

AIM: Describing the relationship between electricity and magnetism.

Imagine your life without TV, radio, computers, refrigerators, or light bulbs. What do all of these have in common?



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All of these things are possible because of electricity.

The use of electricity has become so routine that most of us never stop to think about what happens when we switch on a light or turn on a motor. This section is about electricity and electric circuits.

Circuits are usually made of wires that carry electricity and devices that use electricity.

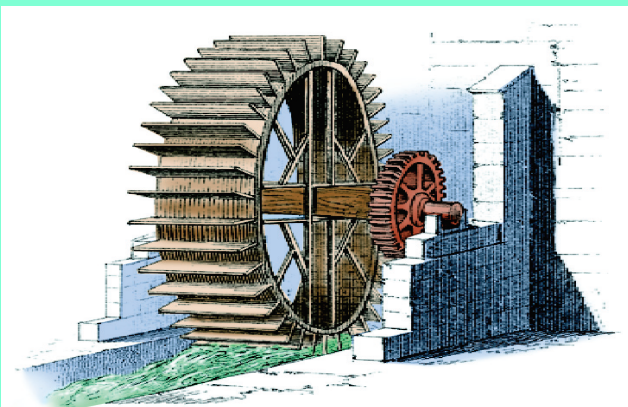
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Electricity usually means the flow of **electric current** in wires, motors, light bulbs, and other inventions.



Electric current is almost always invisible and comes from the motion of electrons or other charged particles.

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For example, a waterwheel turns when a current of water exerts a force on it

Before electricity was available, waterwheels were used to supply energy to many machines. Today, the same tasks are done using energy from electric current. Look around you right now and probably you see wires carrying electric current into buildings.

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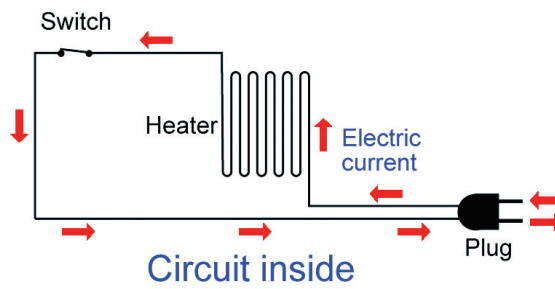
An **electric circuit** is a complete path through which electricity travels.

Bread is toasted by heaters that convert electrical energy to heat.

The circuit has a switch that turns on when the lever on the side of the toaster is pulled down.



Electric toaster



With the switch on, electric current enters through one side of the plug from the socket in the wall, and goes through the toaster and out the other side of the plug.

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Circuits are not confined to appliances, wires, and devices built by people.

These are some examples of natural circuits:

- The nerves in your body are an electrical circuit that carries messages from your brain to your muscles.



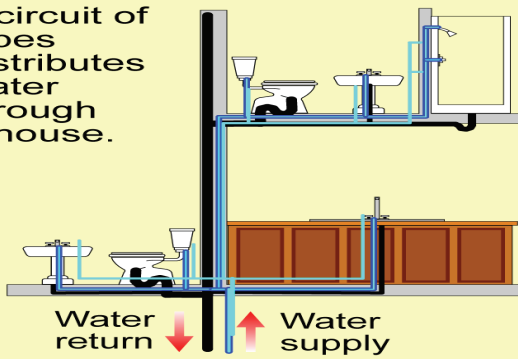
- The tail of an electric eel makes a circuit when it stuns a fish with a jolt of electricity.

- The Earth makes a gigantic circuit when lightning carries electric current between the clouds and the ground.

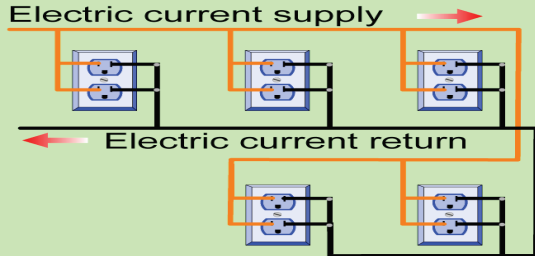


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A circuit of pipes distributes water through a house.



