

Name (Print) _____

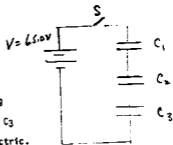
Name (Sign) _____

Discussion Instructor (CIRCLE ONE): Johnson

Spanning

Yan

Discussion Section # _____



When the switch is closed, C_1 and C_3 have no dielectric, and C_2 has a dielectric totally filling the capacitor with $K = 4.00$. The values of C_1 and C_3 given are without dielectric, C_2 is with the dielectric.

$$C_1 = 3.00 \text{ pF}$$

$$C_2 = 16.00 \text{ pF}$$

$$C_3 = 8.00 \text{ pF}$$

- (a) Find the potential and the charge on each capacitor. (10) pts ($\frac{1}{2}$ suppt. if)
- (b) Now the switch is opened, and the dielectric is moved from (1.5) ($\frac{1}{2}$ member)
- C_2 to C_1 . Find the new values of the charge and potential for each capacitor.

$$a) \quad \frac{1}{C_y} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$

$$\therefore \frac{1}{C_y} = \left(\frac{1}{3 \times 10^{-12}} + \frac{1}{16 \times 10^{-12}} + \frac{1}{8 \times 10^{-12}} \right)$$

$$C_y = 1.92 \times 10^{-9} \text{ F}$$

$$q = CV = (1.92 \times 10^{-9})(65) = \underline{\underline{1.25 \times 10^{-7} \text{ C}}} \quad \text{on each}$$

$$\therefore V_1 = \frac{q}{C_1} = \underline{\underline{41.6 \text{ V}}}$$

$$V_3 = \frac{q}{C_3} = \underline{\underline{15.6 \text{ V}}}$$

$$V_2 = \frac{q}{C_2} = \underline{\underline{7.81 \text{ V}}}$$

$$b) \quad C_2' = \frac{C_2}{K} = 4.00 \times 10^{-12} \text{ F}$$

$$C_1' = KC_1 = 12.0 \times 10^{-12} \text{ F}$$

q is the same

$$\therefore V_1 = \frac{q}{C_1'} = \underline{\underline{10.4 \text{ V}}}$$

$$V_2 = \frac{q}{C_2'} = \underline{\underline{31.2 \text{ V}}}$$

$$V_3 = \frac{q}{C_3} = \underline{\underline{15.6 \text{ V}}}$$