

# Electric Circuits



## Glossary

TERM	DEFINITION
electric circuit	
battery	
electric current	
electron	
force field	<i>a region of space where an object exerts a force on other objects</i>
electric charge	<i>a property of matter; there are two kinds of electric charge—positive and negative</i>
electricity	

## Objective

In this lesson, you will

## Electric Circuits and Energy

Electric and electronic devices work when we turn them on because they have \_\_\_\_\_  
\_\_\_\_\_ inside them.

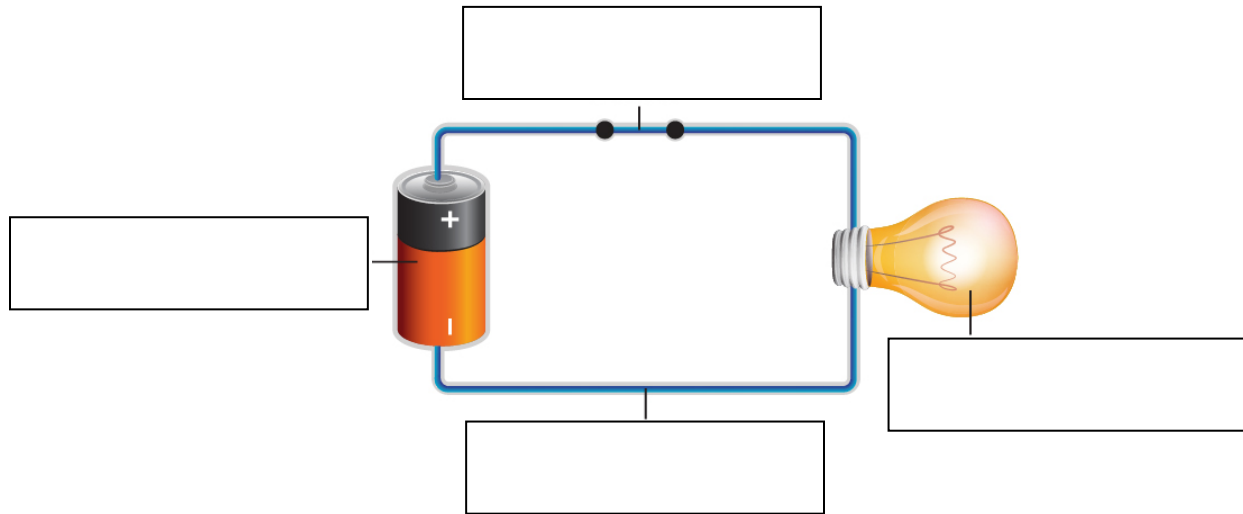
## Electric Circuits

Every circuit is made of three main parts:

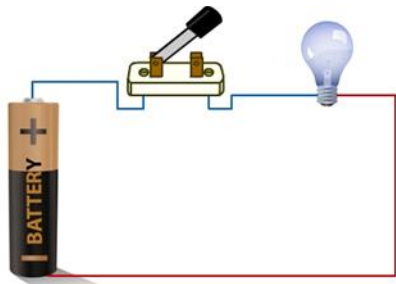


In an electric circuit, \_\_\_\_\_ is transformed into other forms of energy, such as light, \_\_\_\_\_, \_\_\_\_\_, and motion.

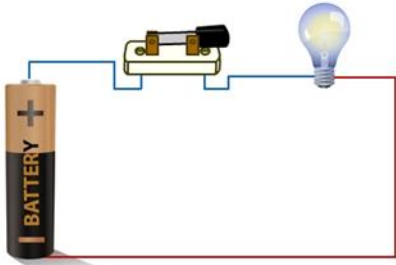
### Example of a Simple Electric Circuit



- The energy source in an electric circuit is called a \_\_\_\_\_. The voltage source provides energy, creating an \_\_\_\_\_ force field. In the flashlight circuit, the \_\_\_\_\_ is the voltage source. When a flashlight is switched on, the battery creates an electric force field that moves \_\_\_\_\_ through the \_\_\_\_\_ in the circuit. The strength of the force field is measured in \_\_\_\_\_ (V).
- \_\_\_\_\_ are affected by the force field from a voltage source. The \_\_\_\_\_, or flow, of electrons in a circuit causes energy to be transferred.
- All electric circuits have a connecting path made of \_\_\_\_\_. Metal is good \_\_\_\_\_ of electric current because it has freely moving \_\_\_\_\_.
- The \_\_\_\_\_ in a wire will move if an electric force is applied. The movement of positive or negative charges is called \_\_\_\_\_, which is measured in \_\_\_\_\_ (A).