A circuit of wires distributes electric current through a house.



Beside Electricity what else is similar to a electric circuit in your house.



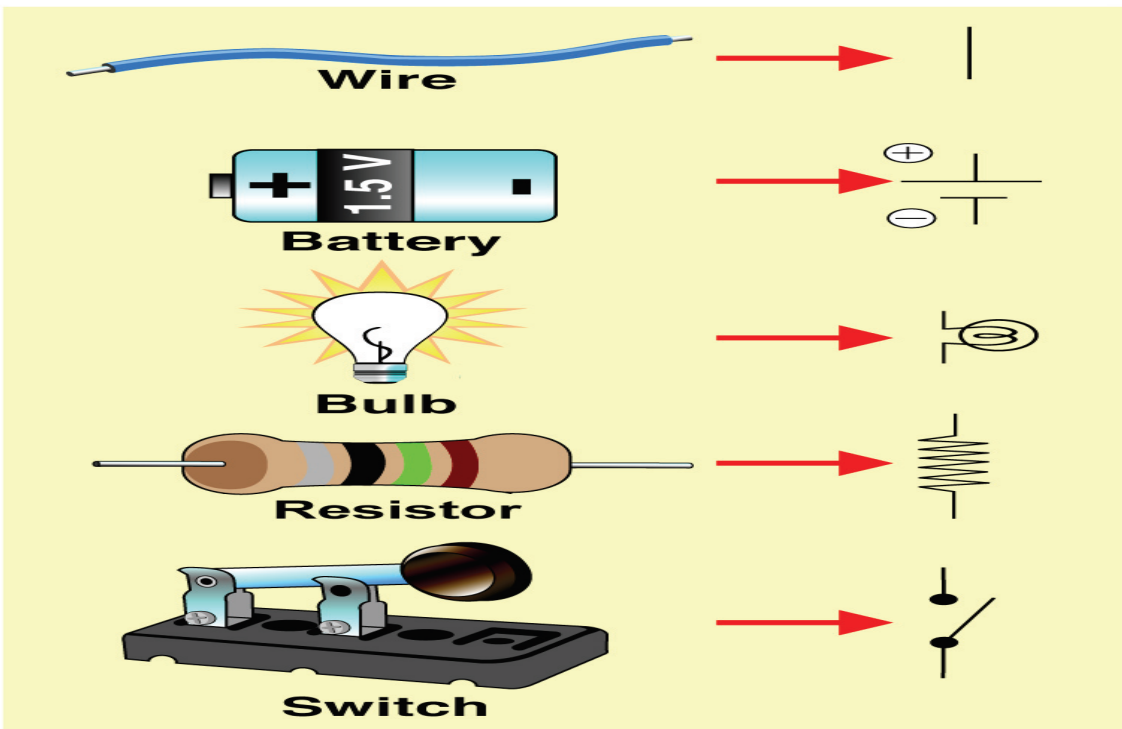
The flow of water through pipes.

