Discussion 5 - Coulomb's Law

Problem 1. State Coulomb's Law and explain what every variable means.

Problem 2. Two point charges, $q_1 > 0$ and $q_2 < 0$, are separated by a distance r. Find the magnitude and direction of the electric force that

a. q_1 exerts on q_2

b. q_2 exerts on q_1.

Problem 3. Three point charges are arranged on a line. Charge q_3 is at the origin. Charge q_2 is at x_2. Charge q_1 is at x_1. What is q_1 if the net force on q_3 is zero and $x_1 x_2 < 0$?

Problem 4. Positive charge Q is distributed uniformly along the x-axis from $x = 0$ to $x = a$. A positive point charge q is located on the positive x-axis at $x = a + b$, a distance b to the right of the end of Q as shown in the figure.

a. Calculate the x- and y-components of the electric field produced by the charge distribution Q on the points on the positive x-axis where $x > a$.

b. Calculate the force (magnitude and direction) that the charge distribution Q exerts on q.

c. Show that if $b \gg a$, the magnitude of the force in part (b) is approximately kQq/b^2. Explain why this result is obtained.

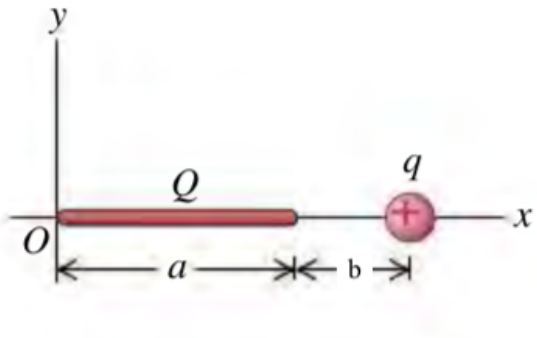

Figure 1: Problem 4