An open switch in the electric circuit breaks the flow of current, preventing the lightbulb from glowing.

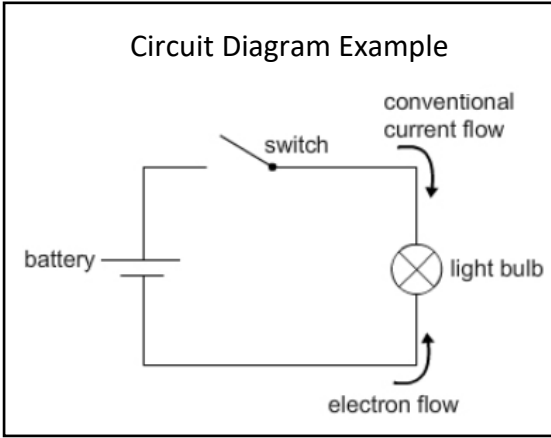


A closed switch in the electric circuit allows current to flow, which makes the lightbulb glow.

**!** A circuit can function only if current flows through the entire \_\_\_\_\_ of the circuit. A break in the circuit path stops the \_\_\_\_\_ of electrons, preventing the circuit from working. A \_\_\_\_\_ is designed to start and stop the current.

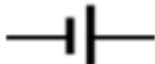








Three ways to represent a circuit:

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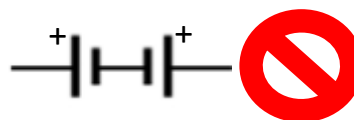
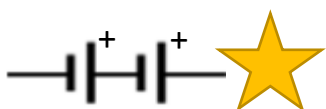


\_\_\_\_\_ are understood around the world and are the standard way to depict circuits.

