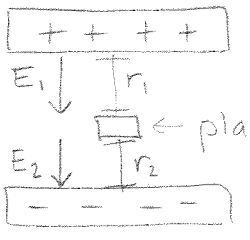
P #19

Ch 15 - pg 492

h = 3000 m

h = 2000 m

h = 1000 m



$Q_1 = +40\ C$

$Q_2 = -40\ C$

E_1 from Q_1 is directed down (away from Q_1)
E_2 from Q_2 is directed down (towards Q_2)

Find E_1: $r_1 = 3000\ m - 2000\ m = 1000\ m$
$Q_1 = +40.0\ C$

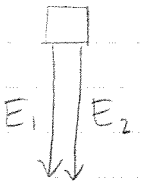
$$E = \frac{k_e \cdot Q}{r^2} = \frac{(9.0 \times 10^9\ N \cdot m^2/C^2)(40\ C)}{(1000\ m)^2}$$

$$E_1 = 360{,}000\ N/C$$

Find E_2: $r_2 = 2000\ m - 1000\ m = 1000\ m$
$Q_2 = -40\ C$

$$E_2 = E_1 = 360{,}000\ N/C$$

Find E_{total}:



$$E_{total} = E_1 + E_2$$
$$= (360{,}000\ N/C) + (360{,}000\ N/C)$$

$$E_{total} = 720{,}000\ N/C \text{ (down)}$$