

Appendix V


The following instructions are meant as a guideline to plot a set of data with error bars in the y-axis. The data and error values given in this appendix are examples and are not to be used as values in the graphs which you are to create. By following the steps and using your data from Table A – C you should be able to create three individual graphs for $(\text{Velocity})^2$ vs each of the varied variable of F_c , R and $1/m$. The uncertainty for V^2 for each graph should be determined from each respective data table by taking the average of the 5 uncertainty values. Each graph should also contain the data points (0,0).

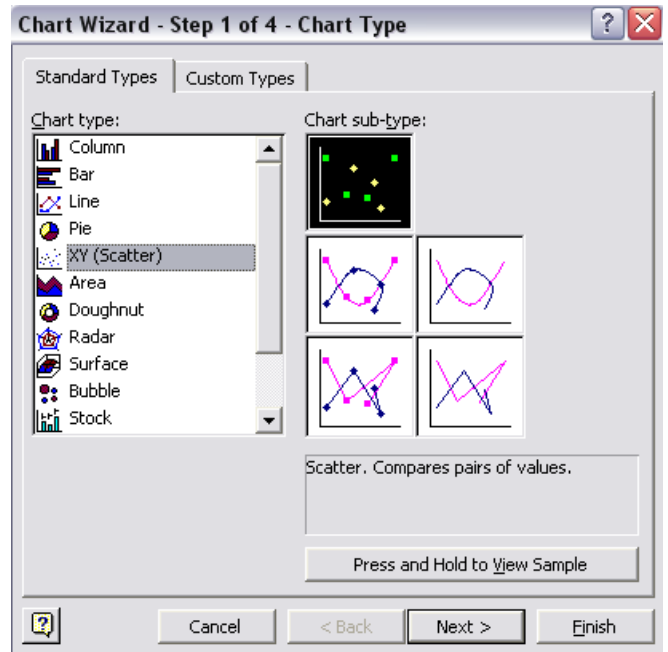
This example will create a graph of Velocity v. Time, with the velocity value having an uncertainty of 0.05 m/s.

The x axis value, time, will be entered into the first column. The velocity values are entered into the second column. These two columns will allow a best fit line to be created. To create a worst fit line, data will need to be entered into the third column. This data is determined by adding the uncertainty to the largest value of velocity and subtracting it from the smallest value of velocity. In this example 0.05 was added to 0.97 and subtracted from 0.196.

0	0	
0.125	0.196	0.146
0.25	0.384	
0.375	0.578	
0.5	0.79	
0.625	0.97	1.02

Select the data.

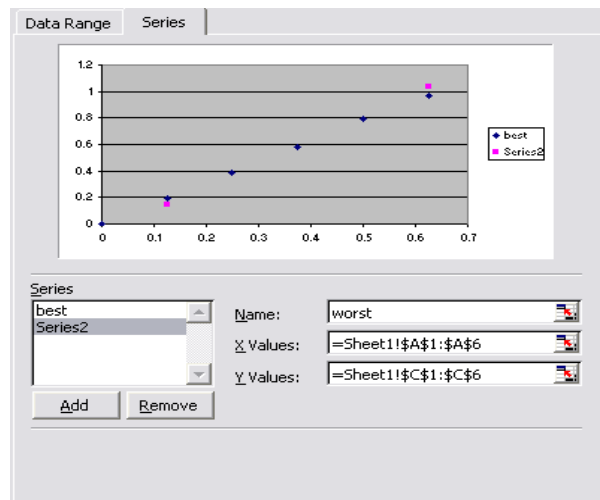
In the menu bar select the graph button . The chart wizard will appear; make the selections, which are shown in the picture to the right. Then select **Next**.



