

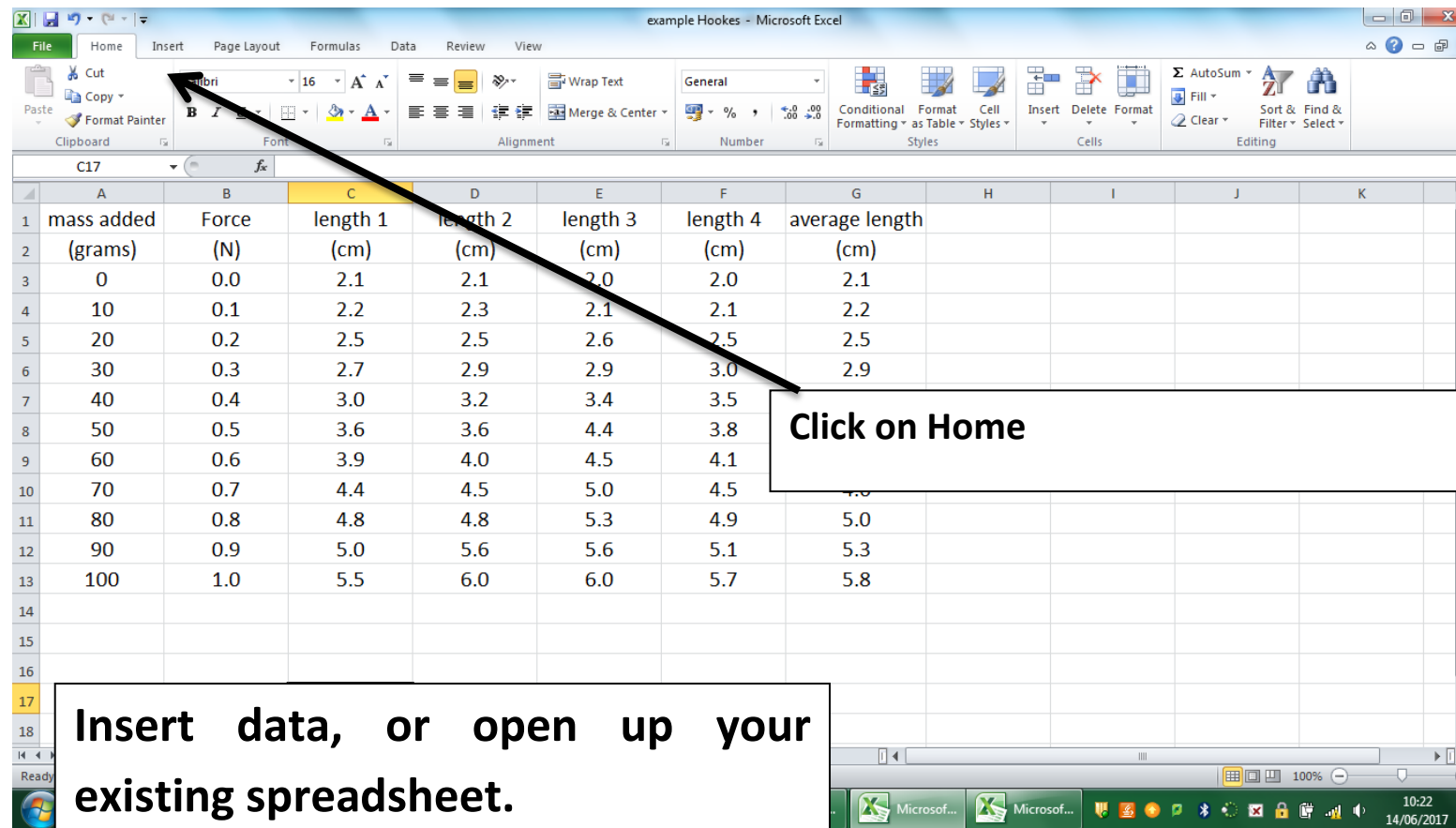
Plotting Graphs in Excel

For Use with Your Hooke's Law Data

2017

J A HARGREAVES

USE OF EXCEL 2010 PHYSICS- A GRAPH OF HOOKE'S LAW



example Hooke's - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View

Clipboard Font Alignment Number Styles Cells Editing

	A	B	C	D	E	F	G	H	I	J	K
1	mass added	Force	length 1	length 2	length 3	length 4	average length				
2	(grams)	(N)	(cm)	(cm)	(cm)	(cm)	(cm)				
3	0	0.0	2.1	2.1	2.0	2.0	2.1				
4	10	0.1	2.2	2.3	2.1	2.1	2.2				
5	20	0.2	2.5	2.5	2.6	2.5	2.5				
6	30	0.3	2.7	2.9	2.9	3.0	2.9				
7	40	0.4	3.0	3.2	3.4	3.5					
8	50	0.5	3.6	3.6	4.4	3.8					
9	60	0.6	3.9	4.0	4.5	4.1					
10	70	0.7	4.4	4.5	5.0	4.5					
11	80	0.8	4.8	4.8	5.3	4.9	5.0				
12	90	0.9	5.0	5.6	5.6	5.1	5.3				
13	100	1.0	5.5	6.0	6.0	5.7	5.8				
14											
15											
16											
17											
18											

Click on Home

Insert data, or open up your existing spreadsheet.

Plotting Graphs in Excel

The screenshot shows the Microsoft Excel interface with the 'Insert' tab selected. The 'Scatter' chart type is highlighted in the 'Charts' group. A text box with arrows points to the 'Scatter' icon and the data range in the worksheet.

Worksheet Data:

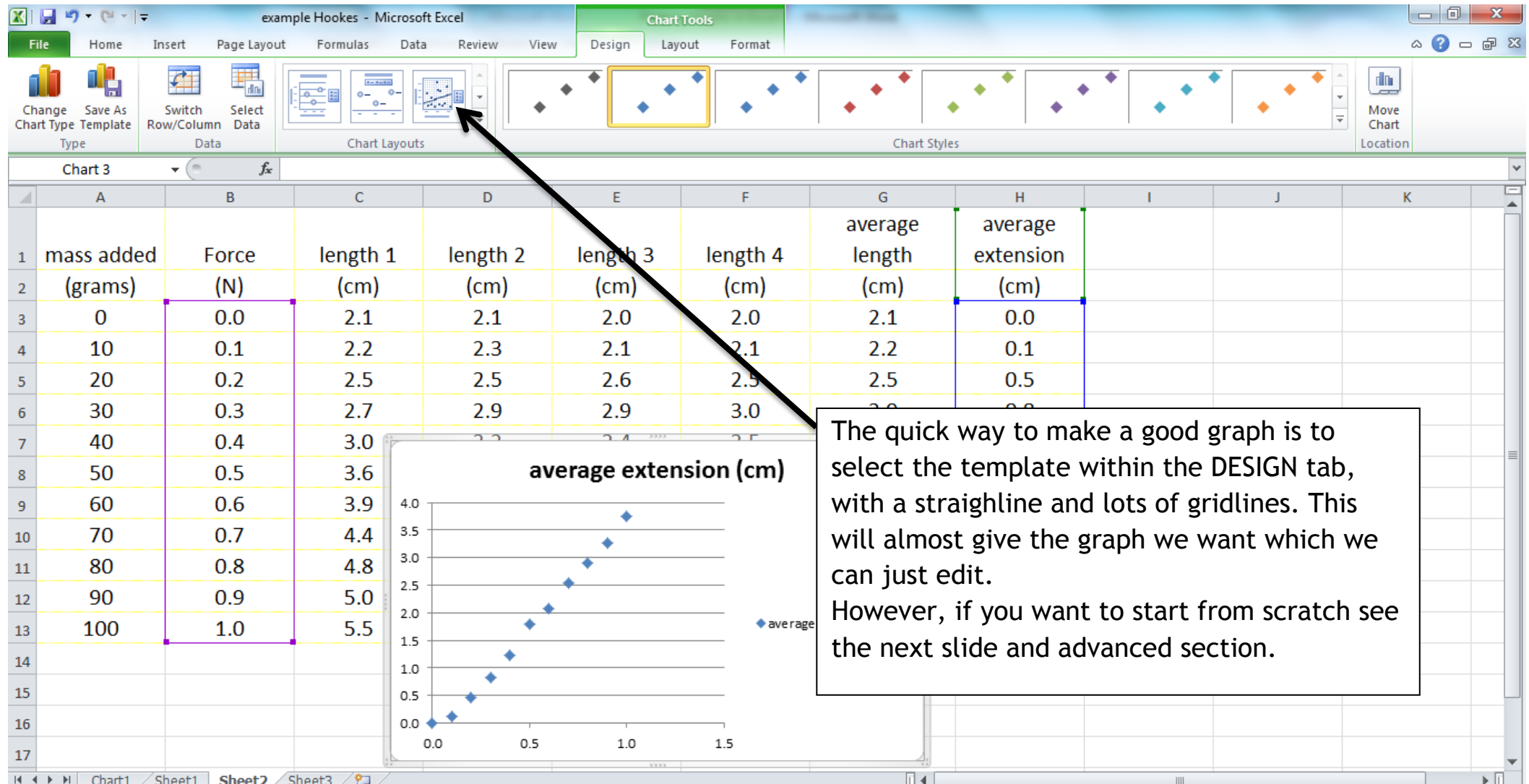
	A	B	C	D	E	F	G	H	I	J	K
1	mass added	Force	length 1	length 2	length		average	average			
2	(grams)	(N)	(cm)	(cm)	(cm)		length	extension			
3	0	0.0	2.1	2.1	2.0		(cm)	(cm)			
4	10	0.1	2.2	2.3	2.1		2.1	0.0			
5	20	0.2	2.5	2.5	2.6		2.2	0.1			
6	30	0.3	2.7	2.9	2.9		2.5	0.5			
7	40	0.4	3.0	3.2	3.4		2.9	0.8			
8	50	0.5	3.6	3.6	4.4		3.0	1.2			
9	60	0.6	3.9	4.0	4.5		3.3	1.8			
10	70	0.7	4.4	4.5	5.0		3.5	2.1			
11	80	0.8	4.8	4.8	5.3		3.8	2.6			
12	90	0.9	5.0	5.6	5.6		4.1				
13	100	1.0	5.5	6.0	6.0		4.6				

Text Box:

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!

