Keyboard Shortcuts

Excel Keyboard Shortcuts

Moving Between Cells

Confirm entry and move down = Enter

Confirm entry and move up = Shift + Enter

Confirm entry and move right = Tab

Confirm entry and move left = Shift + Tab

Find active cell = CTRL + Backspace … Useful for finding cursor on large worksheet.

Moving Around the Excel Worksheet

Move one cell up = ↑ arrow key

Move one cell down = ↓ arrow key

Move one cell right = → arrow key

Move one cell left = ← arrow key

Move to beginning of row = Home

Move to beginning of worksheet = Ctrl + Home

Move to bottom right corner of worksheet = Ctrl + End

Move one screen right = Alt + Page Down

Move one screen left = Alt + Page Up

Repeat the last action = F4 … Especially useful when inserting rows or columns.

Working With Data in Cells

Cancel action or selection = ESC ... Also to remove squiggly lines after a Copy.

Undo the last action = Ctrl + Z or Alt + Backspace ...May be pressed multiple times to undo multiple actions.

Redo the last action = Ctrl + Y

Edit cell contents inside the cell = Double-click in a cell or Click + F2

Toggle between cell values and formulas = Ctrl + ` ... The left apostrophe key is located to the left of the number 1 on many keyboards.

Copy to clipboard = Ctrl + C ... For use in cut and paste.

Cut data = Ctrl + X ... For use in cut and paste.

Paste from clipboard = Ctrl + V

Fill down = Ctrl + D ... Select (highlight) cell with data and desired number of cells below it. Then press **Ctrl + D**.

Fill to the right = Ctrl + R ... Select cell with data and highlight to select appropriate number of cells to the right to fill. Then press **Ctrl + R**. Can fill to the right multiple cells in a column.

Format with bold = Ctrl + B

Format with italics = Ctrl + I

Format with underscore = Ctrl + U

Insert a hyperlink = Ctrl + K

Display "Format Cells" window = Ctrl + 1

Display Find and Replace (find tab) = Ctrl + F

Display Find and Replace (replace tab) = Ctrl + H

Insert date = Ctrl + ;

Insert time = Ctrl + Shift + :

Insert date and time = Ctrl + ; press the spacebar Ctrl + Shift + :

Selecting (Highlighting) Cells

Select column = Ctrl + Spacebar

Select row = Shift + Spacebar

Select all cells = Ctrl + A ... Can also click the top left square of the worksheet to select all spreadsheet cells.

Select adjacent cells = Shift + Click ... Click in first cell, press and hold the Shift key, and click in last cell to be selected.

Select non-adjacent cells = Ctrl + Click ... Click in first cell, press and hold Ctrl key while clicking in other cells to be selected.

Working with Excel Worksheets and Workbooks

Save worksheet = Ctrl + S

Open "Save As" window = F12

Open Print window = Ctrl + P or Ctrl + F2

Insert a new worksheet = Shift + F11 ... inserts it left of the active sheet

Create new workbook = Ctrl + N

Open existing workbook = Ctrl + O

Close current workbook = Ctrl + W

Exit Excel = Alt + F4

Insert chart in worksheet = Alt + F1 ... First, select cells to graph, then use shortcut.

Create chart in new worksheet = F11 … First, select cells to graph, then use shortcut.

The Beginner's Guide to Excel Charts "case to preview"

An Excel charts case study

Meet Lucy. She works on the marketing team at her company and is primarily responsible for all of the email marketing campaigns.

She has to deliver a presentation to her organization's leadership team, where she'll highlight the growth of email subscribers over the past 12 months. She really wants to knock the presentation out of the park—because, when you boil it down, this information proves that she's doing her job well.

Currently, she has the total number of email subscribers for each month of 2017 in a simple Excel spreadsheet that looks like this:

	A	B
1	Month	# of Email Subscribers
2	January	742
3	February	814
4	March	926
5	April	947
6	May	1,024
7	June	1,102
8	July	1,291
9	August	1,353
10	September	1,585
11	October	1,741
12	November	1,886
13	December	1,981
14		

Sure, the numbers themselves show impressive growth, and she could simply spit out those digits during her presentation. But, she really wants to make an impact—so, she's going to use an Excel chart to display the subscriber growth she's worked so hard for.

How to build an Excel chart

1. Get your data ready

Before she dives right in with creating her chart, Lucy should take some time to scroll through her data and fix any errors that she spots—whether it's a digit that looks off, a month spelled incorrectly, or something else.
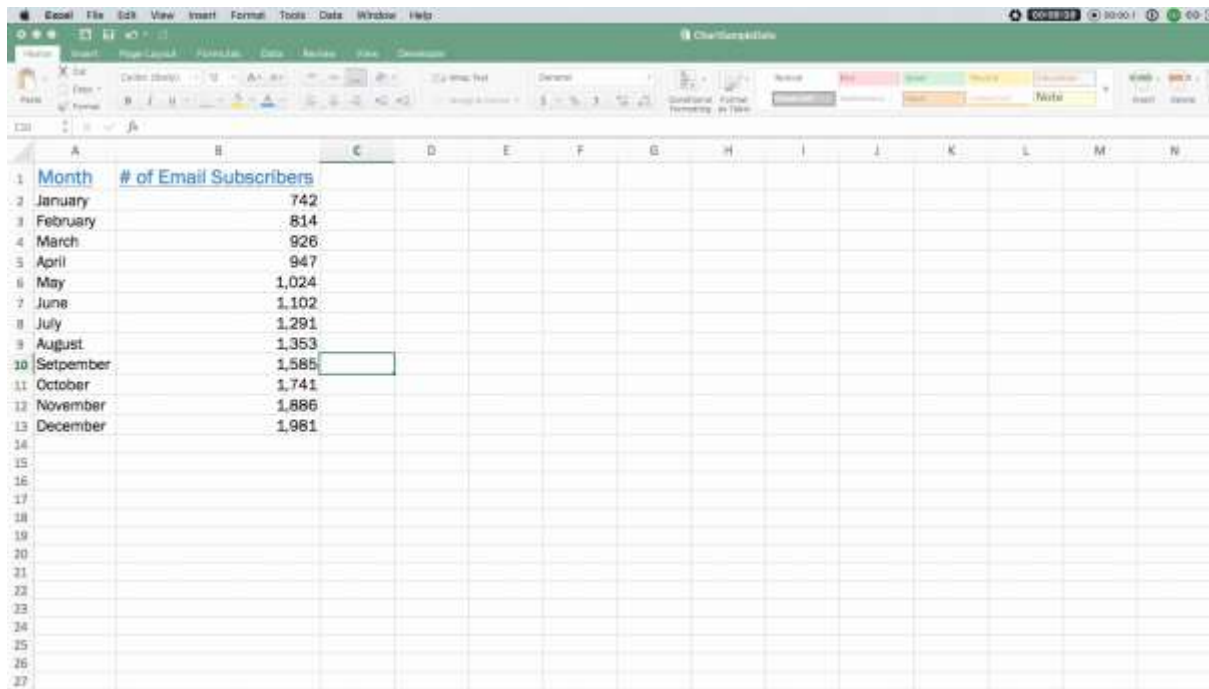
Remember, the charts you build within Excel are going to pull directly from your data set. So, whatever errors you have there will also appear in your chart. Taking even just a little bit of time to check over your data could prevent you from having to go back and make changes after you see something off in your chart.

You should also ensure that you have descriptive column headers for your data. In this case, it's pretty straightforward: Lucy has a column header for the month and a column header for the number of email subscribers.

TIP: Checking over data is pretty simple when you have a really small data set like Lucy, but it can become a little more cumbersome when you have hundreds or thousands of rows of data.

If you spot an issue, use Excel's "find and replace" feature to correct all instances of that error. Go to the edit menu at the top of the page, and then type in the mistake you want to find and what it should be replaced with.

For example, if Lucy realized she spelled "September" as "Setpember" she could use this feature to replace all instances where it's spelled incorrectly.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Month	# of Email Subscribers												
2	January	742												
3	February	814												
4	March	926												
5	April	947												
6	May	1,024												
7	June	1,102												
8	July	1,291												
9	August	1,353												
10	Setpember	1,585												
11	October	1,741												
12	November	1,886												
13	December	1,981												

2. Insert chart and select chart type

With her data cleaned up, Lucy is ready to insert her chart into her spreadsheet. To do so, she'll highlight all of the data (including column headers!) she wants included in her chart.

Once her data is highlighted, she'll head to the "Insert" menu in the ribbon and select what type of chart she wants to use to display her data.

Excel offers tons of different types of charts to choose from, including:

- Line

- Column

- Bar

- Pie

- Scatter plot

- Numerous other more advanced charts

-

If you're unsure what type of chart to use, you can click the "Recommended Charts" button to see options that Excel suggests based on what appears in your data. This isn't foolproof, but it can certainly help to give you some direction.
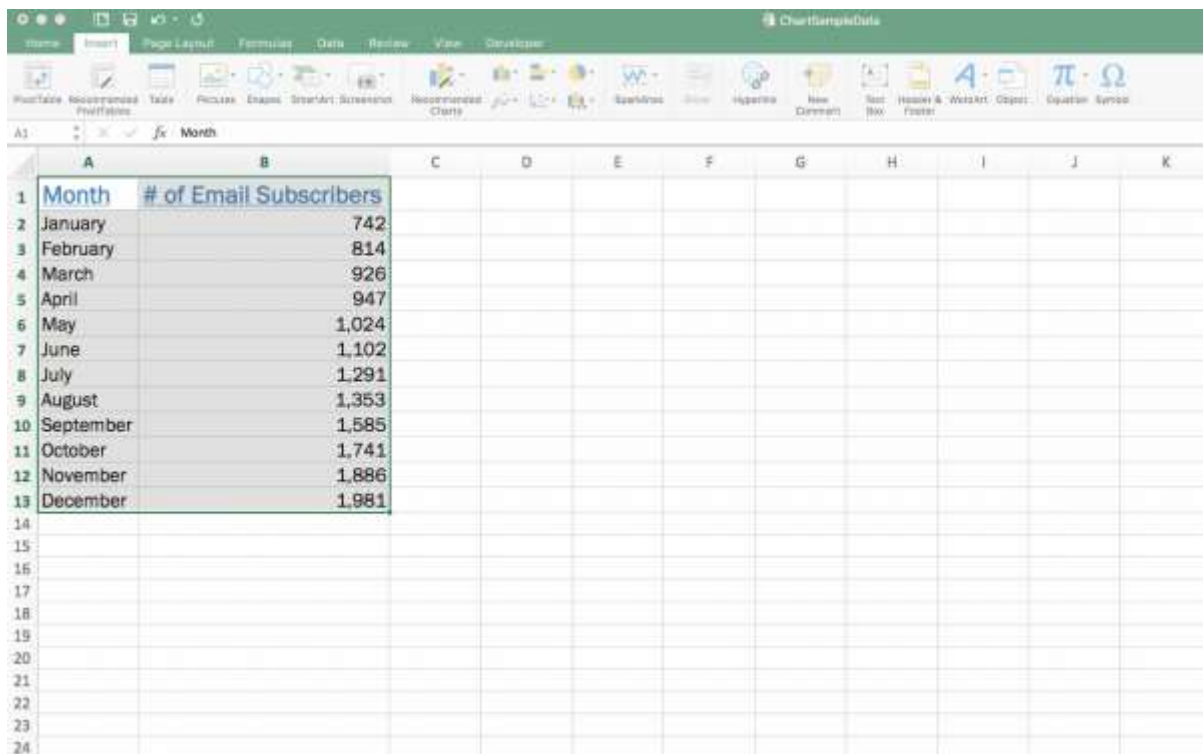
	A	B	C	D	E	F
1	Month	# of Email Subscribers				
2	January	742				
3	February	814				
4	March	926				
5	April	947				
6	May	1,024				
7	June	1,102				
8	July	1,291				
9	August	1,353				
10	September	1,585				
11	October	1,741				
12	November	1,886				
13	December	1,981				
14						
15						
16						
17						

In this case, because Lucy wants to display a trend in her data over time, she knows that a line chart is probably her best bet. So, she selects a line chart from those options.

After doing so, her chart instantly appears within the same tab of her Excel workbook. That's it—she's just created her chart. Pretty easy, right?

3. Double-check your chart

Now with her chart is created, it's a good time for Lucy to take another quick peek and make sure nothing is unexpected or looks out of place.

In this case, since we're working with such a small data set, it's not a huge issue. But, when you're working with a much larger set of data, mistakes can slip past much easier.

If you see a huge spike that you weren't expecting or anything else that makes you hesitant, it's best to return to your original data set to confirm there aren't any errors that you didn't catch the first time.

4. Customize your chart

At this point, the chart is created—and, you can stop here if you're happy with it.

But, since Lucy works in marketing, she wants to make some changes to the colors to match her company's branding, as well as add axis titles and a legend to make her point explicitly clear.

Let's start by changing the colors. Here's the important thing to remember about customizing a chart within Excel: You should click directly on the

portion of the chart that you want to edit. So, if Lucy wants to change the line from orange to blue, she should click directly on the line—so that those formatting dots appear all around it.
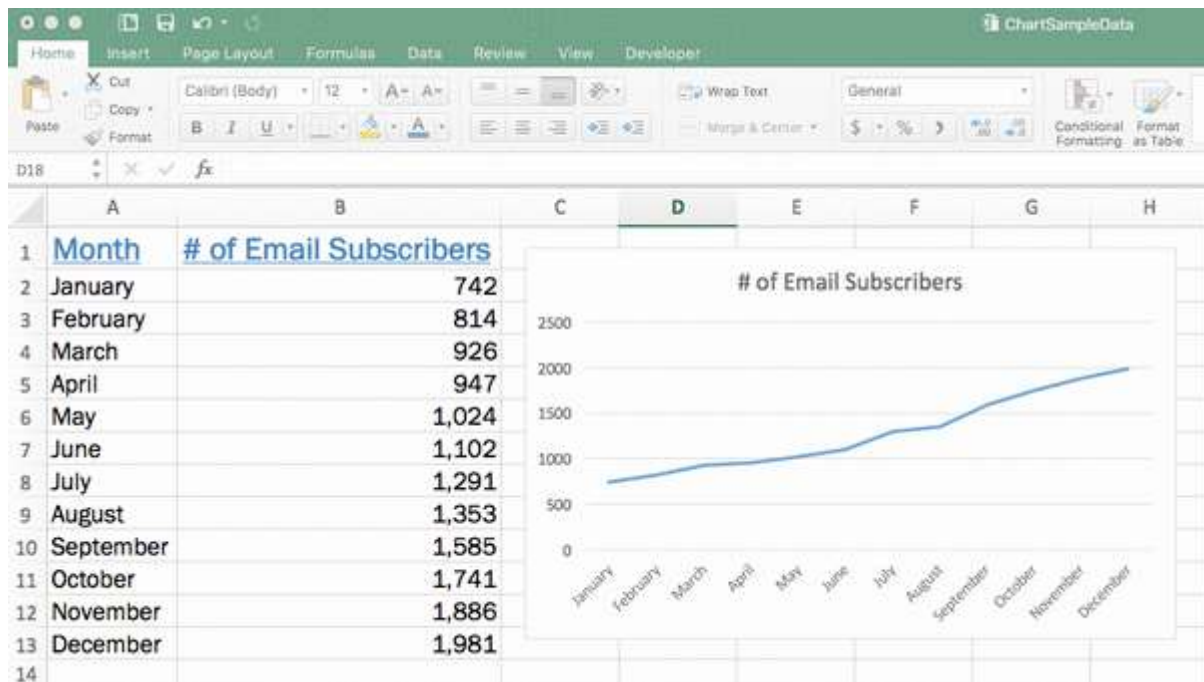
When she's clicked on the item that she wants to change, she'll right-click on the line and select "Format Data Series."

A quick note: The exact language here can vary depending on what portion of the chart you're clicked into (for example, if you're changing the white space around the chart, it'll say "Format Chart Area"). In short, just look for the "Format" option.

After selecting "Format Data Series," Lucy clicks the paint can for the color and then selects orange. Her line then changes from blue to orange.
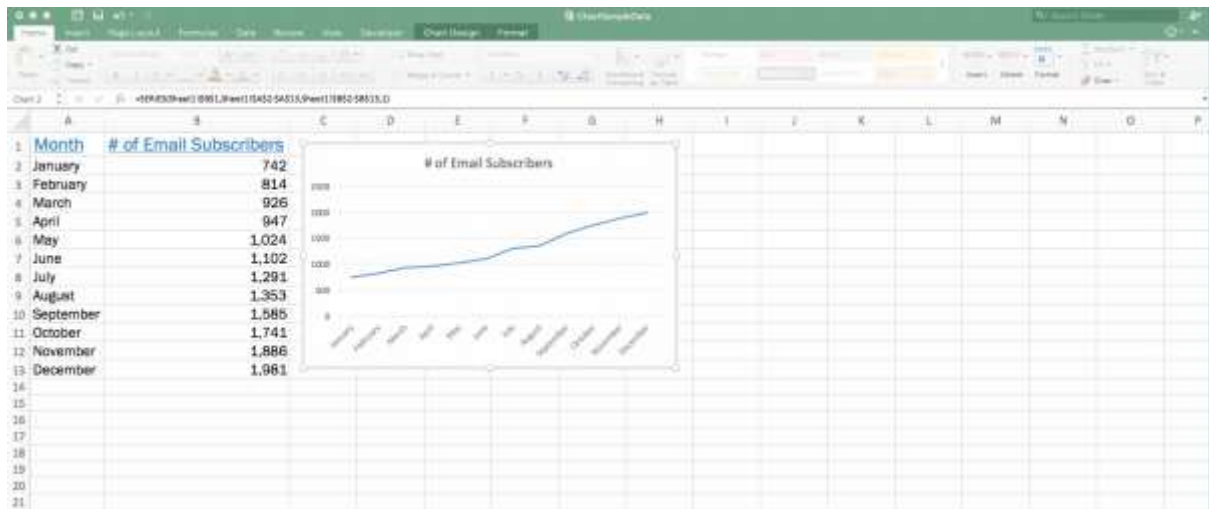
Next, Lucy wants to add axis labels so that there's no doubt about the information that's being displayed.

To do so, she clicks within her chart and then visits the "Chart Design" tab in the ribbon (you must be clicked in your chart for this "Chart Design" tab to appear!). Within that menu, she'll click "Add Chart Element" and select "Axis Titles".
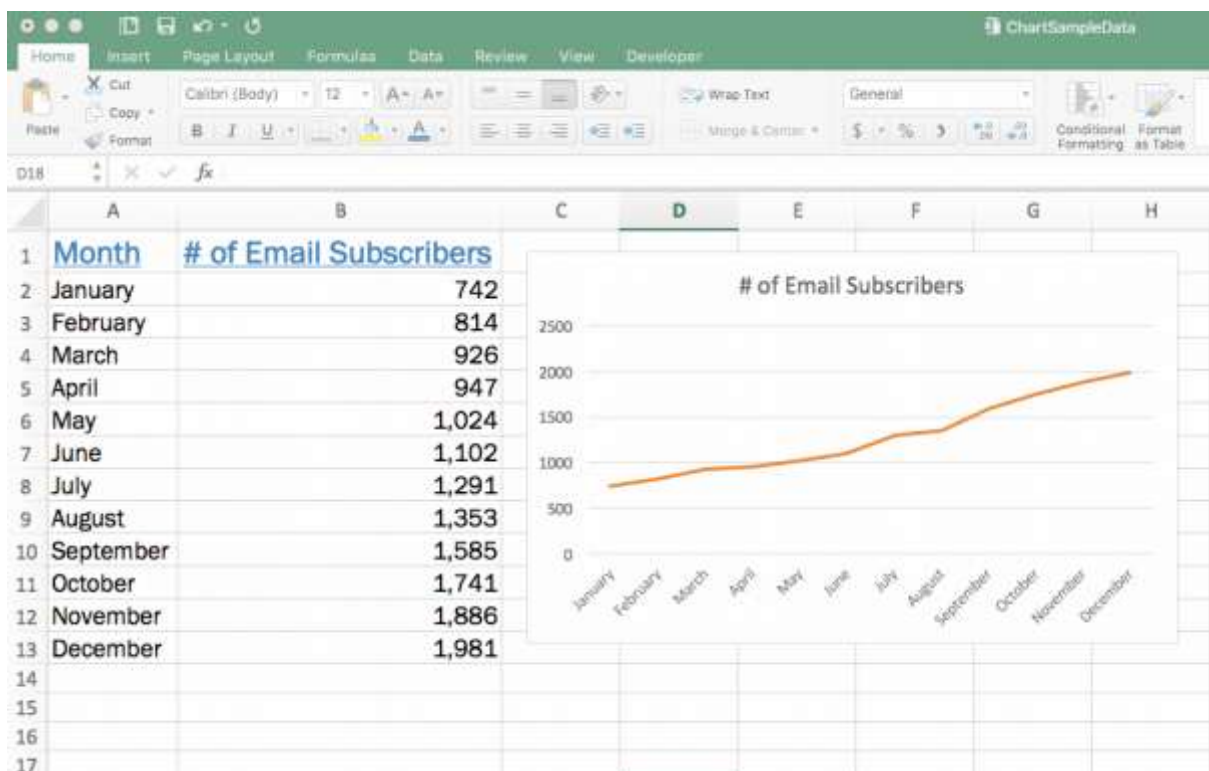
She'll insert each axis title—the horizontal and the vertical—separately and enter the appropriate name for each. After doing so, they'll appear on her chart.
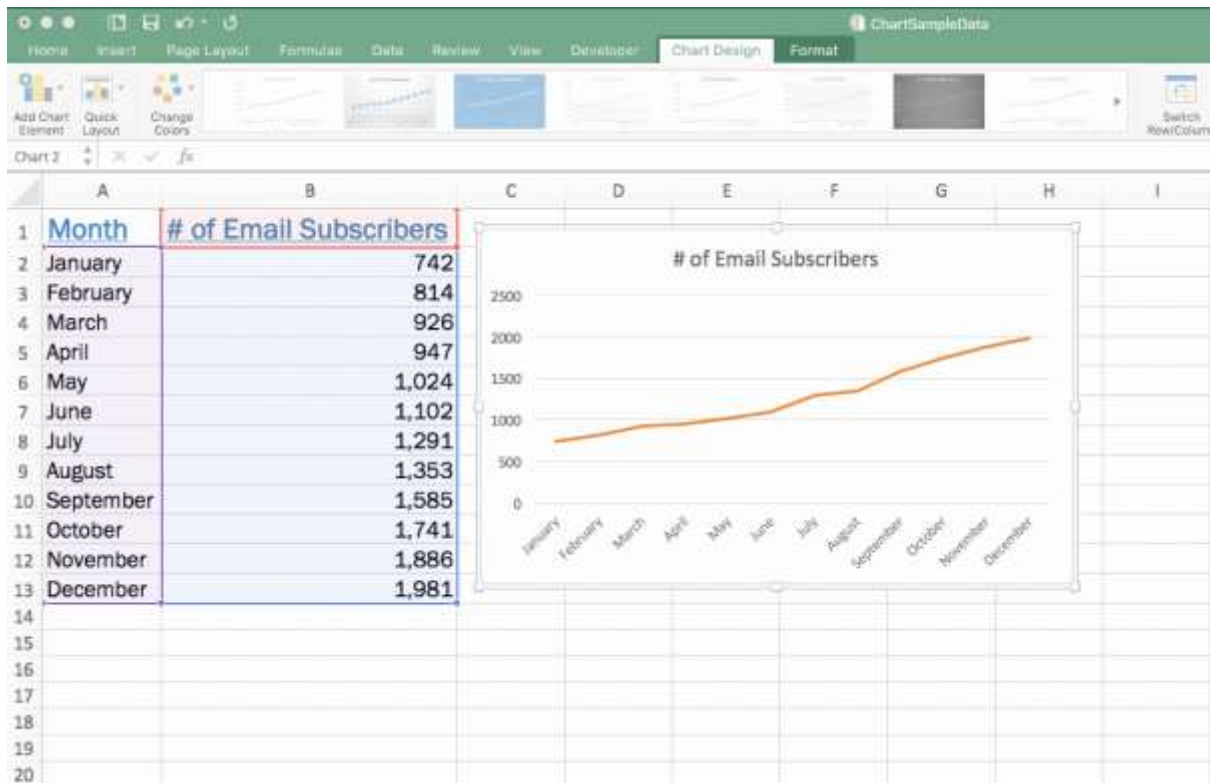
Finally, Lucy wants to add a legend. It's not really necessary on a data set like this (since there's only one line displaying data). But, for clarity's sake, we'll go through the steps to add one.

Again, Lucy will click within the chart, head to the "Chart Design" tab, click the "Add Chart Element" button, and select "Legend."

She'll need to select where she'd like it to appear on her chart. This is all up to personal preference, so Lucy selects the right side of her chart.

When she does so, her new legend appears.
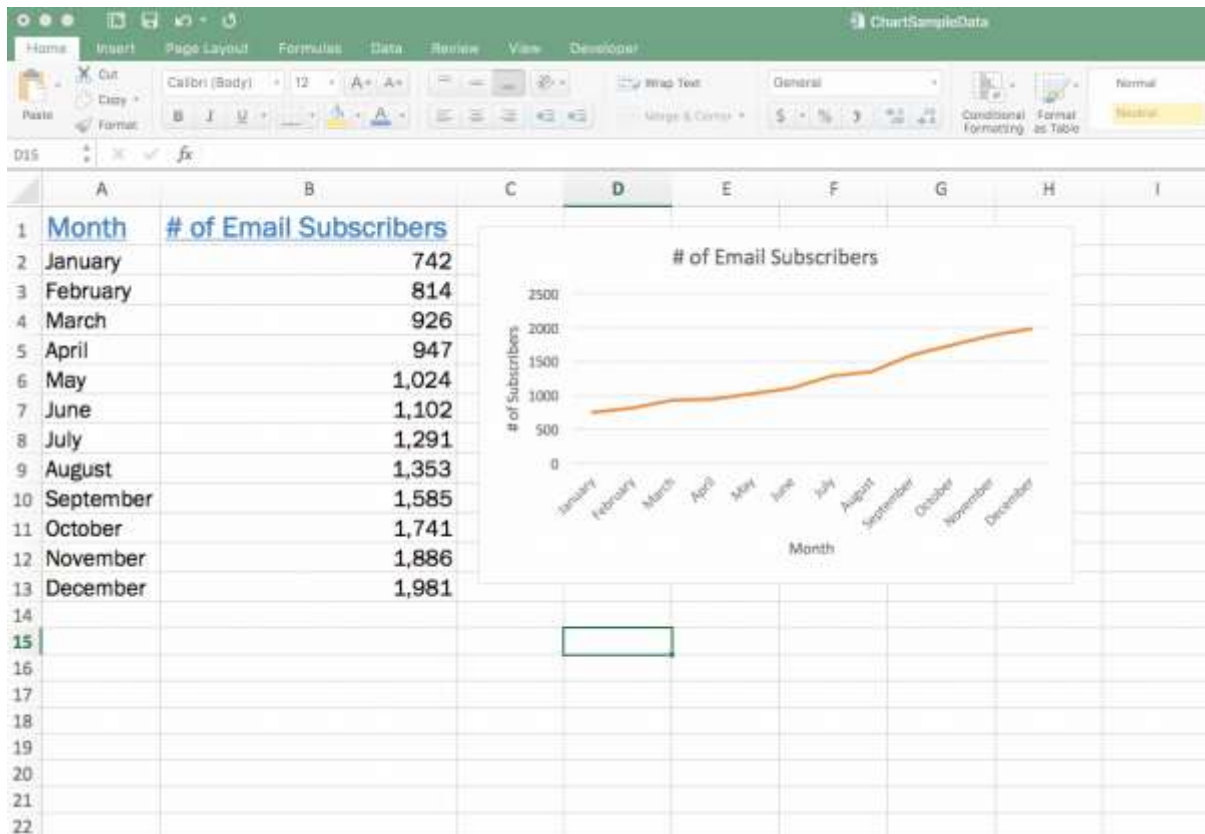
But, wait... what if you regret your chart choice?

Sometimes it can be hard to visualize what your data will look like in chart form until you've actually created the chart.

So, what happens if Lucy had created this line chart—but, after seeing it, she thinks that a bar chart would be better? Does she have to start all over again from scratch?

Absolutely not! Excel makes it easy to swap out the type of chart you're using—even after it's created.

To do so, click within the chart, go to the "Chart Design" tab, find the "Change Chart Type" button, and select the type of chart you want to swap to.
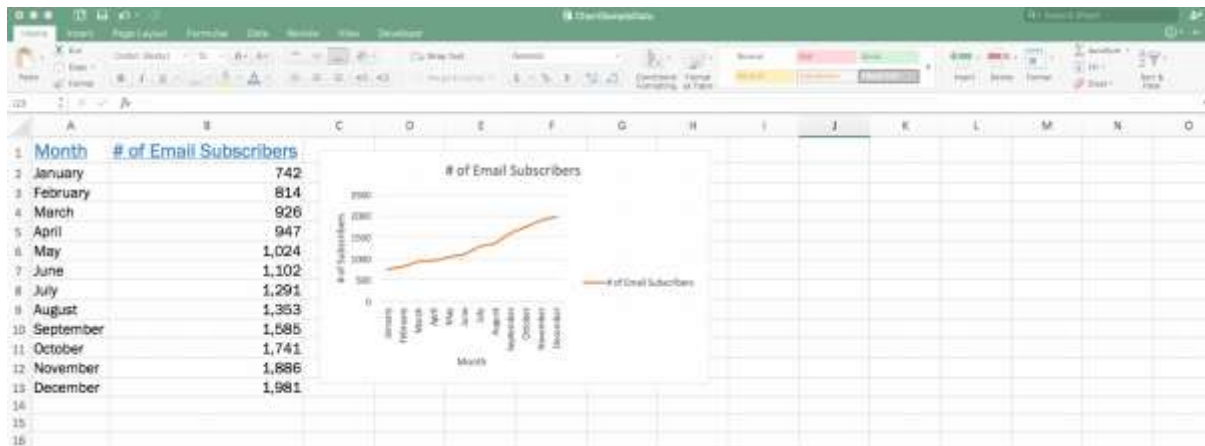
Take note that after doing so, you might have to reformat some of the colors selected (since Lucy chose to have lines displayed in orange when editing her line graph, that's what's showing up even in the column graph).

But, otherwise, swapping out your chart type is as easy as that.
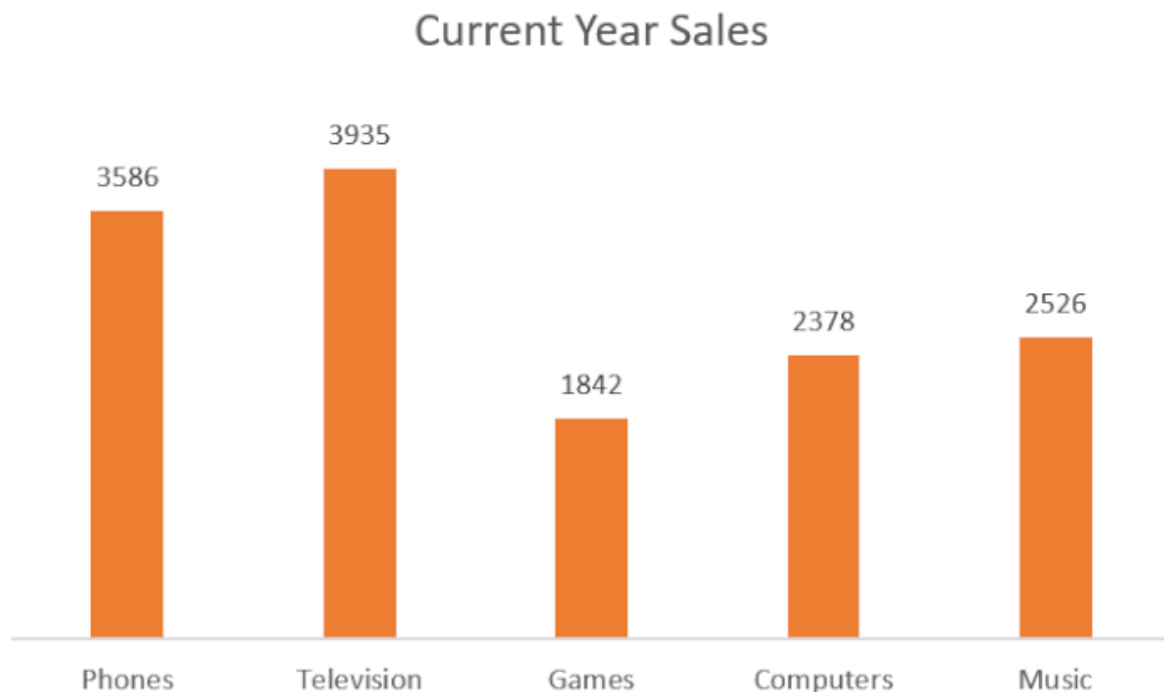
How to Make a Column Chart in Excel

Why are column charts so useful

Here are five reasons why column charts are so great:

1. Column charts are simple to create. You can create a column chart in just a few clicks.

2. Users are more familiar with column charts than some of the other chart types. This makes them a sensible option as you want others to understand what you are presenting.

3. There are a huge number of formatting options available with column charts.

4. Column charts provide advanced options that are not available with some other chart types such as trendlines and adding a secondary axis.

5. They are extremely versatile and can be used to compare data, to see progress toward a goal, percentage contribution, the distribution of data and actuals against target scenarios.

Below is a classic column chart. This chart is comparing the current year's sales of different products.

Current Year Sales

It is easy to interpret the data and see that phones and televisions have the most sales, and the games products with the least.

How to make a column chart in Excel

The data shown below was used to create the column chart above.

	A	B
1		Sales
2	Phones	3586
3	Television	3935
4	Games	1842
5	Computers	2378
6	Music	2526

The data is arranged with the labels in the first column and the values in the second column. Nice and simple. The chart will have no problem interpreting this layout.

Select the range of cells A2:B6.

	A	B
1		Sales
2	Phones	3586
3	Television	3935
4	Games	1842
5	Computers	2378
6	Music	2526

We have excluded row 1 in our selection. If we selected A1:B6 then the label in cell B2 would be used as a chart title. But we will insert our own title as we are not happy with the text "Sales".

Click Insert > Insert Column or Bar Chart > Clustered Column
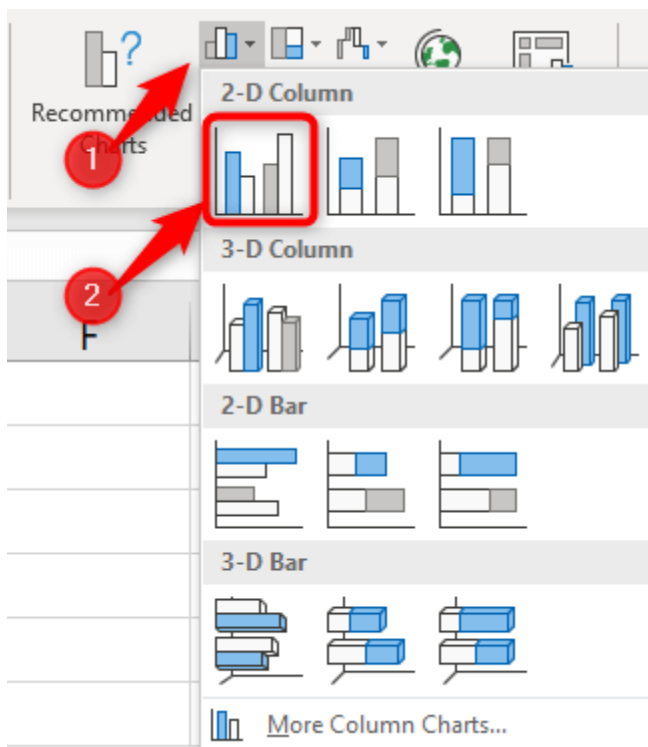

In just a few clicks, we have made the column chart below.

