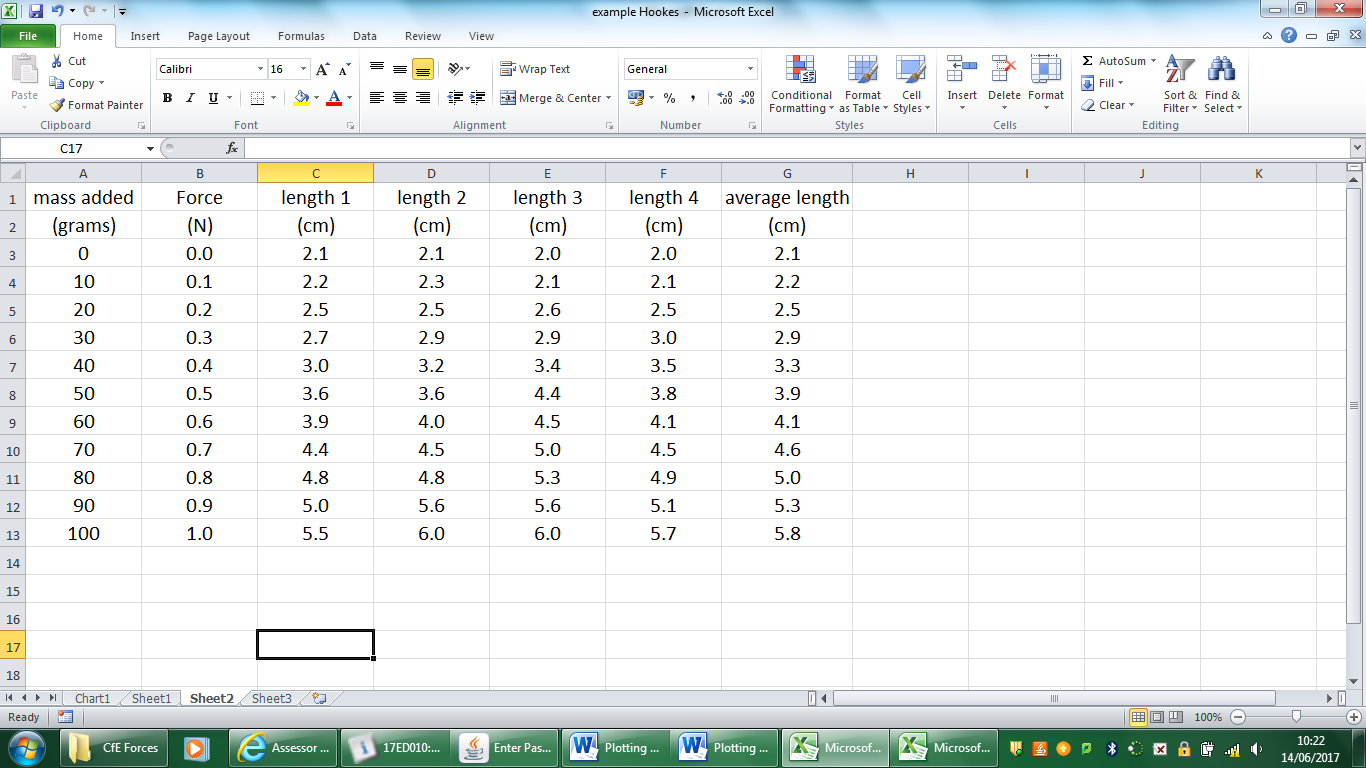
**qwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnm**

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| --- |
| Plotting Graphs in Excel  For Use with Your Hooke’s Law Data  2017  J A HARGREAVES |

Use of Excel 2010 Physics- A Graph of Hooke’s Law



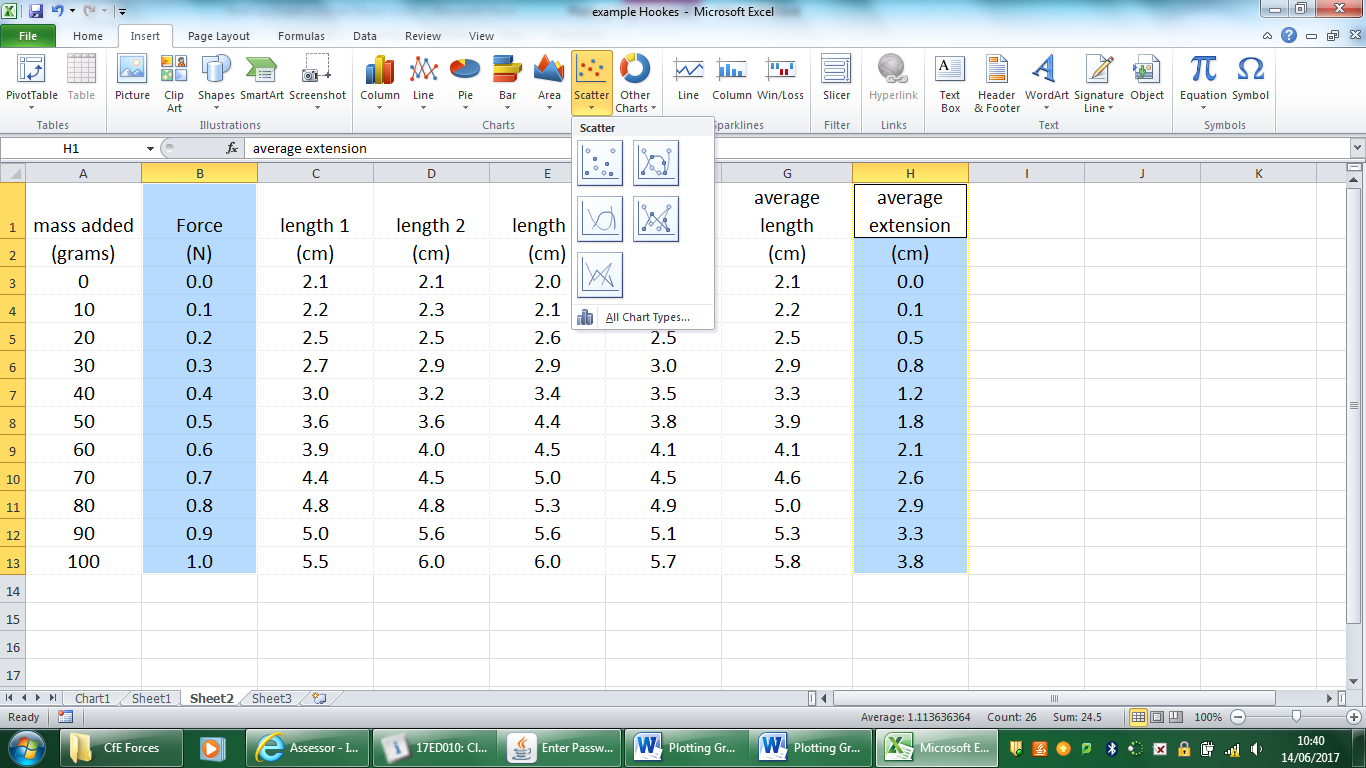
**Insert data, or open up your existing spreadsheet.**

**Click on Home**

**Highlight data to be plotted.**

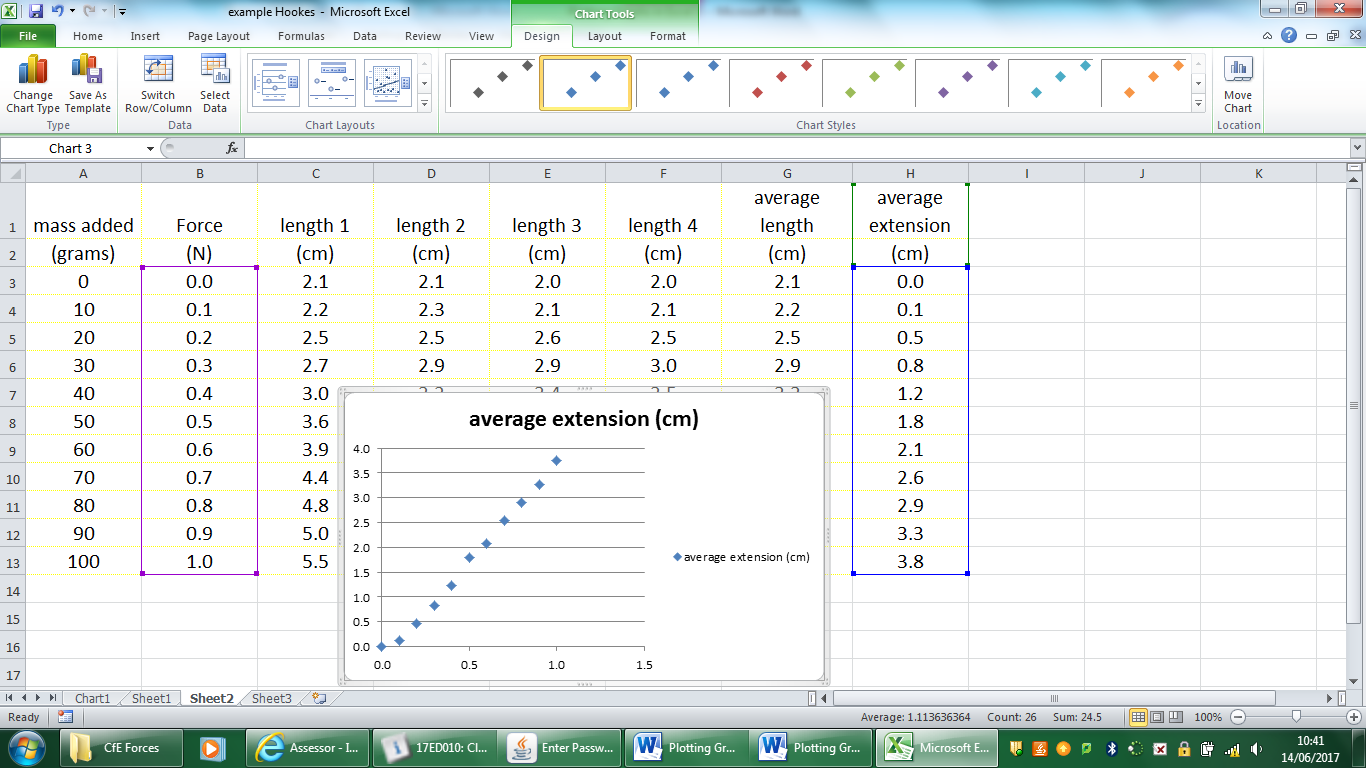
**Click on Insert, then select**

**“Scatter”**



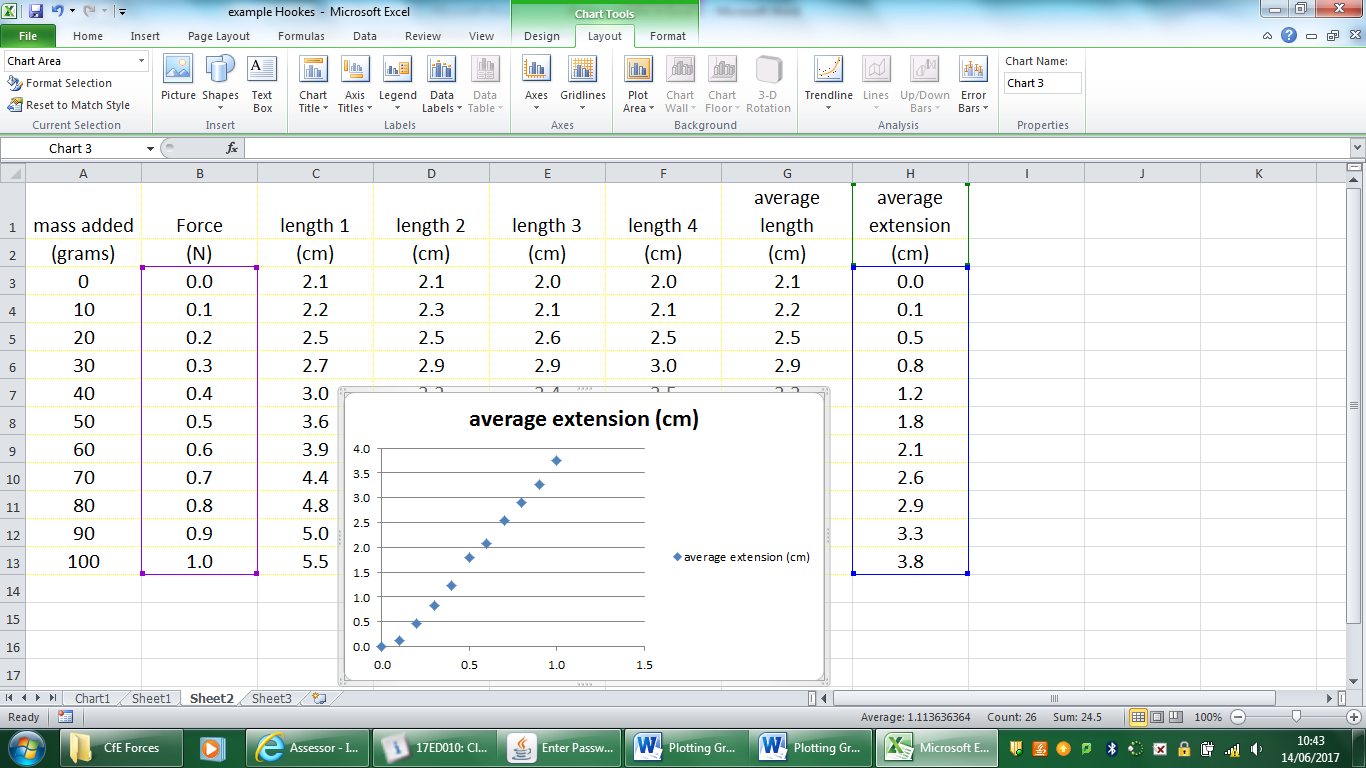
**First highlight the data that you want to plot. As these are not next to each other you should click in the first column and drag down the cells that you want to plot, then holding down the CONTROL key repeat for the other column. This involves the left mouse- try it!**

**Go to INSERT and then SCATTER graph. Plot the first graph the dots without lines.**



The quick way to make a good graph is to select the template within the DESIGN tab, with a straighline and lots of gridlines. This will almost give the graph we want which we can just edit.   
However, if you want to start from scratch see the next slide and advanced section.

