

Physics 100B, Quiz 1

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Name: Standard Answer SCORE:

Find your solutions to the following questions. For each question, please give original formula, details of the formula with known data substituted, and the final answer.

(1) In the X and Y coordinate system, two point charges lie on the X and Y axes, respectively. The first charge Q1 of $-6.2 \mu\text{C}$ is located on X axis with $x = +4 \text{ cm}$. The second charge Q2 of $9.6 \mu\text{C}$ is located on Y axis with $y = 4 \text{ cm}$.

(a) What is the magnitude of the net electric field at the position P ($x = +4 \text{ cm}$ and $y = +4 \text{ cm}$)?

(b) If a charge of $Q = 5.0 \mu\text{C}$ is placed at the position P, what is the magnitude of electric-static force applied on Q?

(a)

$$E_1 = k \frac{|Q_1|}{r_1^2} = 8.99 \times 10^9 \frac{6.2 \times 10^{-6}}{(4 \times 10^{-2})^2} = 3.48 \times 10^7 \text{ N/C}$$

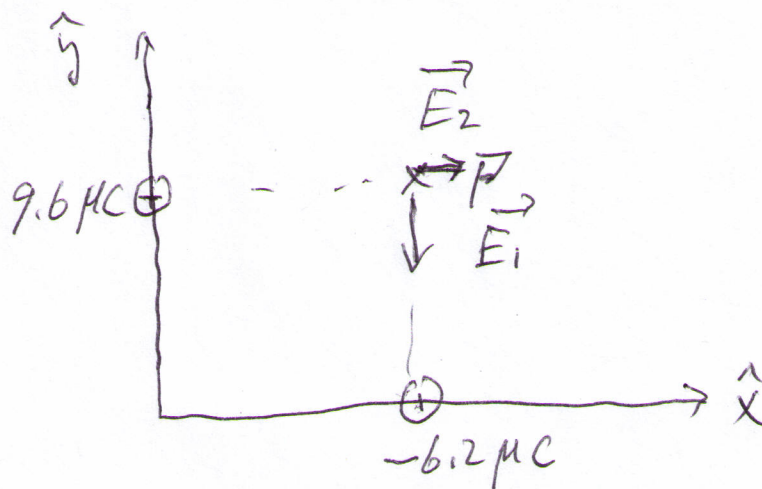
$$E_2 = k \frac{|Q_2|}{r_2^2} = 8.99 \times 10^9 \frac{9.6 \times 10^{-6}}{(4 \times 10^{-2})^2} = 5.39 \times 10^7 \text{ N/C}$$

$$E_{\text{net}} = \sqrt{E_1^2 + E_2^2} = \underline{6.42 \times 10^7 \text{ N/C}}$$

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(b)

$$F = E_{\text{net}} \cdot Q = (6.42 \times 10^7) \times (5.0 \times 10^{-6}) = \underline{3.21 \times 10^2 \text{ N}}$$



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