Chart Title
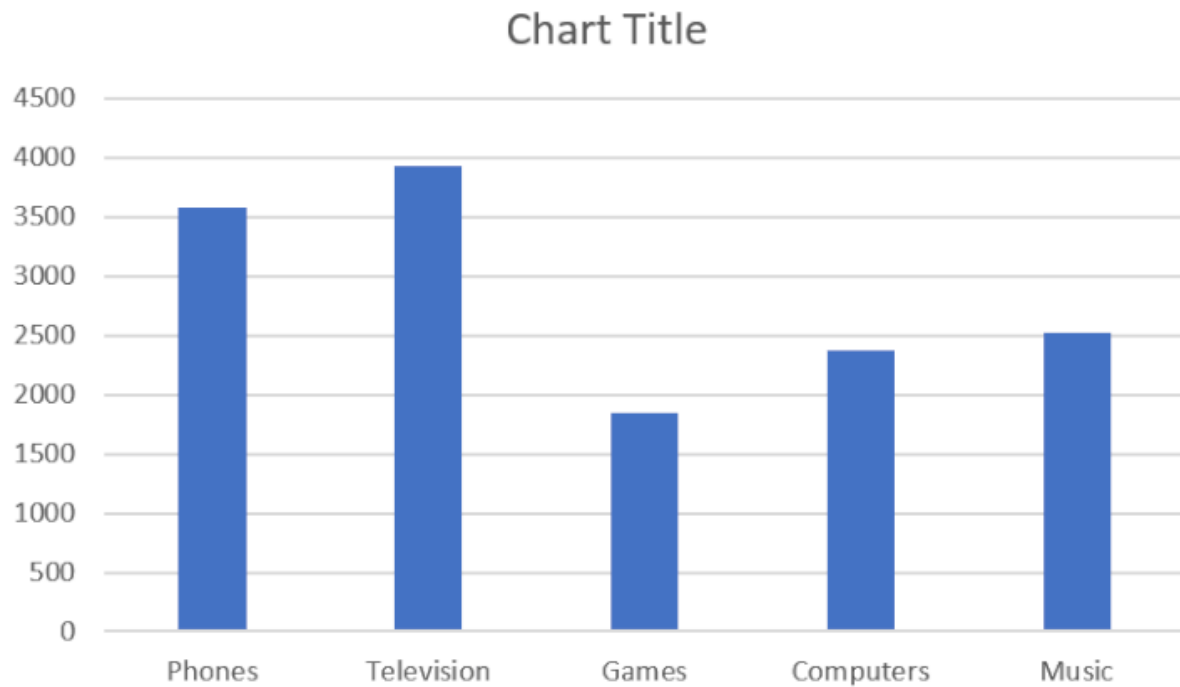
We can now look at making some improvements to this chart.

Formatting a column chart

When a chart is created, the default colours and layout are used. These are rarely sufficient.

Let's start by changing the colours of the columns.

The easiest way to do this would be to use the Change Colors button on the Design tab.
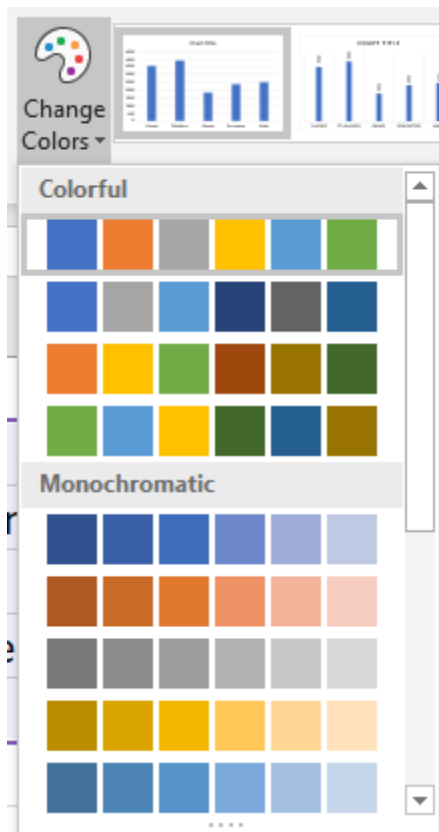
From here we can easily select a built-in colour scheme.

Alternatively, you can click on a column in the chart to select all of the columns (the data series).
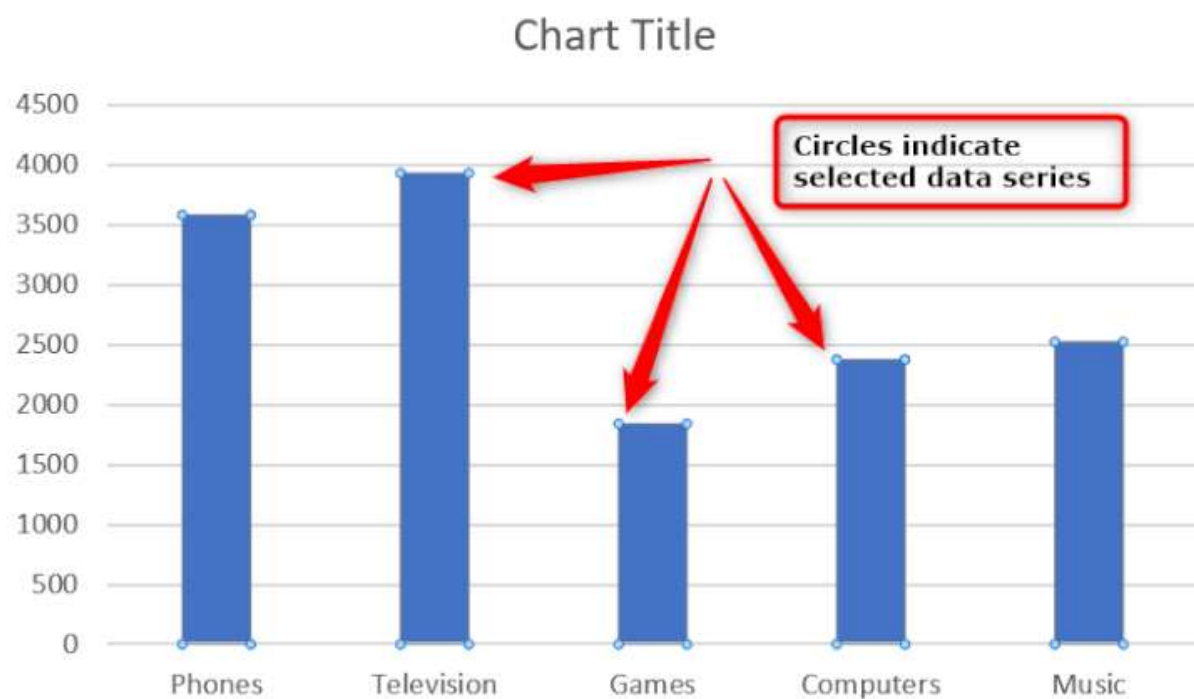
And then click the Format tab.

There are a selection of shape styles to choose from. These will apply a fill and outline colour to your columns with the click of a button.
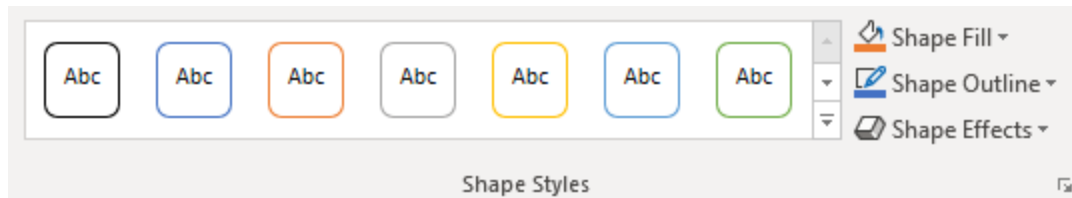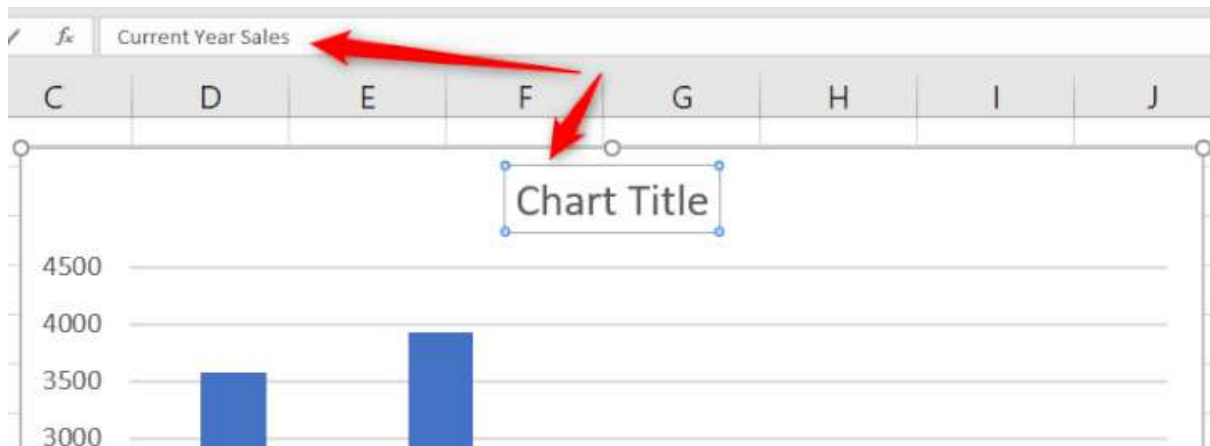

However, you can also use the Shape Fill and Shape Outline buttons to get complete control over the column colours and many other settings.

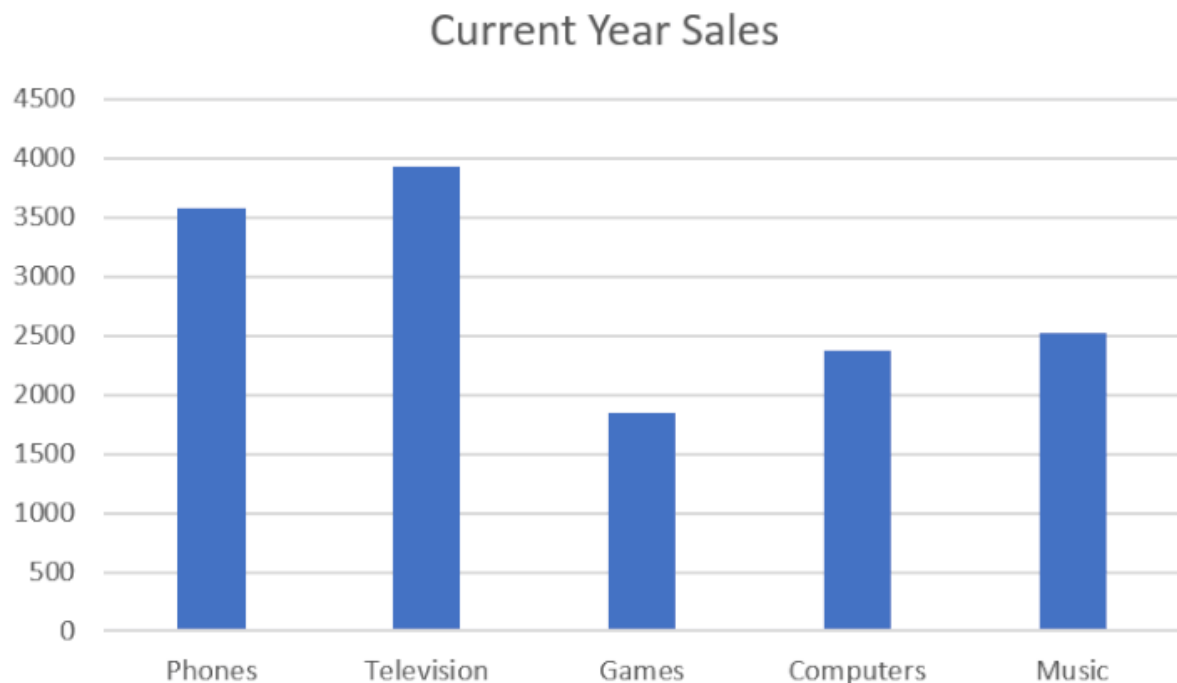For this example, I will select an orange colour from the Shape Fill button.
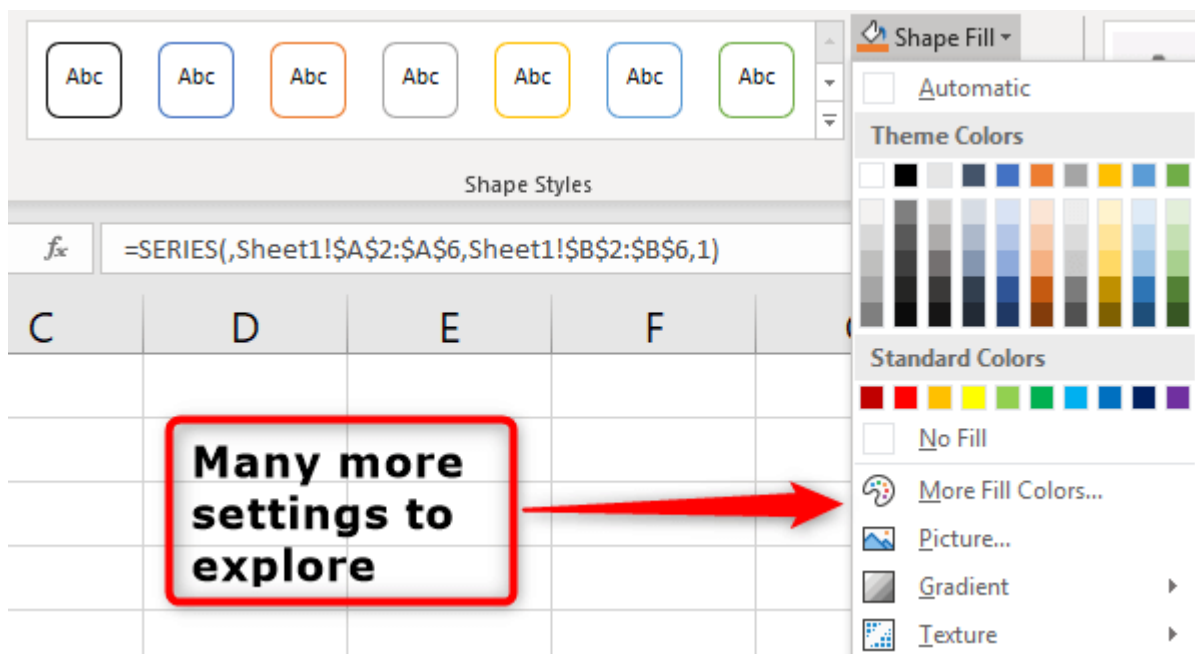
We will now edit the chart title.

Click on the chart title and start typing the text you would like to use. The text will appear in the formula bar as you type.

Press Enter when complete and the text will appear as the chart title.

A column chart is made up of many different elements.

Our simple column chart consists of two axes, gridlines, one data series (consisting of 5 data points), a chart title, chart area and a plot area.

Column charts are not limited to just these elements, and we will talk about how to add more or remove some of these shortly.

All of these elements can be formatted and there are many options to do so.

The place to find all of the options is in the formatting pane for the chart element.

Click the Format tab, select the chart element from the list and then click Format Selection.
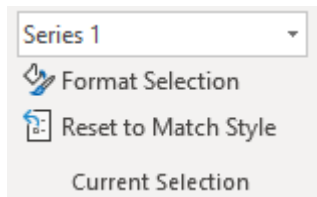
Because cell B2 was not selected when the chart was created, the data series does not have a name and is referred to as "Series 1".

Below is the formatting pane for the data series. At the top are three category icons to access other options.
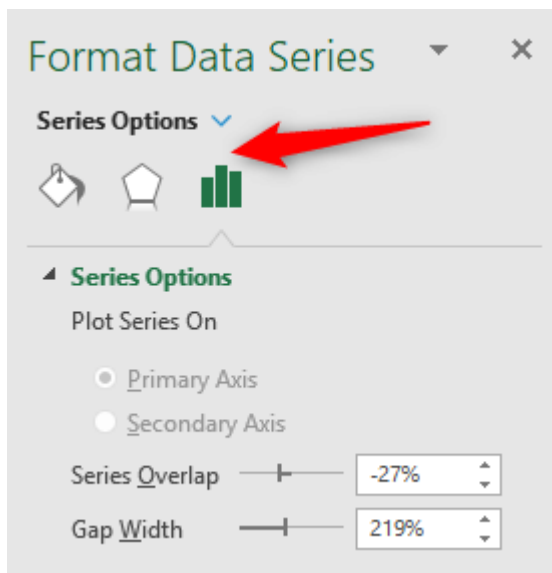

If you click another chart element or select one from the list on the Format tab, the formatting pane will show you options relating to that chart element.

So in short, there are many elements for column charts and there are numerous formatting options.

As an example, let's change the Gap Width for the data series from 219% to 110%.
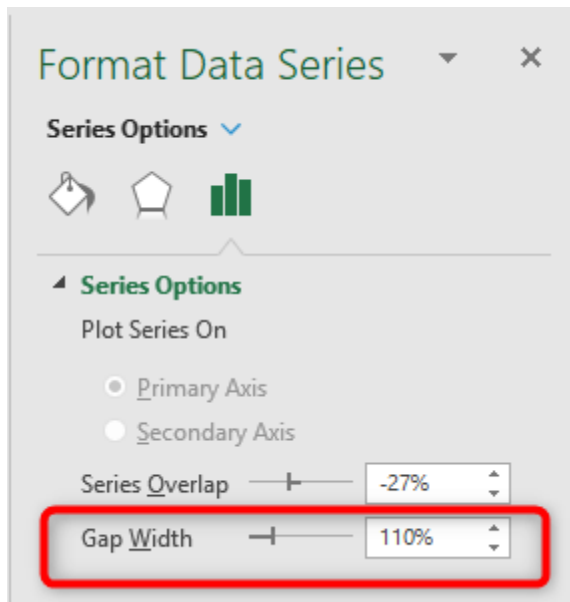
By reducing the gap width the columns will become wider.
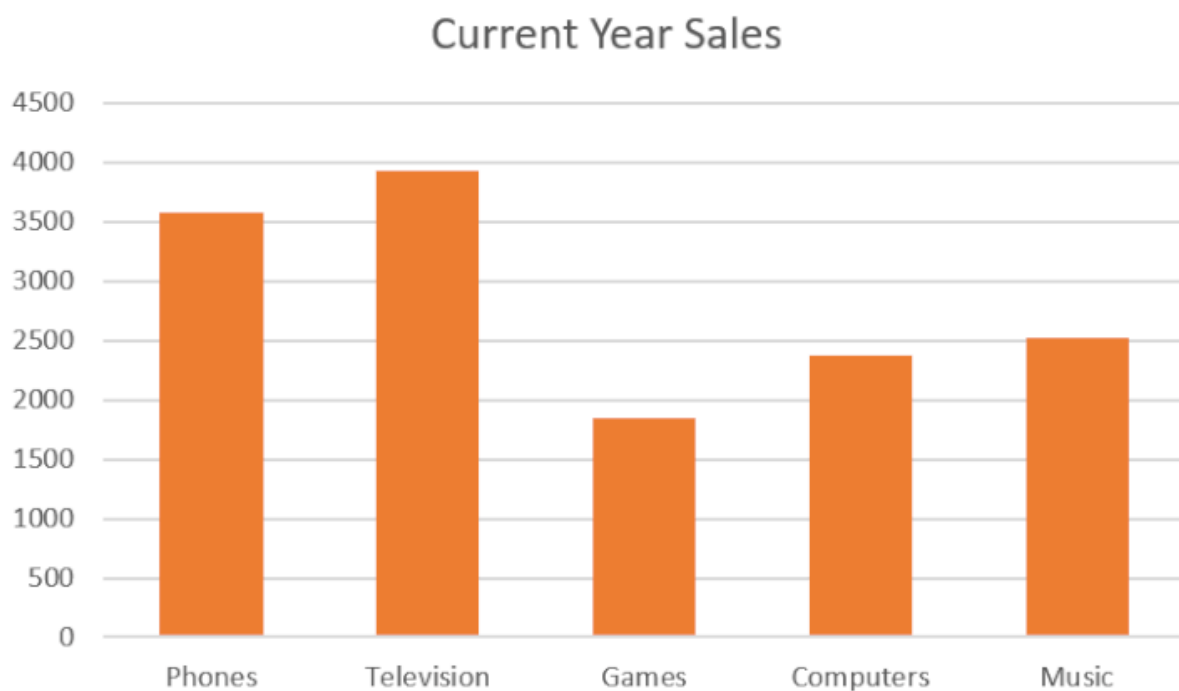

Add and remove column chart elements

One of the strengths of a column chart is that despite its simplicity, it does have many options in its arsenal.