Do check that your gaph looks correct. Sometimes Excel has a huff and produces nonsense. Usually you need to go back start again and only highlight the data and not the headings! It doesn’t like blanks in cells, so don’t leave any!

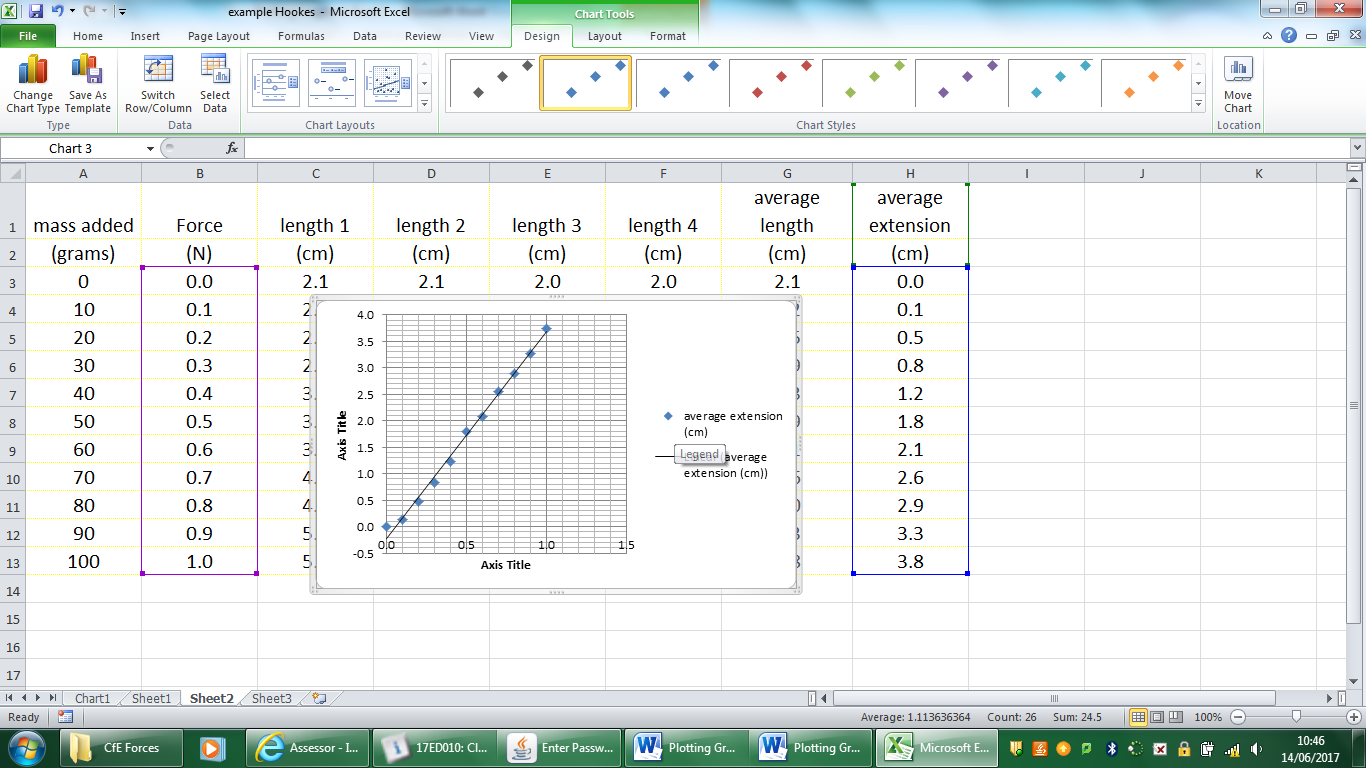


**You can then insert Chart and Axes Titles and label axes with units.**

**Ensure the graph has been selected.**

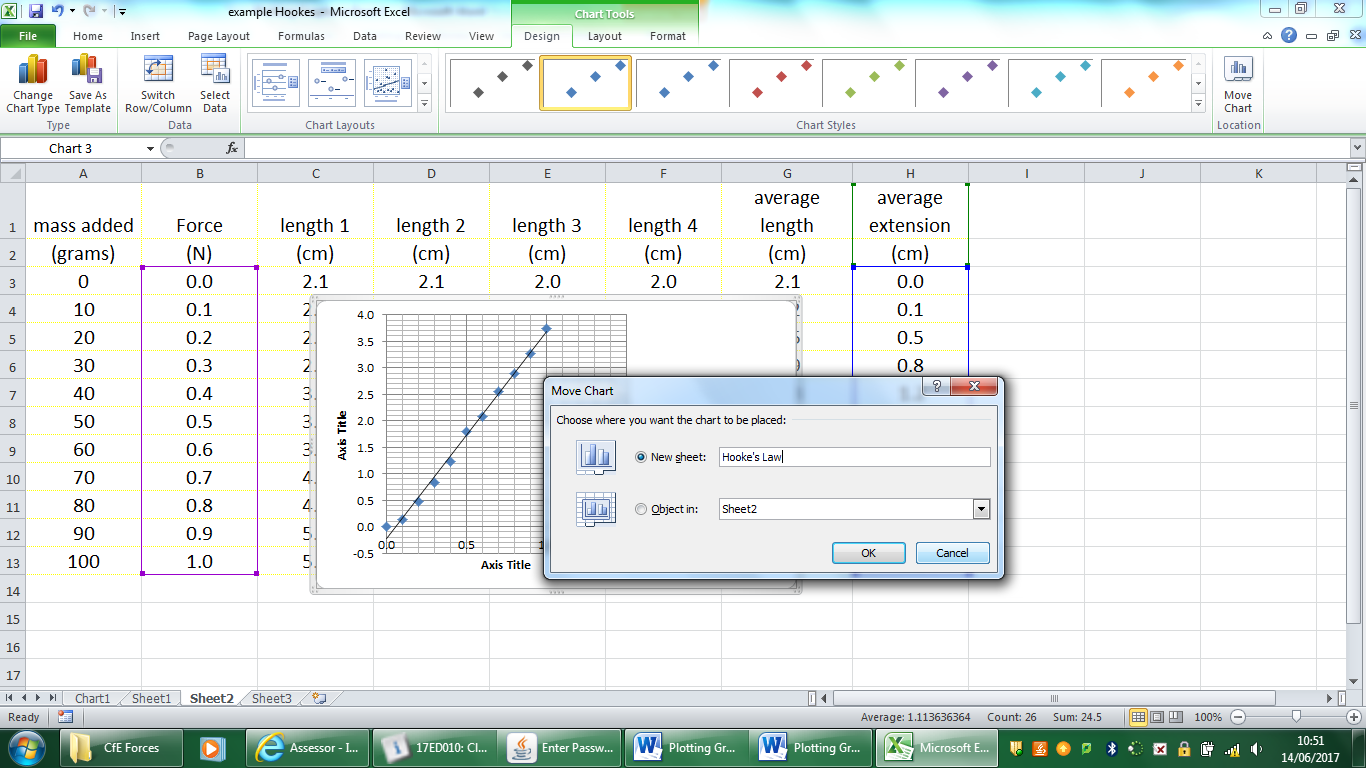
**Click on Chart Tools – Layout.**

**Click on Legend – select none.**

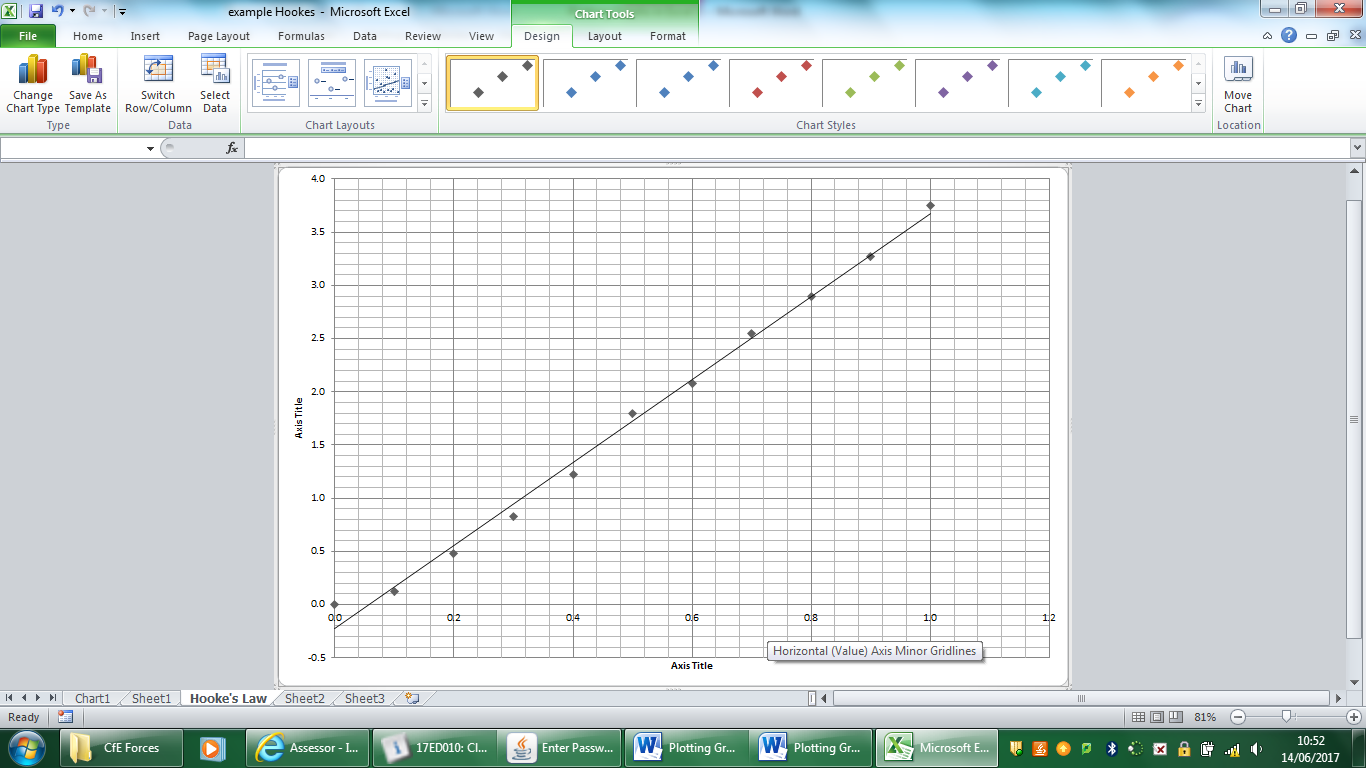


You want to delete this “legend” as it is taking up too much. Select this legend and click delete

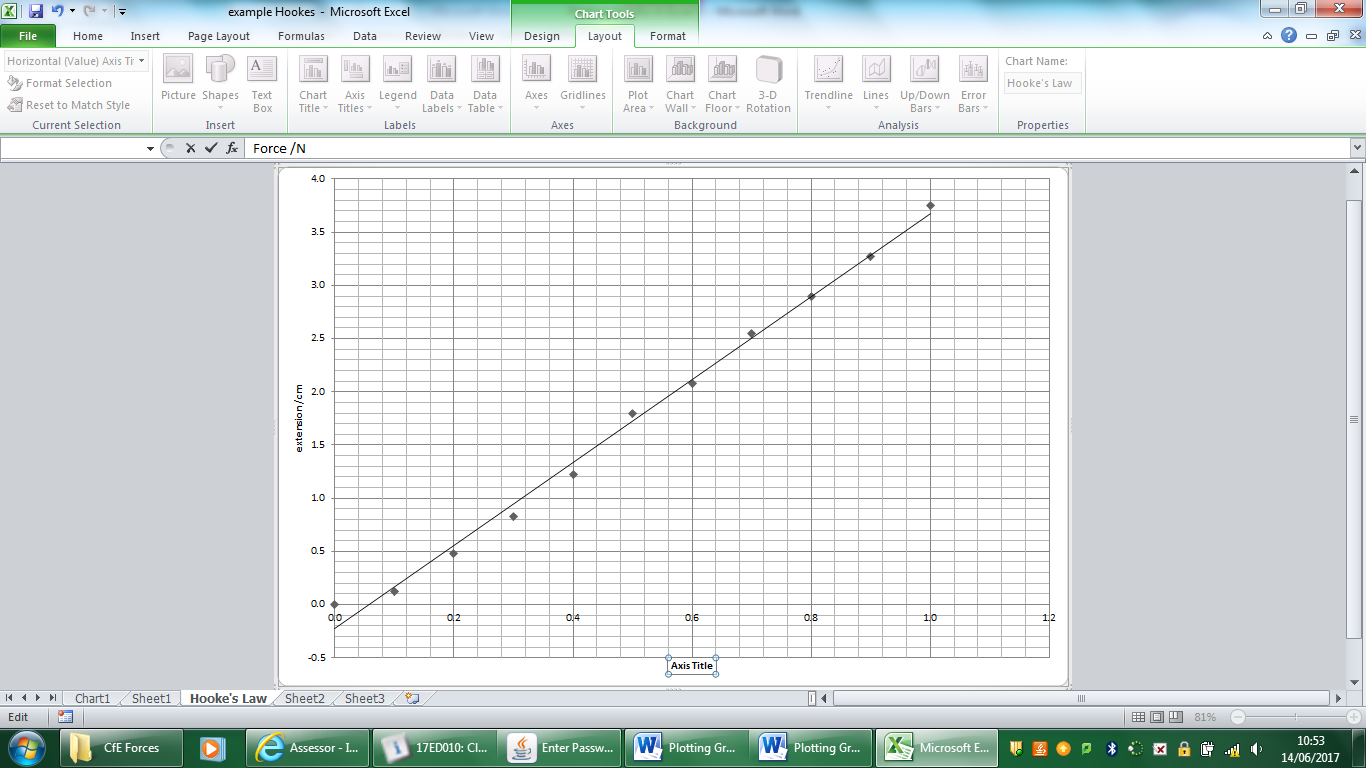
We want to move the graph as it is too small. Click on move chart within the design menu and click move to a new page and it will fill a whole A4 page.



