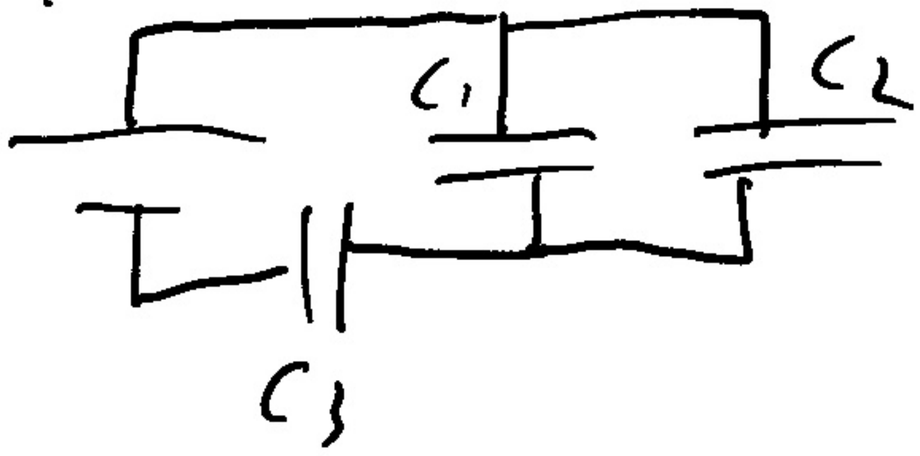
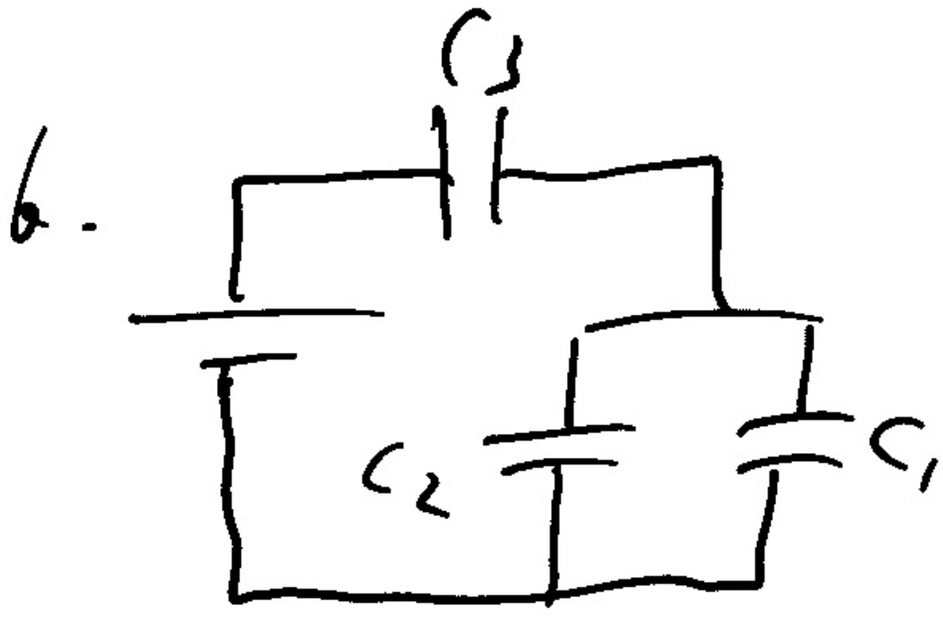
HWC1:

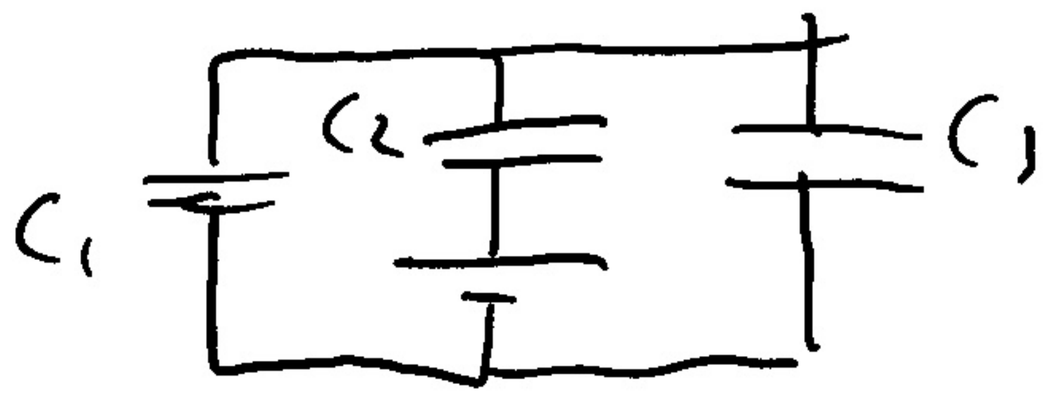
a.



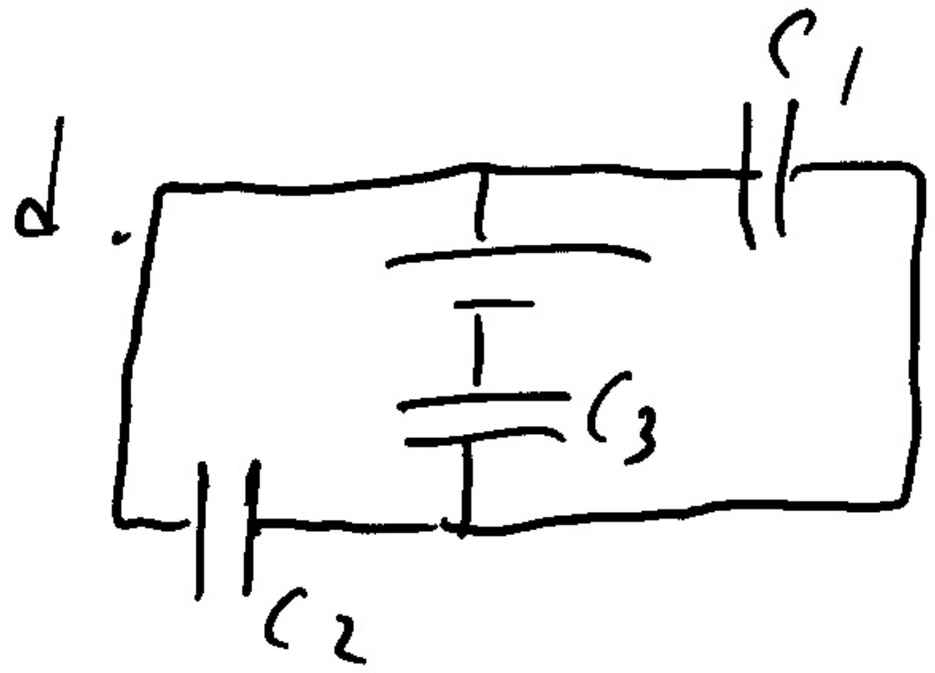
b.



c.



d.

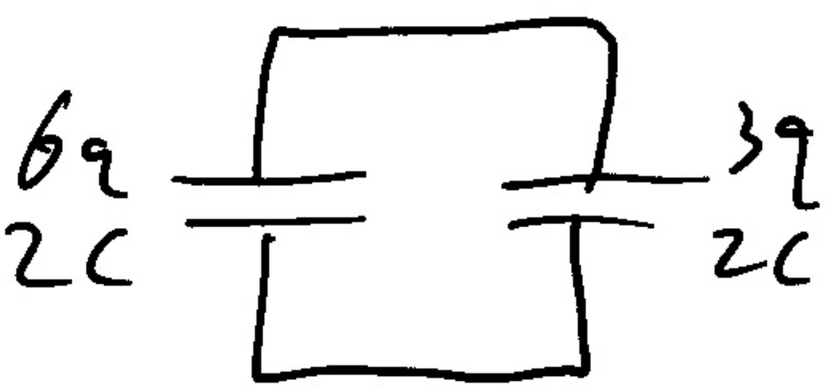


All same circuit!