These include the number of elements that you can add and remove from a column chart.

Let's begin by looking at removing the gridlines and the primary vertical axis (value axis) from the chart.

One way of doing this would be to select the element in the chart and press the Delete key on the keyboard.

However, I prefer to click the Chart Elements button to the right of the chart.
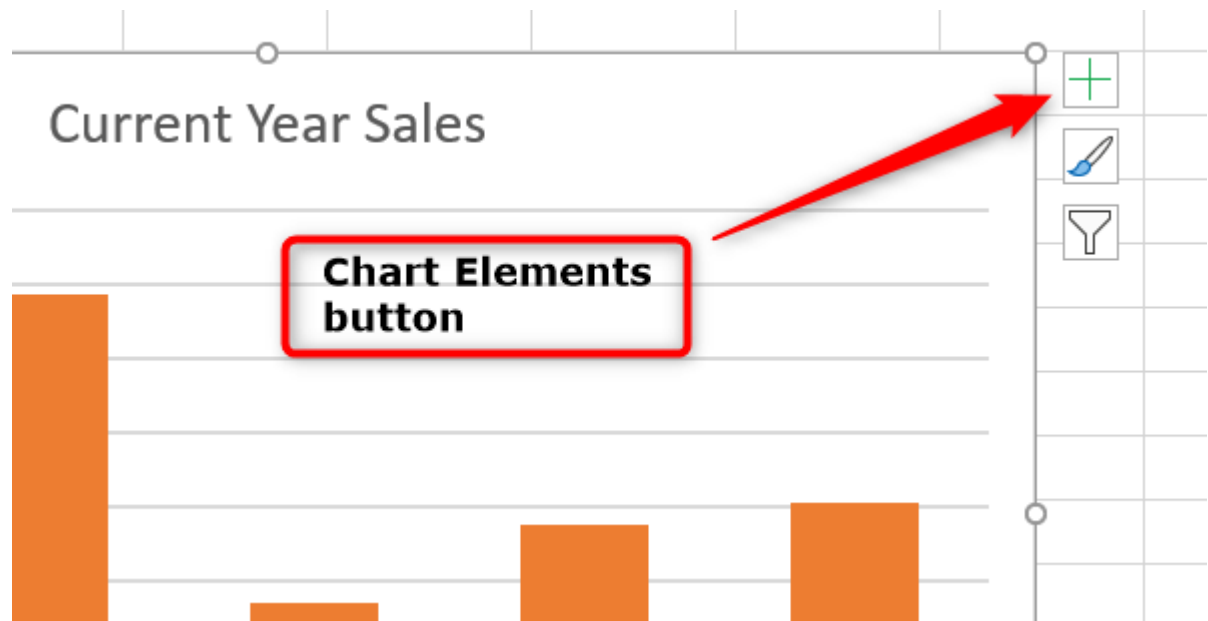

A list of chart elements is displayed. Uncheck the Gridlines box. Then position the mouse over the Axes option and click the arrow that appears to the right.

Uncheck the box for the Primary Vertical Axis.
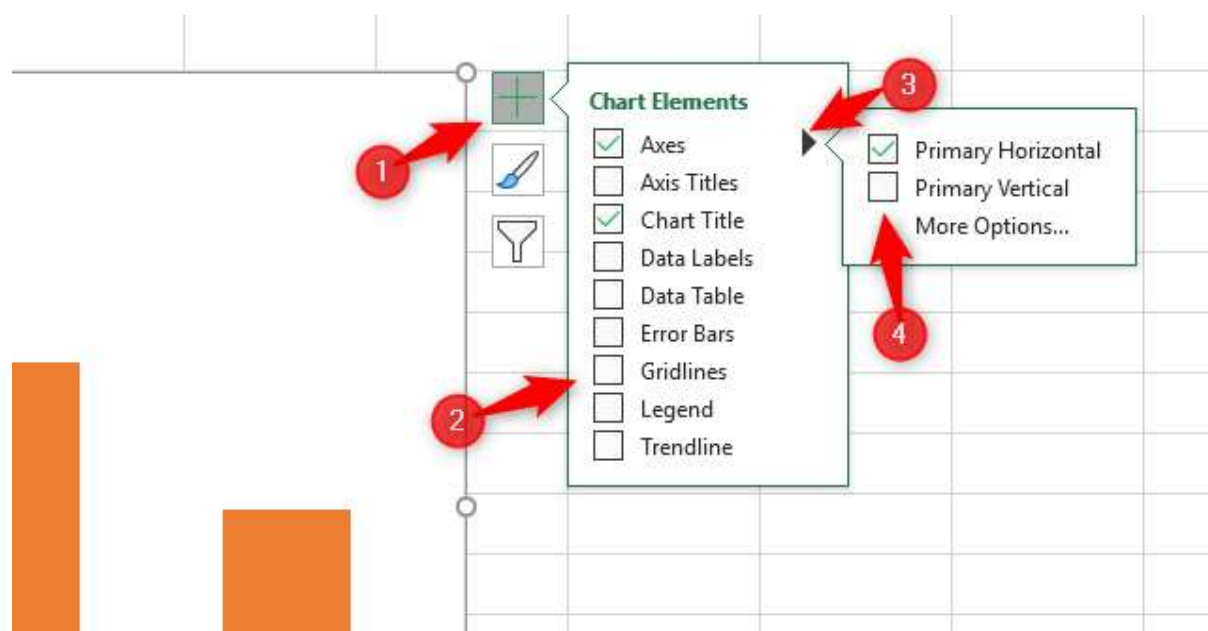
Instead of the axis, we will add some data labels to the chart. This is quite a simple column chart with just 5 columns, so it should present nicely.

Position the mouse over the Data Labels option and click the arrow to the right. Then check the box for Outside End.
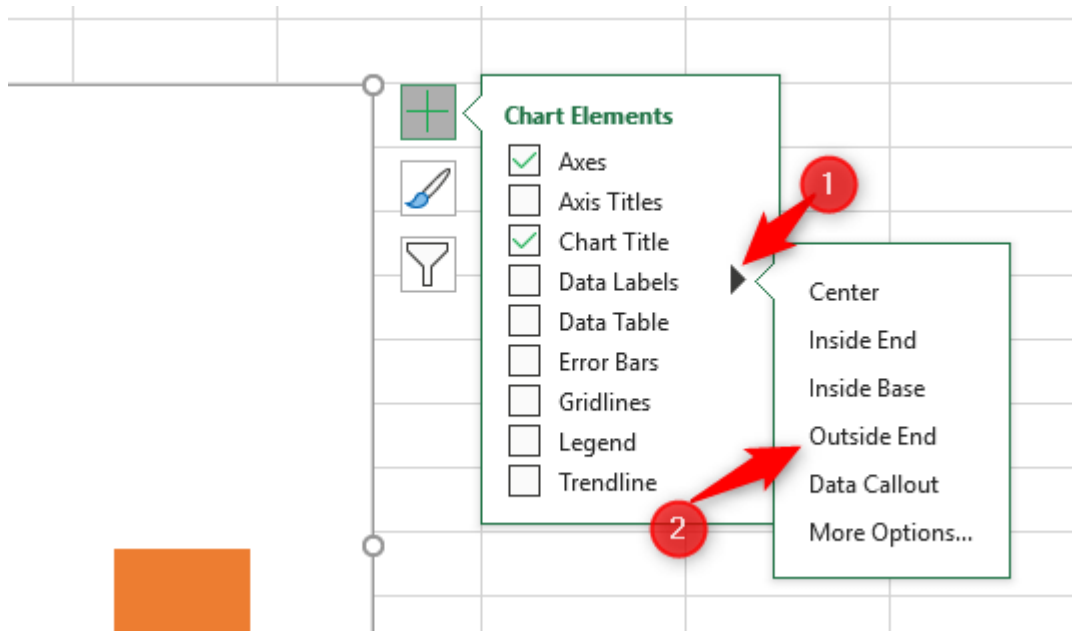
Click on the Chart Elements button to hide the list when finished.

The data labels are added above the columns.
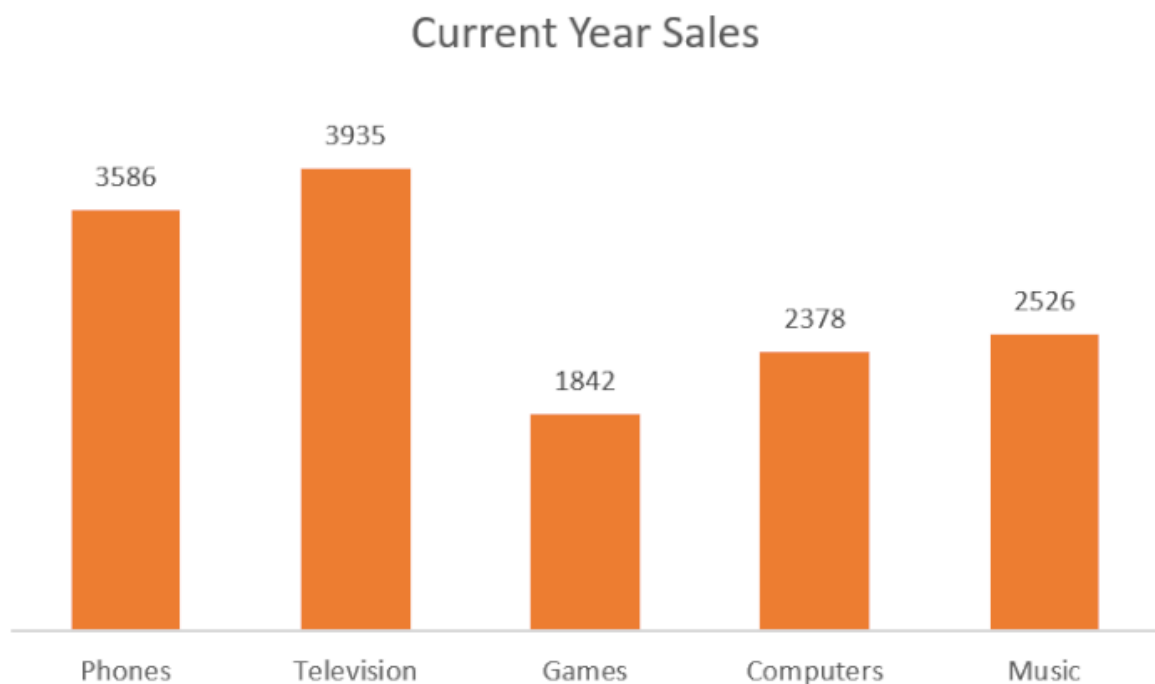
This looks good for this chart. If we had more columns then the labels could get messy and the axis would probably be a better alternative.

Create a column chart with multiple data series

The previous chart had a single data series. Let's look at a column chart with multiple data series.

For this example, we will be using the data shown below.

|	A	B	C	D
1		Brixton	Green Park	Hammersmith
2	Phones	3586	3144	2700
3	Television	3935	3823	1518
4	Games	1842	2353	2040
5	Computers	2378	2447	2668
6	Music	2526	3768	3402

This data shows sales for 5 different departments across 3 different store locations.

Select the cell range A1:D6.

And just like with the previous chart - click Insert > Insert Column or Bar Chart > Clustered Column.
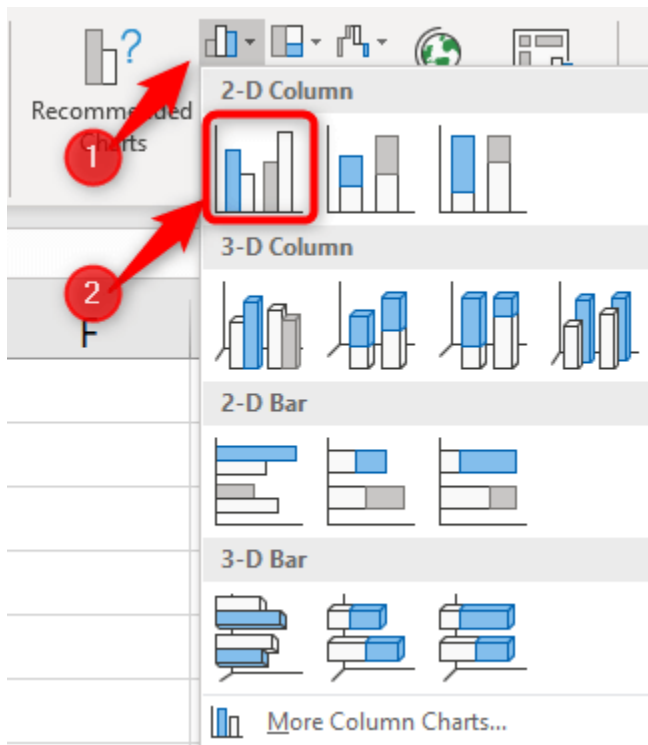
The column chart is inserted.
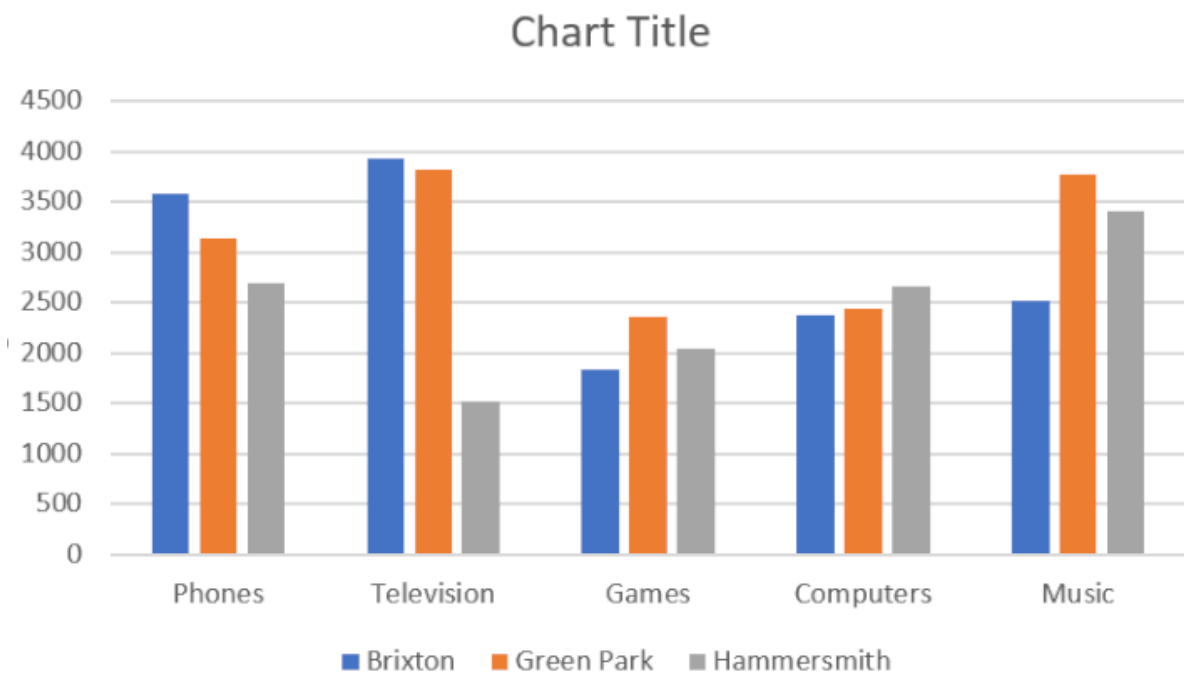
This chart is a lot busier than the previous one. It has 15 columns but it is still easy to interpret the information.

For example, television sales in Hammersmith are noticeably worse than the other two stores. And sales of games and computers are consistent across all three stores.

We can now start to make improvements to the chart like before. Especially to the chart title as the current one is useless.

This has already been spoken about in this article though, so we will leave that and look at making another type of column chart instead.
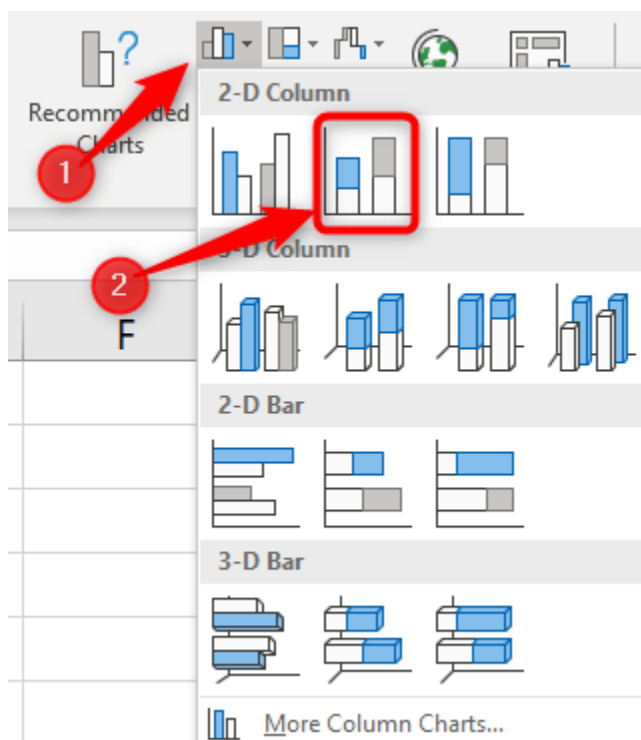
How to make a stacked column chart

Stacked column charts are great. They perform a slightly different role to the clustered column charts.