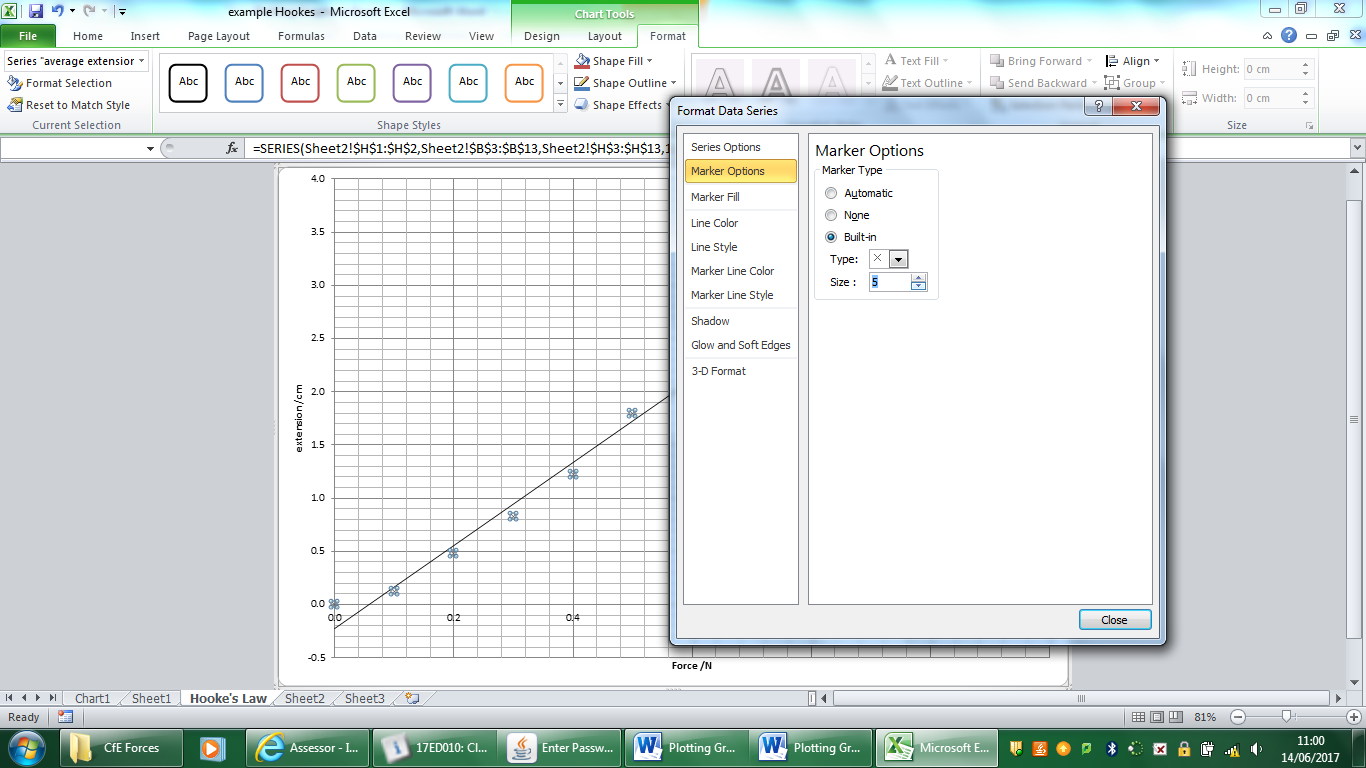
Once you get the move chart option click on “ new sheet” and give your graph a name. In this case Hooke’s Law



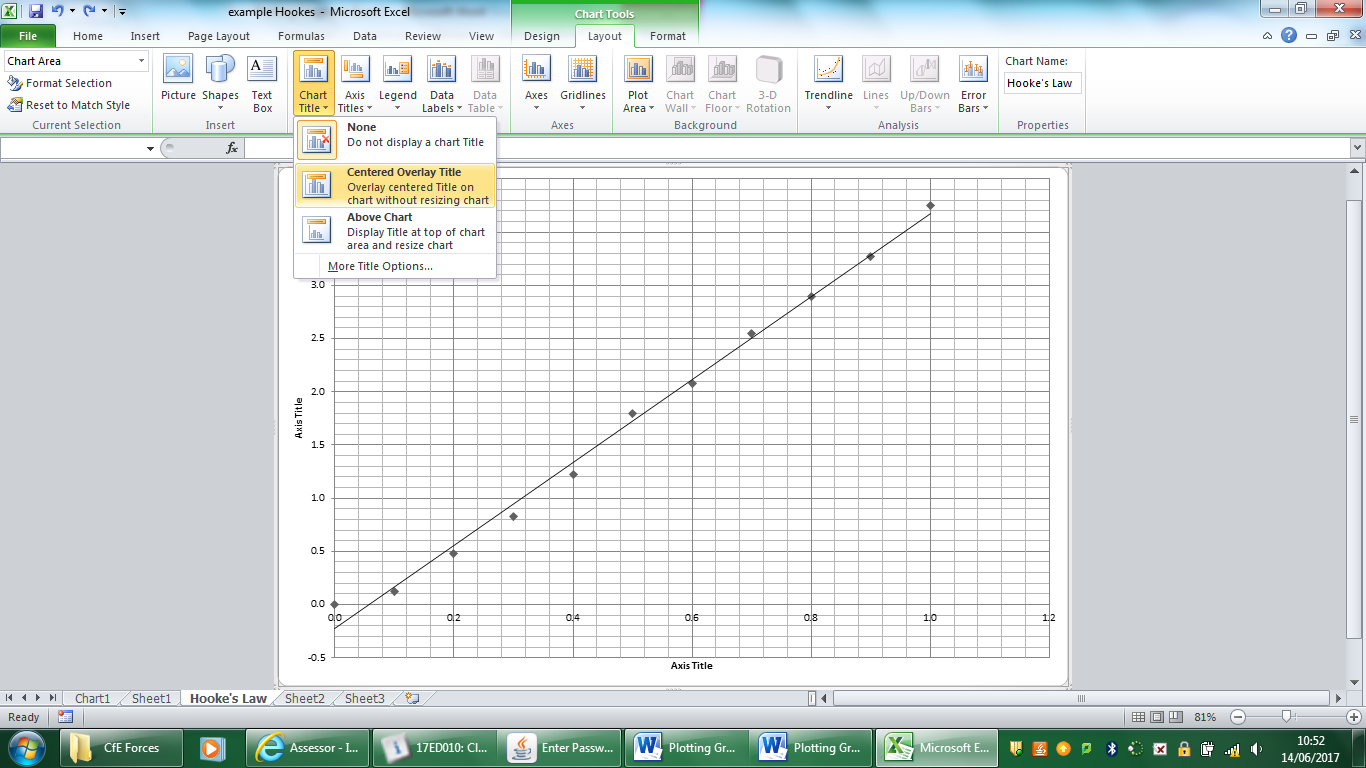
Click on the axes and give them names. It ought to have a quantity and unit. These are separated by a “\”



Click on the axes and give them names. It ought to have a quantity and unit. These are separated by a “\” Titles can be added to this box and click return when finished.

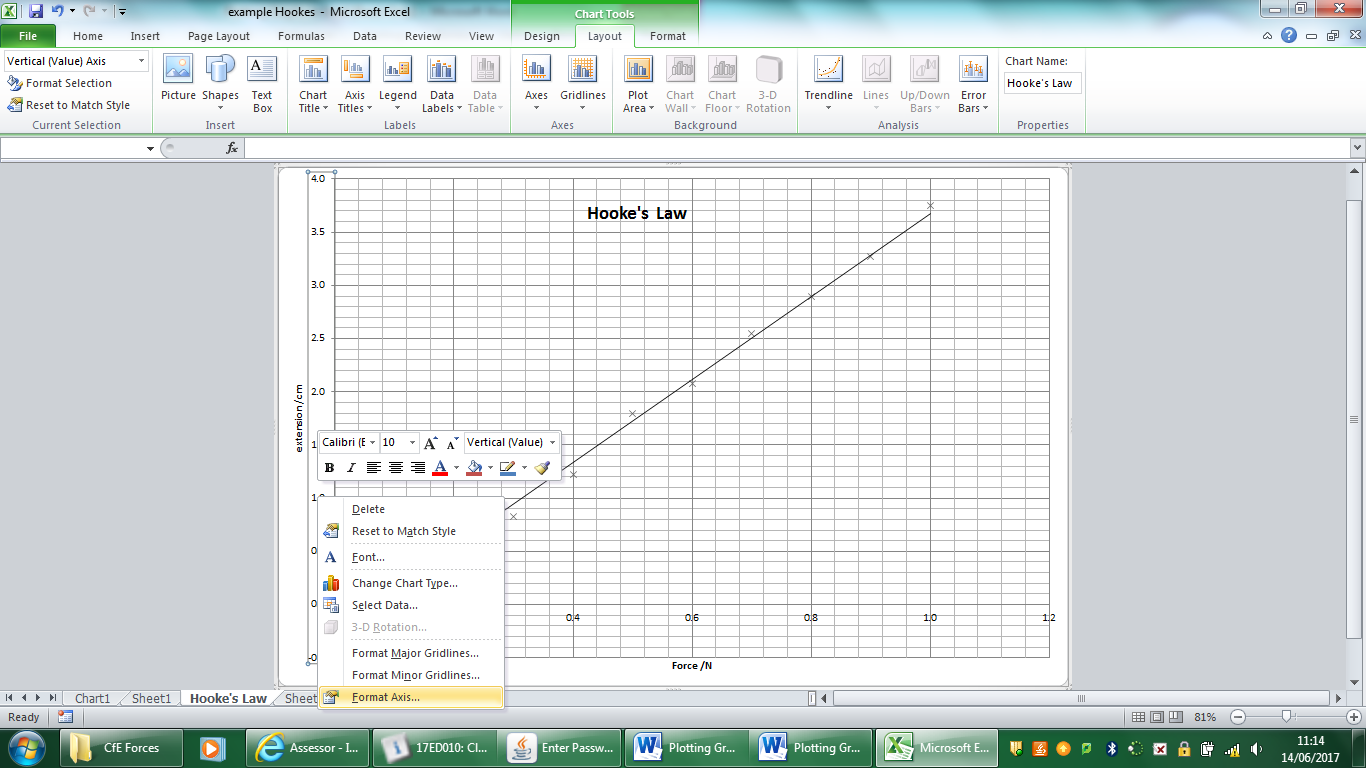


We want small points or crosses not great blobs. Click on the data points on your graph to highlight them, then right click on the mouse until you get a format data series menu. At the bottom. Click on format data series and then change the marker options from the built in menu to about 5 point and + or x shape.

