

Marble Acceleration Lab

Problem: If I double the time of an object accelerates will the distance it travels also double?

Hypothesis: IF _____

THEN: _____

Materials: Meter stick, plank, marble, stopwatch, calculator

Lab Procedure:

- 1). In groups of 4 - Begin by picking one person to be the marble starter, 1 person as distance marker/watcher, one person as timer, and one to catch it at the other end of the ramp.
- 2). Roll the marble from the top of the plank; determine how many centimeters the marble rolled in .5 seconds. Record your distance in the data table.
- 3). Repeat step #2 two more times and record data under trial 2 and 3.
- 4.) Repeat steps 2-3 four more times with adding .5 second each time.

Average acceleration =
(cm/s²)

$$\frac{\text{Final velocity} - \text{Starting velocity}(0 \text{ m/s})}{\text{Time it takes to change velocity}}$$

Segment A (.5 sec)	$\frac{V_f - 0}{t} \rightarrow \frac{d}{t}$ $t \rightarrow .5s$
Segment B (1 sec)	
Segment C (1.5 sec)	
Segment D (2 sec)	
Segment E (2.5 sec)	

- 5.) Average your distances for each segment and record.
- 6.) Calculate the average speed for each segment and record this in the table.
- 7.) Calculate the acceleration for each of the segments (each .5 second-distance your marble rolled). Initial velocity will always be 0 m/s. Use your average velocity numbers from your data table for the final velocity number. Average acceleration = Final velocity – Starting velocity(0 m/s) (cm/s²)
- 8.) Repeat the lab this time changing the shape of the ramp so instead of a flat angled ramp put a curve into the ramp and predict what you think will happen to the acceleration.

Analysis/Conclusion:

1. Does your data support your hypothesis? Explain.
2. If you were to let the marble roll for 5 seconds what might you expect to see each second? Explain.
3. Describe your marble's average acceleration for the 2.5 seconds you tested.
4. Sketch the shape of a velocity/time graph using your calculated numbers as a guide.