

# A Guide for Making Graphs in Excel

## Mac Version

### Introduction

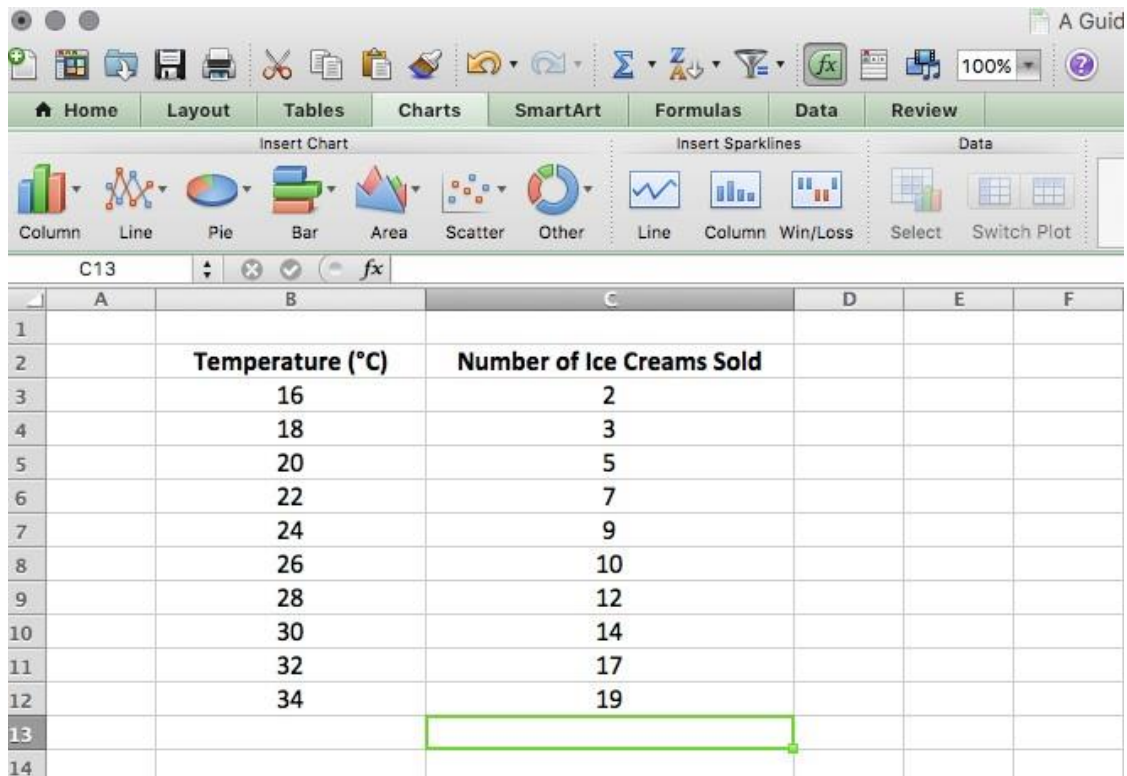
In science investigations, you will often need to draw a graph of your data. Graphs help us to visualise the relationship between the variables being studied. They can be drawn by hand or created using computer programs like Microsoft Excel. In this guide, you will learn how to use Microsoft Excel to draw a graph of your data.

### Excel and Scatter Plots

If the data is continuous, you will need to make a scatter plot. Continuous data can take any value within a range. When data is continuous, any data point is possible along the scale of measurement. Temperature is an example of a continuous variable.

Step 1: Create a table for your data. Make sure that each column has an appropriate heading and include units where necessary. In this example, we will be looking at the relationship between the temperature and the number of ice creams sold.

Step 2: Add your data to the table. Make sure each measurement or observation goes in its own cell. Remember, you should only put units in the heading, not in each cell.



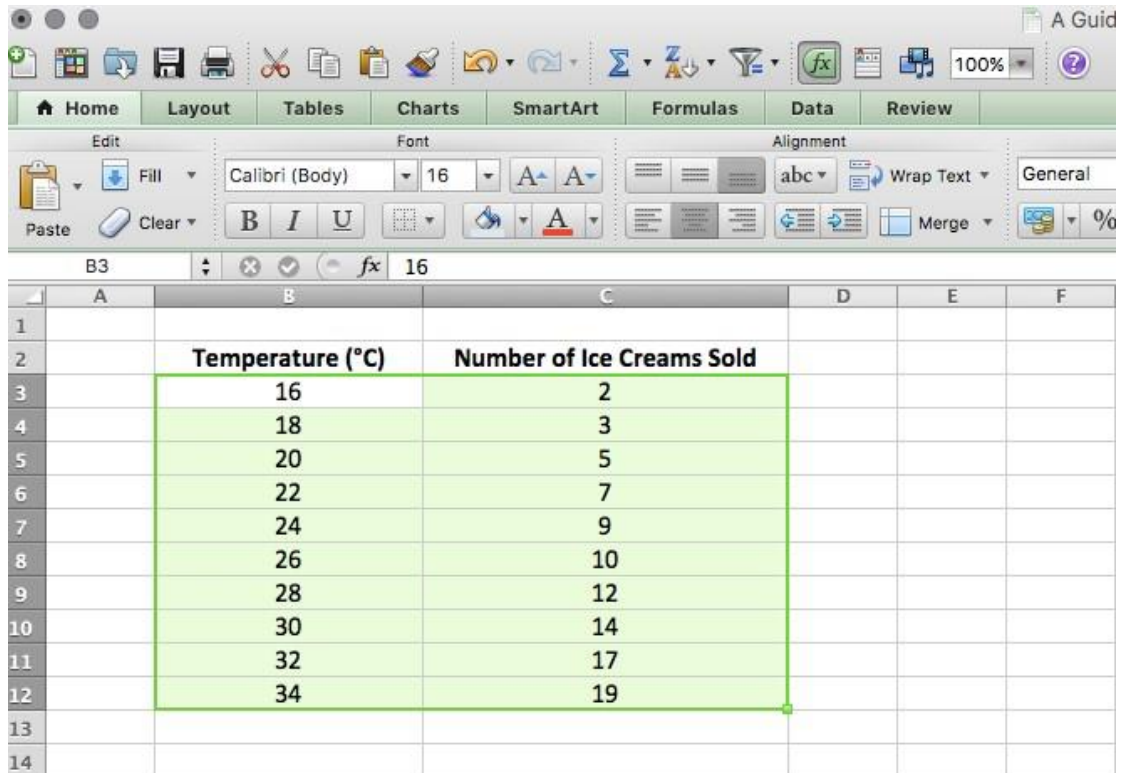
The screenshot shows the Microsoft Excel interface with a scatter plot titled 'A Guide' displayed. The plot shows a positive linear relationship between Temperature (°C) on the x-axis and Number of Ice Creams Sold on the y-axis. The data points are as follows:

Temperature (°C)	Number of Ice Creams Sold
16	2
18	3
20	5
22	7
24	9
26	10
28	12
30	14
32	17
34	19

The Excel spreadsheet below shows the data used for the scatter plot. The x-axis is labeled 'Temperature (°C)' and the y-axis is labeled 'Number of Ice Creams Sold'. The data is entered in cells B3 through B13 and C3 through C13.