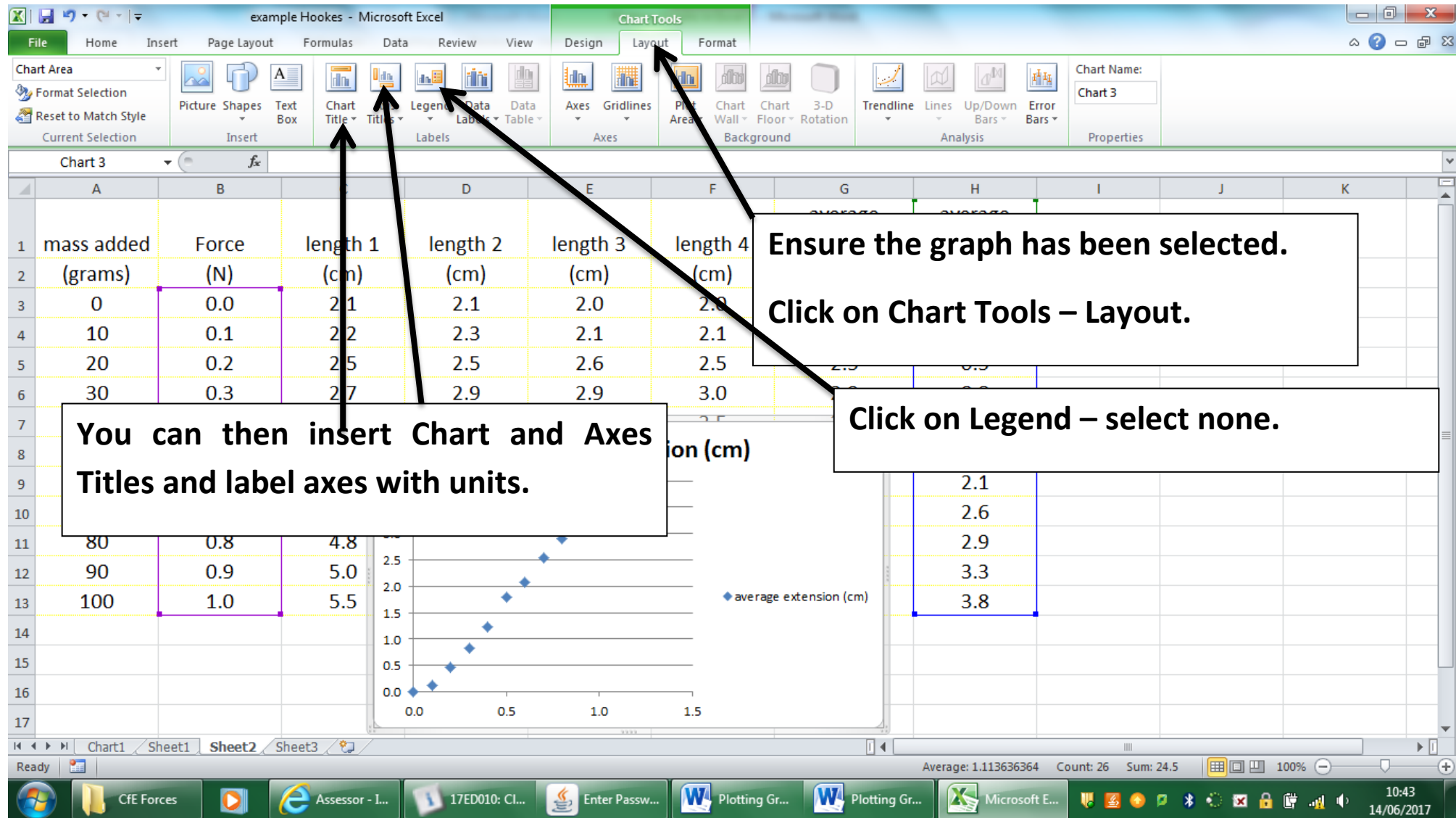
Go to INSERT and then SCATTER graph. Plot the first graph the dots without lines.

Plotting Graphs in Excel

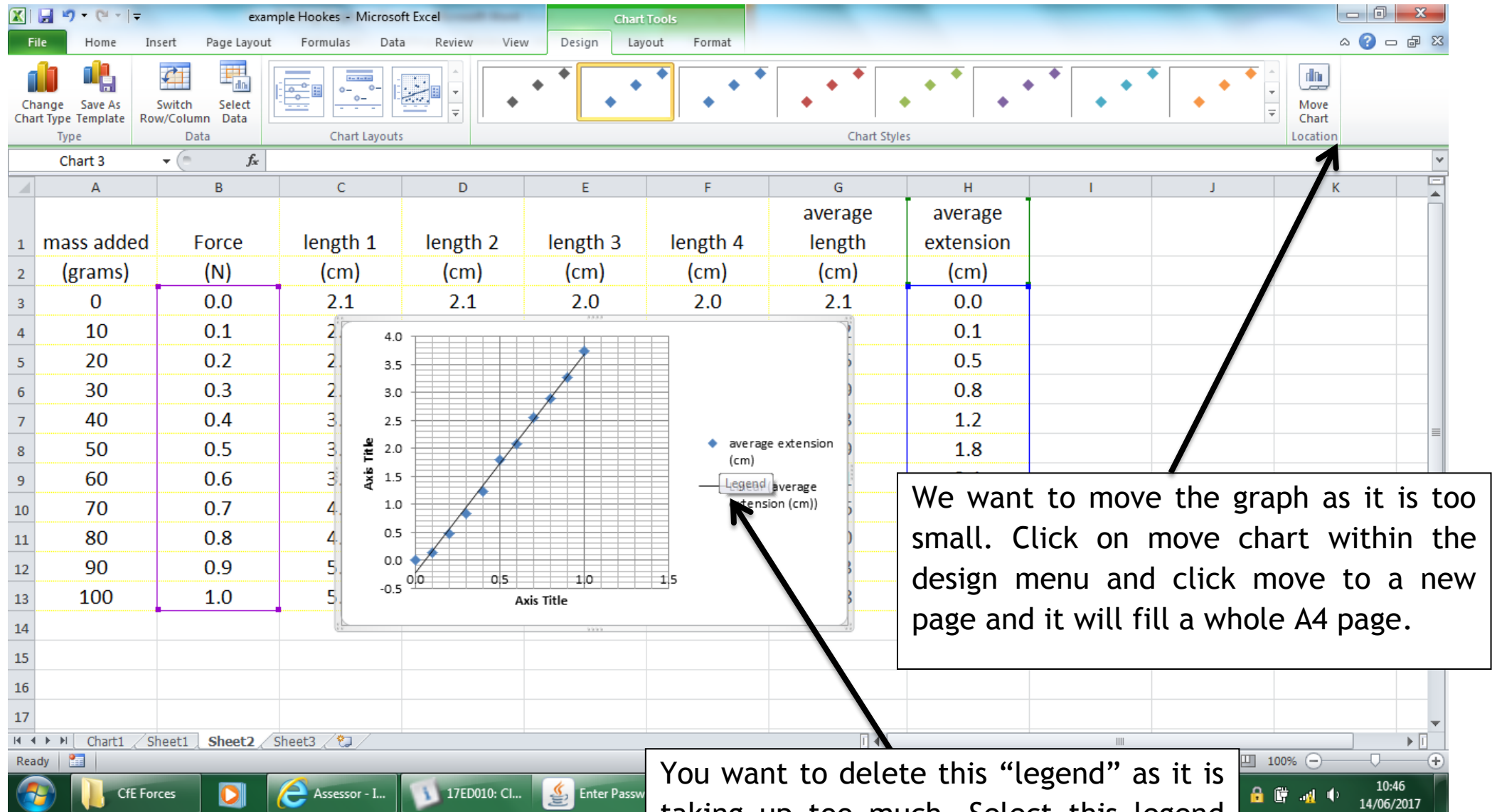


Do check that your graph looks correct. Sometimes Excel has a huff and produces nonsense. Usually you need to go back start again and only highlight the data and not the headings! It doesn't like blanks in cells, so don't leave any!

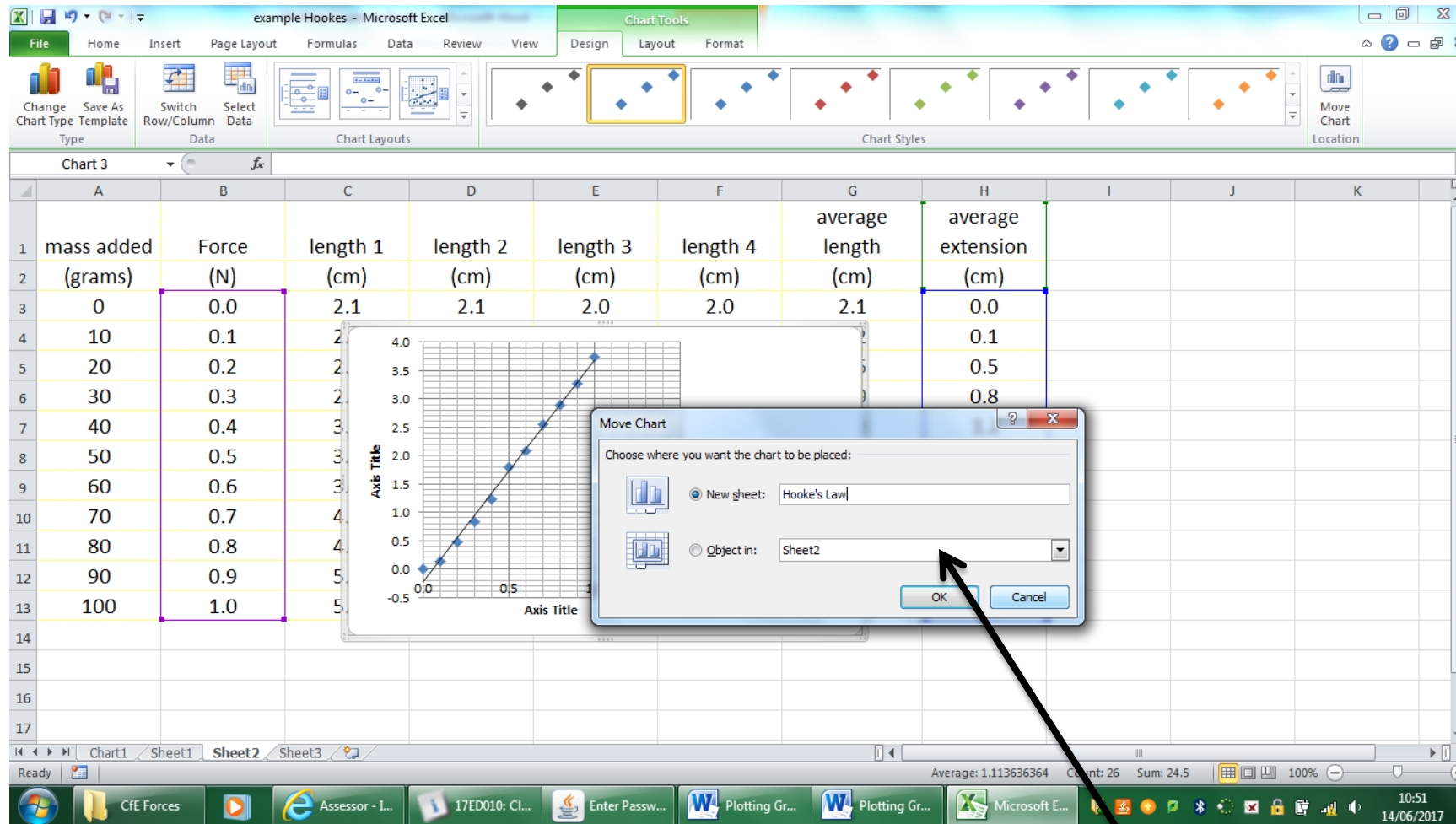
Plotting Graphs in Excel



Plotting Graphs in Excel

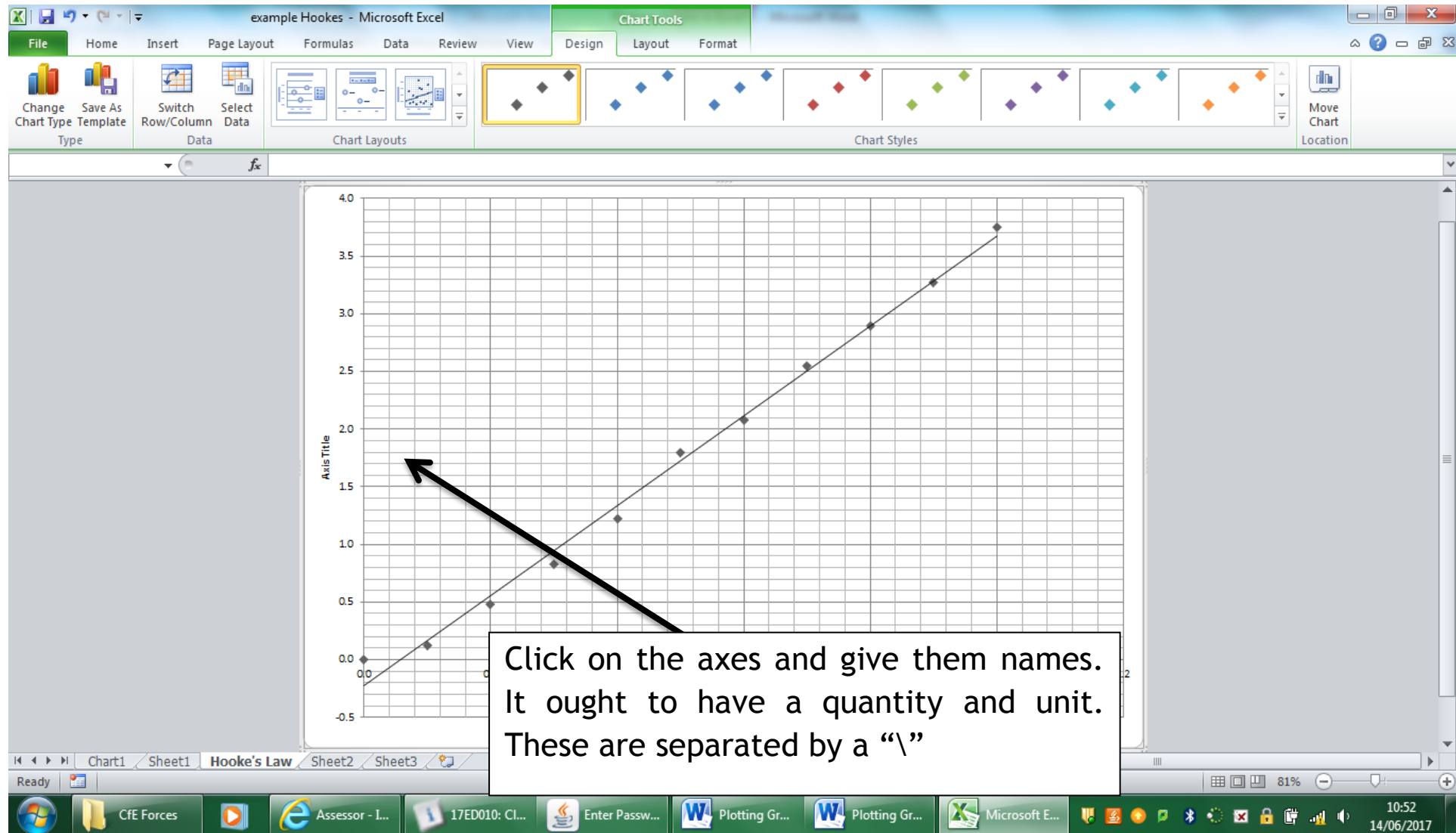


Plotting Graphs in Excel

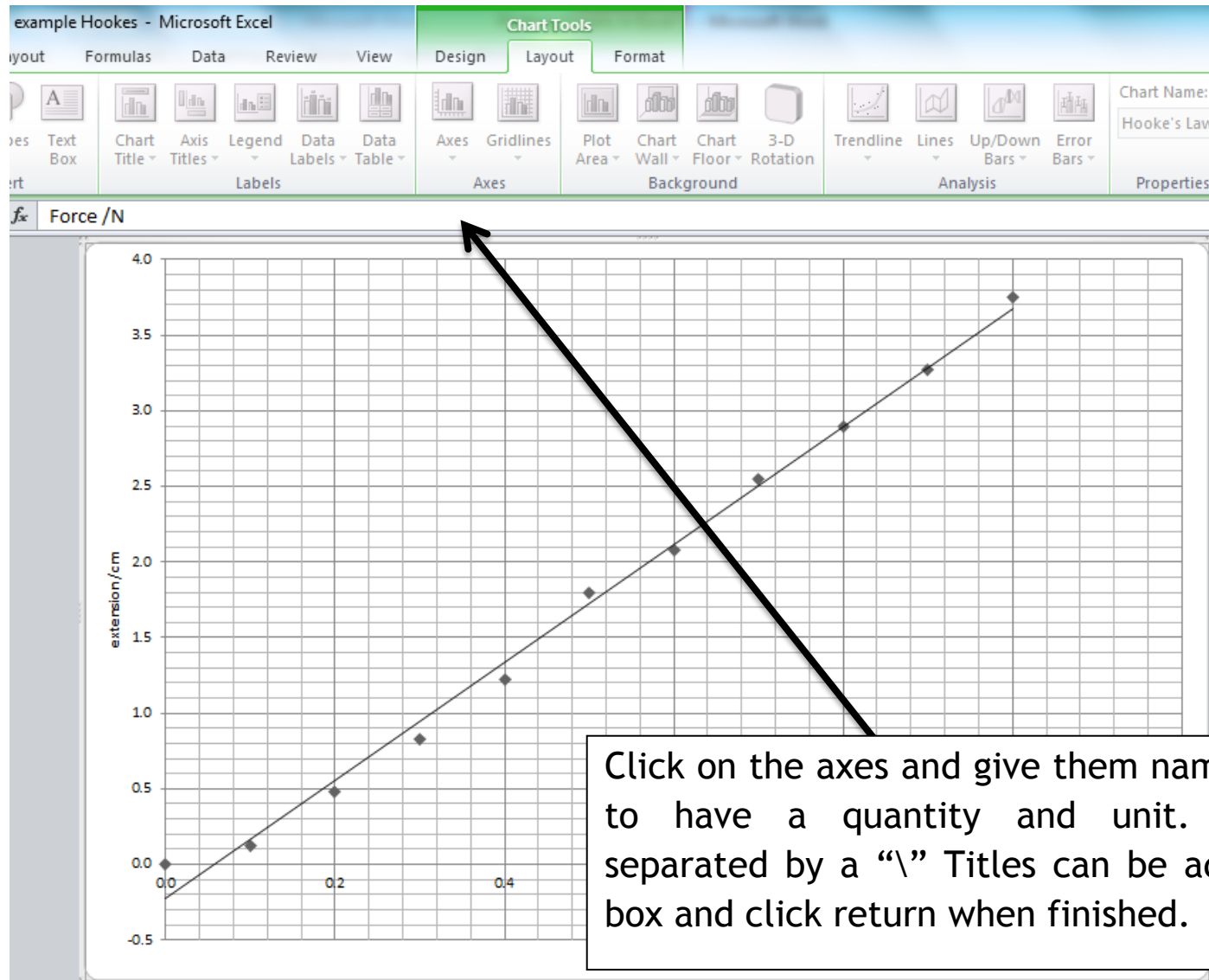


Once you get the move chart option click on “ new sheet” and give your graph a name. In this case Hooke’s Law

