$Q_A = +6.2\ \mu C$ $\quad Q_B = +7.3\ \mu C$

(A) $\longleftarrow 3.00 \times 10^{-2}\ m \longrightarrow$ (B)

$\vec{F}_{A\to B} = ?$

$$\vec{F}_{A\to B} = \frac{k\, Q_A Q_B}{r_{AB}^2}\ \hat{}\ \text{Right}$$

$$\vec{F}_{B\to A} = \frac{k\, Q_B Q_A}{r_{BA}^2}\ \hat{}\ \text{Left}$$

$$\vec{F}_{A\to B} = \frac{\left(8.99 \times 10^{9}\ \frac{N m^2}{C^2}\right)\left(6.2 \times 10^{-6}\ C\right)\left(7.3 \times 10^{-6}\ C\right)}{\left(3.00 \times 10^{-2}\ m\right)^2}$$

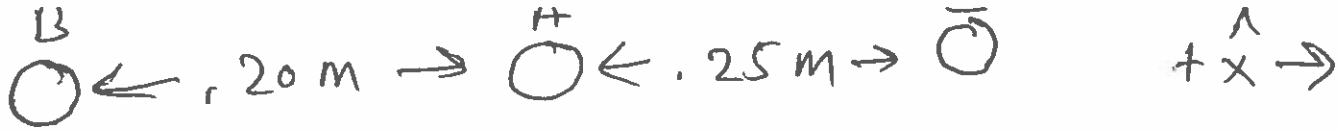
$$\vec{F}_{A\to B} = 452.0\ N\ \hat{}\ \text{Right}$$

Law of Superposition

$$\vec{F}_{net\to A} = \sum_i \vec{F}_{iA}$$

3 charges A, B, C

$$\vec{F}_{net\to A} = \vec{F}_{B\to A} + \vec{F}_{C\to A}$$



$Q_B = -3\mu C \qquad Q_A = +5\mu C \qquad Q_C = -4\mu C$

$$\vec{F}_{net\to A} = ?$$

$$\vec{F}_{net\to A} = \vec{F}_{B\to A} + \vec{F}_{C\to A}$$

$$= \frac{k Q_B Q_A}{r_{BA}^2}(-\hat{x}) + \frac{k Q_C Q_A}{r_{CA}^2}(+\hat{x})$$

$$= \frac{\left(8.99\times10^{9}\frac{N m^2}{C^2}\right)\left(3\times10^{-6}C\right)\left(5\times10^{-6}C\right)}{(.20\ m)^2}(-\hat{x})$$

$$+ \frac{\left(8.99\times10^{9}\frac{N m^2}{C^2}\right)\left(4\times10^{-6}C\right)\left(5\times10^{-6}C\right)}{(.25\ m)^2}(+\hat{x})$$