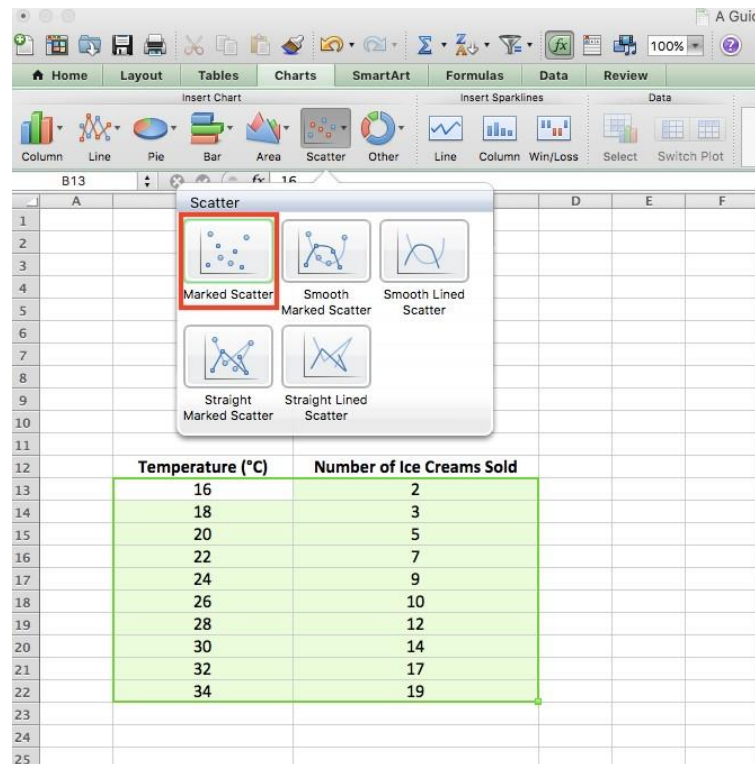
	A	B	C	D	E	F
1						
2		Temperature (°C)	Number of Ice Creams Sold			
3		16	2			
4		18	3			
5		20	5			
6		22	7			
7		24	9			
8		26	10			
9		28	12			
10		30	14			
11		32	17			
12		34	19			
13						
14						

Step 3: Highlight the numbers in both columns. Do not highlight the titles.

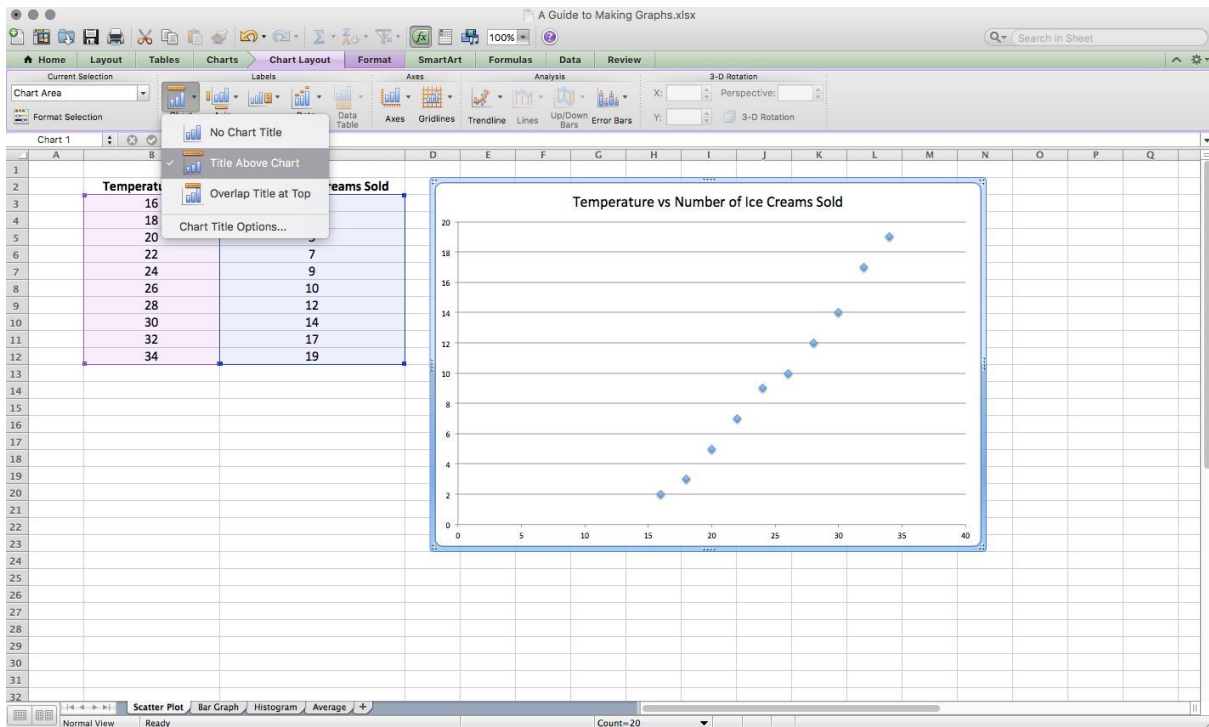


	A	B	C	D	E	F
1						
2		<b>Temperature (°C)</b>	<b>Number of Ice Creams Sold</b>			
3		16	2			
4		18	3			
5		20	5			
6		22	7			
7		24	9			
8		26	10			
9		28	12			
10		30	14			
11		32	17			
12		34	19			
13						
14						