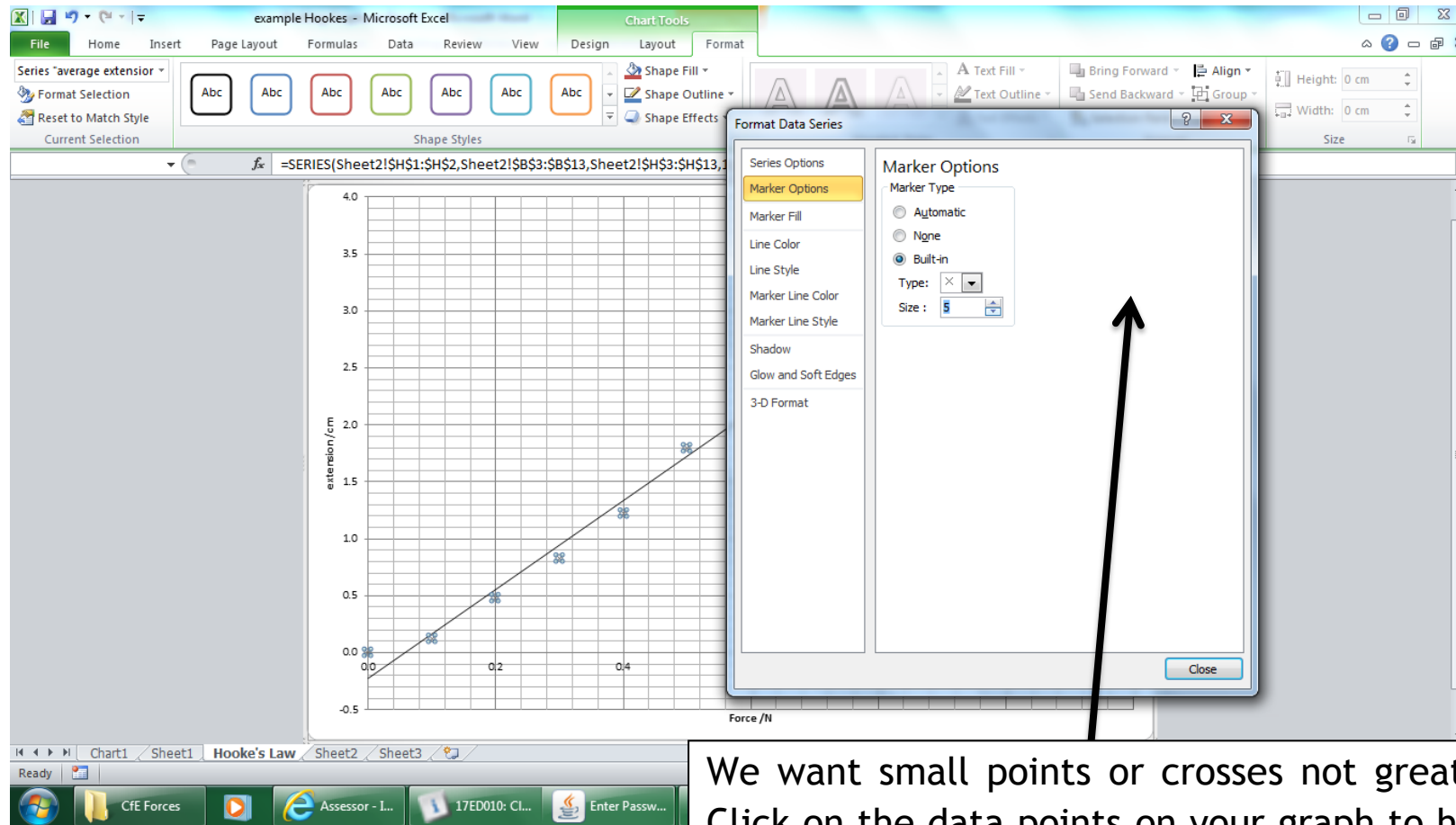
Plotting Graphs in Excel



Plotting Graphs in Excel

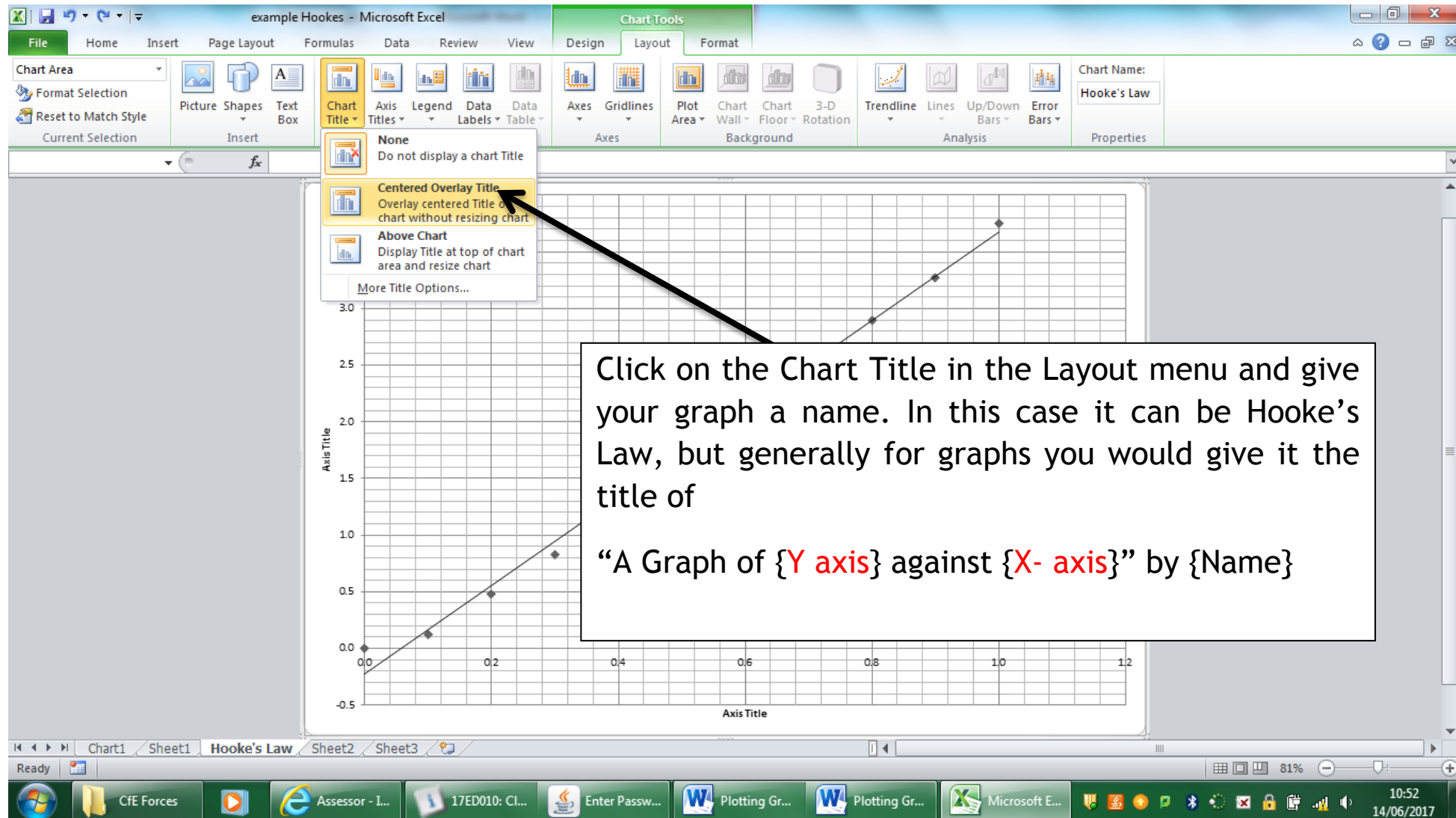


Plotting Graphs in Excel

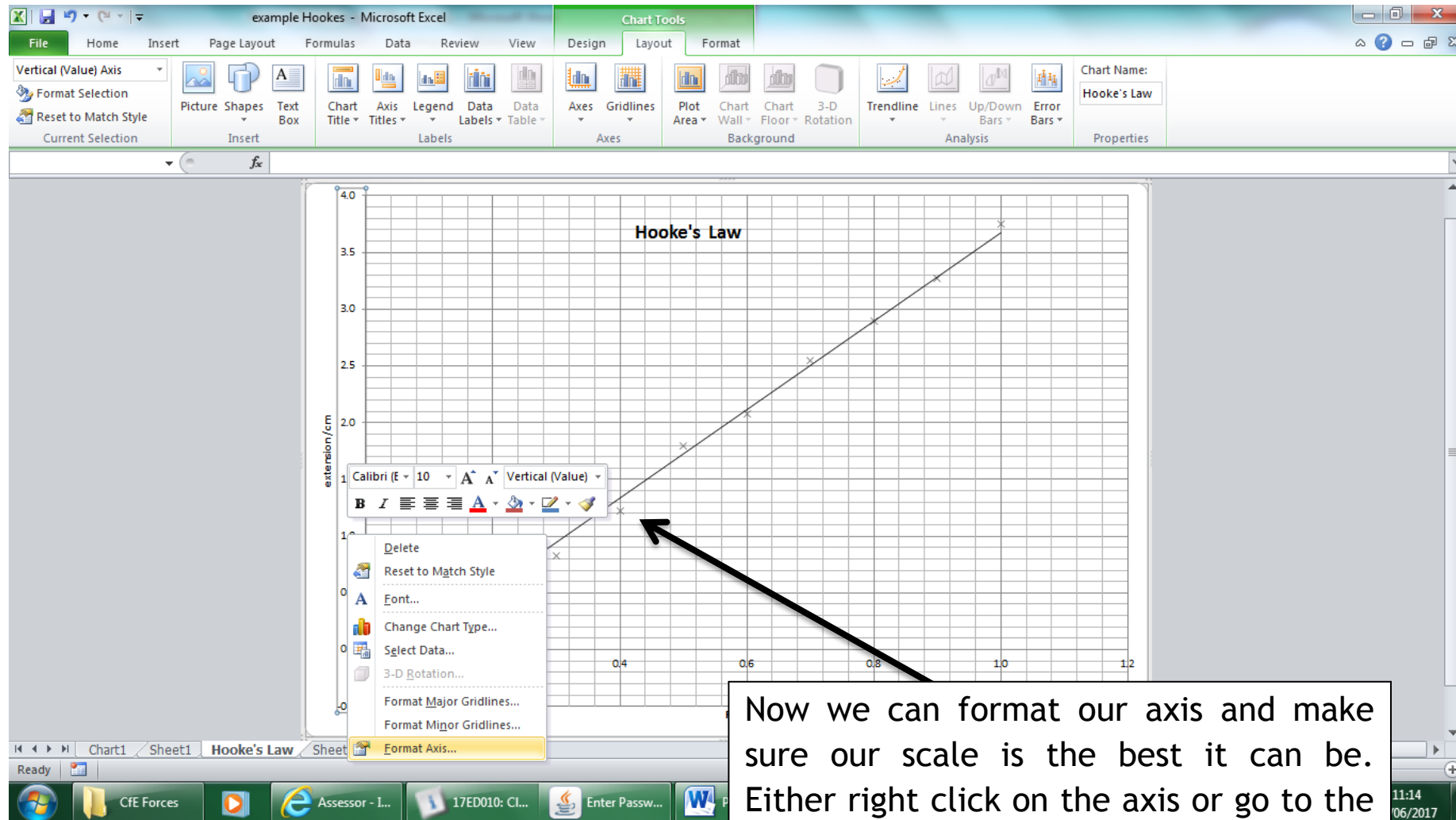


We want small points or crosses not great blobs. Click on the data points on your graph to highlight them, then right click on the mouse until you get a format data series menu. At the bottom. Click on format data series and then change the marker options from the built in menu to about 5 point and +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

