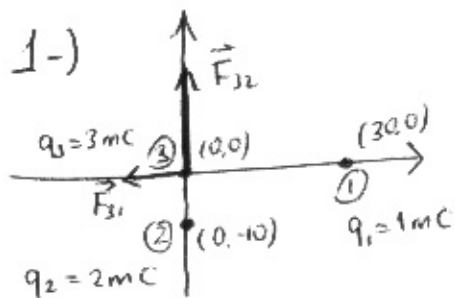


KEY

to Quiz #1
(of PHYS 1304)



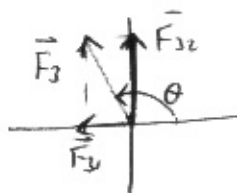
$$\begin{aligned} \vec{F}_3 &= \vec{F}_{31} + \vec{F}_{32} \\ &= \frac{kq_3q_1}{r_1^2} (-\hat{i}) + \frac{kq_3q_2}{r_2^2} (\hat{j}) \\ &= \frac{8.9875 \times 10^9 \times 1.10^{-3} \times 3.10^{-3}}{(30 \times 10^{-1})^2} (-\hat{i}) + \frac{8.9875 \times 10^9 \times 2.10^{-3} \times 3.10^{-3}}{(10 \times 10^{-1})^2} (\hat{j}) \\ &= 3 \times 10^5 (-\hat{i}) + 5.39 \times 10^6 \hat{j} \\ &= (-3\hat{i} + 53.9\hat{j}) \times 10^5 \text{ N} \end{aligned}$$

Mag: $|\vec{F}_3| = \sqrt{(F_{31})^2 + (F_{32})^2}$

$$= \sqrt{(-3 \times 10^5)^2 + (53.9 \times 10^5)^2}$$

$$|\vec{F}_3| = 5.4 \times 10^6 \text{ N}$$

Direction:

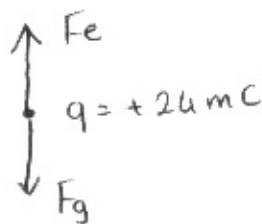


$$\tan \theta = \frac{F_y}{F_x} = \frac{F_{32}}{F_{31}} = \frac{53.9 \times 10^5}{-3 \times 10^5} = -17.97 \Rightarrow \theta = -86.8^\circ$$

or $\theta = 93.2^\circ$

2-)

$E = 610 \text{ N/C}$



$$|F_e| = |F_g|$$

$$qE = mg$$

$$\Rightarrow m = \frac{qE}{g}$$

$$m = \frac{610 \times 24 \times 10^{-3}}{9.81}$$

$$m = 1.49 \text{ kg}$$