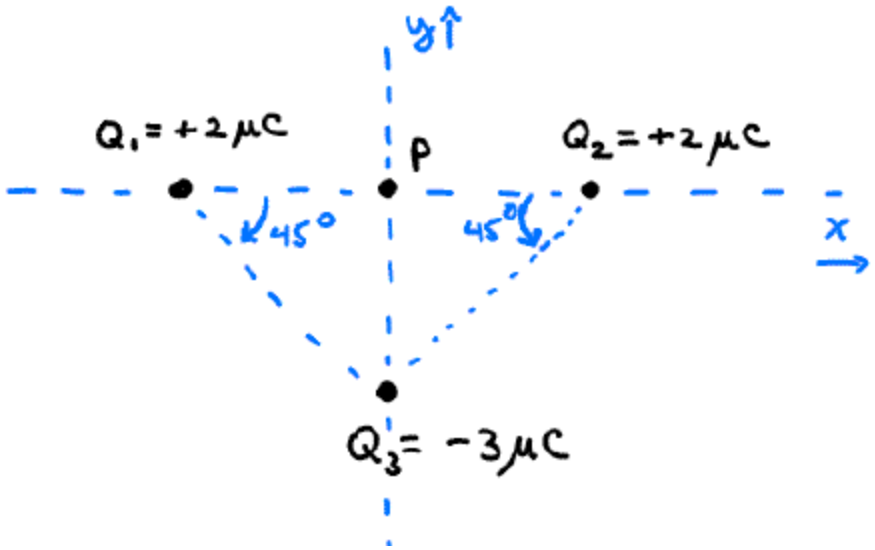
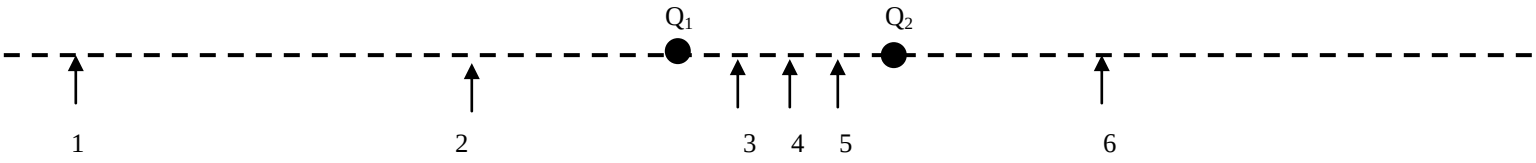
Workshop module 1 - Physics 114, Spring 2010

1) In the figure below, what electric charge can be placed at point P to insure that there is zero net electrostatic force on Q_3? Let the distance between Q_1 and Q_3 (as well as between Q_2 and Q_3) be 1.4 m. The distance between Q_3 and P is 1 m. ($1\ \mu C = 10^{-6}$ C, $k = 9 \times 10^9\ Nm^2/C^2$)

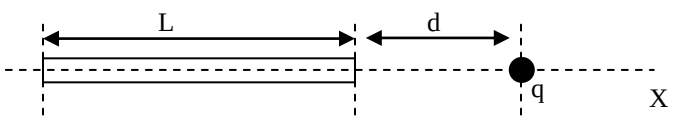


2) Charges $Q_1 = -q$ and $Q_2 = +4q$ are placed as shown. Of the six positions on the axis indicated by the numbered arrows, the one at which the electric field is zero is *(do not expect the positioning in the drawing to be perfect)*

a) 1
b) 2
c) 3
d) 4
e) 5
f) 6



3) A thin, non-conducting rod of length L carries a total charge positive Q distributed uniformly along it's length. Determine the electrostatic force of this rod of charge on a positive charge q located a distance d from one end of the rod along the central axis of the rod as shown in the sketch.



4) Consider a cubic surface with the area of each side of the cube being equal to 1 m^2. Let this cube be centered at the origin such that two sides are perpendicular to each of the three coordinate axes. Suppose a constant electric field of 2 N/C in the x direction permeates this region of space. What is the electric flux passing through each of the sides of the cube? What is the total flux passing through the cubical surface?

5) A flat, square surface with sides of length L is described by the equations x=L, 0<=y<=L, 0<=z<=L. (a) draw the square on a drawing of x, y, z axes (b) find the electric flux through the square due to a positive point charge q placed at the origin. *Hint: Think about the definition of flux and consider the total flux emanated from the charge.*

6) A total positive charge Q is uniformly distributed around a semicircle of radius R. Find the electric field (magnitude and direction) at the center of the semicircle (center of curvature).