$$\vec{F}_{NET\to A} = 3.37\ N\,(-\hat{x}) + (1.73\ N)(+\hat{x})$$

$$\boxed{\vec{F}_{NET\to A} = 1.64\ N\,(-\hat{x})}$$

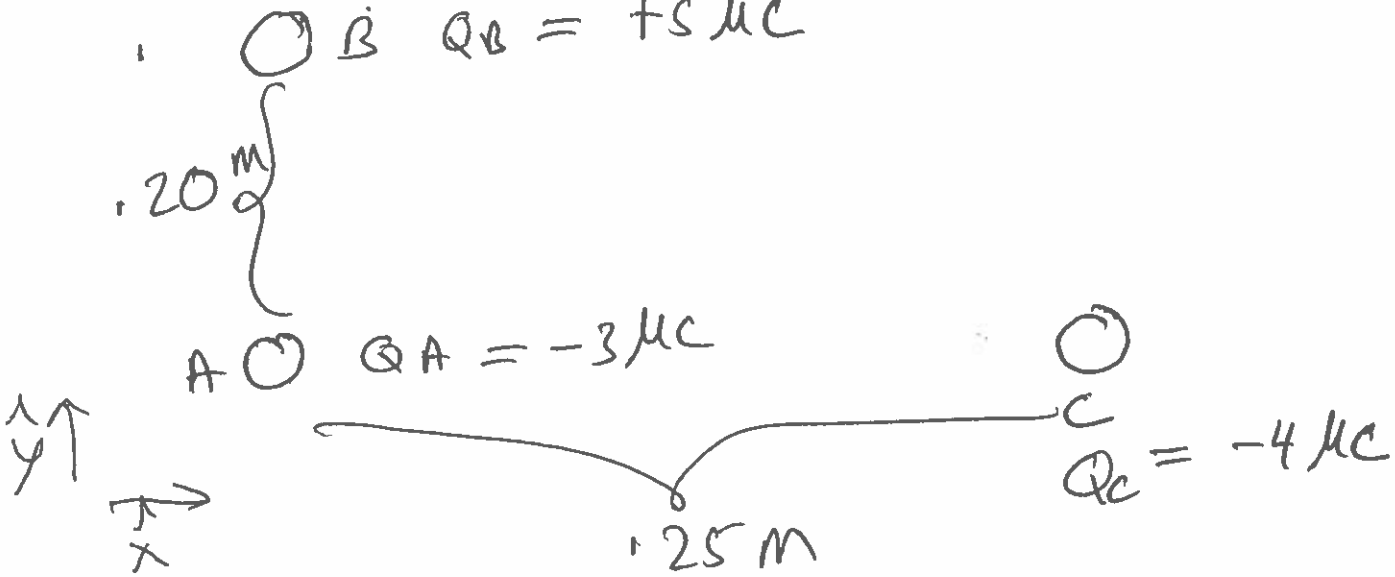
$m_A = (.020 kg)$

$\vec{a}_A = ?$

$\vec{F} = m\vec{a}$

$\vec{a} = \frac{\vec{F}}{m} = \frac{1.64N}{0.020kg}(-\hat{x})$

$\boxed{\vec{a} = 82.0\ m/s^2\ (-\hat{x})}$



$\vec{F}_{net-A} = ?$

$\vec{F}_{net-A} = \vec{F}_{B\to A} + \vec{F}_{C\to A}$

$$\vec{F}_{NET\to A} = \frac{kQ_BQ_A}{r_{AB}^2}(+\hat{y}) + \frac{kQ_CQ_A}{r_{CA}^2}(-\hat{x})$$

$$= \frac{\left(8.99\times10^9 \frac{Nm^2}{C^2}\right)(5\times10^{-6}C)(3\times10^{-6}C)}{(1.20m)^2}(+\hat{y})$$

$$= \frac{\left(8.99\times10^9 \frac{Nm^2}{C^2}\right)(4\times10^{-6}C)(3\times10^{-6}C)}{(1.25m)^2}(-\hat{x})$$

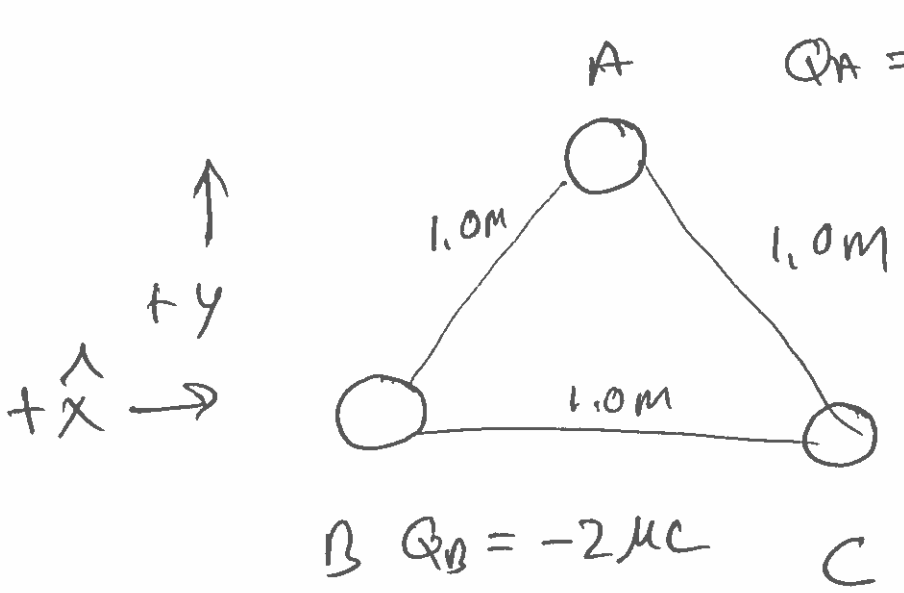
$$\vec{F}_{NET\to A} = 3.37\,N\,(+\hat{y}) + 1.73\,N\,(-\hat{x})$$

