# Physics II

More electric force problems

Problem 1.- In an analog oscilloscope, the screen measures 20cm vertically and the electron gun emits electrons with 15,000eV of kinetic energy, 25cm behind it.
To sweep the screen, an electric field is applied in the vertical direction. Calculate the strength of this field, if it is enough to deflect the trajectory of the electrons 10cm down as shown in the figure.
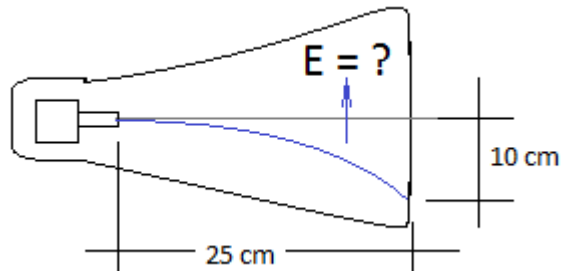
Problem 2.- In the figure we have: A sphere with radius R=2m, uniformly charged in all its volume with Q_1 = -30µC, a point charge of value Q_2= 10µC inside the sphere at position (-3,0) and a 3m long wire located on the X-axis with total charge Q_3 = -20µC uniformly distributed over its length. Calculate

a) The electric force over Q_2 due to Q_1.
b) The electric force over Q_2 due to Q_3.
c) The electric force over Q_1 due to Q_3.
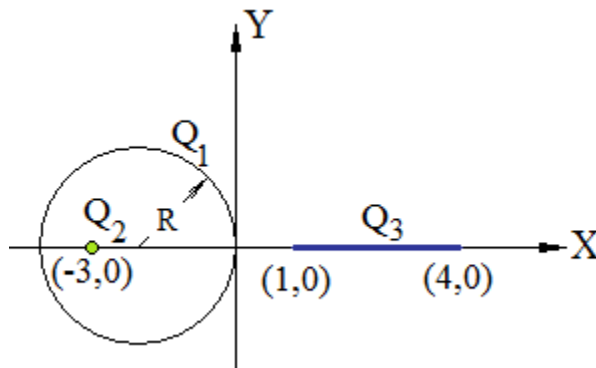
Problem 3.- Figure (A) shows a spring with un-stretched length h_o = 0.12m. Then you hang a mass m = 0.002 kg with charge q = 1µC and the spring stretches as shown in (B) reaching equilibrium with a length h_1 = 0.14m. Finally, a charge Q is place below q as shown in (C) and the new equilibrium length is h_2 = 0.13m with a charge separation L = 0.045m.
Calculate:
a) The spring constant k_r
b) The force charge Q produces on q in figure (C)
c) The value of charge Q

(A)   (B)   (C)

h_0 h_1 h_2

q q

L

Q