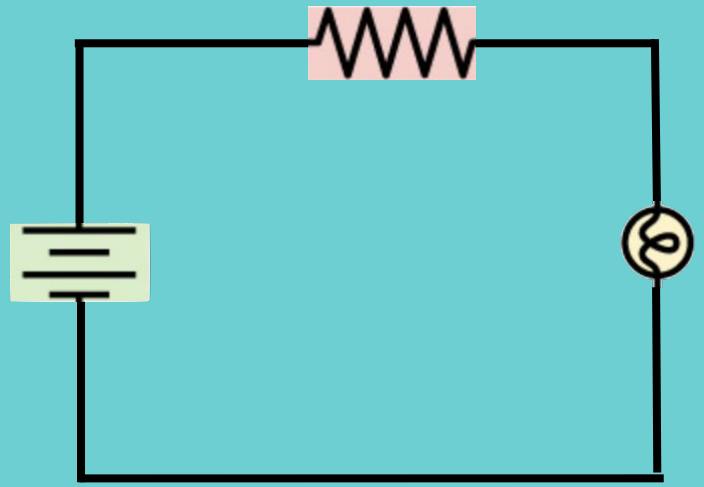
CIRCUITS

WHAT IS A CIRCUIT?

A circuit is a path for the movement of electric current

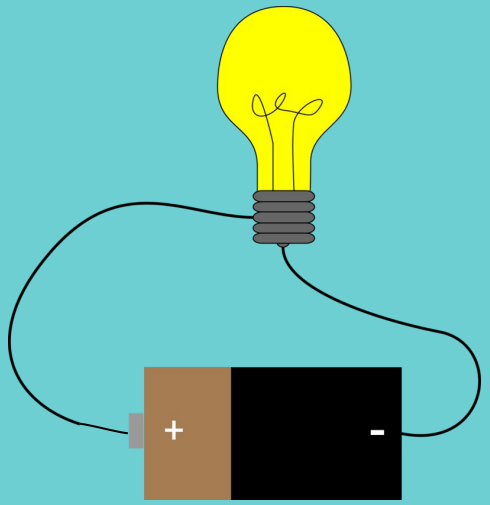
- When electric current moves through a circuit, the energy it carries gets transferred to a device, like a light bulb, and is changed to other forms of energy to provide power!
  - This is how electricity works!



This is a circuit drawing! The shapes all represent different parts of a circuit!

CIRCUIT DRAWINGS

Circuit Drawing



Actual Circuit

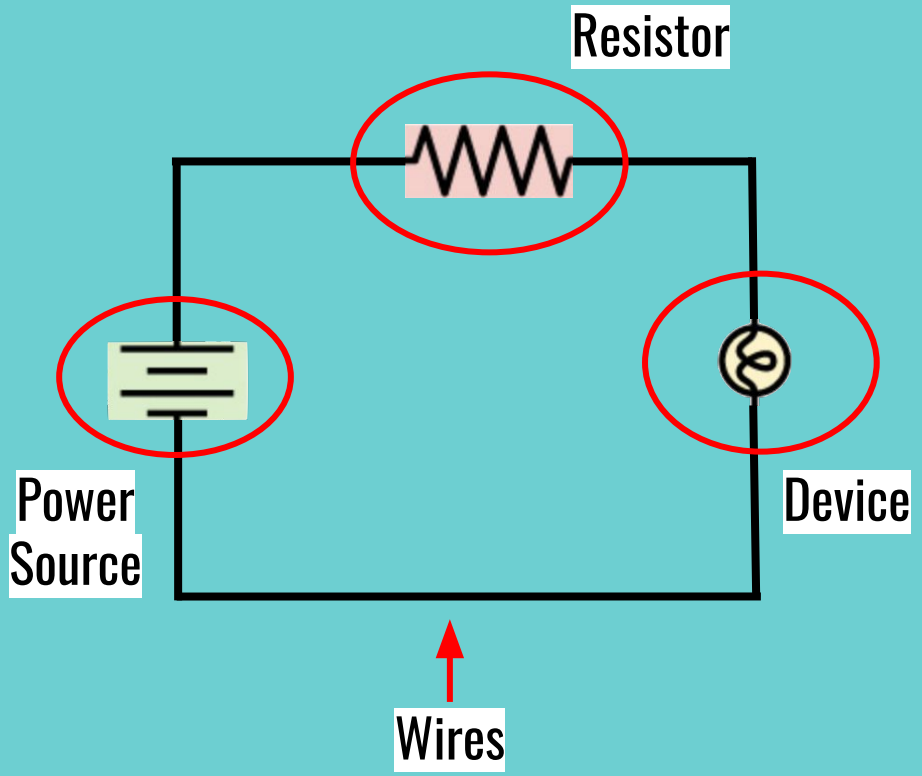
We can use a basic circuit drawing to represent the actual circuit!

