position of the pointer. Record in Table 8.2 below.

7. Reset the trailing pointer to zero, and repeat steps 1 to 5 five more times, each time adding a 10-g mass to the pendulum using the screw at the bottom. The total added mass is denoted by m_a. Make sure that you always compress the spring to the second lock-in position.

IV. Data Analysis

Part 1:

Calculation of the magnitude of exit velocities of the steel ball for the three possible tension energies.

1. Using Equation 8.2, calculate the magnitude of exit velocity of the ball at the three settings and record your calculations in Table 8.1 below.

Table 8.1

$k = 750$ N/m $\qquad$ $m = 28 \pm 0.01$ g

x(m)	x^2(m^2)	kx^2 (N.m)	v (m/s)
0.020	∝	∝	∝
0.035	0.001225	0.92	5.73
0.050	∝	∝	∝

t 2:

. Using the data you obtained in part 1 of the experimental procedure, fill in Table 8.2 below:

0.095 Kg

(10)

0.028 kg

Table 8.2

$M = 95 \pm 0.01$ g $L = 24.00 \pm 0.05$ cm

m_a (kg)	θ (degrees)	(1 – cosθ)	$M_{tot} = M + m_a$ (kg)	$M_{tot}+m$ (kg)	$[m/(M_{tot}+m)]^2$
0	48	0.331	0.095	0.123	0.0518
0.01	44	0.281	0.105	0.133	0.0448
0.02	42	0.257	0.115	0.143	0.0383
0.03	34	0.171	0.125	0.153	0.0335
0.04	32	0.152	0.135	0.163	0.0295

2. Once you have filled Table 8.2, plot on a linear graph paper (1 - cos θ) versus $[m/(m + M_{tot})]^2$.
3. Draw the best fit line through your data points and compute its slope.

.....

slope = 8

.....

.....

4. What does this slope represent? What is its unit?

.....

$\sqrt{2}$ unit less

$2gL$

.....

5. Calculate g, the acceleration due to gravity, using the slope you obtained in 3 above.

.....

$y = \frac{5.7^2}{2 \times 0.24 \times 8} = 8.55$ m/s²

.....

.....

6. State and discuss three sources of error in this experiment.

.....

.....

.....