Newton's Second Law Lab Report

California Crosspoint Academy

AP Physics 1

Mr. Yee

James Ding

October 28, 2020

Abstract:

This lab was mainly about Newton's second laws and proving them. The acceleration of an object is proportional to the net force as the data from Table 2 shows. The acceleration of an object is also inversely proportional to the mass, as the data from Table 3 shows. This proves that Newton's law, "The acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force, in the same direction as the net force, and inversely proportional to the mass of the object." is true.

Data:

Table 1:

	Mass (kg)
Cart	0.331
Hexagonal Mass	0.124
Cart Total	0.829

Table 2:

	Part 1: Force vs. Acceleration (Constant Total Mass with Varying Force)				
Case	**Hanging Weight (kg)**	**Force of Gravity (N)**	**Mass in Cart (kg)**	**Total Mass of System (kg)**	**Acceleration ($\frac{m}{s^2}$)**
1	0.11	1.1	0	0.939	1
2	0.1	1	0.01		0.982
3	0.09	0.9	0.02		0.877
4	0.08	0.8	0.03		0.79
5	0.07	0.7	0.04		0.67
6	0.06	0.6	0.05		0.58
7	0.05	0.5	0.06		0.58

8	0.04	0.4	0.07		0.378
9	0.03	0.3	0.08		0.278
10	0.02	0.2	0.09		0.17

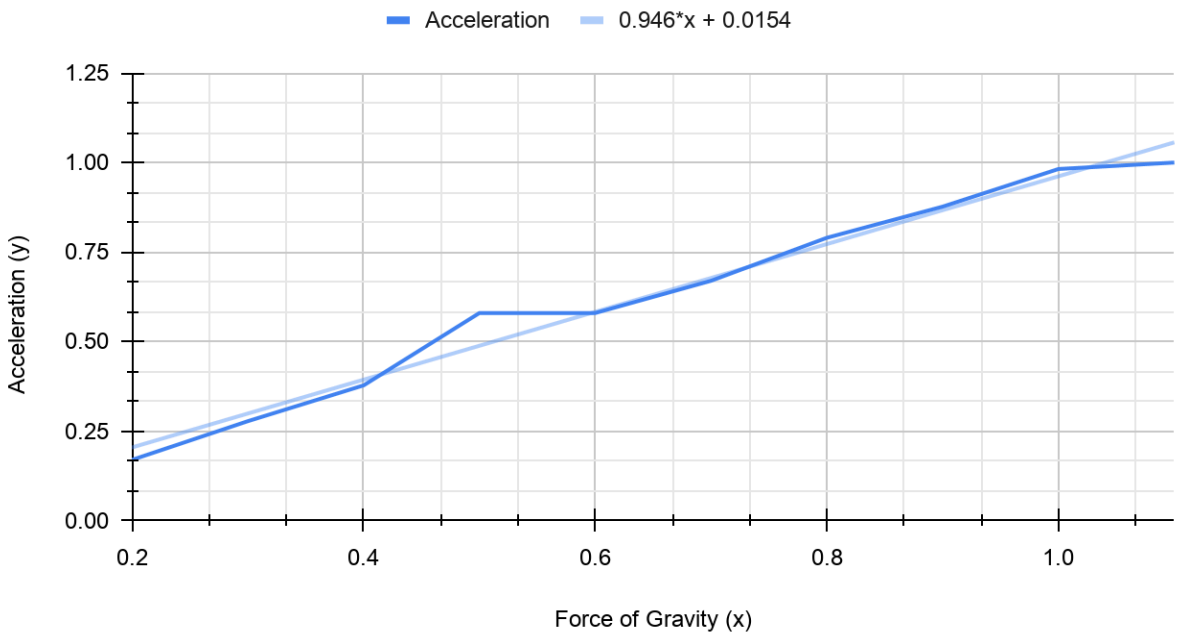
Table 3:

	Part 2: Mass vs. Acceleration (Constant Force with Varying Total Mass)				
Case	**Hanging Weight (kg)**	**Force of Gravity (N)**	**Mass in Cart (kg)**	**Total Mass of System (kg)**	**Acceleration ($\frac{m}{s^2}$)**
1	0.05	0.5	0	0.879	0.512
2			0.01	0.889	0.506
3			0.02	0.899	0.501
4			0.03	0.909	0.496
5			0.04	0.919	0.486
6			0.05	0.929	0.48
7			0.06	0.939	0.471
8			0.07	0.949	0.466
9			0.08	0.959	0.458
10			0.09	0.969	0.445

Discussion:

Part 1:

Figure 1

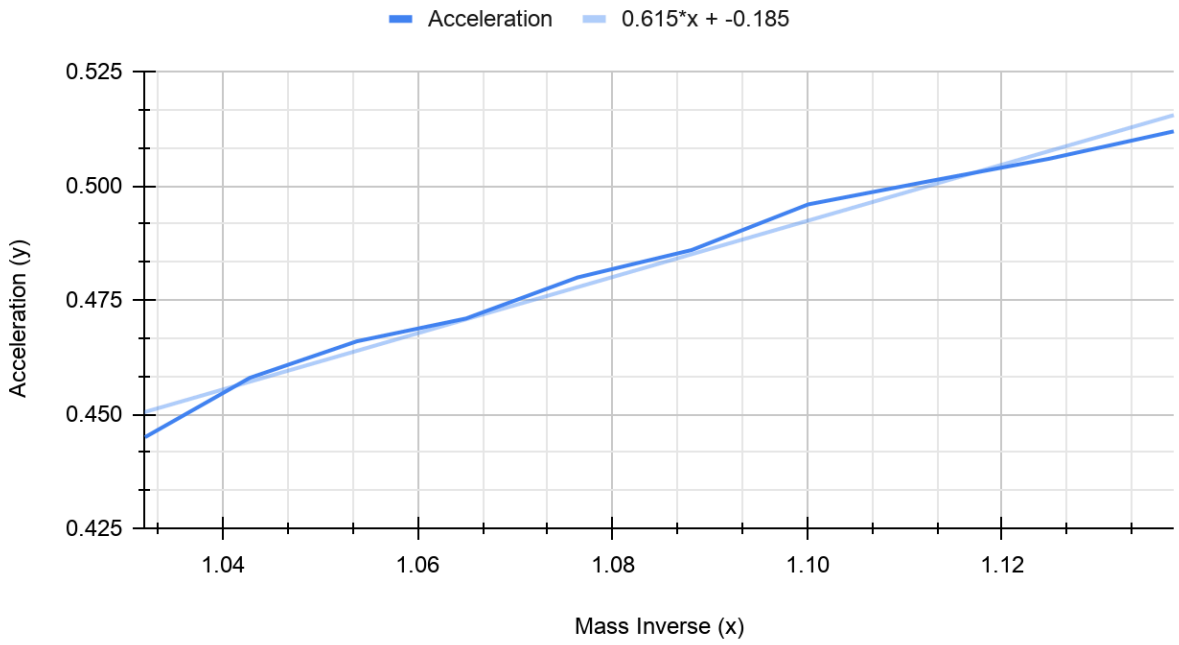


In Figure 1, as the force increases, the acceleration will also increase at a linear rate. Because it increases at a linear rate, acceleration is directly proportional to force. This makes sense because this is Newton's second law, "The acceleration of an object as produced by a net force is **directly proportional to the magnitude of the net force**, in the same direction as the net force, and inversely proportional to the mass of the object.".

The slope of the graph represents the mass of the object. The steeper the slope, the mass would be lower, and if the slope is flatter, that means that the mass is greater. The value is extremely close to the total mass of the system.

Part 2:

Figure 2



In Figure 2, if mass increases, the acceleration will decrease. The total mass is inversely proportional to the acceleration. Because Figure 2 shows mass inverse and the trend is proportional, the graph trend is inversely proportional. Newton's second law tells us that "The acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force, in the same direction as the net force, **and inversely proportional to the mass of the object.**"

The slope represents the force (force of gravity in this case). The steeper the slope, the greater the force, and if the slope is flatter the smaller the force. The value is pretty close to the data.