

1. (a) The charge that passes through any cross section is the product of the current and time. Since  $4.0 \text{ min} = (4.0 \text{ min})(60 \text{ s/min}) = 240 \text{ s}$ ,  $q = it = (5.0 \text{ A})(240 \text{ s}) = 1200 \text{ C}$ .
- (b) The number of electrons  $N$  is given by  $q = Ne$ , where  $e$  is the magnitude of the charge on an electron. Thus  $N = q/e = (1200 \text{ C})/(1.60 \times 10^{-19} \text{ C}) = 7.5 \times 10^{21}$ .