

Lab exercise 2: acceleration essay sample



**ASSIGN
BUSTER**

A. Objective

This experiment will provide data to calculate the acceleration of a marble as it rolls down an incline plane over measured periods of time. To do this, the marble's velocity will be determined and then its acceleration.

1. What is the distance between two marks in your inclined plan? -50cm

2. What is the angle of your inclined plan with respect the horizontal? -
16degrees

3. Newton's first law says a body at rest will remain at rest unless acted upon by an outside force, and a body in motion will continue in motion at the same speed and in the same direction unless acted upon by an outside force. What forces were acting on the marble as it traveled down the ramp?

-While traveling down the ramp the forces of gravity were acting on the marble.

4. Did the measured acceleration was about the same for the three (or four) sections of the experiment (Release point to 1st marking, to 2nd marking, etc) ?

-Yes the rates of acceleration between each section of the experiment were pretty similar.

5. Do you expect this acceleration to be constant or different for the three (or four) sections of this experiment? Explain your reasoning.

- I expect the rate of acceleration to be constant throughout the experiment being that the marble will reach its maximum acceleration and stop there.

6. By looking at the Standard Deviation results for the calculated acceleration, which section of this experiment is the more precise? Explain your reasoning.

-Section 3 had the lowest deviation in results thus making it the most precise.

7. What was the average value of acceleration for the most precise section of this experiment?

-The average value of acceleration for section 3 was 1.42 m/s^2 .

8. Intuitively, we can understand that the velocity (and therefore the acceleration) of the ball will increase as we increase the angle of the inclined plane. We can make the assumption that the acceleration of the ball is equal to:

Expected acceleration = $9.8 \text{ m/s}^2 * \sin(\text{angle of inclined plane})$

The angle of the inclined plane is the value that you measured in Question 2 and transcribed into the table. Using the measured value of the angle of the inclined plane, calculate the expected value of the acceleration.

Expected acceleration = $9.8 \text{ m/s}^2 * \sin(16)$

= $9.8 * 0.276$

= 2.701 m/s^2

9. Calculate the relative error between the measured value of acceleration (from Question 7) and the expected value of acceleration (from Question 8).

The relative error between the measured value of the two is . 474

$$\text{Rel(error)} = \frac{1.42 - 2.701}{2.701}$$

$$= 0.474$$

10. What do you think are the elements that may contribute to increasing this error? How would you solve them?

I believe the elements contributing to the increased error are the lack of physical information ie. (marble mass, type of surface and distance). Just determining this information could solve this error.

During this lab I encountered a few difficulties the main one was being able to click the stop watch on and off at the appropriate time. During this experiment I learned a lot about how velocity and acceleration work in relation to moving objects. In closing this experiment really put a mental picture to all of the information covered in this module.