

46. (a) $\tau = RC = (1.40 \times 10^6 \Omega)(1.80 \times 10^{-6} \text{ F}) = 2.52 \text{ s}$.

(b) $q_0 = \mathcal{E}C = (12.0 \text{ V})(1.80 \mu\text{F}) = 21.6 \mu\text{C}$.

(c) The time t satisfies $q = q_0(1 - e^{-t/RC})$, or

$$t = RC \ln\left(\frac{q_0}{q_0 - q}\right) = (2.52 \text{ s}) \ln\left(\frac{21.6 \mu\text{C}}{21.6 \mu\text{C} - 16.0 \mu\text{C}}\right) = 3.40 \text{ s}.$$