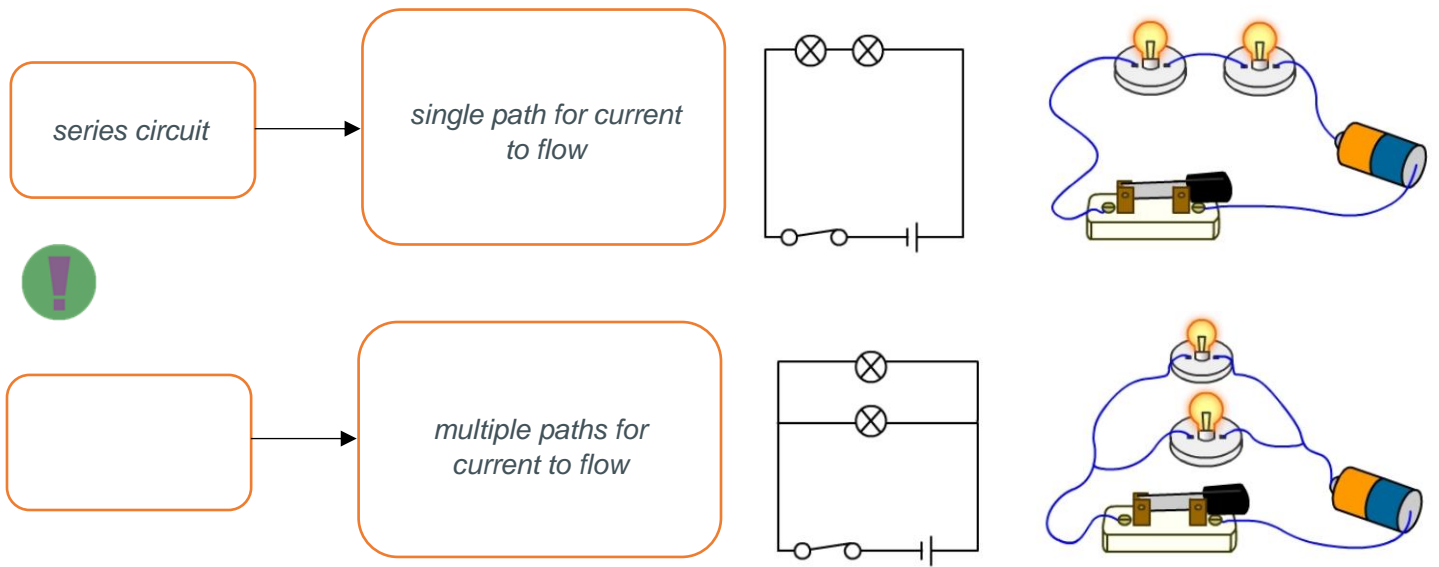
# Circuit Diagram Symbols

Component	Symbol	Description
		
<i>bulb</i>	 or 	<i>transforms electric energy into light energy and glows</i>
		
		
		
<i>switch (on)</i>		
		<i>measures electric current</i>
		<i>slows the flow of electric current</i>

If a circuit has two batteries, the batteries should be connected so that the negative pole of one battery is closer to the positive pole of the other battery. In a circuit diagram, the short line on the battery symbol is the negative pole and the long line is the positive pole.



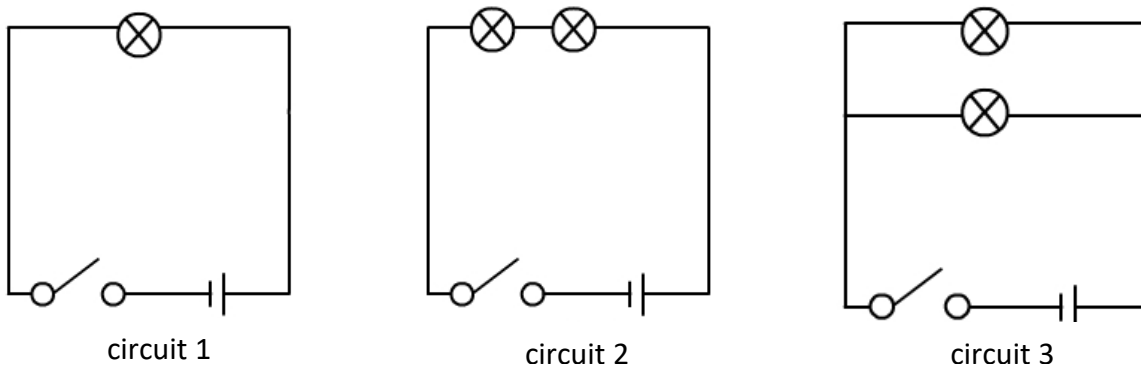
# Series and Parallel Circuits



## Lesson Activity

### Building and Comparing Series and Parallel Circuits

Circuit 1 and circuit 2 are series circuits. Circuit 3 is a parallel circuit.



At a certain time, the switches in all three circuits are closed. When this occurs, the single bulb in circuit 1 shines more brightly than the two bulbs in circuit \_\_\_\_\_. The brightness of both bulbs in circuit 3, which has a parallel design, is nearly the same as the one bulb in circuit \_\_\_\_\_, which has series design.

In order to receive a steady amount of electric current, standard wiring in households in the United States is the \_\_\_\_\_ circuit design. Each outlet provides either \_\_\_\_\_ volts or \_\_\_\_\_ volts.

# Circuit Quantities

Quantity	Variable or Abbreviation	Unit	Unit Symbol	Description
<i>Voltage</i>	<i>V</i>	<i>volts</i>	<i>V</i>	
<i>Current</i>				<i>the flow of electrons</i>
<i>Resistance</i>	<i>R</i>		$\Omega$	

A resistor is a circuit component that is designed to slow an electric current and only transform electric energy into heat energy. There are several devices that are similar to resistors because they slow down the flow of current. These devices include light bulbs, motors, and buzzers. These devices give of different kinds of energy in addition to heat.

a picture of a resistor



## Ohm's Law



$$\boxed{\phantom{V}} = \frac{V}{R} \quad \text{or} \quad \text{current} = \frac{\boxed{\phantom{I}}}{\text{resistance}}$$

An increase in \_\_\_\_\_ will increase the current in the circuit, assuming the resistance is unchanged. An increase in resistance will decrease the \_\_\_\_\_, assuming the voltage is unchanged.

## Summary

How can using circuit diagrams and Ohm's law help electrical professionals design circuits needed to build electronic devices?