

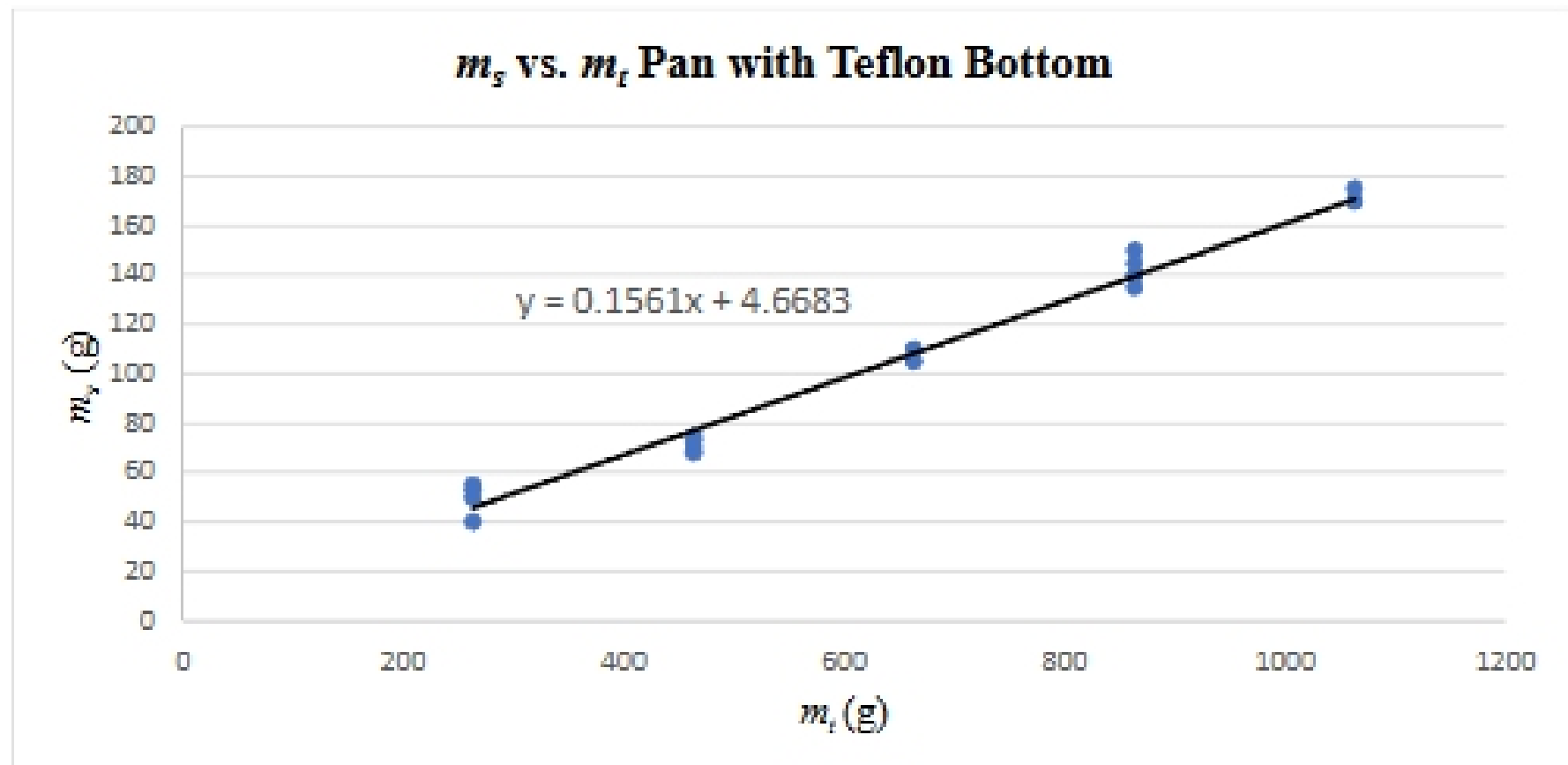
## VI-1

|  |
|--|
| $(m_p)$ The mass of the pan with the Teflon bottom was measured as 63.6 g.   |
| $(m_p')$ The mass of the pan with the rubber bottom was measured as 122.9 g. |

