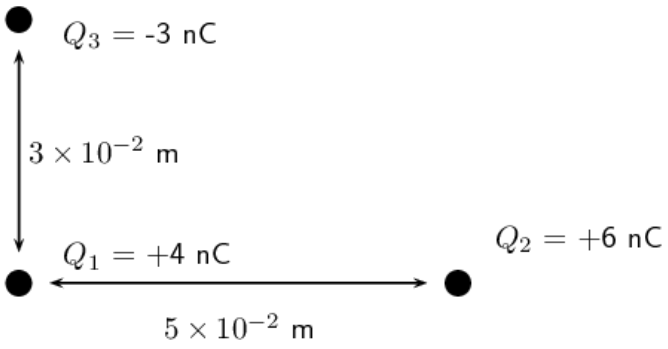
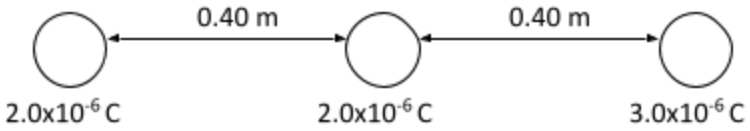
AP Physics 2

Coulomb's law

2-Dimensions

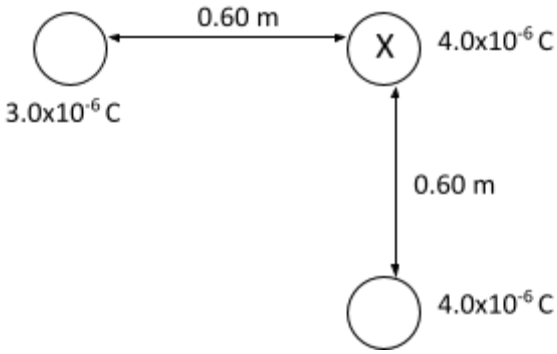


Three-point charges form a right-angled triangle. Their charges are Q1=4 nC, Q2=6 nC and Q3 =−3 nC. The distance between Q1 and Q2 is 5×10^{-2} m and the distance between Q1 and Q3 is 3×10^{-2} m. What is the net electrostatic force on Q1 due to the other two charges if they are arranged as shown?

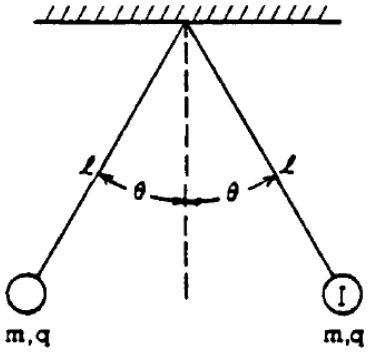


2. Three charged objects are placed in a line as shown. Calculate the force on the middle object due to the other charges.

3. Three point charges are placed at the corner of a right angle triangle as shown. Calculate the magnitude of the net electric force on the object marked X due to the other two charges.



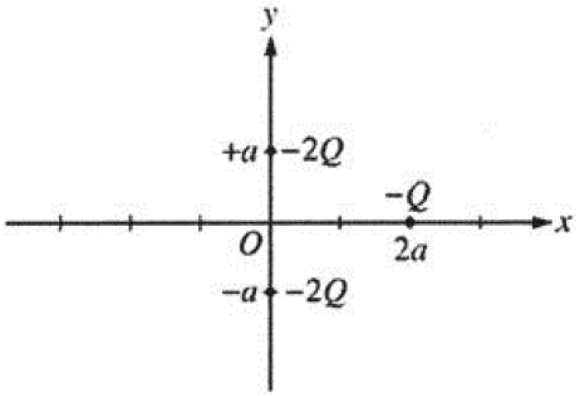
1979B7. Two small spheres, each of mass m and positive charge q, hang from light threads of lengths *l*.



Each thread makes an angle θ with the vertical as shown above.

On the diagram draw and label all forces on sphere I.

Develop an expression for the charge q in terms of m, *l*, θ, g, and the Coulomb's law constant.



2005Bb3 The figure above shows two point charges, each of charge –2Q, fixed on the y–axis at y = +a and at y = –a. A third point charge of charge –Q is placed on the x–axis at x = 2a. Express all algebraic answers in terms of Q, a, and fundamental constants.

a. Derive an expression for the magnitude of the net force on the charge –Q due to the other two charges, and state its direction.

b. Derive an expression for the magnitude of the net electric field at the origin due to all three charges, and state its direction.

c. Derive an expression for the electrical potential at the origin due to all three charges.

d. On the axes below, sketch a graph of the force F on the –Q charge caused by the other two charges as

it is moved along the x–axis from a large positive position to a large negative position. Let the force be positive when it acts to the right and negative when it acts to the left.