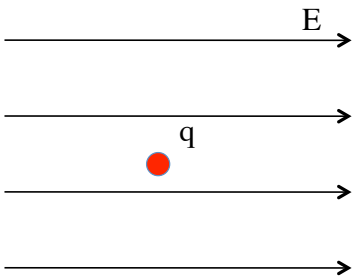
Problem 23.45

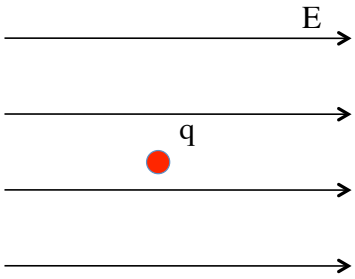


This is a simple, "Take what you know and find the right equation" problem. Doing that:

a.) acceleration?

$$a = \left(\frac{F}{m}\right)$$
$$= \left(\frac{qE}{m}\right)$$
$$= \frac{(1.60\text{x}10^{-19}\ \text{C})(640\ \text{N/C})}{(1.67\text{x}10^{-27}\ \text{kg})}$$
$$= 6.13\text{x}10^{10}\ \text{m/s}^2$$

b.) time of flight?



$$v_2 = \cancel{v_1}^{0} + a\Delta t$$
$$(1.20\text{x}10^{6}\ \text{m/s}) = 0 + (6.14\text{x}10^{10}\ \text{m/s}^2)\Delta t$$
$$\Rightarrow \quad \Delta t = 1.96\text{x}10^{-5}\ \text{sec}$$

c.) how far did it travel?

$$x_2 = \cancel{x_1}^{0} + \cancel{v_1}^{0}\Delta t + \frac{1}{2}a(\Delta t)^2$$
$$= \frac{1}{2}(6.13\text{x}10^{10}\ \text{m/s}^2)(1.96\text{x}10^{-5}\ \text{sec})^2$$
$$= 11.7\ \text{m}$$

d.) final kinetic energy?

$$KE = \frac{1}{2}mv^2$$
$$= \frac{1}{2}(1.67\text{x}10^{-27}\ \text{kg})(1.20\text{x}10^{6}\ \text{m/s})^2$$
$$= 1.20\text{x}10^{-15}\ \text{J}$$