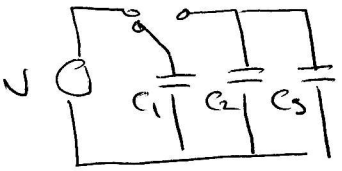
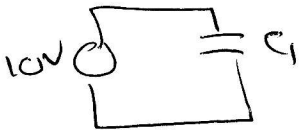
Chp 25 #22

Initial situation

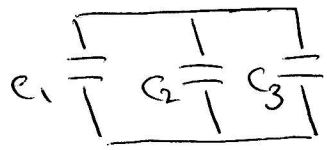




So volt. across C_1 is $V_1 = 10\,V$

and $Q_1 = \frac{C_1}{C_{eq}} V_1 = 100\,\mu C$

Then, flip switch:



- Total charge can't change so

$Q_1 + Q_2 + Q_3 = 100\,\mu C$

- since in parallel, $V_1 = V_2 = V_3$ ← For equilibrium

- told $C_2 = C_3$, and with above volt. condition, we have that $Q_2 = Q_3$

$\therefore \; V_1 = V_2$

$\frac{Q_1}{C_1} = \frac{Q_2}{C_2}$ and $Q_1 + Q_2 + Q_3 = 100\,\mu C$

$\hookrightarrow Q_1 + 2Q_2 = 100\,\mu C$

$\hookrightarrow Q_1 = \frac{C_1 Q_2}{C_2}$ (1) $\hookrightarrow Q_1 = 100\,\mu C - 2Q_2$ (2)

So (1) = (2) and $Q_2\left(2 + \frac{C_1}{C_2}\right) = 100\,\mu C$

$Q_2 = 40\,\mu C \rightarrow Q_1 = \underline{\underline{20\,\mu C}}$