Physics Laboratory Report PHY 151

M5 Newton's Second Law

This lab is worth 65 points

This section is completed by the student

Student Name: Mayank Jha

Date: 10/12/2020

TA name: Alexander Bivolcic Section: 1

This section is completed by the TA:

VI-1 (38): _____

VI-2 (17): _____

Do at home (10) _____

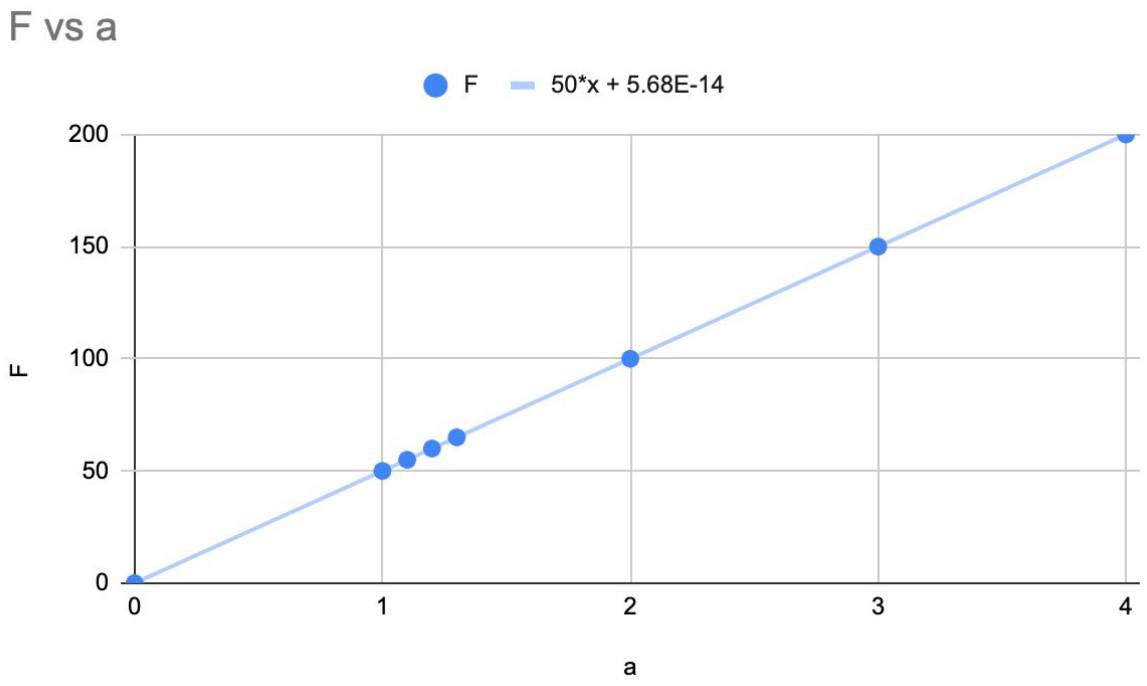
Report Grade:_____

TA Signature: _____

M1 Report Do at-home exercise

Recorded 8 values of Force applied and acceleration observed

a	F
0	0
1	50
1.1	55
1.2	60
1.3	65
2	100
3	150
4	200



This is the chart observed by the data recorded. The line is linear hence supporting the proportion between F and a for the equation F = ma

From the graph we see the slope equation as F = 50*a + ≈ 0 = 50a
Here 50 represents the slope which is equal to the mass of our crate
Hence the mass of the crate is 50kg