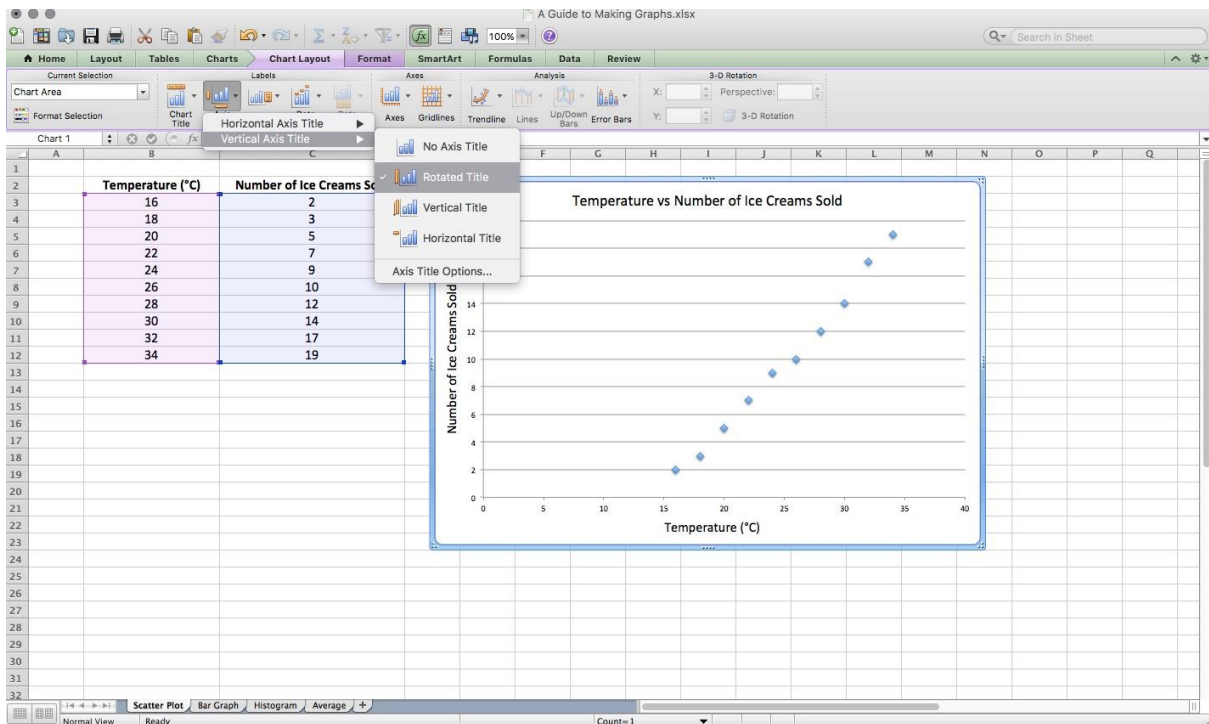
Step 4: Once you have your data highlighted, click *Charts > Scatter > Marked Scatter*.



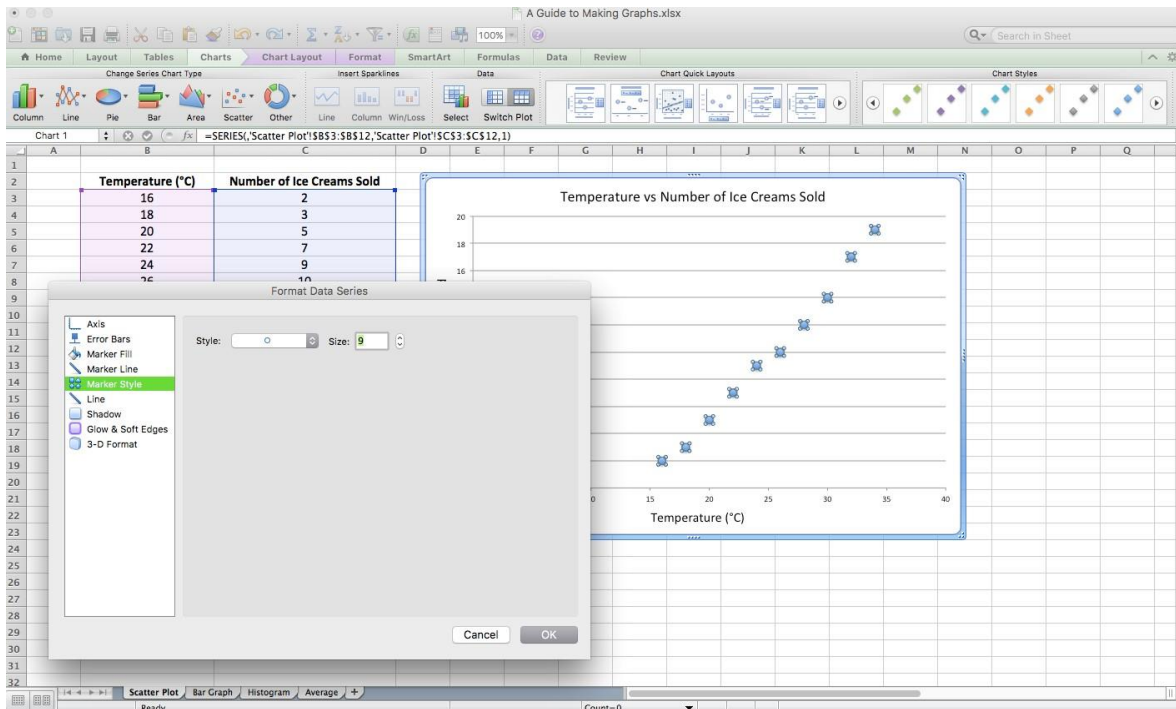
Step 5: This will give you a graph like the one below. You will need to change the way the graph is formatted. Firstly, add a title that describes the data. Click *Chart Layout > Chart Title > Title Above Chart*.



