

Physics 102-Rec
 Quiz # 5
 Chapter 23

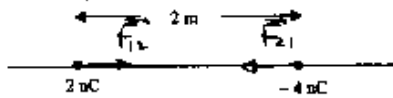
Date: 16 April 2002

Name: Key Id: _____ Sect: _____

Two point charges are located as shown in the figure.

(a) What is the magnitude and direction of the force on each charge?

magnitude: $F_{12} = \frac{k q_1 q_2}{r_{12}^2}$

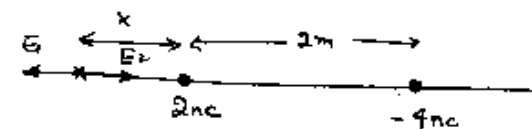
$$= \frac{9 \times 10^9 (2 \times 10^{-9})(4 \times 10^{-9})}{(2)^2} = 18 \times 10^{-9} \text{ N}$$


direction: To the right (see figure)

$$F_{21} = F_{12} = 18 \times 10^{-9} \text{ N}$$

direction: To the left (see figure)

(b) Find the location (other than infinity) where the net electric field is zero.

$$\vec{E}_{\text{net}} = E_2 - E_1 = 0$$


$$\Rightarrow E_2 = E_1$$

$$\frac{k q_2}{(2+x)^2} = \frac{k q_1}{x^2} \Rightarrow \frac{4}{(2+x)^2} = \frac{2}{x^2}$$

$$\Rightarrow 2x^2 = (2+x)^2$$

$$x\sqrt{2} = 2+x \Rightarrow x = \frac{2}{\sqrt{2}-1} = 4.8 \text{ m}$$

$x = 4.8 \text{ m}$ to the left of the
 2 nC charge