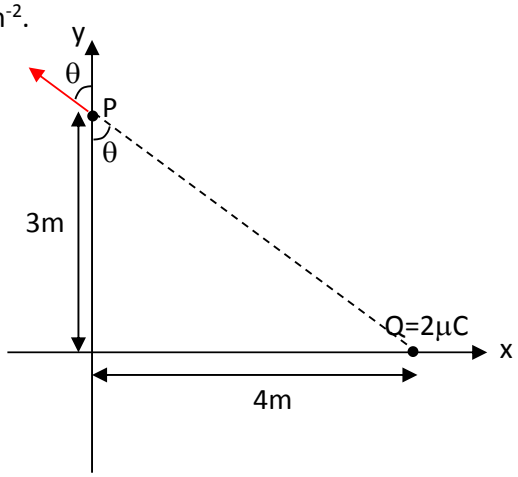
Name: _____ Sec: _____

PHY 232 Fall 2014 Class Work

Class 5. Electric field

Given $\varepsilon_0 = 8.8542\times10^{-12}\ C^2N^{-1}m^{-2}$.



(a) Calculate the magnitude of the electric field at point P due to the 2μC charge.

$$|\vec{E}| = \frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2} = \frac{1}{4\pi\cdot 8.854\times10^{-12}}\cdot\frac{2\times10^{-6}}{5^2} = \underline{\underline{719.0\ NC^{-1}}}$$

(b) In the figure above, sketch the vector of the electric field at point P.

See red arrows in the figure.

(c) Calculate the x- and y- components of the electric field at point P.

$$E_x = -|\vec{E}|\sin\theta = -719.0\times\frac{4}{5} = \underline{\underline{-575.2NC^{-1}}}$$

$$E_y = |\vec{E}|\cos\theta = 719.0\times\frac{3}{5} = \underline{\underline{431.4NC^{-1}}}$$

(d) If a charge of q= 5μC is placed at point P, calculate the x- and y- components of the electric force acting on q.

$$F_x = qE_x = 5\times10^{-6}\times(-575.2) = \underline{\underline{-2.876\times10^{-3}\ N}}$$

$$F_y = qE_y = 5\times10^{-6}\times431.4 = \underline{\underline{2.157\times10^{-3}\ N}}$$

(e) If a charge of q= 10μC is placed at point P, calculate the x- and y- components of the electric force acting on q.

$$F_x = qE_x = 10\times10^{-6}\times(-575.2) = \underline{\underline{-5.752\times10^{-3}\ \text{N}}}$$

$$F_y = qE_y = 10\times10^{-6}\times431.4 = \underline{\underline{4.314\times10^{-3}\ \text{N}}}$$