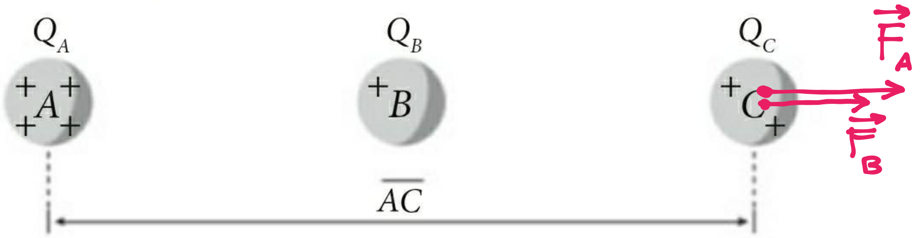
23/9/2021

42 ◆◆◆ **ORA PROVA TU** Il segmento AC è lungo 24 cm e B è il suo punto medio. In A, B e C sono poste tre cariche puntiformi positive che valgono, rispettivamente, $Q_A = 73{,}5$ nC, $Q_B = 18{,}1$ nC e $Q_C = 33{,}8$ nC.

▶ Determina la forza elettrica totale che agisce sulla carica nel punto C.



[$7{,}7 \times 10^{-4}$ N]

$$\vec{F} = \vec{F}_A + \vec{F}_B \qquad \overline{AC} = r \qquad \overline{BC} = \frac{r}{2}$$

$$F = F_A + F_B = K_0 \frac{Q_A \cdot Q_C}{\overline{AC}^2} + K_0 \frac{Q_B \cdot Q_C}{\overline{BC}^2} =$$

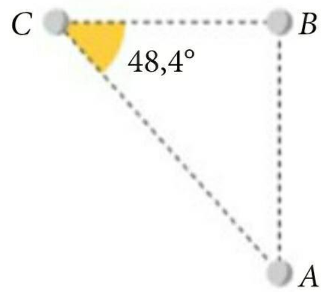
$$= K_0 \frac{Q_A \cdot Q_C}{r^2} + K_0 \frac{Q_B \cdot Q_C}{\frac{r^2}{4}} = \frac{K_0 \cdot Q_C}{r^2}\left(Q_A + 4 Q_B\right) =$$

$$= \frac{\left(8{,}99 \times 10^9 \ \frac{N \cdot m^2}{C^2}\right)\left(33{,}8 \times 10^{-9}\ C\right)}{24^2 \times 10^{-4}\ m^2}\left[\left(73{,}5 + 4 \cdot 18{,}1\right) \times 10^{-9}\ C\right] =$$

$$= 76{,}96\ldots \times 10^{-5}\ N \simeq \boxed{7{,}7 \times 10^{-4}\ N}$$

50 ◆◆◆ **ORA PROVA TU**

Tre cariche puntiformi $Q_A = 7{,}24$ nC, $Q_B = 13{,}8$ nC e $Q_C = -9{,}68$ nC sono poste nei vertici di un triangolo ABC, rettangolo in B. Il cateto AB misura 12,5 cm e l'angolo $B\hat{C}A$ misura 48,4°.



- Determina le componenti parallele ai due cateti delle forze esercitate da Q_A e da Q_B su Q_C.
- Determina il modulo della forza risultante che agisce su Q_C.

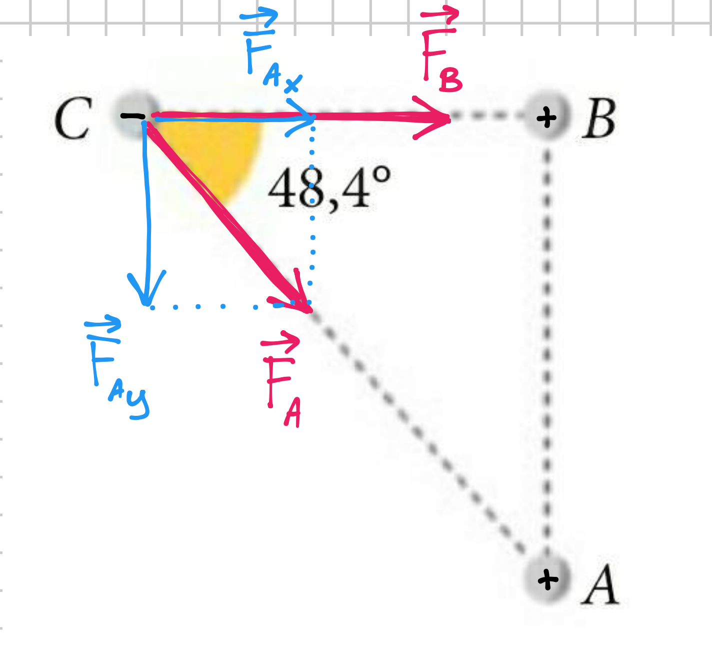
[$1{,}50 \times 10^{-5}$ N; $-1{,}69 \times 10^{-5}$ N; $1{,}14 \times 10^{-4}$ N]

