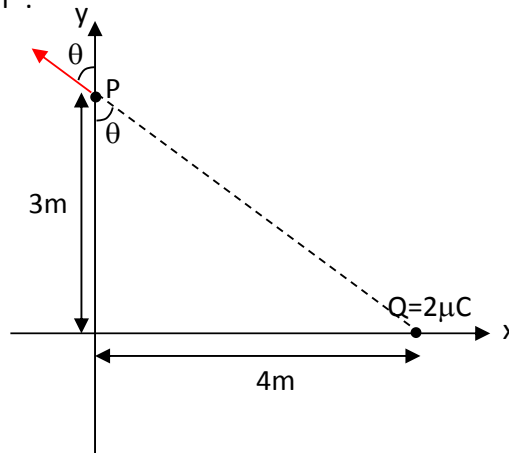


Name: _____

Sec: _____

PHHY 232 Fall 2017 Supplementary Work (will not be collected)

Class 5. Electric field

Given $\epsilon_0 = 8.8542 \times 10^{-12} \text{ C}^2 \text{N}^{-1} \text{m}^{-2}$.

- (a) Calculate the magnitude of the electric field at point P due to the
- $2\mu\text{C}$
- charge.

$$|\vec{E}| = \frac{1}{4\pi\epsilon_0} \frac{Q}{r^2} = \frac{1}{4\pi \cdot 8.854 \times 10^{-12}} \cdot \frac{2 \times 10^{-6}}{5^2} = \underline{\underline{719.0 \text{ NC}^{-1}}}$$

- (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.

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

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

- (d) If a charge of
- $q = 5\mu\text{C}$
- is placed at point P, calculate the x- and y- components of the electric force acting on q.

$$F_x = qE_x = 5 \times 10^{-6} \times (-575.2) = \underline{\underline{-2.876 \times 10^{-3} \text{ N}}}$$

$$F_y = qE_y = 5 \times 10^{-6} \times 431.4 = \underline{\underline{2.157 \times 10^{-3} \text{ N}}}$$

- (e) If a charge of
- $q = 10\mu\text{C}$
- is placed at point P, calculate the x- and y- components of the electric force acting on q.

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

$$F_y = qE_y = 10 \times 10^{-6} \times 431.4 = \underline{\underline{4.314 \times 10^{-3} \text{ N}}}$$