PARTS OF A CIRCUIT

Electrical circuits have 3 main parts:

1. **Wires** to carry the electric current through the circuit
2. A **Device** that uses the current to do work (like a light bulb)
3. A **Power Source** to provide energy (like a battery)

There is also sometimes a **Resistor** in a circuit that changes the current flow. Here, you can see what the shapes in the circuit drawing mean.



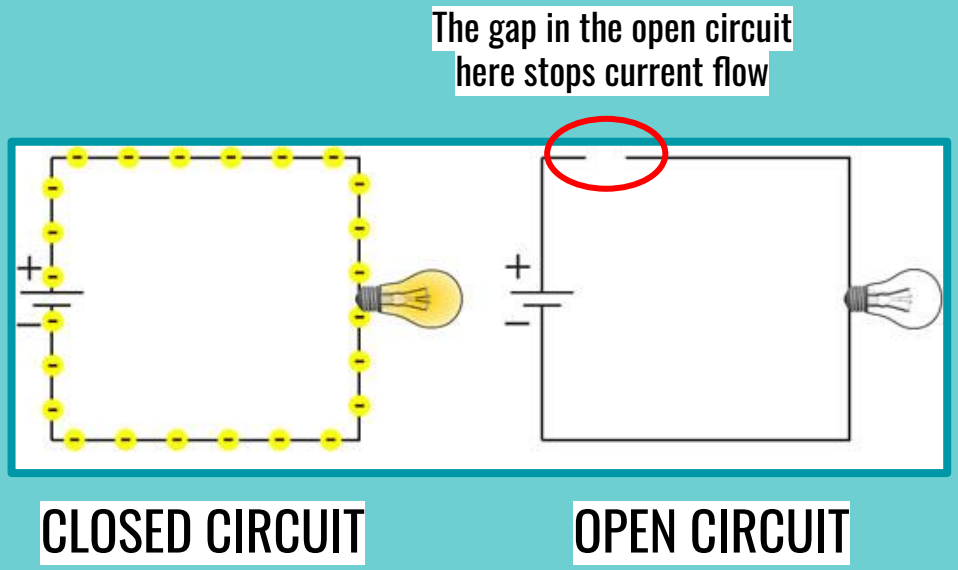
CLOSED VS. OPEN CIRCUITS

Closed Circuit

- A closed circuit is a complete pathway which allows current to flow

Open Circuit

- An open circuit has a gap in the pathway which stops current from flowing

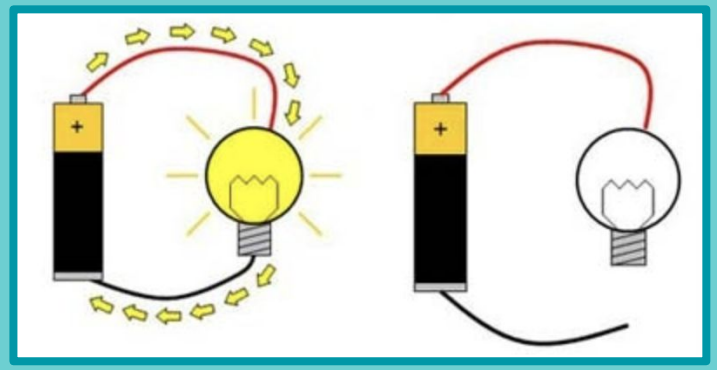


LIGHT BULBS USE A CIRCUIT

A circuit turns a light bulb on and off

- **Light bulb ON:** a complete pathway allows current to flow to the light bulb and turns the light bulb on

