Electrostatics/ Natural Electric Charge

Book Chapter: 15, 16
Book Pages: 466-488, 498
Practice Problems: pp491-494: 4, 10, 16, 18, 22, 38
Terms/ Ideas:
Static electricity
Conductor
Insulator
Electrode
Grounding
Electroscope
Photoelectric effect
Permitivity of free space
Permeability of free space
Electric Field lines
Electric Flux
Dipole
DOP
Capacitance
Voltaic Cell
Coulomb
Elementary Charge
Coulomb's Law
Electron Volt
Equations:

$$F = k\frac{q_1 q_2}{r^2}$$

$$E = \frac{F}{q}$$

$$\phi = \frac{Q}{\varepsilon_o}(flux)$$

$$\tau = pE\sin\theta$$

$$V = \frac{W}{q}(volt)$$

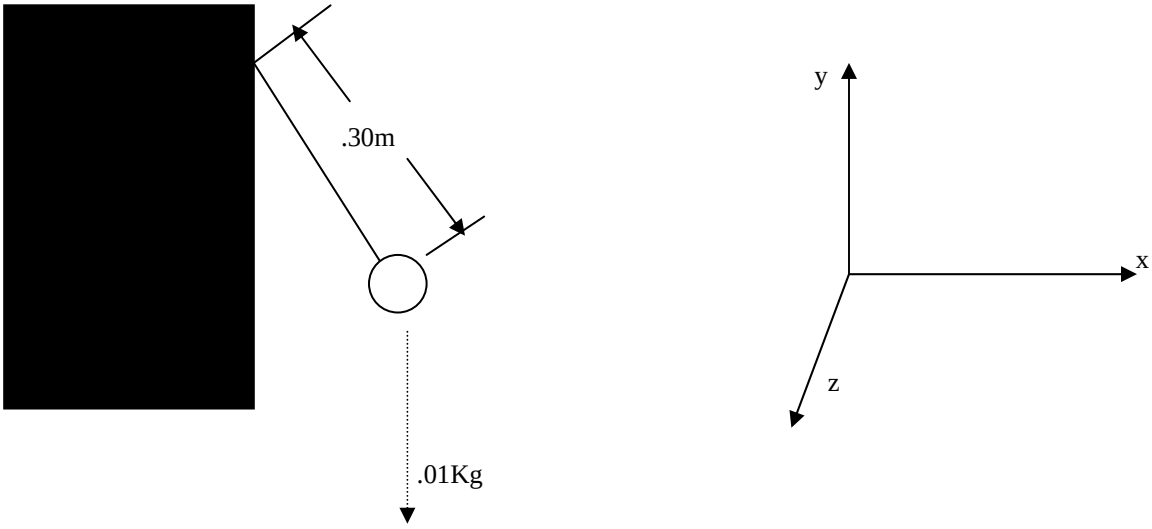
$$E = \frac{V}{d}$$

$$C = \frac{q}{V}$$

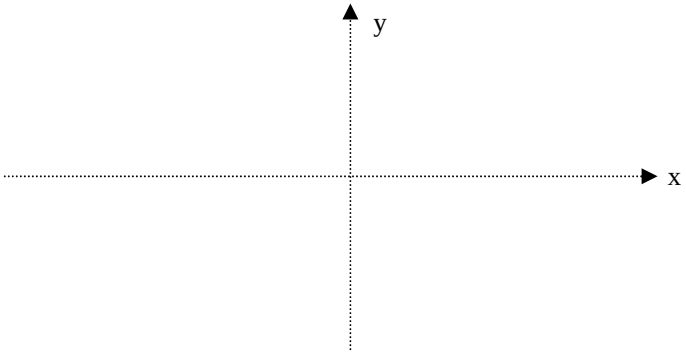
$$W = \frac{1}{2}CV^2$$

Free Response:

A wall has a negative charge distribution producing a uniform horizontal electric field. A small plastic ball of mass .01 Kg, carrying a charge of –80.0 μC, is suspended by an uncharged, non-conducting thread .30 meters long. The thread is attached to the wall and the ball hangs in equilibrium, as shown above, in the electric and gravitational fields. The electric force on the ball has a magnitude of .032 N.



1) On the diagram below, draw and label all of the forces acting on the ball.



2) Calculate the magnitude of the electric field at the ball's location due to the charged wall, and state its direction relative to the coordinate axis shown.

3) Determine the perpendicular distance from the wall to the center of the ball.

4) The string is now cut. Describe the resulting path of the ball.

5) Calculate the charge on the ball.