The clustered column charts made it simple to compare the sales from different stores.

The stacked column chart will enable us to compare the total sales of each department and the contribution of each store to that total.

Using the same range of cells as the previous example, click Insert > Insert Column or Bar Chart and then Stacked Column.
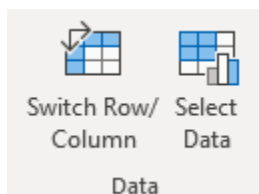

The stacked column chart makes it easy to see that sales of games and computers were the lowest.
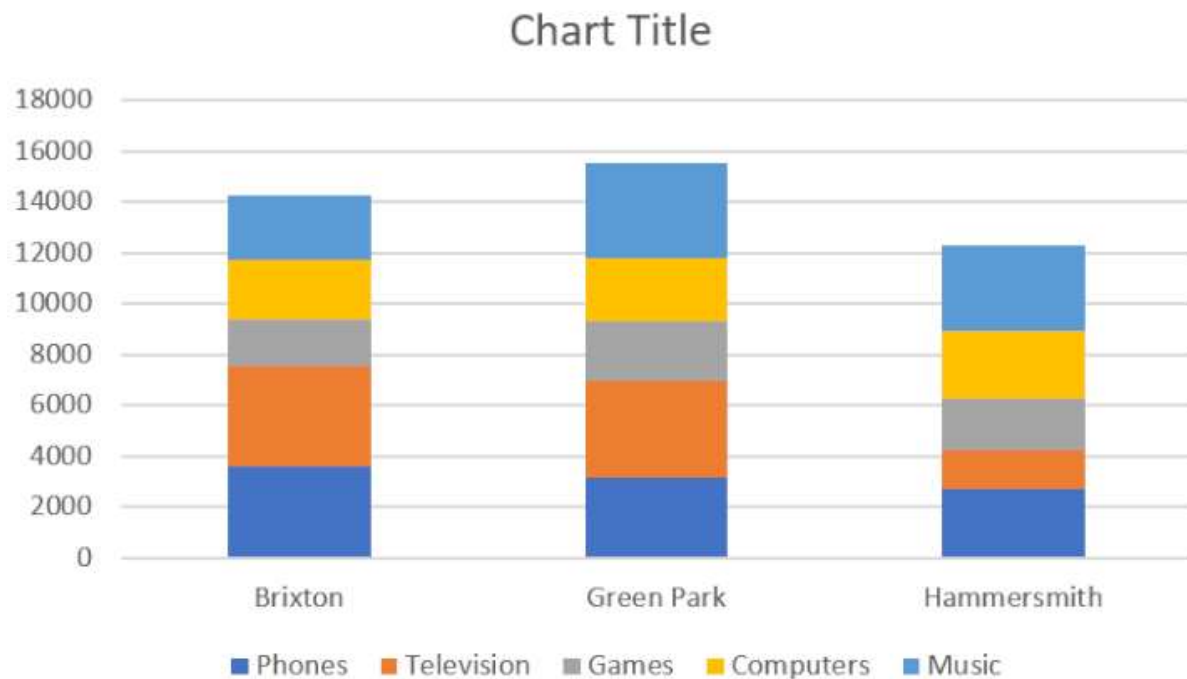
Chart Title
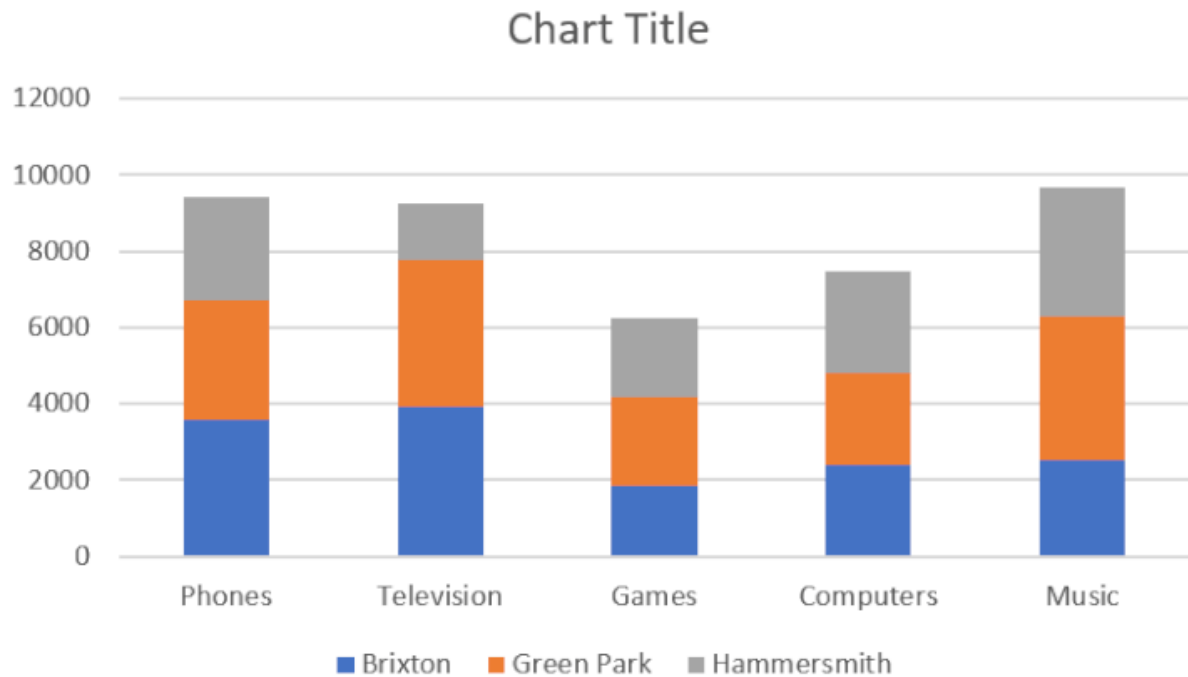
This stacked column has a column for each department with the store's sales stacked on top of each other.

This can be reversed by clicking the Switch Row/Column button on the Design tab.

The chart now shows a column for each store, with the department's sales stacked.

Chart Title

In this chart, we can see that sales from the Green Park store were highest.

100% stacked column chart

The stacked column chart was great at comparing total sales. It also displayed the contribution to those sales by each department, or store.

The contributions were more difficult to interpret, however, especially if they were similar values.

Excel offers a 100% stacked column chart. In this chart, each column is the same height making it easier to see the contributions.

Using the same range of cells, click Insert > Insert Column or Bar Chart and then 100% Stacked Column.
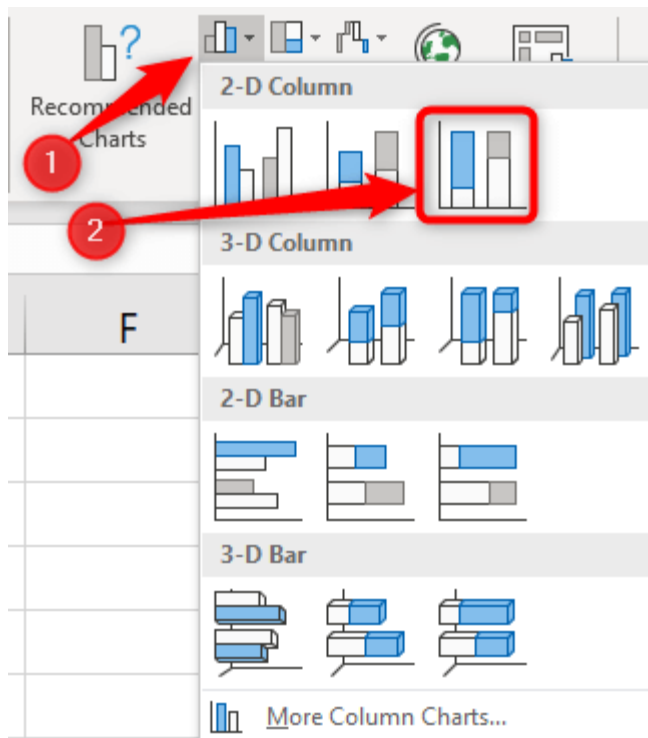
The inserted chart is shown below.
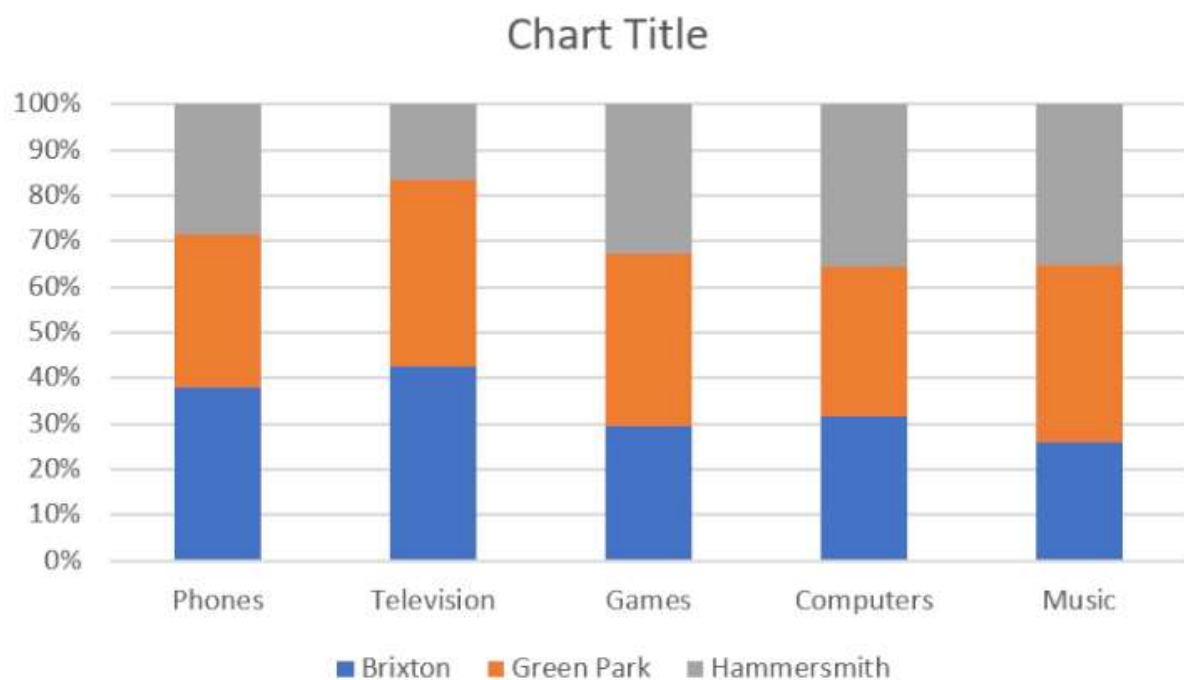
A 100% stacked column chart is like having multiple pie charts in a single chart.

Guide to Power Query, Power Pivot and Power BI

What is Power Query?

Power Query is the tool used to import, clean and shape data in Excel.

It first appeared in Excel 2013 but was made available only as an add-in named Power Query. From Excel 2016 and in Office 365, it is available directly within Excel from the Data tab, but is labeled Get & Transform.
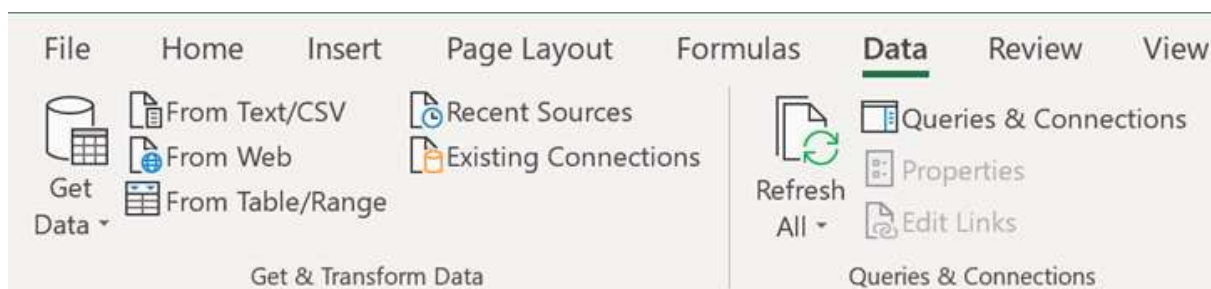
Power Query can import data from a variety of sources including CSV, text files, a folder on a drive, Facebook and Salesforce. New connections are being built into Power Query regularly making it easy to get data from external sources.
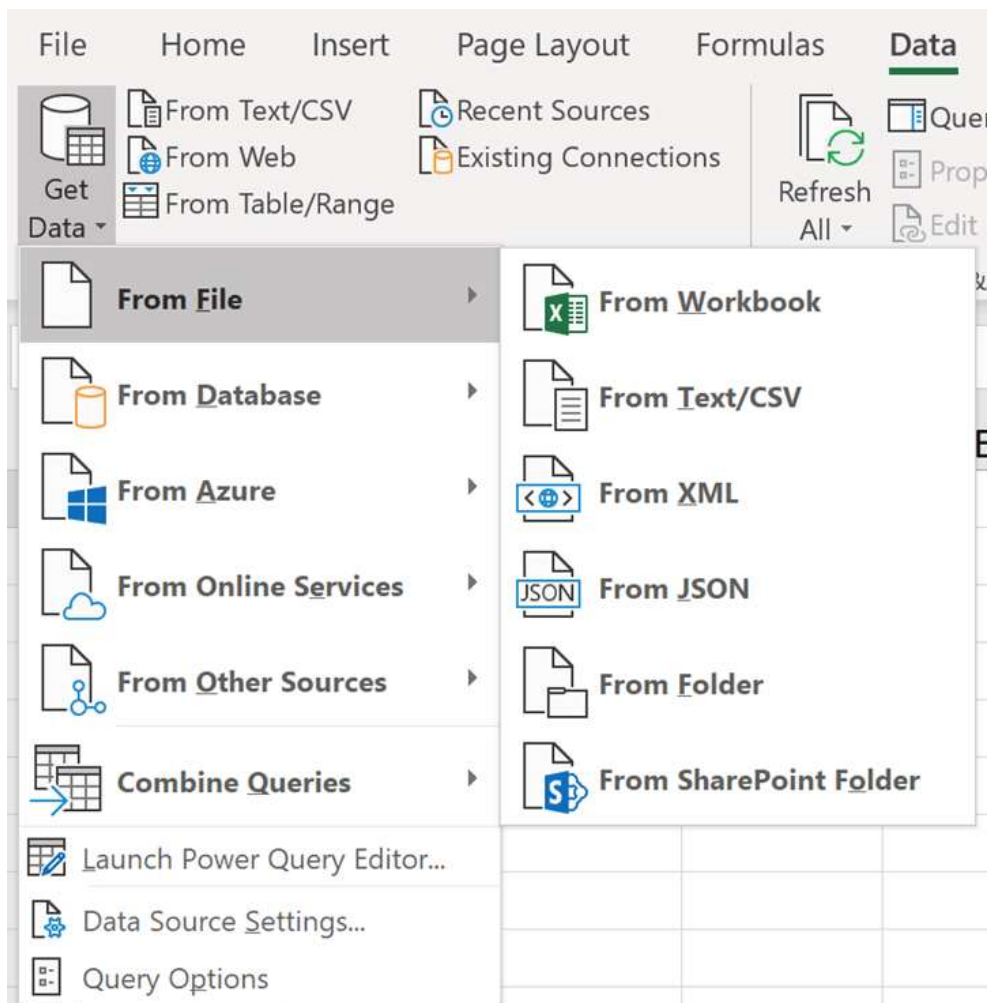
After importing data (connecting to a source) the Power Query Editor window opens.

This tool is extremely powerful, incredibly useful - but yet simple to use. It has a nice easy to use interface with a variety of commands that will be recognizable to many Excel users.
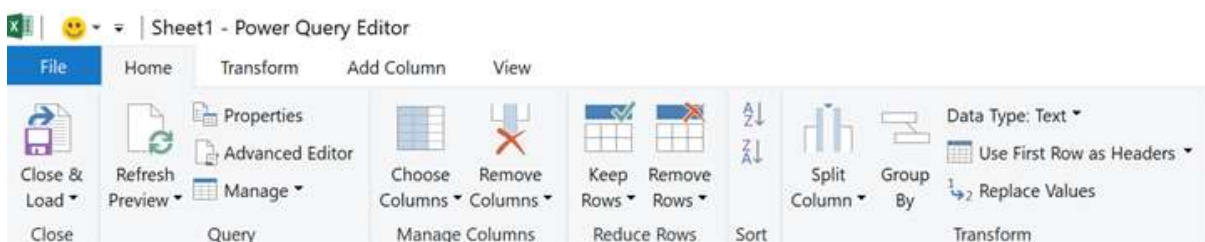
As users perform commands to clean and shape their data such as split columns, replace values or remove duplicates - Power Query records the step and writes M code behind the scenes (similar to how VBA is written when you record a macro).

