

# LAB REPORT FOR EXPERIMENT M9: SIMPLE HARMONIC MOTION

## DATA COLLECTED

### Section V-1

$$M_{\text{(holder)}} = 5.2 \text{ grams}$$

$$M_{\text{(spring)}} = 2.8 \text{ grams}$$

$$M_{\text{(flag)}} = 3.4 \text{ grams}$$

### Section V-2

$$X_0 = 40 \text{ cm}$$

$$\sigma_{x0} = 0.1 \text{ cm}$$

#	$m$ (g)	$x_m$ (cm)	$x = x_0 - x_m$ (cm)
1	20.0	37.6	2.4
2	40.0	35.0	5.0
3	60.0	32.5	7.5
4	80.0	30.1	9.9
5	100.0	27.4	12.6
6	120.0	24.9	15.1

Sample calculation:  $x = x_0 - x_m$

$$x = 40 \text{ cm} - 37.6 \text{ cm} = 2.4 \text{ cm}$$

### Section V-3

#	$m$ (g)	$m_T$ (g)	$C_1$	$C_2$	$C_3$
1	40.0	48.6	238	240	239
2	60.0	68.6	201	201	201
3	80.0	88.6	178	178	178
4	100.0	108.6	161	160	160
5	120.0	128.6	148	147	148

$$m_T = m_H + m + m_f$$

Sample calculation:  $m_T = m_H + m + m_f$

$$m_T = 5.2 \text{ g} + 40.0 \text{ g} + 3.4 \text{ g} = 48.6 \text{ g}$$

$C_1$ ,  $C_2$ , and  $C_3$  are repeated counter readings.

$$N = \frac{2(C_i - 1) + 1}{4}, \quad T = \frac{60.00}{N}$$

Section V-4

$$d = 1.7 \text{ cm}$$

$$\sigma_d = 0.1 \text{ cm}$$

#	$l'$ (cm)	$l = l' + d/2$ (cm)	$C_1$	$C_2$	$C_3$
1	32.2	33.05	104	103	104
2	36.5	37.35	97	98	97
3	40.6	41.45	93	93	93
4	44.9	45.75	88	88	88
5	48.8	49.65	85	85	85
6	53.1	53.95	82	81	82

Sample Calculation:  $l = l' + d/2$  (cm)

$$l = 32.2 \text{ cm} + 1.7 \text{ cm}/2 = 33.05 \text{ cm}$$

$C_1$ ,  $C_2$ , and  $C_3$  are repeated counter readings.

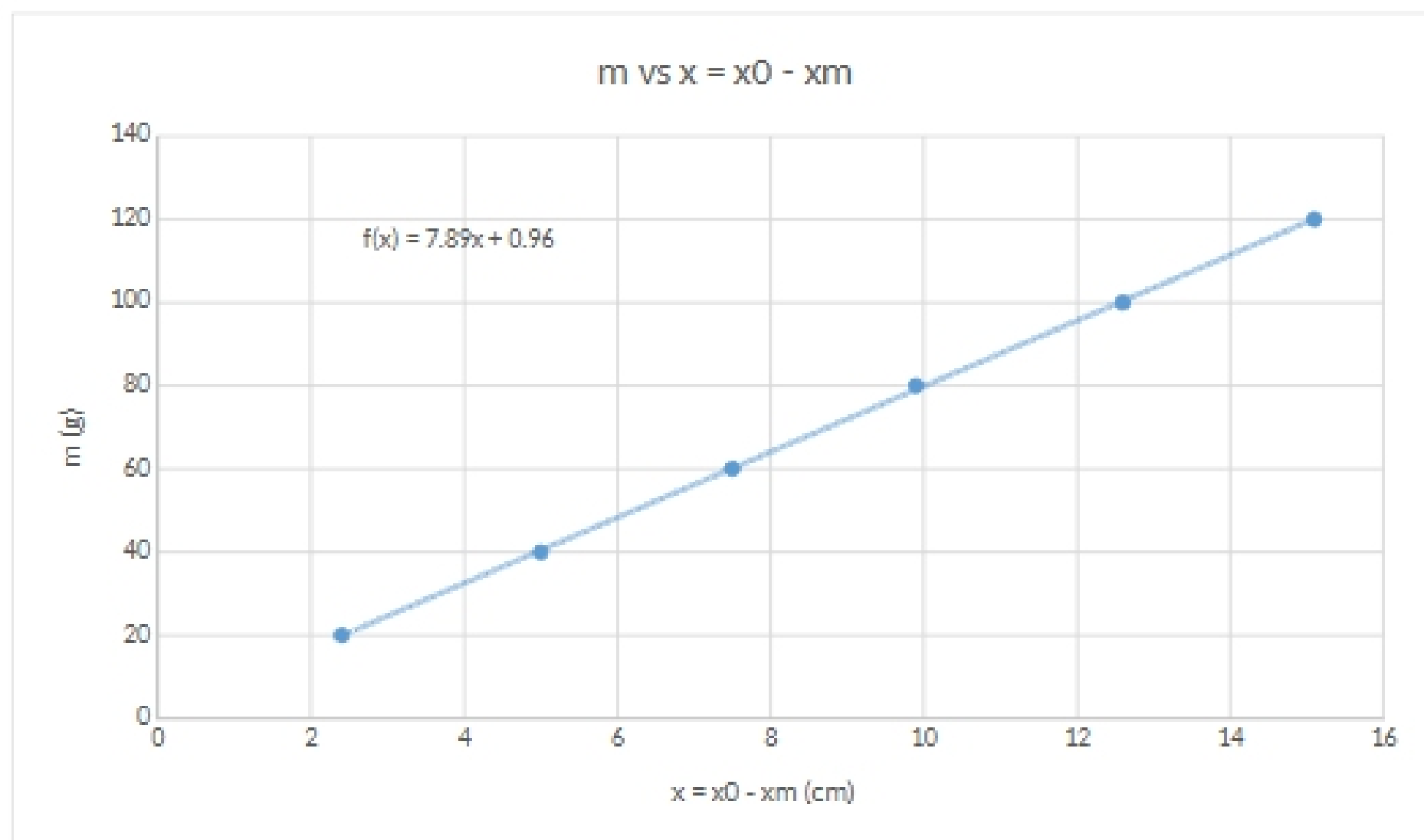
$$N = \frac{2(C_i - 1) + 1}{4}, \quad T = \frac{60.00}{N}$$

FOR THE REPORT

Section V-1

$m$ (g)	$x_m$ (cm)	$x = x_0 - x_m$ (cm)
20	37.6	2.4

40	35	5
60	32.5	7.5
80	30.1	9.9
100	27.4	12.6
120	24.9	15.1



Using LINEST we can get slope, the intercept, and the uncertainties of these values.

Slope,  $s$ : 7.89

Uncertainty of slope,  $\sigma_s$ : 0.0519

Intercept,  $b$ : 0.96

Uncertainty of intercept,  $\sigma_b$ : 0.506

Using these values we can find  $k \pm \sigma_k$ . The slope the plot will be

$$s = \frac{k}{g}$$

Rearranging this equation we can find  $k$ .