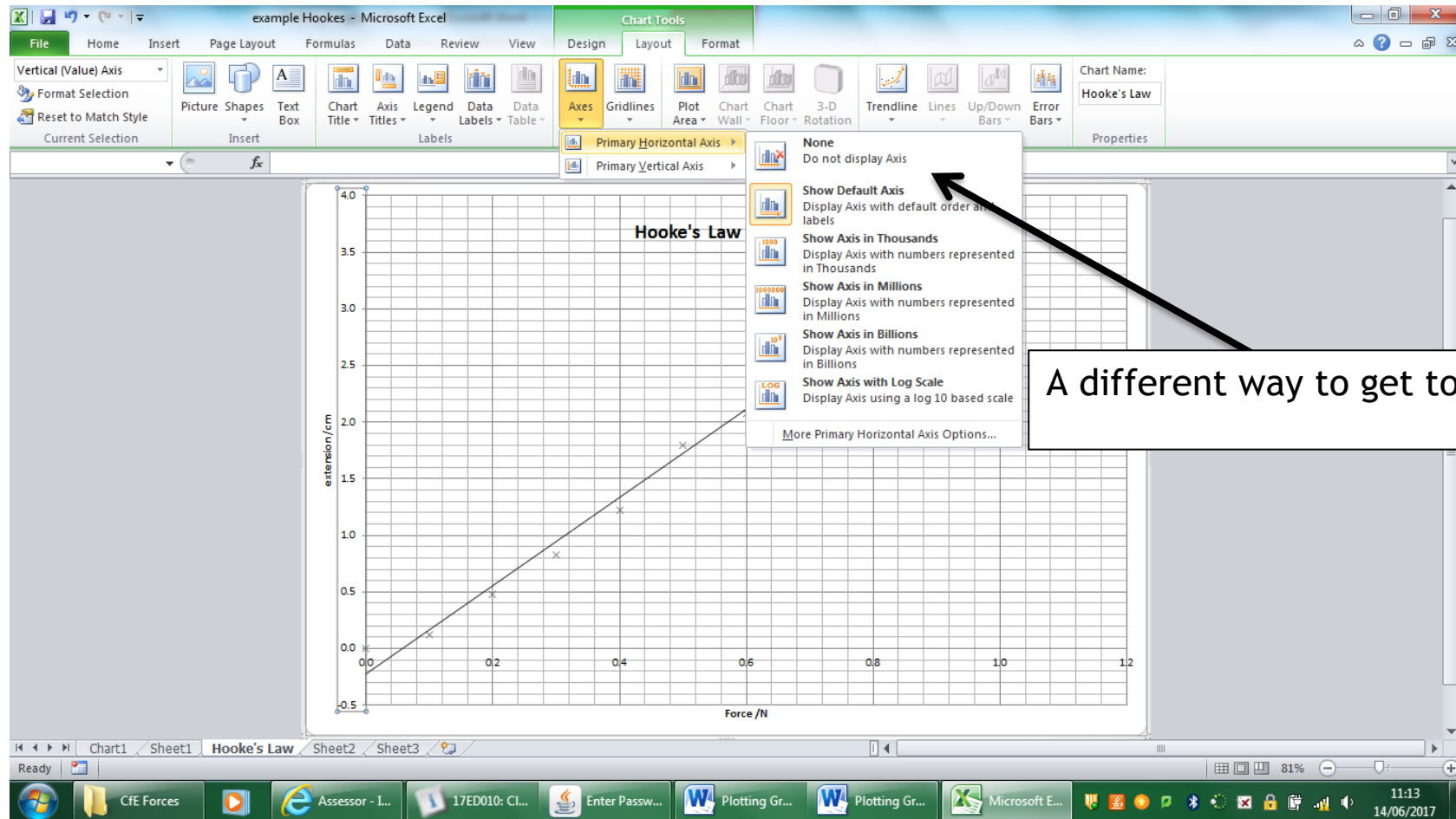
Plotting Graphs in Excel



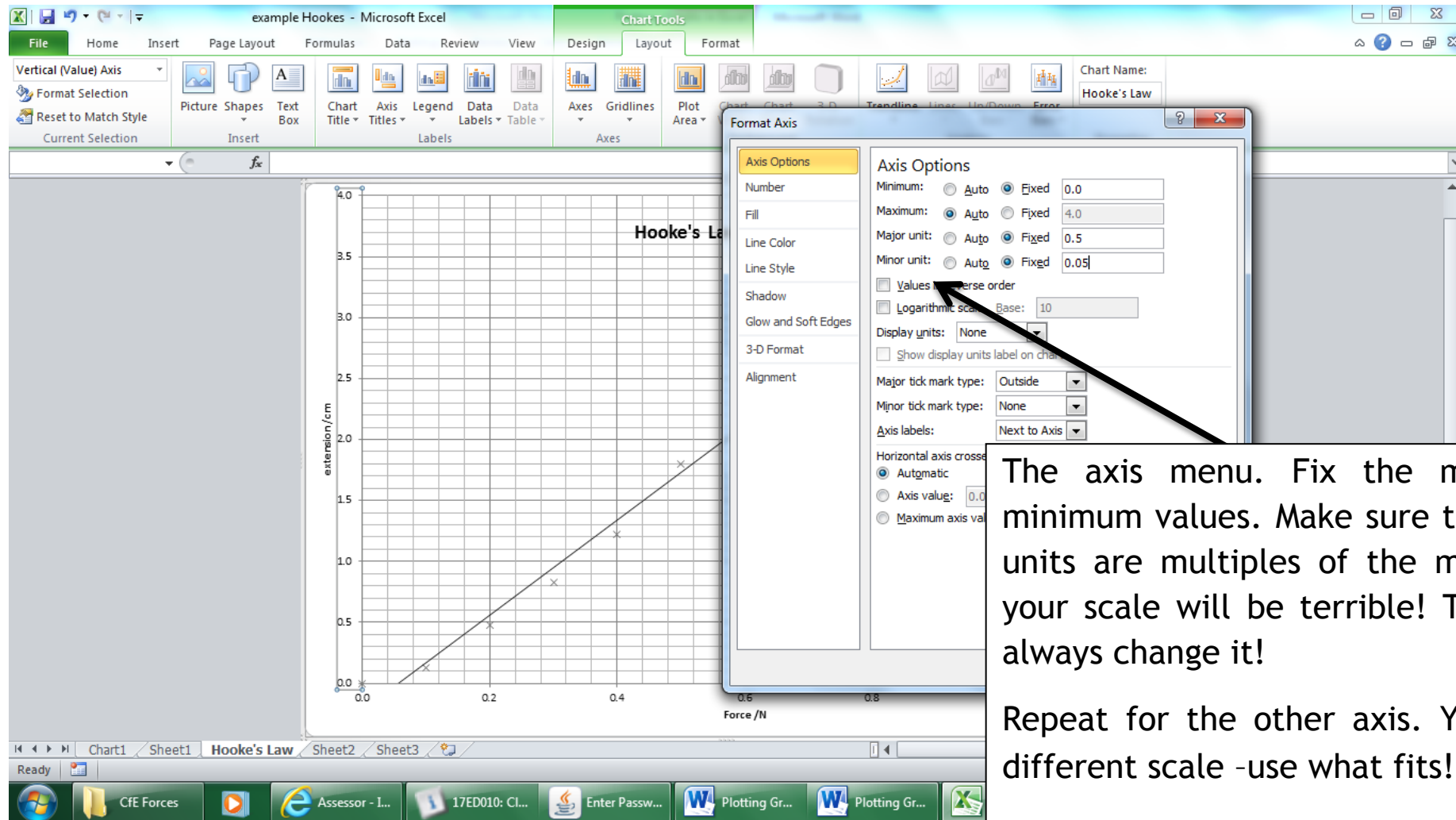
Plotting Graphs in Excel



Plotting Graphs in Excel



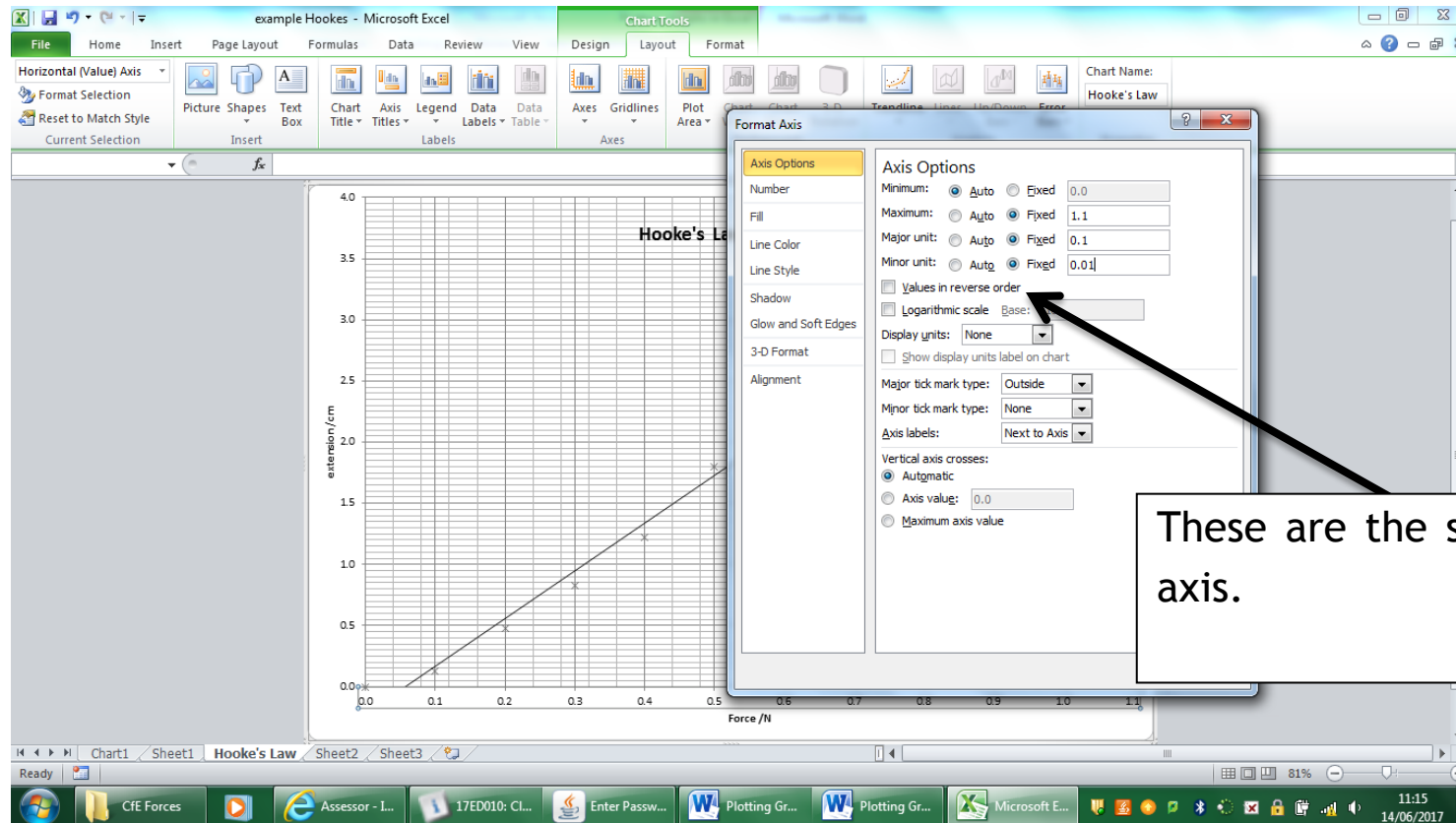
Plotting Graphs in Excel



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!

Plotting Graphs in Excel



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

ADDITIONAL INFORMATION – ADVANCED GRAPHING & ALTERNATIVE METHODS

Use of Excel 2010 in AH Physics

Plotting Graphs in Excel

The screenshot shows the Microsoft Excel interface with the 'Home' tab selected in the ribbon. A callout box with an arrow pointing to the 'Home' tab contains the text 'Click on Home'. Below this, another callout box contains the text 'Insert data, including uncertainties. Full stop in front of uncertainties stops "arith. operation"'. The data table is as follows:

	A	B	C	D	E	F
1	X	Y	. - X	. + X	. - Y	. + Y
2	2.0	2.3	0.2	0.2	0.1	0.1
3	4.0	4.8	0.2	0.2	0.1	0.1
4	6.0	7.1	0.3	0.3	0.2	0.2
5	8.0	9.5	0.3	0.3	0.3	0.3
6	10.0	12.5	0.4	0.4	0.2	0.2

Plotting Graphs in Excel

excel - Copy - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View

PivotTable Table Picture Clip Art Shapes SmartArt Screenshot Column Line Pie Bar Area Scatter Other Charts Line Column Win/Loss Slicer Hyperlink Text Box Header & Footer WordArt Signature Line Object Equation Symbol

Tables Illustrations Charts Sparklines Filter Links Text Symbols

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	X	Y	. -X	. +X	. -Y	. +Y															
2	2.0	2.3	0.2	0.2	0.1	0.1															
3	4.0	4.8	0.2	0.2	0.1	0.1															
4	6.0	7.1	0.3	0.3	0.2	0.2															
5	8.0	9.5	0.3	0.3	0.3	0.3															
6	10.0	12.5	0.4	0.4	0.2	0.2															

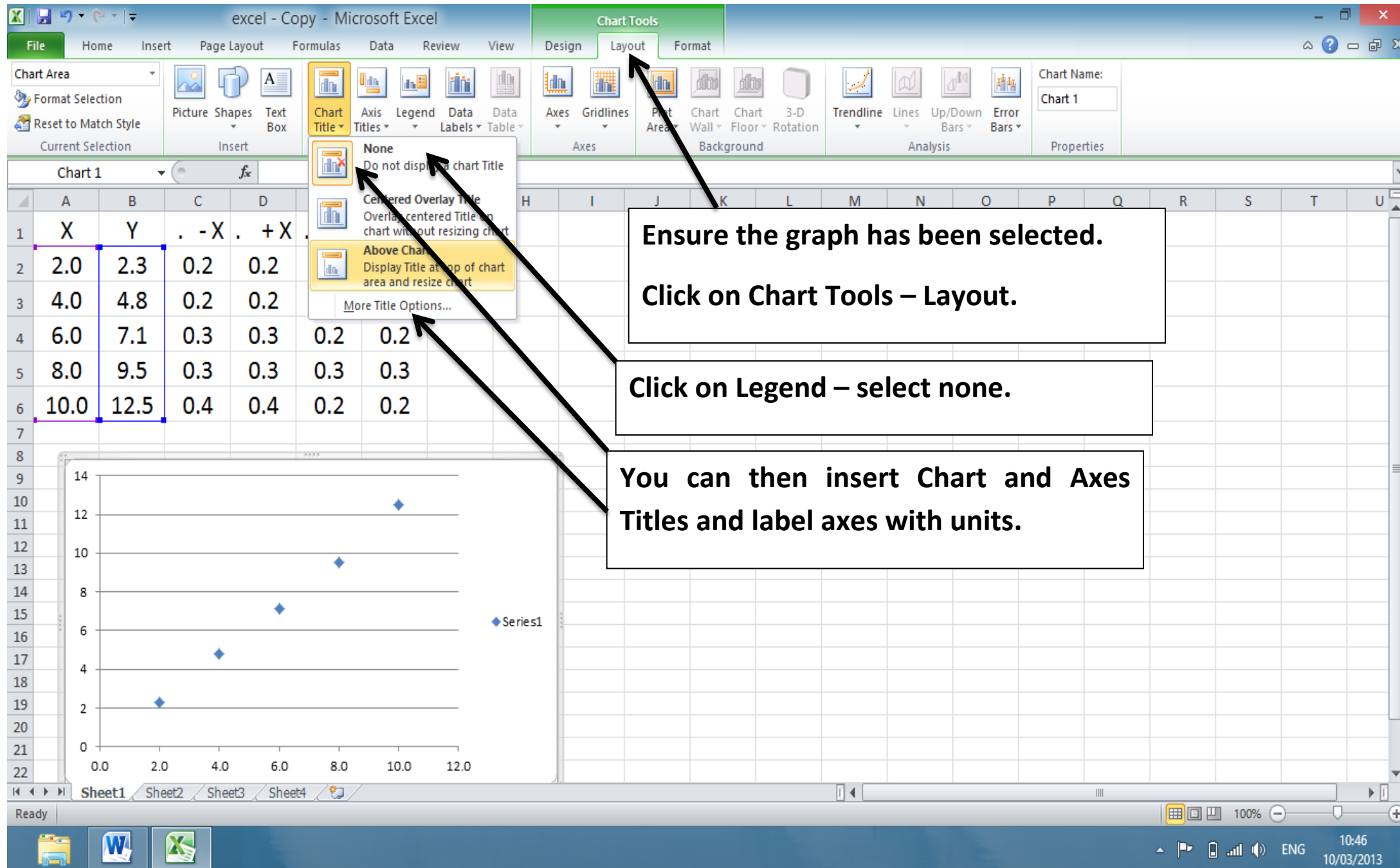
Scatter

All Chart Types...

Highlight data to be plotted.
Click on Insert, then select
"Scatter"

Ready Average: 6.6 Count: 10 Sum: 66.2 100% 10:41 10/03/2013

Plotting Graphs in Excel



