Phy220 Unquiz 01

Note: $k=8.99\text{x}10^{9}\frac{Nm^2}{C^2}$

Consider the following charges: (1:+2μC;2,3),(2:-3μC;1,5). Find the force on charge 2 due to charge 1. The coordinates here are in SI units.

Steps:

Identify p charge:

$\vec{r}_1=$

$\vec{r}_2=$

$\vec{r}_{ip}=$

$|\vec{r}_{ip}|=$

Complete the Force:

$$\vec{F}_{?}p=k\frac{q_{?}q_p\vec{r}_{?p}}{|?|^{?}}$$

Find the numerical vector force with correct SI units:

$\vec{F}_{??}=(?)\hat{x}+(?)\hat{y}?$

Phy250 Unquiz 01

Note: $k=8.99\text{x}10^{9}\,\frac{\text{Nm}^2}{\text{C}^2}$

Consider the following charges: (1:+2μC;2,3),(2:-3μC;1,5). Find the force on charge 2 due to charge 1. The coordinates here are in SI units.

Steps:

Identify p charge: Charge 2 is charge p.

$\vec{r}_1=2\hat{x}+3\hat{y}$

$\vec{r}_2=1\hat{x}+5\hat{y}=\vec{r}_p$

$\vec{r}_{ip}=\vec{r}_p-\vec{r}_i=(1-2)\hat{x}+(5-3)\hat{y}=-1\hat{x}+2\hat{y}$

$|\vec{r}_{ip}|=\sqrt{(-1)^2+2^2}=\sqrt{5}=2.24$

Complete the Force:

$$\vec{F}_{1p}=k\,\frac{q_1 q_p \vec{r}_{1p}}{|\vec{r}_{ip}|^3}$$

Find the numerical vector force with correct SI units:

$$F=8990\mu\left[\frac{-1\hat{x}}{2.24^3}+\frac{2\hat{y}}{2.24^3}\right]=8990\mu\left[\frac{-1}{11.2}\hat{x}+\frac{2}{11.2}\hat{y}\right]$$
$$=8990\mu\left[-0.089\hat{x}+.179\hat{y}\right]=-803\text{x}10^{-6}\hat{x}1605\text{x}10^{-6}\hat{y}$$
$$=8.03\text{x}10^{-4}\hat{x}+1.605\text{x}10^{-3}\hat{y}\,\text{N}$$

$\vec{F}_{12}=\left[(8.03\text{x}10^{-4})\hat{x}+(1.605\text{x}10^{-3})\hat{y}\right]\text{N}$