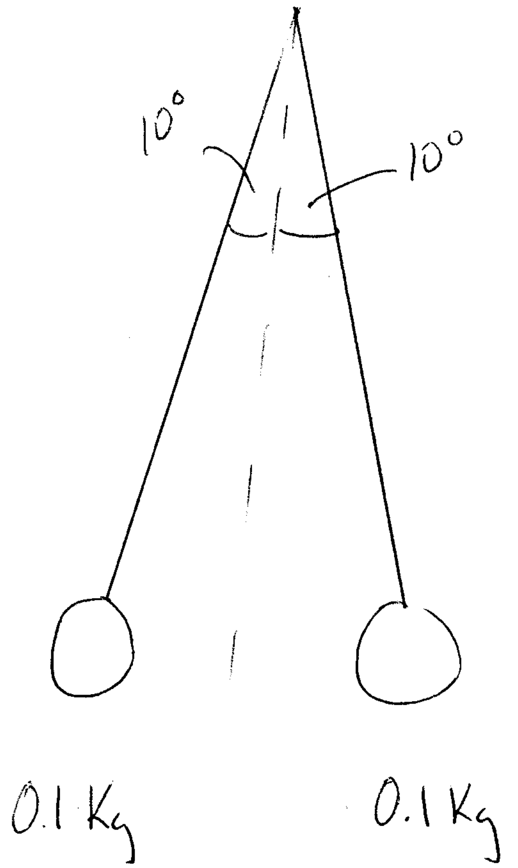
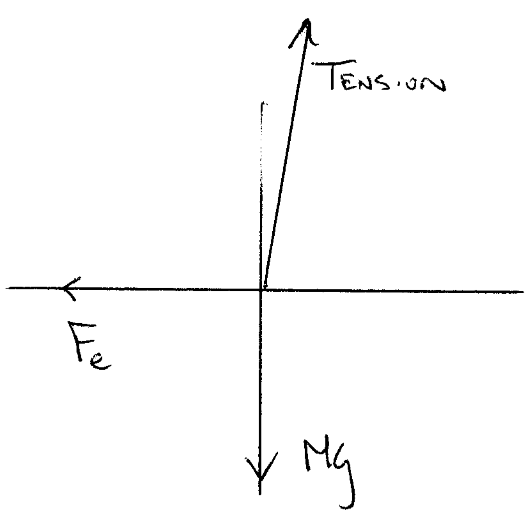


Each Sphere Has the Same Charge Upon it. Find the Charge on Each Sphere.

1) Since Each Sphere is identical, Look at the left one.



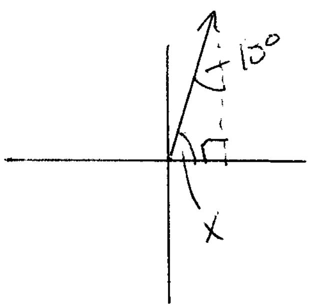
Tension = the String Conn
the Sphere to the S

F_e = the Electric Force
to the other Sph.

Mg = Weight of Sphere

2) BREAK EACH FORCE INTO X AND Y COMPONENTS.

BOTH F_e AND Mg Already lie upon Either the X OR Y Axis Already. Only NEED to BREAK UP the TENSION.



All Triangles Have 180° between All three Interior Angles.

$\therefore \quad 10° + 90° + X = 180°$

So $X = 80°$

	X	Y
F_e:	$-F_e$	0
T:	$T \cos 80°$	$T \sin 80°$
Mg:	0 N	$-(0.1)(9.8)$ N

3) Since the Sphere Is Not Moving (In Equilibrium)

$$\sum F_x = 0 \quad \text{AND} \quad \sum F_y = 0$$

So: $-F_e + T\cos 80° = 0$ (x-direction)

AND

$T \sin 80° - 0.98 = 0$ (y-direction)

y-dir: $T \sin 80° = 0.98\,N$

$$T = \frac{0.98\,N}{\sin 80°} = 0.995\,N \Rightarrow 1.0\,N \text{ (2 Sig Figs)}$$

Put into other Equation:

$$-F_e + (1.0\,N)\cos 80° = 0$$

$$\therefore -F_e = -0.17\,N$$

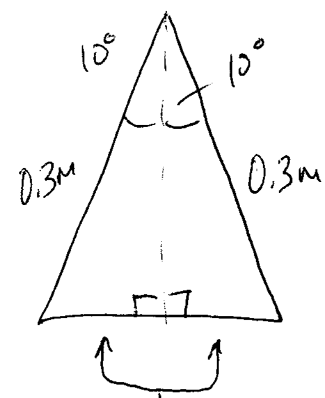
OR

$$F_e = 0.17\,N$$

4) NOW WE HAVE the FORCE, WE MAY find the CHARGE ON EACH SPHERE

TO FIND THE ~~DIFFERENCE~~ DISTANCE BETWEEN THE SPHERES.

WE USE A LITTLE TRIGONOMETRY:



EACH DISTANCE IS: $\sin 10° = \dfrac{X}{0.3M}$

So $X = 0.3M \times \sin 10° = 0.05M$

TOTAL DISTANCE BETWEEN SPHERES IS:

$2 \times 0.05M = 0.1M$

SINCE $q_1 = q_2$

RECALL: $F_e = \dfrac{K q_1 q_2}{r^2} = \dfrac{8.99 \times 10^9 \, N \cdot M^2/C^2 \; q^2}{(0.1M)^2}$

So: $q = \sqrt{\dfrac{(0.1M)^2 (0.17N) \; C^2}{8.99 \times 10^9 \, N M^2}} = 4.35 \times 10^{-7} C$