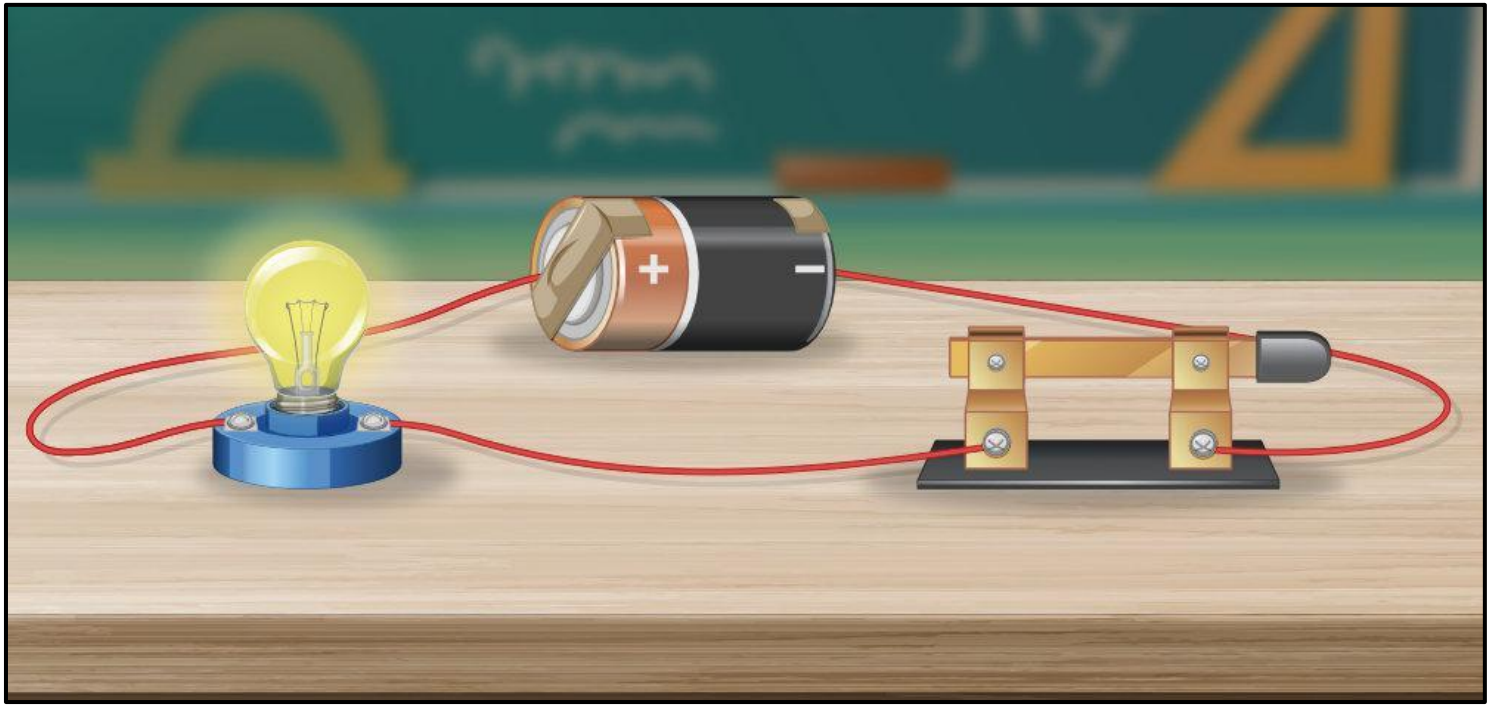
Electrical Circuits

An ***electric circuit*** is a set of connected components through which an electric current can flow.



Electrical Circuits

The basic elements of an electric circuit are:

A generator: This produces energy for the electrons to move. It has two poles: one positive and one negative. Different generators produce electricity in different ways: **batteries** (chemical processes); **alternators or dynamos** (motion); **photovoltaic solar cells** (the Sun); **hydrogen cells** (hydrogen with oxygen in the air).