Plotting Graphs in Excel

The screenshot shows the Microsoft Excel interface with the 'Chart Tools' ribbon selected. The 'Layout' tab is active, and the 'Gridlines' group is expanded. A dropdown menu is open, showing options for 'Primary Horizontal Gridlines' and 'Primary Vertical Gridlines'. The 'Major & Minor Gridlines' option is highlighted. A text box with arrows points to the 'Gridlines' group and the 'Major & Minor Gridlines' option, containing the following text:

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

Again ensure the graph has been selected.

The data table below shows the values for the graph:

	A	B	C	D	E	F
1	X	Y	. - X	. + X	. - Y	. + Y
2	2.0	2.3	0.2	0.2	0.1	0.1
3	4.0	4.8	0.2	0.2	0.1	0.1
4	6.0	7.1	0.3	0.3	0.2	0.2
5	8.0	9.5	0.3	0.3	0.3	0.3
6	10.0	12.5	0.4	0.4	0.2	0.2

The graph, titled 'Graph of Y vs X', is a scatter plot with 'X / Units' on the horizontal axis and 'Y / units' on the vertical axis. The data points are plotted at (2.0, 2.3), (4.0, 4.8), (6.0, 7.1), (8.0, 9.5), and (10.0, 12.5). The graph has major and minor gridlines displayed.

Plotting Graphs in Excel

excel - Copy - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Design Layout Format

Chart Area

Format Selection

Reset to Match Style

Current Selection

Picture Shapes Text Box

Insert

Chart Title Axis Titles Legend Data Labels Data Table

Labels

Axes Gridlines Plot Area Chart Wall Chart Floor 3-D Rotation Background

Trendline

Lines Up/Down Error Bars

Chart Name: Chart 1

Chart 1

fx

	A	B	C	D	E	F	G	H	I	J	K	L		R	S	T	U
1	X	Y	. -X	. +X	. -Y	. +Y											
2	2.0	2.3	0.2	0.2	0.1	0.1											
3	4.0	4.8	0.2	0.2	0.1	0.1											
4	6.0	7.1	0.3	0.3	0.2	0.2											
5	8.0	9.5	0.3	0.3	0.3	0.3											
6	10.0	12.5	0.4	0.4	0.2	0.2											
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	

Graph of Y vs X

Click on Trendline

Select "More Trendline Options".

Select "linear" if appropriate.

