Electric Field ($\vec{E}$)

- Points away from ⊕ sources
- Points toward ⊖ sources

- Pushes ⊕ test cha
- Pulls ⊖ test charge

$\vec{F} = q_0 \vec{E}$

$\vec{E}$ points toward Low V

Electric Potential (V)

- High (⊕) near ⊕ sources
- Low (⊖) near ⊖ sources

- High V is high PE for ⊕ test charges.

$E_x = -\frac{\Delta V}{\Delta x}$

$\Delta PE = q_0 \Delta V$

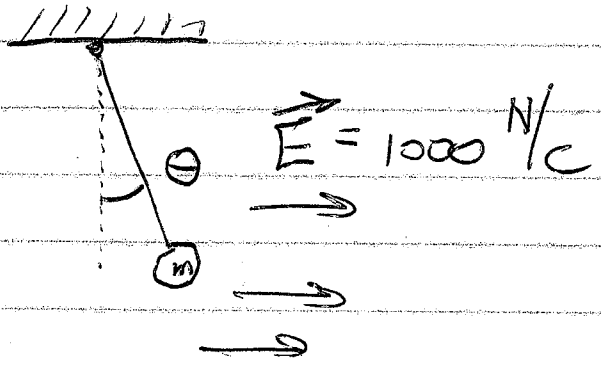
E is force per charge (N/C)

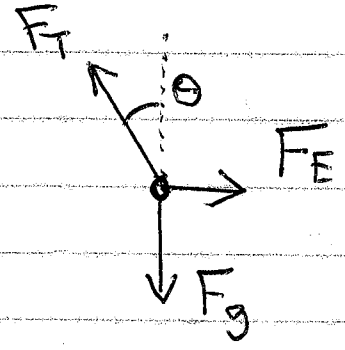
Also, 1 V/m = 1 N/C

V is energy per charge (J/C)

Also, 1 V = 1 J/C

HW6 - 17 Problem 15.52





θ is angle between string and "vertical".

	x-forces	y-forces
F_E	qE ?	0
F_g	0	$-mg$ ✓
F_T	$-F_T \sin\theta$	$+F_T \cos\theta$

SOH-CAH-TOA

↳ cosine goes with adjacent.

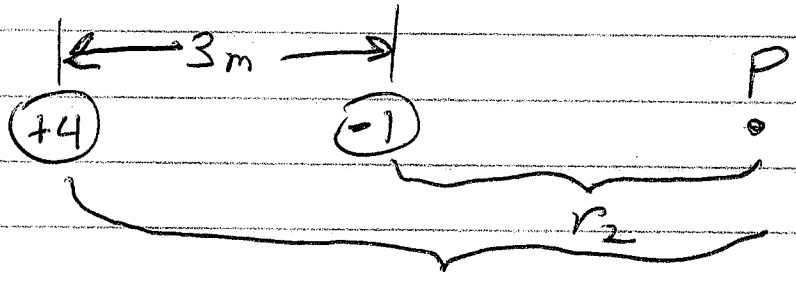
y: $\overset{?}{F_T} \overset{\checkmark}{\cos\theta} - \overset{\checkmark}{m} \overset{\checkmark}{g} = 0 \Rightarrow F_T = \text{~~} \checkmark$

x: $\overset{?}{q} \overset{\checkmark}{E} - \overset{\checkmark}{F_T} \overset{\checkmark}{\sin\theta} = 0 \Rightarrow q = \text{~~} \checkmark$

HW1-14 Where is $E=0$?

$$\frac{k|q_1|}{r_1^2} = \frac{k|q_2|}{r_2^2}$$

- If q_1 is bigger, r_1 must be bigger.



- Cancel k's.

$$\frac{4}{(x+3)^2} = \frac{1}{x^2}$$

Let x = smaller distance = r_1

$$\frac{2}{x+3} = \frac{1}{x} \rightarrow 2x = x+3$$

$$x = 3$$

DC = Direct Current
Electricity flows without reversing direction.

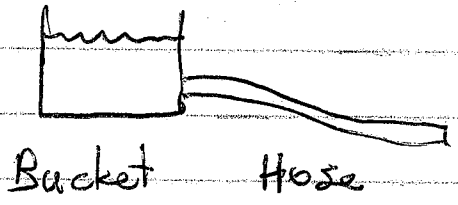
Current = Flow rate of charges.

$$I = \frac{\Delta Q}{\Delta t} = \text{Passing charge per unit time}$$

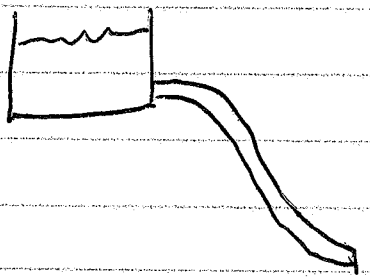
I ← Current

How do we measure current?
- Force the charges to go through our current meter. (aka ammeter)
- Try not to affect the original circuit. Let the current pass easily.

What motivates current? Voltage.

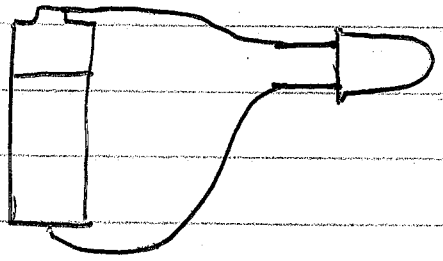


Slow flow
Small height diff.



Fast flow
Large height diff.

A simple Circuit



- Battery generates voltage. $\mathcal{E}$ = EMF
- Circuit gives looped path.
  Flow without buildup.
  ↑ many C/s ↑ nC max, virtually zero
- Light Bulb Allows limited flow.

$$V = I R$$

R: Resistance

$\Delta V = \mathcal{E}$: Voltage

$I = \Delta Q / \Delta t$: Current