$$q_i = q\left[1 - \frac{1}{K}\right]$$

$$\sigma_i = \sigma\left(1 - \frac{1}{K}\right)$$

Dielectric →

$C_m = KC$

Insulating material

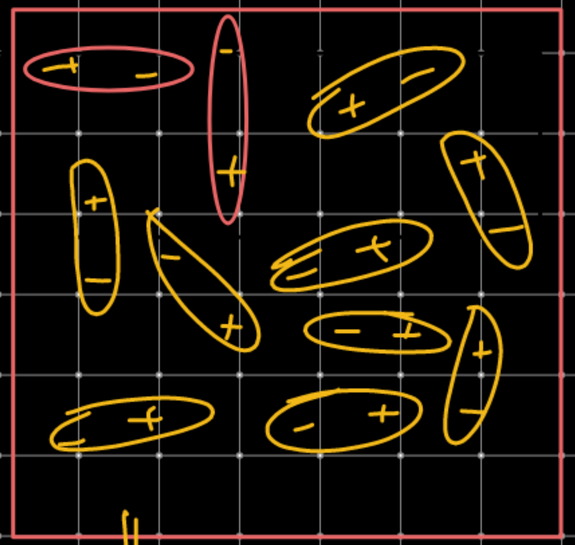
Polar dielectric

⇒ Net dipole moment = 0

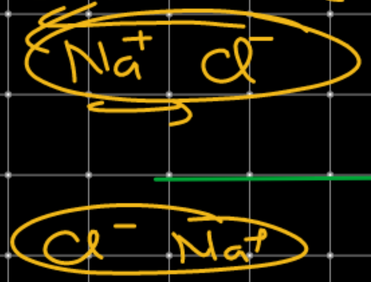
$NaCl$ NH_3 Na^+ Cl^-

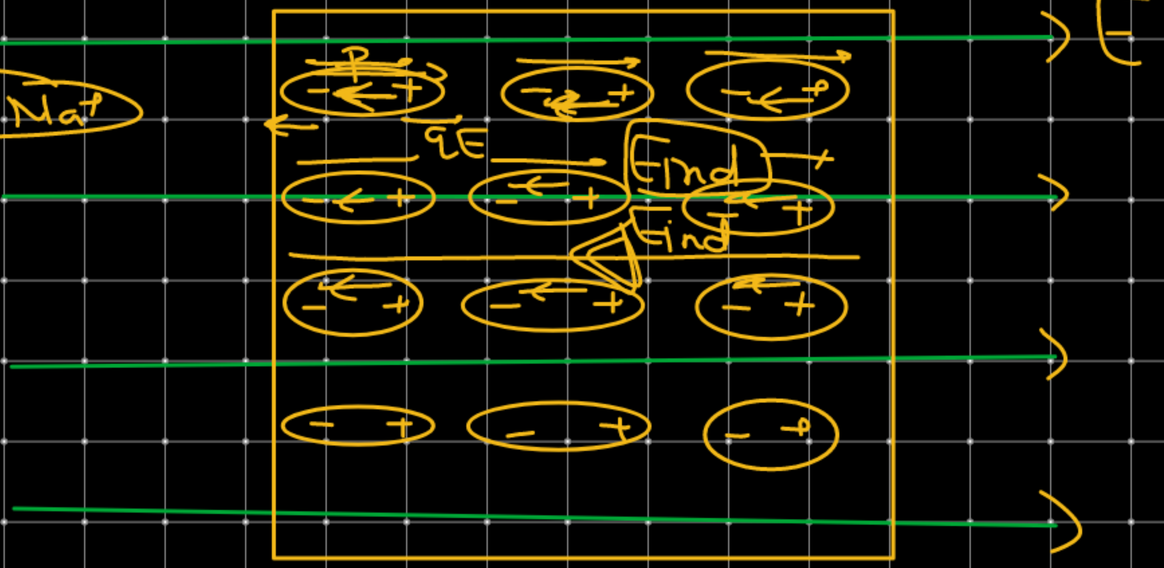
Non-Polar dielectric

↳ when Polar dielectric Placed in Uniform electric field.