None
Removes the selected Trendline or all Trendlines if none are selected

Linear Trendline
Adds/sets a Linear Trendline for the selected chart series

Exponential Trendline
Adds/sets an Exponential Trendline for the selected chart series

Linear Forecast Trendline
Adds/sets a Linear Trendline with 2 period forecast for the selected chart series

Two Period Moving Average
Adds/sets a 2 Period Moving Average Trendline for the selected chart series

More Trendline Options...

Sheet1 Sheet2 Sheet3 Sheet4

Ready

100%

11:16 10/03/2013

Plotting Graphs in Excel

excel - Copy - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View ChartTools Design Layout Format

Series 1 Trendline 1

Format Selection

Reset to Match Style

Current Selection

Picture Shapes Text Box

Chart Title Axis Titles Legend Data Labels Data Table

Insert

Labels

Axes Gridlines

Plot Area Chart Wall Chart Floor 3-D Rotation Background

Trendline Lines Up/Down Bars Error Bars

Analysis

Chart Name: Chart 1

Properties

Chart 1

Graph of Y vs X

Y / units

X / Units

Click on "Display Equation on Chart"

Format Trendline

Trendline Options

Line Color

Line Style

Shadow

Glow and Soft Edges

Trend/Regression Type

Exponential

Linear

Logarithmic

Polynomial Order: 2

Power

Moving Average Period: 2

Trendline Name

Automatic: Linear (Series1)

Custom:

Forecast

Forward: 0.0 periods

Backward: 0.0 periods

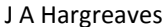
Set Intercept = 0.0

Display Equation on chart

Display R-squared value on chart

Close

	A	B	C	D	E	F	G	H	I
1	X	Y	. - X	. + X	. - Y	. + Y			
2	2.0	2.3	0.2	0.2	0.1	0.1			
3	4.0	4.8	0.2	0.2	0.1	0.1			
4	6.0	7.1	0.3	0.3	0.2	0.2			
5	8.0	9.5	0.3	0.3	0.3	0.3			
6	10.0	12.5	0.4	0.4	0.2	0.2			



Plotting Graphs in Excel

excel - Copy - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Chart Tools Design Layout Format

Series 1 Y Error Bars

Format Selection

Reset to Match Style

Current Selection

Picture Shapes Text Box

Chart Title

Axis Titles

Legend

Data Labels

Data Table

Axes

Gridlines

Plot Area

Chart Wall

Chart Floor

3-D Rotation

Trendline

Lines

Up/Down Bars

Error Bars

Chart Name: Chart 1

Properties

Chart 1

fx

	A	B	C	D	E	F
1	X	Y	. -X	. +X	. -Y	. +Y
2	2.0	2.3	0.2	0.2	0.1	0.1
3	4.0	4.8	0.2	0.2	0.1	0.1
4	6.0	7.1	0.3	0.3	0.2	0.2
5	8.0	9.5	0.3	0.3	0.3	0.3
6	10.0	12.5	0.4	0.4	0.2	0.2

Select Both

Click on Custom and then Specify Value

Graph of Y vs X

Y / units

X / Units

$y = 1.255x - 0.29$

Format Error Bars

Vertical Error Bars

Line Color

Line Style

Shadow

Glow and Soft Edges

Display

Direction

☒ Both

☐ Minus

☐ Plus

End Style

☐ No Cap

☒ Cap

Error Amount

☐ Fixed value: 0.1

☐ Percentage: 5.0 %

☐ Standard deviation(s): 1.0

☐ Standard error

☒ Custom: Specify Value

Close

Sheet1 Sheet2 Sheet3 Sheet4

Ready

100%

12:06 10/03/2013

Plotting Graphs in Excel

excel - Copy - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Design Layout Format

Series 1 Y Error Bars

Format Selection

Reset to Match Style

Current Selection

Picture Shapes Text Box

Axis Titles Labels

Axes Gridlines

3-D Rotation Background Analysis Properties

Chart Name:

F2

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	X	Y	. -X	. +X	. -Y	. +Y															
2	2.0	2.3	0.2	0.2	0.1	0.1															
3	4.0	4.8	0.2	0.2	0.1	0.1															
4	6.0	7.1	0.3	0.3	0.2	0.2															
5	8.0	9.5	0.3	0.3	0.3	0.3															
6	10.0	12.5	0.4	0.4	0.2	0.2															
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					
16																					
17																					
18																					
19																					
20																					
21																					
22																					

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

Repeat for Negative Error Value

Click Okay

Format Error Bars

Custom Error Bars

Positive Error Value

=Sheet1!\$F

Negative Error Value

= {1}

OK

Cancel

End Style

No Cap

Cap

Error Amount

Fixed value: 0.1

Percentage: 5.0 %

Standard deviation(s): 1.0

Standard error

Custom: Specify Value

Click to highlight data insertion box.

Point

Sheet1 Sheet2 Sheet3 Sheet4

100%

12:10 10/03/2013

Plotting Graphs in Excel

excel - Copy - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Chart Tools Design Layout Format

Series 1 Y Error Bars

Format Selection

Reset to Match Style

Current Selection

Picture Shapes Text Box

Insert

Chart Title Axis Titles Legend Data Labels Table

Labels

Axes Gridlines

Axes

Plot Area Chart Wall Chart Floor 3-D Rotation

Background

Trendline Lines Up/Down Bars Error Bars

Analysis

Chart Name: Chart 1

Properties

Chart 1

f_x

	A	B	C	D	E
1	X	Y	. -X	. +X	. -Y
2	2.0	2.3	0.2	0.2	0.1
3	4.0	4.8	0.2	0.2	0.1
4	6.0	7.1	0.3	0.3	0.2
5	8.0	9.5	0.3	0.3	0.3
6	10.0	12.5	0.4	0.4	0.2

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

Graph of Y vs X

Y / units

X / Units

Chart Area

Vertical Error Bars

Line Color

Line Style

Shadow

Glow and Soft Edges

Vertical Error Bars

Display

Direction

☒ Both

☐ Minus

☐ Plus

End Style

☐ No Cap

☒ Cap

Error Amount

☐ Fixed value: 0.1

☐ Percentage: 5.0 %

☐ Standard deviation(s): 1.0

☐ Standard error

☒ Custom: Specify Value

Sheet1 Sheet2 Sheet3 Sheet4

Ready

100%

12:40

10/03/2013

Plotting Graphs in Excel

excel - Copy - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View ChartTools Design Layout Format

Series 1 X Error Bars

Format Selection
Reset to Match Style
Current Selection

Picture Shapes Text Box

Chart Title
Axis Titles
Legend
Data Labels
Table

Chart 1

Chart Name: Chart 1

Properties

Changes to Horizontal Error Bars

This should now read "Horizontal Error Bars".

Repeat the procedure to enter customised horizontal error bars.

Horizontal Error Bars

Line Color
Line Style
Shadow
Glow and Soft Edges

Horizontal Error Bars

Display

Direction

☒ Both
☐ Minus
☐ Plus

End Style

☐ No Cap
☒ Cap

Error Amount

☐ Fixed value: 1.0
☐ Percentage: 5.0 %
☐ Standard deviation(s): 1.0
☐ Standard error
☒ Custom: Specify Value

Graph of Y vs X

Y / units

X / Units

$y = 1.255x - 0.29$

Sheet1 Sheet2 Sheet3 Sheet4

Ready

100%

ENG 12:43 10/03/2013

Plotting Graphs in Excel

excel - Copy - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Design Layout Format

Series 1 X Error Bars

Format Selection
Reset to Match Style
Current Selection

Picture Shapes
Text Box
Insert

Axis Titles
Labels

Axes
Gridlines
Axes

3-D Rotation
Background
Analysis
Properties

Chart Name:

C2

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	X	Y	-X	+X	-Y	+Y															
2	2.0	2.3	0.2	0.2	0.1																
3	4.0	4.8	0.2	0.2	0.1																
4	6.0	7.1	0.3	0.3	0.2																
5	8.0	9.5	0.3	0.3	0.3																
6	10.0	12.5	0.4	0.4	0.2																

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

Click to highlight data insertion box.

Format Error Bars

Horizontal Error Bars

Custom Error Bars

Positive Error Value
=Sheet1!\$

Negative Error Value
=Sheet1!\$

OK Cancel

End Style
No Cap
Cap

Error Amount
Fixed value: 1.0
Percentage: 5.0 %
Standard deviation(s): 1.0
Standard error
Custom: Specify Value

Graph of Y vs X

Y / units

X / Units

Sheet1 Sheet2 Sheet3 Sheet4

Point

Close

100%

ENG 12:48 10/03/2013

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.

