

Physics
Buggy Lab with Ticker Tape Timer Makeup

Name _____
 Date _____

Purpose –

1. Determine the mathematical relationship between change of position (displacement) and time for a buggy.
2. Determine the mathematical relationship between velocity and time for a buggy.

This is the procedure your classmates followed to collect the data. Please see below for theoretical data and graphs to analyze.

Procedures for x vs. t graph

1. Assemble the ticker tape timer so that the white paper is beneath the carbon paper disc. Tape the end of the paper strip to the back of the buggy.
2. Hold the buggy down and then turn the switch. At the same time release the buggy and turn the ticker tape timer on. Allow the buggy to move until the strip of paper passes completely through the apparatus.
3. Choose a starting point (not exactly where the dots first begin) and make a mark. Count 6 spaces and make another mark – *this represents 0.1 s*. Count another six spaces and write 0.2 s. Continue this process until you have about 2 s (or the length of your tape) worth of time data points.
4. Place the meter stick at the starting point. Measure the distance to 0.1 s and record this in the data table (convert to meters first). Without moving the ruler, record the distance to 0.2 s. Continue measuring the distances without moving the meter stick. Add another meter stick when you get to 1 m.
5. Determine which quantity is the independent variable and which is the dependent variable. Use graphical analysis and enter your data. Determine the relationship between displacement and time.

Data

**** Every 6 dots represents 0.1 s****

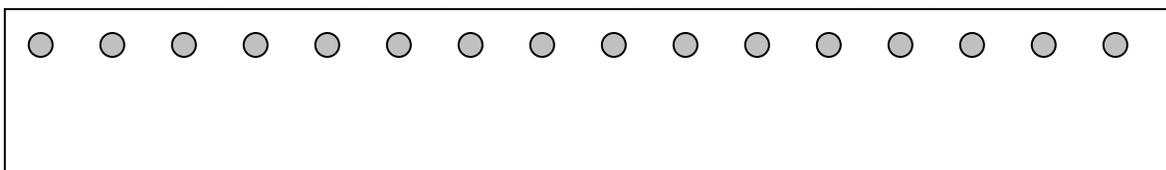
Time (s)	Position (m)
0.1	
0.2	
0.3	

	Data Set		
	Time (s)	Position (m)	Velocity (m/s)
1	0.1	0.038	
2	0.2	0.074	0.360
3	0.3	0.112	0.380
4	0.4	0.147	0.350
5	0.5	0.184	0.370
6	0.6	0.221	0.370
7	0.7	0.259	0.380
8	0.8	0.297	0.380
9	0.9	0.334	0.370
10	1.0	0.371	0.370
	2.0		

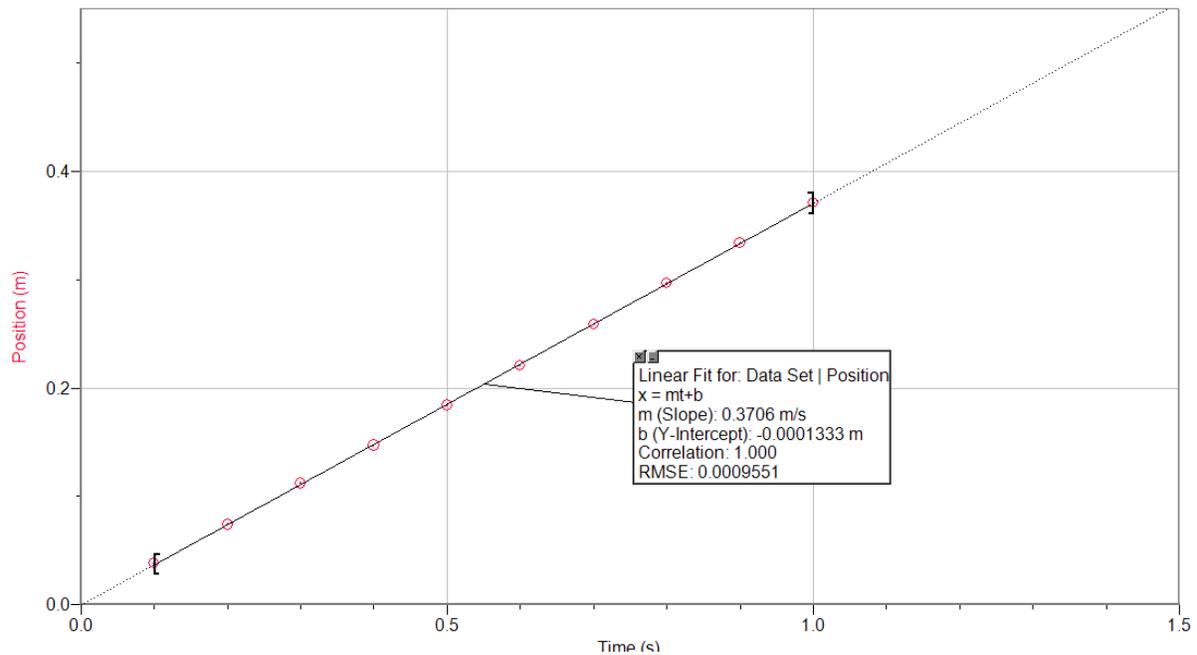
Sketch the resulting curve here:

Analysis of x vs. t graph

1. Look at this sample ticker tape strip. How would you describe the spacing of the dots on this tape?



2. What does this indicate about the motion of the buggy? (How can these dots be used to describe the motion of the buggy?)



