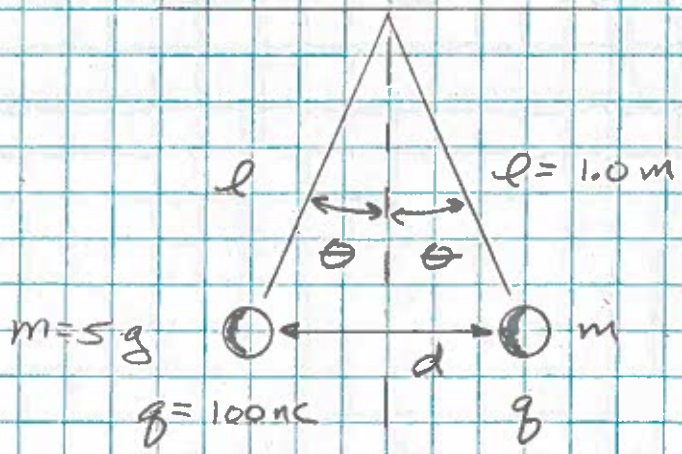
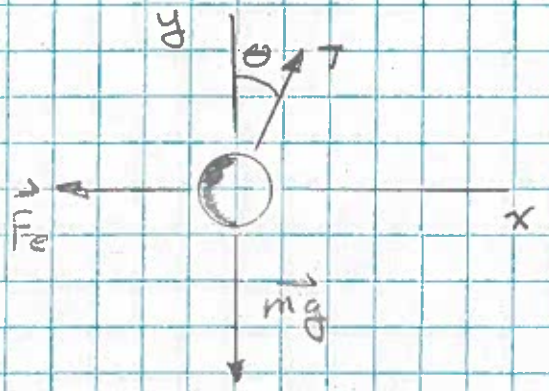



FBD for left ball (right one is the same)




Static equilibrium:

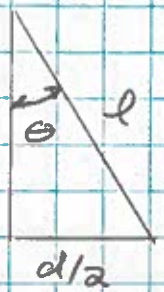
$$\Sigma F_x = -F_e + T\sin\theta = 0 \quad (1)$$

$$\Sigma F_y = -mg + T\cos\theta = 0 \quad (2)$$

Now, the electric force:

$$F_e = \frac{K|q||q|}{d^2}$$

and:




$$\sin\theta = \frac{d/2}{l}$$

$$\therefore d = 2l\sin\theta$$

So:

$$F_e = \frac{Kq^2}{4l^2\sin^2\theta}$$

So, equn (1) & (2) are:

$$T\sin\theta = \frac{Kq^2}{4l^2\sin^2\theta} \qquad (3)$$

$$T\cos\theta = mg \qquad (4)$$

Divide: equn(3) / equn(4)

$$\tan\theta = \frac{Kq^2}{4l^2\sin^2\theta\, mg}$$

Or,

$$\tan\theta\sin^2\theta = \frac{Kq^2}{4l^2 mg} = 4.587\times10^{-4}$$

Now, assume small angles:

$$\tan\theta \approx \sin\theta$$

$$\sin^3\theta = 4.587\times10^{-4}$$

$$\theta = \sin^{-1}\left\{(4.587\times10^{-3})^{1/3}\right\}$$

$$\underline{\theta = 4.42^\circ}$$