

# 1. Introduction

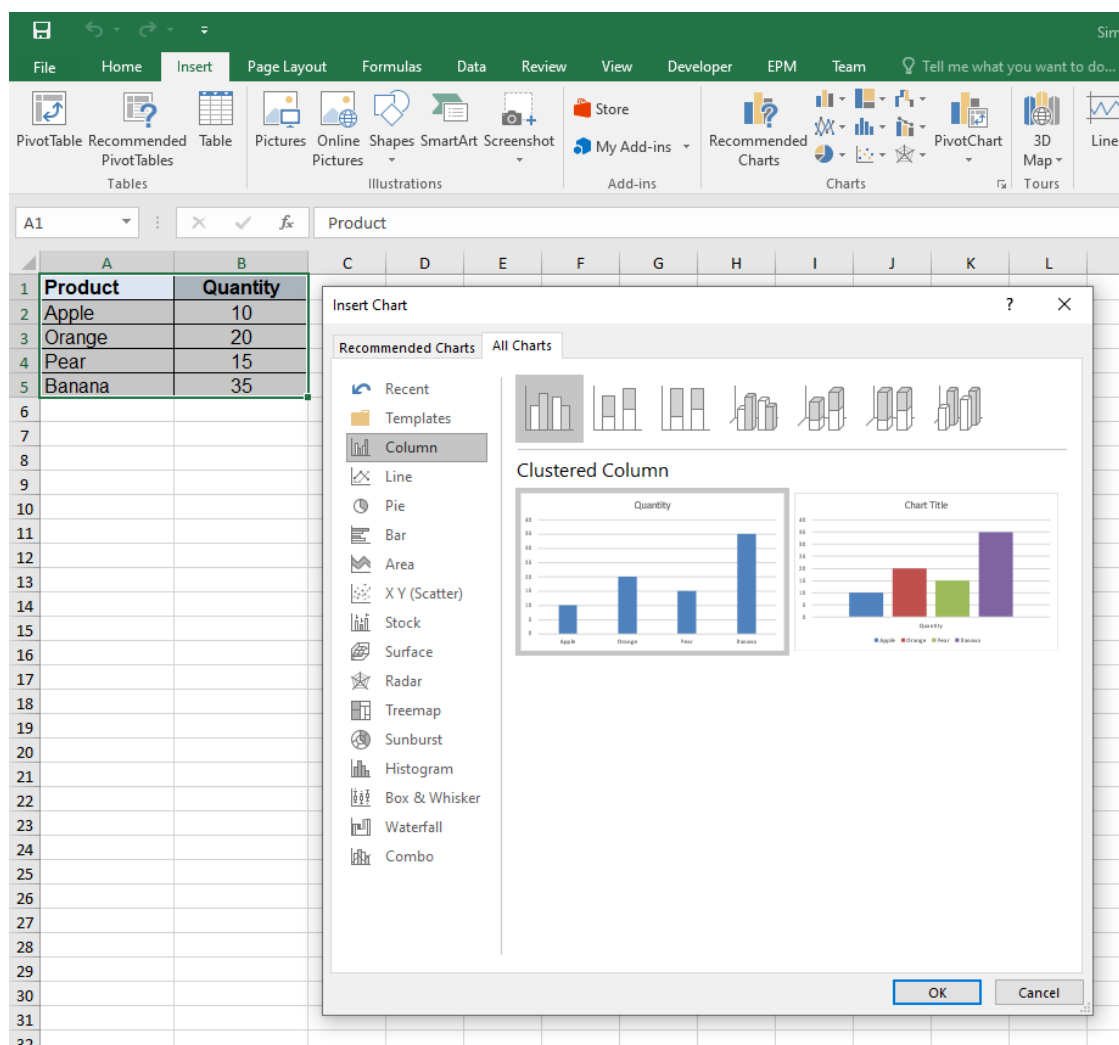
## 1.1 Overview

Charting or graphing of data makes it easier to understand a trend about presentation of data. Many of us need to create such graphs or charts such as pie chart. It is often complicated to understand and create charts with conventional tools or software. In Microsoft Excel, a chart is often called a graph. It is a visual representation of data from a worksheet that can bring more understanding to the data than just looking at the numbers.

You can create a chart on its own sheet or as an embedded object on a worksheet. You can also publish a chart on a Web page. To create a chart, you must first enter the data for the chart on the worksheet. Then create a basic chart that you can format later.

## 1.2 How to Create Charts?

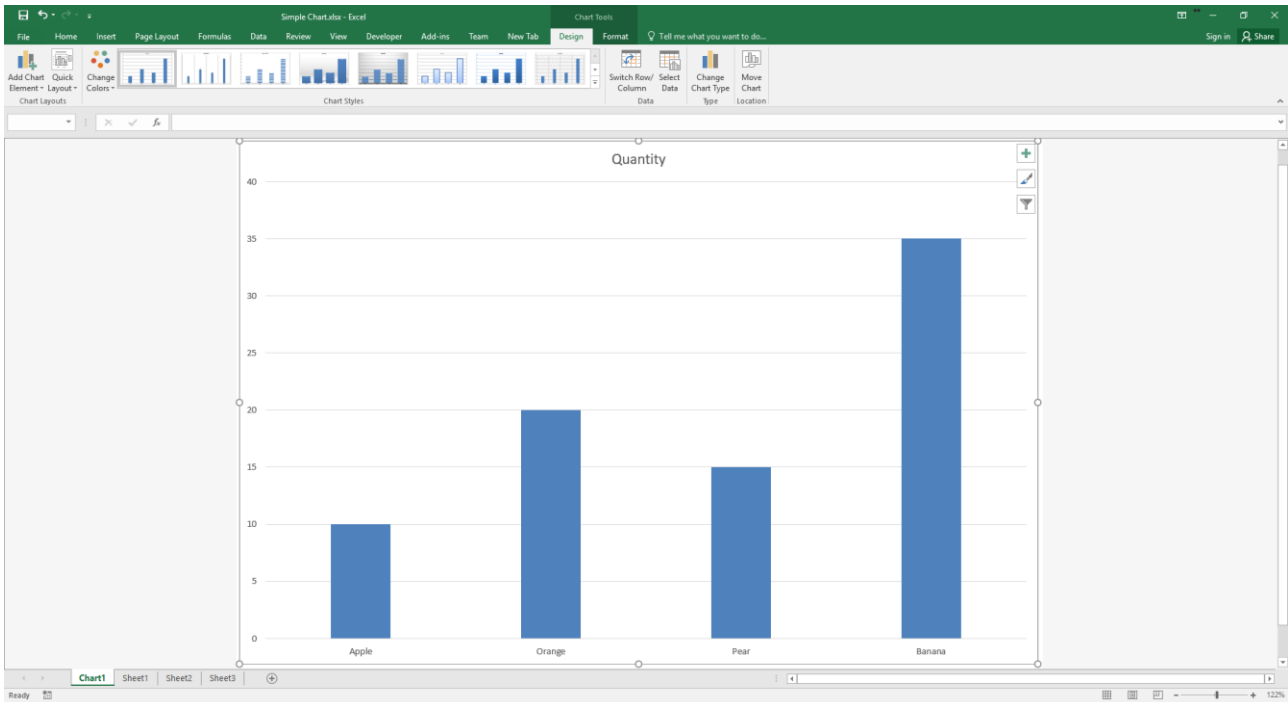
Select the cells you want to chart, including the column titles and row labels. These cells will be the source data for the chart. Make sure that there is some data in Excel worksheet and does not contain any blank cells between the different columns, then click the **Insert** menu and choose the chart type that you wish to draw.



The screenshot shows the Microsoft Excel interface with the 'Insert' tab selected. The 'Insert Chart' dialog box is open, displaying the 'Recommended Charts' tab. The 'Column' chart type is selected, and the 'Clustered Column' chart is previewed. The preview shows a bar chart with four bars representing Apple, Orange, Pear, and Banana, with a legend below the chart. The data from the worksheet is as follows:

Product	Quantity
Apple	10
Orange	20
Pear	15
Banana	35

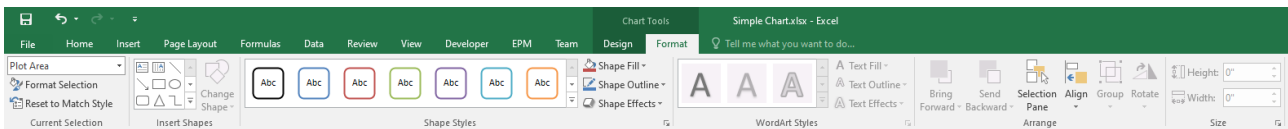
Besides, the snappiest way to create a chart is to select some data and press **[F11]** button.



