Electric Fields 2

① $E = \frac{F_e}{q}$

$= \frac{0.06}{-2\times10^{-8}}$

$E = -3\times10^{6}$ N/C or $\boxed{3\times10^{6}\text{ N/C [Left]}}$

② $E = \frac{F_e}{q}$

$= \frac{2.5\times10^{-4}}{5\times10^{-4}}$

$E = \boxed{0.5\text{ N/C}}$

③ a) Different forces. Since $F_e = qE$, changing q will change the force.

b) Same field. The strength of the field is independent of the charge placed in it.

(Doubling the charge will double the force. These changes will cancel each other out.)

e.g. $E = \frac{F_e}{q}$ $E = \frac{F_e}{q}$

$= \frac{1}{1\times10^{-6}}$ $= \frac{2}{2\times10^{-6}}$

$E = 1\times10^{6}$ N/C $E = 1\times10^{-6}$ N/C

④ $E = \frac{F_e}{q}$

$= \frac{0.2}{1 \times 10^{-5}}$

$E = \boxed{2 \times 10^4 \text{ N/C}}$ or 20 000 N/C

⑤ $q = \frac{F_e}{E}$

$= \frac{1.4 \times 10^{-8}}{2 \times 10^{-4}}$

$q = \boxed{7 \times 10^{-5} \text{ C}}$

⑥ $q = \frac{F_e}{E}$

$= \frac{0.2}{4.5 \times 10^5}$

$q = \boxed{4.4 \times 10^{-7} \text{ C}}$

⑦ $F_e = qE$

$= (8 \times 10^{-5})(50)$

$F_e = 0.004 \text{ N}$ or $\boxed{4 \times 10^{-3} \text{ N}}$

⑧ a) $E_T = E_1 - E_2$ (vector addition)

$= 5 - 10$

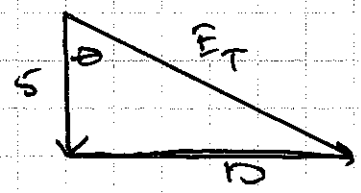
$= -5$ N/C or $\boxed{5 \text{ N/C [Left]}}$

b) $F_e = qE$

$= (4.5)(5)$

$= \boxed{22.5 \text{ N [Left]}}$ (assuming q is +)

⑨ a)



$\theta = \tan^{-1}\left(\frac{10}{5}\right)$

$\theta = 63.4°$

$E_T = \sqrt{5^2 + 10^2}$

$E_T = \boxed{11.2 \text{ N/C [26.6° S of E]}}$

or

11.2 N/C [63.4° E of S]

b) $F_e = qE$

$= (4)(11.2)$

$F_e = \boxed{44.8 \text{ N [26.6° S of E]}}$

(assuming q is +)