- **Light bulb OFF:** an open pathway creates a gap in the pathway which prevents current flow to the light bulb and turns the light off

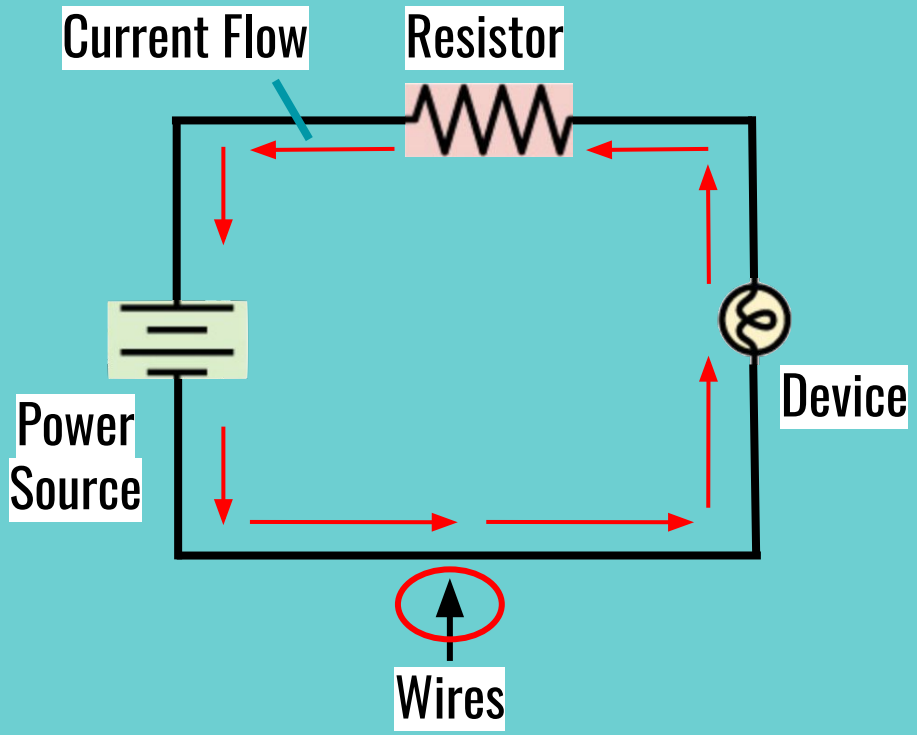


CLOSED OPEN

CURRENT IS THE FLOW OF CHARGE

Current is the flow of electrical charges through a circuit

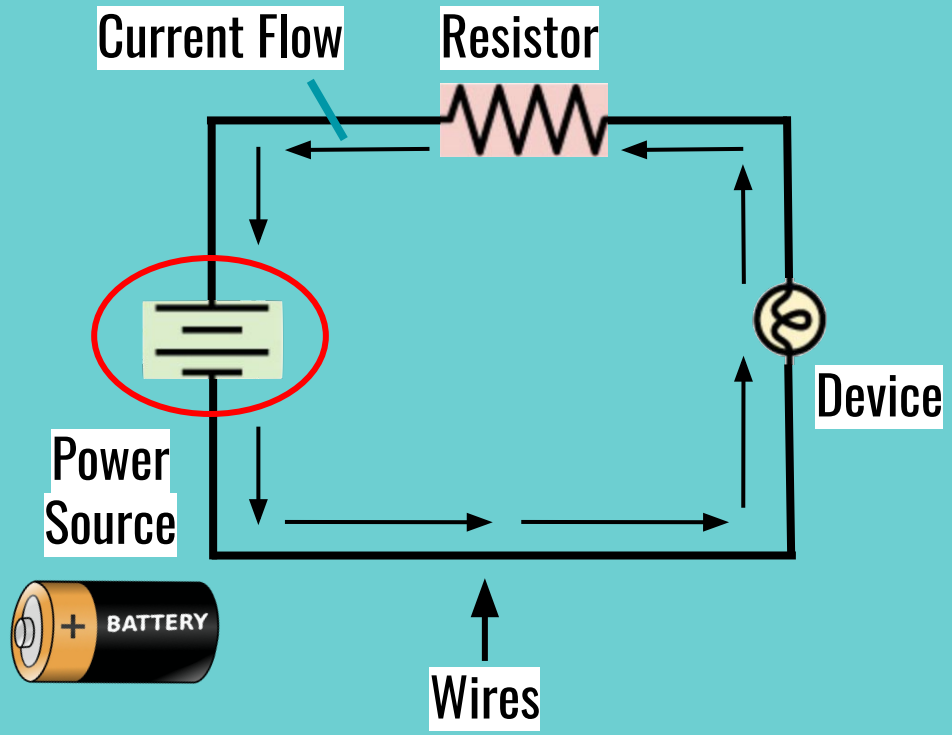
- Current is made up of a lot of small electric charges
  - The energy from the electric charges in the current will be used to provide power!
- Current flow is shown by the red arrows in the circuit drawing
- Current is measured in **Amps (A)** but written as **(I)**