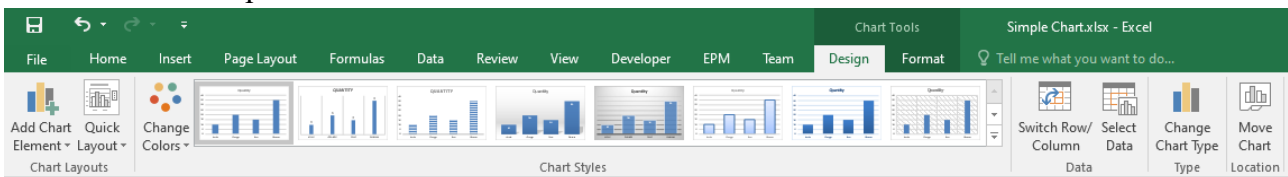
The data in your Excel sheet will be organized as a chart. You can change the attributes by right-click the chart and adjust the options for changing chart types, data, and other formatting.

### 1.3 Chart Tools

The Chart Tools menu allows you to modify the design, layout and formatting of the chart and the table. You can tweak many options related to the charts like layouts, formatting, design, chart type, displaying data, legends, color scheme etc.



In the **Design** option in the charting area, you can select other options line graph, pie chart for different kind of representation of the data.



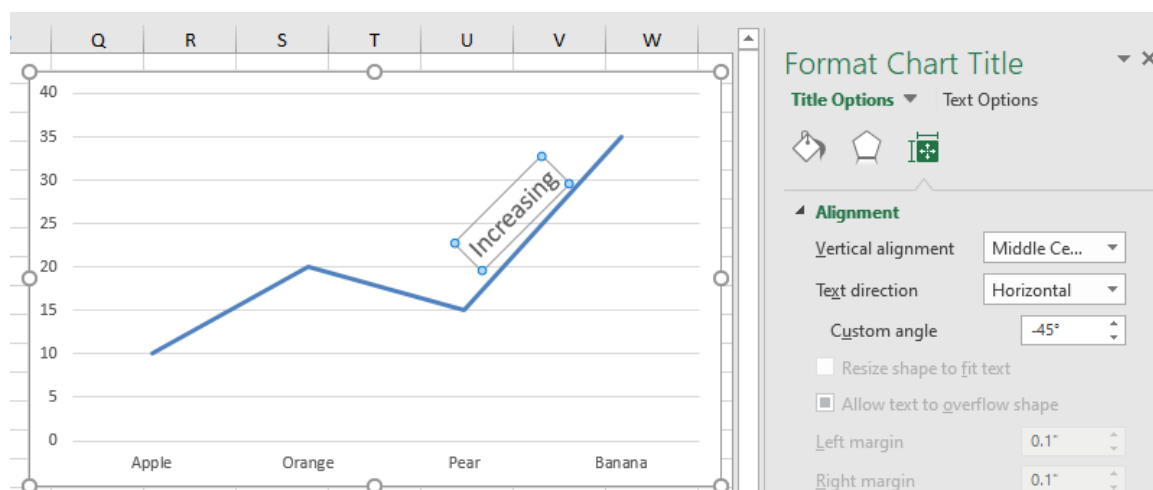
## 2. Enhancing Chart Appearance

### 2.1 Working with Titles

#### 2.1.1 Formatting a Title

To change the font, color, border, background, or alignment of a title, you can right-click it and choose **Format Chart Title** to access the Format Chart Title dialog box,

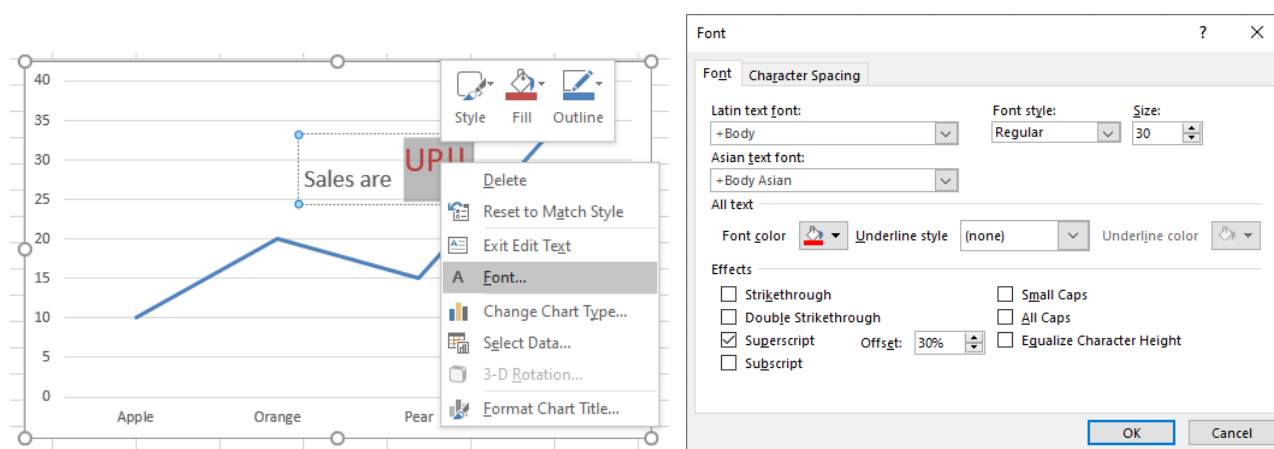
The idea of a diagonal chart title might seem silly at first. However, you can drag the title onto the plot area if you want. A slanted title on the plot area can make a stylish chart annotation.



#### 2.1.2 Formatting Individual Characters in a Title

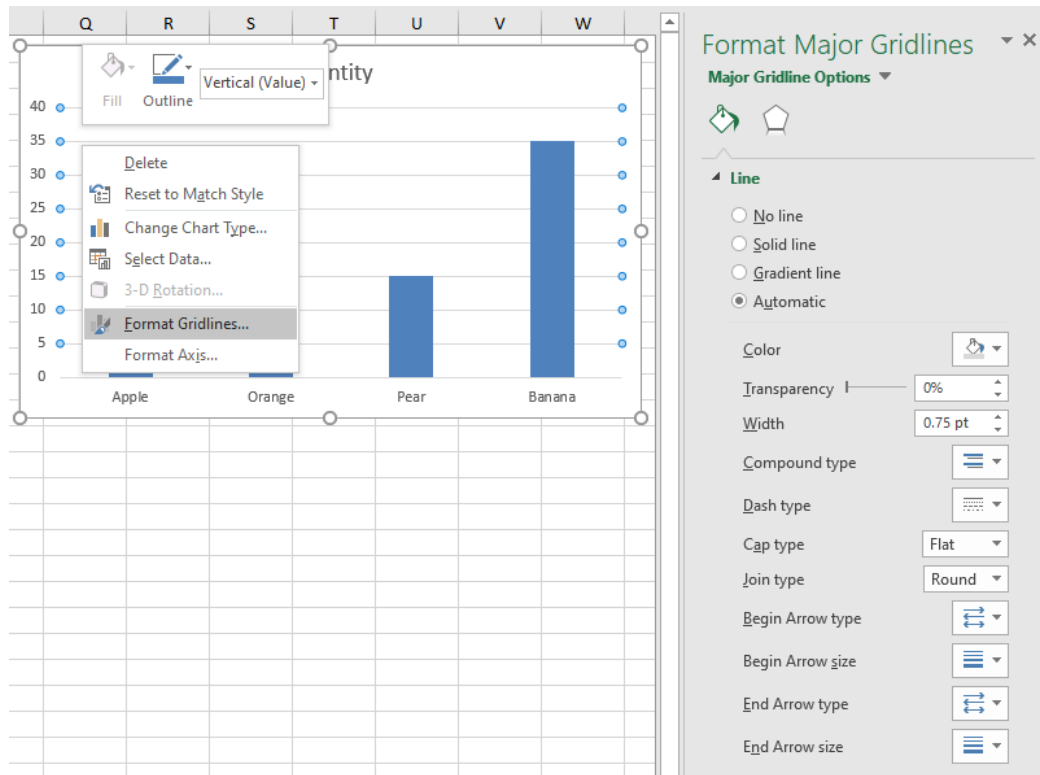
By formatting title characters individually, you can make your titles look like ransom notes. One possible use for individual-character formatting is the characters in the word up have been elevated via the superscript option.

