Physics – Formal Lab Report

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For this lab we constructed an experiment with a string, mass, and a timer in order to find the acceleration of gravity. This was completed by a few tests which resulted in a gravity force, 10.255m/s2 that matched closely with the university gravity constant (9.8m/s2) within a reasonable uncertainty.

**INTRODUCTION**

During this experiment we used a pendulum with a few controlled variables in order to find the gravity effecting the pendulums swing. This was done by using formulas given from the physics book/lecture. This can be used in many circumstances in the real world to simply find how gravity changes with elevation.

**PROCEDURE**

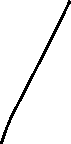
The pendulum was set up by pinching a string to the edge of a desk with a knot which had the mass(metal weights provided) attached to it. After placing string as described, we could take a measurement of the length of the string with a provided meter stick. Next, we pulled the mass to an arbitrary height and released it setting it into motion. Then using an iPhone timer, we timed 10 oscillations and received the average time for one oscillation. All these steps were repeated in 3 trials, each with different lengths of string. After collecting all this data, we used the period formula in order to find the gravity constant.

**DATA**

Experimental Data

|  |  |  |  |
| --- | --- | --- | --- |
|  | **TRIAL 1** | **TRIAL 2** | **TRIAL 3** |
| **STRING LENGTH** | 30cm | 40cm | 50cm |
| **MASS OF OBJECT** | 20g | 20g | 20g |
| **PERIOD OF OSCILLATION** | 1.068s | 1.259s | 1.404s |
| **GRAVITY CONSTANT** | 10.383m/s2 | 9.962m/s2 | 10.42m/s2 |

Each trial was measured separately, at each time the experiment was run. The measurements were all taken with the same meter stick giving accurate measurements. Each time was captured by an iPhone stopwatch, giving the uncertainty higher percentage due to inexact start/stop commands.



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**ANALYSIS**

**Formulas:**

AVERAGE GRAVITY CONSTANT**: 10.255m/s2**

Only one formula was used during this lab. After plugging in all known variables, the unknown variable can be solved for. This was repeated 3 times by the partners and matched by each person giving certain results.

**SUMMARY**

After completing 3 trials and solving for the gravity, 10.255m/s2 was the result. This is %4.64 off the universal value which is 9.8m/s2. This can happen for many of reasons like miscalculation of length of string, mass not weighing exactly 20g, the timer not being exact, or rounding errors in the calculations. The largest contributor to the uncertainty was the time of period. The slightest amount of time could have thrown the constant off. This could have been measured with greater precision with some more precise tools like a laser timer to stop right at the furthest swinging point. This could also be recorded with a camera to see when the mass would come to complete rest, allowing the time to be exact.

The experiment was fun and showed how this material can be used in the real world. Some improvement could be made with more precise tools, but results were not too far off with what resources we could get a hold of.