

39. (a) We use $\Delta x = v_{\text{avg}}t = vt/2$:

$$v = \frac{2\Delta x}{t} = \frac{2(2.0 \times 10^{-2} \text{ m})}{1.5 \times 10^{-8} \text{ s}} = 2.7 \times 10^6 \text{ m/s} .$$

(b) We use $\Delta x = \frac{1}{2}at^2$ and $E = F/e = ma/e$:

$$E = \frac{ma}{e} = \frac{2\Delta xm}{et^2} = \frac{2(2.0 \times 10^{-2} \text{ m})(9.11 \times 10^{-31} \text{ kg})}{(1.60 \times 10^{-19} \text{ C})(1.5 \times 10^{-8} \text{ s})^2} = 1.0 \times 10^3 \text{ N/C} .$$