socket without a bulb?

Clue: Look at the arrows along the wires.

LOG ON *Science in Motion* Watch a parallel circuit at www.macmillanmh.com