VOLTAGE PUSHES CURRENT IN A CIRCUIT

Voltage makes the electric current in a circuit move

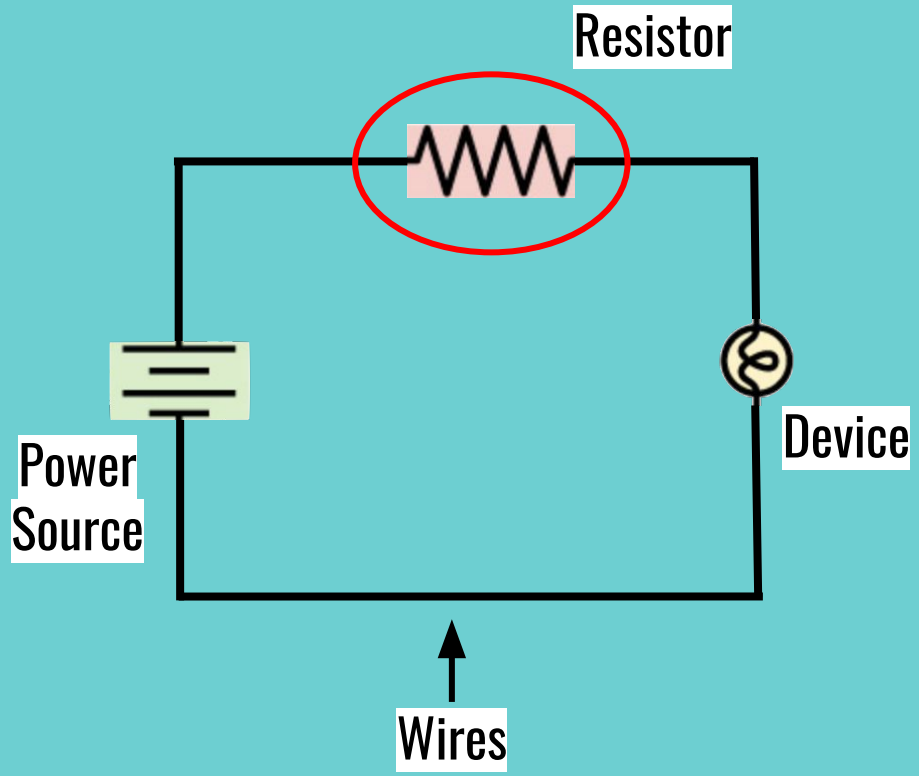
- Voltage is the "push" that causes current to move in the the circuit
- In this circuit drawing, the voltage comes from the power source and pushes the current in the wires
- A battery is an example of a power source!
- Voltage is measured in **Volts (V)** and written as **(V)**



RESISTORS SLOW DOWN CURRENT FLOW

Resistors provide ***resistance*** in the circuit which slows down the current flow