Net dipole moment
= 0

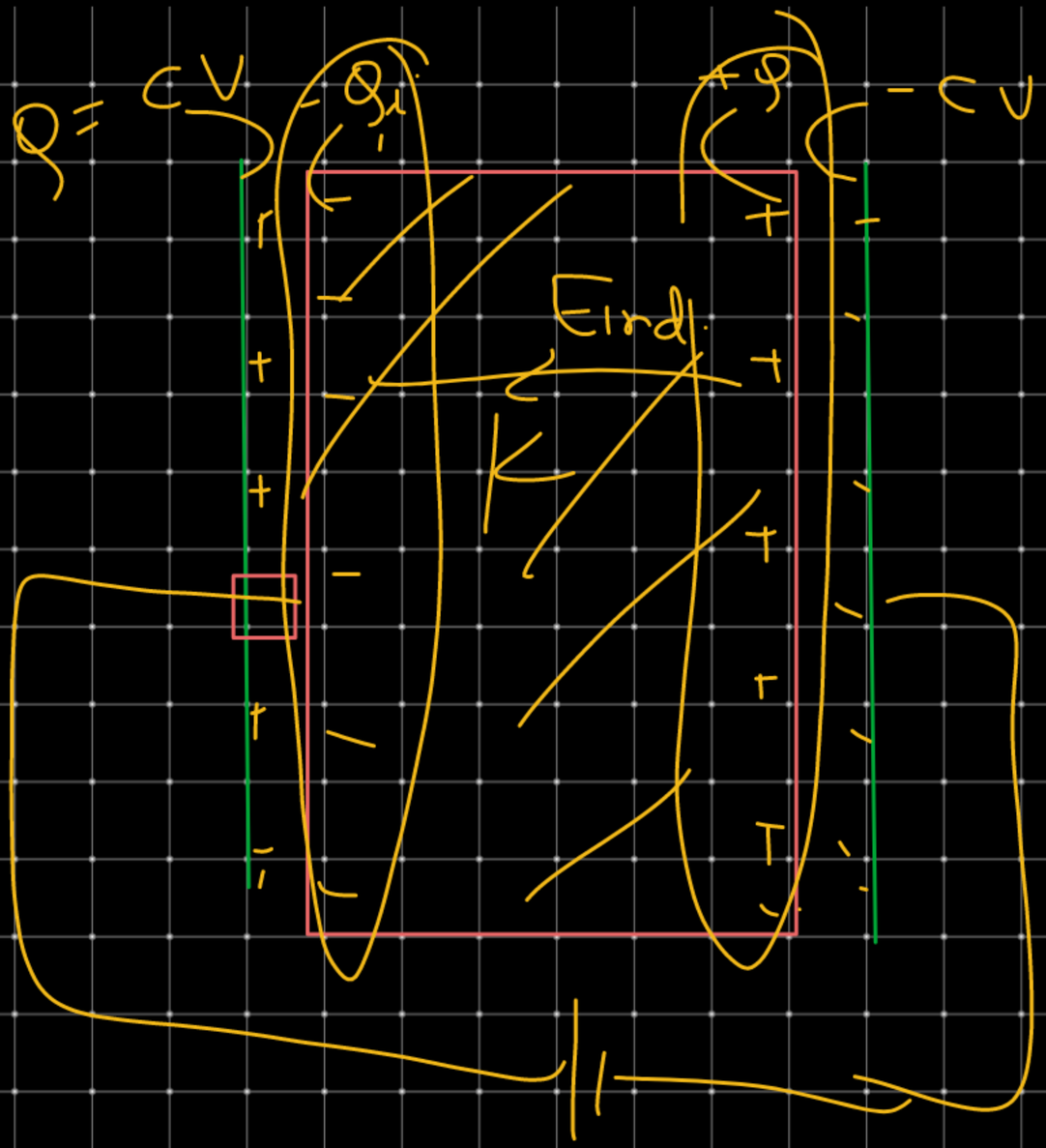




Net dipole moment ≠ 0

Total dipole moment = $n\vec{p}$

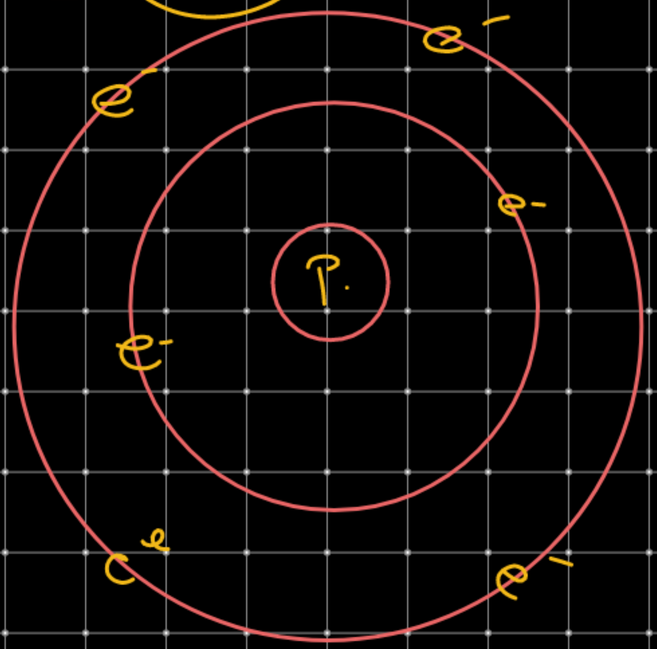
n = no of molecule


Q = CV
-Q
+Q
-CV
Eind
K

Non-polar dielectric:

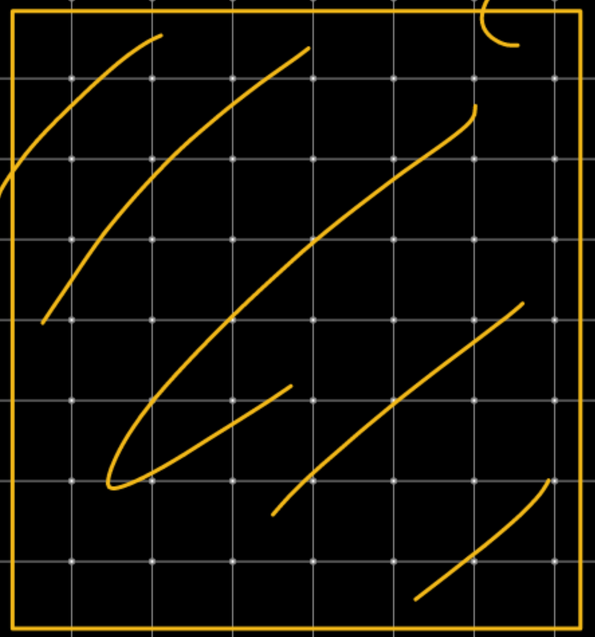
↳ dipole moment of each molecule is zero.

