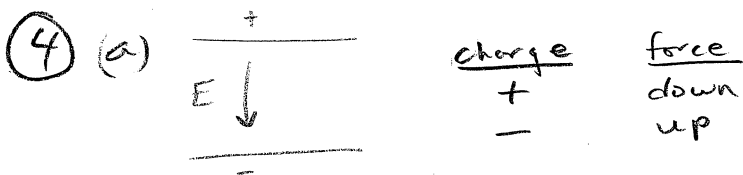


# Electric fields $\neq 1$

①  $E = \frac{F}{q} = \frac{.2}{1.0 \times 10^{-5}} = 2.0 \times 10^4 \text{ N/C}$

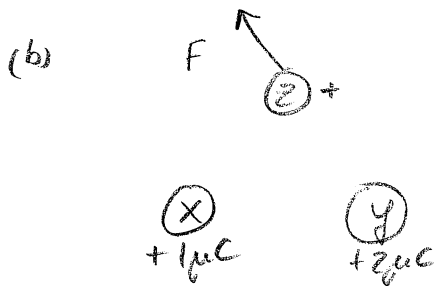
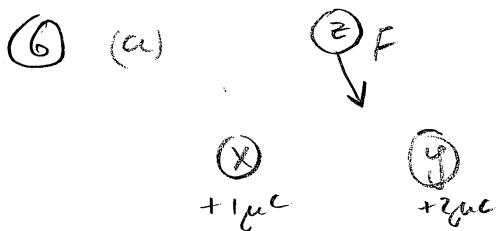
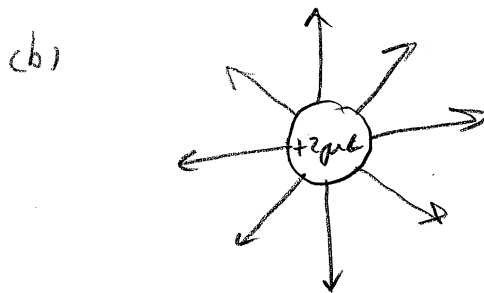
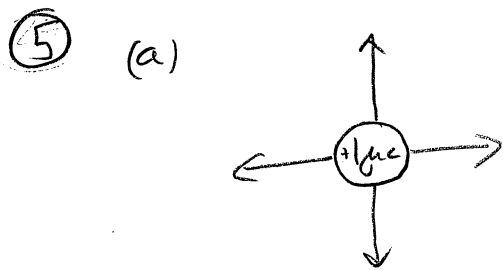
②  $E = \frac{F}{q}$       $q = \frac{F}{E} = \frac{1.4 \times 10^{-8}}{2.0 \times 10^{-4}} = 7 \times 10^{-5} \text{ C}$

③  $E = \frac{F}{q}$       $q = \frac{F}{E} = \frac{.2}{4.5 \times 10^5} = 4.4 \times 10^{-7} \text{ C}$



(b)  $E = \frac{F}{q}$       $F = qE = (1.6 \times 10^{-19})(150) = 2.4 \times 10^{-17} \text{ N down}$

(c)  $F = mg = (1.67 \times 10^{-27})(9.8) = 1.64 \times 10^{-26} \text{ N down}$



⑦  $E = \frac{F}{q}$       $F = qE = (8.0 \times 10^{-5})(50) = 0.004 \text{ N}$

$$\textcircled{8} \text{ (a) } E = \frac{F}{q} \quad F = qE = (1.6 \times 10^{-19})(1 \times 10^5) = 1.6 \times 10^{-14} \text{ N}$$

$$\text{(b) } F = ma \quad a = \frac{F}{m} = \frac{1.6 \times 10^{-14} \text{ N}}{9.11 \times 10^{-31} \text{ kg}} = 1.76 \times 10^{16} \text{ m/s}^2$$

$$\textcircled{9} \text{ (a) } \begin{array}{c} \uparrow F_E \\ \circ \\ \downarrow F_g \end{array} \quad \text{(b) } F_E = F_g$$

$$\textcircled{10} \text{ (a) } F_E = qE \quad F_g = F_E$$

$$q = \frac{F_E}{E} = \frac{1.9 \times 10^{-15}}{6.0 \times 10^3} = \underline{3.17 \times 10^{-19} \text{ C}}$$

$$\text{(b) } \frac{3.17 \times 10^{-19}}{1.6 \times 10^{-19}} = 1.98 \approx \underline{2}$$

$$\textcircled{11} \text{ (a) } q = \frac{F_E}{E} = \frac{6.4 \times 10^{-13}}{4 \times 10^6} = \underline{1.6 \times 10^{-19}}$$

$$\text{(b) } \frac{1.6 \times 10^{-19}}{1.6 \times 10^{-19}} = \underline{1}$$

$$\textcircled{12} \quad q = 4(1.6 \times 10^{-19}) = 6.4 \times 10^{-19} \text{ C}$$

$$F_E = 6.4 \times 10^{-13} \text{ N}$$

$$E = \frac{F_E}{q} = \frac{6.4 \times 10^{-13}}{6.4 \times 10^{-19}} = \underline{1 \times 10^6 \text{ N/C}}$$

$$(13) \quad E = \frac{F}{q} = \frac{0.060 \text{ N}}{2.0 \times 10^{-8} \text{ C}} = \underline{3.0 \times 10^{-10} \text{ N/C left}}$$

$E \longleftarrow$   
 $\ominus \longrightarrow F$

$$(14) \quad E = \frac{F}{q} = \frac{2.5 \times 10^{-4} \text{ N}}{5.0 \times 10^{-9} \text{ C}} = \underline{0.50 \text{ N/C}}$$

$$(15) \quad E \longrightarrow$$

$\longleftarrow \oplus$

$$E = \frac{F}{q}$$

$$500 \text{ N/C} = \frac{F}{1.6 \times 10^{-19} \text{ C}}$$

$$F = 8 \times 10^{-17} \text{ N} \quad (\text{force exerted on proton})$$

proton moving in  $-x$  direction, therefore this force causes a negative acceleration

$$F = ma$$

$$8 \times 10^{-17} \text{ N} = (1.6 \times 10^{-27} \text{ kg}) a$$

$$a = -5 \times 10^{10} \text{ m/s}^2$$

$$v_i = 4 \times 10^5 \text{ m/s}$$

$$a = -5 \times 10^{10} \text{ m/s}^2$$

$$d = 0.4 \text{ m}$$

$$v_f = ?$$

$$v_f^2 = v_i^2 + 2ad$$

$$= (4 \times 10^5 \text{ m/s})^2 + 2(-5 \times 10^{10} \text{ m/s}^2)(0.4 \text{ m})$$

$$\underline{v_f = 3.5 \times 10^5 \text{ m/s}}$$