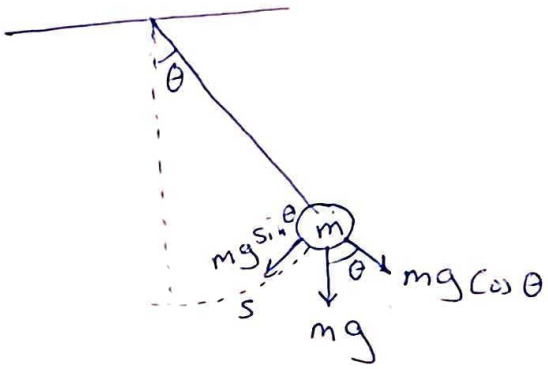
Exp 7: Measuring of "g"

Tangential direction:

$$-mg\sin\theta = m a_T$$

$$a_T = \frac{d^2 s}{dt^2}$$



For small θ ; $\sin\theta \simeq \theta$

$$m\frac{d^2 s}{dt^2} + mg\theta = 0$$

s is arc length. $s = L\theta$

$$\theta = \frac{s}{L}$$

$$\Rightarrow \boxed{\frac{d^2 s}{dt^2} + \frac{g}{L} s = 0}$$

$$s(t) = S_0 \sin(\omega t + \delta)$$

$$\Rightarrow \boxed{\omega^2 = \frac{g}{L}}$$, ω: angular freq.

$$\omega = 2\pi f \quad , \quad f = \frac{1}{T}$$

$$\Rightarrow \omega = \frac{2\pi}{T}$$

$$\left(\frac{2\pi}{T}\right)^2 = \frac{g}{L}$$

$$\Rightarrow \boxed{T^2 = \frac{4\pi^2}{g} L}$$, if we plot T^2 Vs. L

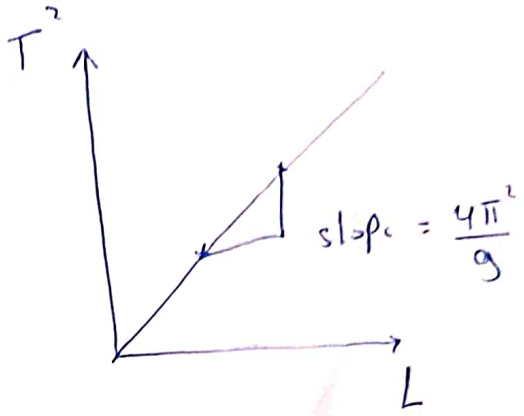
$\Rightarrow$ slope of the line $\left(m = \frac{4\pi^2}{g}\right)$

$y_{int} = 0$

$$\Rightarrow g = \frac{4\pi^2}{m}$$

$$\Delta g = \left|\frac{\partial g}{\partial m}\right| \Delta m$$

$$\boxed{\Delta g = \frac{4\pi^2}{m^2} \Delta m}$$



Using "Excel" Program to Draw T^2 Vs L

then Find $m \Rightarrow g$

$\Delta m \Rightarrow \Delta g$