27. The assumption stated at the end of the problem is equivalent to setting $\phi = 0$ in Eq. 33-25. Since the maximum energy in the capacitor (each cycle) is given by $q_{\rm max}^2/2C$, where $q_{\rm max}$ is the maximum charge (during a given cycle), then we seek the time for which

$$\frac{q_{\rm max}^2}{2C} = \frac{1}{2}\frac{Q^2}{2C} \implies q_{\rm max} = \frac{Q}{\sqrt{2}} \; .$$

Now $q_{\rm max}$ (referred to as the *exponentially decaying amplitude* in §33-5) is related to Q (and the other parameters of the circuit) by

$$q_{\rm max} = Qe^{-Rt/2L} \implies \ln\left(\frac{q_{\rm max}}{Q}\right) = -\frac{Rt}{2L} \; .$$

Setting $q_{\rm max} = Q/\sqrt{2}$, we solve for t:

$$t = -\frac{2L}{R}\ln\left(\frac{q_{\rm max}}{Q}\right) = -\frac{2L}{R}\ln\left(\frac{1}{\sqrt{2}}\right) = \frac{L}{R}\ln 2 \; .$$

The identities $\ln(1/\sqrt{2}) = -\ln\sqrt{2} = -\frac{1}{2}\ln 2$ were used to obtain the final form of the result.