To change the appearance of one or more characters in a title, select the title, pause, and then select the characters you want to change. The dialog box that appears has only a Font tab. In other words, you can't change the background characteristics of selected characters.



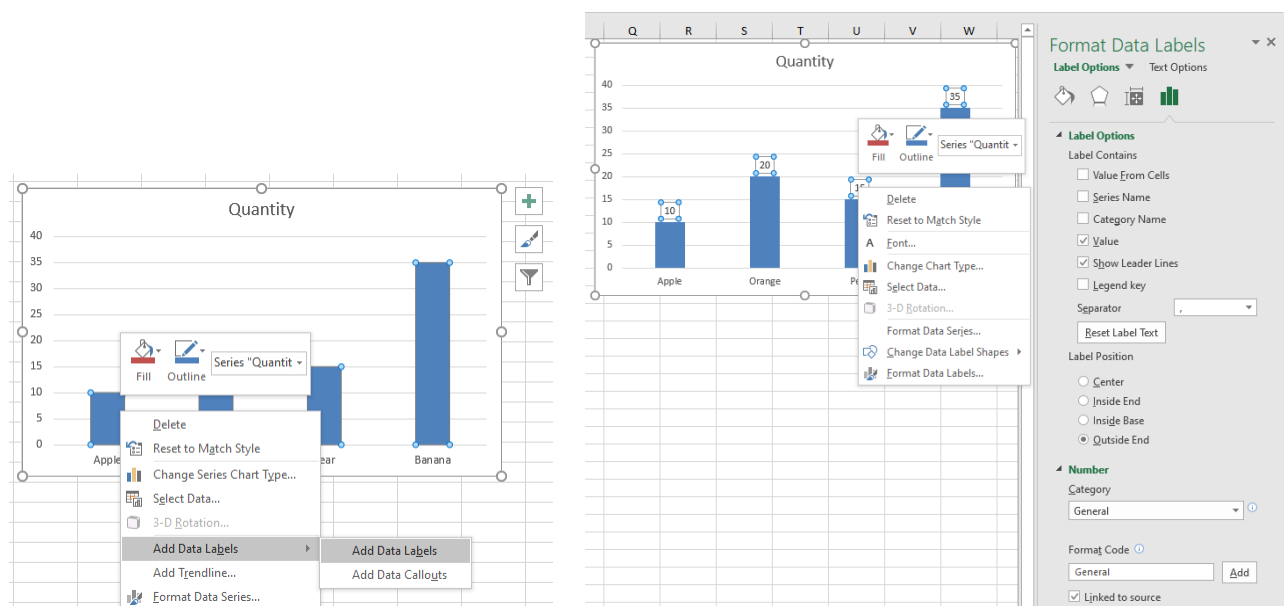
## 2.2 Working with Gridlines

Excel automatically adds gridlines, but you can delete them if you decide they're not essential and reduce clutter in the process. Select **Format Gridlines** after right clicking the chart.



## 2.3 Working with Data Labels

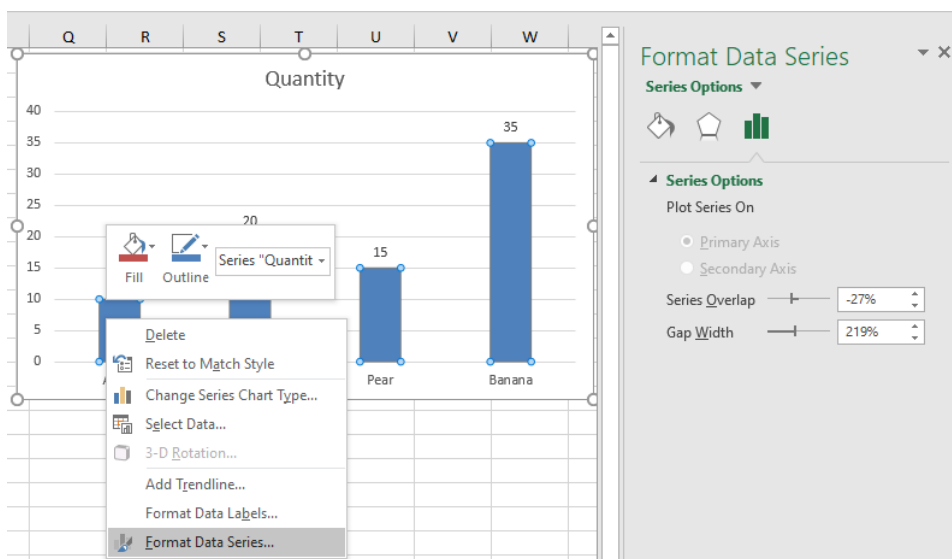
If you delete gridlines, but feel a little insecure without them, you can show your audience the exact number of values by the data labels above each column. To add data labels, you could first add the data label and then format it.



## 2.4 Change Colors and Use Fill Effects

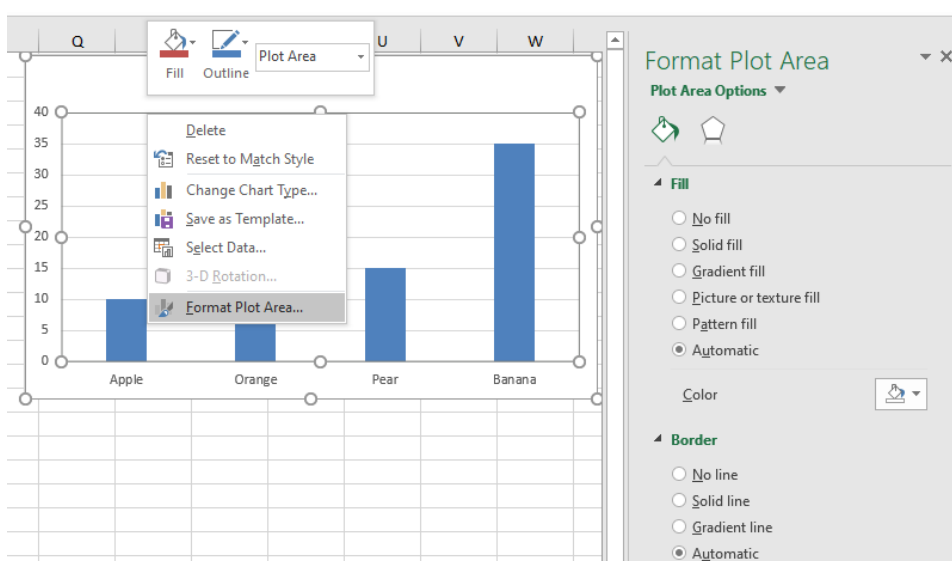
Excel formats the plot area a standard gray color. But you can choose another color.

To use a gradient fill, you'd select the plot area, right-click, select the **Format Plot Area** and **Format Data Series** on the shortcut menu, select **Fill**, and then select a color. A gradient fill was also used for each data series to give the colors some shading and depth. The gradient fills define each column well enough that borders around each column weren't necessary and could be deleted. In general, avoid putting two dark colors next to each other. The contrast between light and dark adds extra emphasis to your data and makes it easier to see the differences between the different data series. Greater contrast between colors will also help anyone in your audience who may be color blind to read your charts.



## 2.5 Chart Plot Area

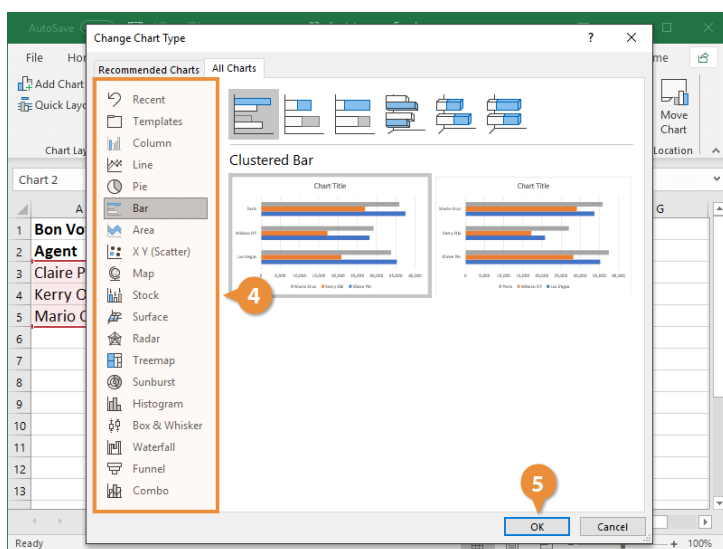
The area that is covered by a specific chart is called the chart plot area. By default, Excel draws charts according to the default configuration, but it's very easy to edit the plot area, simply right-click the chart and choose the **Format Plot Area** option. Now you will see a dialogue box which lets you set the chart's fill style, borders, Glow and soft Edges, and 3-D effects.



