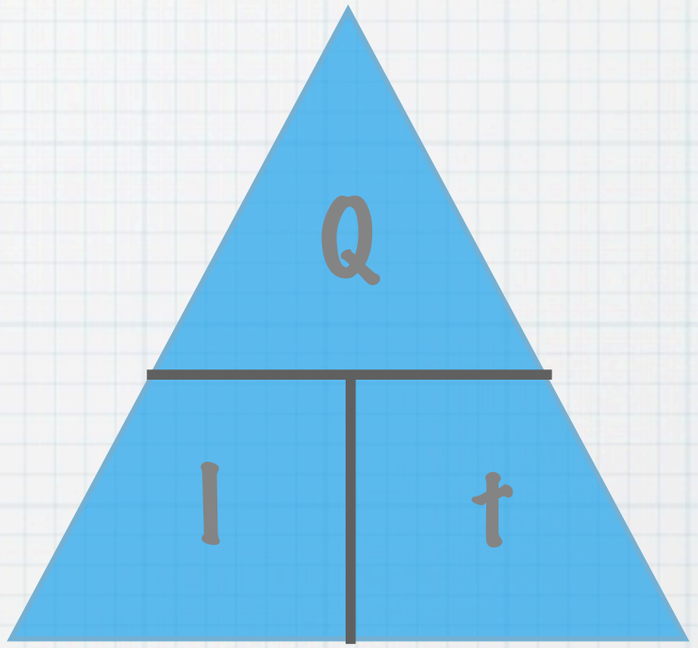
Electrical Current

Electrical Current

* The amount of charge that passes a point in a conducting wire every second
* Represented by I
* Measured in amperes (coulomb/second)
* Measured using an ammeter

Electric Current

* I = Q / t
  * I=current (measured in amperes)
  * Q= charge moving past a point(measured in coulombs)
  * t=time (measured in seconds)



Sample Calculation

* If 240 coulombs of charge pass a point in a wire in five minutes, what is the current thought that point in the wire?
  * Given
    * Q=240 C (Charge)
    * t=5 min (time)

Sample Calculation

* First, time must always be in seconds
  * t=5min
  * t=5 min x 60 seconds = 300 seconds

Sample Calculation

* Required: I (current)
* I= Q / t
* I= 240 C/ 300 sec
* =0.80 A
* Therefore 0.80A will move through that point in the conductor.

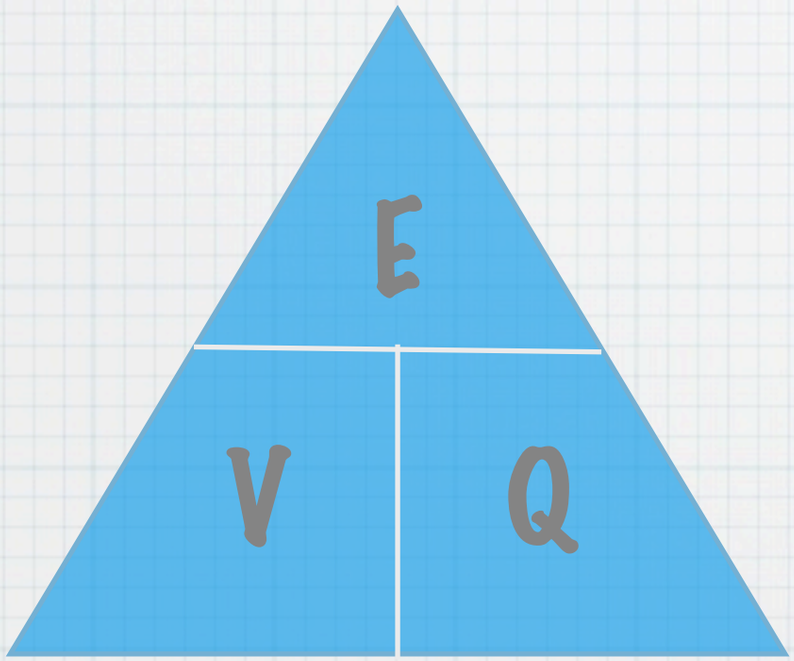
Potential Difference

Potential Difference

* **Electrical Potential Energy**: Electrical energy that is stored in a battery
* **Joules(J)**: Measure of energy
* **Potential Difference**: the difference in potential energy per coulomb of charge at one point of the circuit compared to another point.
  * Unit: Volt = J/C (Joule/Coulomb)

Potential Difference

* E= V x Q



* E= energy (measured in joules)
* V=Volts (measured in joules per coulomb)
* Q= charges passing a certain point(coulombs)

Sample Calculation

* In a battery, 45 J of chemical energy are converted into electrical energy y separating positive and negative charges. The energy places 15 C of charge at the negative terminus, leaving a deficit at the positive terminus. What is the potential difference between the negative and positive terminals of the battery?

Sample Calculation

* Given
* E= 45 J
* Q= 15C
* V =?

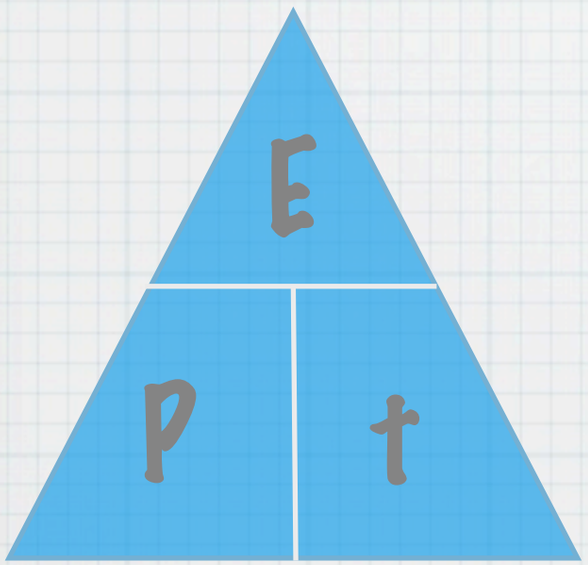
Sample Calculation

* Solution
  * V=E/Q
  * V= 45 J/ 15C
  * V= 3 J/C
  * A battery that uses 45 J of chemical energy to separate 15C of charge has a potential difference of 3 J/C.

Electrical Power

Electrical Power

* Electrical Power is the amount of energy per unit time
  * Measured is Watts (J/s)



  * P = Power, measured in watts
  * E = Energy, measured in joules
  * T = Time, measured in seconds

Calculating Efficiency

Calculating Efficiency

* Efficiency is a measure of how much useful energy a device produces compared to the energy supplied to that device
* Percent Efficiency= useful energy output/ total energy input x 100

Sample Calculation

* A light bulb uses 100 J of energy and produces 35 J of light. Calculate the percent efficiency of the light bulb
* Answer
  * 35 J/ 100 J/ x 100
  * 35%

Parallel vs Series Circuits

A quick review

Series Circuits

* Series Circuits:
  * Has one path for current to flow
  * Current is the same at any point in the circuit
  * If a bulb is unscrewed, the current stops flowing

Parallel Circuits

- Parallel Circuits:
  - More than one pathway for current to flow
  - Current is not the same at each point in the circuit (Differs at each branch)
  - If one bulb goes out, the other will not because they still have a supply of electrons
  -

Parallel Circuits

* Characteristics of Parallel Circuits
  * 1) If one bulb in one branch burn out, the bulbs in the remaining branched continue flowing.
  * 2) The current (amps) can vary in each branch. The sum of the current in all branches is equal to that supplied by the battery

Parallel Circuits

* Characteristics of Parallel Circuits
* 3) One bulb glows as brghtly as two bulbs