Electricity

Ohm’s Law

- The current of a circuit is directly proportional to the potential difference (voltage) and inversely proportional to the resistance of the circuit
  - Current = Voltage / Resistance

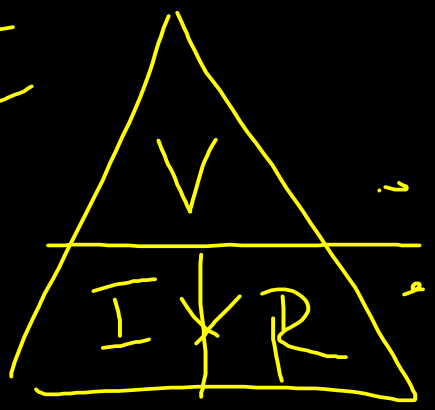
Ohm's Law

$$V = IR$$

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

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

- Variables:
  - Current: I
  - Potential Difference (Voltage): V
  - Resistance: R
- Units:
  - Current: Amps (A)
  - Potential Difference: Volts (V)
  - Resistance: Ohms (Ω)
- Formula: V = ~~I~~ R



Ohm's Law

1. How much current flows through a circuit with a 12Ω resistor connected to two 1.5V batteries?

I

R

V = 3V

$$I = \frac{V}{R} = \frac{3V}{12\Omega} = 0.25A$$

Ohm's Law

2. What is the resistance of a circuit with 120V of potential difference and 60A of current?

$$R = \frac{V}{I} = \frac{120\,V}{60\,A} = 2\,\Omega$$

Ohm's Law

V

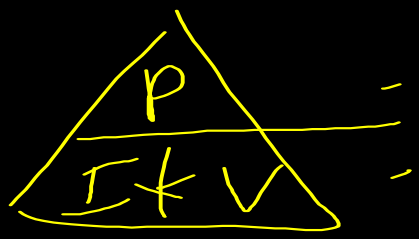
3. What is the potential difference of a circuit with two 30Ω resistors and 3A of current?

R = 60 Ω I

V = I R = (3 A)(60 Ω) =

180 V

Electricity & Power



- Electrical power is the rate at which another form of energy is converted into electrical energy
  - Unit: Watt (1W=1J/s)
  - P (watts) = I (amps) x V (volts)
- Electrical energy is calculated by multiplying power by time
  - Unit: Kilowatt-hour (kW-h)
  - E (kilowatt-hours) = P (kilowatts) x t (hours)

Electrical Power

1. How much power is contained in a circuit with 0.43A of current connected to a 9V battery?

$P = IV = (0.43A)(9V) =$

$3.9\,W$

Electrical Power

2. What is the current in a lamp connected to a 120V outlet with a 60W bulb?

$$I = \frac{P}{V} = \frac{60w}{120V} = 0.5A$$

Electrical Power

3. What is the voltage of a circuit with 15W of power and a current of 8A?

$$V = \frac{P}{I} = \frac{15W}{8A} = 1.9V$$