Ex N_2, CH_4, C_6H_6,



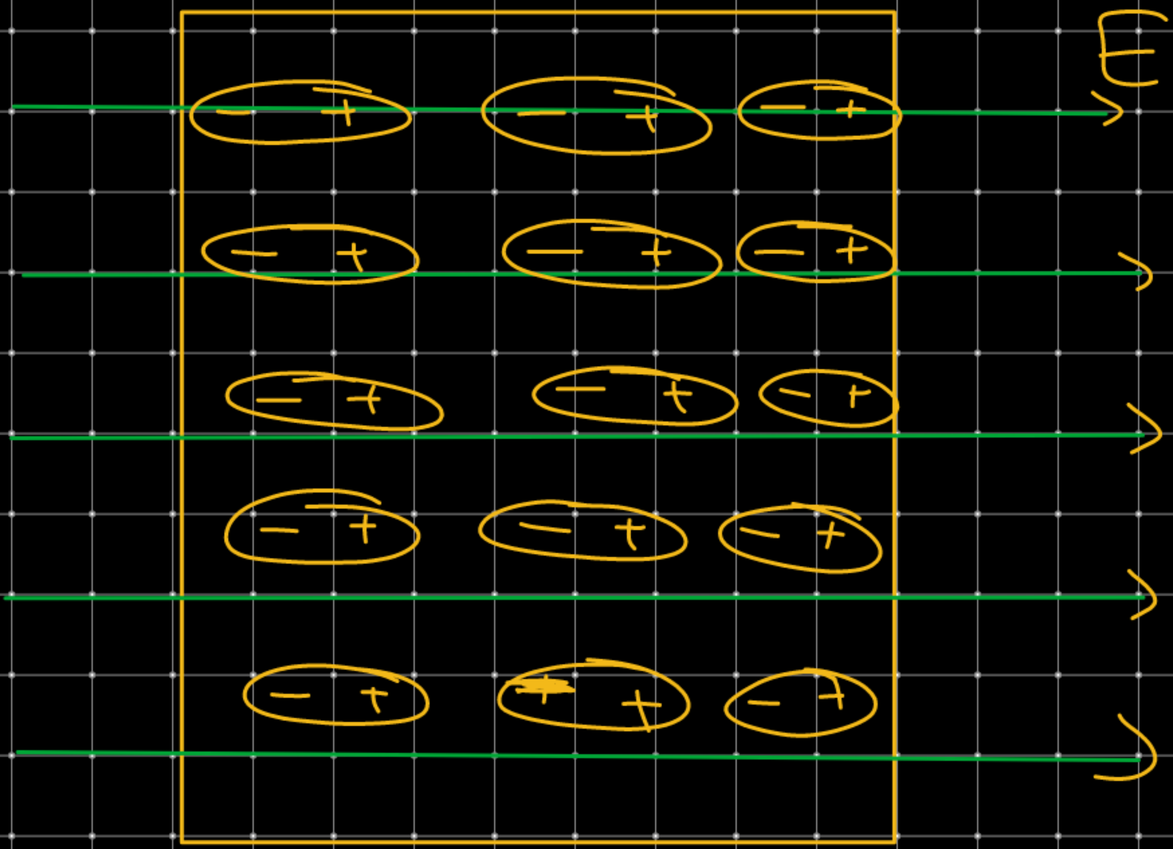
$\Rightarrow p = 0$

↳ non-polar.

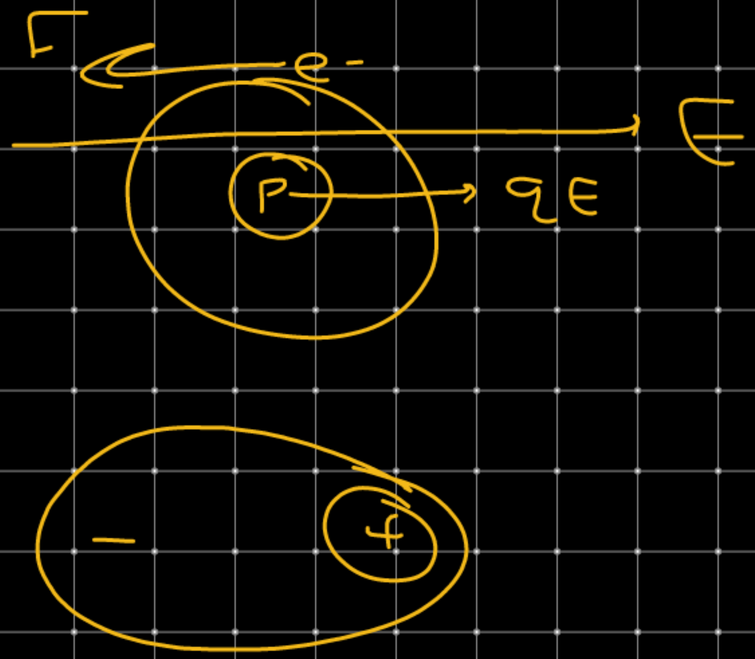


$P_{net} = 0$

⊛ When we placed non-polar dielectric in External Electric field.

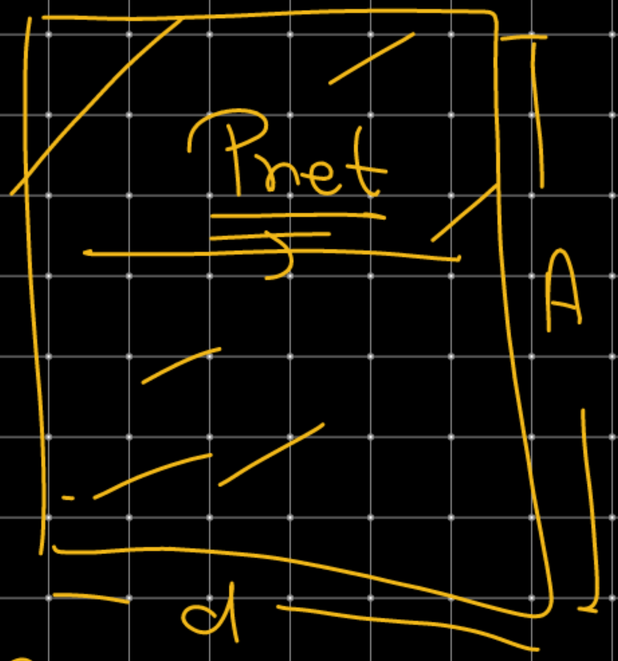


$P_{net} \neq 0$ $\underline{P_i = nP}$



Polarization Vector :

$$\text{Polarization} = \frac{P_T}{V} = \frac{nP}{Ad}$$



NEET/JEE (m)

