My name is Mike Gentile.
(you can call me "Mike")
mgentile@physics.rutgers.edu

Welcome!

Physics 194 - Lecture 6

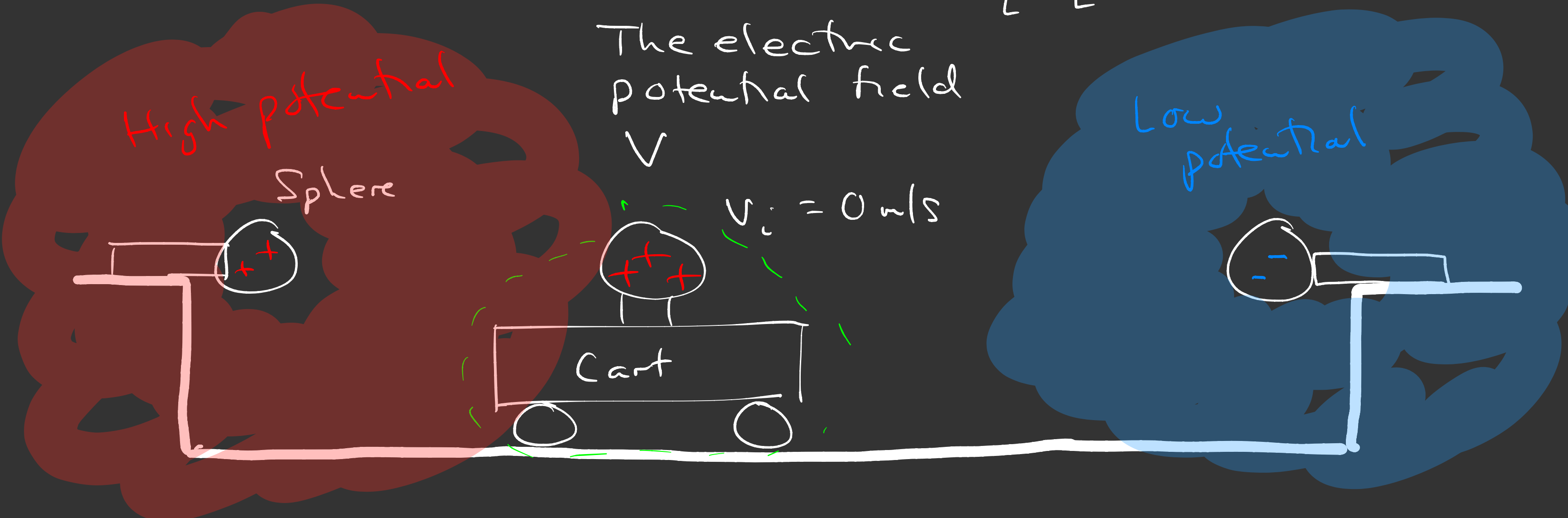
Have a question during class? Please ask it right away, even if it means interrupting in the middle of a thought. I want you to!

Agenda

- Electric circuits
- Batteries, resistive devices, current
- Kirchhoff's rules
- Power

Class starts @2:15 pm

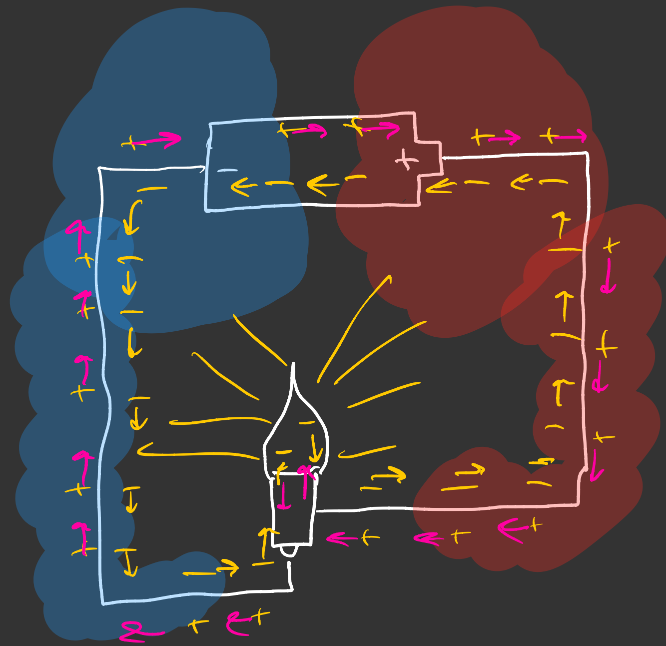
$U_q = qV$



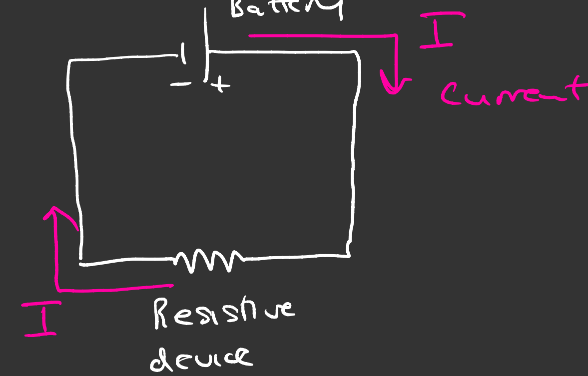
1) Positive charges create regions of high potential (V)
Negative charges " " " low " "

2) Positively charged objects accelerate towards lower potential regions. Negatively charged objects accelerate towards higher potential regions.