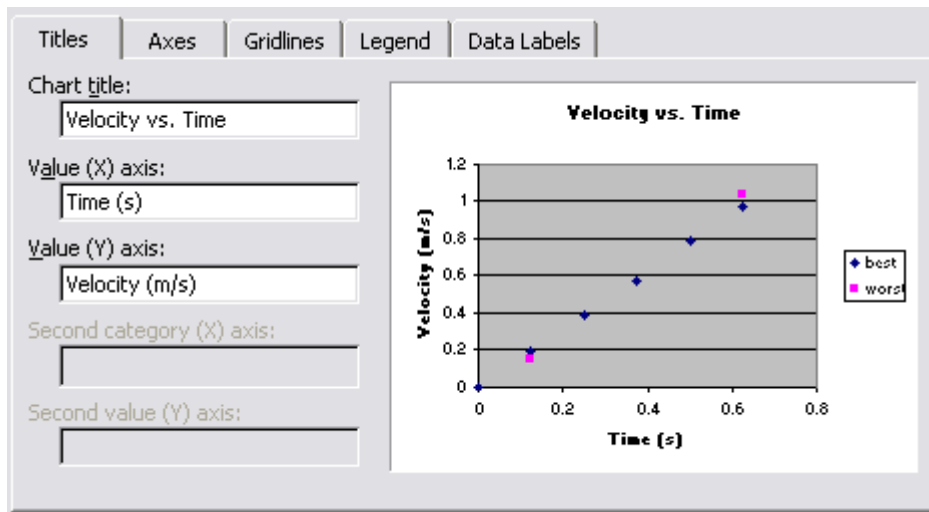
The next panel should look like the pictures shown below.

Select the Series tab. In the Series box select Series 1 and then change the name to Best. Now select Series 2 and rename it to Worst.

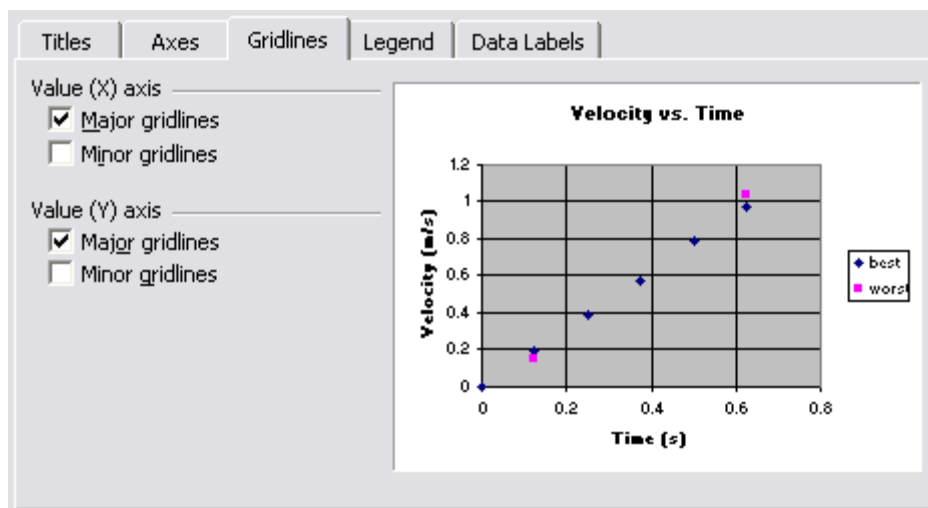
Click outside the Name input box so that Series 2 is renamed to worst. Then select Next.



Select the Titles tab. Title the Chart and each axis as shown in the example below.
 The title and axis for your graphs will change depending upon which Data Table is being graphed.



Next select the Gridlines tab and select major gridlines for the x and y axis.