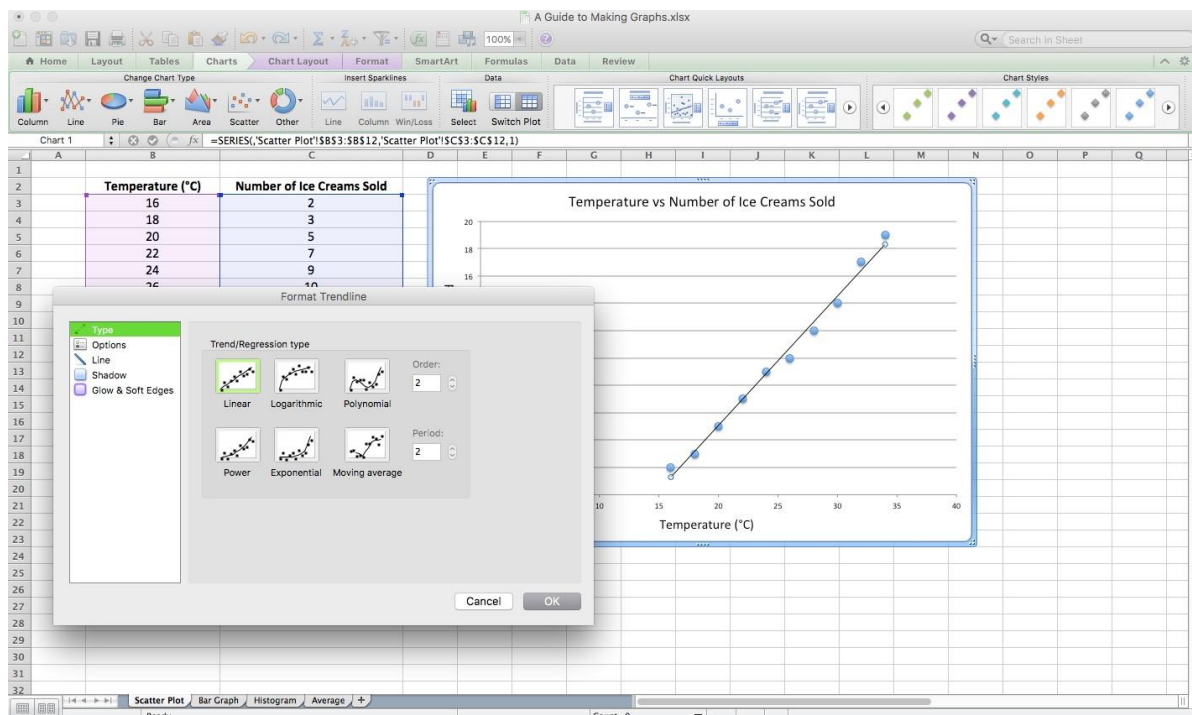
Step 6: Add axis titles by clicking *Chart Layout > Axis Titles*. Remember to include units in your axis titles.



Step 7: Change the marker type from a diamond to a circle. Double click on a data point to bring up the *Format Data Series* dialog box. Click on *Marker Style* and change the style to circle.



Step 8: Add a trend line, or line of best fit, to the graph. To add a trend line, right click on a data point, select *Add Trendline* and add a line that fits the data. The trend line should reflect the relationship between the variables. In this example, there is a linear relationship between the temperature and number of ice creams sold.

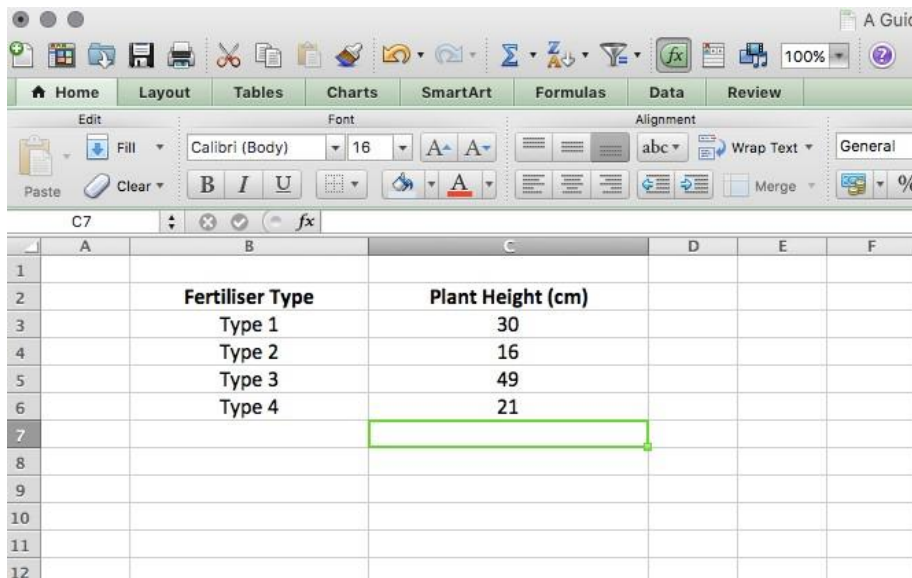


## Excel and Column (Bar) Graphs

Column graphs are a type of bar graph, and are often referred to as bar graphs. If the data is discrete, you will need to make a column graph instead of a scatter plot. When data is discrete, only certain values are possible. In the example below, there are four discrete types of fertiliser. There are no values between each type of fertiliser.

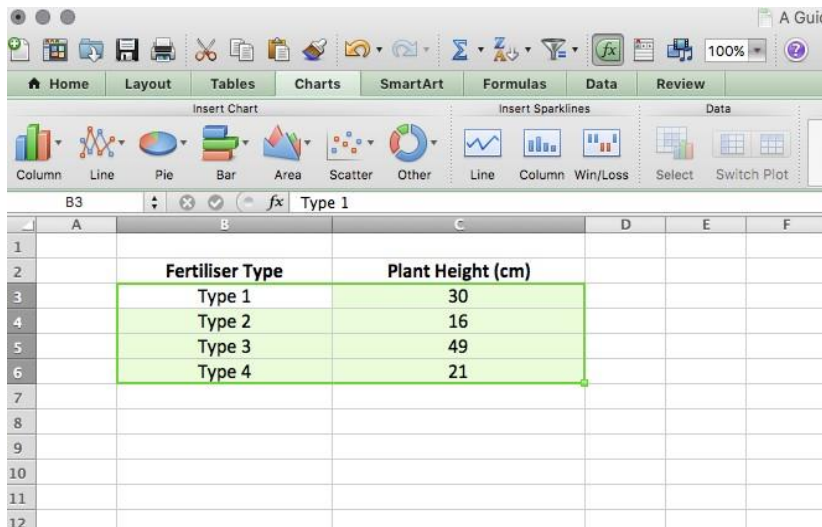
**Step 1:** Create a table for your data. Make sure that each column has an appropriate heading and include units where necessary. In this example, we will be looking at the relationship between plant height and fertiliser type.

**Step 2:** Add your data to the table. Make sure each measurement or observation goes in its own cell. Remember, you should only put units in the heading, not in each cell.