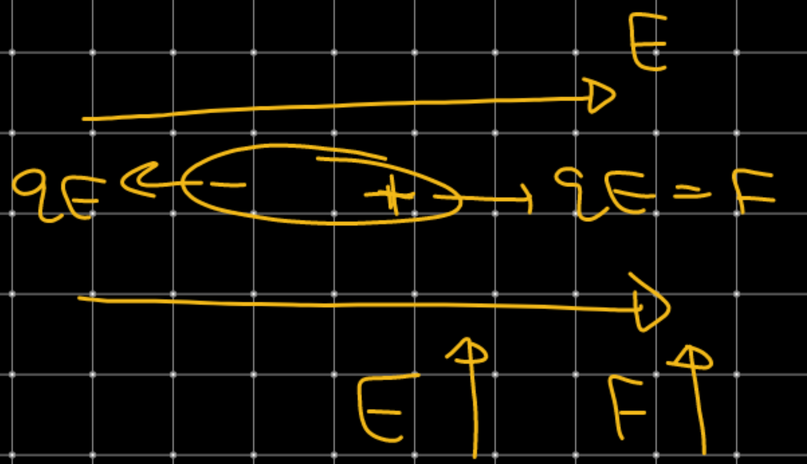
dimensional formula of Polarization :

$$= \frac{C \cdot M}{m^2} = C/m^2$$

$$\Rightarrow \frac{[AT]}{[L^2]} = [L^{-2} \, AT \, m^3]$$

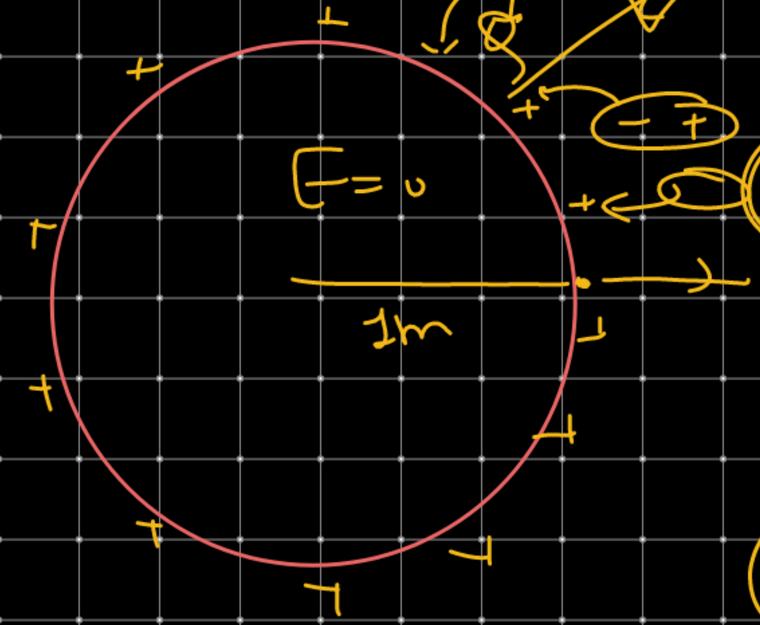
Dielectric strength of material:

$\Rightarrow$ $E = 3 \times 10^6 \, N/C$ — for air.



At a certain value of Electronic field, dipole break, This certain value of electronic field is known as breakdown Electronic field & Potential is Called breakdown Potential.

Q1: Find the maximum charge on a sphere placed in Air of radius r 1m.



$$E_{max} = \frac{kq}{R^2}$$

$$3 \times 10^6 = \frac{9 \times 10^9 \times q}{1}$$

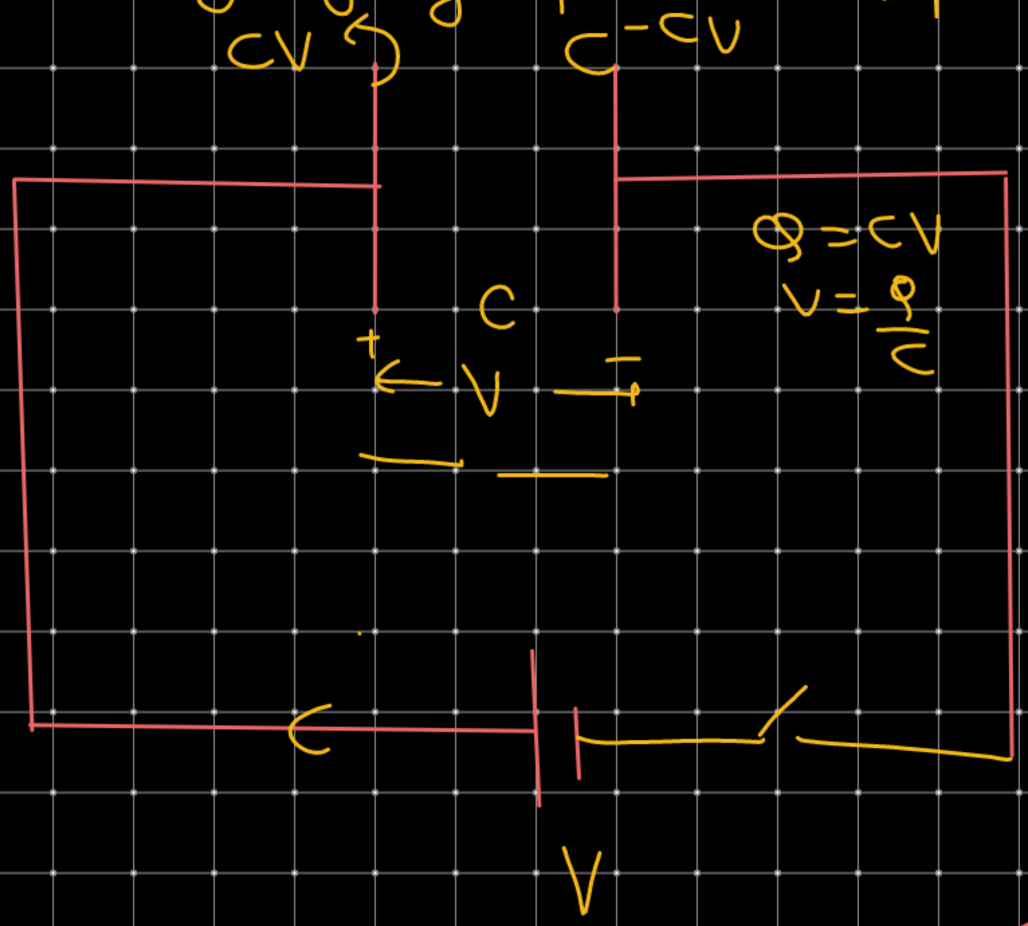
$$q = \frac{3 \times 10^6}{9 \times 10^9}$$

$$q = \frac{1}{3 \times 10^3}\ C$$

$$q = 3.33 \times 10^{-4}\ C$$

Parallel Plate Capacitor:-

① Charging of Parallel plate Capacitor.



