Simple Harmonic Motion Lab Report

Objectives:

* Find g from the equation: T²= 4π²/g ((L²/12 + d²)/ d)
* Graph period squared vs. ((1/12)+ d^2)/ (d) to get the slope, then to calculate thevalue of g.

L= 1m

Materials:

* Meter Stick with holes at varying distances
* Modeling Clay
* Calculator
* Calculator Modem to connect all devices
* Appropriate Physics Program on Calculator
* Motion Detector
* Paper Clip
* Wooden Blocks (when necessary to produce more height under the meter stick)
* C clamp

Procedure:

One begins by using a flat surface to stack up the wooden blocks onto. Then place the paper clip onto the blocks with one leg un bent facing out hanging off the blocks. Tighten the C-clamp around the blocks and paper clip to secure the system. Place the meter stick onto the paperclip using one of the various holes and securing it by placing the modeling clay on the end of the paper clip. Attach the motion detector to a stand and hook up all chords to the calculator modem and load the program on the calculator. The detector will need to be set up with the program. Simply follow the directions on the program. Place the motion detector on the ground directly under the meter stick with just enough room so that the meter stick breaks the beam from the motion detector.

When everything is set up, pull the meter stick back 15 degrees or less and press enter on the program. Then release the meter stick and allow it to swing. The calculator will give you the period of the motions. Repeat these final steps for this same distance on the meter stick twice and move to a new distance to complete the lab.

Data:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| d (m) | T1 (sec) | T2 (sec) | T3 (sec) | T(av) | (1/12 +d^2)/d | T(av)^2 |
| 0.15 | 1.696 | 1.698 | 1.699 | 1.697667 | 0.705555556 | 2.882072 |
| 0.25 | 1.54 | 1.538 | 1.538 | 1.538667 | 0.583333333 | 2.367495 |
| 0.49 | 1.636 | 1.637 | 1.636 | 1.636333 | 0.660068027 | 2.677587 |

Graph:

M = (4π^2)/g

g = 4.186

M= 9.43106

% error = new-old

old

= 9.43106-9.81

9.81

= -3.86%

Conclusion:

By graphing the equation T^2= (4π^2/g)\* (1/12 +d^2)/d, I was able to use excel to find the slope of my data. This slope is used to calculate g, and my percent error was -3.86, so this is in an acceptable range. I was very surprised to receive and acceptable value for g with only three data points. The data that I received did not seem normal when I was recording it, but it ended up to have a linear relationship when graphed in the correct format. I also noted that the modeling clay was moving with the meter stick, so this may have affected the data, but it seemed to have not very much. All in all, the lab was a success, and I have furthered my knowledge of simple harmonic motion.