## 2.6 Change Chart Type

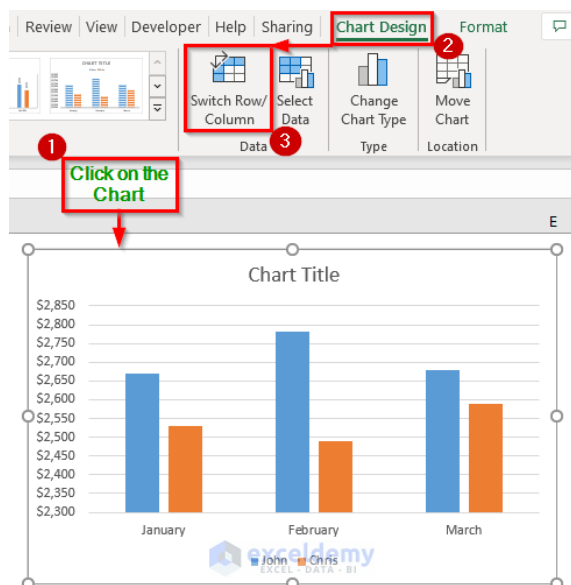
For most 2-D charts, you can change the chart type of the whole chart to give the chart a different look, or you can select a different chart type for any single data series, which turns the chart into a combination chart. For bubble charts and all 3-D charts, you can only change the chart type of the whole chart.

1. Click the chart area or plot area of the chart to display the chart tools. You can also right-click the chart area or plot area, click **Change Chart Type**.
2. On the **Design** tab, in the **Type** group, click **Change Chart Type**.
3. In the **Change Chart Type** dialog box, click the chart type that you want to use. The first box shows a list of chart type categories, and the second box shows the available chart types for each chart type category.



## 2.7 Switch Row/Column

To change the way that data is plotted, click anywhere in the chart that contains the data series that you want to plot on different axes. On the **Design** tab, in the **Data** group, click **Switch Row/Column**.



## 3. Working with Chart Data

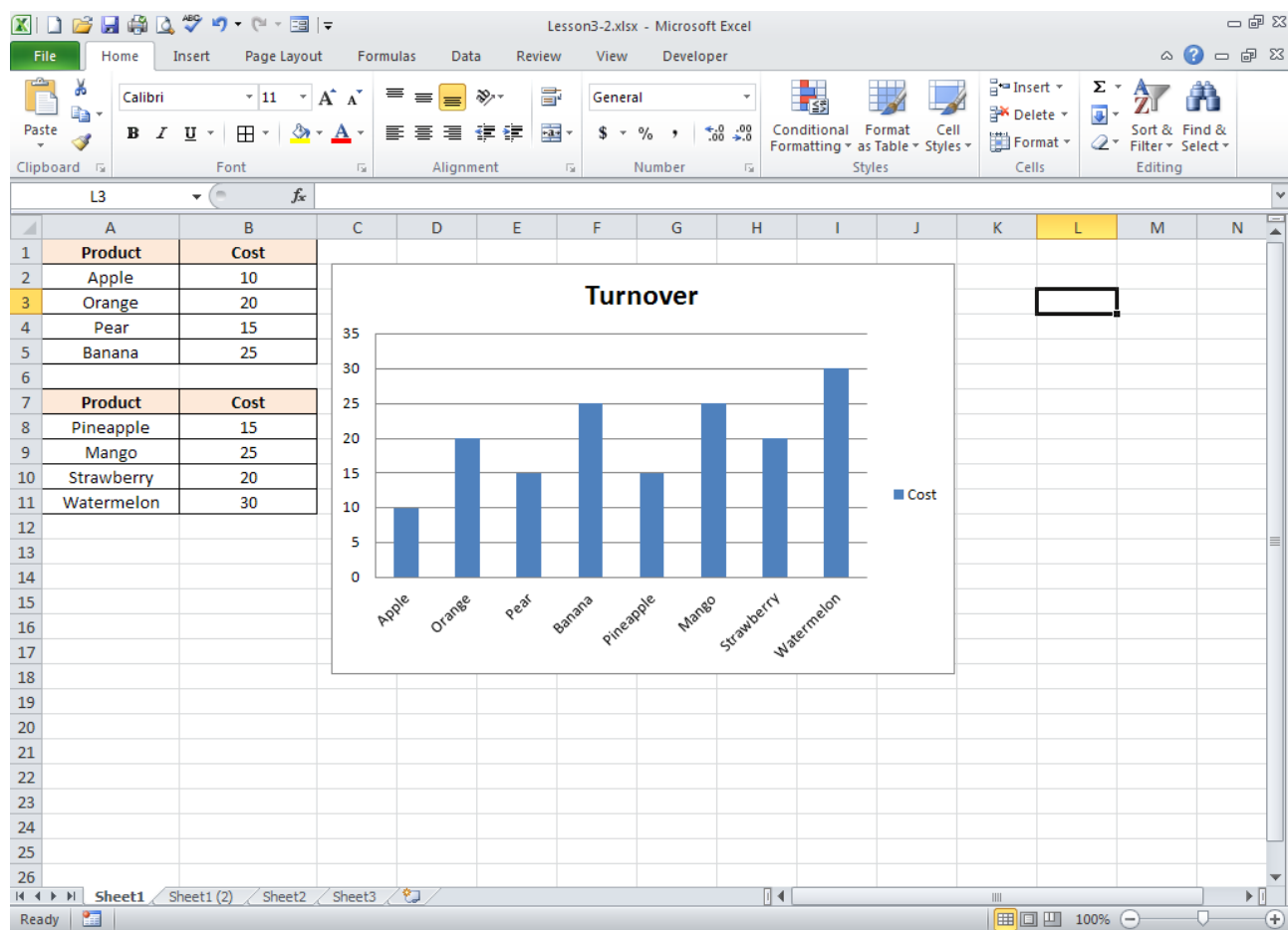
### 3.1 Adding Data

Excel provides several ways to add data to a chart. Excel drew two rectangles around the chart's source data after the plot area is selected. The first rectangle outlines the worksheet range that the chart is using for its category-axis labels. The second rectangle outlines the data series. Excel uses **blue** for the first rectangle and **purple** for the second, to help you distinguish the two.

#### 3.1.1 Using Copy and Paste

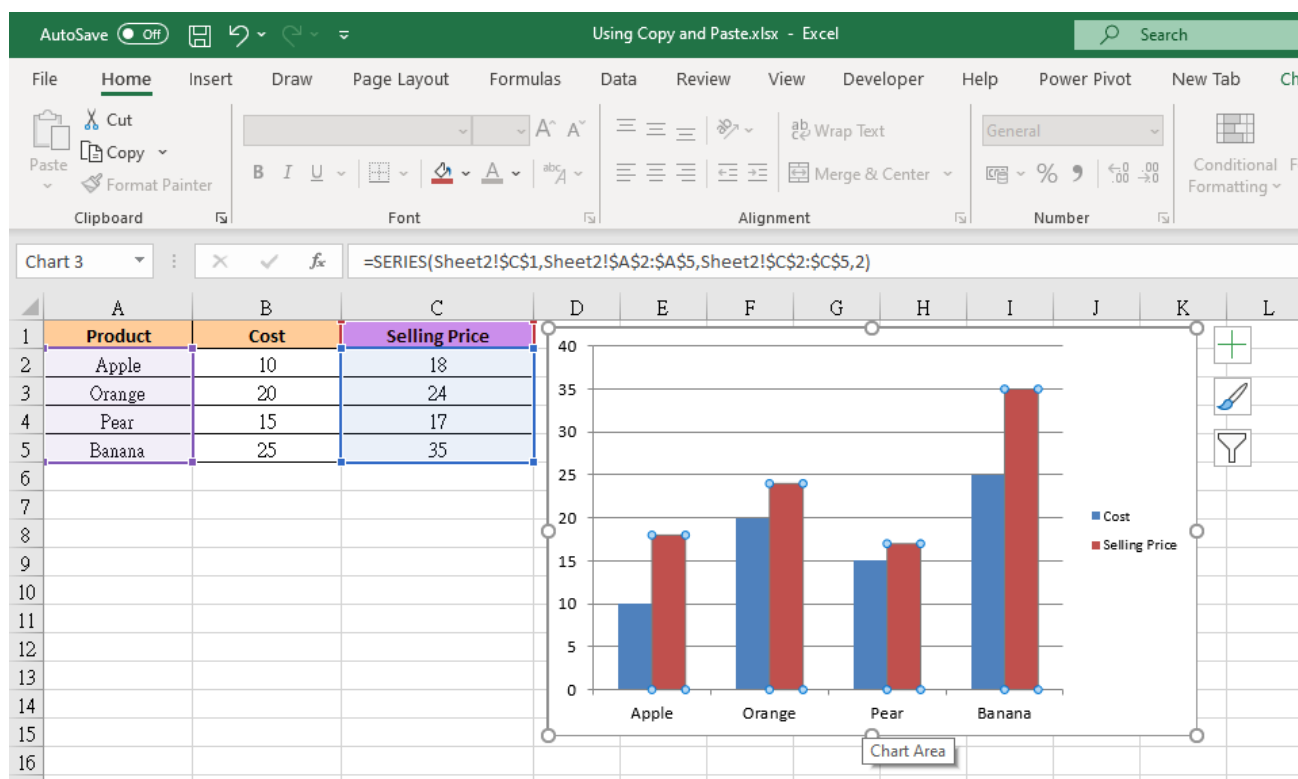
You can use standard copy-and-paste procedures if your chart and its data are close together on the same worksheet. Select the new data, and then choose **Copy**. Next, select the chart, and choose **Paste**.

