# Week 4 Physics Lab Report: Dynamics and Forces

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**Introduction**

The purpose of this report is to confirm the relationship between force and acceleration. This was done by collecting force and acceleration data in three different ways and then calculating mass to determine how close they were. All of the following sections will be sorted by these various methods.

**Methodology**

The first test was very simple, the IO lab device was placed on end on the table with a screw attached. It was left to sit for ten seconds while accelerometer and force sensor data were collected. It was then picked up for ten seconds, and then placed back down on the table for ten seconds. The same data was collected for all of this.

A diagram of a step and step

Description automatically generated

Figure The IO lab is lifted and set back down

The second test was also very simple. The IO lab was placed on its back on the table with the screw attached. It was then gently pushed five times while accelerometer and force sensor data were collected.

A diagram of a mathematical equation

Description automatically generated with medium confidence

Figure The IO lab is gently pushed five times

The third test was more complicated. A different screw was attached to the IO lab with the purpose of hanging it from a spring. A screw driver was then placed on the edge of the table with part of it hanging off the edge. A spring was then attached between the screwdriver and the IO lab device. After the IO lab stabilized the accelerometer and force sensor were turned on and the device was pulled down gently and released to allow it to oscillate.

A drawing of a diagram

Description automatically generated with medium confidence

Figure The IO lab is hung from a spring and bounces

**Results**

The results of the first method are shown in figure 4

A close-up of some writing

Description automatically generated

Figure Results of the first method

This is acceleration and force data for when the IO lab is sitting on the table and after it’s lifted. The data collected is fairly simple and has very little meaning until analyzed in tandem with the other methods.

The results of the next method are shown in figure 5

A close-up of a paper

Description automatically generated

Figure Results of the second method

These results show the acceleration and force from each of the five pushes. The force and acceleration increase as expected since the device was pushed with increasing strength.

The results of the last method are shown in figure 6

A graph with a red line

Description automatically generated

Figure Results of the final method

This data shows the relationship between acceleration and force while the device is oscillating on the spring.

**Analysis**

To show the relationship between force and acceleration the data collected in each method will be used to estimate the mass of the IO lab device.