


Reminders 2-06-08:

- Next Webassign Due February 10**
- Electric Field Conceptual Questions Due 2/14**
- Start Reading Chapter 16**
- Write your name and last 4 digits of ID on random page in book. Do not leave books unattended (it will disappear).**

Objectives:

- Coulomb's Law**
- The Electric Field**
- Electric Field Lines**
- Electric Fields and Conductors**



Physics 2B Old Exams

- Dominic Calabrese -

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OLD PROBLEMS

Note: The above sample exams were used in class periods that were 50 minutes in length. As a result, some of the exams were combined into one exam.

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Conceptual Questions

(to be assigned as needed)

[Wave Motion & Sound](#)

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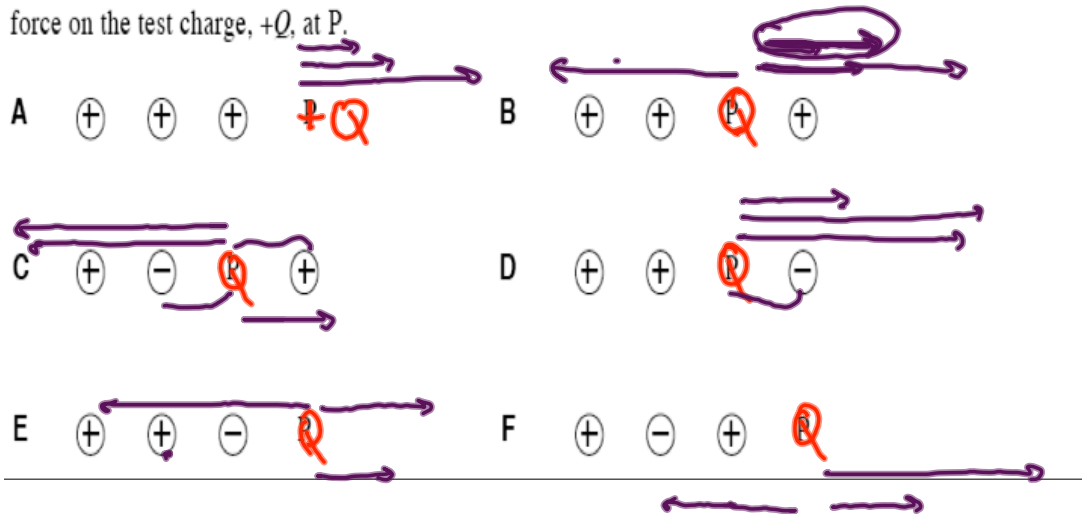
ELECTRIC FORCES

- **What happens to the force between two charged particles if the distance between them is tripled? Halved?**
- **List some differences between the gravitational force and the electric force.**

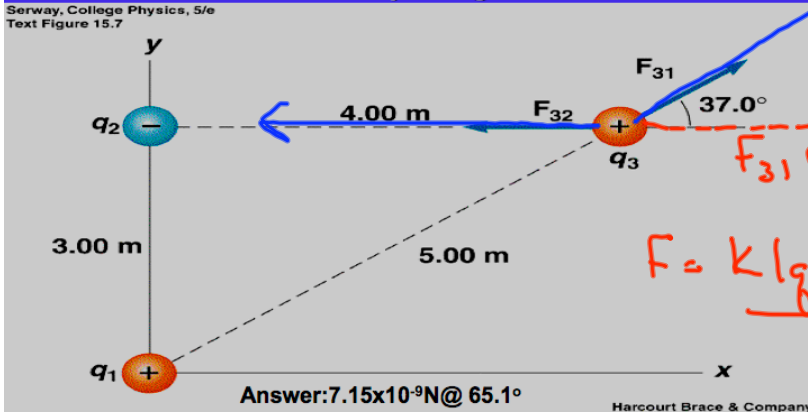
Given below are arrangements of three fixed electric charges. In each figure, a point labeled P is also identified. All of the charges are the same size charge, q , but they can be either positive or negative as indicated. The charges and point P all lie on a straight line. The distances between adjacent items, either between two charges or between a charge and point P, are all the same. There are no other charges in this region. A test charge, $+Q$, is placed at point P.

