

VI-1

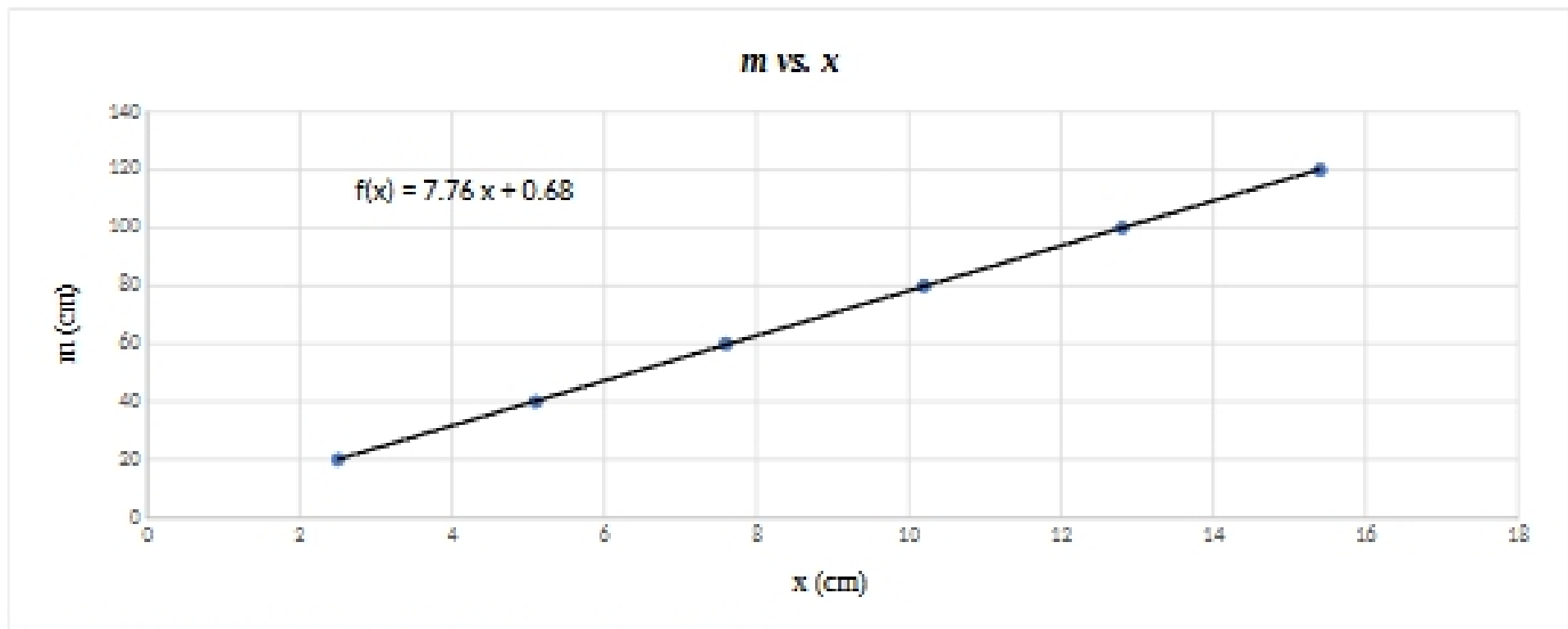
Holder mass: $m_h = 5.1 \text{ g}$

Spring mass: $m_s = 2.8 \text{ g}$

Flag mass: $m_f = 3.5 \text{ g}$

$x_0 = 40.1 \text{ cm}$ $\sigma_{x_0} = 0 \text{ cm}$

#	$m \text{ (g)}$	$x_m \text{ (cm)}$	$x = x_0 - x_m \text{ (cm)}$
1	20	37.6	2.5
2	40	35	5.1
3	60	32.5	7.6
4	80	29.9	10.2
5	100	27.3	12.8
6	120	24.7	15.4



Using LINEST function in Excel the following values were obtained:

Slope (s): 7.76025237

y-intercept (b): 0.67507886

Uncertainty in the slope (σ_s): 0.02329807

Uncertainty in the y-intercept (σ_b): 0.23201965

Calculating the spring constant:

We can compare the force on a spring with the slope-intercept form of the line that was calculated using LINEST in Excel. Thus, we can then determine the spring constant k .

We use the equation $y = sx + b$.

$$y = sx + b$$

$$s = kg$$

$$\therefore k = s/g$$

$$k = (7.76025237 \text{ g/cm})/i$$

$$k = 7605.05 \text{ g/s}^2$$

Calculating σ_k :

$$\sigma_k = i$$

$$\sigma_k = 661.5773 \text{ g/s}^2$$

$$K = k \pm \sigma_k = 7605 \pm 6.62 \times 10^{-2} \text{ g/s}^2$$

VI-2

m (g)	m_T (g)	C_1	C_2	C_3	N_1	N_2	N_3	T_1 (s)	T_2 (s)	T_3 (s)	T_1^2 (s) ²	T_2^2 (s) ²	T_3^2 (s) ²
40	48.6	240	234	239	119 .75	116 .75	119 .25	0.5010 4384	0.5139 1863	0.50314 465	0.251044 93	0.26411 236	0.25315 454
60	68.6	203	203	200	101 .25	101 .25	99 75	0.5925 9259	0.5925 9259	0.60150 376	0.351165 98	0.35116 598	0.36180 677
80	88.6	181	178	179	90 25	88 75	89 25	0.6648 1994	0.6760 5634	0.67226 891	0.441985 56	0.45705 217	0.45194 548
100	108.6	161	149	161	80 25	74 25	80 25	0.7476 6355	0.8080 8081	0.74766 355	0.559000 79	0.65299 459	0.55900 079
120	128.6	149	148	149	70 24	73 75	74 25	0.8542 1412	0.8135 5932	0.80808 081	0.729681 77	0.66187 877	0.65299 459

To determine the values of N , T , and T^2 :

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

Calculations for Trial 1 are on next page...

$$N = \frac{2(240 - 1) + 1}{4} = \frac{479}{4} = 119.75$$

$$T = \frac{60.00}{N} = \frac{60.00}{119.75} = .5010438143$$

$$T^2 = T_i^2 = .5010438143^2 = 0.2510449309$$