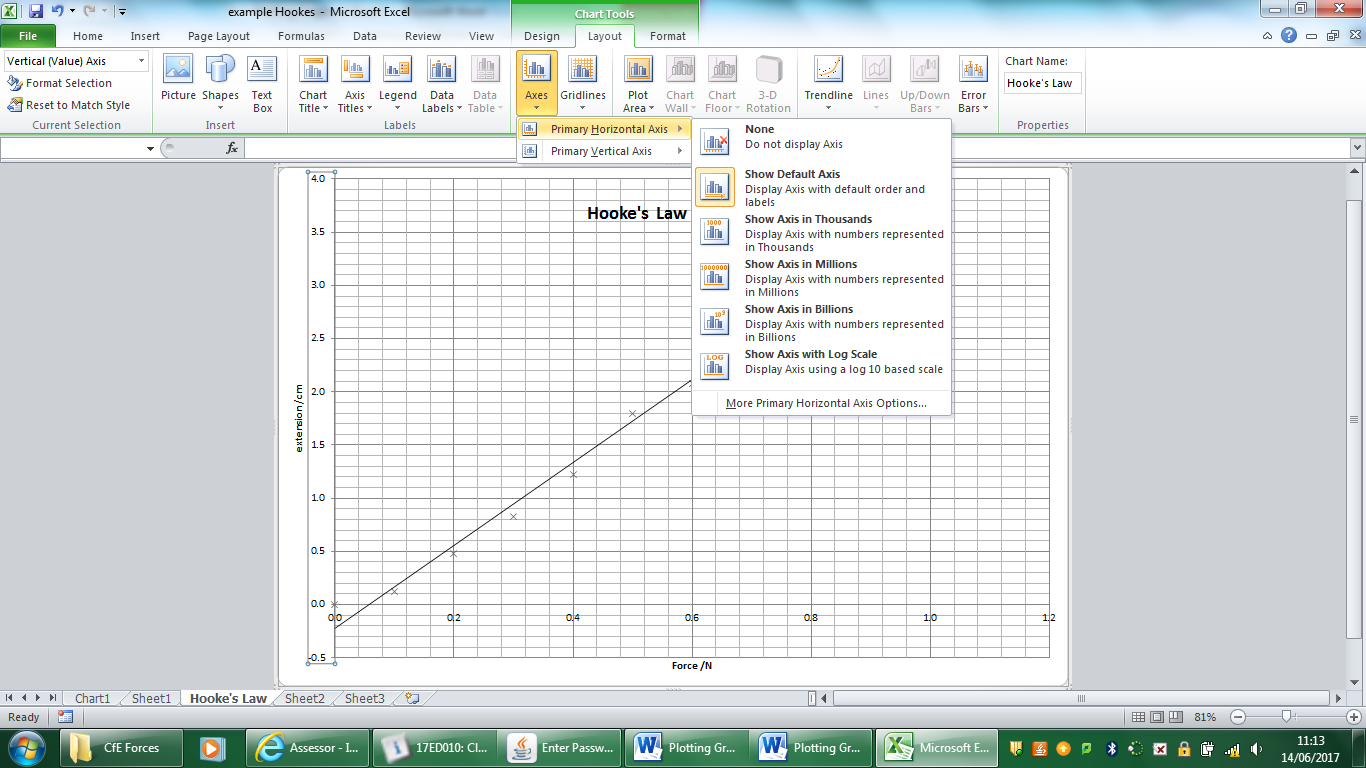


Click on the Chart Title in the Layout menu and give your graph a name. In this case it can be Hooke’s Law, but generally for graphs you would give it the title of

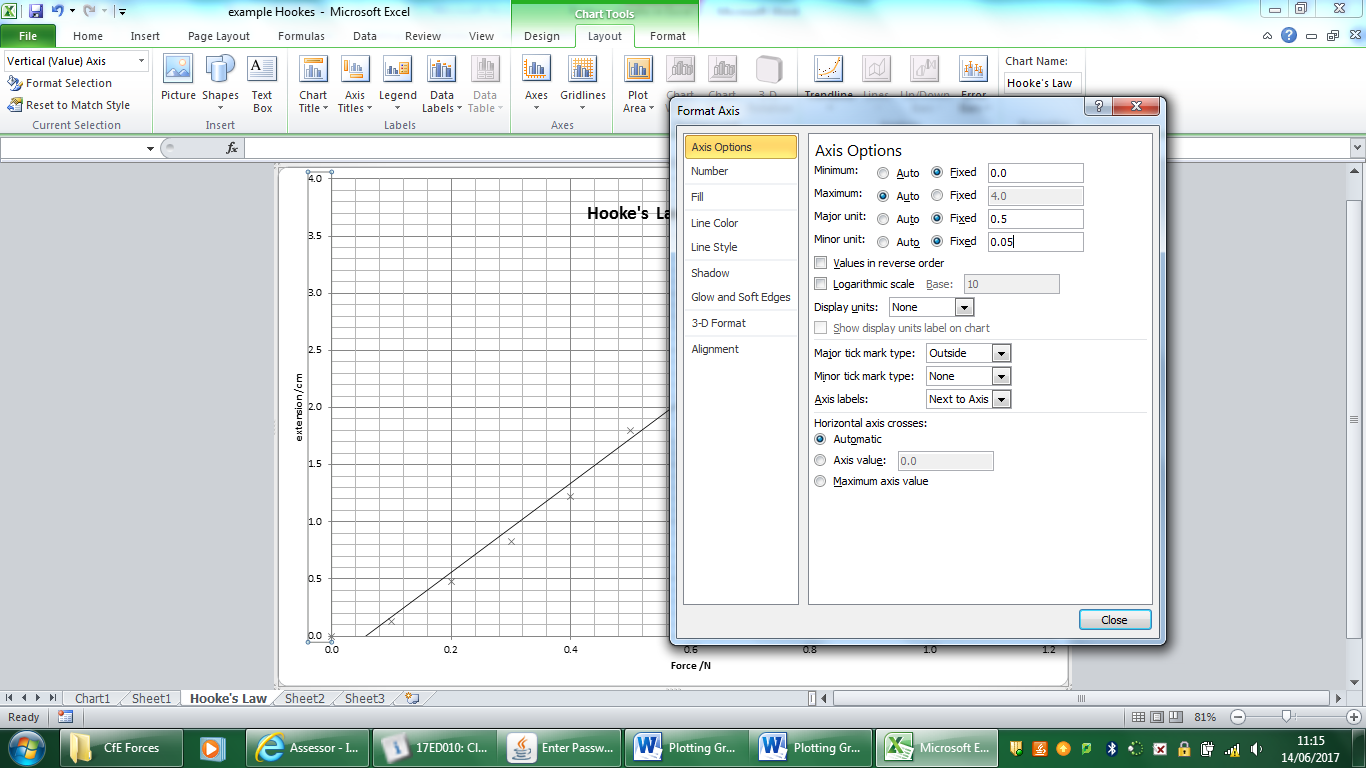
“A Graph of {Y axis} against {X- axis}” by {Name}



Now we can format our axis and make sure our scale is the best it can be. Either right click on the axis or go to the top menus. Set the scale to be as large as possible with minimum gap at the top.

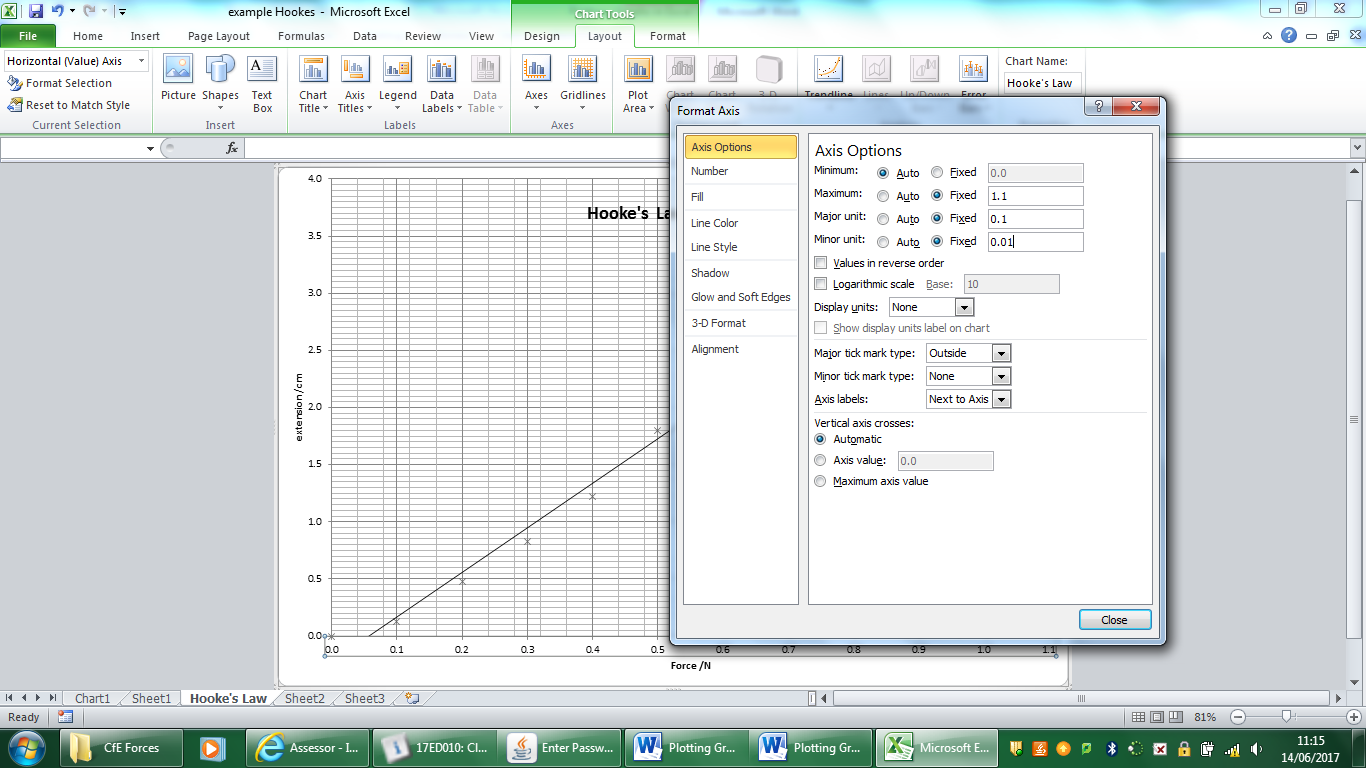


A different way to get to the axes menu



The axis menu. Fix the maximum and minimum values. Make sure that the minor units are multiples of the major unit. Or your scale will be terrible! Try it you can always change it!

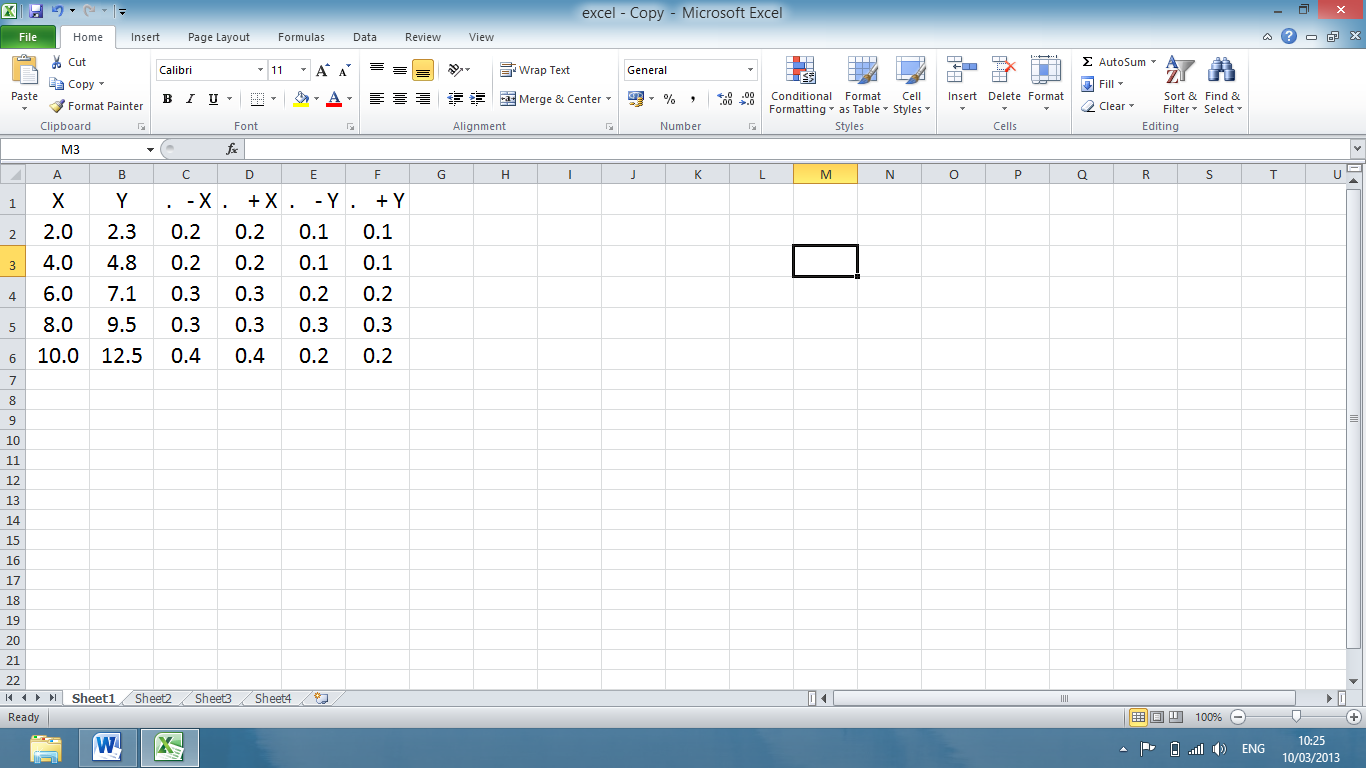
Repeat for the other axis. You can use a different scale –use what fits!