M is the language of Power Query. It is quite different to Excel formulas and tricky to master. Power Query shields you from the code by hiding the Formula Bar. But you can click View > Formula Bar to show it in the Power Query Editor.
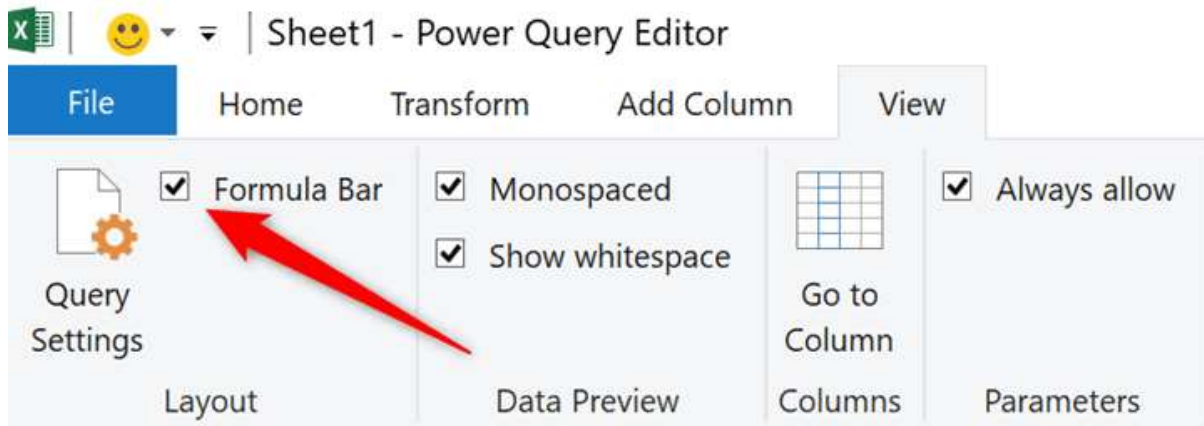
Advanced users can manipulate this code by using the Advanced Editor on the Home tab, or directly in the Formula Bar.
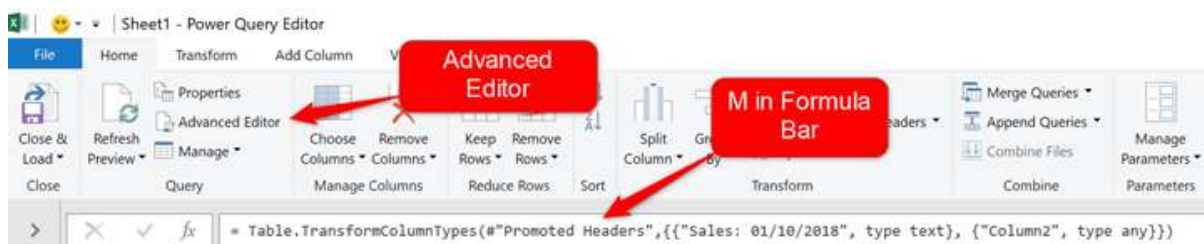
The steps that a user has performed are recorded and shown in the Applied Steps pane.
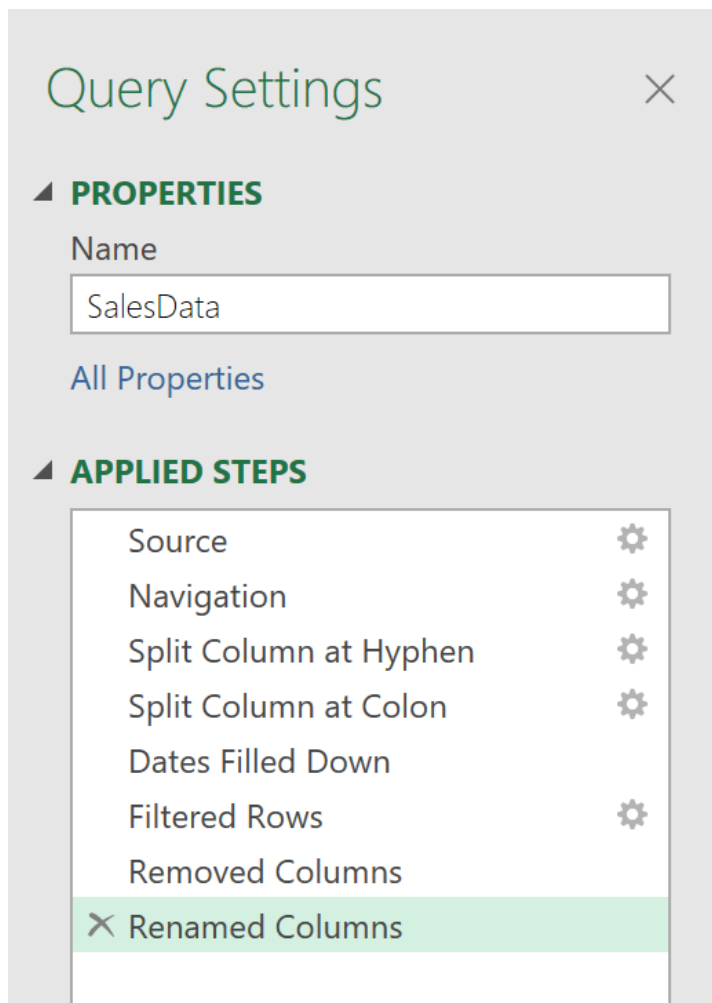
A user can view, edit and delete the steps from here. Power Query does not have an undo button. Removing a step is the undo of Power Query.

All of these steps are saved in the query. The query can then be loaded ready for analysis by clicking Home, the list arrow on the Close & Load button and then Close & Load To.
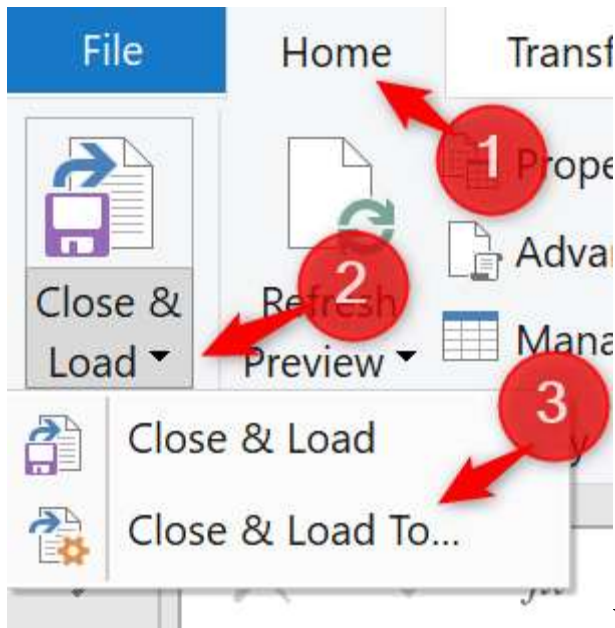
You can load your data into a table in Excel, straight into a PivotTable or just as a connection.

Loading it directly into a PivotTable enables us to avoid the physical limitations and strain on Excel. You can avoid monstrous file sizes because you are not actually storing the data in Excel.

By loading as a connection you can load much larger datasets than what Excel can handle (over 1 million rows of data), still keep your file sizes lean by not storing them in Excel and take advantage of more advanced calculations by using Power Pivot (our next Power tool to discuss).

Queries can be run again in the future by clicking the Refresh button on the Data tab, or using the Queries and Connections pane in Excel.

Imagine the potential here for regular data imports and reports that you may create. The whole process could be reduced to the click of the refresh button.

What is Power Pivot?

Power Pivot is used to model your data and perform more complex calculations than Excel can handle.

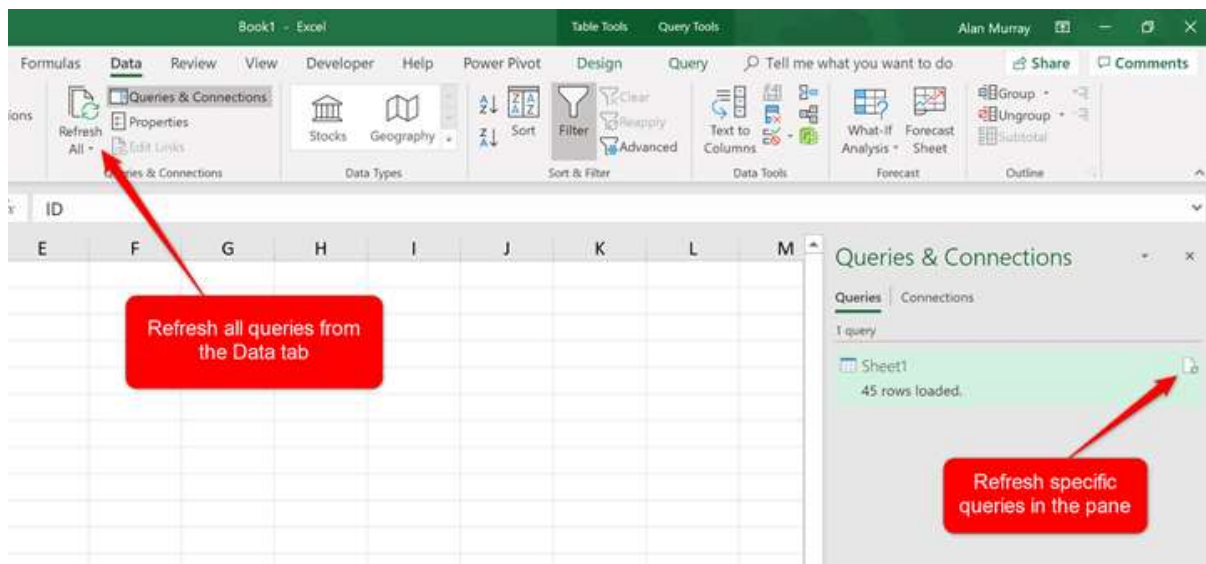Power Pivot is great when working with huge data sets. Once Power Query has imported and cleaned the various data sources, Power Pivot is used to establish relationships between the tables/queries.

Then using DAX (Data Analysis Expressions), the formula language of Power Pivot, you can create more powerful calculations and more sophisticated data models than you can in Excel alone.

Power Pivot was initially only available as an add-in, but from Excel 2013 has been part of native Excel. You can access Power Pivot by clicking the Go to the Power Pivot Window button on the Data tab.
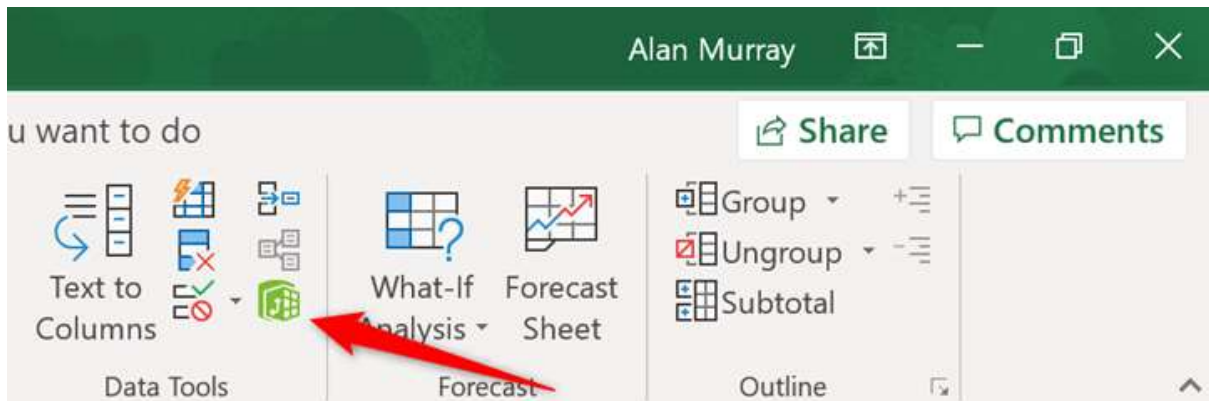
Alternatively, you can enable the Power Pivot tab on the Ribbon. This is hidden by default.

Right mouse click anywhere on the Ribbon and click Customize the Ribbon.
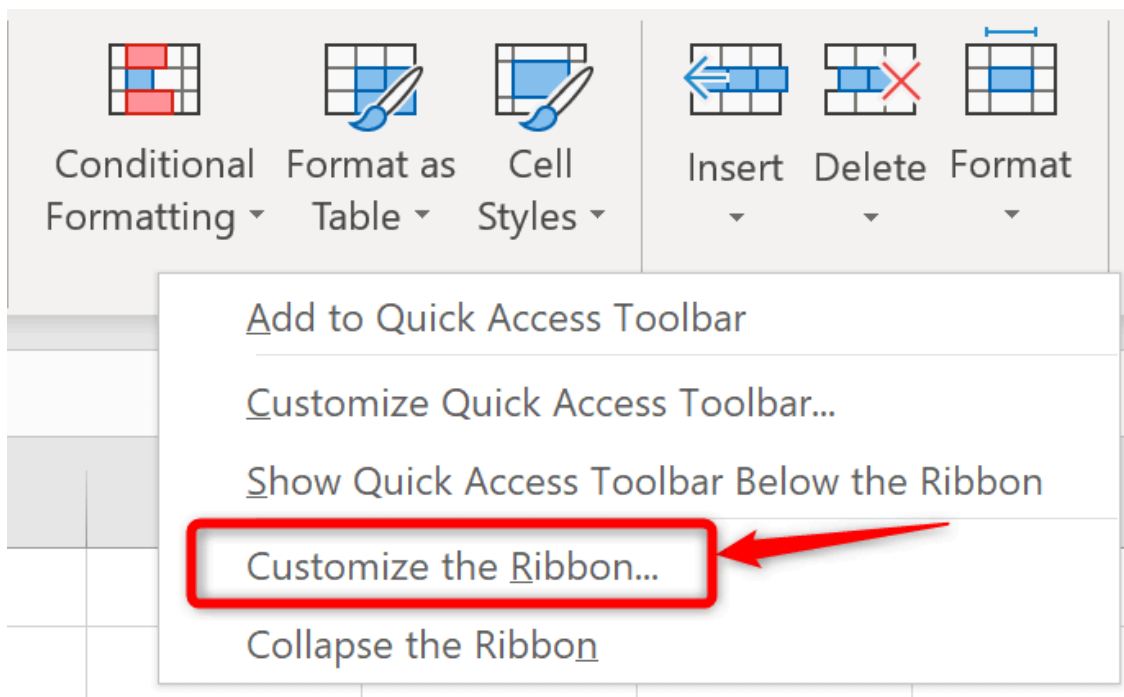
Check the box for Power Pivot on the right and click Ok.
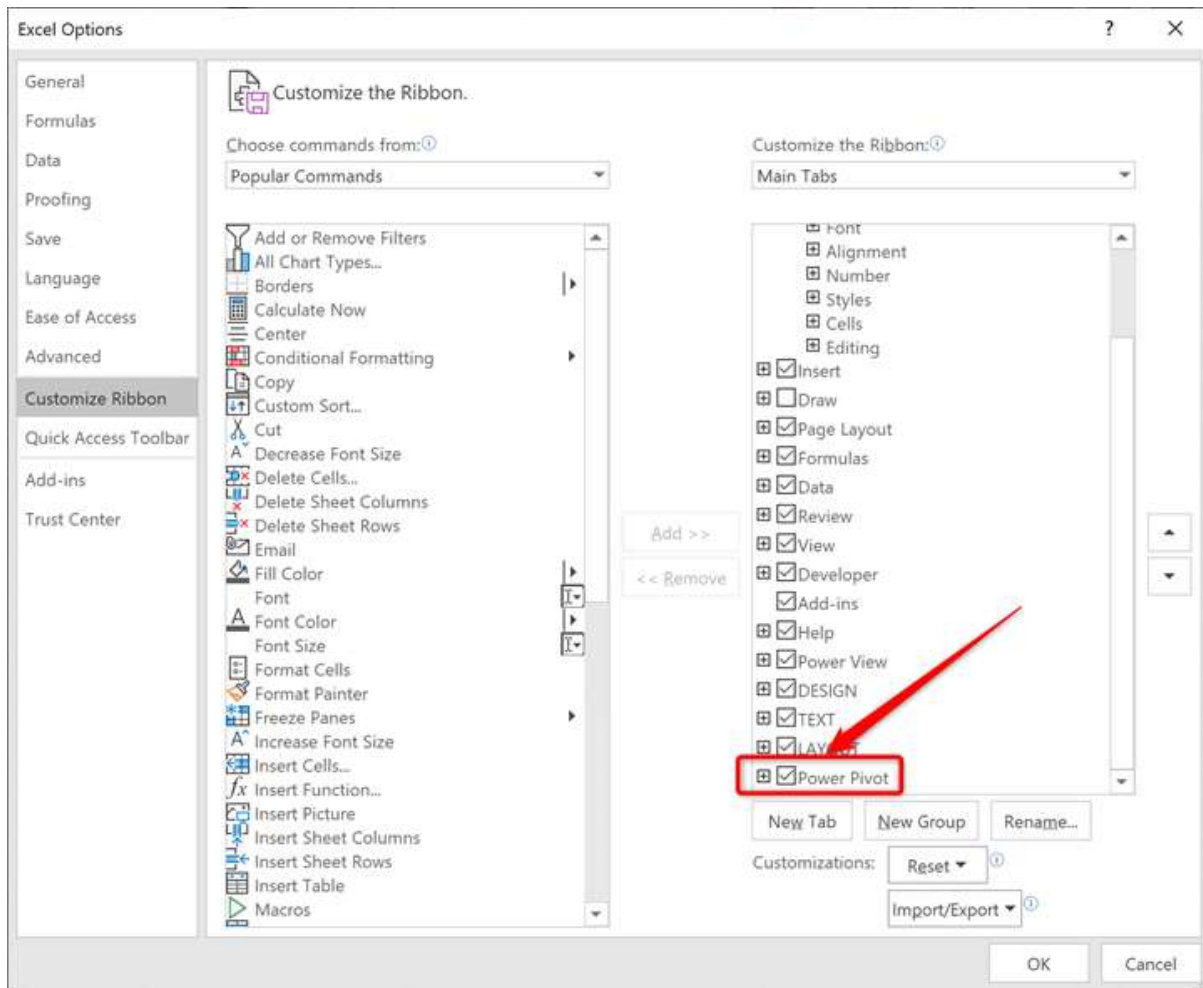
The Power Pivot tab is shown below. It has a button to open the Power Pivot window (just like the Data tab), to create measures (DAX formula) directly in Excel and a few more.
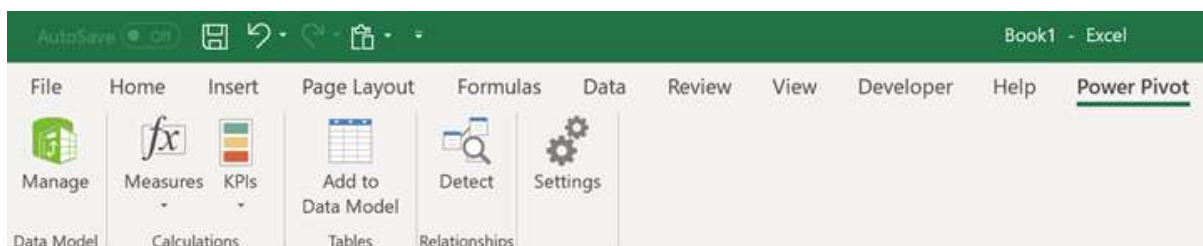
The Power Pivot window has two views. The Data view looks similar to Excel and enables you to see your data and create calculated columns and measures using DAX formulas.

