# Everything you need to know about Electricity

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# I= Q/t

Current Measures the flow of electrons and is calculated by dividing the change in charge by the change in time. It is measured in Amperes(coulombs per second).

# Common Misconception-Batteries

Current in a current does not flow from the negative to positive terminals of battery .

- Rather a conventional flow of current in a circuit flows from **Positive to Negative**
- Batteries supply this electrical energy by converting stored chemical energy
- **Also,** if voltage is changed in a battery the resistance will remain the same

# $R = \rho l/A$

Resistivity is the quantity that determines how much energy it takes to push charge through a wire. Resistivity is measured in Ω (Ohms).

# Ohm´s Law

## Resistance dictates flow of current

- V=IR
  - Resistance measured in Ohms Ω
  - Voltage is the energy lost across a section of a circuit
  - it depends on the current and the resistance

# Power and Work

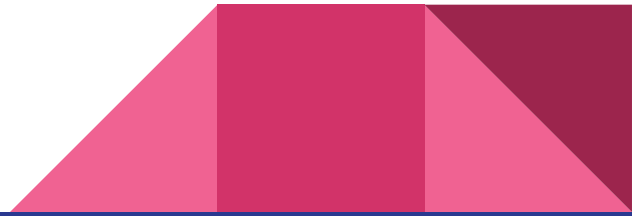
$P=VI = V^2 /R = I^2 R$

- Energy per time measured in watts
- (found by substitution)

$W = qV$

- Work measures energy
- Charge times Voltage (energy per charge).

$P = W/t$



# Circuits: Series

Resistors connected end to end are in SERIES

- Each resistor eats up energy creating a Voltage drop
  - Resistance Total= Sum of all the Resistors
- Current is constant
- Voltage Total= Sum of the Voltages across all resistors

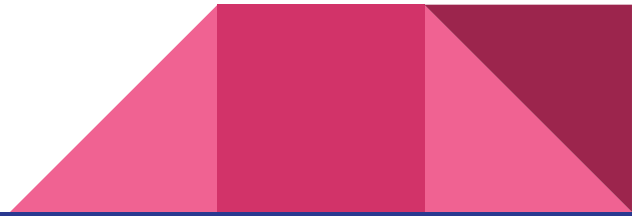
# Circuits: Parallel

## Junctions split current into multiple parallel paths

- Voltage drop is equal across all legs of a parallel circuit.
- Current varies depending on resistance.
- The resistance of a parallel circuit is less than either of the separate paths.

# Kirchoff’s Rules

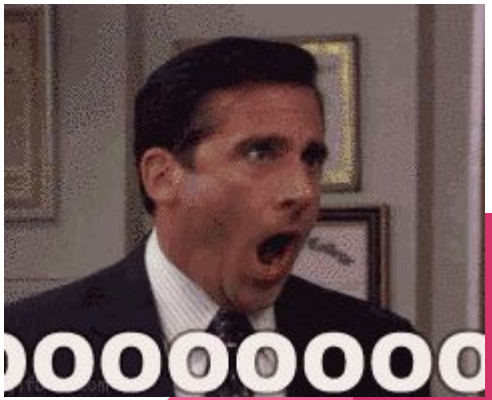
1. Junction Rule -- Current into a junction will equal current out of the junction
2. Loop Rule -- sum of potential charges in a loop is zero



# Capacitors in Circuits/

## Series

- Potential supplied by battery
  - Q/ C total = The sum of each capacitors reciprocal
- **Common Mistake: Remember that capacitors in series to take the reciprocal of the sum**



# Common Mistake-- Capacitors vs Resistors

In a series circuit, add resistance and take the reciprocal of capacitance.

In a parallel circuit, add capacitance and take the reciprocal of resistance.

# Example Problem (for us)

A circuit has 4 resistors connected in series, all of which have a resistance of 10.0 Ω. If 4.00 A of current flow through the circuit how much work is done by the battery in one minute.

Answer: W = 38400J

# Problem to do on your own

If a circuit has 5 resistors connected in parallel, each of which has 10.0 Ω of resistance, and 8.00 A of current flow through the circuit from two batteries of equal strength, what is the power of each battery.

Answer: P = 64w