V1 report

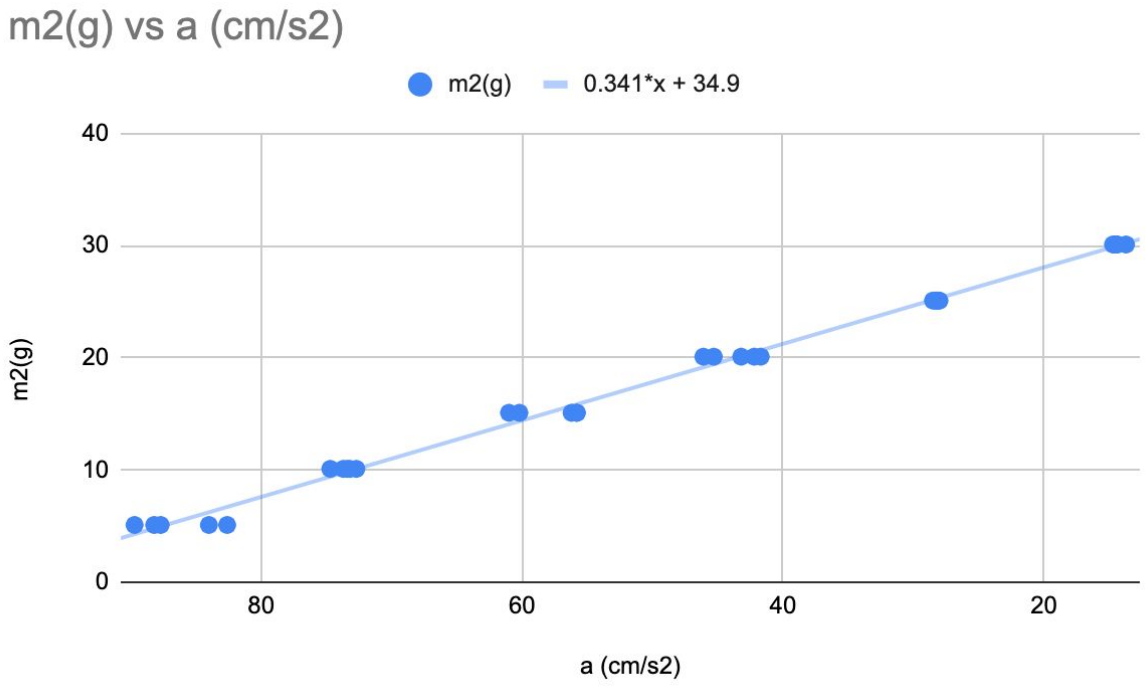
Tabulated data
Here the data is accounted for where the glider (M1) has a mass of 299.4g and the hanger(M2) has a mass of 5.1

We were provided with the data for m1 and to calculate m2, the following equation has been used
m2 = 25 - m1

m1(g)	m2(g)	a (cm/s2)
324.4	5.1	89.7
324.4	5.1	88.2
324.4	5.1	87.7
324.4	5.1	84
324.4	5.1	82.6
319.4	10.1	74.7
319.4	10.1	73.7
319.4	10.1	73.4
319.4	10.1	73.2
319.4	10.1	72.7
314.4	15.1	61
314.4	15.1	60.2
314.4	15.1	56.2
314.4	15.1	55.8
314.4	15.1	55.8
309.4	20.1	46.1
309.4	20.1	45.3
309.4	20.1	43.2
309.4	20.1	42.2
309.4	20.1	41.7
304.4	25.1	28.5
304.4	25.1	28.3
304.4	25.1	28.2
304.4	25.1	28.1
304.4	25.1	28

299.4	30.1	14.7
299.4	30.1	14.5
299.4	30.1	14.4
299.4	30.1	14.4
299.4	30.1	13.7

Plotting a vs M2 we get the graph



Using linest we get

LINEST VALUES	
0.341112	-4.78526
0.004482	0.253226

We see the slope is matched from linest and graph

Uncertainty is 0.00448.
If mass uncertainty is negligible
Then, g => 9.8 ± 0.00448 m/s^2

V2 of Report

From given values of a1, the average value is 60.5 cm/s^2 = **0.605 m/s²**
From given values of a2, the average value is 50.7 cm/s^2 = **0.507 m/s²**
Mass of M1 on glider = 10 + 299.4 = 309.4g = **0.3094** kg
Mass of M2 on hanger = 15 + 5.1 = 20.1g = **0.0201** kg

Using these values and the equation
$f = ((M1 + M2)(a1 - a2) / 2)$
We get
$f = (3094 + 0.0201)*(0.605 - 0.507)/2 = 0.0161455N$