To extend the chart so that it includes the new data, drag the **Fill** handle in the lower right corner of either rectangle. Alternatively, you can use drag-and-drop by selecting the new data, including its category-axis labels. Position your mouse on the border of the selection so that the mouse pointer changes to an arrow. Then drag the selection and drop it anywhere on the chart. Excel confirms the addition by extending the rectangles to include the new data.



### 3.1.2 Adding Series

Adding a new series is like adding new points to existing series: Select the data series you want to add, copy it, and then paste it onto the chart. If the new data series is adjacent to the existing data, Excel has no difficulty figuring out that you want to add a new series rather than some new points.



### 3.2 Removing Data

The simplest way to remove a data series from a chart is to select the series on the chart itself and press **[Delete]**. This method works even if you've refined the selection to a single point in the series; delete that point and the whole series is gone. If you try to delete the series by clearing or deleting the source data on the worksheet, your chart will still reference the empty or nonexistent cells.

To delete points from either end of all the series in a chart, select the chart area or the plot area, and then drag the Fill handle at one of the corners of either the purple or blue bounding rectangle that surrounds your data. To remove points from a particular series, select that series, and then drag the blue Fill handle.

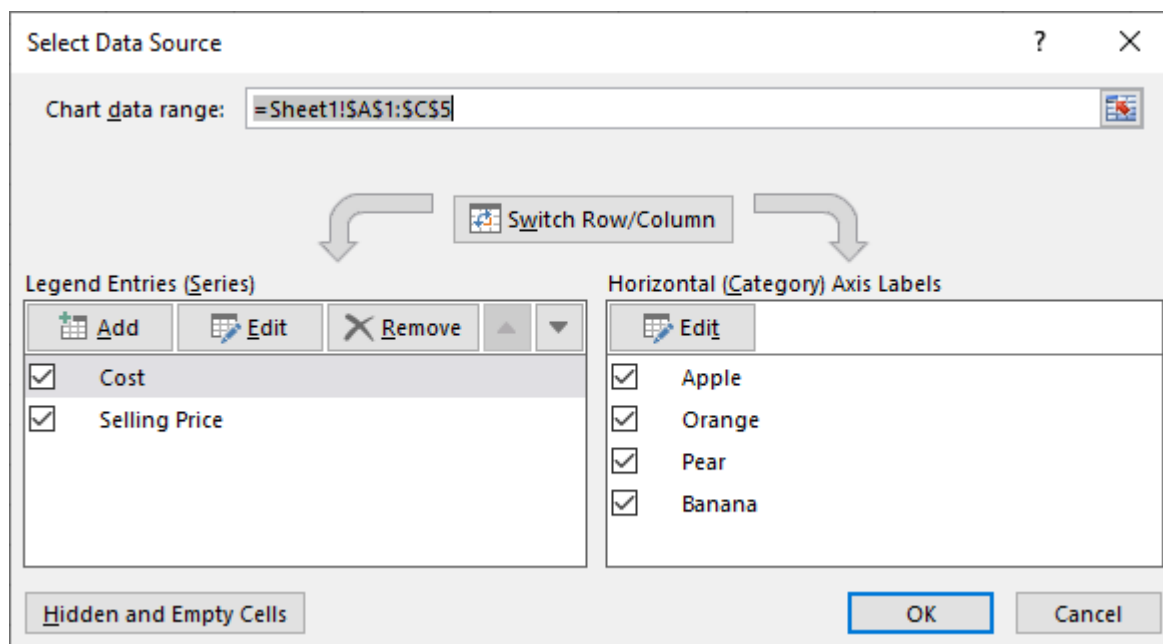
### 3.3 Changing or Replacing Data

If you drag the lower or upper perimeter of a data-bounding rectangle, rather than its Fill handle, Excel moves both the start and endpoint of your series. This can be an effective way to obtain detailed views of a chart's data across the whole range of available data. To switch to an entirely different set of data, select any part of your chart, and then choose **Source Data**. You can adjust the entire chart at once (all series) by using the **Data Range** box on the **Data Range** tab, or you can work with individual series on the **Series** tab.



