VI-1

Pendulum bob diameter measurement using ruler: $d = 2.1\,cm.\ d = 2.4\,cm.\ d = 2.59\,cm.$

Range of values for ruler is Maximum – Minimum = $2.59\,cm. - 2.1\,cm. = 0.49\,cm. \vee 4.9\,mm.$

Pendulum bob diameter using caliper: $d = 24.8\,mm.\ d = 24.8\,mm.\ d = 29.5\,mm.$

Range of values for caliper is = $29.5\,mm. - 24.8\,mm. = 4.7\,mm. \vee 0.47\,cm.$

- The range of measurements using the caliper was smaller than the range of measurements using the ruler. I would therefore make the conclusion that the precision of the caliper is much more reliable than the precision of the ruler.

Thickness of the 100g mass using ruler: $t = 0.9\,cm.\ t = 0.8\,cm.\ t = 0.8\,cm.$

Range of values for ruler Maximum – Minimum = $0.9\,cm. - 0.8\,cm. = 0.1\,cm. \vee 1\,mm.$

Thickness of the 100g mass using caliper: $t = 9.2\,mm.\ t = 8.6\,mm.\ t = 8.5\,mm.$

Range of values for caliper = $9.2\,mm. - 8.5\,mm. = 0.7\,mm. \vee 0.07\,cm.$

- Here, the caliper was once again the more precise measurement than the ruler, as it gave a smaller value. So again, in this case, I would conclude that the caliper has a more precise measurement than the ruler.
- The range of values for the ruler measurement of the pendulum bob is nearly 5 times larger than the caliper measurement of the 100g mass. This is due to several factors. The first, is that the mass is narrower than the pendulum bob which gives a more accurate measurement. This decreases the chance of experiencing parallax error. The mass has flat edges compared to the bob which means you measure from the same spot each time. Unlike the bob, it is round, and you would get different measurements each time you measure depending on where the measurement is taken from.

VI-2

Measured Values of T in seconds

1.11	1.17	1.07
1.29	1.62	1.66
1.47	1.6	1.56
1.66	1.72	1.59
1.66	1.57	1.63

Average value of T given through excel = 1.492 seconds.

Standard deviation of T as σ_T given through excel = 0.219

The standard deviation of the mean is given as: $\sigma_{\bar{T}} = \frac{\sigma_T}{\sqrt{n}} = \frac{0.219\,s}{\sqrt{15}} = 0.0565\,seconds$

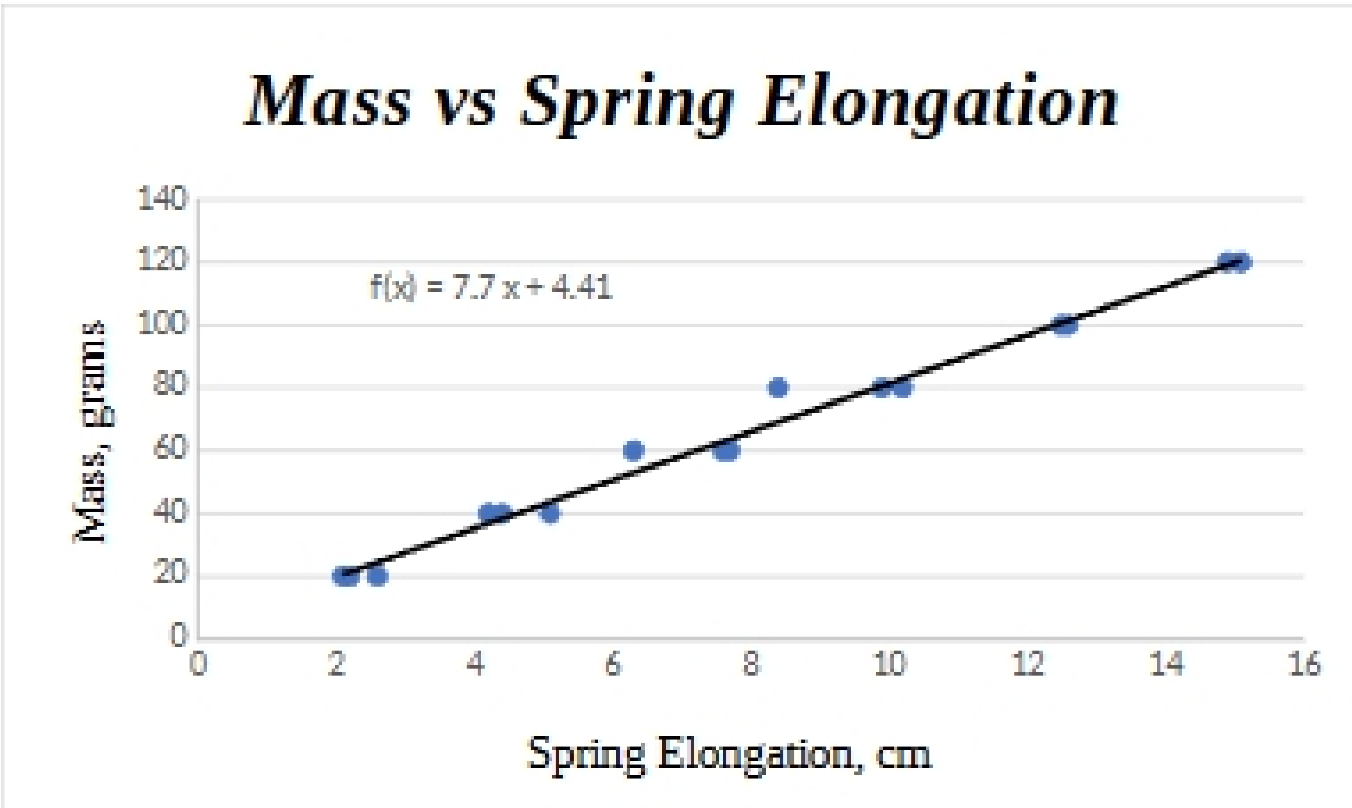
Therefore: $T \pm \sigma_T = 1.50 \pm 0.06\,seconds$.

VI-3

$x_0 = \text{¿}$	52.6	cm	
$x_m(cm)$	$x(cm)$	$m(g)$	
50	2.6	20	
50.4	2.2	20	
50.5	2.1	20	
47.5	5.1	40	
48.4	4.2	40	
48.2	4.4	40	
44.9	7.7	60	
45	7.6	60	
46.29	6.31	60	
42.4	10.2	80	
42.7	9.9	80	
44.2	8.4	80	
40	12.6	100	
40.1	12.5	100	
40.1	12.5	100	
37.5	15.1	120	
37.7	14.9	120	
37.5	15.1	120	
Slope	7.69582634	4.41018227	Intercept

Slope unc.	0.21238458	2.03821959	Intercept unc.

$x = x_0 - x_m$ When $m = 20\,grams$: $52.6\,cm - 50.0\,cm = 2.6\,cm$



$s \pm \sigma_s = 7.70 \pm 0.21\,g/m$

$b \pm \sigma_b = 4.41 \pm 2.04\,g$

Since: $m = \frac{k}{g} x$

the slope: $s = \frac{k}{g}$

Therefore, $k = gs$

$k = (980\,cm/s^2)(7.6958\,g/cm) = 7541.9\,g/s^2$

From equation 10 from the prologue with $k = C$, $g = A$, and $s = B$, we see that: