

30. (a) The charge q_3 in the Figure is $q_3 = C_3V = (4.00 \mu\text{F})(100 \text{ V}) = 4.00 \times 10^{-4} \text{ C}$.

(b) $V_3 = V = 100 \text{ V}$.

(c) Using $U_i = \frac{1}{2} C_i V_i^2$, we have $U_3 = \frac{1}{2} C_3 V_3^2 = 2.00 \times 10^{-2} \text{ J}$.

(d) From the Figure,

$$q_1 = q_2 = \frac{C_1 C_2 V}{C_1 + C_2} = \frac{(10.0 \mu\text{F})(5.00 \mu\text{F})(100 \text{ V})}{10.0 \mu\text{F} + 5.00 \mu\text{F}} = 3.33 \times 10^{-4} \text{ C}.$$

(e) $V_1 = q_1 / C_1 = 3.33 \times 10^{-4} \text{ C} / 10.0 \mu\text{F} = 33.3 \text{ V}$.

(f) $U_1 = \frac{1}{2} C_1 V_1^2 = 5.55 \times 10^{-3} \text{ J}$.

(g) From part (d), we have $q_2 = q_1 = 3.33 \times 10^{-4} \text{ C}$.

(h) $V_2 = V - V_1 = 100 \text{ V} - 33.3 \text{ V} = 66.7 \text{ V}$.

(i) $U_2 = \frac{1}{2} C_2 V_2^2 = 1.11 \times 10^{-2} \text{ J}$.