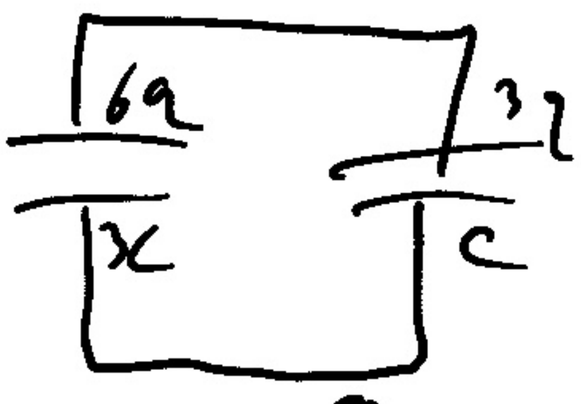
HWC2:

Need $|\Delta V_1| = |\Delta V_2|$

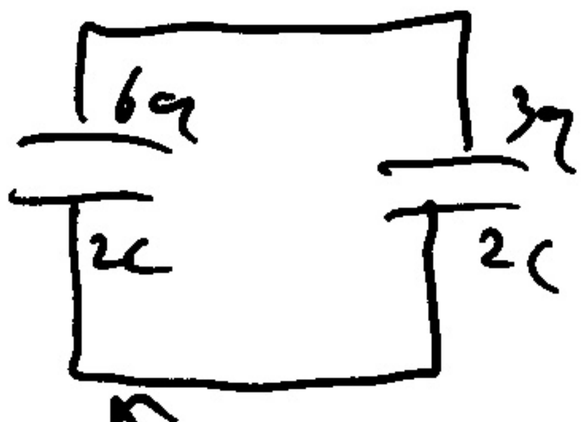
So $Q_1/C_1 = Q_2/C_2$



balanced

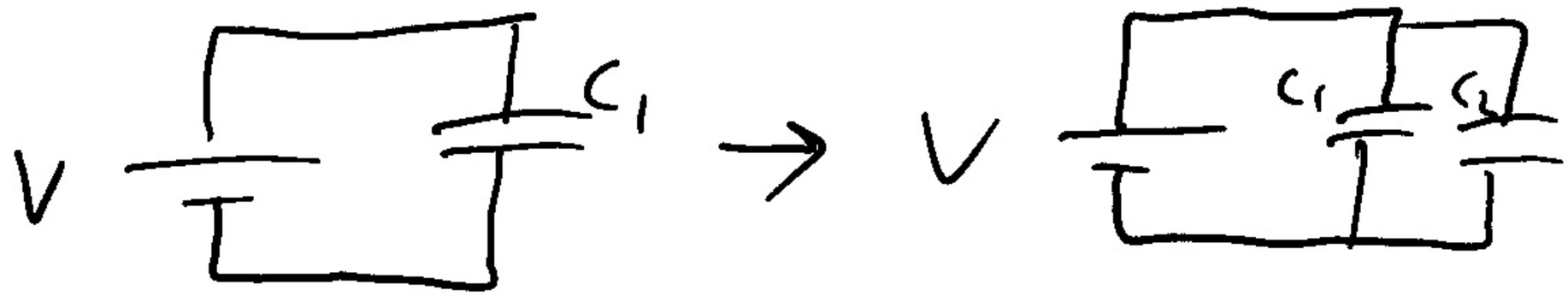


Extra Q



Extra Q

HWC3:



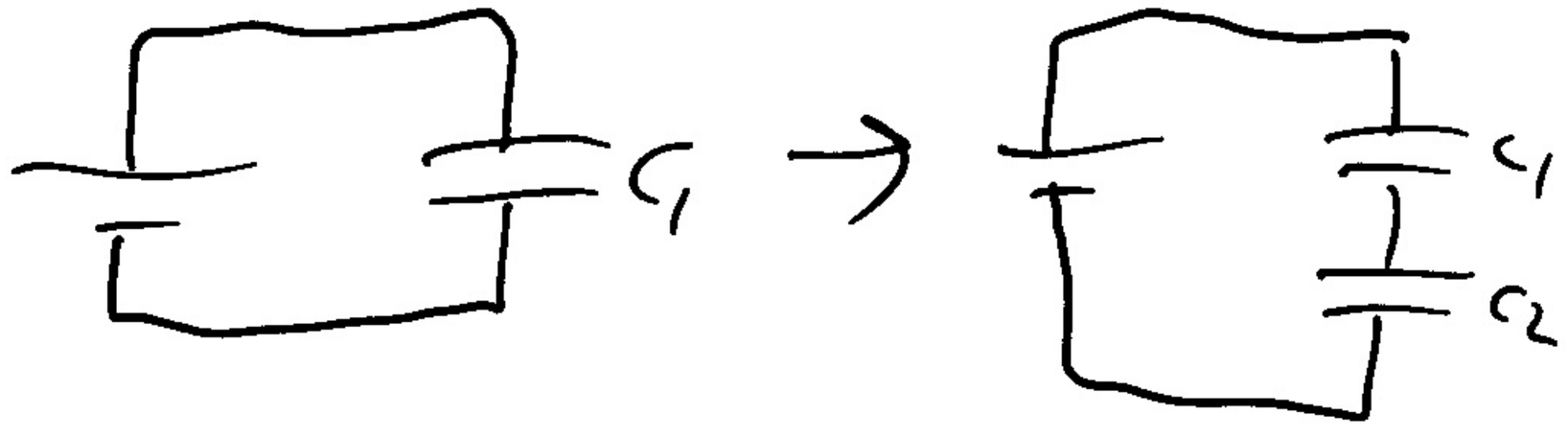
Q_{tot} ↑

$\Delta V_1 \rightarrow$

$Q_1 \rightarrow$

C_{tot} ↑

HWC4:



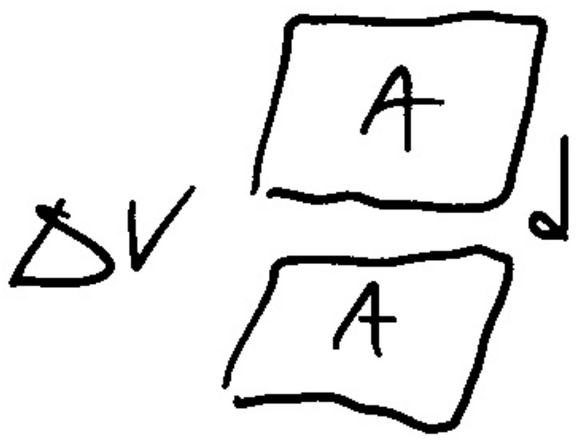
$\Delta V \downarrow$

$Q \downarrow$

$C \downarrow$

$Q \downarrow$

HWC5:



If d decreases

$C \uparrow$ / $\Delta V \rightarrow$

$Q \uparrow$ / $U = Q^2/2C \uparrow$

$E \uparrow$ / $u_E \uparrow$

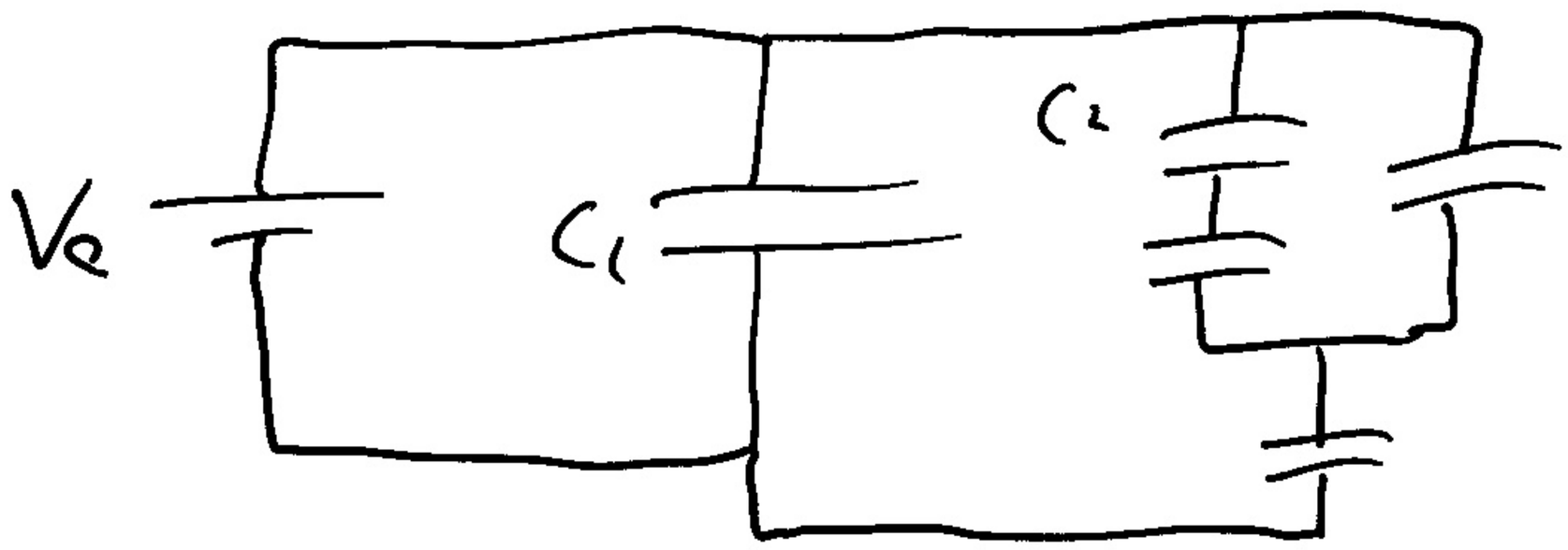
HWM1: $C = \varepsilon_0 A / d$

$\Rightarrow d = \varepsilon_0 A / C$

$\sim 10^{-11}$ m

tough to build

HW M 2;



