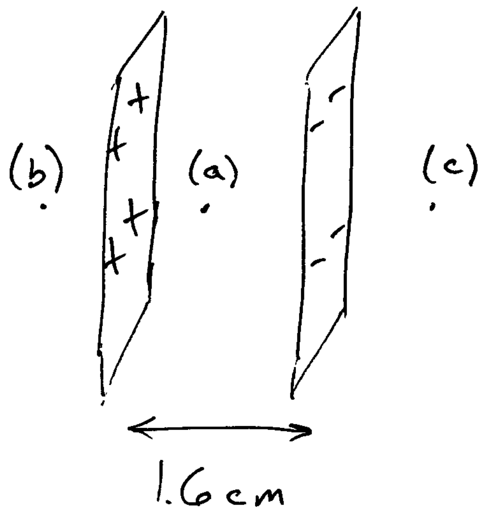
PARALLEL PLATES



(a) $E_+ = 2\pi K\sigma = 2\pi\left(9\times10^{9}\frac{Nm^2}{C^2}\right)\left(8\times10^{-6}\frac{C}{m^2}\right)$

$= 4.5\times10^{5}\ N/C$ TO THE RIGHT

$E_- = 2\pi K\sigma$

$= 4.5\times10^{5}\ N/C$ TO THE RIGHT

$E = 9.0\times10^{5}\ N/C$ TO THE RIGHT

(b) $E_+ = 4.5\times10^{5}\ N/C$ TO THE LEFT

$E_- = 4.5\times10^{5}\ N/C$ TO THE RIGHT

$E = 0$

(c)

$E_+ = 4.5 \times 10^5$ N/C TO THE RIGHT

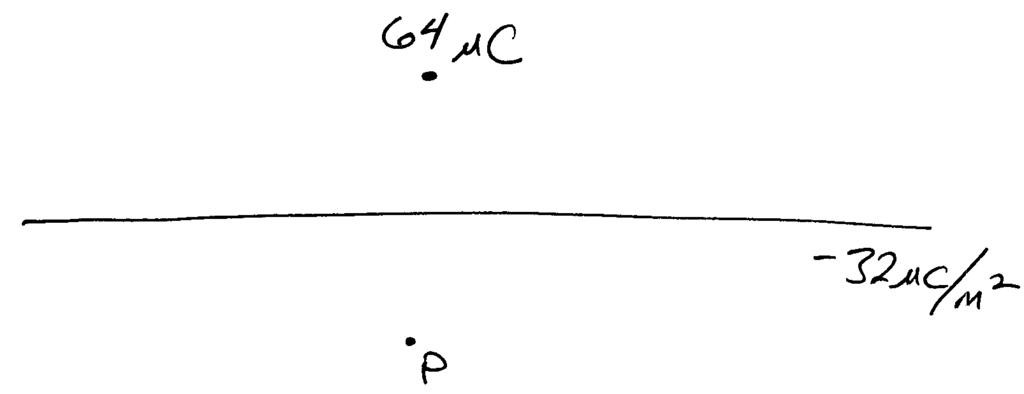
$E_- = 4.5 \times 10^5$ N/C TO THE LEFT

$E = 0$

A PARALLEL-PLATE CAPACITOR CONSISTS OF TWO PARALLEL PLATES WITH EQUAL AND OPPOSITE CHARGE.

THE ELECTRIC FIELD INSIDE THE CAPACITOR IS UNIFORM.

THE ELECTRIC FIELD OUTSIDE THE CAPACITOR IS ZERO.



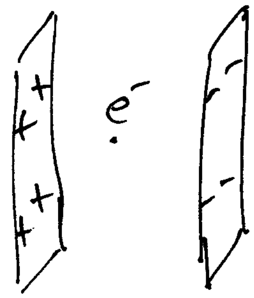
$$E_{PL} = 2\pi k\sigma = 2\pi\left(9\times10^{9}\frac{Nm^2}{C^2}\right)\left(32\times10^{-6}\frac{C}{m^2}\right)$$

$$= 1.81\times10^{6}\ N/C \quad \text{UPWARD}$$

$$E_{PT} = k\frac{Q}{r^2} = \left(9\times10^{9}\frac{Nm^2}{C^2}\right)\frac{(64\times10^{-6}C)}{(0.2m)^2}$$

$$= 1.4\times10^{7}\ N/C \quad \text{DOWNWARD}$$

$$E = 1.22\times10^{7}\ N/C \quad \text{DOWNWARD}$$



$-1.602 \times 10^{-19}\,C$

$F = qE$ $\qquad\qquad \vec{F} = q\vec{E}$

$$E = 4\pi K\sigma = 4\pi\left(9\times10^{9}\,\frac{Nm^2}{C^2}\right)\left(20\times10^{-9}\,\frac{C}{m^2}\right)$$

$$= 2.26\times10^{3}\,N/C \text{ TO THE RIGHT}$$

$$F = qE = \left(-1.602\times10^{-19}\,C\right)\left(2.26\times10^{3}\,N/C\right)$$

$$= 3.61\times10^{-16}\,N \text{ TO THE LEFT}$$

$$a = \frac{F}{m} = \frac{3.61\times10^{-16}\,N}{9.1\times10^{-31}\,kg} = 3.9\times10^{14}\,m/s^2$$