NOTES FOR ASSIGNMENT #3

Friction Force is linearly proportional to the mass of the object whose motion is to be opposed

The proportionality constant between friction force and mass is the coefficient of static/kinetic friction \( F = \mu_s W \) or \( F = \mu_k W \)

The above friction equations guide us on how to determine the coefficient of friction between any two surfaces.

Coefficient of friction, \( \mu = \frac{F}{W} = \frac{F_1}{W_1} = \frac{F_2}{W_2} = \frac{F_3}{W_3} = \frac{F_4}{W_4} \ldots \) etc.

A graph of \( F \) (y-axis) versus \( W \) (x-axis) will give a straight line with a slope equal to the coefficient of friction. Due to the inherent nature of conducting an experiment, your data \([(F_1,W_1), (F_2,W_2), (F_3/W_3), (F_4/W_4), \ldots (F_n,W_n)]\) will not lie on a perfect straight line. It should, however, resemble a straight line with scatter in the data. You can fit the data to an equation of a straight line using regression analysis, and the slope obtained for the straight line will be the coefficient of friction.

Perform linear regression to fit best straight line through data points; \( \text{slope} = \mu \)
Use EXCEL to Perform Linear Regression

1. Create EXCEL table for Force and Weight data
2. Highlight data set
3. Go to pull-down manual Tool, select Data Analysis and select Regression
4. In “Input Y Range” give cell numbers depicting range separated by : of dependent variable, i.e., F
5. In “Input X Range” give cell numbers depicting range separated by : of dependent variable, i.e., W
6. In Output Option” select “output range” and enter cell number where you wish EXCEL to place results of regression analysis
7. Select “OK” to executive