Problem 1.8

The current flowing past a point in a device is shown in Fig. 1.25. Calculate the total charge through the point.

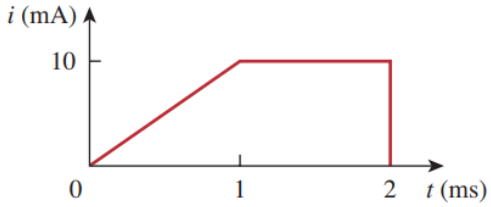

Figure 1.25
For Prob. 1.8.

Solution

Current and charge are related by

$$i(t) = \frac{dq}{dt} \quad \rightarrow \quad q(t) = \int i(t)\,dt,$$

so the total charge is the area under the current-versus-time graph. Here the area can be split up into a triangle and a rectangle.

$$Q = \int_0^2 i(t)\,dt = \left[\frac{1}{2}(1)(10) + 10(1)\right] \text{mA} \cdot \text{ms} = 15 \text{ mA} \cdot \text{ms} = 15\ \mu\text{C}$$