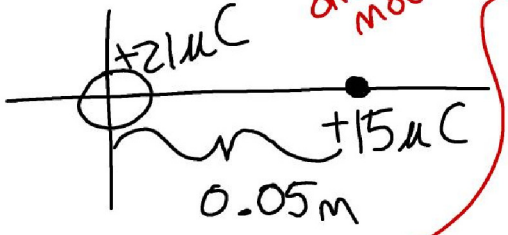
Quiz P 21



The one that moves!

$$W_{\text{by } E} = q(V_A - V_\infty)$$

$$= (15\times10^{-6})\left[\frac{(9\times10^{9})(21\times10^{-6})}{0.05} - 0\right]$$

$$= 56.7\ \text{J}$$

$$W = \Delta E$$

$$W = E_A - E_\infty = \frac{kq_1q_2}{r_A} - \frac{kq_1q_2}{r_\infty} = \frac{(9\times10^{9})(21\times10^{-6})(15\times10^{-6})}{0.05} - \frac{(9\times10^{9})(21\times10^{-6})(15\times10^{-6})}{\infty}$$

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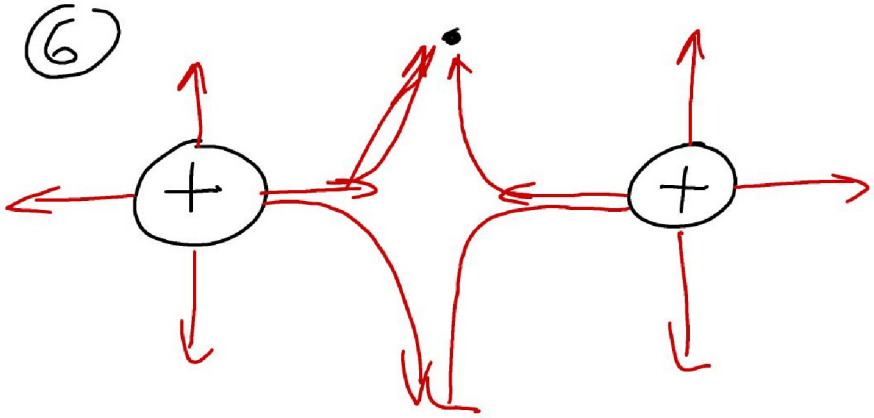
(9)

$$V_{\text{net}} = V_1 + V_2$$

$$= \frac{(9\times10^{9})(50\times10^{-6})}{0.03\text{m}} + \frac{(9\times10^{9})(-70\times10^{-6})}{0.03}$$

$$= -6\times10^{6}\ \text{V}$$

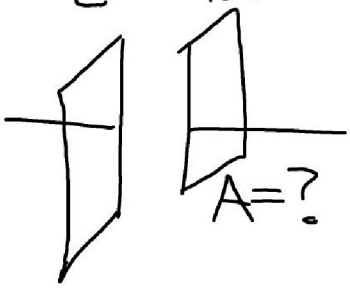
(6)



(10)

$q = 400 \times 10^{-6} C$

$E = 4.8 \times 10^{8} \frac{N}{C}$



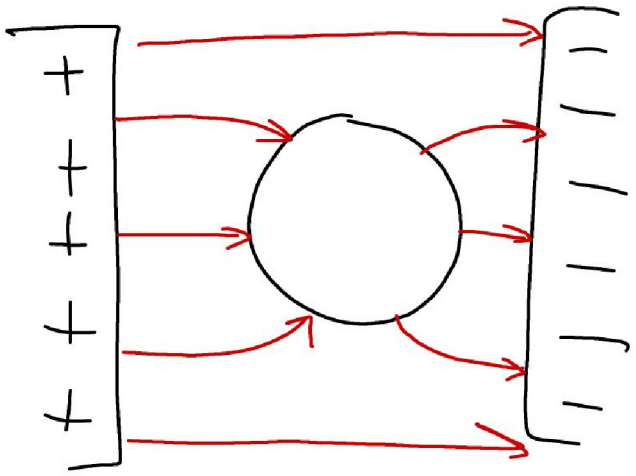
$\sigma = \frac{q}{A}$

$\vec{E} = \frac{\sigma}{\varepsilon_0} = \vec{E} = \frac{q}{A\varepsilon_0}$

$A = \frac{q}{\vec{E}\varepsilon_0}$

sub & Solve

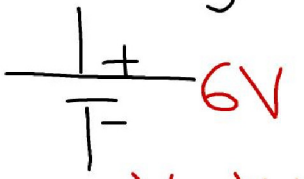
11



Circuits

Voltage Source (Batteries or generators)

