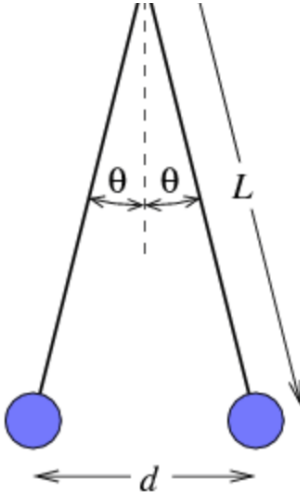


### Answer on Question #73733-Physics-Electromagnetism

Two balls of the same radius and weight are suspended from threads so that their surfaces are in contact. What charge should be applied to the balls for the tension of the threads to become equal to 0.098 N? The distance from the point of suspension to the center of a ball is 10 cm and the mass of each ball is 0.005 kg

#### Solution



For the equilibrium:

$$mg = T \cos \theta$$

$$\frac{kq^2}{d^2} = T \sin \theta$$

From the picture:

$$\frac{d}{2} = L \sin \theta$$

$$\theta = \cos^{-1} \frac{mg}{T} = \cos^{-1} \frac{(0.005)(9.8)}{0.098} = 60^\circ.$$

$$d = 2L \sin 60 = 2L \frac{\sqrt{3}}{2} = \sqrt{3}L.$$

The charge is

$$q = d \sqrt{\frac{T \sin \theta}{k}} = \sqrt{3}L \sqrt{\frac{T \sin \theta}{k}} = \sqrt{3}(0.1) \sqrt{\frac{0.098 \frac{\sqrt{3}}{2}}{9 \cdot 10^9}} = 0.53 \mu\text{C}.$$

**Answer: 0.53  $\mu\text{C}$ .**

Answer provided by <https://www.AssignmentExpert.com>