

53. (a) We combine Eq. 23-28 (in absolute value) with Newton's second law:

$$a = \frac{|q|E}{m} = \left(\frac{1.60 \times 10^{-19} \text{ C}}{9.11 \times 10^{-31} \text{ kg}} \right) \left(1.40 \times 10^6 \frac{\text{N}}{\text{C}} \right) = 2.46 \times 10^{17} \text{ m/s}^2 .$$

(b) With $v = \frac{c}{10} = 3.00 \times 10^7 \text{ m/s}$, we use Eq. 2-11 to find

$$t = \frac{v - v_o}{a} = \frac{3.00 \times 10^7}{2.46 \times 10^{17}} = 1.22 \times 10^{-10} \text{ s} .$$

(c) Eq. 2-16 gives

$$\Delta x = \frac{v^2 - v_o^2}{2a} = \frac{(3.00 \times 10^7)^2}{2(2.46 \times 10^{17})} = 1.83 \times 10^{-3} \text{ m} .$$