Chapter 21 - Electric Charge and Electric Field Part 1

1a) $r = 6.43 \times 10^{-7}$ m

1b) $v = 176000$ m/s

1c) $F = 1.18$ N

$a = 7.08 \times 10^{26}$ m/s^2

2a and b) $r = 2.14$ cm attractive

3a) $\vec{F}_{+2q} = -\dfrac{3kq^2}{2a^2}\hat{i}$

$\vec{F}_{+q} = +\dfrac{3kq^2}{a^2}\hat{i}$

$\vec{F}_{-q} = -\dfrac{3kq^2}{2a^2}\hat{i}$

3b) $F_{+2q} = F_{-q} < F_{+q}$

4) $\vec{F} = -\dfrac{kq^2 b}{(a^2+b^2)^{3/2}}\hat{i} + \left(\dfrac{3kq^2 a}{(a^2+b^2)^{3/2}} + \dfrac{kq^2}{4a^2}\right)\hat{j}$

5) $x = d(2+\sqrt{2})$

6a) $\vec{r} = 15.0\hat{i} - 29.0\hat{j}$

6b) $r = 32.6$ mm

6c) $\hat{r} = 0.459\hat{i} - 0.888\hat{j}$

6d) $F = 2.16 \times 10^{-25}$ N

6e) $\vec{F}_e = -0.993 \times 10^{-25}\hat{i} + 1.92 \times 10^{-25}\hat{j}$

6f) $\vec{F}_p = +0.993 \times 10^{-25}\hat{i} - 1.92 \times 10^{-25}\hat{j}$

7) $Q_2 = \dfrac{Q_1}{2\sqrt{2}}$

8) $q_2 = -\dfrac{m(a+g)c^3}{kQb}$

$q_1 = \dfrac{m(a+g)c^3}{kQb}$