① $t=0$ Key is closed

↳ Charge on Capacitor

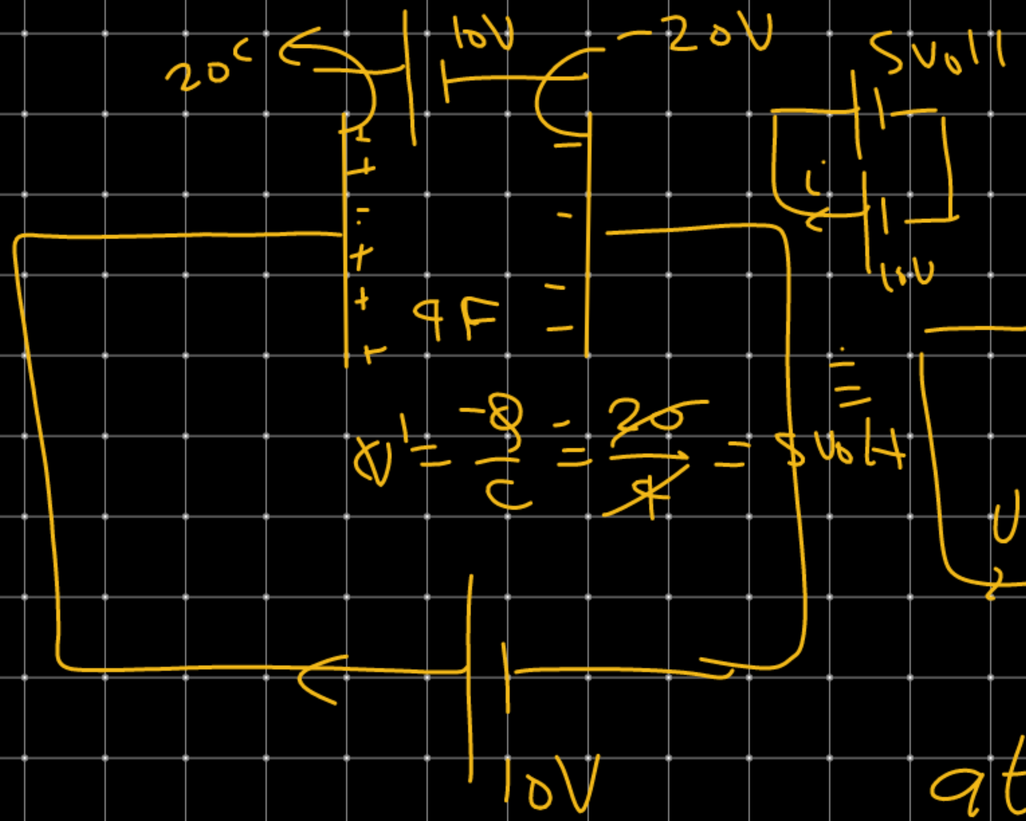
$= \frac{0}{}$

② $t=\infty$ [long time]

