

34. (a) The potential difference across C_1 (the same as across C_2) is given by

$$V_1 = V_2 = \frac{C_3 V}{C_1 + C_2 + C_3} = \frac{(15.0 \mu\text{F})(100 \text{V})}{10.0 \mu\text{F} + 5.00 \mu\text{F} + 15.0 \mu\text{F}} = 50.0 \text{V}.$$

Also, $V_3 = V - V_1 = V - V_2 = 100 \text{V} - 50.0 \text{V} = 50.0 \text{V}$. Thus,

$$q_1 = C_1 V_1 = (10.0 \mu\text{F})(50.0 \text{V}) = 5.00 \times 10^{-4} \text{C}$$

$$q_2 = C_2 V_2 = (5.00 \mu\text{F})(50.0 \text{V}) = 2.50 \times 10^{-4} \text{C}$$

$$q_3 = q_1 + q_2 = 5.00 \times 10^{-4} \text{C} + 2.50 \times 10^{-4} \text{C} = 7.50 \times 10^{-4} \text{C}.$$

(b) The potential difference V_3 was found in the course of solving for the charges in part (a). Its value is $V_3 = 50.0 \text{V}$.

(c) The energy stored in C_3 is $U_3 = C_3 V_3^2 / 2 = (15.0 \mu\text{F})(50.0 \text{V})^2 / 2 = 1.88 \times 10^{-2} \text{J}$.

(d) From part (a), we have $q_1 = 5.00 \times 10^{-4} \text{C}$, and

(e) $V_1 = 50.0 \text{V}$, as shown in (a).

(f) The energy stored in C_1 is

$$U_1 = \frac{1}{2} C_1 V_1^2 = \frac{1}{2} (10.0 \mu\text{F})(50.0 \text{V})^2 = 1.25 \times 10^{-2} \text{J}.$$

(g) Again, from part (a), $q_2 = 2.50 \times 10^{-4} \text{C}$.

(h) $V_2 = 50.0 \text{V}$, as shown in (a).

(i) The energy stored in C_2 is $U_2 = \frac{1}{2} C_2 V_2^2 = \frac{1}{2} (5.00 \mu\text{F})(50.0 \text{V})^2 = 6.25 \times 10^{-3} \text{J}$.