Coulomb's Law

$$F_Q = \frac{kq_1q_2}{r^2} \qquad \left(k = 9.0\times10^{9}\,\frac{N\cdot m^2}{C^2}\right)$$

(attractive/repulsive)

compare to: $$F_g = \frac{Gm_1m_2}{r^2} \qquad \left(G = 6.67\times10^{-11}\,\frac{N\cdot m^2}{kg^2}\right)$$

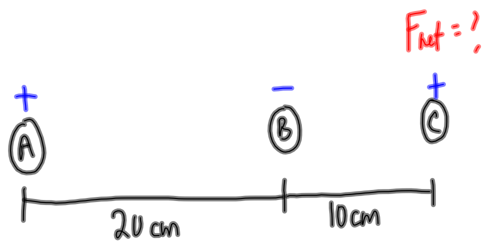
(only attractive)

SP/584 (FOP)

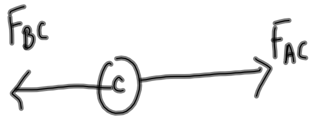
$q_A = +4.0\times10^{-6}\,C$

$q_B = -2.5\times10^{-7}\,C$

$q_C = +6.4\times10^{-6}\,C$



Draw a FBD for C:



$$F_{AC} = \frac{kq_Aq_C}{r^2}$$

$$F_{AC} = \frac{\left(9.0\times10^{9}\,\frac{N\cdot m^2}{C^2}\right)(4.0\times10^{-6}\,C)(6.4\times10^{-6}\,C)}{(0.30\,m)^2}$$

$$F_{AC} = 2.56\,N$$

$$F_{BC} = \frac{\left(9.0\times10^{9}\,\frac{N\cdot m^2}{C^2}\right)(2.5\times10^{-7}\,C)(6.4\times10^{-6}\,C)}{(0.10\,m)^2}$$

$$F_{BC} = 1.44\,N$$

$F_{net}(C) = 2.56\,N - 1.44\,N$

$F_{net}(C) \doteq 1.1\,N$

$\vec{F}_{net}(C) = 1.1\,N\,[R]$

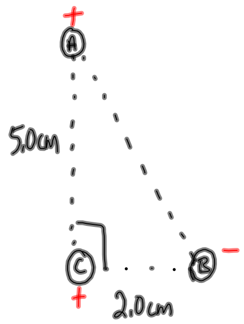
MP|639

$q_A = +5.0\mu C \rightarrow \times 10^{-6}$

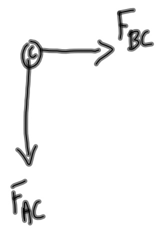
$q_B = -2.0\mu C$

$q_C = +3.0\mu C$

$\vec{F}_{net}(C) = ?$



Draw a FBD for C:



$$F_{AC} = \frac{kq_Aq_C}{r^2}$$

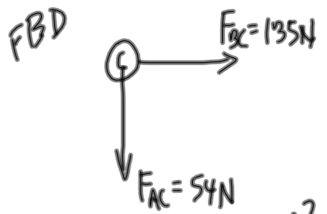
$$F_{AC} = \frac{\left(9.0\times10^9\,\frac{N\cdot m^2}{C^2}\right)\left(5.0\times10^{-6}C\right)\left(3.0\times10^{-6}C\right)}{(0.050m)^2}$$

$F_{AC} = 54N$

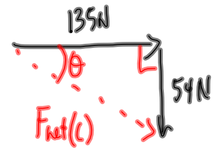
$$F_{BC} = \frac{\left(9.0\times10^9\,\frac{N\cdot m^2}{C^2}\right)\left(2.0\times10^{-6}C\right)\left(3.0\times10^{-6}C\right)}{(0.020m)^2}$$

$F_{BC} = 13\dot{5}N$

FBD



Vector addition diagram.



$c^2 = a^2 + b^2$

$c^2 = (13\dot{5})^2 + (5\dot{4})^2$

$c \doteq 1.5\times10^2 N$

$\tan\theta = \frac{54N}{135N}$

$\theta = \tan^{-1}\left(\frac{54N}{135N}\right)$

$\theta \doteq 22^\circ$

The net force on C is
1.5×10^2N [22° cw from +-xaxis]

TODO: PP|638
PP|640-641