- Resistors change and help control the speed of current flow
  - A lot of resistance makes it harder for the current to flow
- Not every circuit has resistance
- Resistance is measured in **Ohms (Ω)** but written as **(R)**



VOLTAGE, CURRENT & RESISTANCE

What are you measuring?	Unit of measurement	Symbol of measurement	What does it mean?
Current	Amps (A)	**I**	Electric charge moving in a circuit
Voltage	Volts (V)	**V**	Pushes current through the circuit
Resistance	Ohms (Ω)	**R**	Slows current flow through a circuit

PUTTING IT ALL TOGETHER: OHM'S LAW

- Ohm's Law is a basic rule for circuits
  - It describes the relationship between voltage, current, and resistance in math symbols
  - The voltage (V) is equal to the current (I) passing through a conductor, like a wire, multiplied (x) by the resistance (R) in the circuit

V = I x R

V = Voltage (V)
I = Current (A)
R = Resistance (Ω)

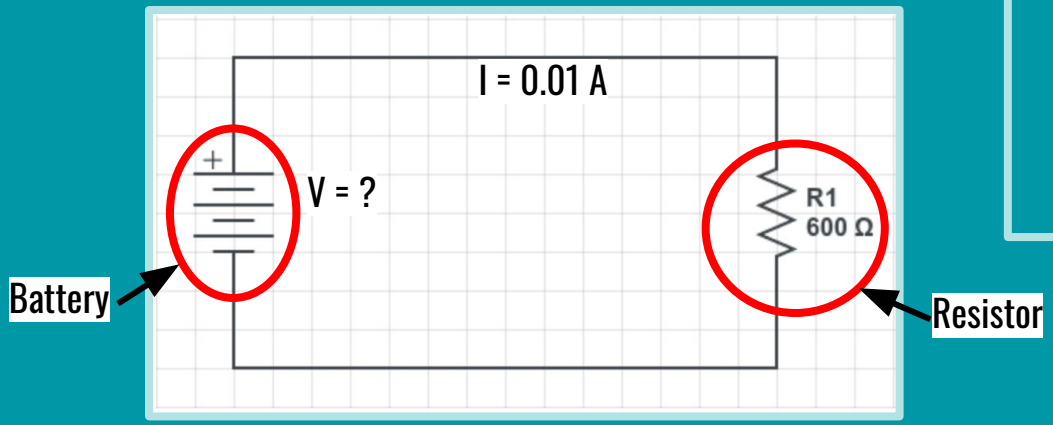
Voltage = Current x Resistance

ACTIVITY

LET'S PRACTICE OHM'S LAW!

Let's practice Ohm's Law!

Take a look at the closed circuit below. There is a battery and a resistor in the circuit. We know the current in the circuit (I = 0.01 A) and resistance in the resistor (R = 600 Ω), but do not know the voltage (V = ?) of the battery! We can use Ohm's Law to find the voltage of the battery in the circuit!



V = I x R

V = Voltage (V)

I = Current (A)

R = Resistance (Ω)

ACTIVITY

LET'S PRACTICE OHM'S LAW!

Let's practice Ohm's Law!

Ohm's Law: V = I x R

V = 0.01 A x 600 Ω = 6 V

V = 6 V

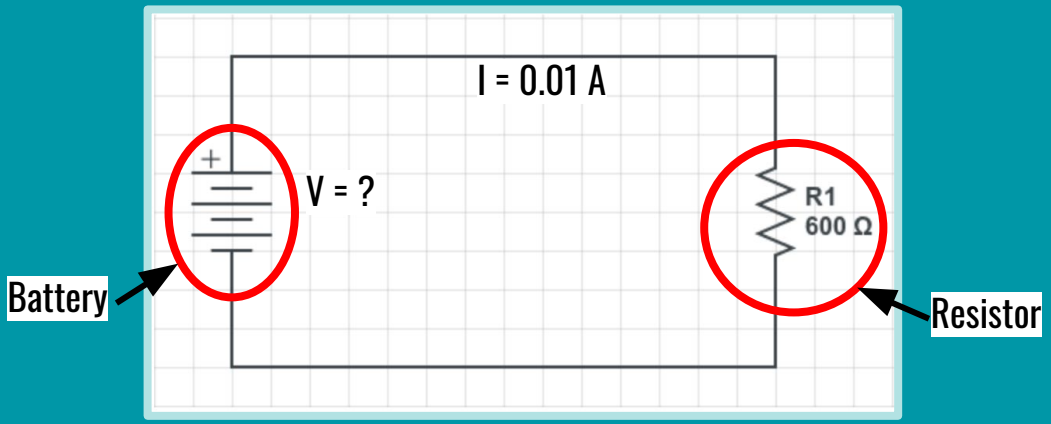
The battery has a voltage of 6 Volts!