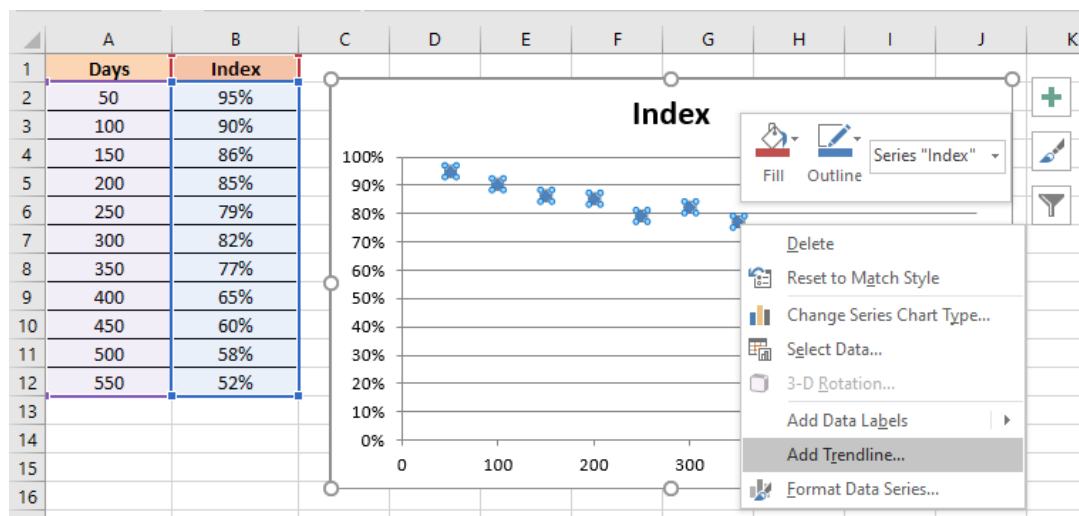
### 3.4 Changing the Plot Order

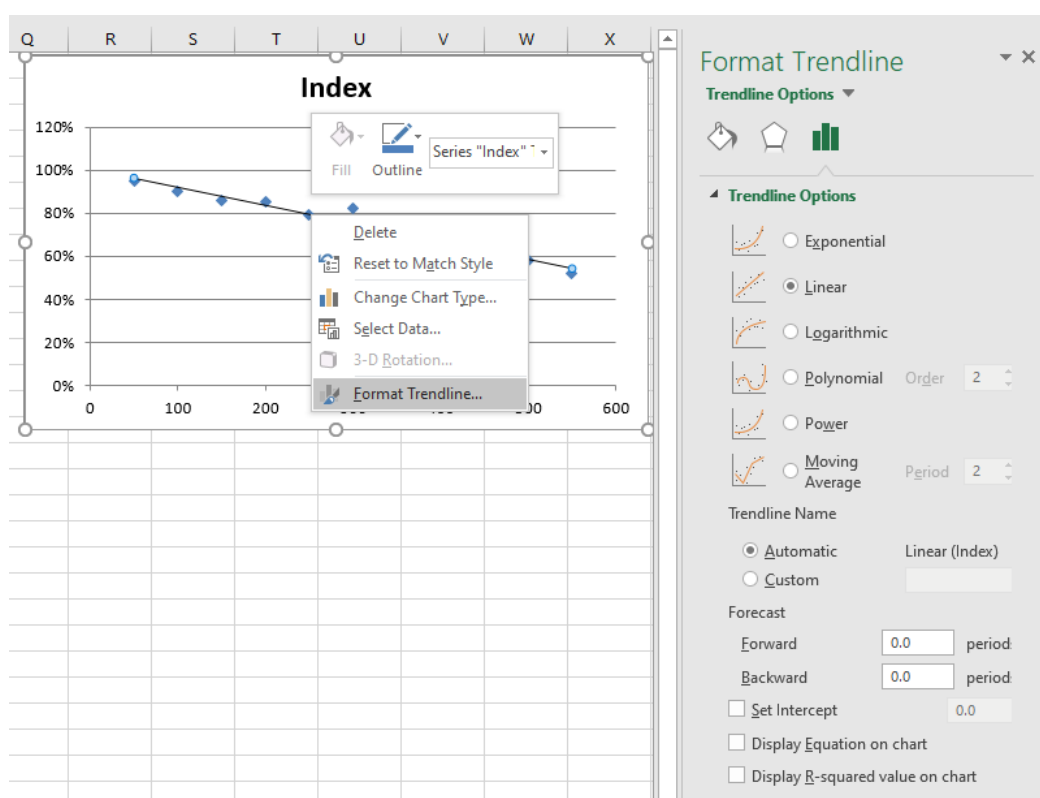
To change the order in which series are plotted, select any series and choose **Selected Data Source**. Use the Move Up and Move Down buttons to manipulate the series order.



### 3.5 Adding Trend Lines

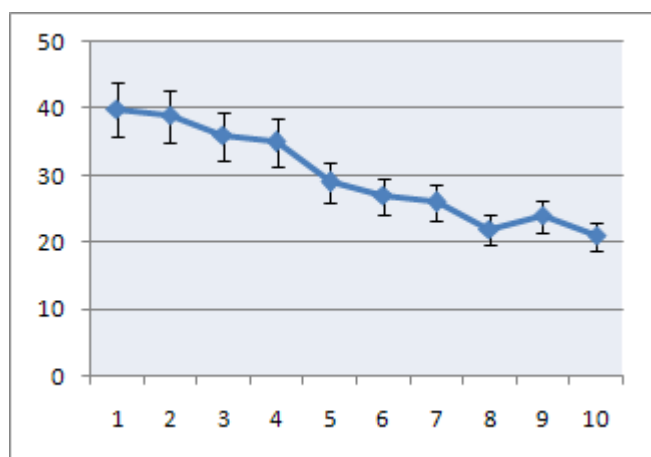
A trend line is a line that describes the general tendency of a data series. To add a trend line to a series in an area, bar, column, line, or xy (scatter) chart, first select the series, and then choose **Add Trendline**. If you select Polynomial, indicate the highest power for the independent variable in the adjacent Order box. If you select Moving Average, indicate the number of periods should use in its calculations in the adjacent Period box. After you've indicated the type of trend or regression line, select the Options tab if you want a name for the trend line to appear in the chart legend. For linear, polynomial, and exponential trend lines, you can also set the y-intercept in the Set Intercept box. You can also display the regression equation and the R-squared value beside the trend line plot.





### 3.6 Error Bars

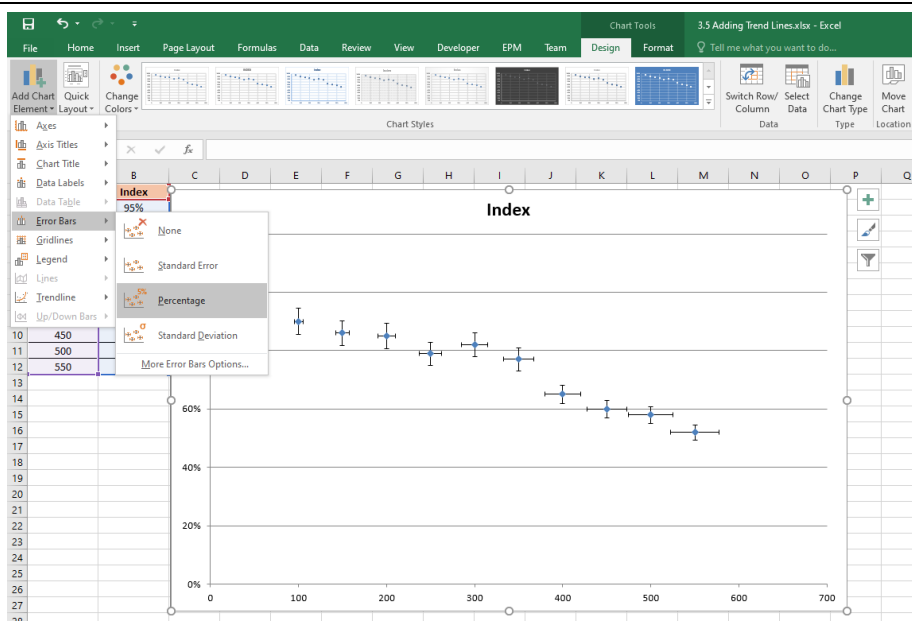
Error bars express potential error amounts that are graphically relative to each data point or data marker in a data series. For example, you could show 5 percent positive and negative potential error amounts in the results of a scientific experiment:



You can add error bars to data series in a 2-D area, bar, column, line, xy (scatter), and bubble charts. For xy (scatter) and bubble charts, you can display error bars for the x values, the y values, or both.

#### 3.6.1 Add Error Bars

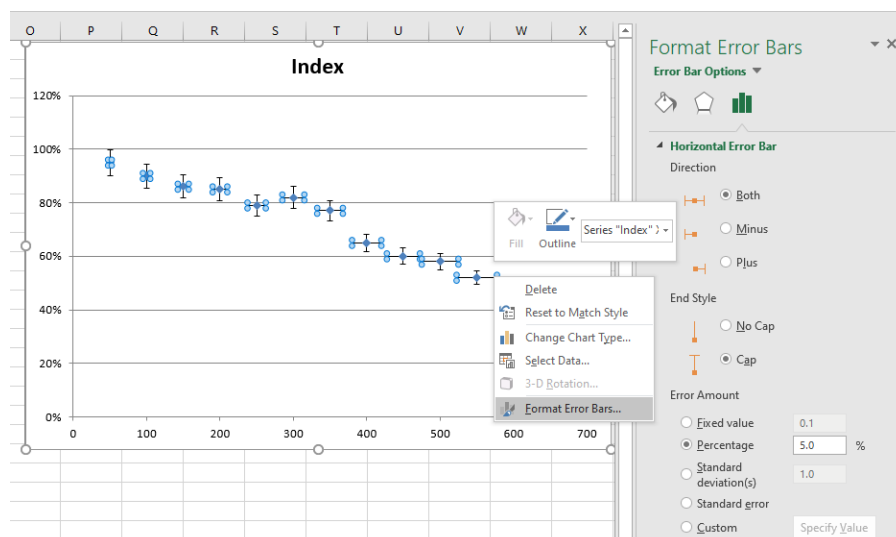
1. Selected data point or data series, click the data point or data series that you want, or do the following to select it from a list of chart elements:
2. On the **Layout** tab, in the **Analysis** group, click **Error Bars**. Click a predefined error bar option, such as **Error Bars with Standard Error**, **Error Bars with Percentage**, or **Error Bars with Standard Deviation**.



- Besides, you can click **More Error Bar Options**, and then under Vertical Error Bars or Horizontal Error Bars, click the display and error amount options that you want to use.

### 3.6.2 Change Error Bar Settings

- On a chart sheet or in an embedded chart, click the error bar or data series that has the error bars that you want to change. When you select an error bar, any changes that you make affect all of the error bars in its associated data series.
- On the Format menu, click Selected Data Series.
- Click the Y Error Bars tab or the X Error Bars tab, depending on the type of error bars that you want to change, and then do one or more of the following:
  - To select a different type of error bar, click the type that you want under Display.
  - To change the method used to determine the error, select the method that you want under Error amount.
  - To change a custom error amount, click Custom. In the Plus and Minus boxes, specify the worksheet range to use as error amount values, or enter the values that you want to use, separated by commas, for example, 0.4, 0.3, 0.8.



