PHYS 212 Spring 2014 Derivation Problem Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_

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|  | Coulomb’s law is given by,  (k = Coulomb’s constant = 9 × 109 N.m2/C2)Two tiny conducting balls of identical mass *m* hang from non-conducting threads of length *L*. When they are given identical charge *q* they repel each other, and come to equilibrium as shown below. (a) Show that: $x^{2}=\frac{kq^{2}}{mg tan⁡(θ)}$ (b) When *θ* is small show that: $x^{3}=\frac{2kq^{2}L}{mg}$ (assume that tan(*θ*) ≈ sin(*θ*), for small *θ*)

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| http://edugen.wiley.com/edugen/courses/crs4957/common/art/pixel.gif |
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