$$\overline{AB} = \overline{AC} \cdot \sin 48{,}4°$$

$$\Rightarrow \overline{AC} = \frac{\overline{AB}}{\sin 48{,}4°}$$

$$\vec{F}_B = (F_B, 0)$$

$$\vec{F}_A = (F_{Ax}, -F_{Ay})$$



$$F_{Ax} = F_A \cdot \cos 48{,}4°$$

$$F_{Ay} = F_A \cdot \sin 48{,}4°$$

$$F_A = k_0 \frac{|Q_A| \cdot |Q_C|}{\overline{AC}^2}$$

$$F_{Ax} = k_0 \frac{|Q_A||Q_C|}{\frac{\overline{AB}^2}{(\sin 48{,}4°)^2}} \cdot \cos 48{,}4° =$$

$$= (8{,}99 \times 10^9) \frac{7{,}24 \times 9{,}68 \times 10^{-18}}{(12{,}5)^2 \times 10^{-4}} \cdot \sin^2 48{,}4° \cdot \cos 48{,}4° \text{ N} =$$

$$= 1{,}4970 \ldots \times 10^{-5} \text{ N} \simeq 1{,}50 \times 10^{-5} \text{ N}$$

$$F_{Ay} = k_0 \frac{|Q_A||Q_C|}{\frac{\overline{AB}^2}{(\sin 48{,}4^\circ)^2}} \cdot \sin 48{,}4^\circ =$$

$$= (8{,}99 \times 10^9) \frac{7{,}24 \times 9{,}68 \times 10^{-18}}{(12{,}5)^2 \times 10^{-4}} \cdot \sin^3 48{,}4^\circ \ \ N =$$

$$= 1{,}68619\ldots \times 10^{-5}\ N \simeq 1{,}69 \times 10^{-5}\ N$$

$$\boxed{\vec{F}_A = \left(1{,}50 \times 10^{-5}\ N\ ,\ -1{,}69 \times 10^{-5}\ N\right)}$$

$$F_B = K_0 \frac{|Q_B||Q_C|}{\overline{CB}^2} = K_0 \frac{|Q_B||Q_C|}{\overline{AB}^2} \cdot \left(\frac{\sin 48{,}4^\circ}{\cos 48{,}4^\circ}\right)^2 =$$

$$\boxed{\overline{CB} = \overline{AC} \cdot \cos 48{,}4^\circ = \frac{\overline{AB}}{\sin 48{,}4^\circ} \cdot \cos 48{,}4^\circ}$$

$$= 8{,}99 \times 10^9 \ \frac{(13{,}8)(9{,}68) \times 10^{-18}}{(12{,}5)^2 \times 10^{-4}} \left(\frac{\sin 48{,}4^\circ}{\cos 48{,}4^\circ}\right)^2 N =$$

$$= 9{,}7504\ldots \times 10^{-5}\ N \simeq 9{,}75 \times 10^{-5}\ N$$

$$\boxed{\vec{F}_B \left(9{,}75 \times 10^{-5}\ N\ ,\ 0\right)}$$

$$\vec{F}_{TOT} = \vec{F}_A + \vec{F}_B = \left(11{,}247\ldots \times 10^{-5}\ N,\ -1{,}6861\ldots \times 10^{-5}\ N\right) =$$

$$= (11{,}247\ ,\ -1{,}6861) \times 10^{-5}\ N$$

$$F_{TOT} = \sqrt{(11,247)^2 + (-1,6861)^2} \times 10^{-5}\,N =$$

$$= 11,372\ldots \times 10^{-5}\,N \simeq \boxed{1,14 \times 10^{-4}\,N}$$