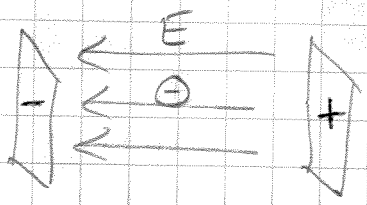
P#L

Ch 16

$d = .02\ m$
$E = 5000\ N/C$
$q = -1.6 \times 10^{-19}\ C$



a) E lines show direction on a positive test charge, so left plate must be $-Q$ (attracts + test charge) and right plate must be $+Q$ (repels + test charge)

b) $E = \frac{V}{d}$ so $(5000\ N/C) = \frac{V}{.02\ m}$

$$\boxed{V = 100\ V}$$

c) $E = \frac{F}{q}$ so $(5000\ N/C) = \frac{F}{1.6 \times 10^{-19} C}$

$$\boxed{F = 8.0 \times 10^{-16}\ N}$$

(right)
(E indicate direction on a positive test charge; since E points left, direction on e^- is right)

d) Find a: $F = m \cdot a$
$(8.0 \times 10^{-16}\ N) = (9.11 \times 10^{-31}\ kg) \cdot a$
$a = 8.78 \times 10^{14}\ m/s^2$

Find v_f: $d = .01$ (1/2 total distance)
$a = 8.78 \times 10^{14}\ m/s^2$
$v_i = 0$

$v_f^2 = v_i^2 + 2 \cdot a \cdot d$
$= 0 + 2(8.78 \times 10^{14}\ m/s^2) \cdot (.01\ m)$

$$\boxed{v_f = 4.18 \times 10^6\ m/s}$$