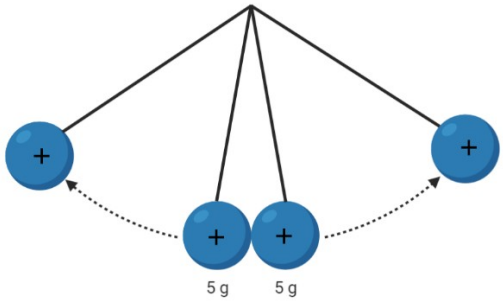
Coulomb's Law Practice Problems

1) Three charges, 2q, -q, q, are held in place at (0, 3), (1, 0), (0, 0) respectively. A fourth charge 3q is introduced at (2, 1). Calculate the electric force experienced by this fourth charged.

2) Two charged spheres of equal charge (q = 0.5*10^-9 C) and mass (m = 5 g) are suspended at the end of a 20-cm-long string each and held together as shown below. How high will the spheres elevate once they are released?

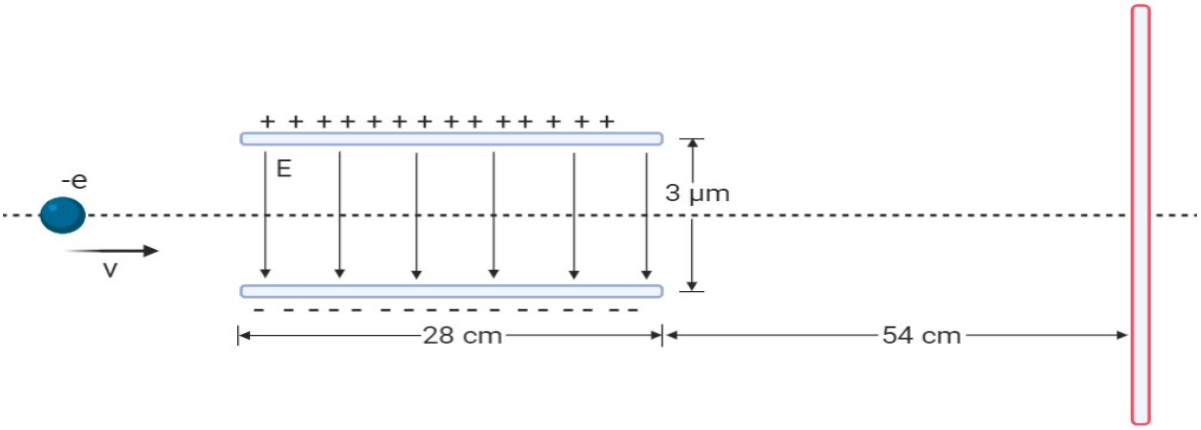


3) This problem was taken from the Sears and Zemansky's University Physics with Modern Physics Technology Update Hugh D. Young Roger A. Freedman Thirteenth Edition, page 783.

A nonconducting disk of radius R has a uniform positive surface charge density. Find the electric field at a point along the axis of the disk a distance x from its center. Assume that x is positive.

4) An electron must pass through two oppositely charged plates 28 cm long that are parallel to each other and separated by a distance of 3 μm to be collected at a screen placed 54 cm away from the plates (see figure below). If the plates have a uniform surface charge density of $0.531 \times 10^{-8} C/m^2$, what should the minimum length of the screen be if we want to collect all electrons that are not blocked by the edges of the plates?

Hint: To find the electric field, use the formula obtained from question (3). Also, ignore gravity.



5) Consider the hydrogen atom to be an electric dipole with charges e and -e separated by a distance $0.53 \times 10^{-10} m$. Calculate the torque experienced by a hydrogen atom if positioned in an electric field of 120 N/C at an angle 25^{o} as shown in the figure below.

