Name ________________________________ **Date** _________________ **Period** _______

Acceleration lab

<u>Objectives</u>:

- To understand that acceleration is a component of motion
- To understand and measure average speed and change in speed (acceleration)
- To use metric system units correctly

<u>Materials</u>:

- 2 meter sticks
- tape
- marker marble
- tennis ball
- noodle ramp (2 meters long)
- marker

<u>Procedures:</u>

1. Tape one end of the ramp to the floor and mark the "start" line at the bottom of the ramp
2. Make a track with mark-lines at 4m, 8m, 12m, and 16m with the tape and marker
3. Have a timer ready at each mark-line, all timers will start simultaneously (same time)

Marble:

4. Elevate your ramp to 100 cm height and be ready to drop the marble.
5. Drop your <u>marble</u>, but don't start the timers until the marble hit the "start" line.
6. Stop each timer when the <u>marble</u> hits their mark-line and record the time using seconds "s" under "Marble" on the data-table

Tennis ball:

7. Elevate your ramp to 100 cm height and be ready to drop the <u>tennis ball</u>
8. Drop the <u>tennis ball</u> and record the time on your data-table under "Tennis-ball" using "s" for seconds.
9. Use the 1st formula to find the <u>average speed</u> for the entire track for both, the marble and the tennis ball.
10. Use the 2nd formula to find the speed at each interval at the 4m, 8m, 12m, and 16m line-mark for both

How to use the speed formula

Look at the following examples:

Example:

Distance (m)	5m	10m	15m	20m	25m	30m
Time (s)	3s	6.4s	9.2s	11.9s	15.1s	18.2s
Speed (m/s)	***1.67m/s***	***1.47m/s***				

1. To find the average speed for the entire track, use the first formula

$$\text{Average Speed} \equiv \frac{\text{total distance}}{\text{total time}}$$

- Which is S= 30m / 18.2s
- S= 1.65m/s

2. However, to find the speed at each interval, use the second formula

$$\text{Speed at intervals} = \frac{d_2 - d_1}{t_2 - t_1}$$

- S = 5m – 0m / 3s – 0s
- S = 5m / 3s
- S = 1.67 m/s

- S = 10m – 5m / 6.4s – 3s
- S = 5m / 3.4s
- S = 1.47m/s

What is Acceleration?

Marble at 100 cm height					
Distance (m)	0 m	4m	8m	12m	16m
Time (S)					
Interval speed					

1. What was the average speed for the entire track? Show your work

2. Is the speed constant at each interval?
3. Compare the average speed to the interval speed of each line-mark. How are they different?

4. Is there acceleration? _______ Explain your answer

Tennis ball at 100 cm height					
Distance (m)	0 m	4m	8m	12m	16m
Time (S)					
Velocity					

5. What was the average speed for the entire track? Show your work

6. How is the average speed of the ball compared to the marble?

7. What happen to the acceleration of the ball as time goes by?

8. How does the height of the drop affects the acceleration of the objects?

9. Why is the ball slowing down with time?

10. Why is the acceleration of the ball and the marble different?

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Name of Lab ____