These are the settings I used for the X-axis.

Additional Information – Advanced Graphing & Alternative methods

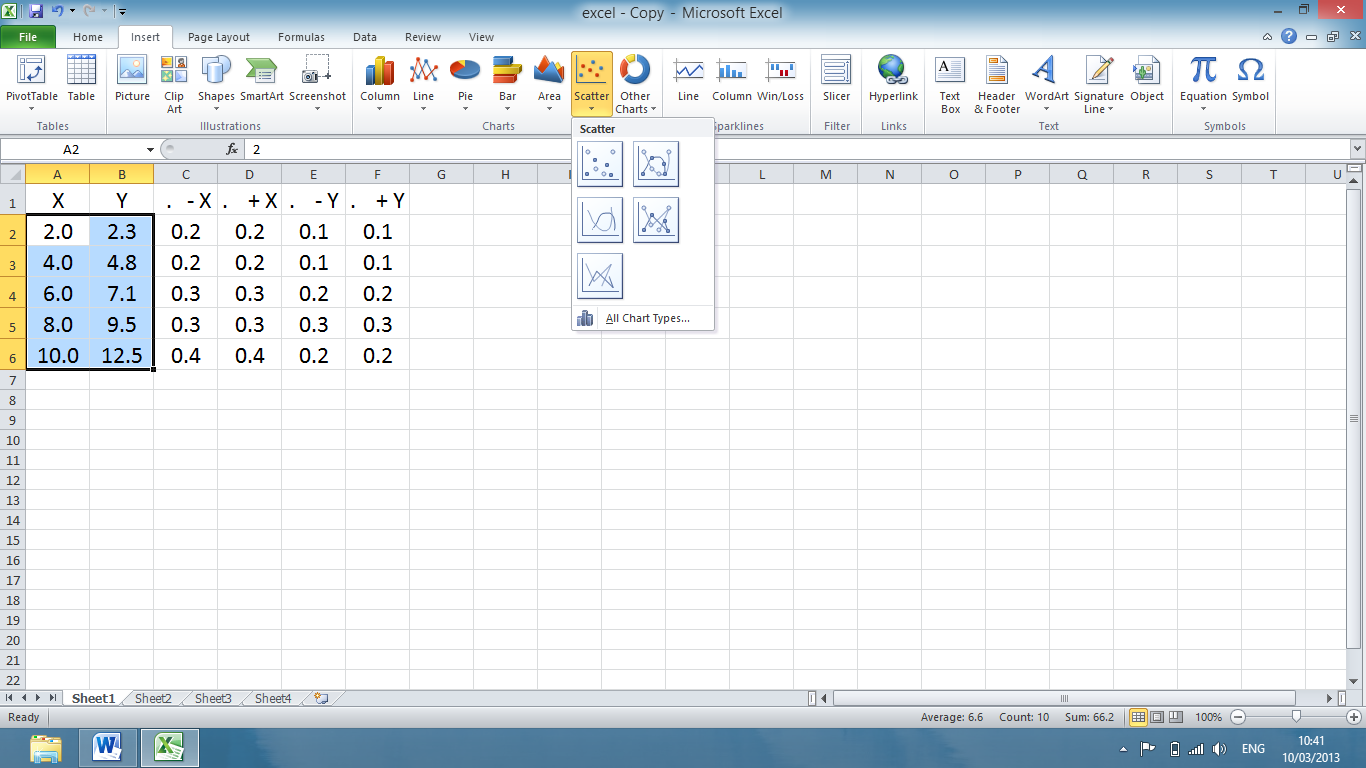
**Use of Excel 2010 in AH Physics**



**Insert data, including uncertainties.**

**Full stop in front of uncertainties stops “arith. operation”.**

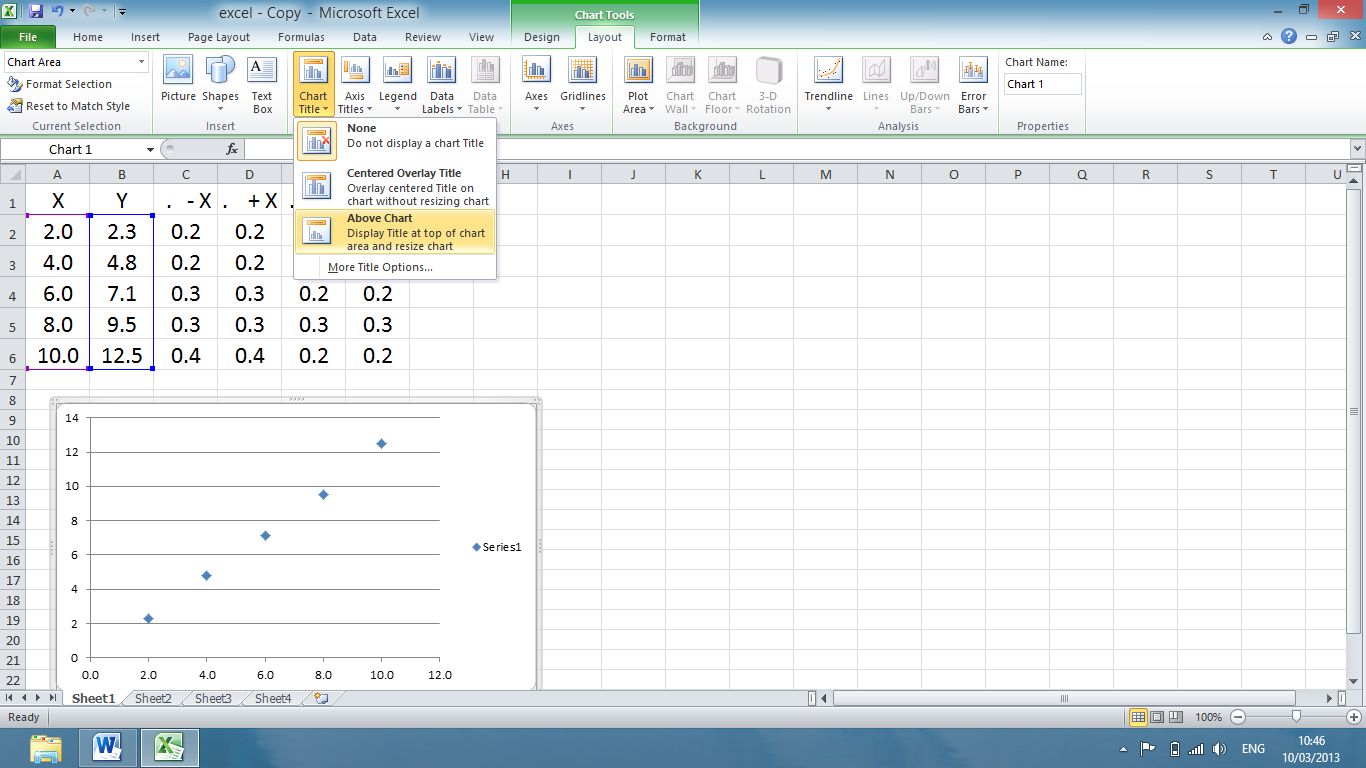
**Click on Home**



**Highlight data to be plotted.**

**Click on Insert, then select**

**“Scatter”**

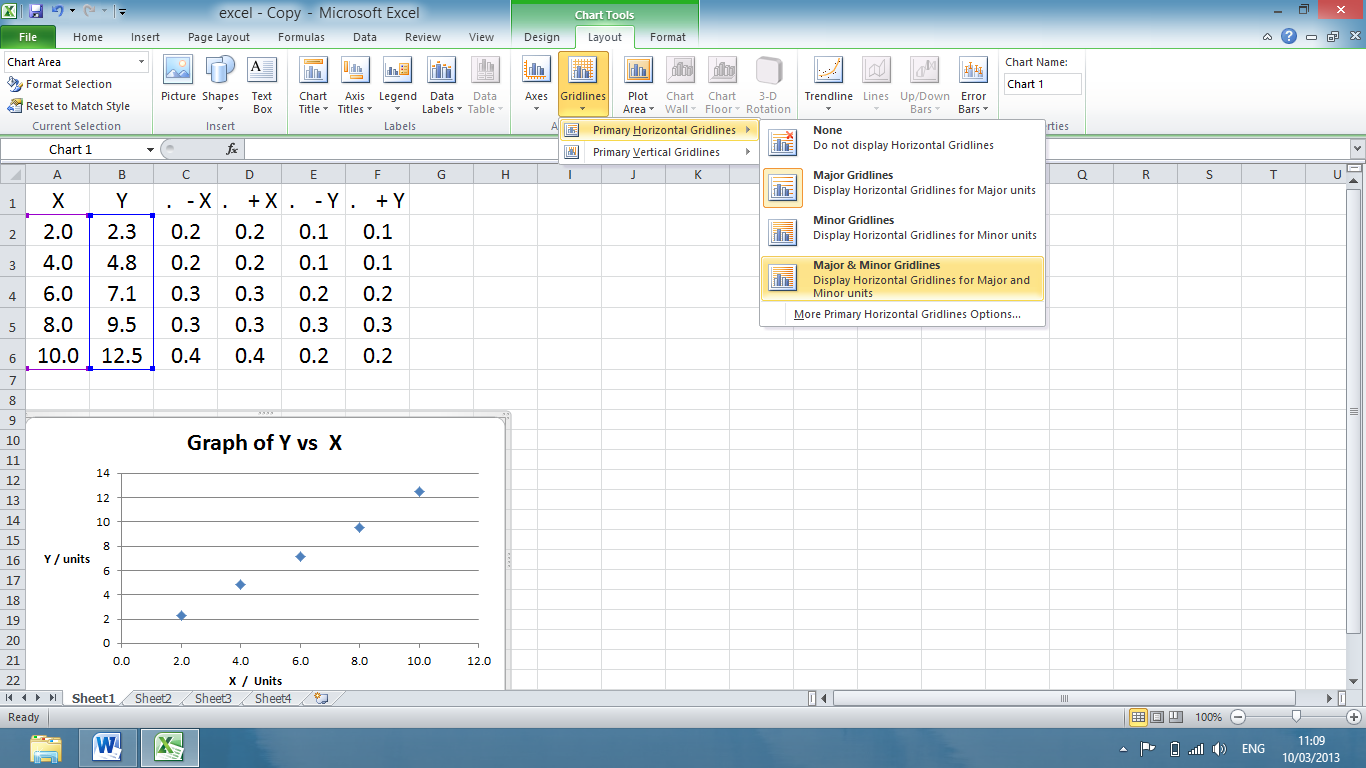


**Click on Legend – select none.**

**Ensure the graph has been selected.**

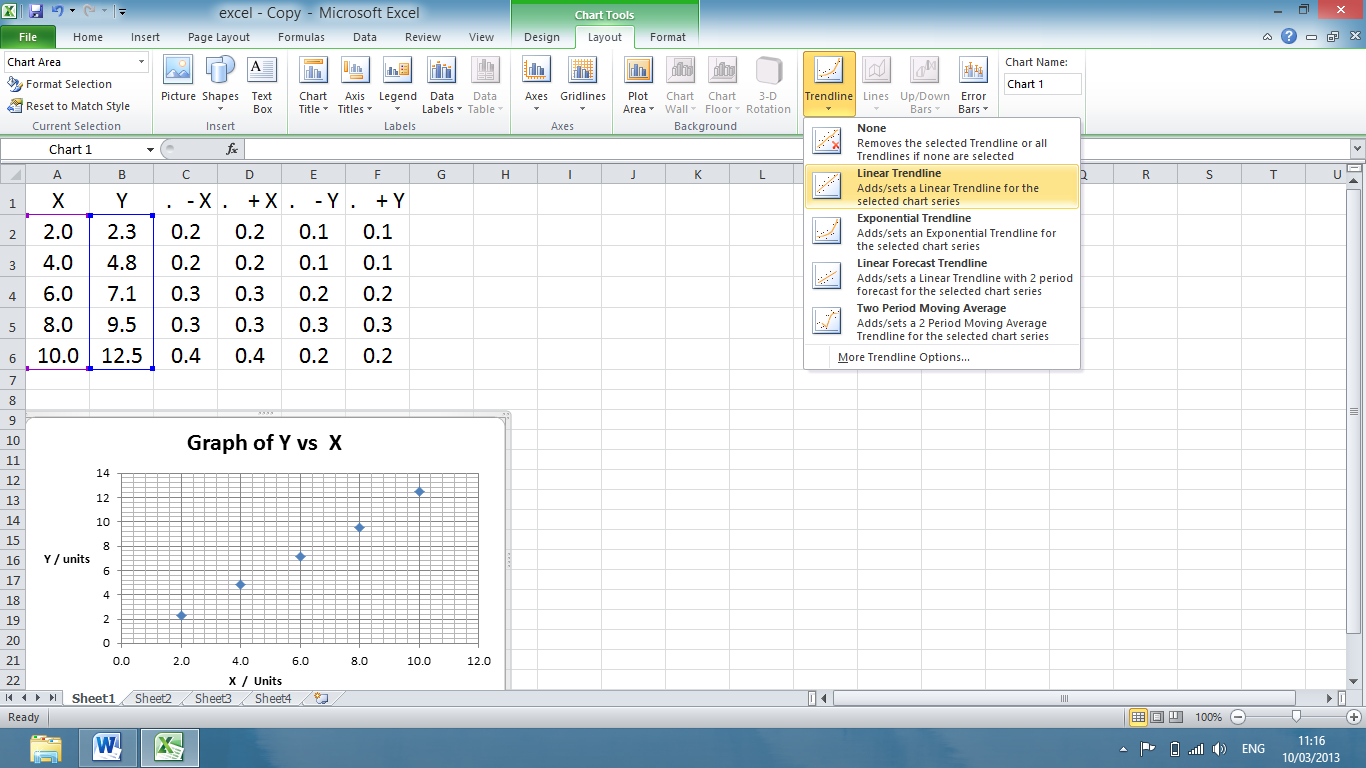
**Click on Chart Tools – Layout.**

**You can then insert Chart and Axes Titles and label axes with units.**



**Select Gridlines. Insert Major and Minor Gridlines – horizontal and vertical.**

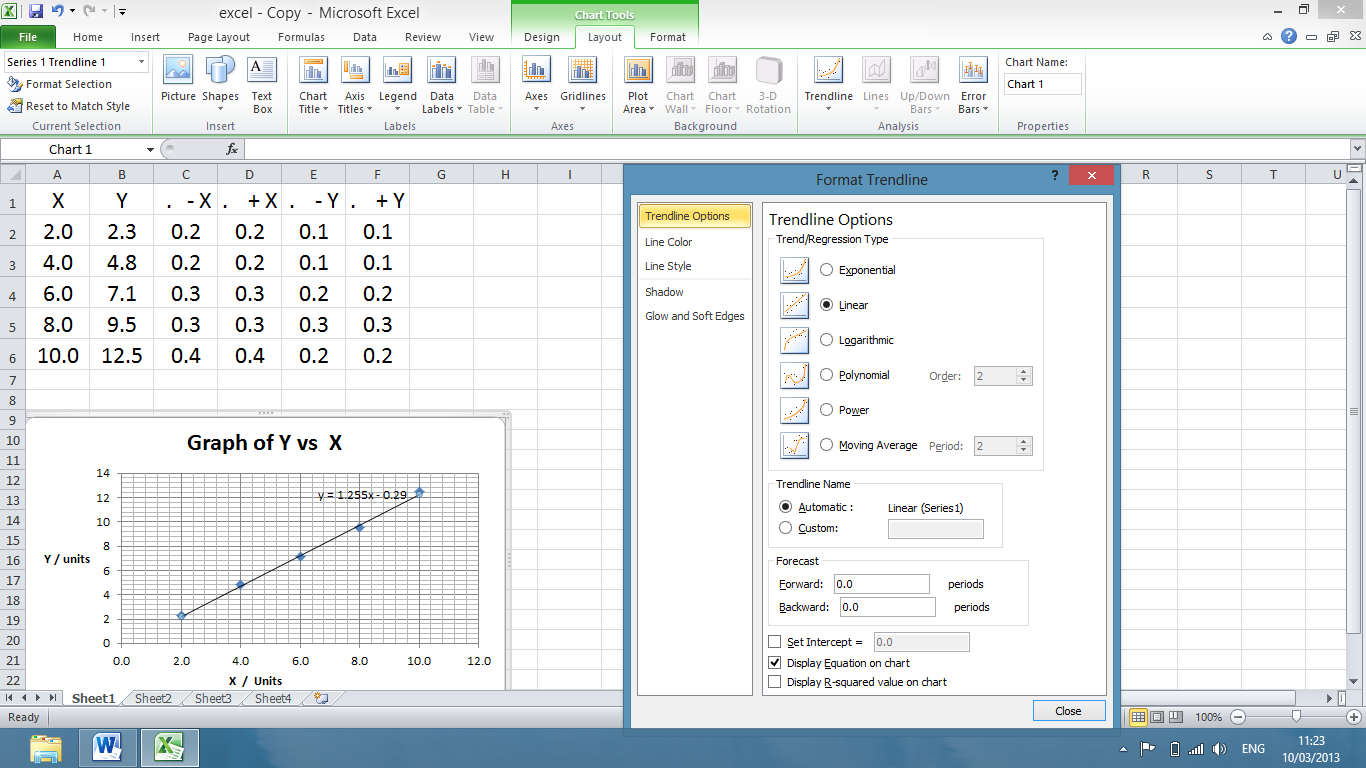
**Again ensure the graph has been selected.**