6V

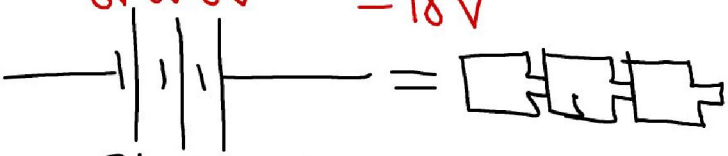


6V

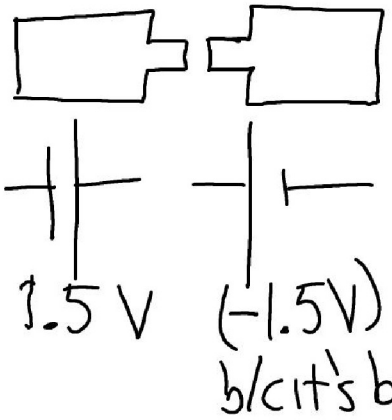
connected in series → $V_{net} = V_1 + V_2 + V_3$

6V 6V 6V

= 18V



3 batteries



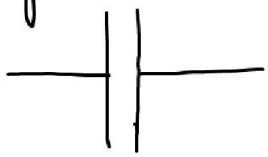
$V = 1.5 + (-1.5)$

$= 0V$

Capacitors

store charge, have a voltage drop across them

Capacitance is measured in Farads (F)



$q = CV$

q: charge, C: Capacitance, V: Potential

K = dielectric constant

$K = \frac{E_0}{E} = \frac{\text{Electric Field w/out dialectric}}{\text{E w/ dielectric}}$

$C = \frac{K\varepsilon_0 A}{d}$

d ← distance between plates

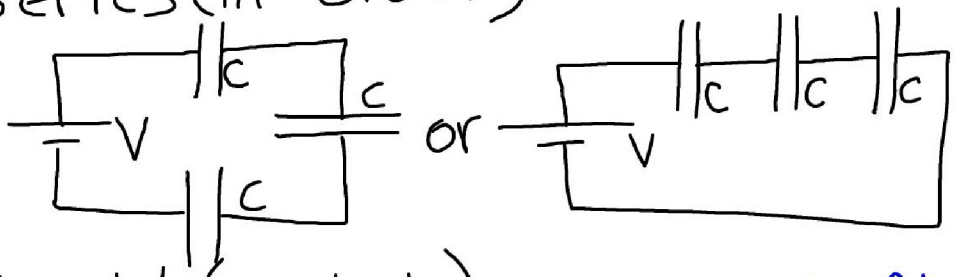
Energy stored in a capacitor

$$E = \frac{1}{2}qV = \frac{1}{2}CV^2$$

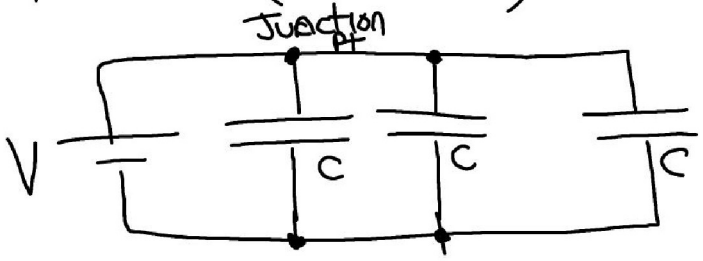
$q = CV$

$$\frac{1}{2}(CV)V = \frac{1}{2}CV^2$$

Series (in order)



Parallel (next to)



current – flow of electrons

symbol: I

unit: A = Amperε

flows from + to −

$$I = \frac{q}{t}$$

Capacitors in...

Series

All have same q

$$\frac{1}{C_{Net}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$

sum of V in loop = 0

Parallel

All have same V

$$C_{Net} = C_1 + C_2 + C_3$$

$$q_{Net} = q_1 + q_2 + q_3 \ldots$$

Resistors

Things that use electric Power (lightbulbs / heaters)

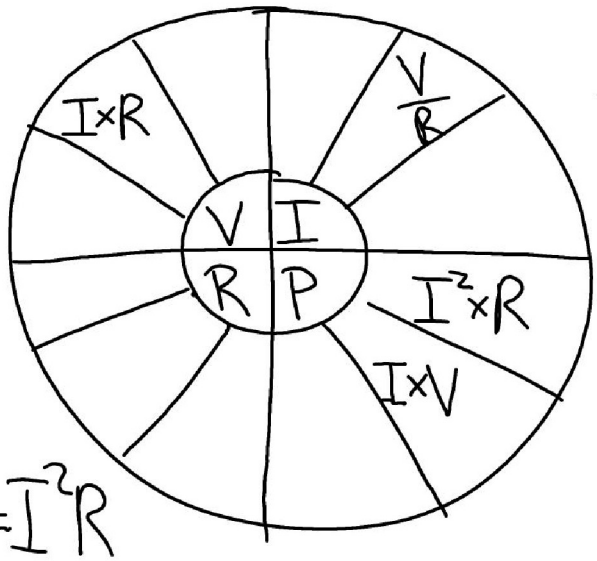
Resistor

Symbol for Resistance: R

Unit: Ohm (Ω)

Ohm's Law

$$V = IR$$



Power

$$P = IV$$

$$= I(IR) = I^2R$$