

CLASS EXERCISE #5 - 20 June 2005

(1) Suppose that the electric field at a certain point is

$$\vec{E} = (-1000 \text{ N/C}, +500 \text{ N/C}).$$

(a) What is the electric force produced by that field on a charge of $15 \mu\text{C}$?

$$\begin{aligned}\vec{F} &= q\vec{E} = (15 \times 10^{-6} \text{ C})(-1000 \text{ N/C}, 500 \text{ N/C}) \\ &= (-0.015 \text{ N}, 0.0075 \text{ N})\end{aligned}$$

(b) What is the electric force produced by that field on a charge of $-20 \mu\text{C}$?

$$\begin{aligned}\vec{F} &= q\vec{E} = (-20 \times 10^{-6} \text{ C})(-1000 \text{ N/C}, 500 \text{ N/C}) \\ &= (0.020 \text{ N}, -0.010 \text{ N})\end{aligned}$$

(2) At a different point in space the $-20 \mu\text{C}$ charge experiences an electrical force $\vec{F} = (4.0 \times 10^{-4} \text{ N}, -2.0 \times 10^{-4} \text{ N})$. What is the electric field at that point?

$$\begin{aligned}\vec{E} &= \vec{F}/q = (4.0 \times 10^{-4} \text{ N}, -2.0 \times 10^{-4} \text{ N})/(-20 \times 10^{-6} \text{ C}) \\ &= (-20 \text{ N/C}, +10 \text{ N/C})\end{aligned}$$