**Click on Trendline**

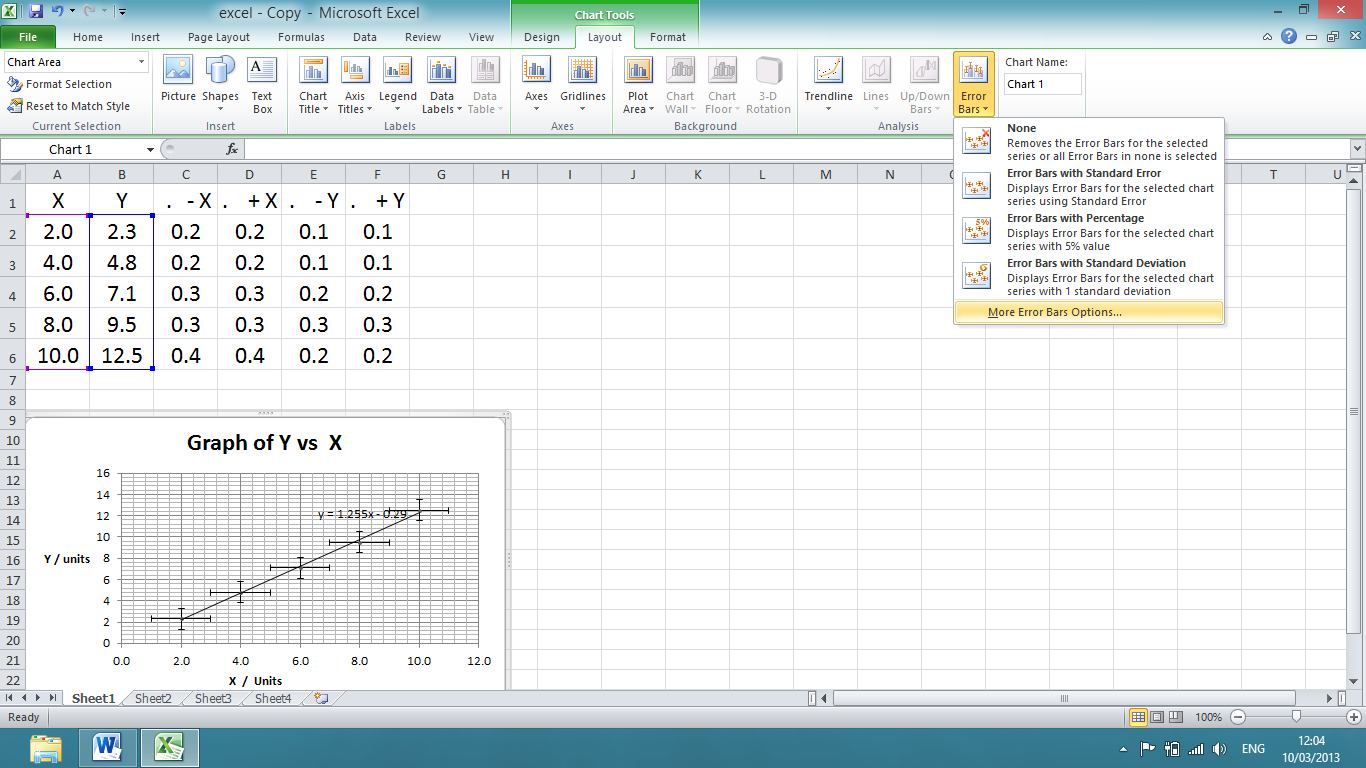
**Select “More Trendline Options”.**

**Select “linear” if appropriate.**

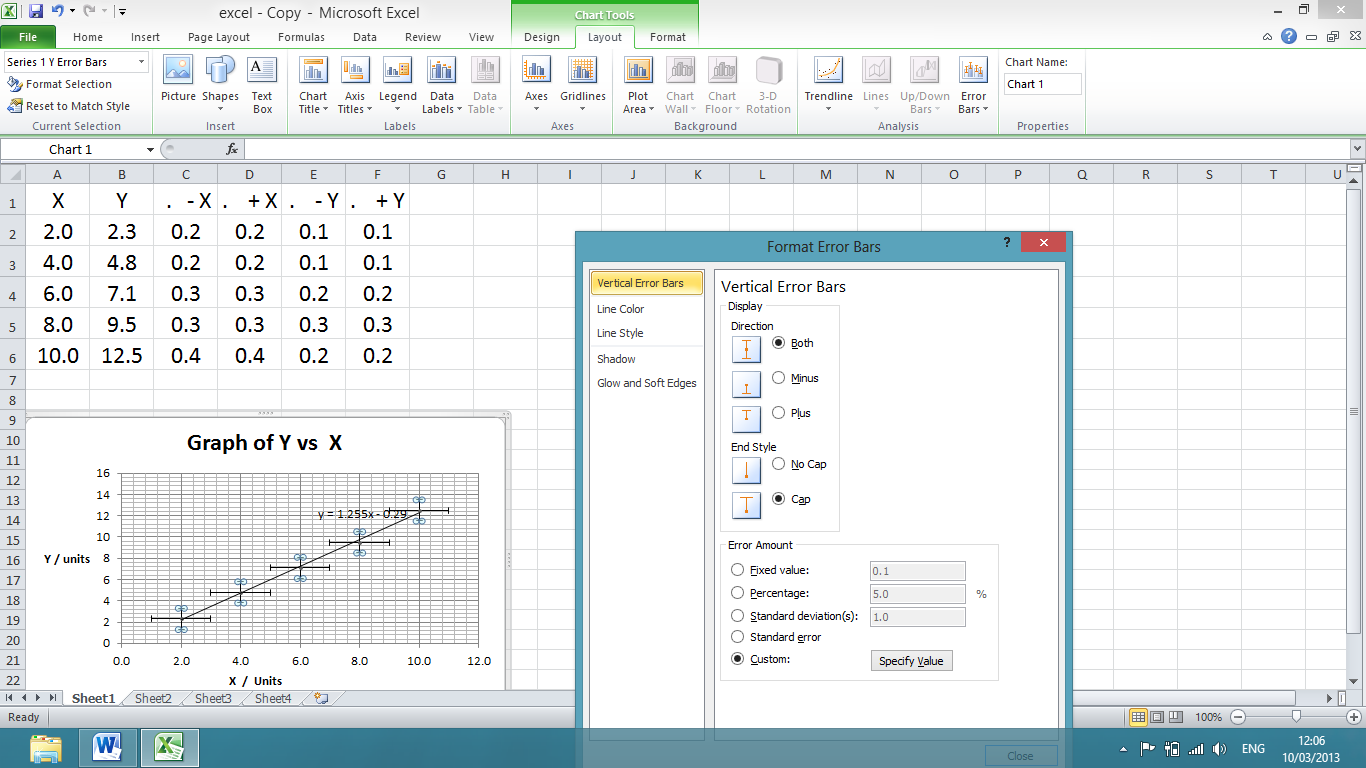


**Click on “Display Equation on Chart”**

**Custom Error Bars**

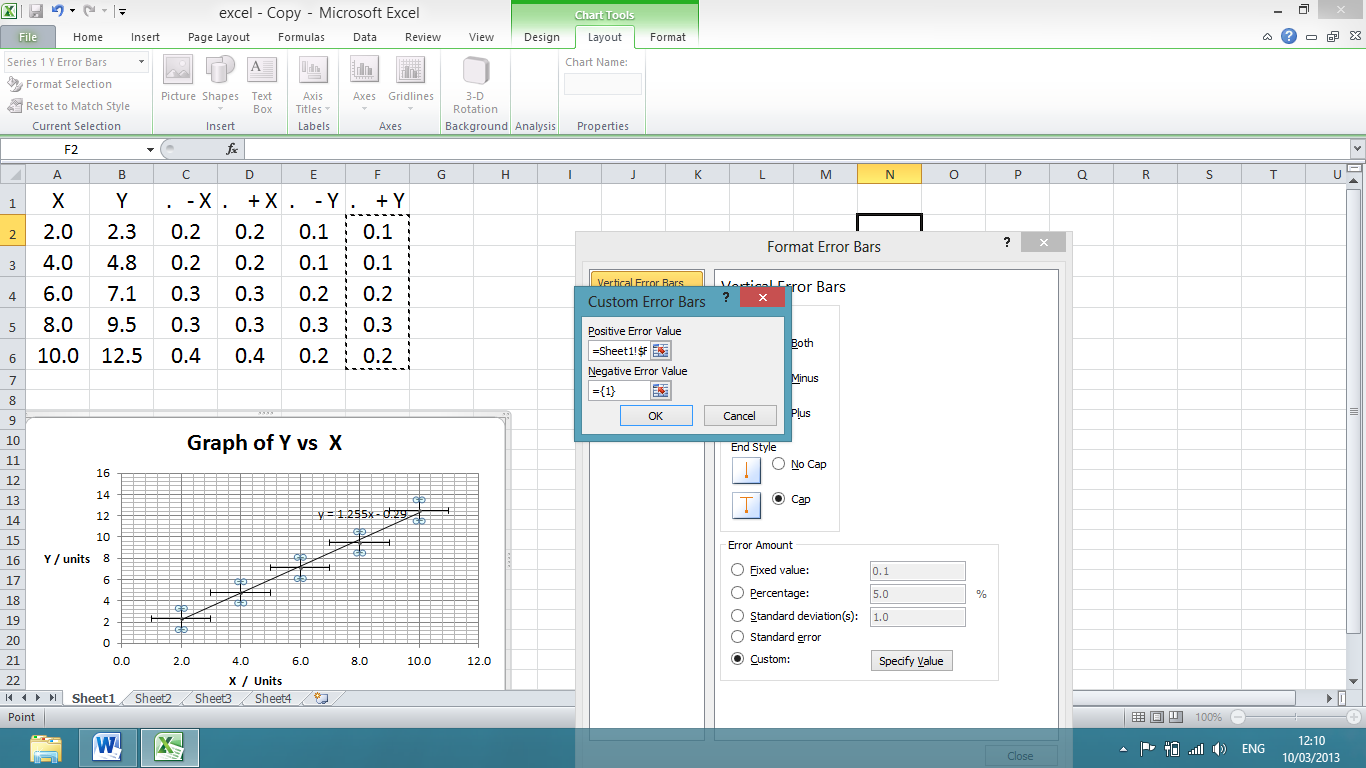


**Click on Error Bars – select More Error Bars Options**



**Select Both**

**Click on Custom and then