

Name: _____

Speedy Buggies: Graphing Speed vs. Time

Overview: In this activity, you will use your speedy buggies data and a graphing calculator to construct a speed vs. time graph of the motion of the buggy.

Materials: Speedy Buggy Lab Data, TI-83 (or 83 Plus) Graphing Calculator

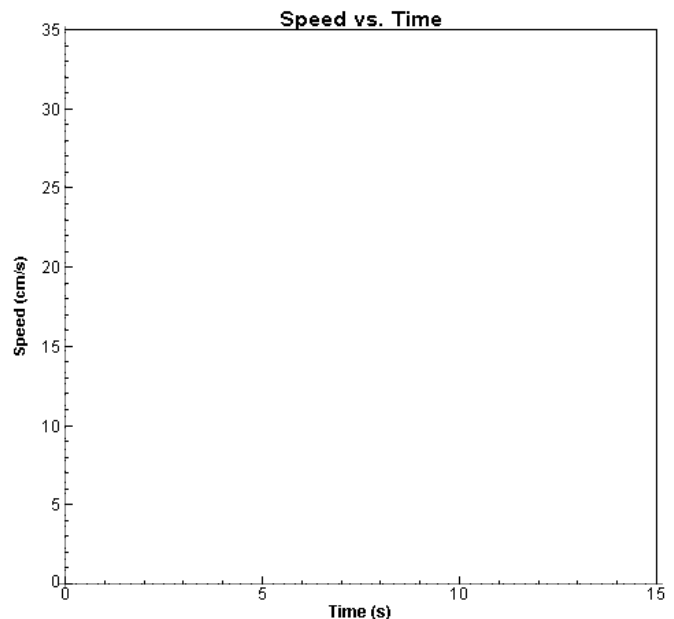
Make a Prediction:

In the speedy buggies lab you determined that the both buggies were traveling at near constant speed. However, the red buggy was traveling at a faster constant speed than the blue buggy.

Now imagine that the speed of the Both buggies are plotted on a speed vs. time graph rather than a distance vs. time graph. In other words, the y-axis now represents **speed** rather than distance.

1. Draw a line or curve on the graph that represents how you think the motion of **blue** buggy is depicted on a speed vs. time graph. Label "Blue Buggy"

2. Explain the reason for your prediction:



Transferring the Data:

In order to verify your prediction, you will first need the data from the Speedy Buggies lab.

On the data table to the right, transfer your data for both the red and blue buggy.

Time Interval	Distance traveled by blue buggy	Distance traveled by red buggy
0 to 3 sec		
3 to 6 sec		
6 to 9 sec		
9 to 12 sec		
12 to 15 sec		

Instructions for Entering the Data into the Graphing Calculator

Note: In the instructions below, all graphing calculator keys are shown in **bold type**.

1. Press **STAT**. Both EDIT and 1: Edit will be highlighted. Press **ENTER**.
2. A set of columns will appear. L1 = List 1, L2 = List 2, etc. Use the arrow keys to enter the distance and time data for the blue buggy in L1 and L2 as shown below.

L1	L2
3	
3	
3	
3	
3	
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Since each interval is 3 seconds, type 3 five times

Enter the blue buggy distance data from the above table.

3. In order to view an approximated speed vs. time graph, the average speed will need to be calculated for each time interval and plotted over a time interval from 0 to 15 seconds. This can be done by creating two new columns in the graphing calculator:

L3 = cumulative times from 0 to 15

L4 = speed calculated by dividing L2 (distance)/L1 (time)

- a. Use the arrow keys to move the cursor to the label 'L3' in the third column. Select LIST by pressing **2nd** then **STAT**.
 - b. Select 'OPS' and use arrow keys to select '6:cumSum(' . Press **ENTER**.
 - c. Type in 'L1' by pressing **2nd** then **1**. Press **ENTER**.
4. In order to setup column L4, move the cursor to the label 'L4'. Type 'L2/L1' (To select L2 press **2nd** then **2**. To select L1 press **2nd** then **1**.)

(View the results of columns L3 and L4 and determine if they are reasonable.)

In order to plot the graph:

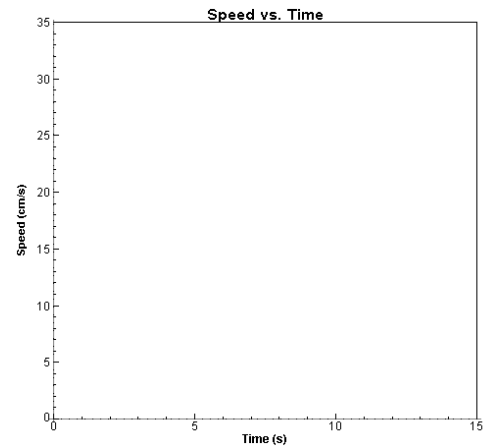
5. Create a scatter plot by selecting **STAT PLOT**. This is done by pressing **2nd** then **Y=**.
6. The first type of plot '1:' will be highlighted. Press **ENTER**.
7. Press **ENTER** again to turn the plot 'On'.
8. Next press **WINDOW** to set the scales of the graph. (Xmin = 0, Xmax = 15, Ymin = 0, Ymax = 35).
9. View the graph by pressing **GRAPH**.

Checking Your Prediction

1. Use the data in column L4 and the information from the graph to draw the line on the same graph as your prediction.
2. How did your prediction compare with the actual graph?
3. Explain why the graph line was horizontal.

Graphing the Red Buggy Data

1. Describe how the appearance of the graph will change when the red buggy data is plotted on the graph. You may describe in words or draw your idea on the graph shown.



2. The speed vs. time graph for the red buggy can be produced in three simple steps:
 - a. Press **STAT**. Both EDIT and 1: Edit will be highlighted. Press **ENTER**.
 - b. Replace the blue buggy data in column L2 with red buggy data from your data table.
 - c. Press **GRAPH** to view the graph.
3. Examine the calculator screen and draw a sketch on the graph above.



The Really Big Ideas:

1. When the **speed** of an object is **constant**, the trend on a:
 - distance vs. time graph will be _____.
 - speed vs. time graph will be _____.
2. *Circle the best responses.* The slope on a distance vs. time graph (increases, decreases) with an increase in object speed and the position of the graph line on a speed vs. time graph will be (lower, higher).