| $m_s$ (g) | $m$ (g) | $m_t$ (g) |
|-----------|---------|-----------|
| 40        | 200     | 263.3     |
| 50        | 200     | 263.3     |
| 55        | 200     | 263.3     |
| 53        | 200     | 263.3     |
| 53        | 200     | 263.3     |
| 70        | 400     | 463.6     |
| 68        | 400     | 463.6     |
| 73        | 400     | 463.6     |
| 75        | 400     | 463.6     |
| 70        | 400     | 463.6     |
| 105       | 600     | 663.6     |
| 110       | 600     | 663.6     |
| 110       | 600     | 663.6     |
| 105       | 600     | 663.6     |
| 105       | 600     | 663.6     |
| 140       | 800     | 863.6     |
| 150       | 800     | 863.6     |
| 145       | 800     | 863.6     |
| 140       | 800     | 863.6     |
| 135       | 800     | 863.6     |
| 170       | 1000    | 1063.6    |
| 175       | 1000    | 1063.6    |
| 170       | 1000    | 1063.6    |
| 170       | 1000    | 1063.6    |
| 170       | 1000    | 1063.6    |

|            |            |            |                |
|------------|------------|------------|----------------|
| Slope      | 0.15614984 | 4.66833385 | Intercept      |
| Slope Unc. | 0.0037931  | 2.73611662 | Intercept Unc. |

The slope, intercept, and the uncertainty of both of these values were calculated using the LINEST function in Excel.



**To find  $m_s$ :**

We take the value of 'm' measured and add it to the value of mass of the pan with the Teflon bottom.

Thus, we have:

$$m_t = m + m_p$$

$$m_s = 200 + 63.6 = 263.6 \text{ g}$$

To determine the value of  $\mu_k$  and  $\sigma_{\mu k}$ :

We use the equation  $m_s = \mu_k(m_t)$

If you rearrange this equation, we get:  $\mu_k = \frac{m_s}{m_t}$ . This also happens to be the slope. So, if the coefficient of kinetic friction is the slope, the uncertainty of kinetic friction would be the uncertainty of the slope.

**Thus,**

$$\mu_k = \text{Slope}$$

$$\sigma_{\mu k} = \text{Uncertainty of the slope}$$

$$\text{Thus, } \mu_k \pm \sigma_{\mu k} = 0.156 \pm 0.004 \text{ N}$$

## VI-2

| $m_t$ (g) | $m$ (g) | $m_t$ (g) |
|-----------|---------|-----------|
| 45        | 100     | 222.9     |
| 40        | 100     | 222.9     |
| 50        | 100     | 222.9     |
| 45        | 100     | 222.9     |
| 50        | 100     | 222.9     |
| 60        | 200     | 322.9     |
| 75        | 200     | 322.9     |
| 75        | 200     | 322.9     |
| 73        | 200     | 322.9     |
| 75        | 200     | 322.9     |
| 105       | 300     | 422.9     |
| 110       | 300     | 422.9     |
| 110       | 300     | 422.9     |
| 110       | 300     | 422.9     |
| 110       | 300     | 422.9     |
| 140       | 400     | 522.9     |
| 150       | 400     | 522.9     |
| 140       | 400     | 522.9     |
| 145       | 400     | 522.9     |
| 140       | 400     | 522.9     |
| 160       | 500     | 622.9     |
| 163       | 500     | 622.9     |
| 155       | 500     | 622.9     |
| 165       | 500     | 622.9     |
| 160       | 500     | 622.9     |

|            |            |            |                |
|------------|------------|------------|----------------|
| Slope      | 0.3006     | -21.08374  | Intercept      |
| Slope Unc. | 0.00899652 | 4.01172629 | Intercept Unc. |

The slope, intercept, and the uncertainty of both of these values were calculated using the LINEST function in Excel.