Batteries

Alternator

Photovoltaic Solar Cells

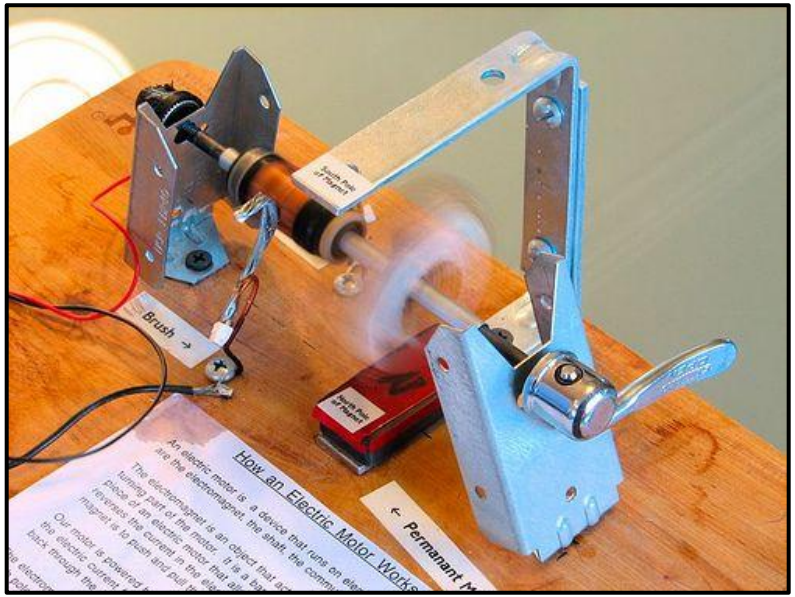
Electrical Circuits

Receptors: These components transform the electrical energy they receive into another form. The electrons leave the generator from one pole and carry energy around the circuit to the other pole. On the way, they interact with receptors that use the energy in different ways.

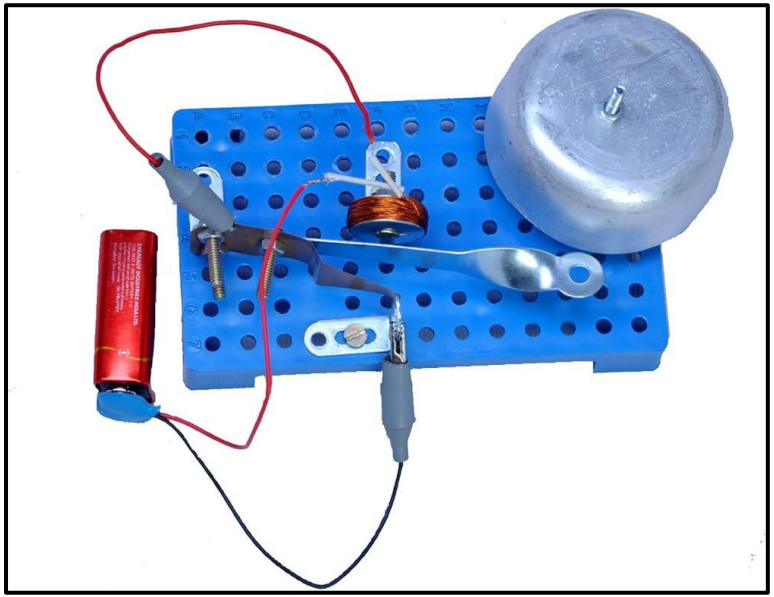
Electric resistor
-thermal or calorific energy
-gives heat

Bulb
-light energy
-gives light

Electrical Circuits



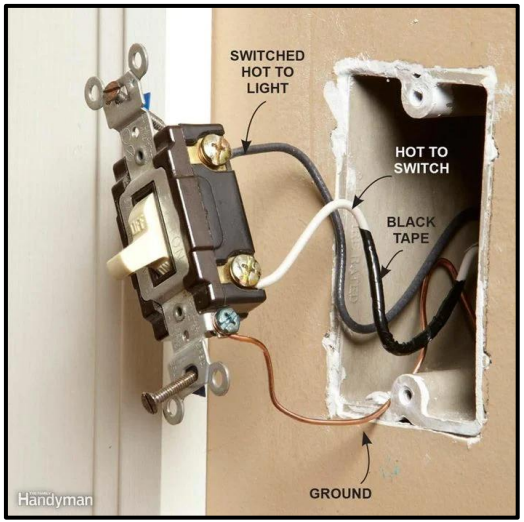
Motor
Mechanical energy
Produces motion



Bell
Acoustic energy
Produces sound

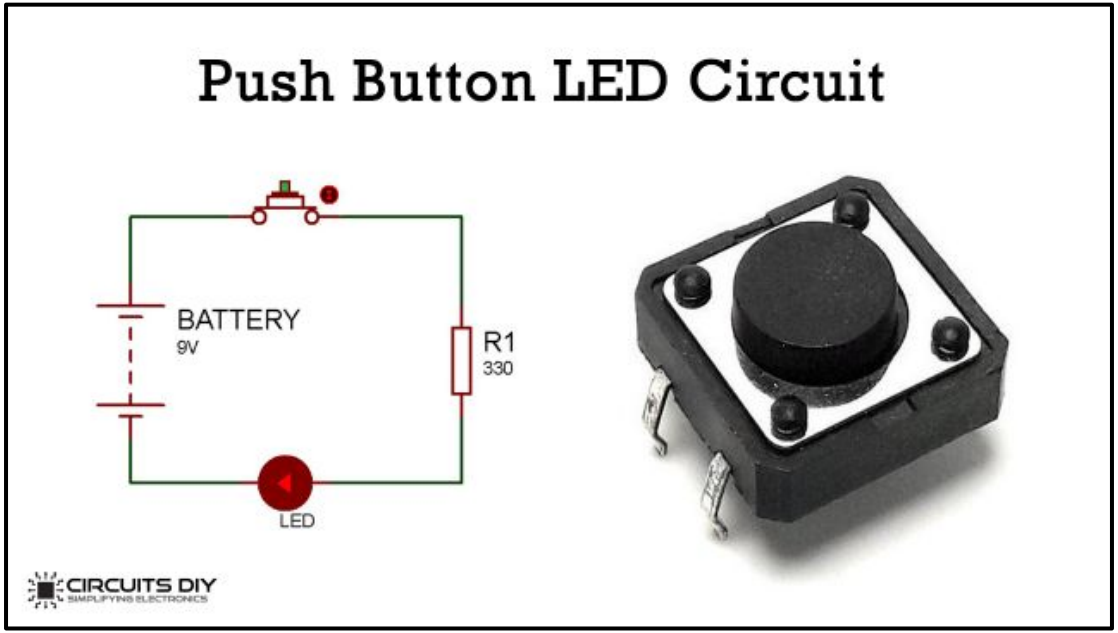
Electrical Circuits

Control components: These direct or stop the flow of the electrical current. The most common are a 2-way switch that has two position, one allows the flow of current and the other stops it; a push button, similar to a 2-way but returns to its original position when we stop pushing it.



Light Switch

Electrical Circuits



Push Button

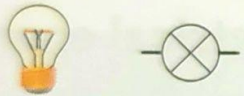
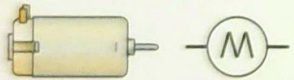
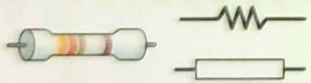
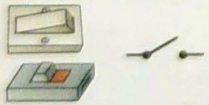
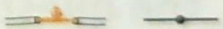
Electrical Circuits

Protection: These stop the flow of current when it gets too high, which protects other components from damage. We can use **fuses** or **thermal magnetic circuit breakers**.

Fuse

Thermal Magnetic Circuit Breaker

Symbols

Component	Symbol	Component	Symbol
battery		push button	
bulb		fuse	
motor		bell	
resistor		crossed wires and bridge	
switch		connection	
3-way switch		ammeter and voltmeter	

Effects of an electrical current

The effects in an electric current has different effects on the receptors and we can transform it into different types of energy: *heat, light, and motion.*

Heat

When electrons crash into the atoms of the material they're flowing through, some of the energy transforms into heat. This is called the **Joule effect**. The resistor is the element that produces heat.

Resistor →

Effects of an electrical current

Light

Incandescent or halogen bulbs produce light when an electric current passes through a metal filament. Most of the energy is lost in the from of heat.

Fluorescent tubes and low-energy bulbs contain gas that emits light when electrons move through them. The gases they contain are toxic.

In **LED** bulbs, electrons move through a semiconductor to produce light.

Incandescent

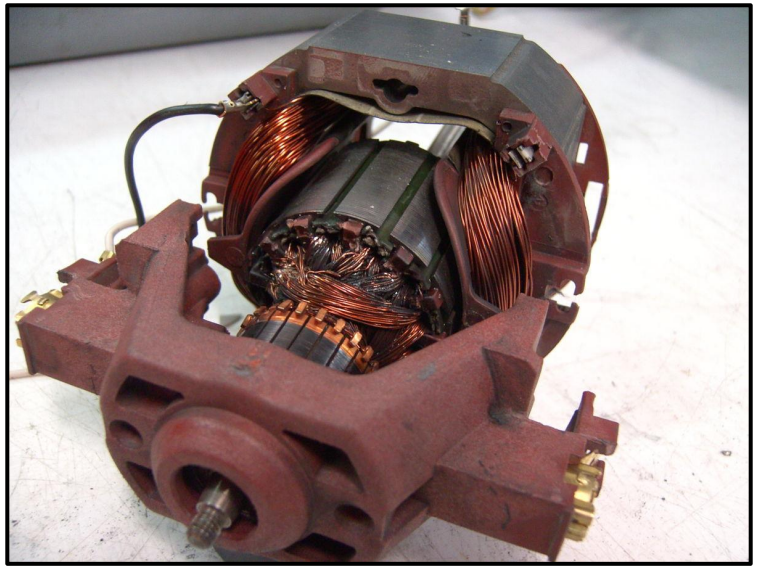
Flourescent

LED

Effects of an electrical current

Motion

Motors transform electric energy into motion. They work with the forces of attraction and repulsion between a magnet and conductor wire. This wire has one or more loops which carry the electric current,.



Ways to save electricity at home:

Home Appliances

- Use dishwashers and washing machines only when they're full.
- Keep the fridge and freezer doors open for the least time possible.
- Switch off the devices when you aren't using them, even ones with a stand-by mode.

Lights

- Make the best use of natural light.
- Turn off the lights when you don't need them.
- Use LED bulbs because they last longer and they consume less energy.

Heating and Cooling

- Try keeping the indoor temperature pleasant without air-conditioning.
- The main side of the building should face south to get the light and the Sun
- To reduce energy bills, use good insulation in the walls, ceilings, and windows.