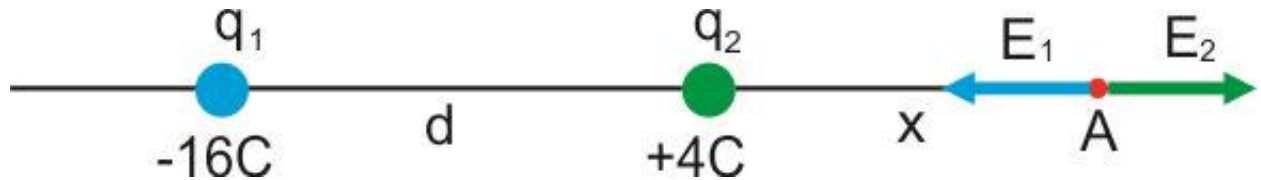


Answer on Question #67475- Physics / Other

Two charges $q_1 = -16 \text{ C}$ and $q_2 = +4 \text{ C}$, are fixed in place and separated by $d = 3.0 \text{ m}$. at what spot along a line through the charges is the net electric field zero? what would be the force on a charge of $+14 \text{ C}$ placed at this spot?

Solution:



Let us assume that zero net electric field is occurring at the point A. So

$$E_1 = E_2.$$

$$E_1 = k \frac{|q_1|}{(d+x)^2}, \quad E_2 = k \frac{|q_2|}{x^2},$$

We obtain

$$\frac{|q_1|}{(d+x)^2} = \frac{|q_2|}{x^2},$$

$$x\sqrt{|q_1|} = (d+x)\sqrt{|q_2|},$$

$$x(\sqrt{|q_1|} + \sqrt{|q_2|}) = d\sqrt{|q_2|},$$

$$x = d \frac{\sqrt{|q_2|}}{\sqrt{|q_1|} + \sqrt{|q_2|}} = d \frac{1}{\sqrt{\frac{|q_1|}{|q_2|}} + 1} = \frac{3}{\sqrt{4} + 1} = 1 \text{ m}.$$

Thus, at the point A there is a zero net electric field.

The force that would be acted on the charge placed at this point is equal to zero.

Answer: The zero net electric field there is at the point that displaced from positive charge to the right on 1 m.

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