And the Diagram view where you can establish the relationships between your tables.
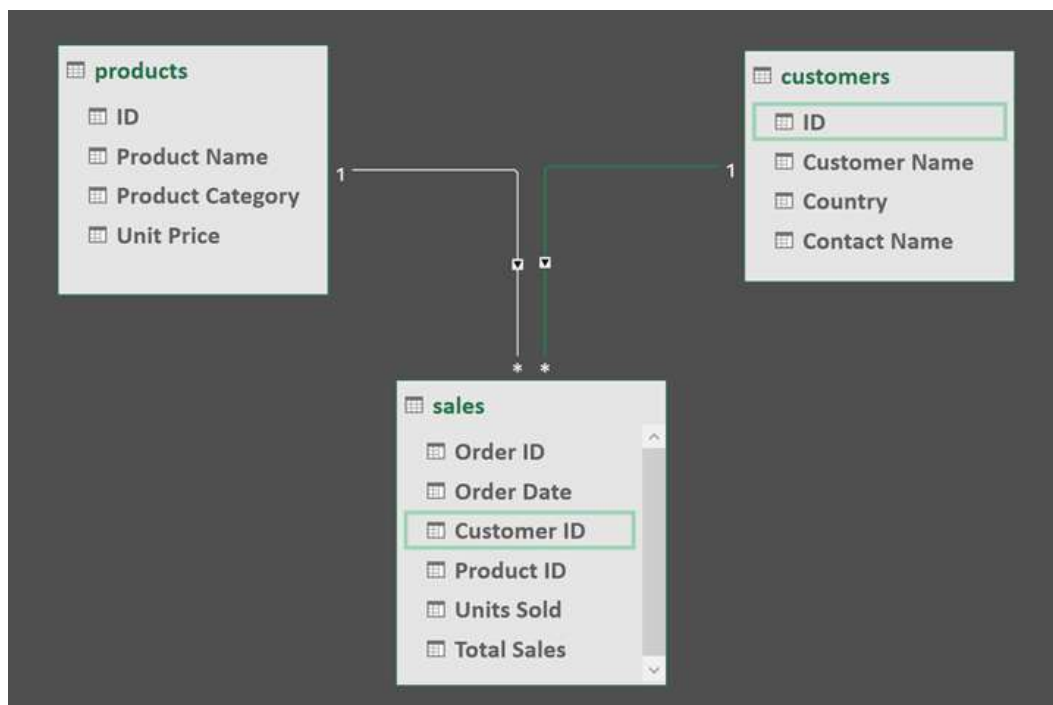
When your model is set up, you can analyze and report on your data using PivotTables.

The field list below shows a PivotTable using three tables from our Power Pivot model.
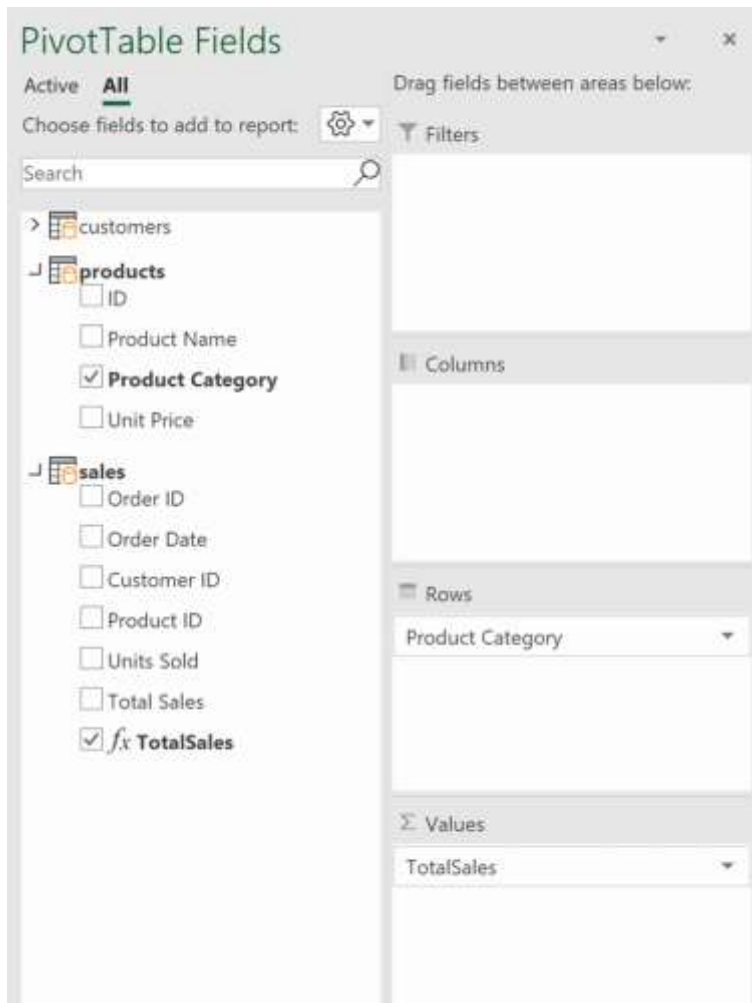
What is Power BI?

Power BI is a term used to describe two different tools - Power BI Desktop and Power BI Service (also referred to as PowerBI.com).

This tool uses the same Power Query and Power Pivot engines to get, clean and model your data ready for reporting. So when you learn these tools in Excel, you are learning them for Power BI Desktop also.

In the image below, you can see similar buttons to what you find in the Power Query and Power Pivot tools. And then more for reports and publishing.

Power BI strengths over regular Excel are in its visualizations. Visualizations is the

name assigned to the charts, slicers, tables and matrixes that you can insert into your reports in Power BI.
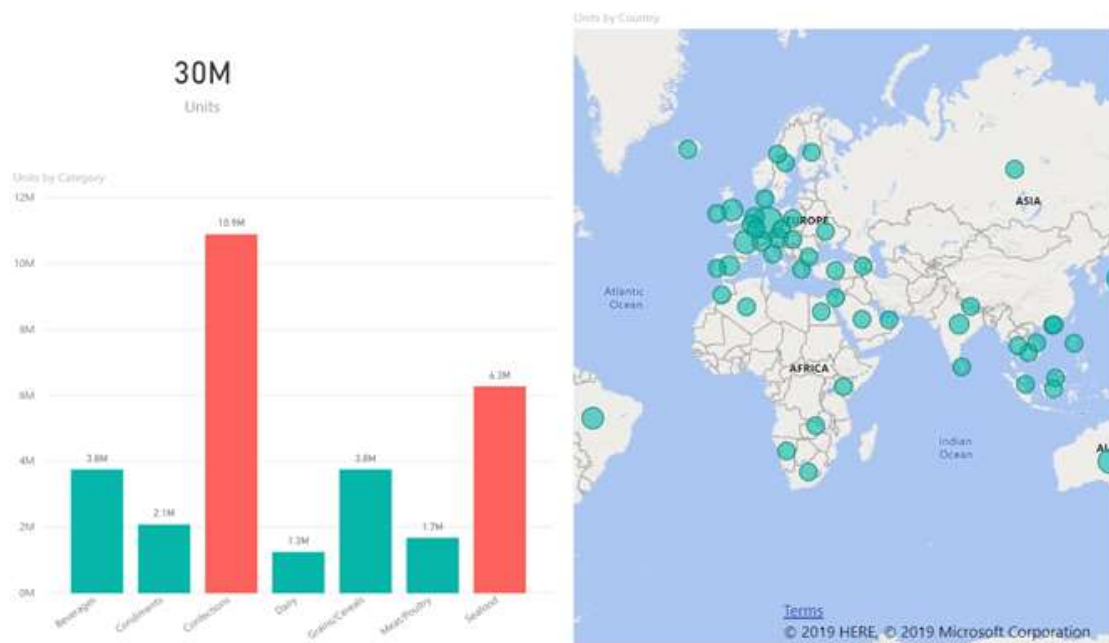
Power BI has a greater choice of visualizations than Excel, and lots of options for how they interact with the other visualizations on a page, or even across the entire report.
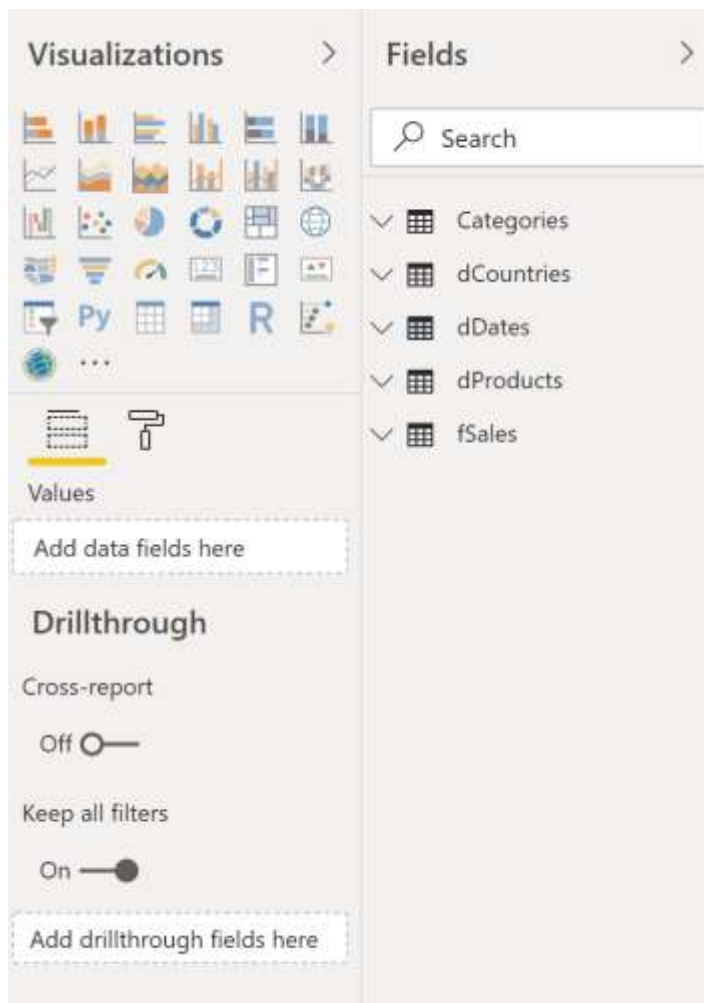
This list is constantly growing, with more available to download from the marketplace and the ability to create your own custom visuals.

Power BI Desktop is where you create your model, perform your DAX calculations and build your reports. These can then be published to PowerBI.com.

Once published, others can view and interact with your reports at PowerBI.com. They can do this via any browser or mobile device.
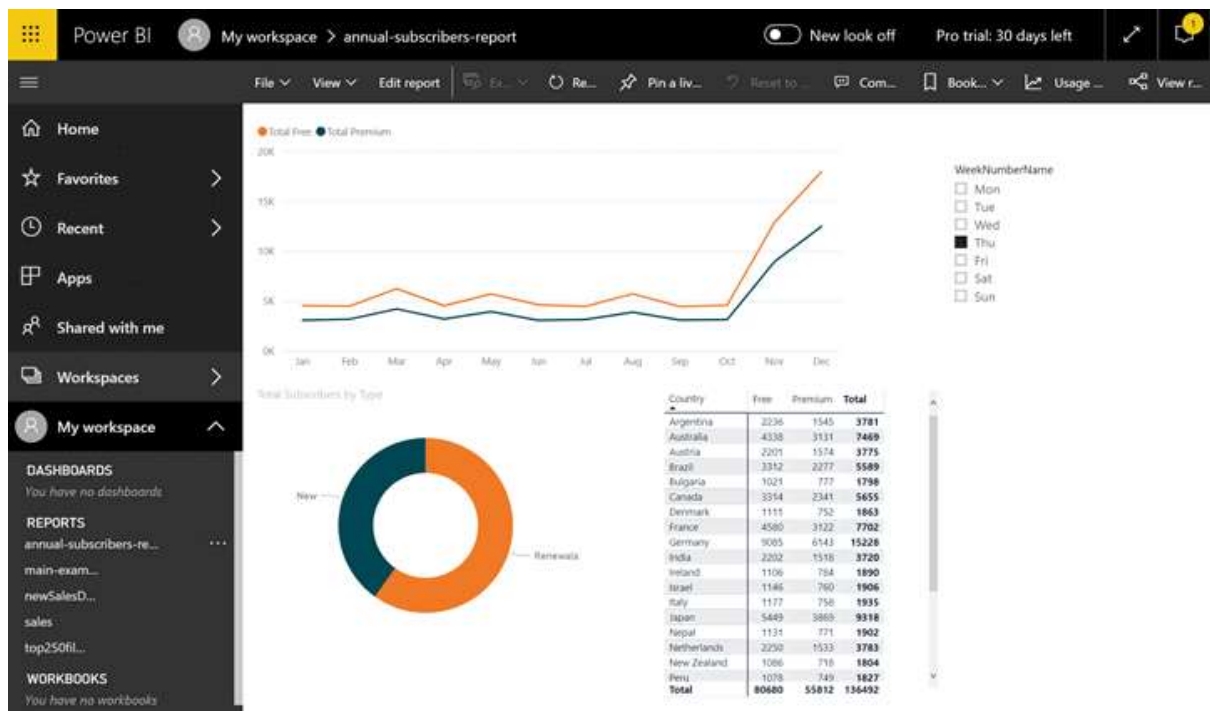
You can also create dashboards using the PowerBI.com service to show the highlights from your reports. And refresh existing reports shared with you.

How do these tools work together?

Power Query and Power Pivot do not both need to be used. They are independent tools and you may just need one or the other.

Power Query can prepare simple but large datasets for analysis. Power Pivot is for more complex models and more powerful calculations than Excel worksheet functions or PivotTables alone.

Although they can be used independently these two tools do complement each other. Power Pivot contains features for importing and shaping data, but it is recommended to leave this job to Power Query.

The data is then loaded to the model for Power Pivot to begin establishing relationships and creating measures using DAX.

Power BI is a completely separate tool that has both of these tools included. It has more connection options than Power Query in Excel. It also has better visualizations and can publish to the Power BI Service for better sharing of reports.

Power BI can be like bringing a hammer to mash your avocado though and Excel is the product that workers recognize and love.

And there are benefits to speaking people's language by using the tools in Excel, unless you require the better visuals and other capabilities that Power BI provides.

Excel Chart Types: Pie, Column, Line, Bar, Area, and Scatter

The Pie Chart

A Pie Chart can only display *one series of data*. A data series is a row or column of numbers used for charting. Excel uses the series identifier (column or row heading) as the chart title (e.g. Flowers) and displays the values for that series as proportional slices of a pie. If we had selected multiple series of data, Excel would ignore all but the first series. In the worksheet below, we have outlined in red a single **data series** in a spreadsheet.

	A	B	C	D	E	F
1		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Year
2	Flowers	$ 170	$ 240	$ 200	$ 230	$ 840
3	Shrubs	$ 220	$ 280	$ 250	$ 290	$ 1,040
4	Trees	$ 260	$ 340	$ 200	$ 320	$ 1,120

Figure 1: single series of data

There are sub-types of the Pie Chart available. The second chart below is the Pie Chart in 3-D and the third chart is an Exploded Pie Chart; an Exploded Pie in 3-D is also available.
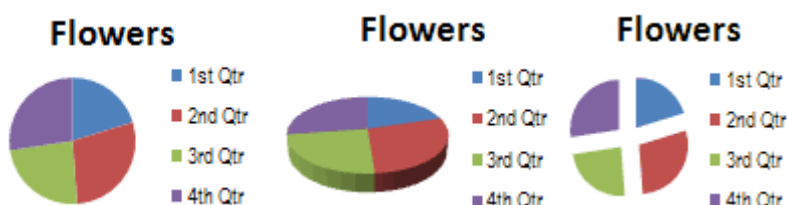
Several other sub-types include the Pie of Pie and Bar of Pie - in which a second pie is created from certain values in the first pie in order to emphasize them. To

customize the values that the second pie contains, right-click on the segment in the first pie, select "Format Data Point," and specify how to split the series.

Notice that the Pie Chart's legend contains the column headings from the worksheet. These can be changed by editing the headings in the worksheet, or by editing the chart directly. The legend can be moved to the top, bottom, left, right, or top right ("corner" in older versions of Excel) of the chart.

It is possible to customize the design of the pie chart so either numeric values or their percentages display on top of the slices of the pie.

The Column Chart
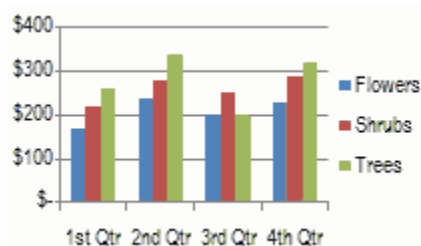
The Column Chart very effectively shows the comparison of one or more series of data points. But the Clustered Column Chart is especially useful in comparing multiple data series.

In the first chart image, we plotted the data points in all three series: Flowers, Shrubs, and Trees. Because Excel uses a different color for each data series, we can easily see how a single series, Flowers for example, changes over time. But because the columns are "clustered," we can also compare the three data series for each time period.
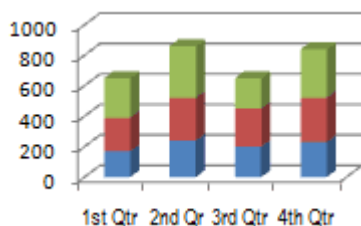
In a Column Chart, the vertical axis (Y-axis) always displays numeric values, and the horizontal axis (X-axis) displays time or other category. And by default, Excel will always plot the category (row or column heading) that contains the most entries on the horizontal axis (X-axis).

One variation of this chart type is the Stacked Column Chart. We show a 3-D Stacked Column Chart above in the second image. In a Stacked Column Chart, the

data points for each time period are "stacked" instead of "clustered." This chart type lets us see the percentage of the total for each data point in the series.

Also available is the 100% Stacked Column Chart, where each value in a series is shown as a portion of 100%. An example of a 100% Stacked Chart is shown in the section on Bar Charts.

All the Column Charts have a version in which the columns display in three-dimension - as illustrated by the 3-D Stacked Column Chart above. But one chart, the "3-D Column Chart," is special because the chart itself is three-dimensional - displaying multiple series on the X-axis, Y-axis, and Z-axis. The first chart below is a 3-D Column Chart of our data series.

All images © Copyright Keynote Support

In newer versions of Excel, cylinders, pyramids, and cones can be used instead of bars for most of the Column charts. The second chart above shows a 3-D Pyramid Chart.

The Line Chart
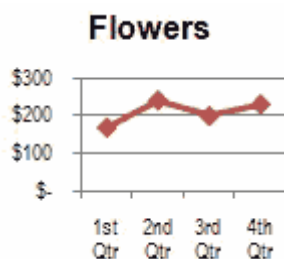
The Line Chart is especially effective in displaying trends. In a Line Chart, the vertical axis (Y-axis) always displays numeric values and the horizontal axis (X-axis) displays time or other category.
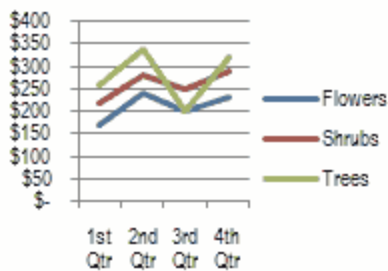
We selected the Line with Markers chart for our single series chart at left. You may choose each Line Chart type with or without markers. Markers are circles, squares, triangles, or other shapes which mark the data points. Excel displays a unique marker - different shape and/or color - for each data series.

