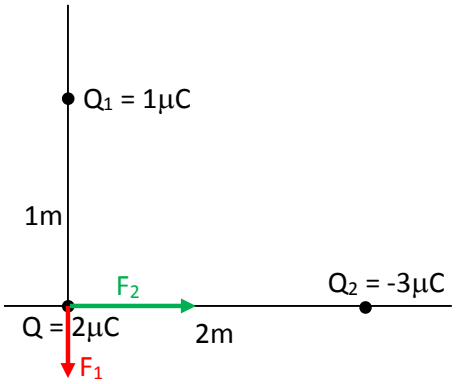
PHY 232 Summer 2016 Class Work

Class 2. Calculation with Coulomb's Law



(a) Calculate the electric force acting on Q due to Q1 (magnitude and direction)

$$|\vec{F}_1| = \frac{1}{4\pi\varepsilon_0}\frac{QQ_1}{r^2}$$
$$= \frac{1}{4\pi(8.854\times10^{-12})}\frac{(2\times10^{-6})(1\times10^{-6})}{1^2}$$
$$= \underline{\underline{0.0180\ \text{N}}}$$

Direction: in the negative y-axis direction (electric force between Q and Q1 is repulsive)

(b) Calculate the electric force acting on Q due to Q2 (magnitude and direction)

$$|\vec{F}_2| = \frac{1}{4\pi\varepsilon_0}\frac{QQ_2}{r^2}$$
$$= \frac{1}{4\pi(8.854\times10^{-12})}\frac{(2\times10^{-6})(3\times10^{-6})}{(2)^2}$$
$$= \underline{\underline{0.0135\ \text{N}}}$$

Direction: in the positive x-axis direction (electric force between Q and Q1 is repulsive)

(c) What is the magnitude of the total force acting on Q due to Q_1 and Q_2?

$$\vec{F}_{\text{Total x}} = 0.0135\ \text{N} \qquad \text{(part (b))}$$
$$\vec{F}_{\text{Total y}} = 0.0180\ \text{N} \qquad \text{(part (a))}$$
$$|\vec{F}_{\text{Total}}| = \sqrt{(F_{\text{Total x}})^2 + (F_{\text{Total y}})}$$
$$= \sqrt{(0.0135)^2 + (0.0180)^2}$$
$$= \underline{\underline{0.0225\text{N}}}$$

If you have time, try to calculate the electric force (magnitude and direction) acting on Q1 due to Q and Q2. How about the electric force acting on Q2?