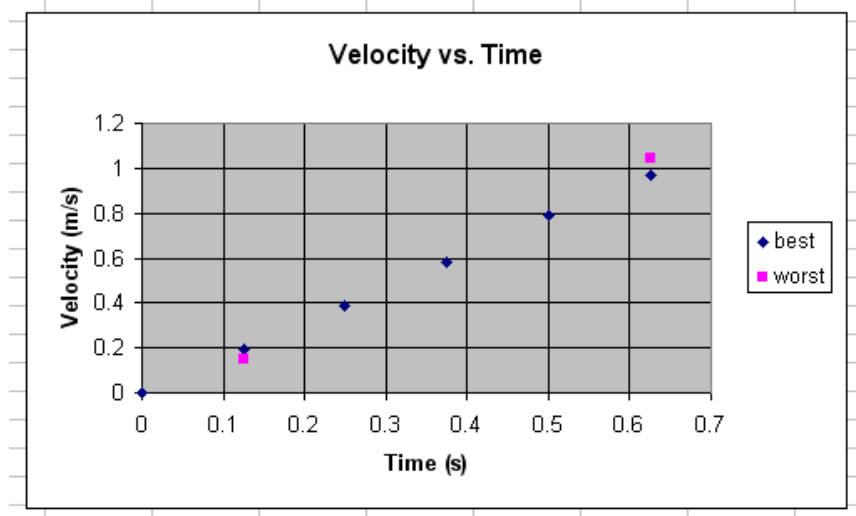
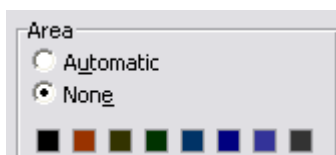


Select Finish.

The graph will appear within the spreadsheet. Select the graph. Right click within the gray region of the graph and from the popup menu select Format Plot Area.

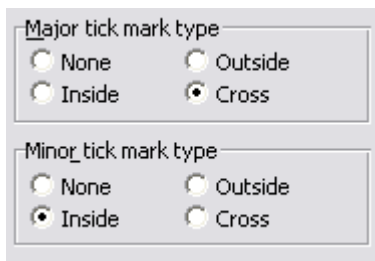
In the Format Plot Area Panel

Within the Area section select none.



Select OK.

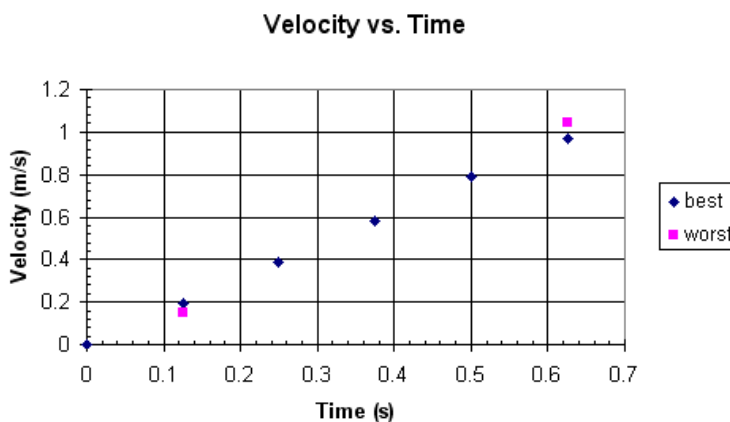
Position the mouse over one of the X axis values and right click with the mouse.
 Select Format Axis.



For Major tick mark select cross.
 For Minor tick mark select inside.

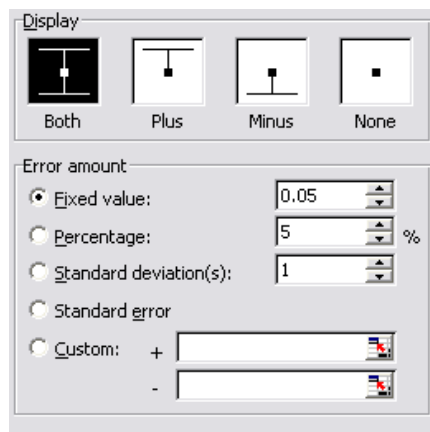
Select OK.
 Do the same for the Y-axis.

The graph should now appear as shown



Position the mouse over one of the best fit data points and right click. From the popup menu select Format Data Series.

Select the Y-error bar tab.