steady state. $(i=0)$

$Q=CV$

as a open wire



$V = \frac{Q}{C} = \frac{20}{4} = 5\text{volt}$

when capacitor is fully charged

$Q = CV$

$= 4 \times 10$

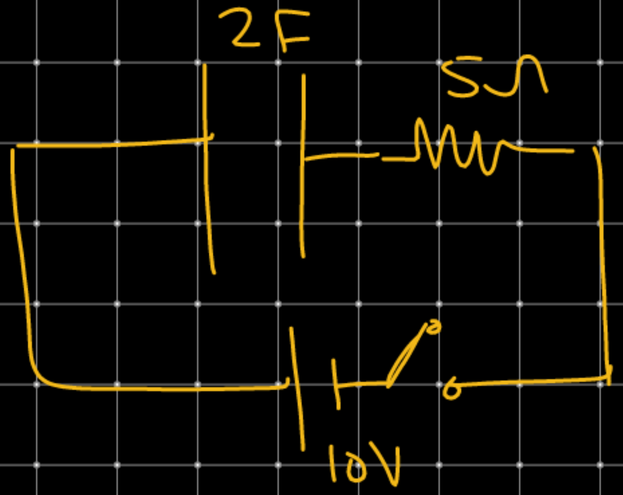
$= 40c$

at $t = t_0$, $Q = 20c$

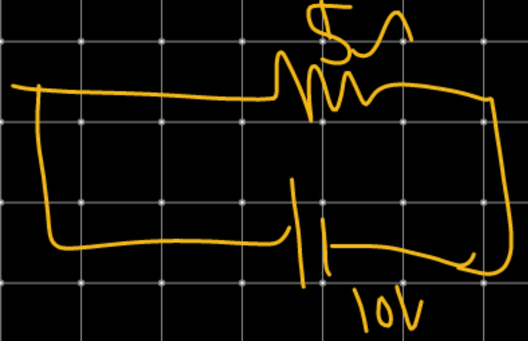
$t = 0$ $\quad$ $t = \infty$

$t = 0 \Rightarrow$ ||

Q1) find Current at $t=0$

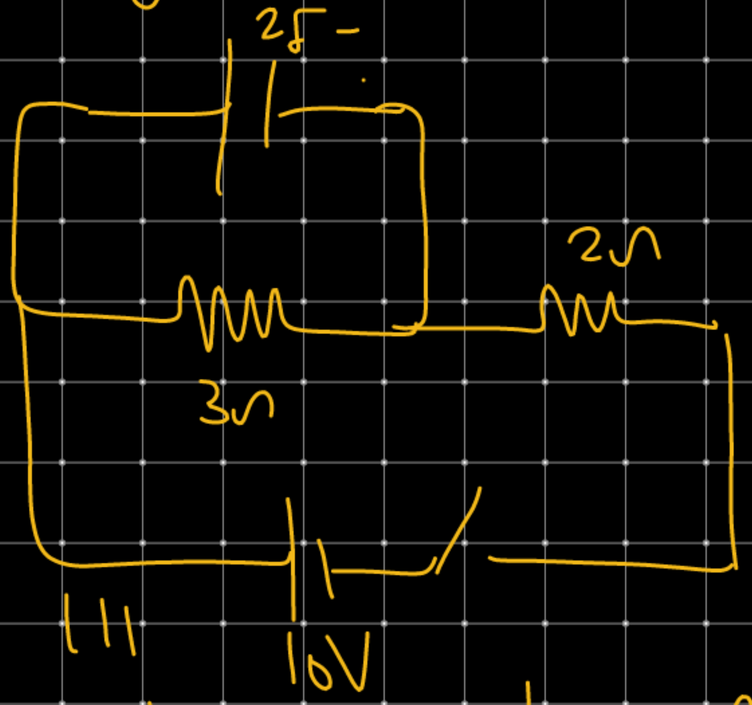


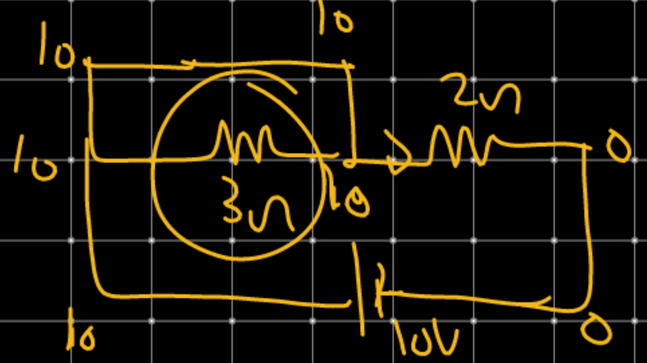
$t=0$



$i = \frac{10}{5} = 2A$

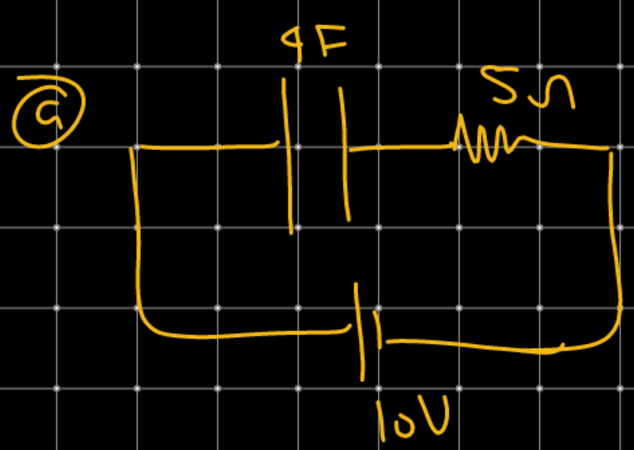
Q2) find Current Supplied by battery at $t=0$



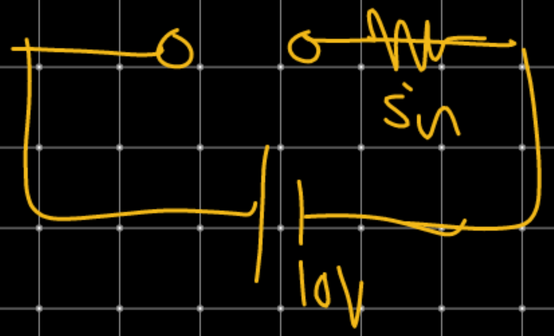


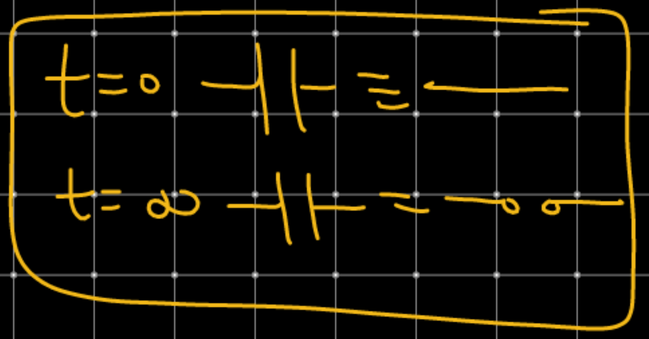
$\frac{10}{2} = 5$ Amp

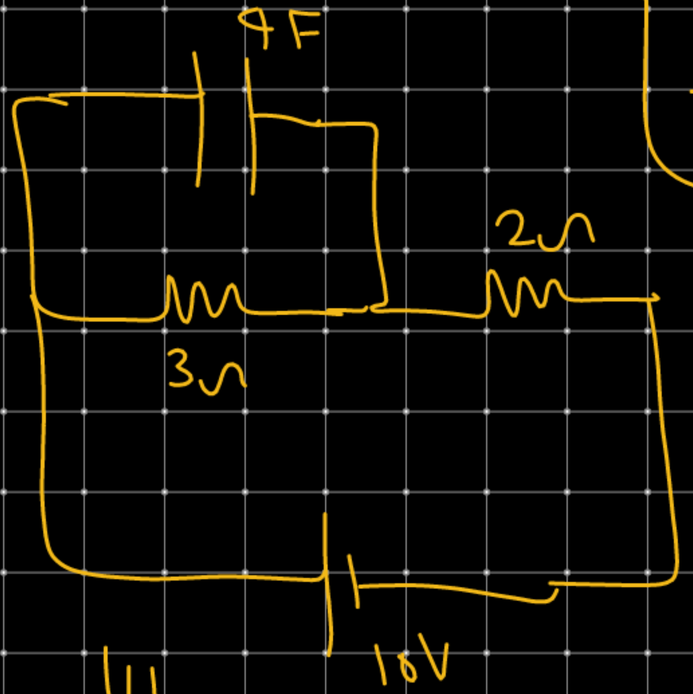
Find Current through battery at $t=\infty$.



