Physics IV

> 1. **Circuit Diagrams**
> 2. **Ohm's Law**

Circuit Diagrams

Parts of a circuit and its connections to each other can be represented through a variety of symbols. These symbols help to indicate where each component of the circuit is placed with respect to each other.

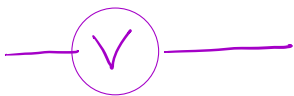| Component		Symbol	Function
Source	Cell		Provides the power source
	Battery		
Conducting Wire			Allows electricity to flow from one device to another
Resistor/Load			Controls the flow of current to other components
Switch	Open		Electrical current is off so electricity cannot pass through
	Closed		Electrical current is on so electricity can pass through
Lightbulb			A type of load that is able to change electrical energy into light and thermal energy
Ammeter			Used to measure the amount of current flowing through the circuit
Voltmeter			Used to measure the amount of voltage passing through the load

We can use these circuit symbols in order to represent how circuits are connected together.

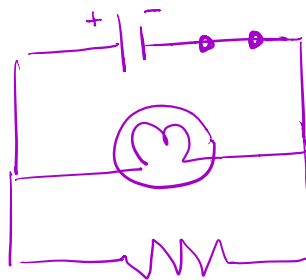Example: Draw a circuit that has a cell, an open switch and one light bulb all connected in one pathway.
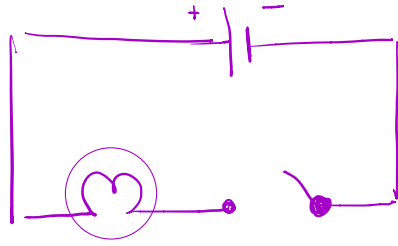
Example: Draw a circuit that has a battery, a closed switch and a resistor connected in one pathway.
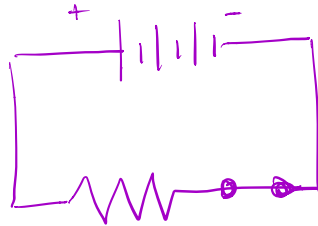
Example: Draw a circuit that has a cell and a closed switch on the main pathway, a light bulb on another pathway and a resister on a third pathway.

Ohm's Law

Ohm's law is formula that describes the relationship between voltage, current, and resistance in an electrical circuit.
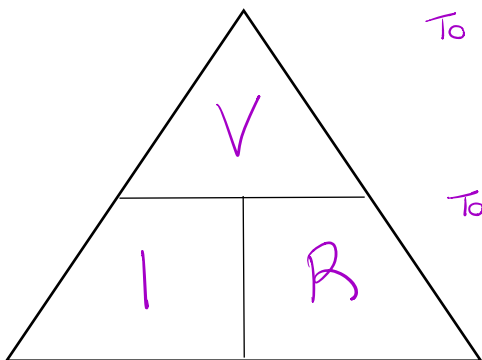
$$V = IR$$

V = voltage (electrical potential difference) in volts (V)

I = current in amps (A)

R = resistance in ohms (Ω)

We are able to rearrange around Ohm's Law in order to calculate for each of the three variables.

To find the voltage:

$$V = I \times R$$

To find resistance:

$$R = \frac{V}{I}$$

To find the current:

$$I = \frac{V}{R}$$

Example: The filament of a light bulb has a resistance of 20.0 Ω. A 5.0 V battery is used in the circuit. What is the current?

Step 1: Identify the known values

Step 2: Write the equation

Step 3: Replace the known values

Step 4: Solve

Step 5: Label with units

(1) $R = 20.0 \, \Omega$

$V = 5.0 V$

$I = ?$

(2) $I = V/R$

(3) $I = \dfrac{5.0V}{20.0\,\Omega}$

(4)

(5) $I = 0.25 A$

*Do NOT forget the units !!!

Example: If the current of a circuit is 10.0 A and voltage from the battery is 20.0 V. How much resistance is needed in the load?

Step 1: Identify the known values

Step 2: Write the equation

Step 3: Replace the known values

Step 4: Solve

Step 5: Label with units

$I = 10.0 A$

$V = 20.0V$

$R = ?$

$R = V/I$

$R = \dfrac{20.0V}{10.0A}$

$R = 2.0 \, \Omega$