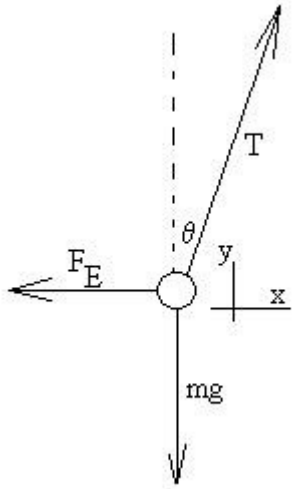
10-2)

Do a free body diagram for one ball (problem is symmetric, so other ball just has a mirror image FBD):



The magnitude of the electric force is $F_E = k_e q^2/d^2$, where d is the separation of the charges.
Since the sphere is not moving, $\Sigma \mathbf{F}_n = 0$.
So,
$T\cos\theta - gm = 0$ $F_E - T\sin\theta = 0$
$T\cos\theta = gm$ $T\sin\theta = F_E$
Divide the equations to eliminate T:
$T\sin\theta / T\cos\theta = F_E/gm$
$\tan\theta = k_e q^2/gmd^2$
Follow the hint and let $\sin\theta = \tan\theta$:
$\sin\theta = k_e q^2/gmd^2 = (d/2)/L$
So, $2Lk_e q^2/gm = d^3$
or
$d = [2k_e q^2 L/gm]^{1/3}$