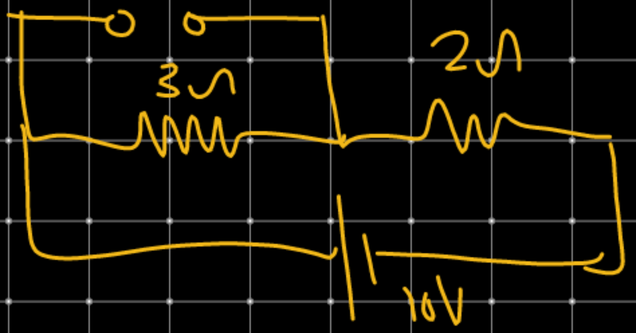
$i=0$, Ckt is OPEN





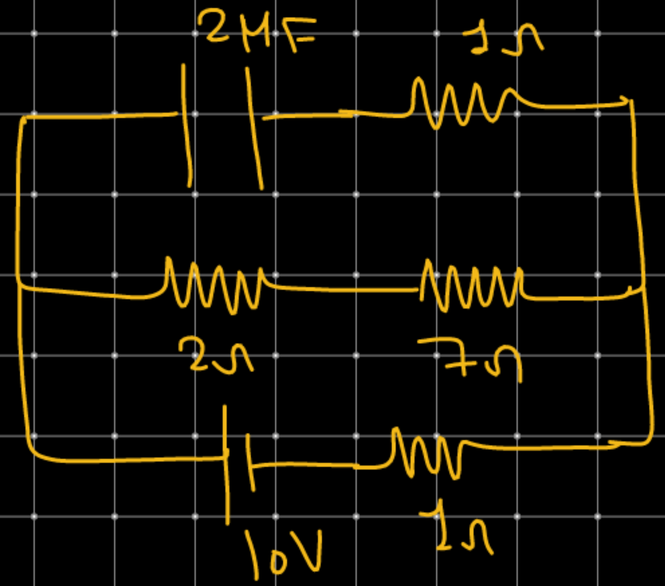


$t=\infty$



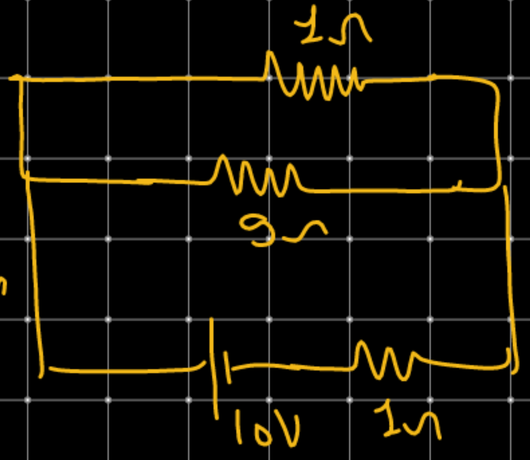
$=$

$i=2$ Amp



at t = 0

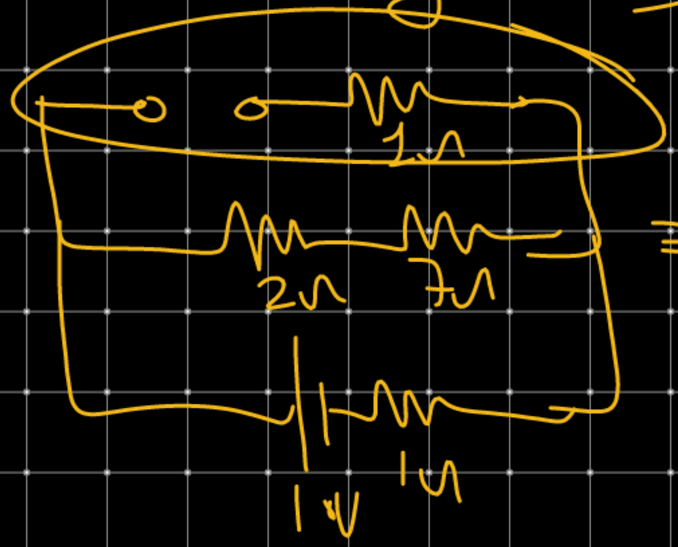
$$R_{eq} = \frac{9 \times 1}{9+1} = \frac{9}{10} = 0.9\Omega$$



$\equiv$

$$i = \frac{10}{1.9} \text{ Amp}$$

t = ∞ (Steady state)



$\equiv$

$$R_{eq} = 10\Omega$$

$$i = \frac{10}{10} = 1 \text{ Amp}$$

#1

$Q = CV$

40C

4F

-40V

2Ω

$t = \infty$

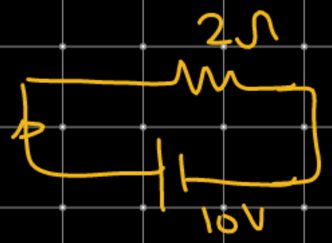
10Volt

10Volt.

↳ $t = \infty$, Steady state.