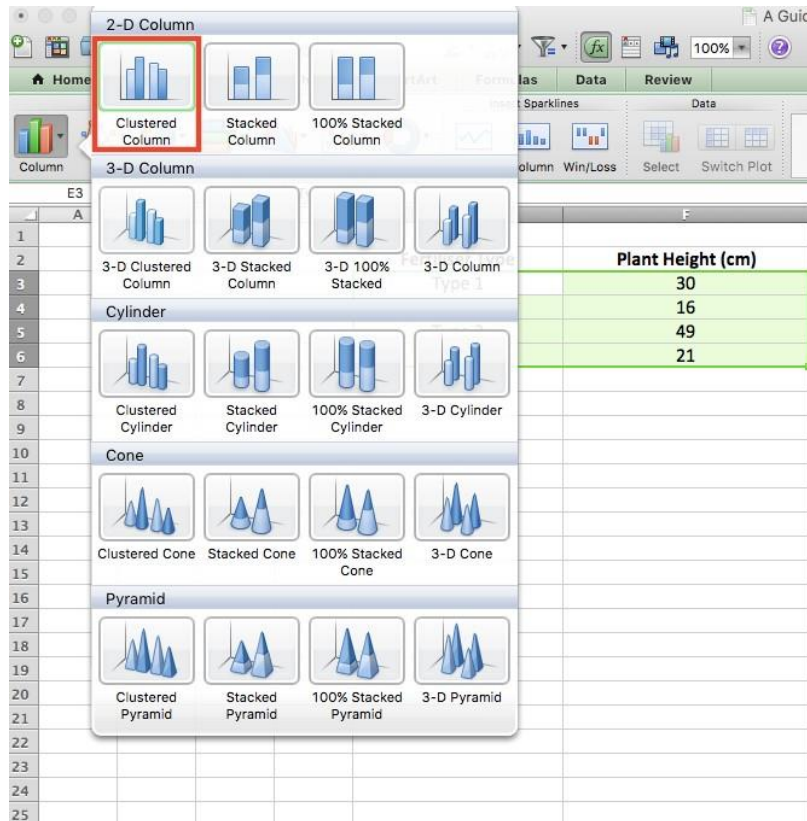
	A	B	C	D	E	F
1						
2		<b>Fertiliser Type</b>	<b>Plant Height (cm)</b>			
3		Type 1	30			
4		Type 2	16			
5		Type 3	49			
6		Type 4	21			
7						
8						
9						
10						
11						
12						

**Step 3:** Highlight the numbers in both the columns. Do not highlight the titles.

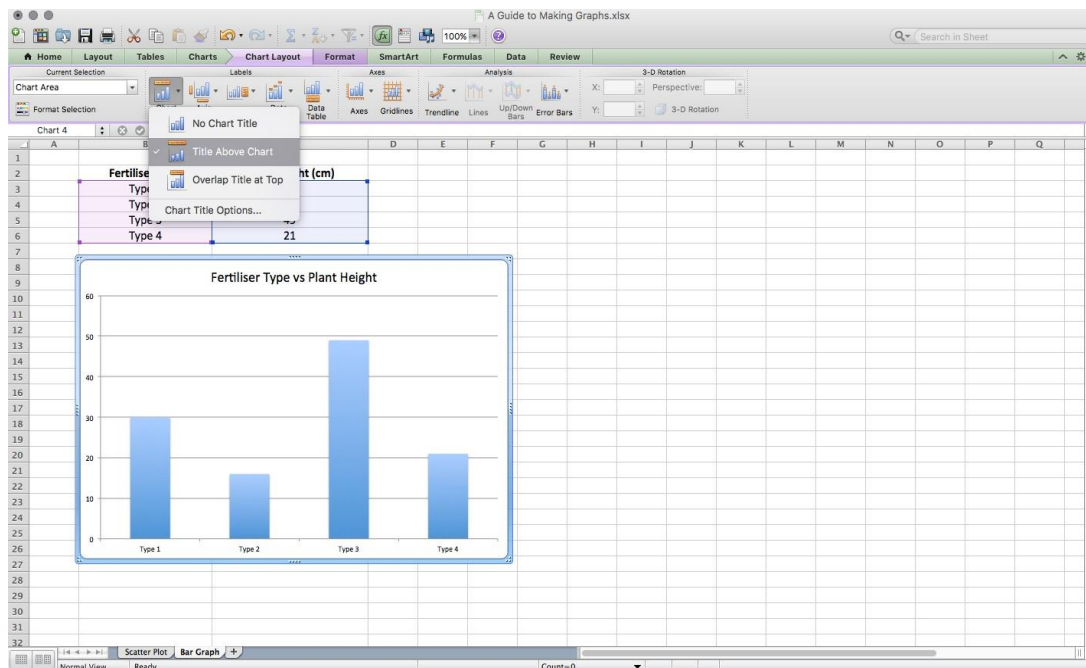


	A	B	C	D	E	F
1						
2		<b>Fertiliser Type</b>	<b>Plant Height (cm)</b>			
3		Type 1	30			
4		Type 2	16			
5		Type 3	49			
6		Type 4	21			
7						
8						
9						
10						
11						
12						

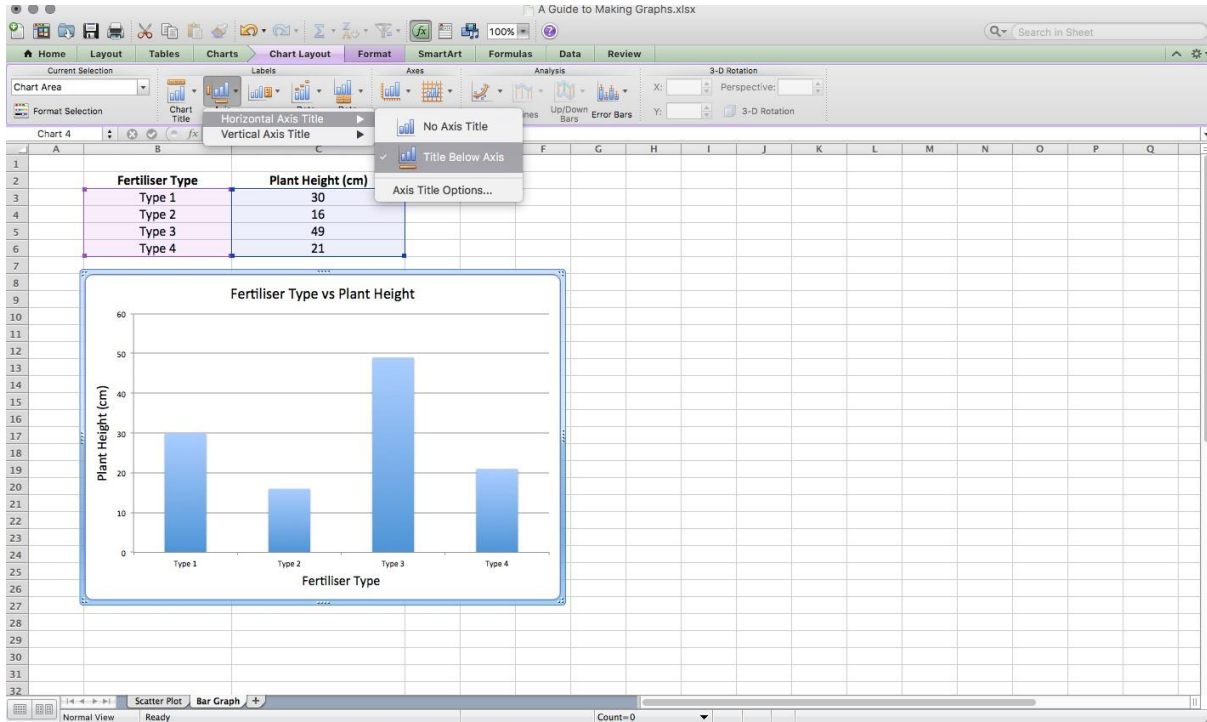
Step 4: Once you have your data highlighted, click *Charts > Column > Clustered Column*.



