

16. If one of them is discharged, there would no electrostatic repulsion between the two balls and they would both come to the position $\theta = 0$, making contact with each other. A redistribution of the remaining charge would then occur, with each of the balls getting $q/2$. Then they would again be separated due to electrostatic repulsion, which results in the new equilibrium separation

$$x' = \left[\frac{(q/2)^2 L}{2\pi\epsilon_0 mg} \right]^{1/3} = \left(\frac{1}{4} \right)^{1/3} x = \left(\frac{1}{4} \right)^{1/3} (5.0 \text{ cm}) = 3.1 \text{ cm} .$$