Acceleration and Velocity Lab

Materials: incline (cardboard tubes), textbooks, timer, meter stick, ping pong balls

Procedures:

1. Set up an inclined plane with the tube on 1 book.
2. Take your rolling object to the top of the incline, allow your object to roll down the incline and to the end of the table. Record the exact amount of time that is required to do this.
3. Repeat step two for at least three trials (two more times).
4. Repeat steps one through three for your object, however change the number of books to 2.
5. Repeat steps one through three for the object with 3 books stacked.
6. Repeat steps one through three for the object with 4 books stacked.
7. Calculate the average velocity of your object down the incline and to the end of the table by using the following formula: v=d/t. Remember velocity is another word for speed.
8. Calculate the average acceleration of your object down the incline and to the end of the table by using the following formula:

A=vfinal – vinitial

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_

t

 \*\*your initial velocity in this lab is 0 because it is not moving at the start

Data: Your data should be listed in a systematic and neat table on the table below. The following information should be recorded for each trial: distance, time, velocity, and acceleration.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Incline | Time for trial 1 (seconds) | Time for trial 2 (seconds) | Time for trial 3 (seconds) | Average for 3 trials (seconds) | Distance (length) of incline and table | Velocity (cm/s) average of 3 trials | Acceleration (cm/s2)Average of 3 trials |
| 10o (1 book) |  |  |  |  |  |  |  |
| 20o (2 books) |  |  |  |  |  |  |  |
| 30o (3 books) |  |  |  |  |  |  |  |
| 40o (4 books) |  |  |  |  |  |  |  |

Conclusion Questions:

1. What force(s) caused the object to roll down the incline?
2. Based upon your data, speculate how increasing the mass of a moving object would increase its velocity down the incline.
3. Why was it important to do multiple trials of this activity?
4. What relationship can you think of between the angle of the tube and the velocity of the ball?
5. What relationship can you think of between the angle of the tube and the acceleration of the ball?
6. What would happen to the velocity if you increased the number of books?
7. What would happen to the acceleration if you increased the number of books?
8. What would happen to the velocity of the ball if you increased the distance it rolls?
9. What would happen to the acceleration if you increased the distance it rolls?

1. When we race the self-propelled cars we are building for our project, we will race them on a flat surface. Why is it a better competition this way instead of having them roll down a ramp first?