

## Homework#1

Due on: Wednesday 5/11/1431 H

### Question#1:

Three point charges are arranged as shown in Figure P23.19. (a) Find the vector electric field that the 6.00-nC and -3.00-nC charges together create at the origin. (b) Find the vector force on the 5.00-nC charge.

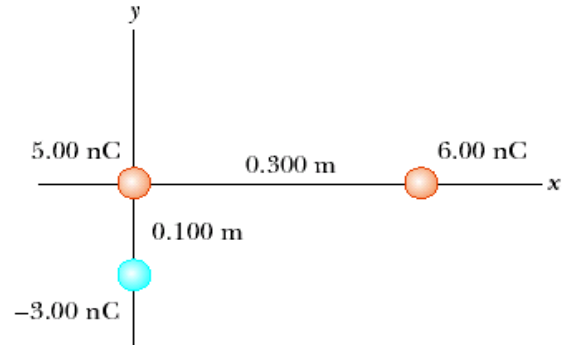


Figure P23.19

$$(a) \quad E_1 = \frac{k_e |q_1|}{r_1^2} (-\hat{j}) = \frac{(8.99 \times 10^9)(3.00 \times 10^{-9})}{(0.100)^2} (-\hat{j}) = -(2.70 \times 10^3 \text{ N/C})\hat{j}$$

$$E_2 = \frac{k_e |q_2|}{r_2^2} (-\hat{i}) = \frac{(8.99 \times 10^9)(6.00 \times 10^{-9})}{(0.300)^2} (-\hat{i}) = -(5.99 \times 10^2 \text{ N/C})\hat{i}$$

$$E = E_2 + E_1 = \boxed{-(5.99 \times 10^2 \text{ N/C})\hat{i} - (2.70 \times 10^3 \text{ N/C})\hat{j}}$$

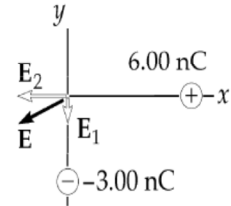


FIG. P23.19

$$(b) \quad F = qE = (5.00 \times 10^{-9} \text{ C})(-599\hat{i} - 2700\hat{j}) \text{ N/C}$$

$$F = (-3.00 \times 10^{-6} \hat{i} - 13.5 \times 10^{-6} \hat{j}) \text{ N} = \boxed{(-3.00\hat{i} - 13.5\hat{j}) \mu\text{N}}$$