V = I x R

V = Voltage (V)

I = Current (A)

R = Resistance (Ω)



ACTIVITY

LET'S PRACTICE OHM'S LAW!

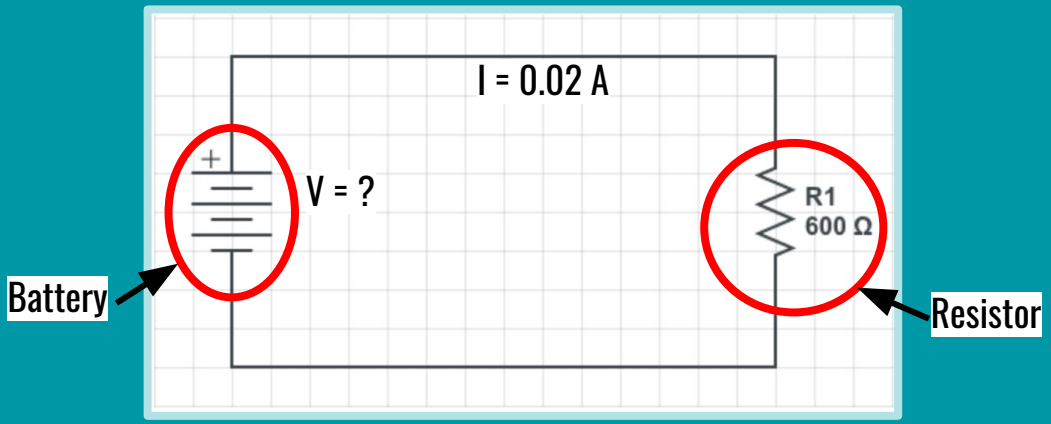
Let's practice Ohm's Law!

Now you try!

V = I x R

V = Voltage (V)
I = Current (A)
R = Resistance (Ω)

Use Ohm's Law to find the voltage (V) of the battery if I = 0.02 A and R = 600 Ω.

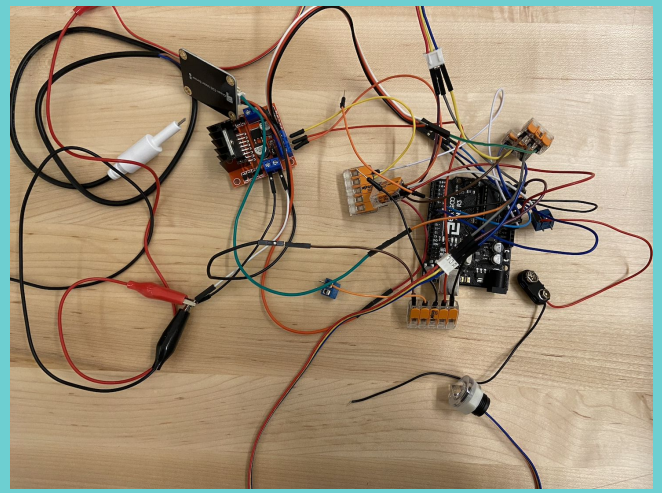


FILTERS CAN HAVE CIRCUITS, TOO

Water filters can have special sensors that tell you if contaminants are in the water

- These sensors are powered by the circuitry!
- The LIFE filter uses a circuit to power the sensors

The batteries are connected to **Wires** to carry current through the LIFE filter's circuit!



These are the batteries that are the **Power Source** for the filter!