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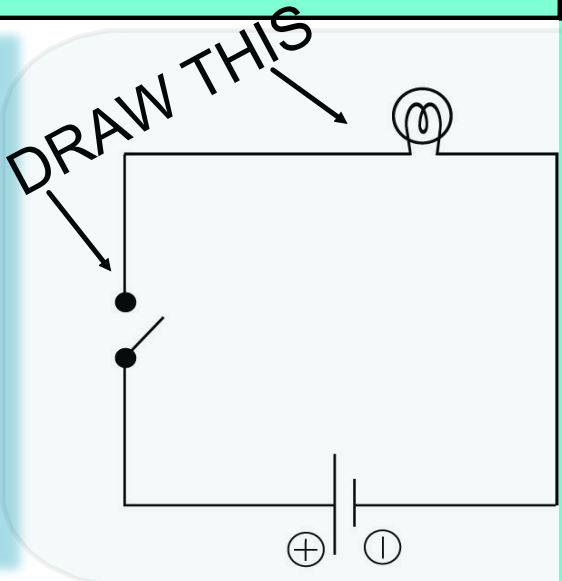
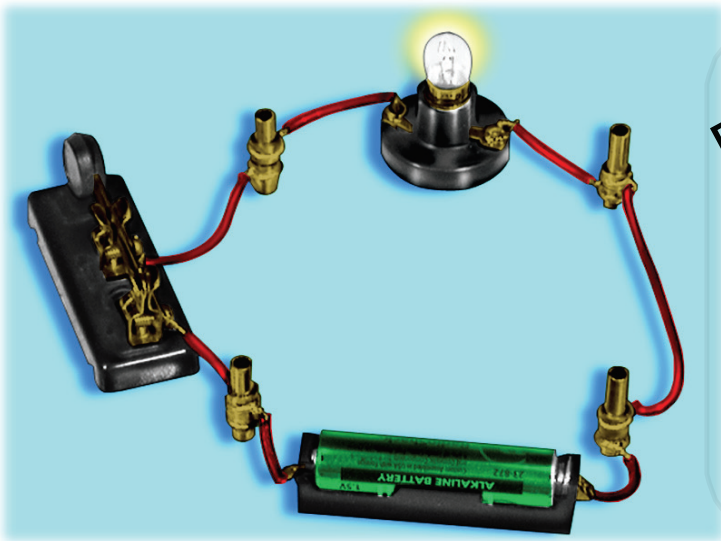
Circuits are made up of wires and electrical parts such as *batteries, light bulbs, motors, and switches.*

A circuit diagram is a shorthand method of describing a working circuit and we use electric symbols to make it easier to identify items in a circuit.

AIM: ELECTRICAL SYMBOLS



AIM: ELECTRICAL DIAGRAM



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All electric circuits must have a source of energy.



What powers these???

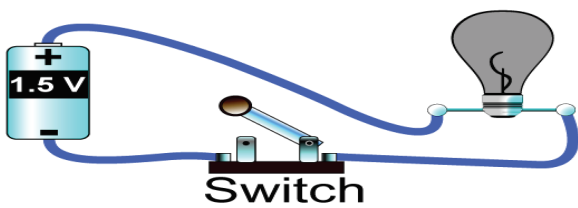
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It is necessary to turn off light bulbs, radios, and most other devices in circuits.
One way to turn off a device is to stop the current by “breaking” the circuit.



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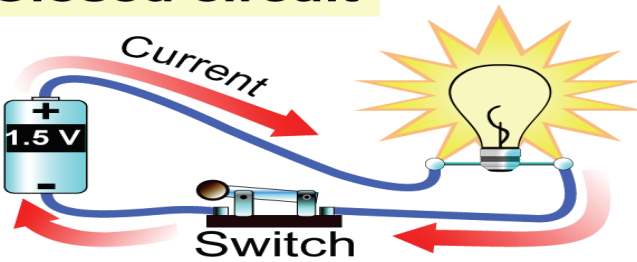
Open circuit



A circuit with any break in it is called an **open circuit**.



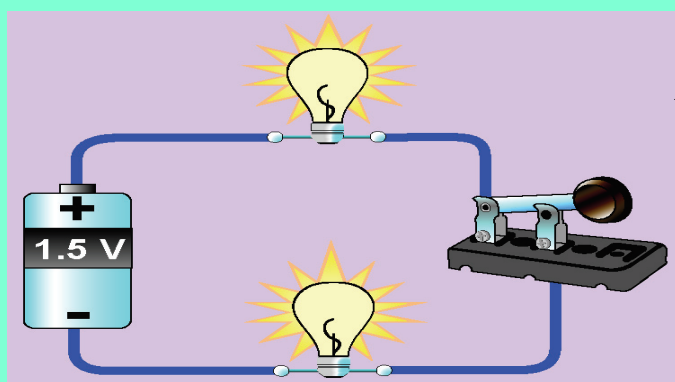
Closed circuit



A circuit with no breaks is called a **closed circuit**

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Complete your Vocab:

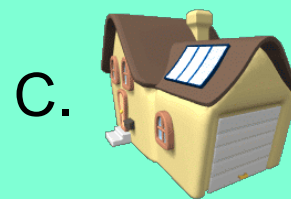
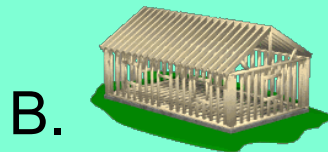


Draw a circuit diagram for the circuit shown in Figure 13.5.

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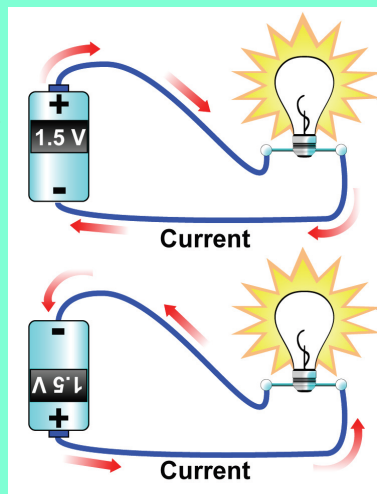
Activator: What is the difference between an Open Circuit and an Closed Circuit?

Write what the object is and what is powering it



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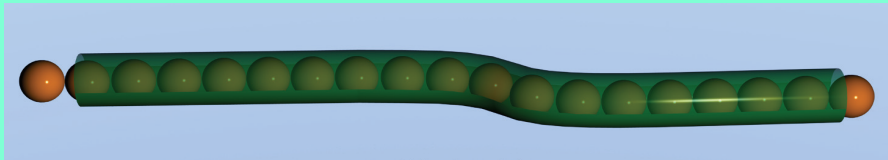
Current is what carries energy in a circuit.



Electric current flows in a circuit from the positive end of a battery and returns toward the negative end.

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Electric current is measured in units called **amperes (A)**, or amps, for short.



Electric current does not leak out of wires the way water sometimes leaks out of a hose or pipe. Electrical forces are so strong that current stops immediately if a circuit is broken.

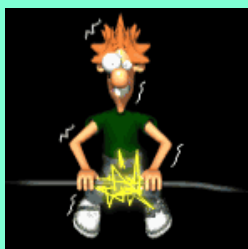
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Voltage is a measure of electric potential energy,

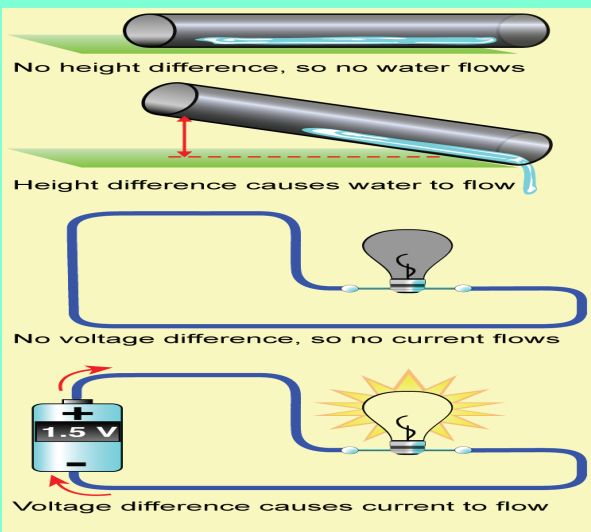
<https://www.youtube.com/watch?v=PscRUIsvhtI>



Voltage is measured in **volts** (V)



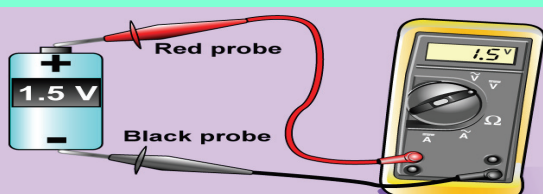
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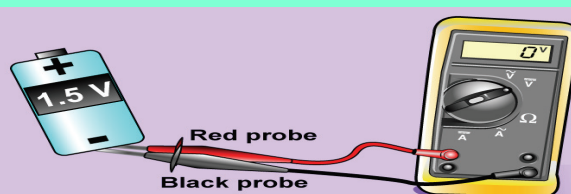
A change in height causes water to flow in a pipe.
Current flows in a circuit because a battery creates voltage difference.