### 3.6.3 Remove Error Bars

On a chart sheet or in an embedded chart, click any error bar to remove all error bars in a data series, and then press **[Delete]**. Or you can right-click an error bar, and then click **Clear**.

You can also remove error bars immediately after you add them to the chart by clicking **Undo** on the **Edit** menu, or by pressing **[Ctrl] + [Z]**.

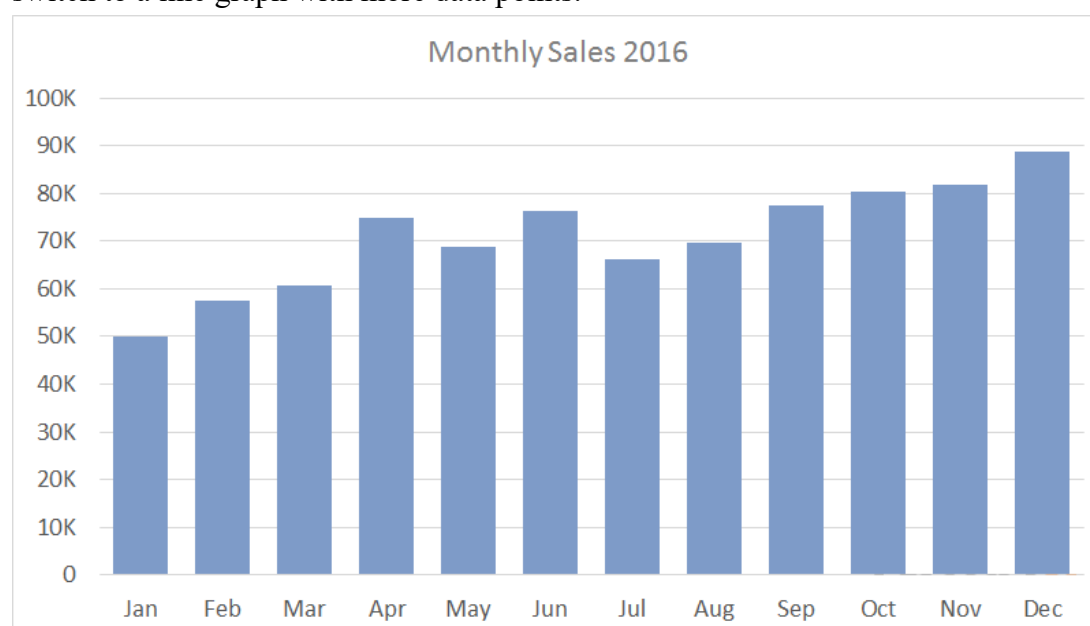
## 4. Most Popular Chart Type

### 4.1 Column Chart

#### 4.1.1 Column Chart

Column charts are a good way to show change over time because it's easy to compare column lengths. Like bar charts, column charts can be used to plot both nominal data and ordinal data, and they can be used instead of a pie chart to plot data with a part-to-whole relationship.

Column charts work best where data points are limited (i.e. 12 months, 4 quarters, etc.). You can switch to a line graph with more data points.



#### Pros

- Easy to read
- Simple and versatile
- Easy to add data labels at ends of bars

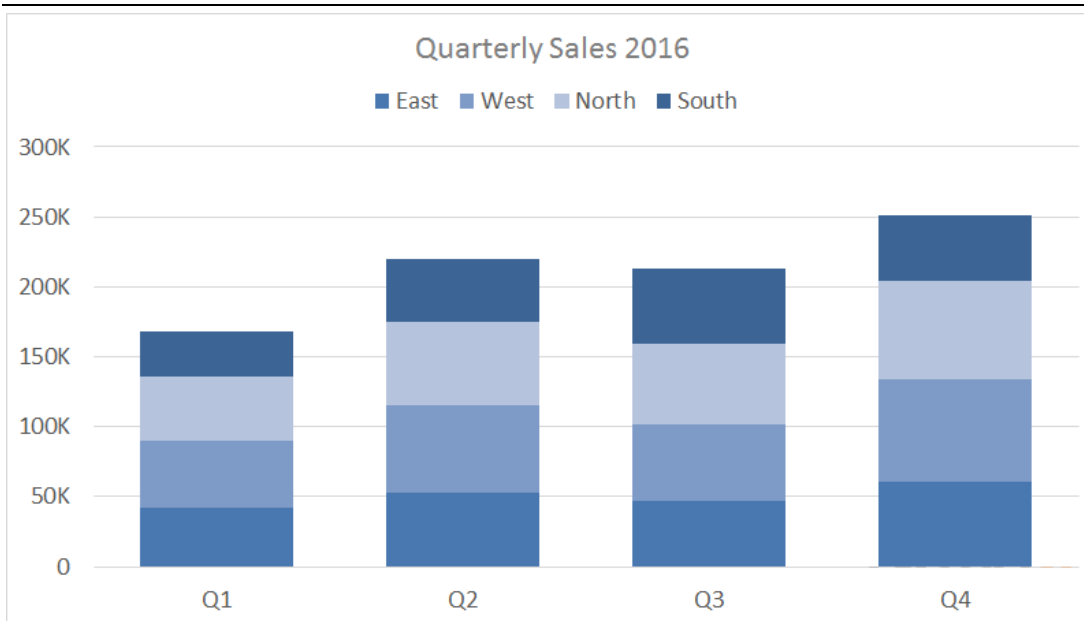
#### Cons

- Become cluttered with too many categories
- Clustered column charts can be difficult to interpret

#### 4.1.2 Stacked Column Chart

Stacked column chart allows part-to-whole comparisons over time, or across categories. In a stacked column chart, data series are stacked one on top of the other in vertical columns.

Stacked column charts can show change over time because it's easy to compare total column lengths. However, except for the first series of data (next to the x-axis) and total bar length, it's difficult to compare the relative size of the components that make up each bar. As categories or data series are added, stacked column charts quickly become complicated.

**Pros**

- Multiple categories and data series in compact space
- Can show change over time

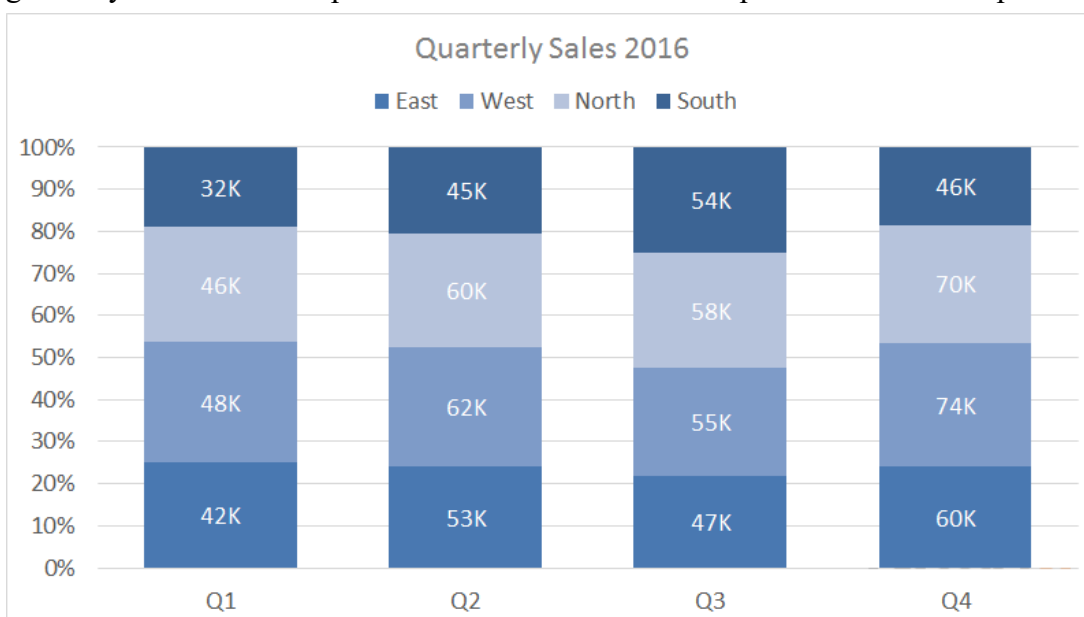
**Cons**

- Difficult to compare all but first series
- Become visually complex as categories or series are added

**4.1.3 100% Stacked Column Chart**

A 100% stacked column chart shows the relative percentage of multiple data series in stacked columns, where the total (cumulative) of stacked columns always equals 100%. The chart can show the part-to-whole proportions over time, for example the proportion of quarterly sales per region or the proportion of monthly mortgage payment that goes toward interest vs. principal.

