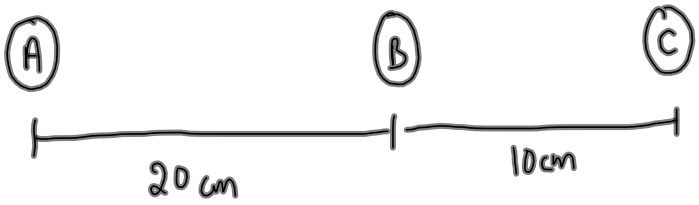
Coulomb's Law

$$F_Q = \frac{k q_1 q_2}{r^2} \qquad \left(k = 9.0\times10^9 \frac{N\cdot m^2}{C^2}\right)$$

← do not use the sign.

Example (FOP/584)

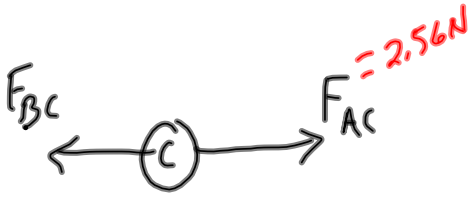
$q_A = +4.0\times10^{-6}C$ $q_B = -2.5\times10^{-7}C$ $q_C = +6.4\times10^{-6}C$



Determine the net force on C:

Draw a FBD for C

$$F_{AC} = \frac{k q_A q_C}{r_{AC}^2}$$



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

$$F_{BC} = \frac{k(2.5\times10^{-7}C)(6.4\times10^{-6}C)}{(0.10m)^2}$$

$F_{AC} = 2.56N$

$F_{BC} = 1.44N$

$$\vec{F}_{net} = F_{AC} - F_{BC}$$

$$\vec{F}_{net} = 2.56N - 1.44N$$

$\vec{F}_{net} = 1.1\ N$ [right]

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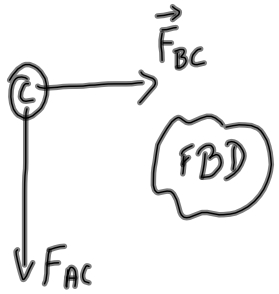
$q_A = +5.0\,\mu C$

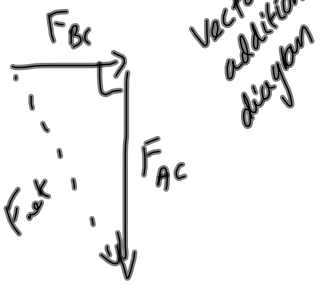
$q_B = -2.0\,\mu C$

$q_C = +3.0\,\mu C$



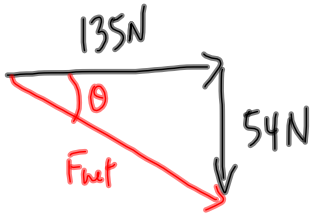
$$F_{BC} = \frac{k(2.0\times10^{-6}C)(3.0\times10^{-6}C)}{(0.020m)^2}$$

$F_{BC} = 135\,N$



$$F_{AC} = \frac{k(5.0\times10^{-6}C)(3.0\times10^{-6}C)}{(0.050m)^2}$$

$F_{AC} = 54\,N$



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

$c^2 = (54N)^2 + (135N)^2$

$c = 145.399\,N$

$c = 1.5\times10^2\,N$

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

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

$\theta = 22^\circ$

The net force on C is $1.5\times10^2\,N$ [22° CW from + x-axis]

TO DO: PP|640-641