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Electric Current and Circuits

Electrical circuits

The movement of charge through a conductor is called **current electricity**.

An **electrical circuit** is a complete pathway in which electrons can flow continuously.

To function properly, an electrical circuit must:

- Have a source of electrical energy. Examples are a battery or wall outlet.
- Have a conductor through which charges can move continuously (without stopping).

These conditions will make the circuit "live".

Typical circuits have a **switch**, which is a device that can turn on a device (close a circuit, completing the pathway) or turn off a device (open a circuit, breaking the pathway).

Circuits are almost pointless without a **load**. A **load** is some type of device that converts electrical energy into other forms of energy that are desired. Examples of loads are light bulbs, speakers, computer monitors, heaters, and motors.

Electrical Current

Similar to how the current of a river is the amount of water molecules passing a point per second, an **electrical current** is the amount of charge that passes a point in a conducting wire per second. Since current is the change in charge over time, current is a rate or speed.

Electric current is measured in units called **amperes, A** (often referred to as Amps). A current of 1 ampere (1.0 A) is produced when 1.0 C (coulombs) of charged particles move past a point in a circuit each second. Because an Ampere is a large amount of current, it is often measured using **milliamperes**.

The electrical current can be measured using an ammeter (or multimeter). This is similar to the voltmeter with one **HUGE** difference. An ammeter must be part of the circuit, in series. It cannot just use two probes that touch the circuit. This is

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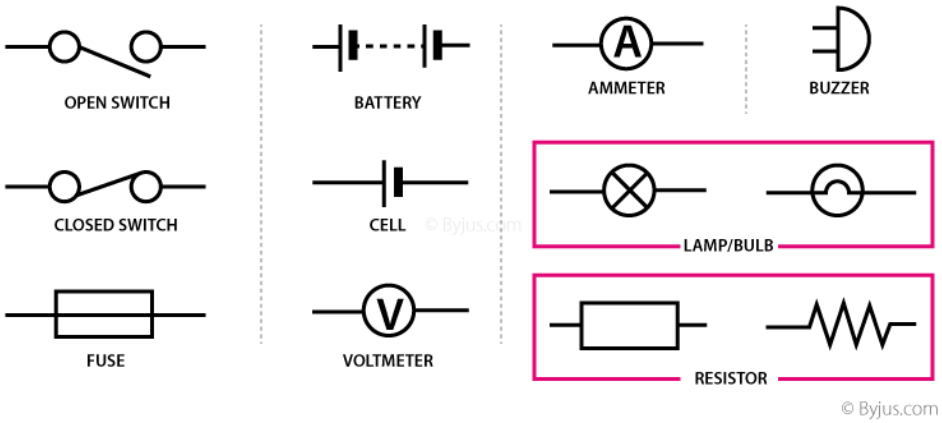
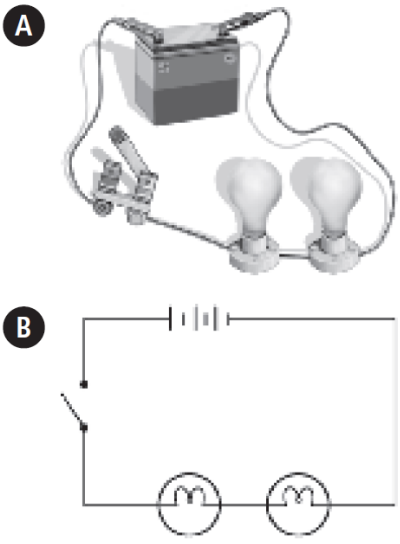
because the ammeter itself is a circuit, which lowers the current of the actual circuit being measured.

What does an electrical circuit look like?

Electricians and physicists use a list of agreed upon symbols to draw diagrams of circuits. Below is a list of symbols, and an example of a simple diagram. In the diagram, the main part that is important is the order of each symbol.





Important!: Direction

Circuits are drawn and read as energy leaving the positive terminal and moving to the negative terminal. This is called **conventional current**, and is the standard we use today.

It is, however, incorrect, as we know negative electrons move, not positive protons. This means the circuits are drawn in the opposite direction to the real **electron flow**.

The diagrams have not been corrected because it would be difficult to correct all the drawings in the world and the math of the circuits is not impacted.