The Hudson School, Hoboken, New Jersey
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Pendulum Lab

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Date Performed ..... February 3, 2016
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1 Purpose

The purpose of this experiment is to find which of the following three variables affect the period of the pendulum: length, mass, and/or amplitude.

2 Hypothesis

I think that the period of a pendulum depends on only the length of the pendulum because the pendulum with the longer string has a lower frequency and the shorter string has a shorter frequency.

3 Materials

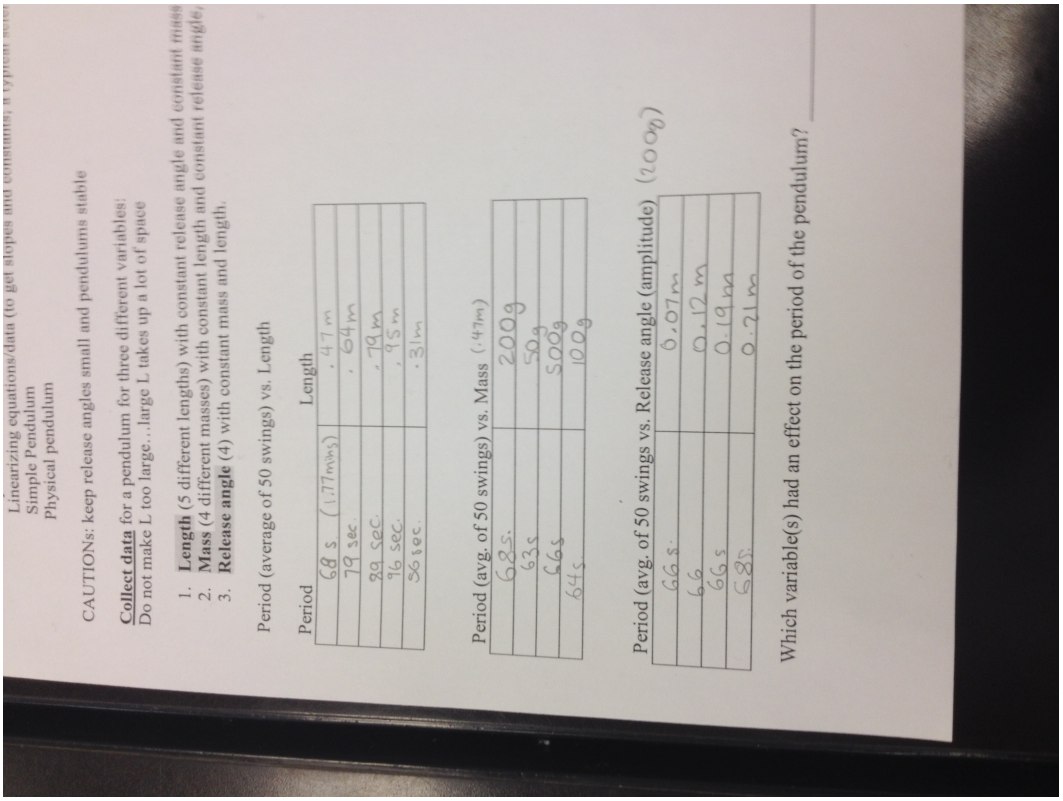
1. C-clamp
2. ing-Stand
3. String
4. Pendulum with various masses

4 Procedure

1. Set up the ring stand
2. Apply vise grip to stand and table

3. Tie string to the pendulum clamp on the ring stand
4. attach Attach a desired weight to the pendulum
5. Hold back pendulum to desired position
6. Release pendulum and track for 50 swings back and forth
7. Divide total time by 50 to get time for one period
8. Do this five times, but each time change length of the pendulum while keeping amplitude and mass the same. Then vary the amplitude while keeping mass and length the same. Lastly, vary mass while keeping the length and amplitude constant.

5 Data


Linearizing equations/data (to get slopes and constants), a typical
Simple Pendulum
Physical pendulum

CAUTIONs: keep release angles small and pendulums stable

Collect data for a pendulum for three different variables:
Do not make L too large…large L takes up a lot of space

1. **Length** (5 different lengths) with constant release angle and constant mass
2. **Mass** (4 different masses) with constant length and constant release angle,
3. **Release angle** (4) with constant mass and length.

Period (average of 50 swings) vs. Length

Period	Length
68 s (1.77 m/s)	.47 m
79 sec	.64 m
89 sec	.79 m
96 sec.	.95 m
56 sec.	.31 m

Period (avg. of 50 swings) vs. Mass (.47m)

68s.	200g
63s	50g
66s	500g
64s	100g

Period (avg. of 50 swings vs. Release angle (amplitude) (200g)

66 s	0.07m
66	0.12 m
66 s	0.19 m
68s	0.21 m

Which variable(s) had an effect on the period of the pendulum?

We noticed that the release point had more of an effect on the time the pendulum took to do 50 rotations and not the mass. As we released the pendulum we noticed that though we changed the release point, the time wasn't changing with it

6 Discussion

The most influential part was the length of the string.

6.1 Results

We discovered that mass doesn't matter as much as length does.The longer the string was the longer the period was and the shorter string had a shorter period

6.2 Critique

Some of the measurements inaccuracies could of came from human error such as being unable to time the exact time of 50 rotations. Also, it could have came from the inability to let go of the pendulum at the same exact spot.

6.3 Definitions

1. Period (of a pendulum)- The time for one complete cycle, a left swing and a right swing, is called the period. The period depends on the length of the pendulum, and also to a slight degree on the amplitude, the width of the pendulum's swing.

2. Amplitude- the maximum extent of a vibration or oscillation, measured from the position of equilibrium.

3. Equilibrium- a state in which a process and its reverse are occurring at equal rates so that no overall change is taking place.

4. Linearizing equations- Linearizing equations is this process of modifying an equation to produce new variables which can be plotted to produce a straight line graph. In many of your labs, this has been done already

5. Simple Pendulum- Period of Simple Pendulum. A point mass hanging on a massless string is an idealized example of a simple pendulum. When displaced from its equilibrium point, the restoring force which brings it back to the center is given by: Show.

6. Physical pendulum- A physical pendulum is the generalized case of the simple pendulum. It consists of any rigid body that oscillates about a pivot point.

7 Conclusion

In conclusion, this lab was very informative and showed the difference between the products of length, mass, and amplitude and how it affected a pendulum.