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

(b) \( q_o = \varepsilon C = (12.0 \, V)(1.80 \, \mu F) = 21.6 \, \mu C \).

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

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

62. The time it takes for the voltage difference across the capacitor to reach \( V_L \) is given by \( V_L = \varepsilon(1 - e^{-t/RC}) \). We solve for \( R \):

\[
R = \frac{t}{C \ln \left[ \frac{\varepsilon}{(\varepsilon - V_L)} \right]} = \frac{0.500 \, s}{\left( 0.150 \times 10^{-6} \, F \right) \ln \left[ 95.0 \, V / (95.0 \, V - 72.0 \, V) \right]} = 2.35 \times 10^6 \, \Omega
\]

where we used \( t = 0.500 \, s \) given (implicitly) in the problem.

64. (a) The potential difference \( V \) across the plates of a capacitor is related to the charge \( q \) on the positive plate by \( V = q/C \), where \( C \) is capacitance. Since the charge on a discharging capacitor is given by \( q = q_0 e^{-t/\tau} \), this means \( V = V_0 e^{-t/\tau} \) where \( V_0 \) is the initial potential difference. We solve for the time constant \( \tau \) by dividing by \( V_0 \) and taking the natural logarithm:

\[
\tau = -\frac{t}{\ln(V/V_0)} = -\frac{10.0 \, s}{\ln \left[ (100 \, V)/(100 \, V) \right]} = 2.17 \, s.
\]

(b) At \( t = 17.0 \, s \), \( t/\tau = (17.0 \, s)/(2.17 \, s) = 7.83 \), so

\[
V = V_0 e^{-t/\tau} = (100 \, V) e^{-7.83} = 3.96 \times 10^{-2} \, V.
\]

65. In the steady state situation, the capacitor voltage will equal the voltage across \( R_2 = 15 \, k\Omega \):

\[
V_0 = R_2 \frac{\varepsilon}{R_1 + R_2} = (15.0 \, k\Omega) \left( \frac{20.0 \, V}{10.0 \, k\Omega + 15.0 \, k\Omega} \right) = 12.0 \, V.
\]

Now, multiplying Eq. 27-39 by the capacitance leads to \( V = V_0 e^{-t/RC} \) describing the voltage across the capacitor (and across \( R_2 = 15.0 \, k\Omega \)) after the switch is opened (at \( t = 0 \)). Thus, with \( t = 0.00400 \, s \), we obtain

\[
V = (12) e^{-0.004/(15000)(0.4 \times 10^{-4})} = 6.16 \, V.
\]

Therefore, using Ohm’s law, the current through \( R_2 \) is 6.16/15000 = \( 4.11 \times 10^{-4} \, A \).