

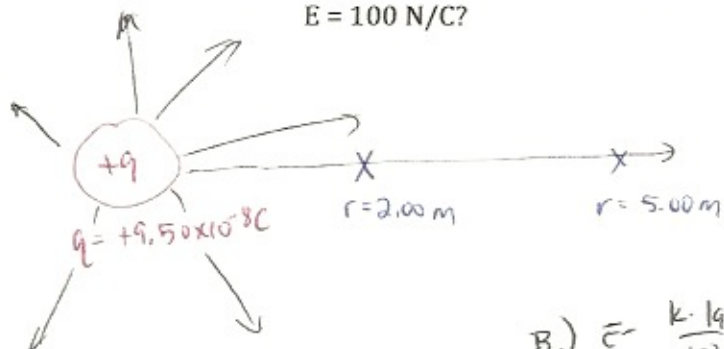
Physics: Electric Fields & Electric Potential

Electric Field: Measuring from a Point Charge

Example 3:

A point charge ($q = +9.50 \times 10^{-8} \text{ C}$) is generating part of the electric field.

- Calculate the strength of the electric field 2.00 m away from this charge.
- Calculate the strength of the electric field 5.00 m away from this charge.
- How far away from this point charge must you be to experience an electric field $E = 100 \text{ N/C}$?



$$A.) E = \frac{k \cdot |q|}{r^2}$$

$$E = \frac{(8.99 \times 10^9) \cdot |9.50 \times 10^{-8}|}{(2.0)^2}$$

$$E = 213.5 \text{ N/C}$$

$$B.) E = \frac{k \cdot |q|}{r^2}$$

$$E = \frac{(8.99 \times 10^9) \cdot |9.50 \times 10^{-8}|}{(5.0)^2}$$

$$E = 34.2 \text{ N/C}$$

$$C.) E = 100 \text{ N/C}$$

$$r = ?$$

$$E = \frac{k \cdot |q|}{r^2}$$

$$E \cdot r^2 = k \cdot |q|$$

$$r = \sqrt{\frac{k \cdot |q|}{E}}$$

$$r = \sqrt{\frac{(8.99 \times 10^9) \cdot |9.50 \times 10^{-8}|}{100}}$$

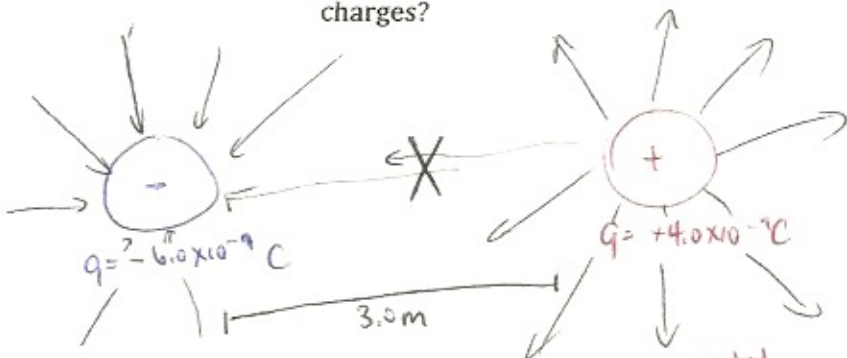
$$r = 2.92 \text{ m}$$

Positive point charges generate a field that goes away from them.

Example 4:

Charges of -6.0×10^{-9} and $+4.0 \times 10^{-9}$ are 3.0 m apart. Determine the electric field at a point midway between them.

- What is the electric field generated by the negative charge?
- What is the electric field generated by the positive charge?
- What is the net strength of the electric field at the point half-way between the charges?



$$E = \frac{k \cdot |q|}{r^2}$$

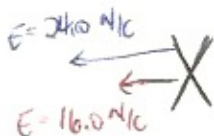
$$E = \frac{(8.99 \times 10^9) \cdot |-6.0 \times 10^{-9}|}{(1.5)^2}$$

$$E = 240 \text{ N/C to the left}$$

$$E = \frac{k \cdot |q|}{r^2}$$

$$E = \frac{(8.99 \times 10^9) \cdot |4.0 \times 10^{-9}|}{(1.5)^2}$$

$$E = 160 \text{ N/C to the left}$$



$$E_{\text{net}} = 240 + 160$$

$$E_{\text{net}} = 400 \text{ N/C to the left}$$