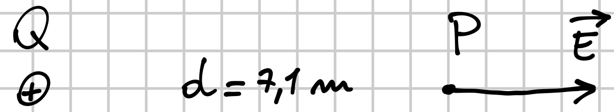
1/10/2019

25 ★★★

Alla distanza $d = 7{,}1$ m da una carica puntiforme Q il modulo del campo elettrico che essa genera è E.

▶ Calcola di quanto deve aumentare la distanza affinché il modulo del campo elettrico si riduca del 25%.

[1,1 m]



$$E_{FIN} = \frac{3}{4} E = \frac{3}{4} k_0 \frac{Q}{d^2} \qquad E_{FIN} = k_0 \frac{Q}{d_{FIN}^2}$$

$$d_{FIN} = d + x$$

$$\frac{3}{4} \cancel{k_0} \frac{\cancel{Q}}{d^2} = \cancel{k_0} \frac{\cancel{Q}}{(d+x)^2}$$

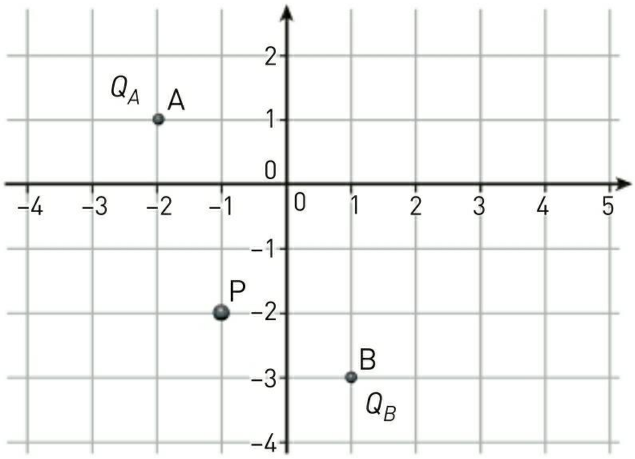
$$(d+x)^2 = \frac{4}{3} d^2$$

$$d + x = \frac{2}{\sqrt{3}} d$$

$$x = \left(\frac{2}{\sqrt{3}} - 1\right) d = \left(\frac{2}{\sqrt{3}} - 1\right)(7{,}1 \text{ m}) = 1{,}09\ldots \text{ m}$$

$$\simeq \boxed{1{,}1 \text{ m}}$$

26 ★★★ Due cariche elettriche $Q_A = -6{,}7$ nC e $Q_B = -4{,}1$ nC sono poste, rispettivamente, in A(−2,0;1,0) e B(1,0;−3,0). Le coordinate sono espresse in metri.



▶ Determina le componenti del vettore campo elettrico nel punto P(−1,0; −2,0) e il suo modulo.

[4,7 N/C; 2,4 N/C; 5,3 N/C]

$$\vec{E}_P = (E_{Px}, E_{Py})$$

$$\vec{E}_P = \vec{E}_{AP} + \vec{E}_{BP}$$

$$\vec{E}_{AP} = \underbrace{k_0 \frac{Q_A}{\overline{AP}^2}} \hat{AP}$$

VERSORE da A a P

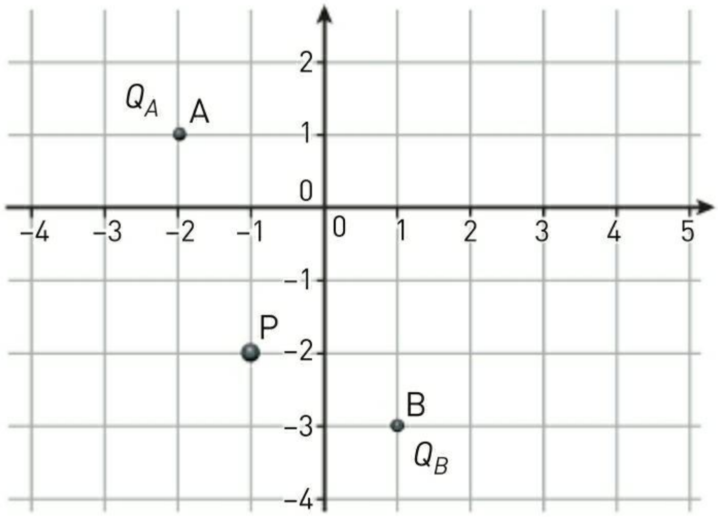
$$\vec{AP} = (1, -3) \qquad \overline{AP} = \sqrt{10}$$

$$\hat{AP} = \frac{1}{\sqrt{10}} \vec{AP} = \left(\frac{1}{\sqrt{10}}, -\frac{3}{\sqrt{10}}\right)$$

$$k_0 \frac{Q_A}{\overline{AP}^2} = \left(8{,}988 \times 10^9 \frac{N \cdot \cancel{m^2}}{C^{\cancel{2}}}\right) \cdot \frac{-6{,}7 \times 10^{-9} \cancel{C}}{10 \cancel{m^2}} = -6{,}02196 \frac{N}{C}$$

$$\vec{E}_{AP} = \left(-6{,}02196 \frac{N}{C}\right)\left(\frac{1}{\sqrt{10}}, -\frac{3}{\sqrt{10}}\right) =$$

$$= \left(-1{,}90431\ldots \frac{N}{C}, 5{,}71293\ldots \frac{N}{C}\right)$$



$$Q_B = -4{,}1 \times 10^{-9}\ C$$

$$\vec{BP} = (-2, 1) \qquad \overline{BP} = \sqrt{5}$$

$$\hat{BP} = \left(-\frac{2}{\sqrt{5}}, \frac{1}{\sqrt{5}}\right)$$

$$\vec{E}_{BP} = K_0 \frac{Q_B}{\overline{BP}^2}\hat{BP}$$

$$K_0 \frac{Q_B}{\overline{BP}^2} = \left(8{,}988 \times 10^9\ \frac{N \cdot \cancel{m^2}}{\cancel{C^2}}\right) \frac{-4{,}1 \times 10^{-9}\ \cancel{C}}{5\ \cancel{m^2}} = -7{,}37016\ \frac{N}{C}$$

$$\vec{E}_{BP} = \left(-7{,}37016\ \frac{N}{C}\right)\left(-\frac{2}{\sqrt{5}}, \frac{1}{\sqrt{5}}\right) = \left(6{,}59207\ldots \frac{N}{C}, -3{,}2960\ldots \frac{N}{C}\right)$$

$$\vec{E}_{TOT} = \vec{E}_{AP} + \vec{E}_{BP} = \left(-1{,}90431\ldots \frac{N}{C}, 5{,}71293\ldots \frac{N}{C}\right) +$$

$$\left(6{,}59207\ldots \frac{N}{C}, -3{,}2960\ldots \frac{N}{C}\right) =$$

$$= \left(4{,}687\ldots \frac{N}{C}, 2{,}4169\ldots \frac{N}{C}\right) \simeq$$

$$\simeq \boxed{\left(4{,}7\ \frac{N}{C}, 2{,}4\ \frac{N}{C}\right)}$$

$$E_{TOT} = \sqrt{(4{,}687\ldots)^2 + (2{,}4169\ldots)^2}\ \frac{N}{C} = 5{,}27\ldots \frac{N}{C} \simeq \boxed{5{,}3\ \frac{N}{C}}$$