Step 5: This will give you a graph like the one below. You will need to change the way the graph is formatted. Firstly, add a title that describes the data. Click *Chart Layout > Chart Title > Title Above Chart*.



Step 6: Add axis titles by clicking *Chart Layout* > *Axis Titles*. Remember to include units in your axis titles.

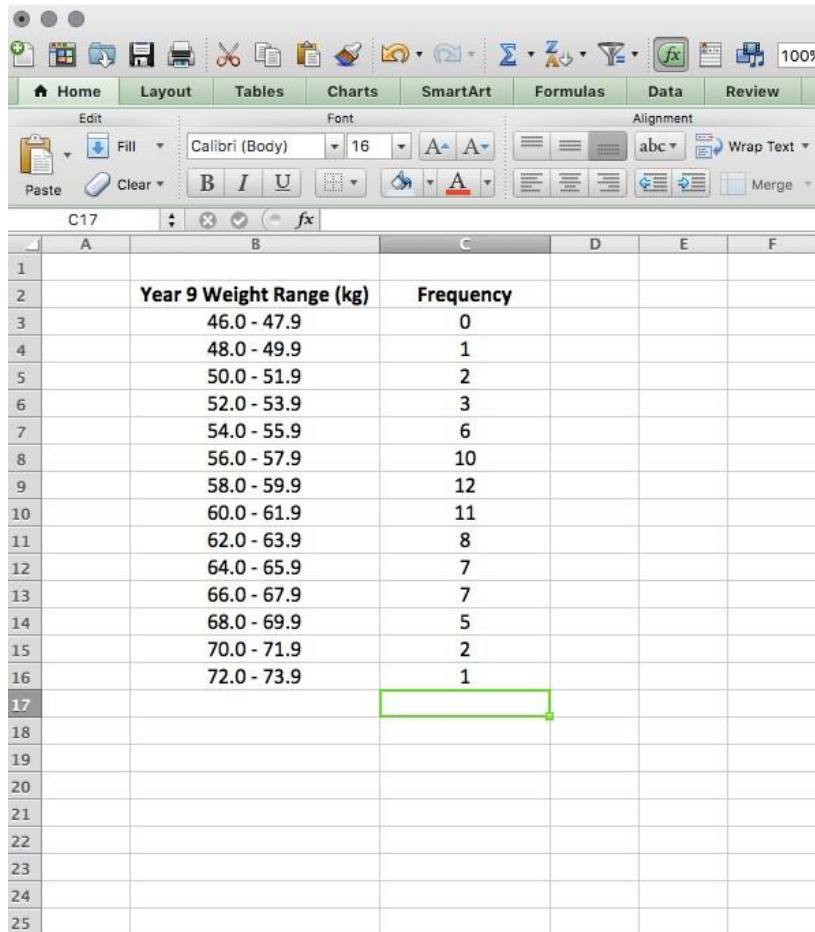


## Excel and Histograms

Use a histogram if you want to divide continuous data into groups.

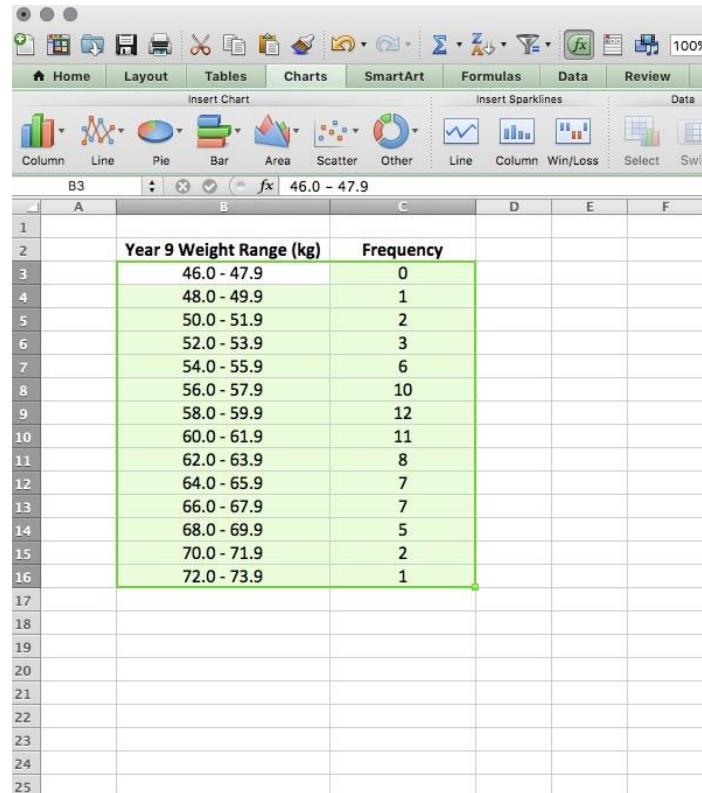
**Step 1:** Create a table for your data. Make sure that each column has an appropriate heading and include units where necessary. In this example, we will be looking at the weight distribution of students in Year 9.

**Step 2:** Add your data to the table. Make sure each measurement or observation goes in its own cell. Remember, you should only put units in the heading, not in each cell.



