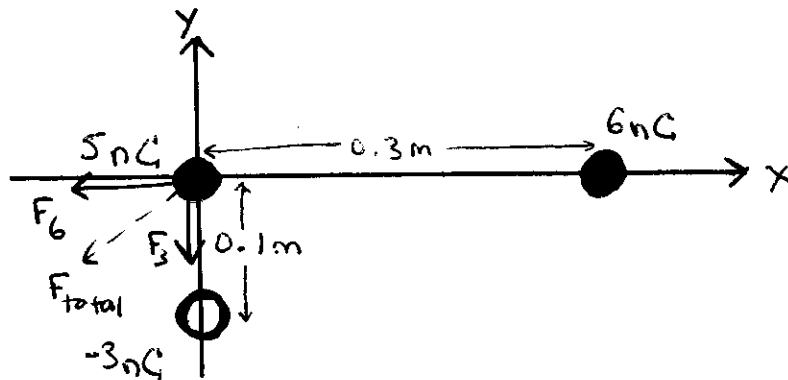


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Phys 122-401  
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## QUIZ 1

Three charges are arranged as shown.  
Find the magnitude and direction of the  
electrostatic force on the charge at the origin.



Coulomb's Law:  $F_e = \frac{k |q_1| |q_2|}{r^2}$  where  $k = 8.99 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2}$

$$F_6 = \frac{(8.99 \times 10^9)(5 \times 10^{-9})(6 \times 10^{-9})}{(0.3)^2} = 3.00 \times 10^{-6} \text{ N (repulsive)}$$

$$F_3 = \frac{(8.99 \times 10^9)(5 \times 10^{-9})(3 \times 10^{-9})}{(0.1)^2} = 1.35 \times 10^{-5} \text{ N (attractive)}$$

$$\vec{F}_{\text{total}} = -F_6 \hat{x} + F_3 \hat{y}$$

$$|\vec{F}_{\text{total}}| = \sqrt{F_6^2 + F_3^2} = 1.38 \times 10^{-5} \text{ N}$$

$$\tan \theta = \frac{F_3}{F_6} \Rightarrow \theta = 77.5^\circ \text{ below } -x\text{-axis}$$

$$\vec{F}_{\text{total}} = 1.38 \times 10^{-5} \text{ N at } 77.5^\circ \text{ below negative } x\text{-axis.}$$