D, C, A, F, E, B

Rank these arrangements from greatest to least on the basis of the strength (magnitude) of the electric force on the test charge, $+Q$, at P.



Consider the arrangement of charges below. Suppose $q_1 = 6.00 \times 10^{-9} \text{C}$, $q_2 = -2.00 \times 10^{-9} \text{C}$, and $q_3 = 5.00 \times 10^{-9} \text{C}$. Find the resultant force on q_3 . Do we need a free-body diagram?



$$\sum F_x = -F_{32x} + F_{31} \cos 37^\circ$$

$$\sum F_y = +F_{31} \sin 37^\circ$$

$$\sum F_x = \frac{-k|q_3||q_2|}{r_{32}^2} + \frac{k|q_3||q_1| \cos 37^\circ}{r_{31}^2}$$

$$\sum F_y = \frac{k|q_3||q_1| \sin 37^\circ}{r_{31}^2}$$

$$F_x = \frac{(9 \times 10^9)(5)(2)(10^{-18})}{16} + \frac{(9 \times 10^9)(5)(6)(10^{-18}) \cos 37^\circ}{25}$$

$$F_y = \frac{(9 \times 10^9)(5)(6)(10^{-18}) \sin 37^\circ}{25} = 6.48 \times 10^{-9} \text{N}$$

$$F = \sqrt{(3.01 \times 10^{-9} \text{N})^2 + (6.48 \times 10^{-9} \text{N})^2} = 7.15 \times 10^{-9} \text{N}$$

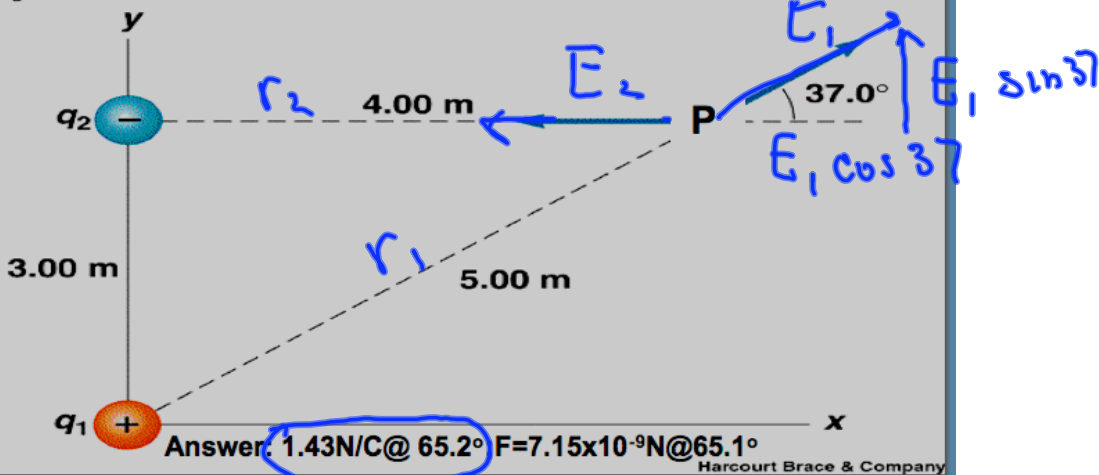
$$\theta = \tan^{-1} \left(\frac{6.48 \times 10^{-9}}{3.01 \times 10^{-9}} \right) = 65.1^\circ$$

above x-axis

$F_{31} = 3.01 \times 10^{-9} \text{N}$

Consider the arrangement of charges below. Suppose $q_1 = 6.00 \times 10^{-9} \text{C}$ and $q_2 = -2.00 \times 10^{-9} \text{C}$. Find the E-field at P. Use these results to calculate the resultant force on a 5.00nC charge placed at P.

Serway, College Physics, 5/e
Text Figure 15.7



$$\sum E_x = -E_2 + E_1 \cos 37$$

$$\sum E_y = E_1 \sin 37$$

$$\sum E_x = \frac{k|q_2|}{r_2^2} + \frac{k|q_1|}{r_1^2} \cos 37 =$$

$$\sum E_y = \frac{k|q_1|}{r_1^2} \sin 37 =$$

$$E = \sqrt{E_x^2 + E_y^2}$$

$$\theta = \tan^{-1} \left(\frac{E_y}{E_x} \right)$$