

17. The charge initially on the charged capacitor is given by $q = C_1 V_0$, where $C_1 = 100 \text{ pF}$ is the capacitance and $V_0 = 50 \text{ V}$ is the initial potential difference. After the battery is disconnected and the second capacitor wired in parallel to the first, the charge on the first capacitor is $q_1 = C_1 V$, where $v = 35 \text{ V}$ is the new potential difference. Since charge is conserved in the process, the charge on the second capacitor is $q_2 = q - q_1$, where C_2 is the capacitance of the second capacitor. Substituting $C_1 V_0$ for q and $C_1 V$ for q_1 , we obtain $q_2 = C_1(V_0 - V)$. The potential difference across the second capacitor is also V , so the capacitance is

$$C_2 = \frac{q_2}{V} = \frac{V_0 - V}{V} C_1 = \frac{50 \text{ V} - 35 \text{ V}}{35 \text{ V}} (100 \text{ pF}) = 3 \text{ pF} .$$