	A	B	C	D	E	F
1						
2		<b>Year 9 Weight Range (kg)</b>	<b>Frequency</b>			
3		46.0 - 47.9	0			
4		48.0 - 49.9	1			
5		50.0 - 51.9	2			
6		52.0 - 53.9	3			
7		54.0 - 55.9	6			
8		56.0 - 57.9	10			
9		58.0 - 59.9	12			
10		60.0 - 61.9	11			
11		62.0 - 63.9	8			
12		64.0 - 65.9	7			
13		66.0 - 67.9	7			
14		68.0 - 69.9	5			
15		70.0 - 71.9	2			
16		72.0 - 73.9	1			
17						
18						
19						
20						
21						
22						
23						
24						
25						

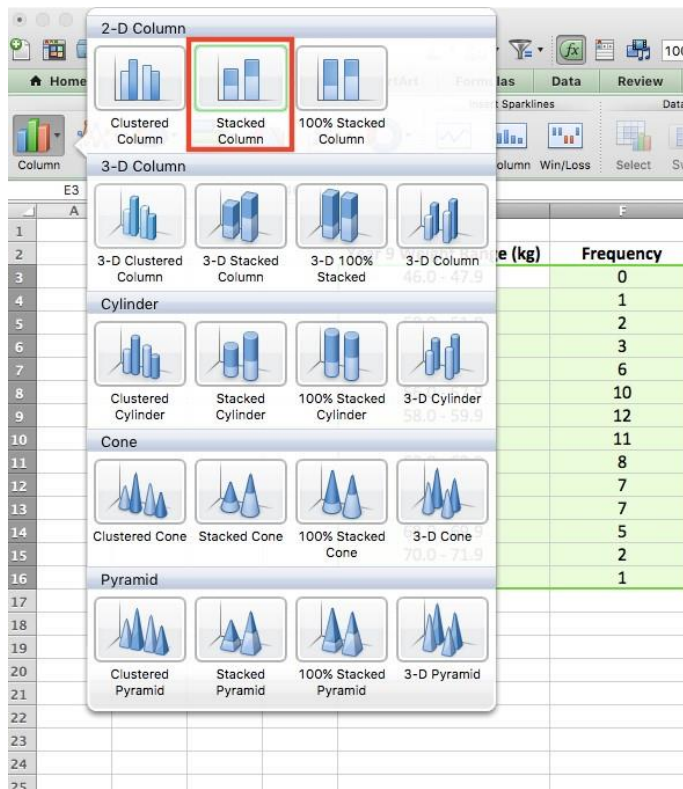
Step 3: Highlight numbers in both columns. Do not highlight the titles.



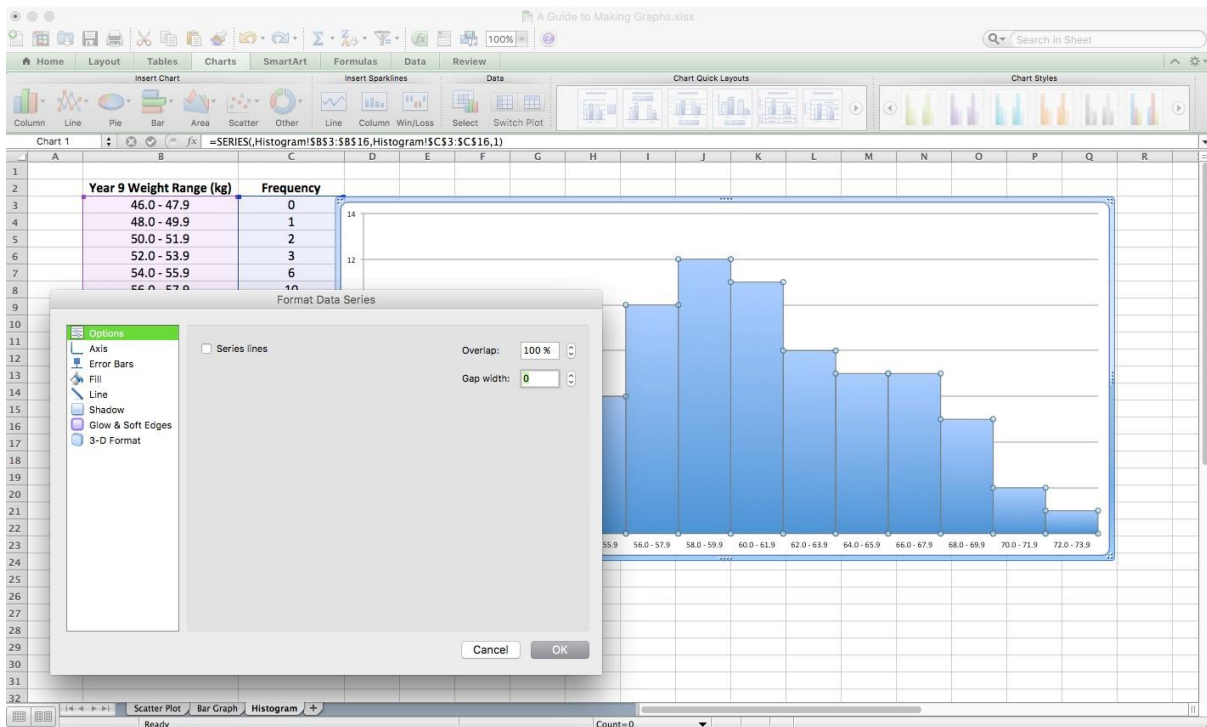
The screenshot shows an Excel spreadsheet with the following data:

	Year 9 Weight Range (kg)	Frequency
	46.0 - 47.9	0
	48.0 - 49.9	1
	50.0 - 51.9	2
	52.0 - 53.9	3
	54.0 - 55.9	6
	56.0 - 57.9	10
	58.0 - 59.9	12
	60.0 - 61.9	11
	62.0 - 63.9	8
	64.0 - 65.9	7
	66.0 - 67.9	7
	68.0 - 69.9	5
	70.0 - 71.9	2
	72.0 - 73.9	1