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A **voltmeter** measures voltage. A more useful meter is a **multimeter**, which can measure voltage or current.



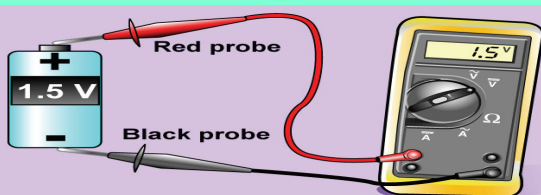
A multimeter can measure a battery's voltage if one probe touches each end.



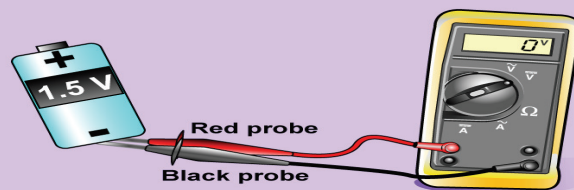
The meter reads zero volts if both probes are connected at the same place.

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The meter reads *positive voltage* if the *red (positive)* probe is at a higher voltage than the black probe. The meter reads *negative* when the *black probe* is at the higher voltage.



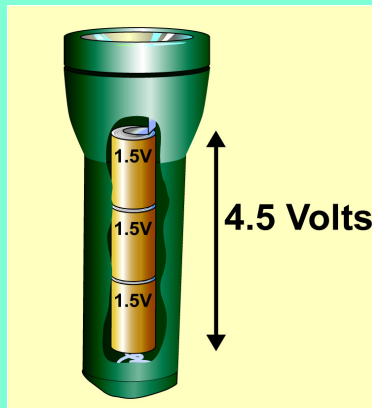
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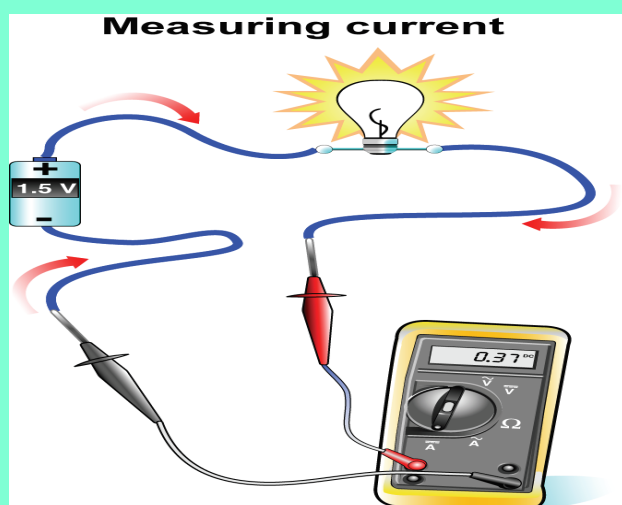
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A **battery** uses chemical energy to create a voltage difference between its two terminals. When current leaves a battery, it carries energy.



3 1.5-volt batteries can be stacked to make a total voltage of 4.5 volts in a flashlight.

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Current must pass through the meter when it is being measured

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Define : **Vocabulary**
ampere, voltage, volt, voltmeter,
multimeter, battery, ammeter

13.2 Section Review

1. List the units for measuring current(302) and voltage(303).
2. Why does a voltmeter display a reading of zero volts when both of its probes are touched to the same end of a battery?(303)
3. What does a 1.5 V battery give to each amp of current in a circuit?(304)