3. Indicate the independent and dependent variables and why each is that specific variable.

4. a) Describe the relationship between the data points.

- b) Write an equation for the curve.

- c) What is the slope?

- d) What are the units of the slope?

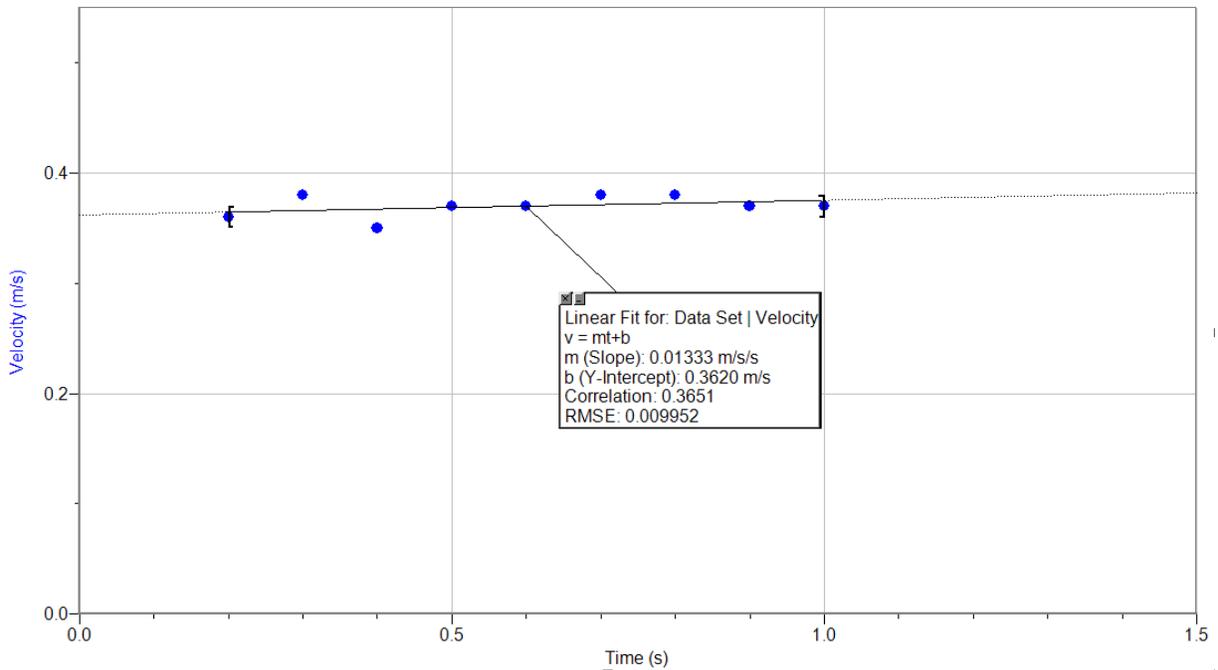
- e) What quantity does this represent?

5. What does a linear fit on a position vs. time graph represent?

6. How is the velocity calculated if only position and time measurements were taken?

7. **Hypothesis:** For an object traveling at a constant velocity, such as the buggies in this lab, what does the velocity vs. time graph look like?

Analysis for v vs. t graph



1. For an object traveling at a constant velocity, such as the buggy in this lab, what does the velocity vs. time graph look like?
 - a) Identify the y- intercept by including a numeric value (go to analyze, linear fit and you can determine the y- intercept by looking for the value of “b.”)
 - b) What does a horizontal straight line on a velocity vs. time graph indicate about the motion of the buggy?

Conclusions

1. Look at your data column for velocity in logger pro.
 - a) What is the average velocity? (*Hint: How would you find an average...such as a grade on a test?*)
 - b) Write down your velocity values from each source in this lab. *Do you notice anything?*
 - ...from x vs. t graph: _____
 - ...from v vs. t graph: _____
 - ...from the average calculated above (1a): _____
 - c) Why is it logical to expect that all of the above values should be related?
2. A _____ line on a position vs. time graph and a _____ line on a velocity vs. time graph both indicate that an object move's with a _____.