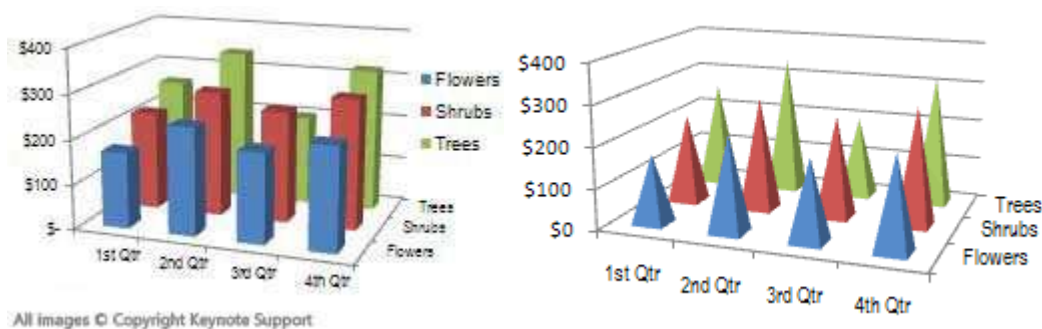The Line Chart is equally effective in displaying trends for multiple series as shown in our chart at right. As you will notice, each line is a different color. This image shows a Line Chart without markers.

Though not as colorful as the other charts, it is easy to see how effective the Line Chart in showing a trend for a single series, and comparing trends for multiple series of data values.

Besides the Line Chart, we have the Stacked Line Chart and the 100% Stacked Line Chart - with or without markers. A 3-D Line Chart is available, but the Line Chart does not display data well in three dimensions.

The Bar Chart

The Bar Chart is like a Column Chart lying on its side. The horizontal axis of a Bar Chart contains the numeric values. The first chart below is the Bar Chart for our single series, Flowers.

When to use a Bar Chart versus a Column Chart depends on the type of data and user preference. Sometimes it is worth the time to create both charts and compare the results. However, Bar Charts do tend to display and compare a large number of series better than the other chart types.
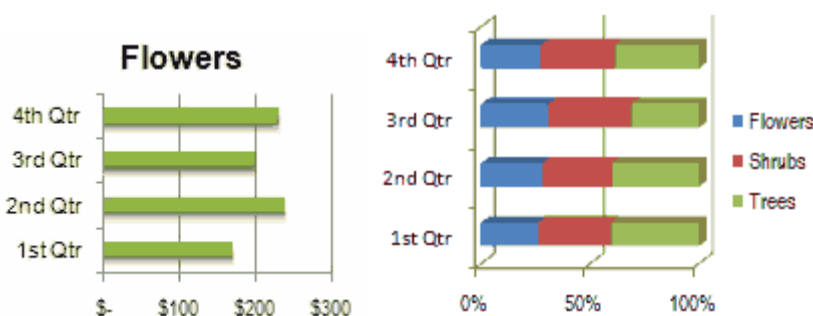
All of the Bar Charts are available in 2-D and 3-D formats, *but only the bars are 3-D.* There is no 3-D Bar chart containing three axes.

As with the other chart types, Excel provides the Stacked Bar Chart and 100% Stacked Bar Chart. The second chart above is our 100% Stacked Bar Chart in 3-D. This chart type doesn't display currency on the horizontal axis, but percentages. It allows us to see what percentage each data point has out of 100%.

As with the other chart types, new versions of Excel provide the option of using cylinders, pyramids, or cones instead of bars.

The Area Chart
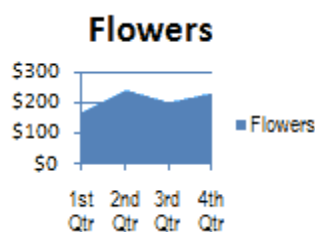
Area Charts are like Line Charts except that the area below the plot line is solid. And like Line Charts, Area Charts are used primarily to show trends over time or other category. The chart at left is an Area Chart for our single series.
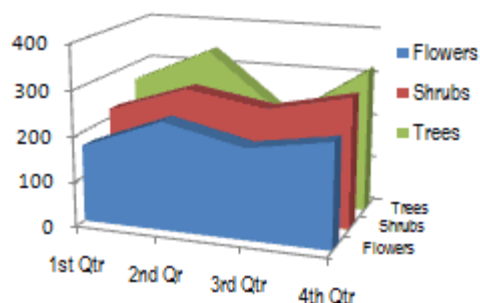
There are three charts available: the Area Chart, the Stacked Area Chart, and the 100% Stacked Area Chart. Each of these charts come in 2-D format and in true 3-D format with X, Y, and Z axes.

The chart at right is our 3-D Area Chart, and effectively displays our three series.

In many cases, the 2-D version of the Area Chart can be ineffective in displaying multiple series of data meaningfully. Series with lesser values may be completely hidden behind series with greater values - as demonstrated in the first chart below. Flowers is totally hidden, and just a wee bit of Trees peaks through. Not a very effective chart!

This problem does not occur in the Stacked Area Chart (shown below) or the 100% Stacked Area Chart.
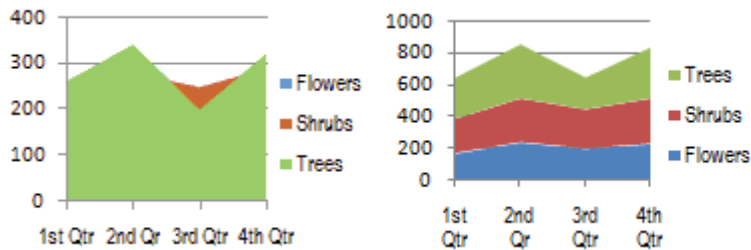
The Scatter Chart

The purpose of a Scatter Chart is to observe how the values of two series compares over time or other category. To illustrate the Scatter Chart, we will use the worksheet values shown below:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	Flowers	$100	$200	$300	$500	$600	$700	$550	$475	$700	$500	$350	$400
3	Shrubs	$200	$250	$400	$600	$700	$760	$650	$550	$775	$600	$275	$200

According to Scatter Plots (U. of Illinois), "Scatter plots are similar to line graphs in that they use horizontal and vertical axes to plot data points. However, they have a very specific purpose. Scatter plots show how much one variable is affected by another. The relationship between two variables is called their correlation."

The series pair has a Positive Correlation if they increase similarly, and a Negative Correlation if they both decrease in like manner. Otherwise, they have No Correlation.

Excel does not use labels from the worksheet to label the horizontal axis; it just numbers the X-axis chronologically.

The Scatter Chart comes in several different formats: markers can indicate the data points; and the points can be unconnected, or connected with smooth or straight lines.

Take a look at our two sample Scatter Charts below. The first chart is a Scatter Chart with Only Markers, and the second chart is a Scatter Chart with Smooth Lines.

In general, markers work well when the number of data points is small, and smooth lines without markers are often used when the number of data points is large. But it is best to try the different sub-types to see which one best presents your data.

The AND Function

The AND function asks Excel to test specific criteria or conditions and to return a value of TRUE **if ALL of the conditions are true**. This tutorial teaches the AND function of Microsoft Excel using clear explanations and worksheet examples.

To have Excel return a value of TRUE if only **some (at least one) conditions are true**, use use the OR Function of Excel.

Description of the AND Function

The AND function is used to test multiple conditions and to return a value of TRUE only if ALL of the conditions are met. Otherwise, the function returns a value of FALSE. The syntax for the AND function is:

AND(test1, test2 ...)

Where:

► test1, test2, ... are from 2 to 255 conditions that Excel can test in a worksheet

A minimum of two conditions must be entered into the AND function.

Let's look at two simple math examples before we look at our spreadsheet examples.

=AND(3+3=6,4*2=8) ... Excel returns a value of TRUE because both conditions are met

=AND(3+3=6,4*2=10) ... Excel returns a value of FALSE because the second condition is not true

Section: Excel Functions Tutorial: The AND Function

Fabulous Examples of Excel Functions: The AND Function

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Worksheet Examples of the AND Function

Now let's look at some worksheet examples using cell references and more complex formulas. The actual function was entered in cell A1 and we can see the result of the function. The other columns contain our data. The function is displayed in the formula bar and also shown in our explanation.

1. AND function with cell addresses

	f_x	=AND(C1>10,C1<30)		
	A	B	C	D
1	TRUE	Paul	12	9
2		Jesse	3	2
3		Chris	7	4

The first AND function example is a simple one and references a cell address: =AND(C1>10,C1<30). The AND function will almost always reference various cells in the worksheet.

In our spreadsheet, the value in cell C1 is 12. So **both** conditions are met and Excel returns a value of TRUE.

2. AND function with cell range and "not equal to <>"

	f_x	=AND(B1="Paul",C1<>10)		
	A	B	C	D
1	TRUE	Paul	12	9
2		Jesse	3	2
3		Chris	7	4

the function must be wrapped in double quotes, and secondly, the **not equal to** operator in Excel is expressed by <>.

In this function, Excel first checks to see if the value in B1 is Paul, which it is. Then it checks to see if C1 "does not equal" 10, which it does not because its value is 12. So both conditions are met and Excel returns a value of TRUE

3. AND function with another Excel function

	f_x	=AND(SUM(C1:C3)>20,C1>10)		
	A	B	C	D
1	TRUE	Paul	12	9
2		Jesse	3	2
3		Chris	7	4

Here is our next sample function: =AND(SUM(C1:C3)>20,C1>10). The AND function parameters can contain other functions, and the first parameter of this example contains the SUM function. Notice that we **do not** precede an embedded function with an equal sign.

The cell range C1:C3 include cells C1, C2, and C3. Their sum is 22. So the first condition of this function is true in that the sum is > 20. Then we check to see if C1 > 10. Cell C1 contains the number 12, so that condition is also met and Excel returns a value of TRUE.

4. AND function with math formulas

fx =AND(C1+D1>10,C2+D2>10)			
A	B	C	D
1 FALSE	Paul	12	9
2	Jesse	3	2
3	Chris	7	4

Example #4 reads: =AND(C1+D1>10,C2+D2>10. The arguments of the AND function can also contain mathematical formulas. The value in C1 is 12 and the value in D1 is 9, so their sum is 21 and the first condition is met.

The second condition adds the contents of cells C2 and D2, which are 3 and 2 respectively. But their sum is not greater than 10, so this condition is not met. For the AND function to return a value of TRUE, every condition must be met, so Excel returns a value of FALSE.

5. AND function with formulas and other functions

fx =AND(C1/SUM(C1:C3)>0.33,C1>1			
A	B	C	D
1 TRUE	Paul	12	9
2	Jesse	3	2
3	Chris	7	4

Our last example, =AND(C1/SUM(C1:C3)>0.33,C1>10), shows a formula that in itself contains another Excel function. The first parameter checks to see if Paul received more than one-third of the total points by dividing his points (12) by the total. The total is the sum of C1:C3, which is 22, and 12 ÷ 22 = .545. So the first condition is met. As C1 contains the number 12, the second condition is also met, and Excel returns a value of TRUE.

Additional parentheses can be used if it will help you keep the portions of the formula straight. For example, this function could have been written **=AND(C1/(SUM(C1:C3))>0.33,C1>10)**.

Using AND and IF Functions Together

The AND function asks Excel to test one or more criteria and to return a value of TRUE if ALL criteria are met. The IF function tests a condition and returns a TRUE or FALSE response.

These two functions are often used together in a powerful way, and in this tutorial we explain how to use the AND function and IF function together, and we provide worksheet examples.

Quick Review of AND and IF Functions

=AND(A1>3,B1>7) is an example of the AND function. If **both** conditions are true, Excel returns a value of TRUE. If both aren't true, Excel returns a value of FALSE. (See our tutorial, The AND Function.)

=IF(A1>69,"Pass","Fail") is an example of the IF function. The first argument is the test, the second is the "value if true," and the last "value if false." So our example would read: If the value in cell A1 is greater than 69, display Pass (the test is true). If not, then display Fail in the cell (the condition was false). See our tutorial, The IF Function.

AND with IF Example

Before we look at our worksheet examples, let's look at an easy example containing only numbers to ensure we understand how these functions work together:

=IF(AND(3>0,7<9),"Green","Blue")

The argument of the IF function **is** the AND function. What we mean by that is that the first argument in an IF function is the test. And the test in

this example is AND(3>0,7<9). The IF function is testing whether the AND function is true or false.

So, in our example, 3 **is** > 0 and 7 **is** < 9. Since **both conditions are met**, the value of the AND function is true. Therefore, the IF function test is true, so so Excel would display the value-if-true of "Green" in the cell.
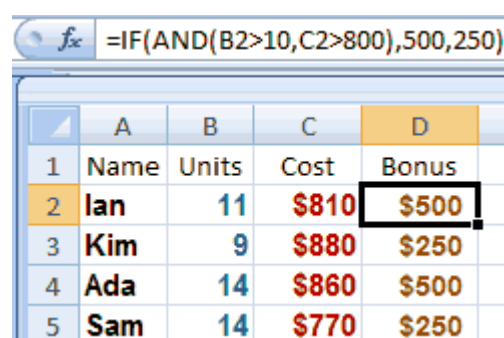
Worksheet Examples of IF and AND Functions Together

Now let's look at our worksheet examples. Each month sales reps make a bonus of $500 or $250. To make a $500 bonus, they must sell 11 or more units AND sell more than $800 cost. So our IF function tests to see if BOTH of these conditions are met via an AND function. If so, Excel returns a value of 500; otherwise, a value of 250.

We've entered our functions in Column D, and the function for Ian is:

=IF(AND(B2>10,C2>800),500,250)

Then we copied and pasted the function into column D for the other 3 persons. Notice that since we're dealing with whole numbers, we specified B2>10 instead of B2>=11 because it's easier to write. The function for Ian can also be seen in the formula bar of our spreadsheet below.

fx =IF(AND(B2>10,C2>800),500,250)

	A	B	C	D
1	Name	Units	Cost	Bonus
2	Ian	11	$810	$500
3	Kim	9	$880	$250
4	Ada	14	$860	$500
5	Sam	14	$770	$250

Ian's function: =IF(AND(B2>10,C2>800),500,250)
For Ian, the value in B2 (11) is > 10 and the cost in cell C2 (810) is > 800, so the value of the AND function is true. Therefore, the result of the IF function will be the value-if-true: 500. (We formatted column D to display currency.)

Kim's function: =IF(AND(B3>10,C3>800),500,250)
The value for Kim in cell B3 (9) is NOT > 10. Even though the next condition
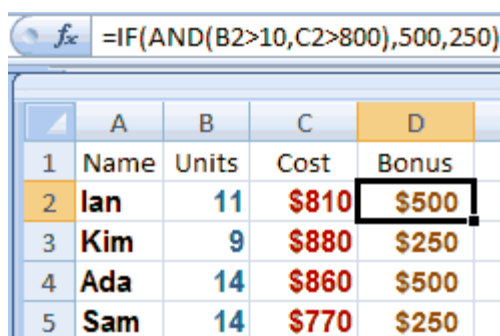
of the AND function is met, the result of the AND function is still false. So the value produced by the IF function is 250 - the value-if-false.

Ada's function: =IF(AND(B4>10,C4>800),500,250)
The value for Ada in B4 (14) is > 10 and the cost in cell C4 (860) is > 800, so the AND function is true, and Excel displays 500 in cell D4.

Sam's function: =IF(AND(B5>10,C5>800),500,250)
The value for Sam in cell B5 (14) is > 10. However, the value in cell C5 (770) is NOT > 800, so the AND function is false. Therefore, the result of the IF function is 250 (value-if-false).

fx =IF(AND(B2>10,C2>800),500,250)

	A	B	C	D
1	Name	Units	Cost	Bonus
2	Ian	11	$810	$500
3	Kim	9	$880	$250
4	Ada	14	$860	$500
5	Sam	14	$770	$250

Helpful Hint: When working with integers (no decimals or fractions), it's easier to use < or > than <= and >=. In our example, the reps needed to sell 11 units or more. We could have specified >=11, but >10 produces the same result and is faster to code.

Specifying Number or Text Values

In our example above, the IF function displays numbers in column D. Then we formatted column D to display these numbers as dollars to enhance our worksheet.

We could have specified in the IF function that we wanted text values of $500 or $250 to display. The function would have been written as follows:

=IF(AND(B2>10,C2>800),"$500","$250")

However, by having the output of the IF function be numbers instead of text, we could use the values in column D in mathematical calculations if we wanted to. We would not have had this option if we had displayed text

values in Column D because text values cannot be used in mathematical calculations in Excel.

Difference Between Average, Median, and Mode

Microsoft Excel provides many built-in functions to increase the productivity of its users. Three of these functions are AVERAGE, MEDIAN, and MODE. However, many folks confuse the definitions of these three terms.

Example #1

In our first example we will find the average (or mathematical mean), median, and mode of the following set of values:.

2, 2, 3, 4, 5

AVERAGE = 3.2
2+2+3+4+5=16
16 ÷ 5 = 3.2

MEDIAN = 3
Middle value is 3

MODE = 2
Most frequent is 2

AVERAGE

To find the average (also called the **mean**) of a dataset, the numbers are added and then their total is divided by how many numbers are in the set. So, the sum of these 5 numbers is 16, and 16 divided by 5 is 3.2.

MEDIAN

The median is the middle number in a set of numbers listed in numerical order. Our median is 3.

MODE

The mode is the number that appears most frequently in a set of numbers. The mode in this example is 2 because there are two 2s.

Example #2

In our second example, we determine the average, median, and mode of a dataset comprised of the following six numbers:

2, 6, 1, 3, 8, 4

Well, it's always a good idea to put the values in numerical order to ensure no errors are made. So here we go:

1, 2, 3, 4, 6, 8

AVERAGE = 4
Sum = 24
24 ÷ 6 = 4

MEDIAN = 3.5
Find average of 3 & 4:
3 + 4 = 7 ÷ 2 = 3.5

MODE = N/A
There is no mode

AVERAGE

The six values are added together (24) and then divided by 6 to arrive at an average of 4.

MEDIAN

With an **even number** of values in the set, there is no middle number. So we must **average the two middle numbers**. The median is 3.5 (3+4=7, and 7÷2=3.5).

MODE

Since no number in the list occurs more than once, this set of numbers has no mode