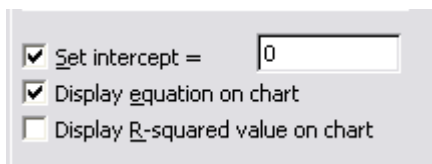
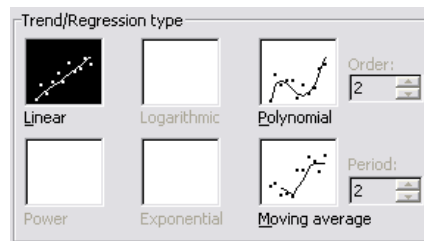
Within this panel select Both.
 In this example change the Fixed value to 0.05.
 Your value will be different.
This value will be the average uncertainty for v^2 taken from the data table which is being graphed.

Select OK.

To add a best fit line right click on one of the data points for the best fit series and select add trend line

Under the type panel select Linear

Select the Options tab and make the selection shown below



Click OK

The value of the slope appears. Reposition the equation location (see final picture). Rename y to **best** and replace the x with the units for the slope in this example it is m/s^2 .

The units for your graphs will be different.

For the worst fit line right click on one of the worst fit data points and from the popup menu select Add trend line. Under the Type panel select Linear and under the Options Menu make the selection shown.

Set intercept =
 Display equation on chart
 Display R-squared value on chart

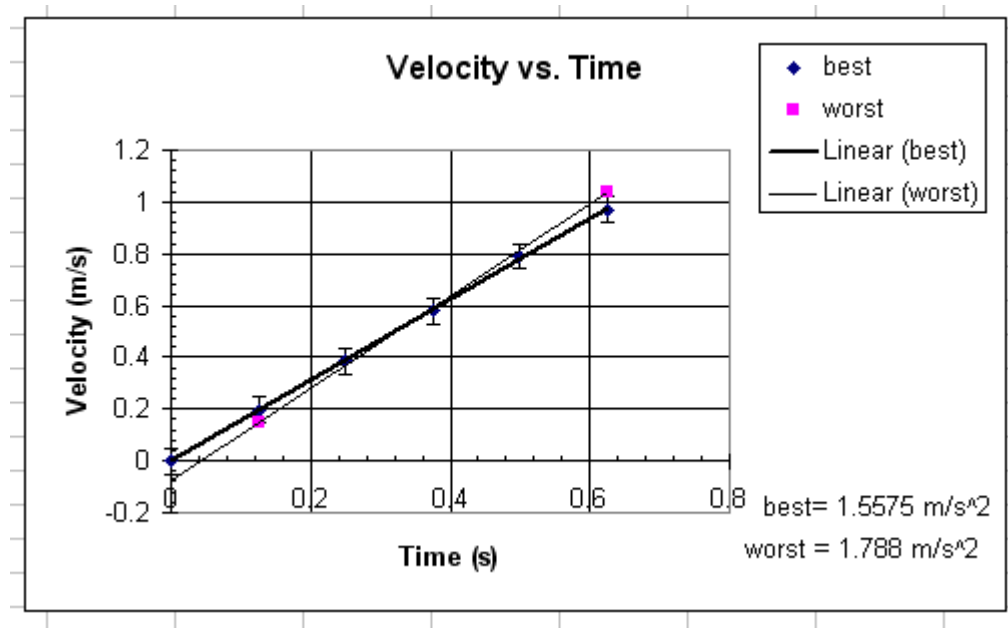
Select OK.

Rename this y to worst and add the unit (see final picture) and remove the y intercept value.

Right Click on the Worst Fit Trend Line and Select Format Trend Line. Under pattern you can choose the style weight and color as you choose as long as the best and worst fit lines are easily distinguished from one another.

Weight:

Your Final graph should appear as below



The graph above is an example only. Your graph for the data taken in the lab must represent the data taken for each data sheet.

The y axis of each graph for unit 4 is v^2 (m^2/s^2).
The x axis depends on which data sheet is being graphed.
Carefully following the instructions will yield a decent graph.