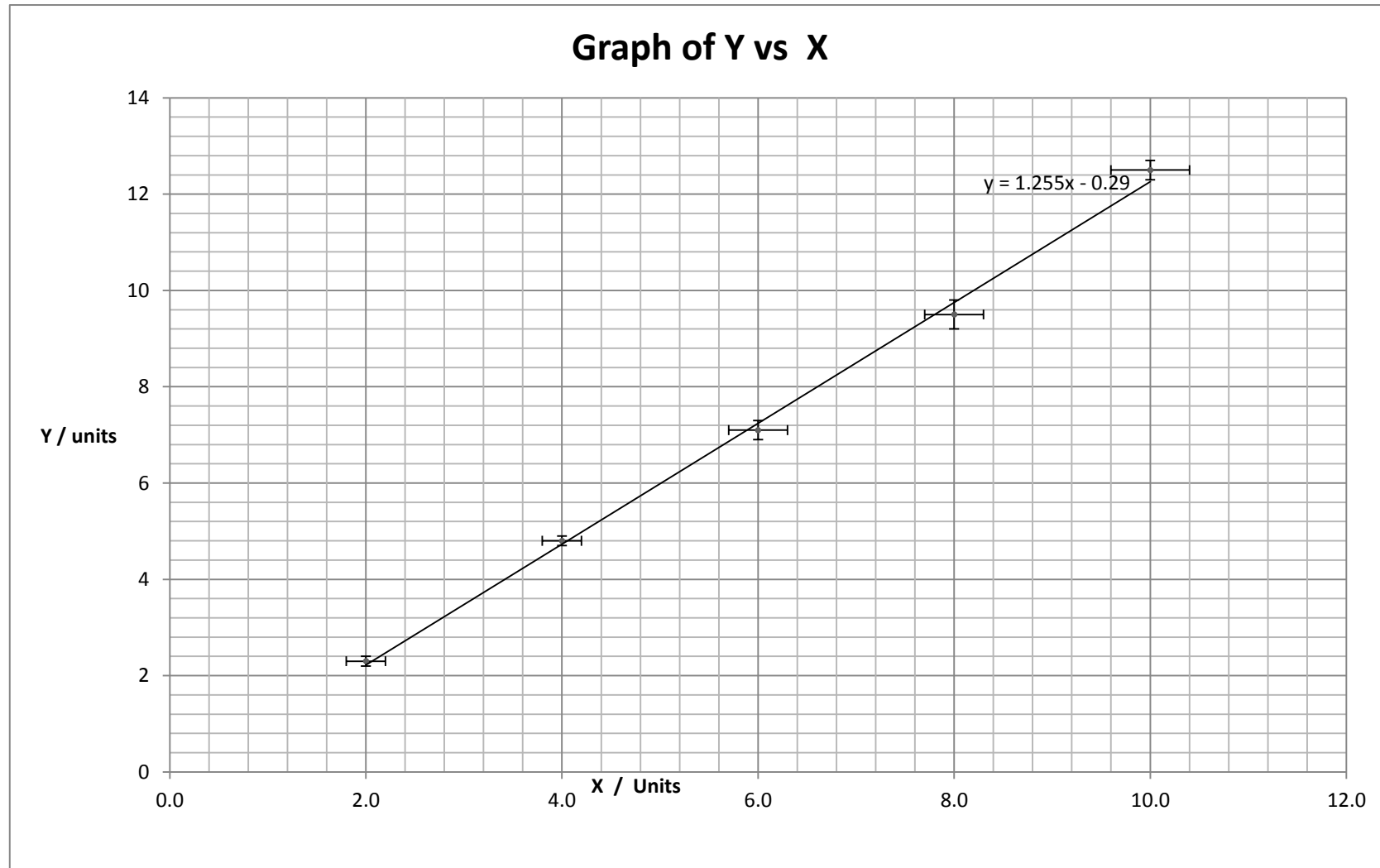
Built in.

Choose style and size

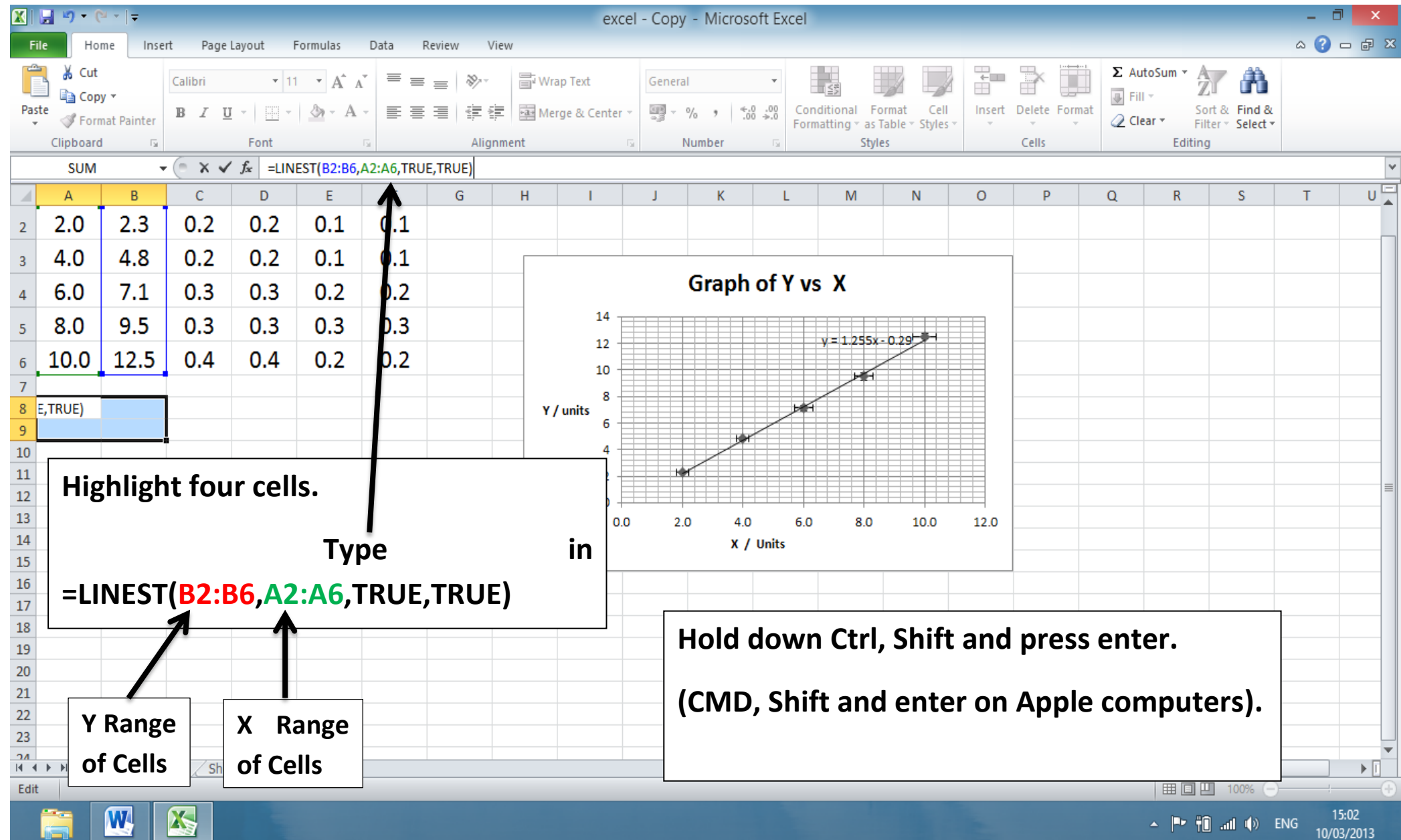
The screenshot shows the Excel interface with the 'Format Data Series' task pane open. The 'Marker Options' tab is selected, and the 'Built-in' marker type is chosen. The 'Size' is set to 2. The background shows a scatter plot with a trendline and a data point selected.

X / Units	Y / units
2.0	2.5
4.0	5.0
6.0	7.5
8.0	10.0
10.0	12.5

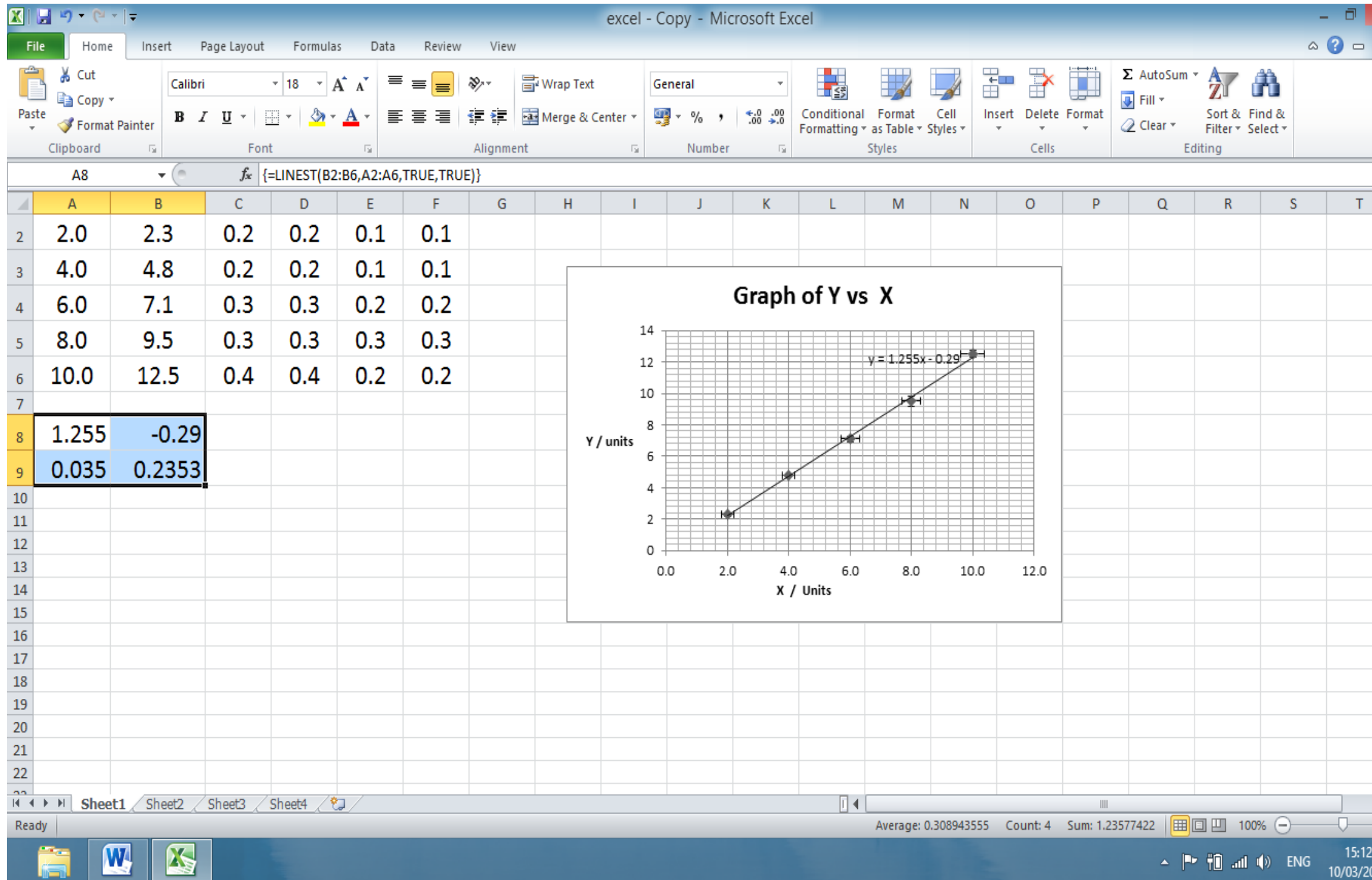
Increase the size of the graph to at least half a page.



Uncertainty in Gradient, Intercept - Use of Linest



Plotting Graphs in Excel



Plotting Graphs in Excel