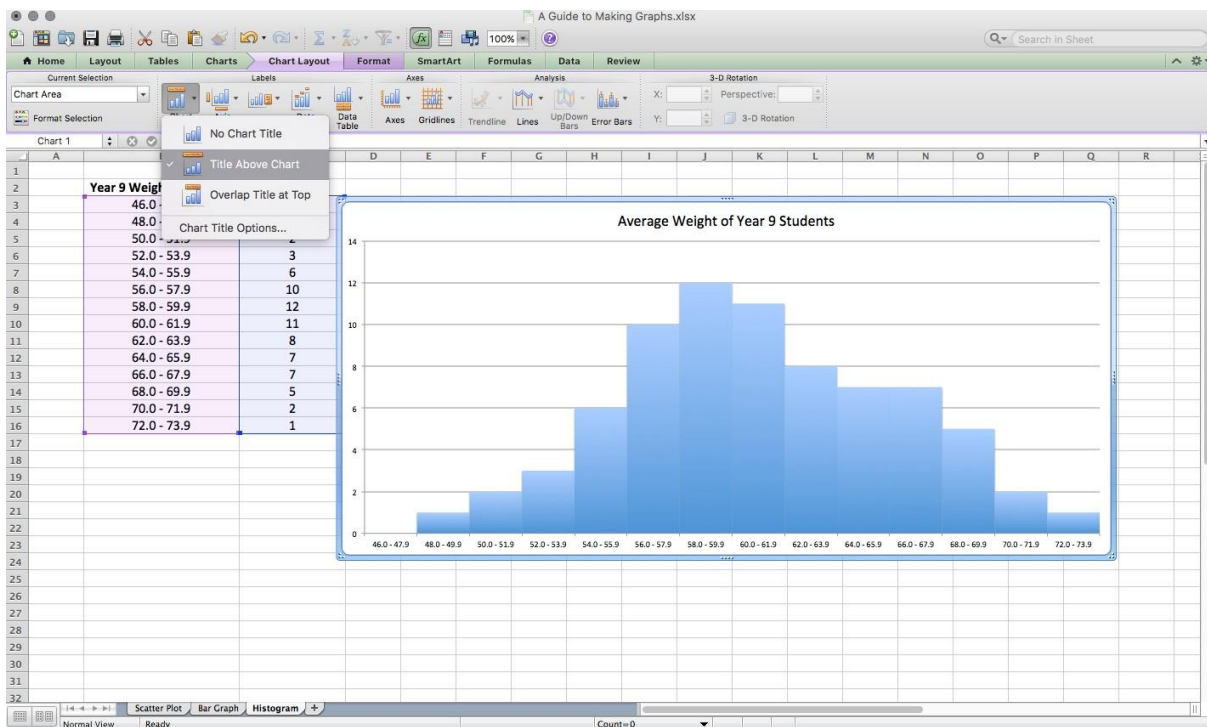
Step 4: Once you have your data highlighted, click *Charts > Column > Stacked Column*.



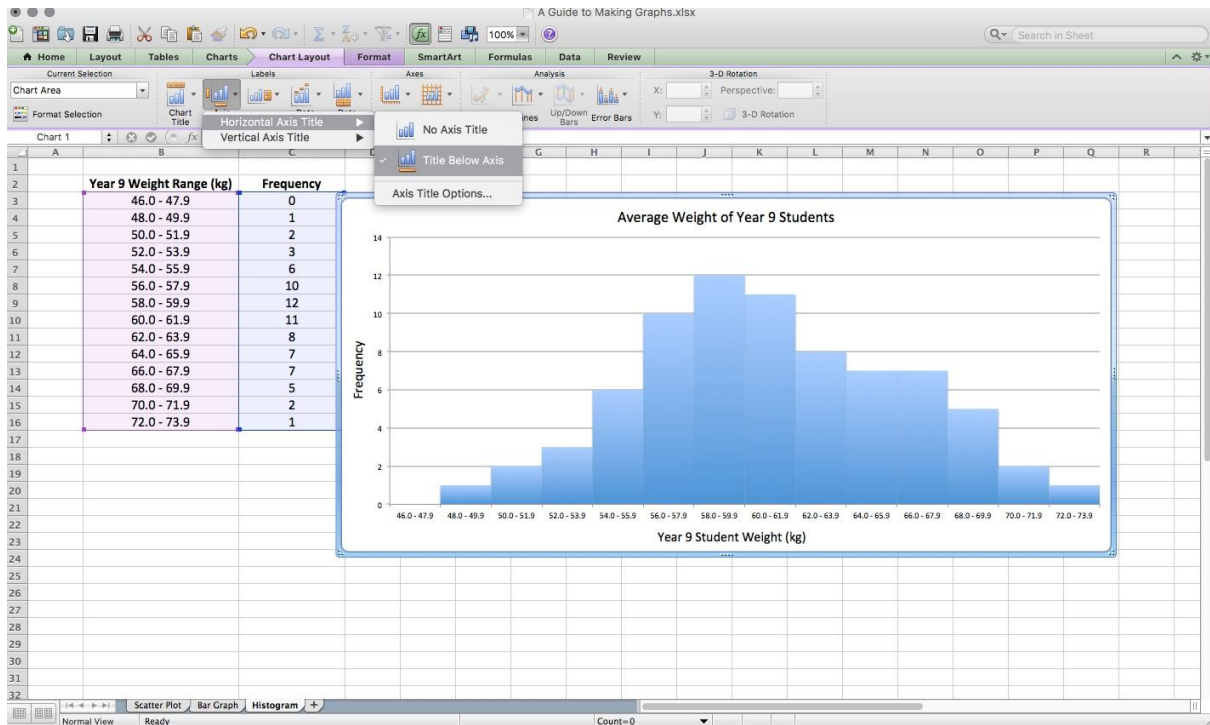
Step 5: Double click on the data series to bring up the *Format Data Series* dialog box. Change the *Gap Width* to zero. Histograms should not have any gaps between the bars.



Step 6: This will give you a graph like the one below. You will still need to change the way the graph is formatted. Firstly, add a title that describes the data. Click *Chart Layout > Chart Title > Title Above Chart*.



Step 6: Add axis titles by clicking *Chart Layout > Axis Titles*. Remember to include units in your axis titles.



## Finding Averages

If you have multiple measurements or trials for a variable, you can create a new column and calculate the average. Sometimes it can be useful to graph the average rather than all the data points for one variable.

Step 1: Create a new column called *Average*. To find the average of each variable, write the following formula in the cells next to the row you want to average (but replace C4:E4 with the cells containing the data you want to average):

=average(C4:E4)

=average(C5:E5)

=average(C6:E6)

=average(C7:E7)

To round the average to the correct number of decimal places click the decrease decimal button shown by the red arrow. In this example, we will reduce the number of decimal places to one.

The screenshot shows an Excel spreadsheet titled 'A Guide to Making Graphs.xlsx'. The spreadsheet has columns A through M and rows 1 through 13. The data is organized as follows:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2													
3		<b>Fertiliser Type</b>		<b>Plant Height (cm)</b>									
4			<b>Trial 1</b>	<b>Trial 2</b>	<b>Trial 3</b>	<b>Average</b>							
5		Type 1	30	32	30	30.667							
6		Type 2	16	15	18	16.333							
7		Type 3	49	50	47	48.667							
8		Type 4	21	21	22	21.333							
9													
10													
11													
12													
13													

The formula bar shows the formula for cell F4: `=AVERAGE(C4:E4)`. The 'Number' group box in the ribbon is visible, with the 'Decrease the number of decimal places' button (represented by a left-pointing arrow) circled in red and pointed to by a red arrow from the spreadsheet.

Step 2: Highlight numbers in the first column. Hold down “command button” (next to the space bar) and highlight the numbers in the average column. Do not highlight the titles.

Step 3: Insert and format your chosen graph as described in the sections above.