

SPEED LAB

Name: _____ Date: _____ Period: _____

Purpose: To calculate and identify any changes in speed due to an _____ in ramp _____ or a change in the marble's _____.

Research:

Speed is the measurement of _____

The formula for speed is _____

Acceleration is any change in _____

Materials per Group:

- PVC Tube (1 meter long)
- Marbles
- Stopwatch
- Textbooks (8)
- Lab Bin
- Calculator

Prediction: Will increasing the ramp height **always** increase the speed of the marble?

Experiment #1, Marbles:

1. Set up the equipment as drawn below:

2. Place the marble at the top of the ramp and have your stopwatch ready. Release the marble and begin timer. When the marble hits the table, stop the timer and record the time for the marble to roll 100cm in the data table.
3. Repeat the above steps for three (3) trials, and average the time for all three rolls for the same ramp height.
4. Repeat steps 2-3 for the remaining 7 ramp (book) heights.
5. Calculate the average marble speed for each ramp height.

Data Collection:

Ramp Height in Books	Distance Rolled	Marble Roll Times in Seconds (round to the nearest hundredth)			Average Marble Time (sec)	Average Marble Speed (show correct unit)
		Trial 1	Trial 2	Trial 3		
1	100cm					
2	100cm					
3	100cm					
4	100cm					
5	100cm					
6	100cm					
7	100cm					
8	100cm					

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Experiment #3, Middle School Speed: Do all middle school students have the same speed when running a 40m dash? Complete the data table for calculating speed while running this type of race for students at your table:

Date Table for Student 40m Run by Table Group				
Student Name (from table)	Student Age	Race Distance (m)	Total Time (s)	Speed (m/s)
				Group Average Speed:

Conclusion:

1. Were either of your predictions correct for experiments 1 & 2? Explain _____

2. What is the relationship between the average speed of the marble and the height of the ramp?

3. Would increasing the ramps steepness always increase the marbles speed? Is there a limit, and if so, why? _____

4. Would the average speed be the same if you measured the time to roll 500 cm? Explain.

5. Calculate the average acceleration between ramp height # 1 and ramp height # 8 for **your** team's marble size? Show your work!

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6. What force do you think is causing the marble motion? When is it a balanced force and when is it an unbalanced one? _____

7. Compare another group's calculation for acceleration that used a different sized marble than your team. Which one did you compare, and which marble accelerated faster? _____

8. Was there a significant difference between the speeds of the different marbles? Why do you suppose this is? _____

9. Compare the average speeds of your group's 40m speed to that of another table. What was the difference between your group speed and their speed? What do you think was the significant difference between your table's results versus the other table's result?

10. How long would it take for your table to travel to the Sun at your current table's average speed? Show your work, and look up the distance online.

Distance from Earth to Sun = _____

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