Specify Value**

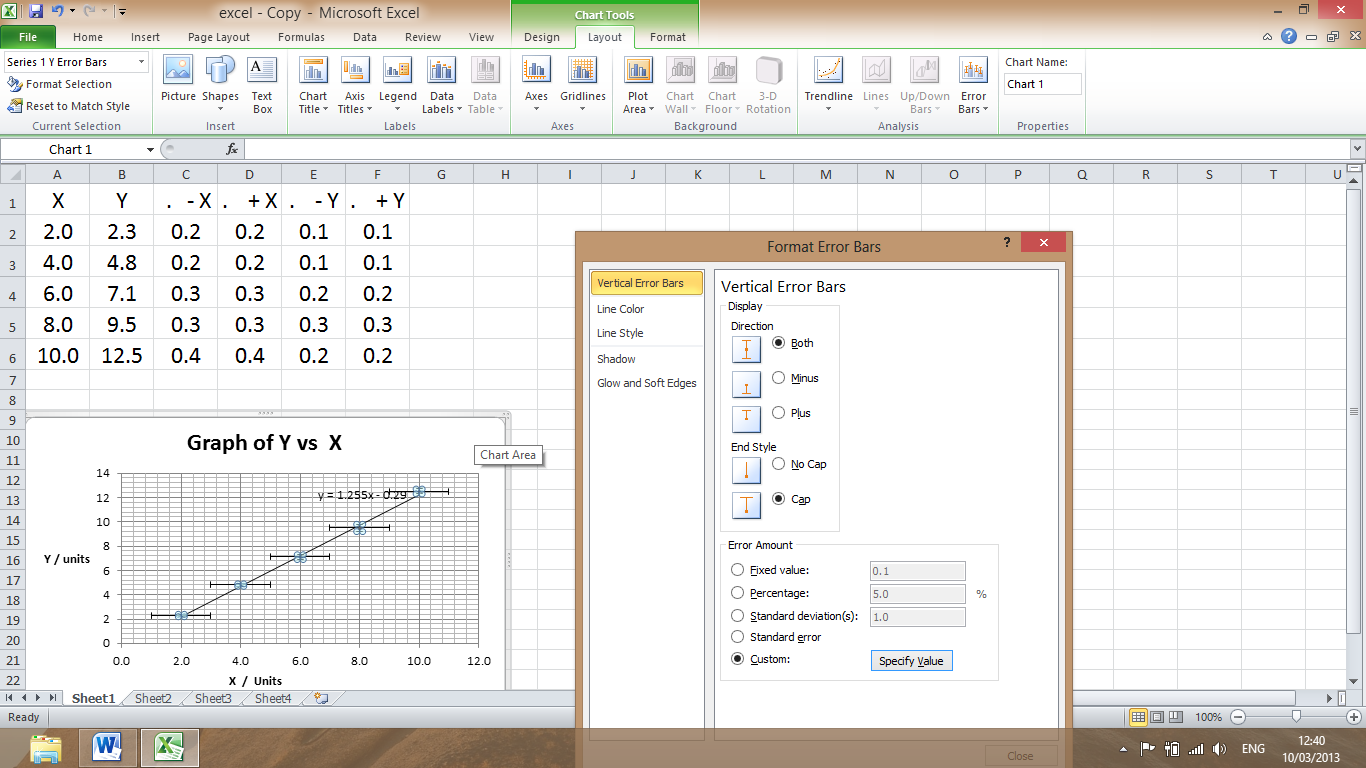


**Click to highlight data insertion box.**

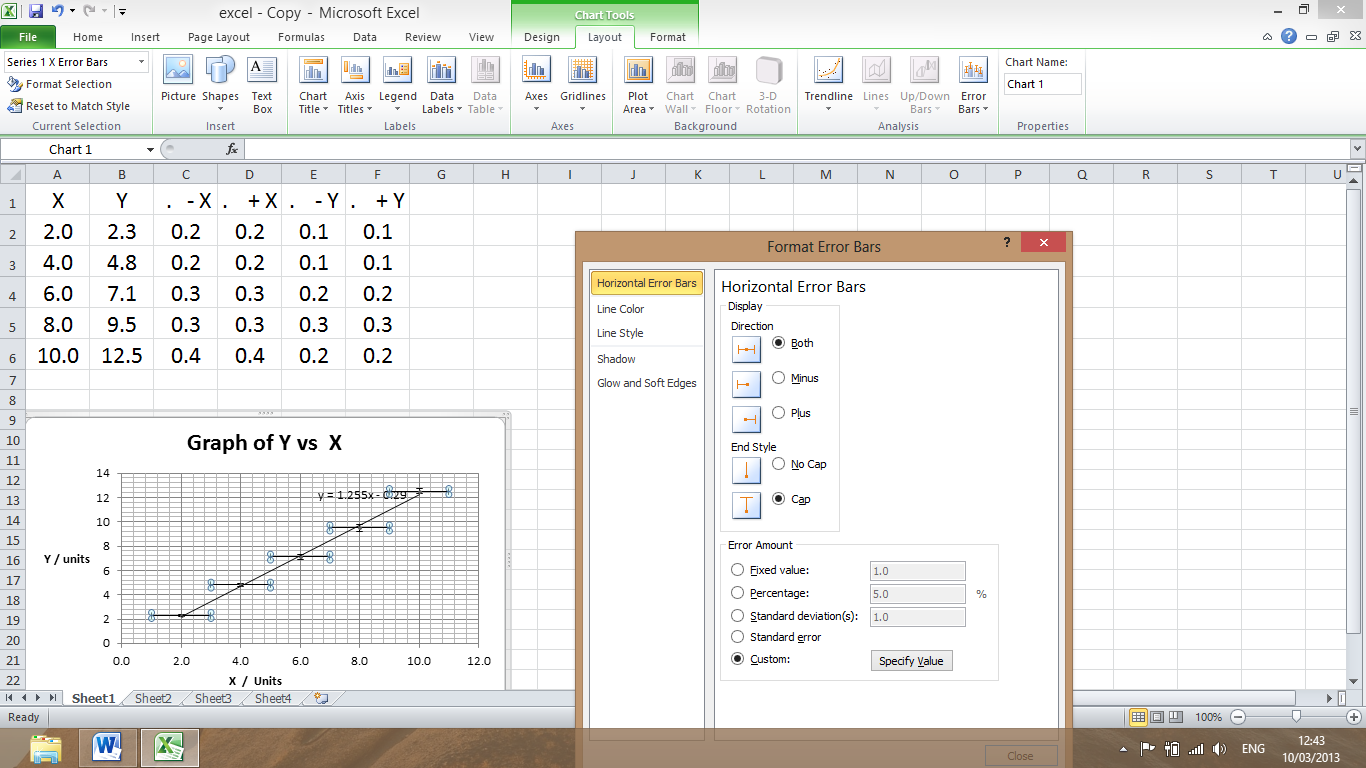
**Click and drag down column to insert value of +Y in data box.**

**Repeat for Negative Error Value**

**Click Okay**



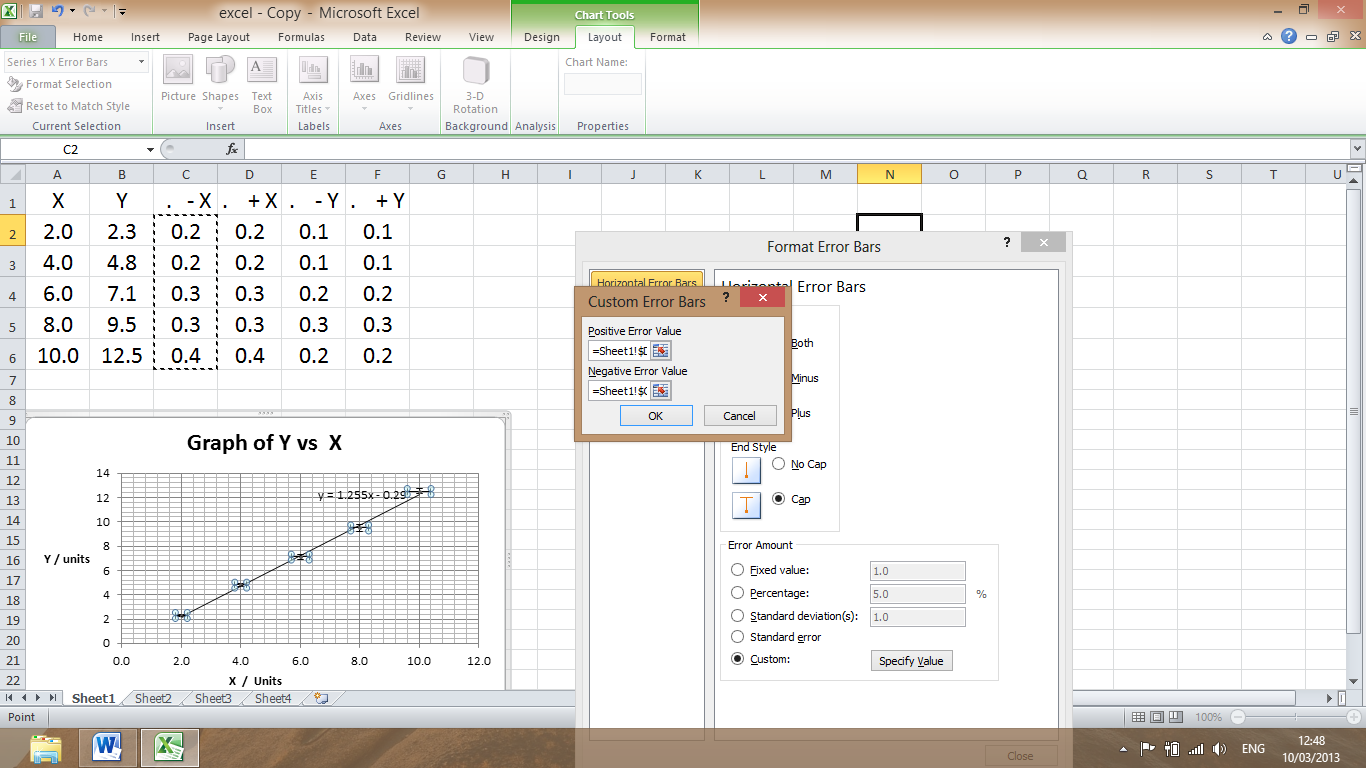
**To select horizontal error bars, click on any horizontal error bar on the graph.**