Capacitor will fully charged

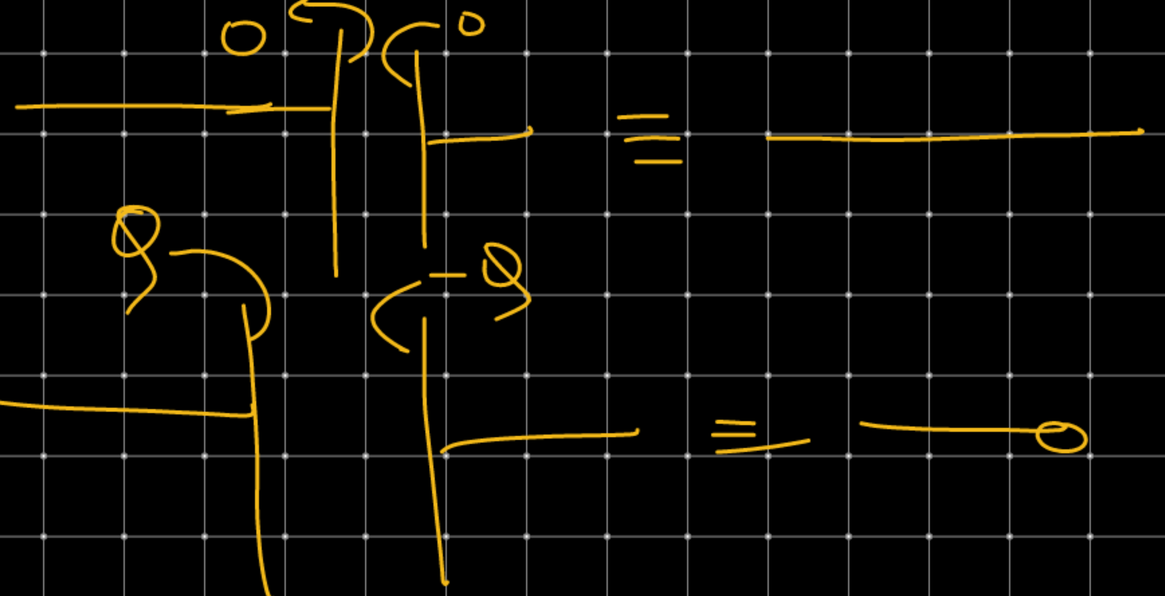
① $t = 0$



$i = \frac{10}{2} = 5$ Amp.

② $t = \infty$

L> $t = 0$



$\equiv$

$\underline{t = \infty}$

$\equiv$

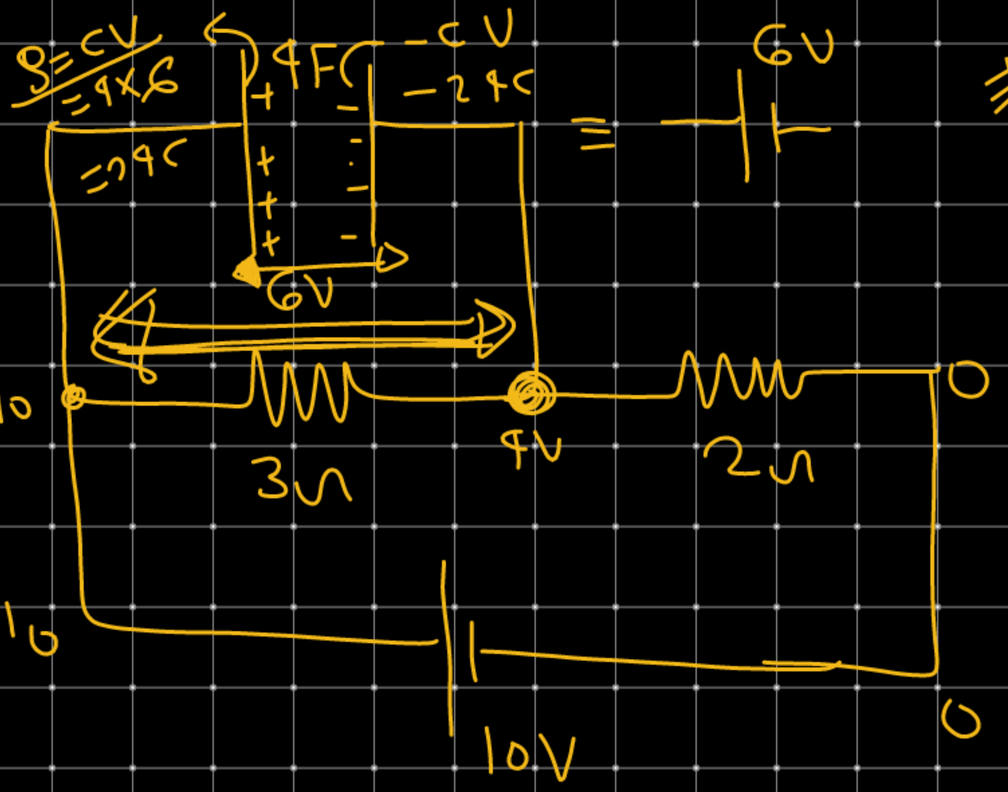
Full charged

$t = t$ (General time

Not fully charge

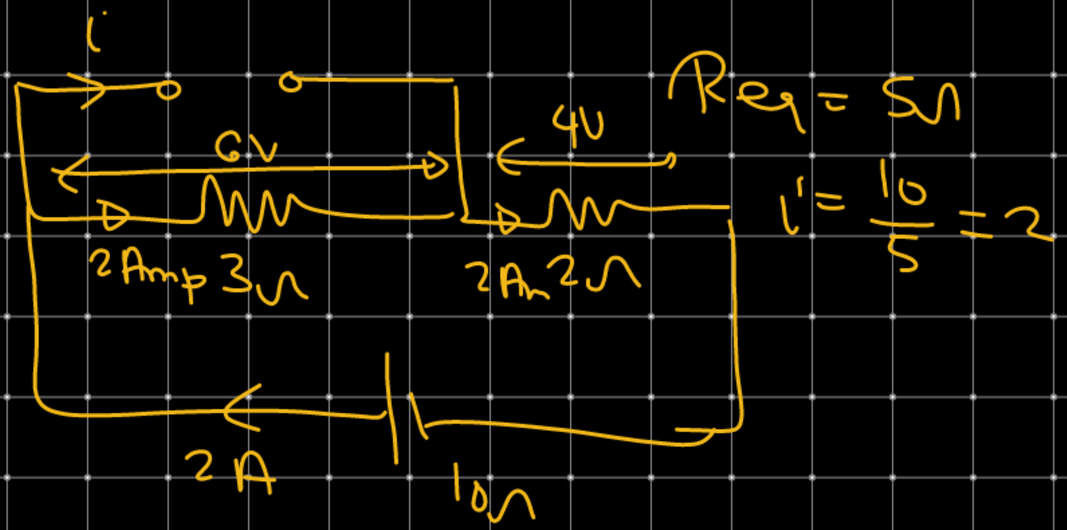
R-C circuit

$q = CV(1 - e^{-t/(RC)})$



at Steady state charge on capacitor [Steady state t=∞

↳ How to Solve



$R_{eq} = 5\Omega$

$i' = \frac{10}{5} = 2$