① $m = 6.00 \times 10^{-2}\ kg$

$q_1 = 0.4 \times 10^{-6}\ C$

$q_2 = -0.22 \times 10^{-6}\ C$

$r = 0.290\ m$

$F = \frac{k q_1 q_2}{r^2}$

$T\cos\theta = mg$

$T\sin\theta = F$

$\tan\theta = F/mg = \frac{k q_1 q_2}{mg \cdot r^2}$

$$\tan\theta = \frac{(9 \times 10^9\ N \cdot m^2/C^2)\cdot(0.4 \times 10^{-6}\ C)\cdot(0.22 \times 10^{-6}\ C)}{0.06 \times 9.8 \times (0.290)^2} = 0.016$$

$\tan^{-1}(0.016) = \boxed{\theta = 0.917^\circ}$

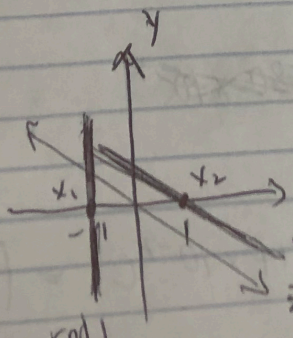
② $a = F/m$

$= \frac{Fe}{m}$

$= \frac{qE}{m} = \frac{1.60 \times 10^{-19}\ C \times (700\ N/C)}{1.67 \times 10^{-27}\ kg}$

$= \boxed{6.71 \times 10^{10}\ m/s^2 \text{ in direction of electric field}}$

③



$\lambda_1 = +1.0\ nC/m$

$x_{1,2} = \pm 1.0\ cm = 0.01\ m$

$\lambda_{1,2} = \pm 1.0\ nC/m = 1.0 \times 10^{-9}\ C/m$

$E_1 = \frac{\lambda_1}{2\pi\varepsilon_0 x_1}$

$= \frac{1.0 \times 10^{-9}\ C/m}{2\pi(8.85 \times 10^{-12}\ C^2/N \cdot m^2)(0.01)}$

$= 1.79 \times 10^3\ N/C$ on +X-axis

$E_2 = \frac{\lambda_2}{2\pi\varepsilon_0 x_2}$

$= \frac{1.0 \times 10^{-9}\ C/m}{2\pi(8.854 \times 10^{-12}\ C^2/N \cdot m^2)(0.01)}$

$= 1.79 \times 10^3\ N/C$ on -X-axis