$$\left|\vec{F}_{NET\to A}\right| = \sqrt{(3.37\,N)^2 + (1.73N)^2}$$

$$= 3.80\,N$$

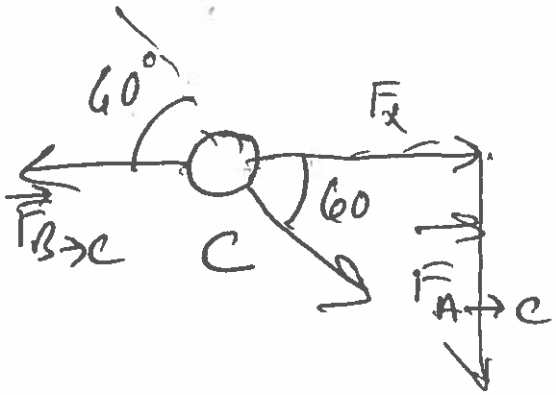
$$\theta = \tan^{-1}\left(\frac{3.37N}{1.73N}\right) = 62.8^\circ$$

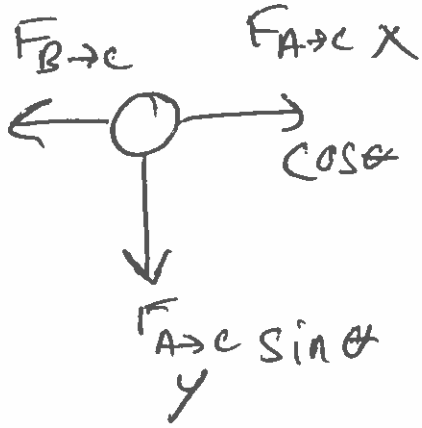
$$\vec{F}_{NET\to A} = 3.80\,N \text{ @ } 62.8^\circ \text{ above } (-\hat{x})$$



$$\vec{F}_{net \to C} = ?$$

$$\vec{F}_{net \to C} = \vec{F}_{A \to C} + \vec{F}_{B \to C}$$





$$\vec{F}_{net \to C} = \left(\vec{F}_{net \to C}\right)_x \hat{x} + \left(\vec{F}_{net \to C}\right)_y \hat{y}$$

$$\left(F_{net \to C}\right)_x = F_{A \to Cx} - F_{B \to C}$$

$$= \frac{k Q_A Q_C}{r_{AC}^2} \cos 60^\circ - \frac{k Q_B Q_C}{r_{BC}^2}$$

$$= \frac{\left(8.99 \times 10^9 \frac{N m^2}{C^2}\right)\left(1 \times 10^{-6} C\right)\left(4 \times 10^{-6} C\right)}{(1 m)^2} \cos 60^\circ$$

$$- \frac{\left(8.99 \times 10^9 \frac{N m^2}{C^2}\right)\left(2 \times 10^{-6} C\right)\left(4 \times 10^{-6} C\right)}{(1 m)^2}$$

$$= 1,80 \times 10^{-2} N - 7,19 \times 10^{-2} N$$

$$= -5,39 \times 10^{-2} N \, (\hat{x})$$

$$\text{or} \quad 5,39 \times 10^{-2} N \, (-\hat{x})$$

$$(F_{net\to C})_y = \frac{k\,Q_A Q_C}{r_{AC}} \sin 60^\circ\,(-\hat{y})$$

$$= \frac{(8.99\times10^{9}\,N)(1\times10^{-6}\,C)(4\times10^{-6}\,C)}{(1\,m)^2}\sin(60)$$

$$= 3.11\times10^{-2}\,N\,(-\hat{y})$$

$$\vec{F}_{net\to C} = 5.39\times10^{-2}\,N\,(-\hat{x}) + 3.11\times10^{-2}\,N\,(-\hat{y})$$

$$F_{net\to C} = \sqrt{(5.39\times10^{-2}\,N)^2 + (3.11\times10^{-2}\,N)^2}$$

$$= 6.22\times10^{-2}\,N$$

$$\theta = \tan^{-1}\left(\frac{3.11\times10^{-2}\,N}{5.39\times10^{-2}\,N}\right)$$

$$\theta = 30^\circ$$

$$\vec{F}_{net\to C} = 6.22\times10^{-2}\,N \text{ @ } 30^\circ \text{ below } (-\hat{x})$$