

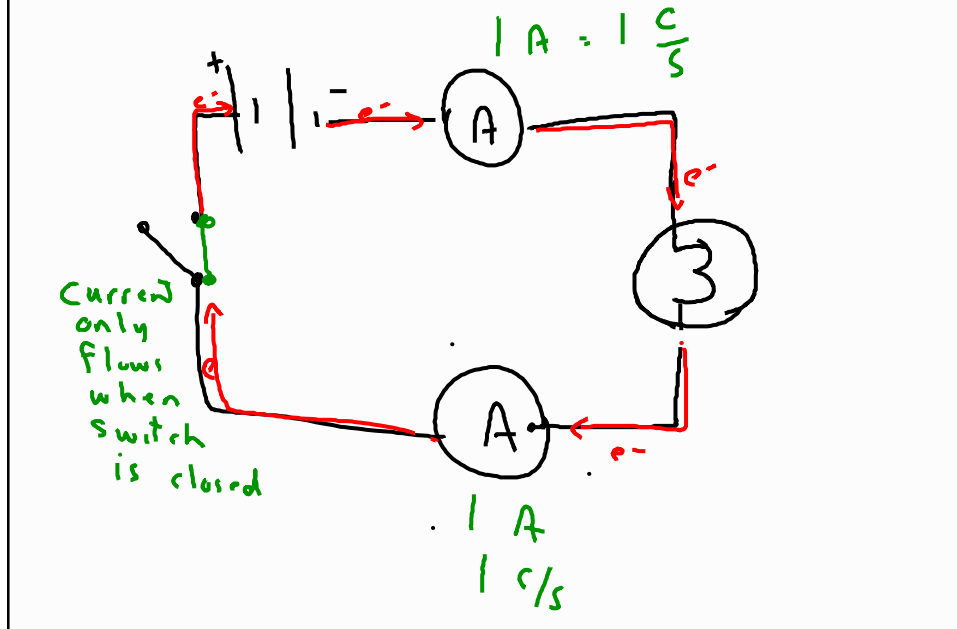
Current

o Current is the rate of flow of electrons/charge

- The symbol for current is I
- The units for current are amperes or amp or A
- It is measured in amperes using an ammeter
- Ammeters must be connected in series
- One ampere is defined as the amount of charge (Q) of electrons flowing past a point each second
- Charge is measured in coulombs
(1 coulomb = 6.28×10^{18} electrons)
- Formula: $I = Q/t$

Quantity	Symbol	Formula	Unit
Time	t		sec
Charge	Q		C or coulomb
Current	I	Q/t	A or amp

Circuit Diagram



DC Current vs. AC Current

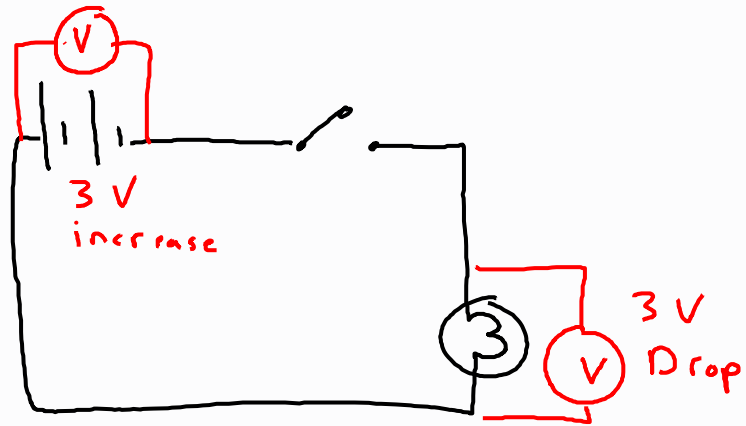
- Direct current (DC) flows in one direction the circuit.
 - Batteries generate a direct current
- Alternating current (AC) flows first in one direction then in the opposite direction.
 - House hold wiring carries AC current

Voltage

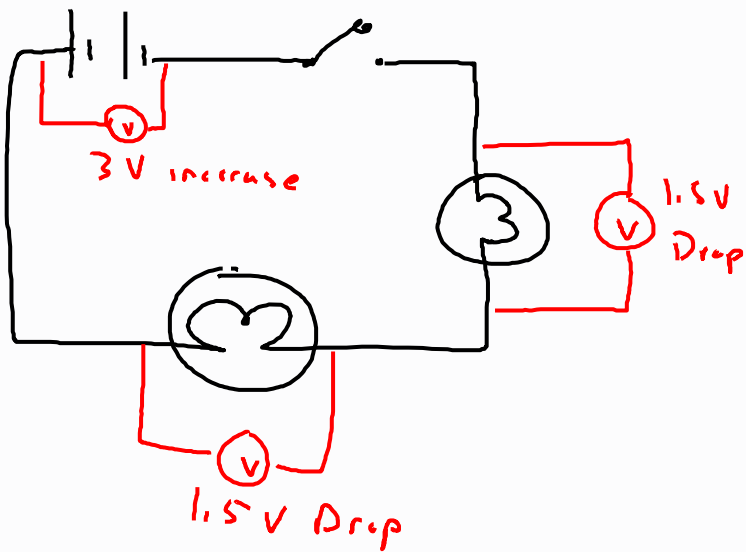
- o **Voltage is a force that pushes/drives the electrons/charge**
 - **Voltage is measured in volts (v)**
 - **Voltage is the energy increase or decrease across source/battery or load/device using energy**
 - **Voltage is calculated $V=E/Q$**
 - **Units: Joules/Coulomb**
 - **A Volt meter is used to measure voltage**
 - **Voltmeters must be connected in parallel ie around the device being measured**

Quantity	Symbol	Formula	Unit
Energy	E		Joules
Charge	Q		C or coulomb
Voltage	V	E/Q	V or volt

Circuit Diagram

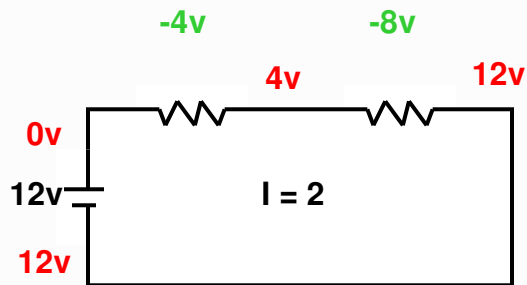


Circuit Diagram



Voltage in the Circuit

- The algebraic sum of all voltages in a complete circuit is equal to zero
- If we consider the source voltage to be positive, there will be a negative “voltage drop” across each resistor
- The voltage drop across each resistor can be calculated with Ohms law



Series vs. Parallel Circuits

Series Circuits

- A series circuit is a circuit in which the current can only flow through one path.
- Current is the same at all points in a series circuit
- The voltage is divided between the loads

Parallel Circuits

- In contrast, in a parallel circuit, there are multiple paths for current flow.
- The current is divided between different paths.
- The voltage increase at the battery is the same as the drop in voltage at each load

Water Example of Electric Circuit

- The reservoir is the battery or other voltage source
- Valve is a switch
- The water is the charge (electrons)
- Water pressure is the voltage
- The pipe is the conductor (wire)
- The rate of flow (volume/s) is the current
- Constrictions in the pipe represent resistors