$C_1 = C \qquad Q_1 = C_1 V_0$

$C_{2345} = 1/(1/C + 1/(C + 1/(1/C + 1/C)))$

$= 1/(1/C + 1/(C + 3/2))$

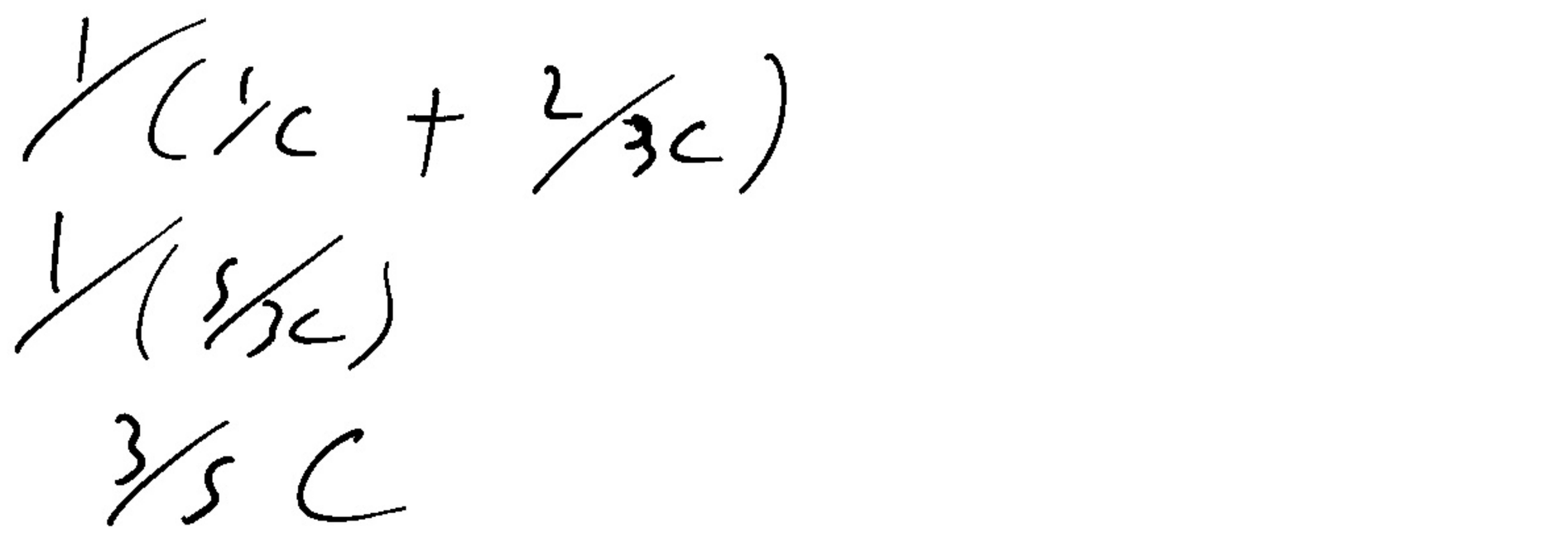
$= 1/(1/C + 2/3C)$

$= 1/(5/3C)$

$= 3/5\, C$

s. $Q_{tot} = 3/5\, Q_1$

$\Rightarrow$



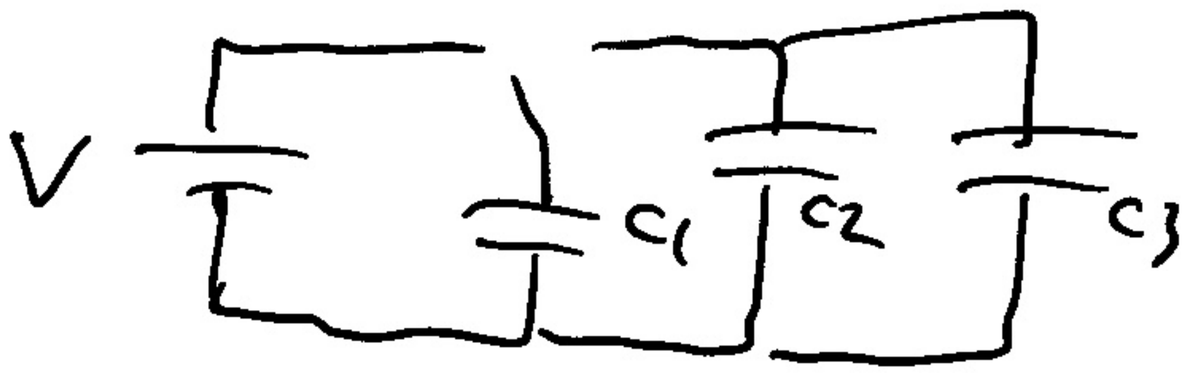
– which leaves $3/5\, V_0$ across here

– half of that across $C_2 \Rightarrow V_2 = 1/5\, V_0$

– $Q_2 = C_2 V_2 = 1/5\, Q_1$

HW M3:

$Q = C_1 V = Q_{tot}$



$C_{tot} = C_1 + C_2 + C_3$

$V_f = Q_{tot} / C_{tot}$

$Q_{1f} = C_1 V_f = C_1 / C_{tot} \cdot Q_{tot}$

$= \dfrac{C_1^2 V}{C_1 + C_2 + C_3}$