44. We assume there are no forces or force-components along the x direction. We combine Eq. 22-28 with Newton's second law, then use Eq. 4-21 to determine time t followed by Eq. 4-23 to determine the final velocity (with $-g$ replaced by the a_y of this problem); for these purposes, the velocity components *given* in the problem statement are re-labeled as v_{0x} and v_{0y} respectively.

(a) We have $\vec{a} = q\vec{E}/m = -(e/m)\vec{E}$ which leads to

$$\vec{a} = -\left(\frac{1.60\times10^{-19}\,\text{C}}{9.11\times10^{-31}\,\text{kg}}\right)\left(120\,\frac{\text{N}}{\text{C}}\right)\hat{\text{j}} = -(2.1\times10^{13}\ \text{m/s}^2)\,\hat{\text{j}}.$$

(b) Since $v_x = v_{0x}$ in this problem (that is, $a_x = 0$), we obtain

$$t = \frac{\Delta x}{v_{0x}} = \frac{0.020\,\text{m}}{1.5\times10^5\ \text{m/s}} = 1.3\times10^{-7}\,\text{s}$$

$$v_y = v_{0y} + a_y t = 3.0\times10^3\ \text{m/s} + \left(-2.1\times10^{13}\ \text{m/s}^2\right)\left(1.3\times10^{-7}\,\text{s}\right)$$

which leads to $v_y = -2.8\times10^6$ m/s. Therefore, the final velocity is

$$\vec{v} = (1.5\times10^5\ \text{m/s})\,\hat{\text{i}} - (2.8\times10^6\ \text{m/s})\,\hat{\text{j}}.$$