Circuit



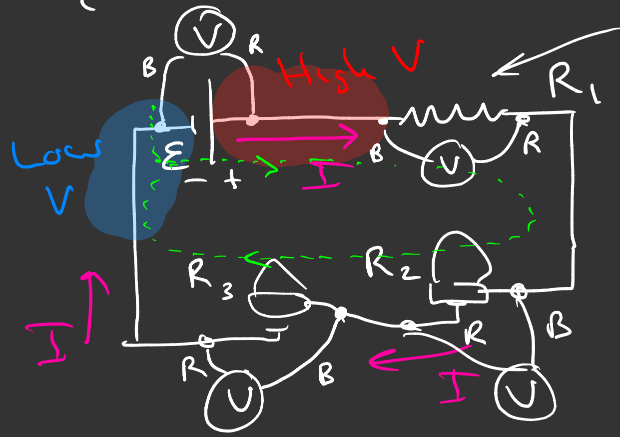
Circuit diagram



What you learned from using a voltmeter to analyze a circuit...

$\varepsilon = 9V$

Resistor



A battery's EMF (electromotive force) is how "strong" the battery is. More or less how much energy it gives each charge that passes through it.

ΔV

Potential difference between 2 points in the circuit.

1) $\Delta V_{\varepsilon} + \Delta V_{R_1} + \Delta V_{R_2} + \Delta V_{R_3} = 0$

$(+) \quad (-) \quad (-) \quad (-)$

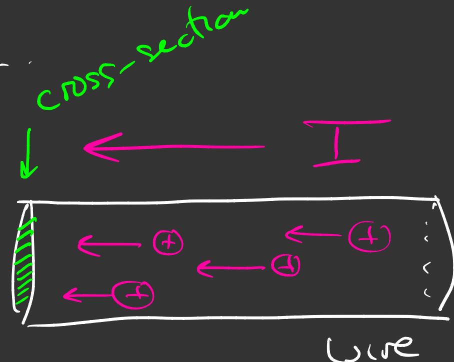
Kirchhoff's loop rule.

$\Sigma \Delta V = 0$

2) The current (motion of the charges) was the same everywhere in the circuit.

More precisely...

Current:



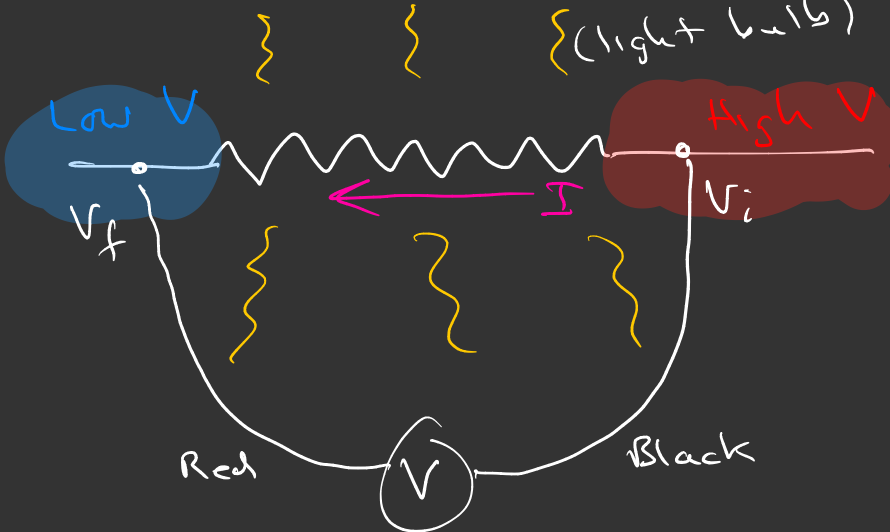
$q = +1.6 \times 10^{-19}\,C$

$$\text{current} = \frac{\text{total electric charge that passes through}}{\Delta t}$$

# of charged objects

$$\underbrace{(C/s}_{=\text{Ampere (A)})}\quad I = \frac{N q^{(C)}}{\Delta t_{(s)}}$$

Potential difference.



$$\Delta V < 0$$

$$\Delta V \quad \text{vs.} \quad \Delta U_q \ (\mathrm{J})$$

$$V_f - V_i$$

$$q V_f - q V_i = \Delta U_q \ (\mathrm{J})$$

$$q \, \Delta V = \Delta U_q$$

$$\Delta V = \frac{\Delta U_q \ (\mathrm{J})}{q \ (\mathrm{C})}$$

$$\left(\frac{\mathrm{J}}{\mathrm{C}} = \mathrm{V} \ (\text{volt}) \right)$$