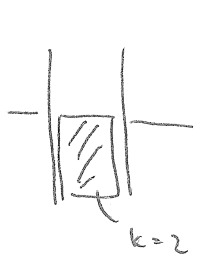
a.

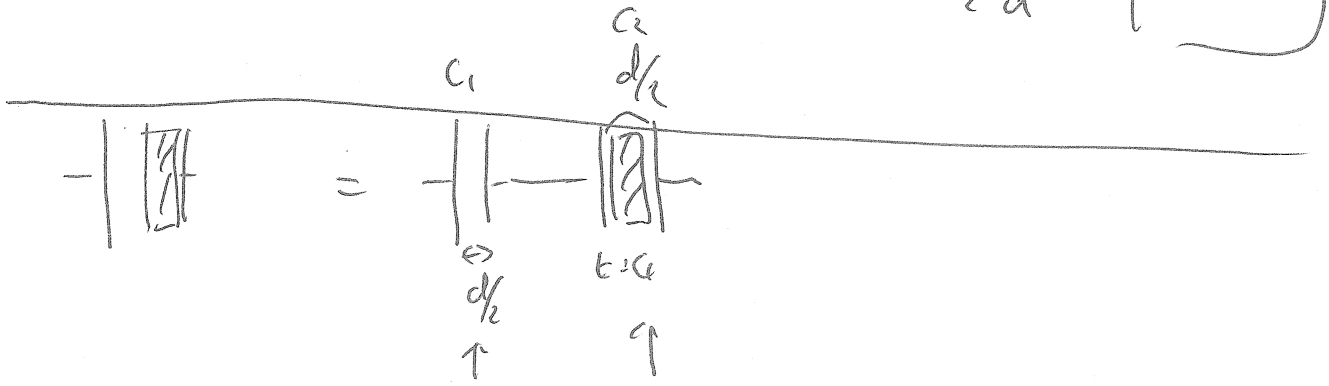
#1



$= \dashv\vdash \leftarrow \frac{\varepsilon_0 A}{2d}$

$\dashv\vdash \leftarrow \frac{k\varepsilon_0 A}{2d} = \frac{\varepsilon_0 A}{d}$

TOTAL CAPACITANCE: $\frac{3\varepsilon_0 A}{2d} = \boxed{1.5\frac{\varepsilon_0 A}{d}}$



$\frac{2\varepsilon_0 A}{d}$ & $4 \cdot \frac{2\varepsilon_0 A}{d} = \frac{8\varepsilon_0 A}{d}$

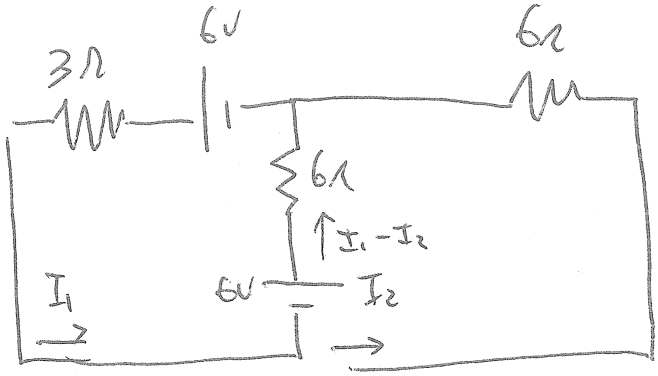
$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} = \frac{d}{2\varepsilon_0 A} + \frac{d}{8\varepsilon_0 A}$

$= \frac{5d}{8\varepsilon_0 A}$

$C_T = \frac{8\varepsilon_0 A}{5d} = \boxed{1.6\frac{\varepsilon_0 A}{d}}$

 HAS MORE CAPACITANCE

#2



$$-6 - 6(I_1 - I_2) + 6 - 3I_1 = 0$$

$$12 - 9I_1 + 6I_2 = 0 \quad \cdots (1)$$

$$12 = 9I_1 - 6I_2$$

$$-6I_2 + 6(I_1 - I_2) - 6 = 0$$

$$6I_1 - 12I_2 = 6 \quad \cdots (2)$$

$$24 = 18I_1 - 12I_2 \quad (2 \times (1))$$

$$-\ )\ 6 = 6I_1 - 12I_2 \quad (2)$$

$$18 = 12I_1$$

$$I_1 = \frac{3}{2} \text{ AMP}$$

SUBSTITUTE TO (2)

$$36 \cdot \frac{3}{4} - 12I_2 = 6$$

$$9 - 12I_2 = 6$$

$$3 = 12I_2$$

$$I_2 = \frac{1}{4}$$

#3 CAPACITOR DISCHARGED AT $t=0$ (ASSUMPTION GIVEN IN EXAM)

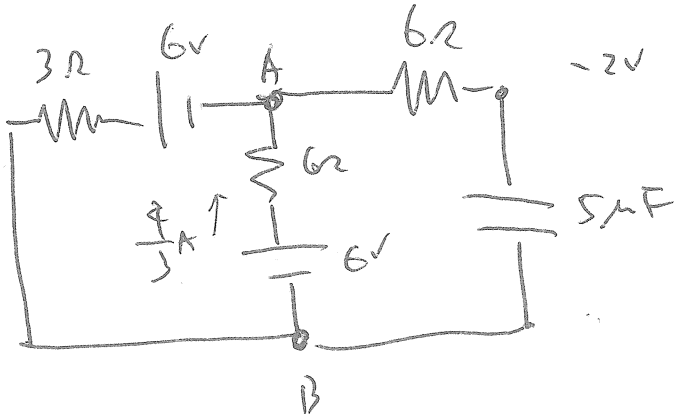
a) At $t=\infty$ 0 CURRENT THRU CAPACITOR

So

$$V = IR$$

$$12 = 9I \Rightarrow \boxed{I = \frac{4}{3}\,A}$$

b) CHARGE ~~STORE~~ STORED AT $t=\infty$



$$V_{AB} = 6 - \frac{4}{3}\cdot 6 = -2\,V$$

$$|\Delta V_{CAPACITOR}| = 2V$$

$$Q = C|V| \Rightarrow \underline{\text{Ptl}}$$

$$Q = 2\text{K}\,5\mu F = \boxed{10\,\mu C}$$

c) (THIS IS A DIFFICULT QUESTION (NEEDS CLARIFICATION)

$R = 12\,\Omega$

$C = 5\mu F$ $\quad \boxed{60\,\mu s} = RC$

#4

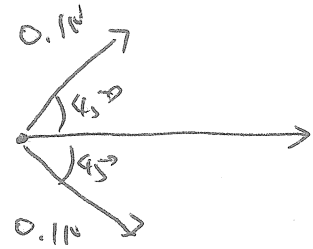
⊙ B

$\vec{F} = I\vec{L}\times\vec{B}$

FOR EACH SEGMENT

$|\vec{F}| = 1\ m \cdot 0.1\ T \cdot 1\ A$

$= 0.1\ N$



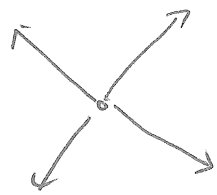
$(\cos 45°)$

$2 \times 0.1N \times \frac{\sqrt{2}}{2}$

$= 2 \times 0.1 * 1.41$

$= \boxed{0.28\ N}$ TO RIGHT

#5



$\boxed{0\ N}$