

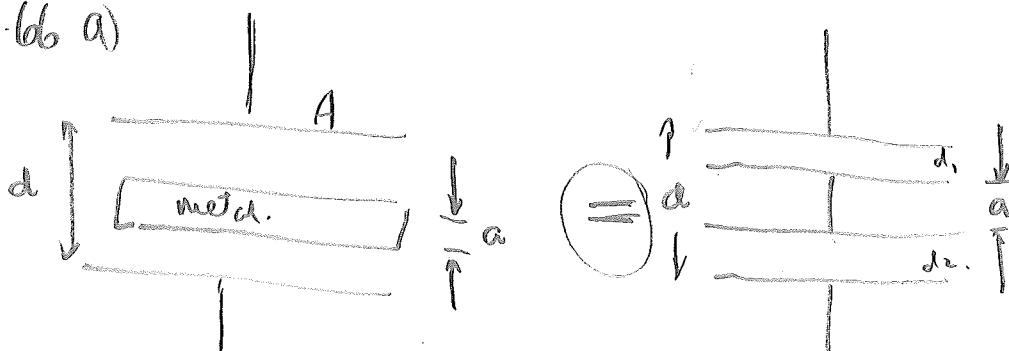
24.46 a) $Q = CV$ and $C = KC_0$ so $K = \frac{Q}{Q_0} = \frac{45}{25} = 1.8$

b) $V = V_{\text{batt}}$ both before & after! $V = Q/C = 25 \mu\text{C} / 12.5 \mu\text{F} = 2\text{V}$.

c) $E = V/d$; since $C_0 = \frac{\epsilon_0 A}{d}$ $E = \frac{QV}{\epsilon_0 A} = \frac{Q}{\epsilon_0 A} = \frac{25 \mu\text{C}}{8.85 \times 10^{-12} \cdot \pi \cdot (0.03)^2}$
 $= 999 \text{ V/m}$ $\leftarrow 3 \text{ cm}$

Same after inserting dielectric

24.66 a)



so $\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2}$ $C_1 = \frac{\epsilon_0 A}{d_1}$ $C_2 = \frac{\epsilon_0 A}{d_2}$

so $\frac{1}{C} = \frac{d_1 + d_2}{\epsilon_0 A} = \frac{d-a}{\epsilon_0 A}$ $C = \frac{\epsilon_0 A}{d-a}$

b) $\frac{C}{C_0} = \frac{d}{d-a}$

c) $C \rightarrow \infty$ as $a \rightarrow d$

$C \rightarrow C_0$ as $a \rightarrow 0$