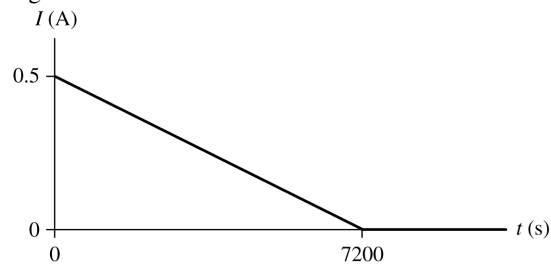


**30.53. Model:** Assume the battery is ideal.

**Visualize:** The current supplied by the battery and passing through the wire is  $I = \Delta V_{\text{bat}}/R$ . A graph of current versus time has exactly the same shape as the graph of  $\Delta V_{\text{bat}}$  with an initial value of  $I_0 = (\Delta V_{\text{bat}})_0/R = (1.5 \text{ V})/(3.0 \text{ } \Omega) = 0.50 \text{ A}$ . The horizontal axis has been changed to seconds.



**Solve:** Current is  $I = dQ/dt$ . Thus the total charge supplied by the battery is

$$\begin{aligned} Q &= \int_0^{\infty} I dt = \text{area under the current-versus-time graph} \\ &= \frac{1}{2}(7200 \text{ s})(0.50 \text{ A}) = 1800 \text{ C} \end{aligned}$$