Changes to Horizontal Error Bars

**This should now read “Horizontal Error Bars”.**

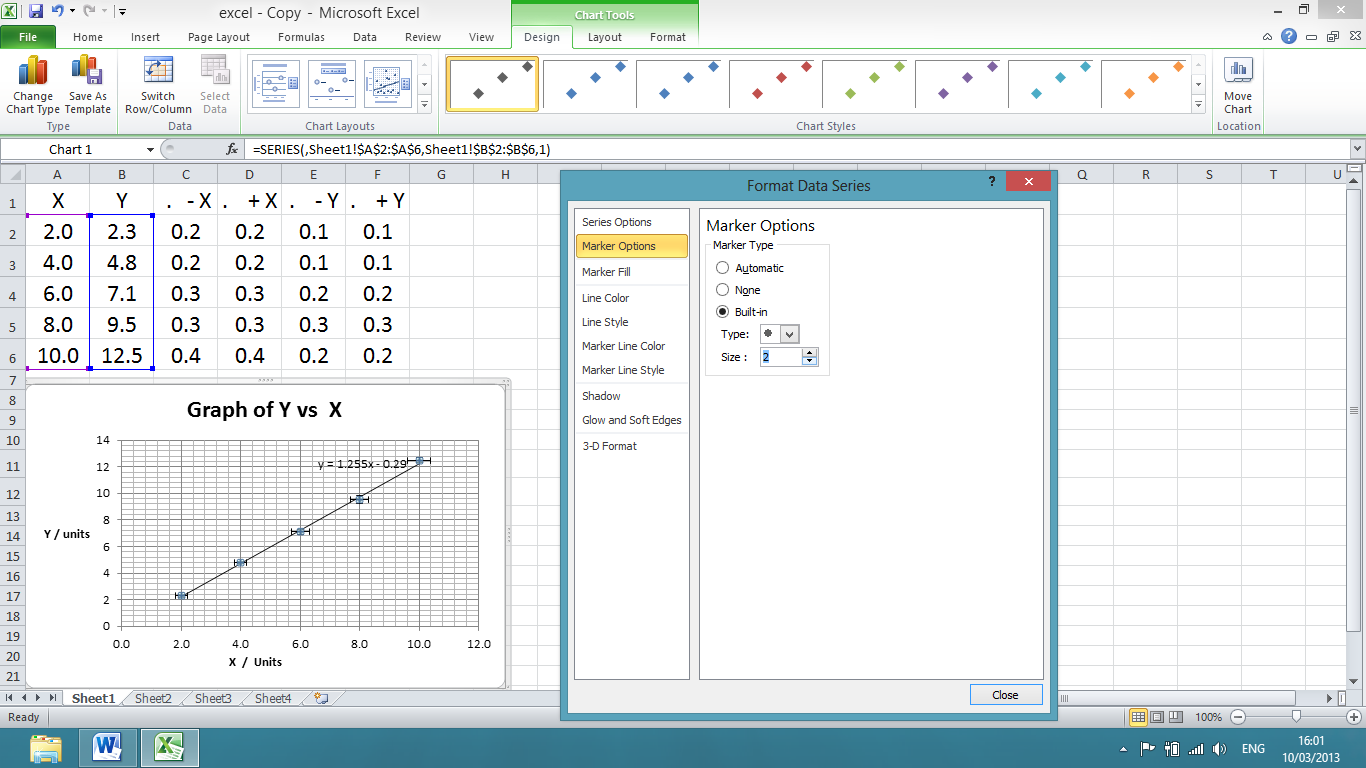
**Repeat the procedure to enter customised horizontal error bars.**



**Click to highlight data insertion box.**

**Click, Drag down vertical column to insert data in box.**

**Click okay**

**To change dot size / shape. ( Use Format Data Series)**

**Doubleclick or right click just next to one of the points.**

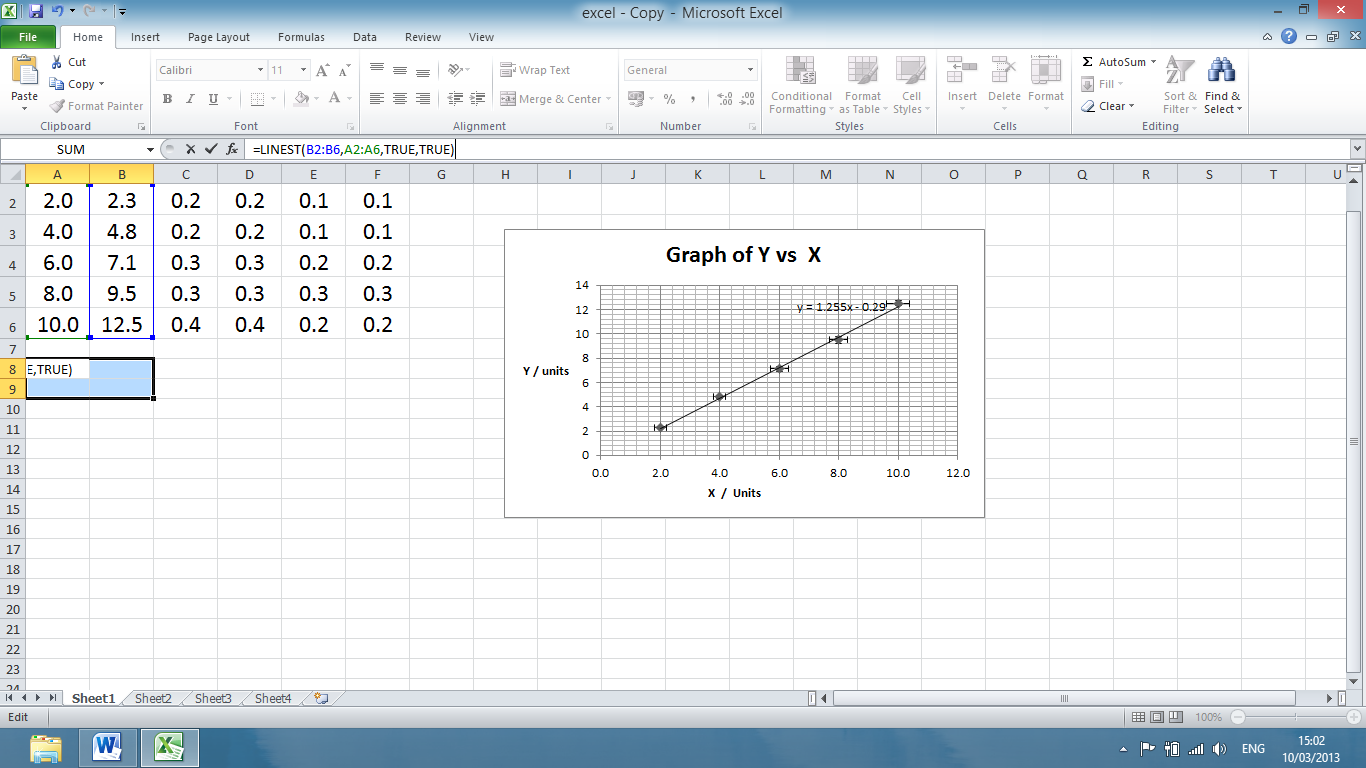
**Format Data Series should open.**

**If you get Format Trendline or Format Error bar then you have clicked on the line, point or error bar.**

**Select Marker Options.**

**Built in. Choose style and size**

**Increase the size of the graph to at least half a page.**

**Uncertainty in Gradient, Intercept - Use of Linest**

**Hold down Ctrl, Shift and press enter.**

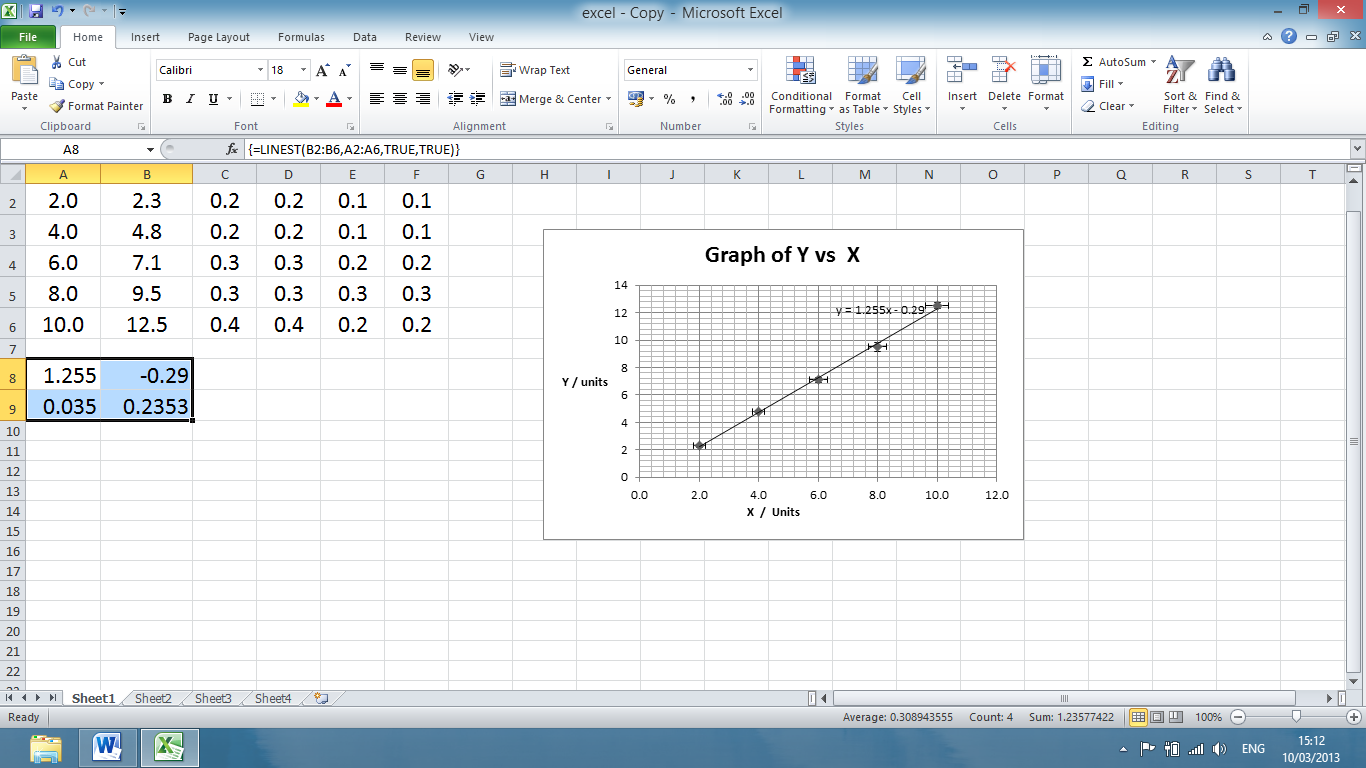
**(CMD, Shift and enter on Apple computers).**

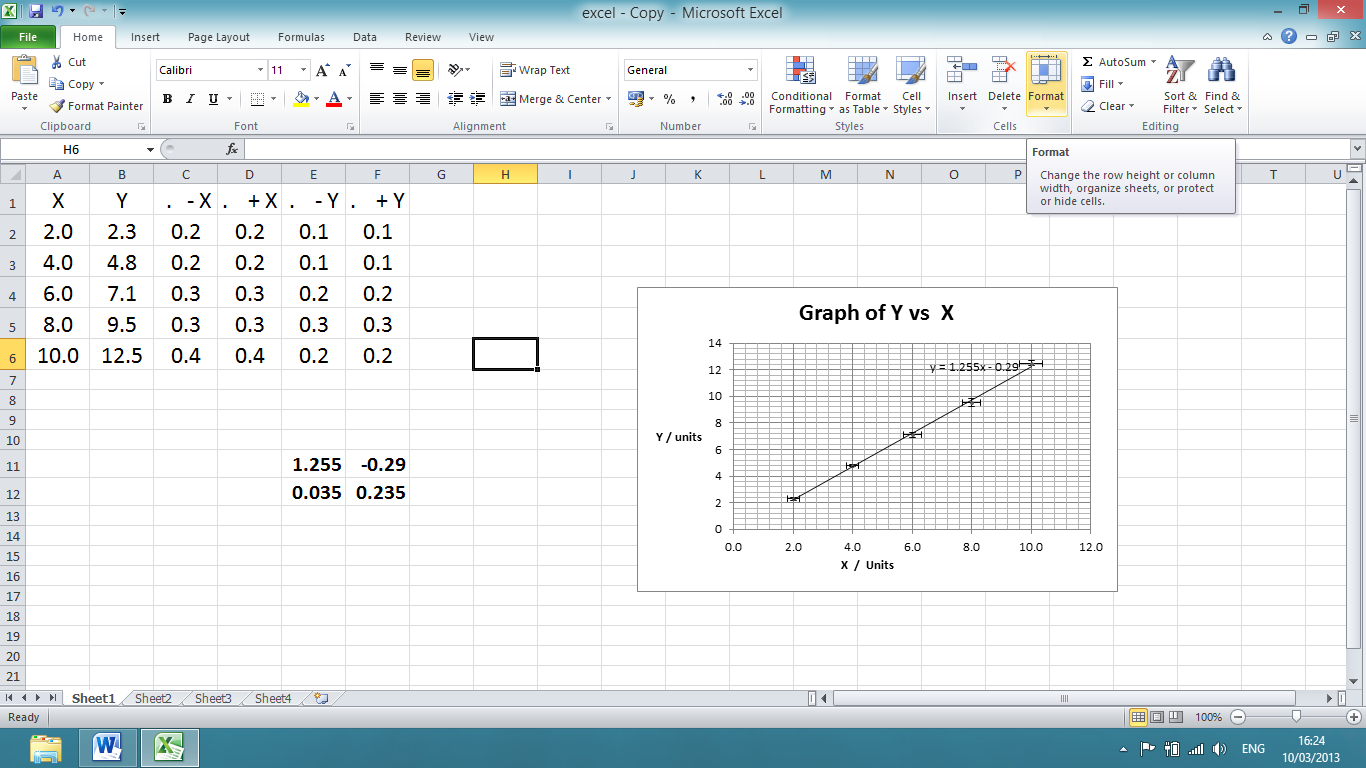
**Y Range of Cells**

**X Range of Cells**

**Highlight four cells.**

**Type in =LINEST(B2:B6,A2:A6,TRUE,TRUE)**





**Uncertainty in**

**Y Intercept**

**Uncertainty in Gradient**

**Y Intercept**

**Gradient**