

Marble Acceleration Lab

Name: _____ Sci #: _____

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

Hypothesis: IF _____ THEN: _____

Materials: Meter stick wood plank marble stopwatch calculator

Set up your lab station as follows:



Lab Procedure:

- 1). In groups of 3 - Begin by picking one person to be the marble starter, 1 person as distance marker/watcher, and one person as timer.
- 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.

Data Table

Seg- ment	Time	Trial 1	Trail 2	Trial 3	Ave. distance	Average velocity (d ÷ t)
A	.5 sec					
B	1 sec					
C	1.5 sec					
D	2 sec					
E	2.5 sec					

5. Average your distances for each segment and record. (Use this number for future problems that require a distance number).
6. Calculate the average speed for each segment and record this in the table.

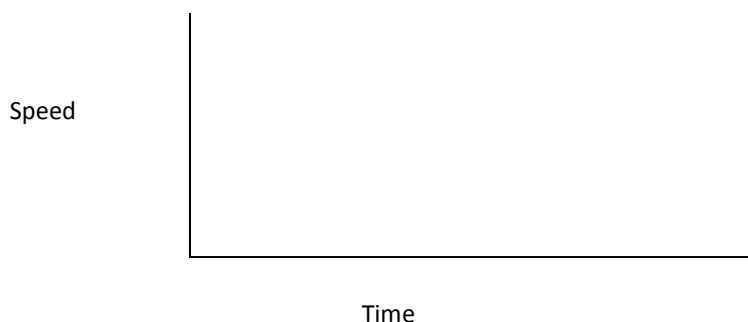
7. Calculate the acceleration for each of the segments (each .5 second-distance your marble rolled). Initial velocity will always be 0 m/s. Use your average velocity numbers from your data table for the final velocity number.

Average acceleration = $\frac{\text{Final velocity} - \text{Starting velocity}(0 \text{ m/s})}{\text{Time it takes to change velocity}}$
 (cm/s²)

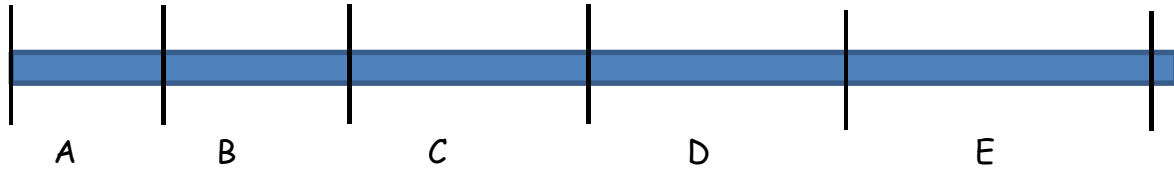
Segment A (.5 sec)	$\frac{V_f - 0}{t} \rightarrow \frac{d}{t}$ $t \rightarrow .5s$
Segment B (1 sec)	
Segment C (1.5 sec)	
Segment D (2 sec)	
Segment E (2.5 sec)	

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 speed/time graph using your calculated numbers as a guide.



CALCULATING ACCELERATION LAB PART 2



1. The lines on the figure above represent each .5-second segment your marble rolled.
 - a. Above the line, label the figure with the distance your marble went for each segment using your data.
 - b. Below the line calculate the distance of each individual segment.
 - c. Calculate each segment's acceleration.
 - d. Compare and analyze these numbers to your average acceleration to each point from the first part of the lab.
 - e. Explain the motion of your marble from beginning to end in terms of acceleration and velocity.