Although stacked column charts can show the change over time of a part-to-whole relationship, it's generally difficult to compare the relative size of the components that make up each column.



**Pros**

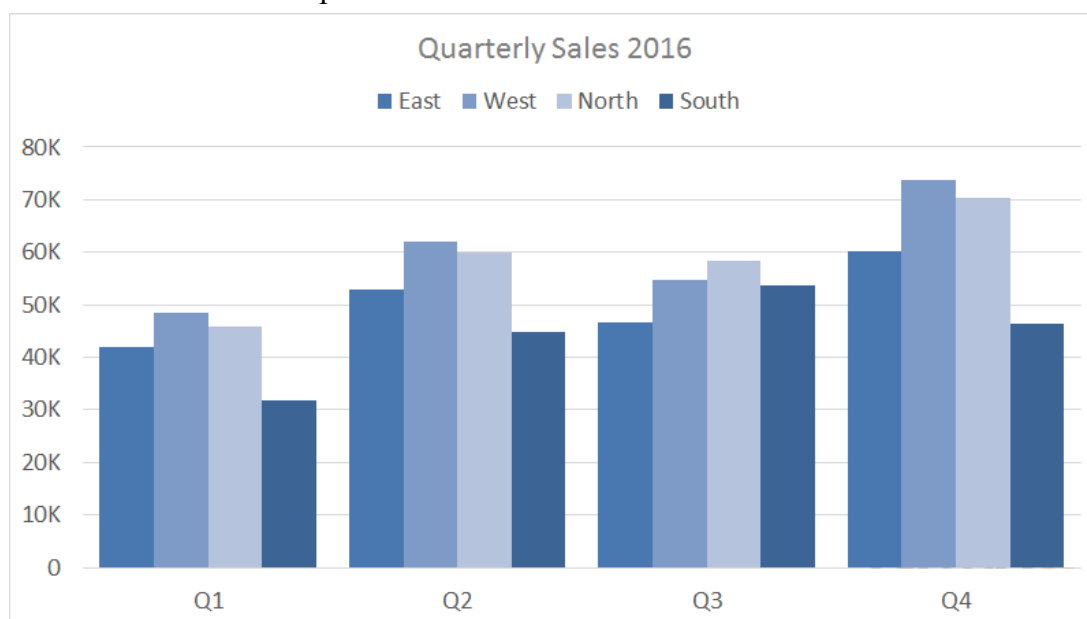
- Multiple categories and data series in compact space
- Can show part-to-whole changes over time

**Cons**

- Difficult to compare all but first series
- Become visually complex as categories or series are added

**4.1.4 Clustered Column Chart**

A clustered column chart displays more than one data series in clustered vertical columns. Each data series shares the same axis labels, so vertical bars are grouped by category. Clustered columns allow the direct comparison of multiple series, but they become visually complex quickly. They work best in situations where data points are limited.

**Pros**

- Allow direct comparison of multiple data series per category
- Can show change over time

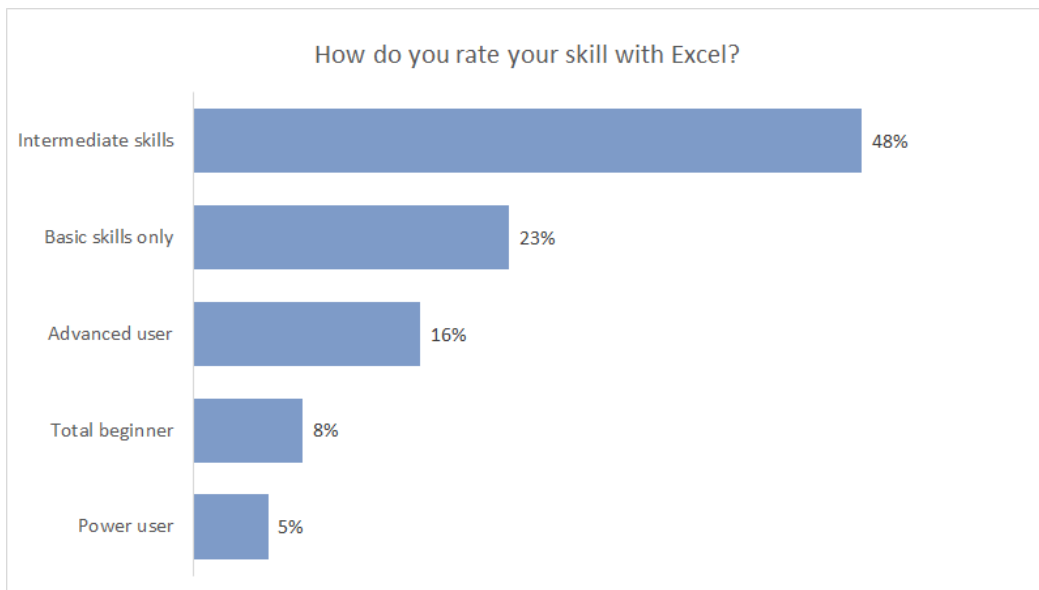
**Cons**

- More difficult to compare a single series across categories
- Become visually complex as categories or series are added

**4.2 Bar Chart****4.2.1 Bar Chart**

A bar chart is a good choice for categorical data. Bar charts plot data using horizontal bars, so they are very easy to read because the human eye can easily compare bars. Also, because of the horizontal layout, bar charts have room to accommodate longer category names.

Bar charts are also versatile. They can be used to plot both nominal data and ordinal data, and they can be used instead of a pie chart to plot data with a part-to-whole relationship. If you're trying to decide on a chart type, a bar chart is a good first choice.



### Pros

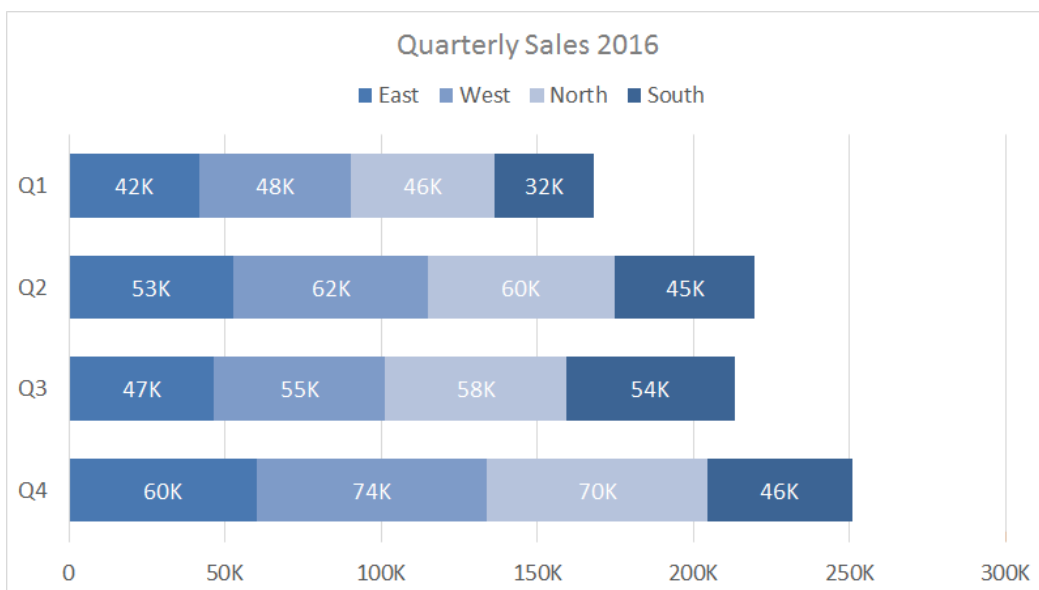
- Very easy to read
- Versatile
- Easy to add data labels at ends of bars
- Room for longer text labels

### Cons

- Become cluttered with too many categories
- Clustered bar charts are harder to read as data series are added

## 4.2.2 Stacked Bar Chart

A stacked bar allows comparison of components across categories. Data is plotted using horizontal bars stacked from left to right. Stacked bar makes it easy to compare total bar lengths. However, except for the first series of data (next to the axis) it's more difficult to compare the relative size of the components that make up each bar. Also, as categories or data series are added, stacked column charts quickly become visually complex.





**Pros**

- Multiple categories and data series in a compact space
- Able to show change over time of category sub-components

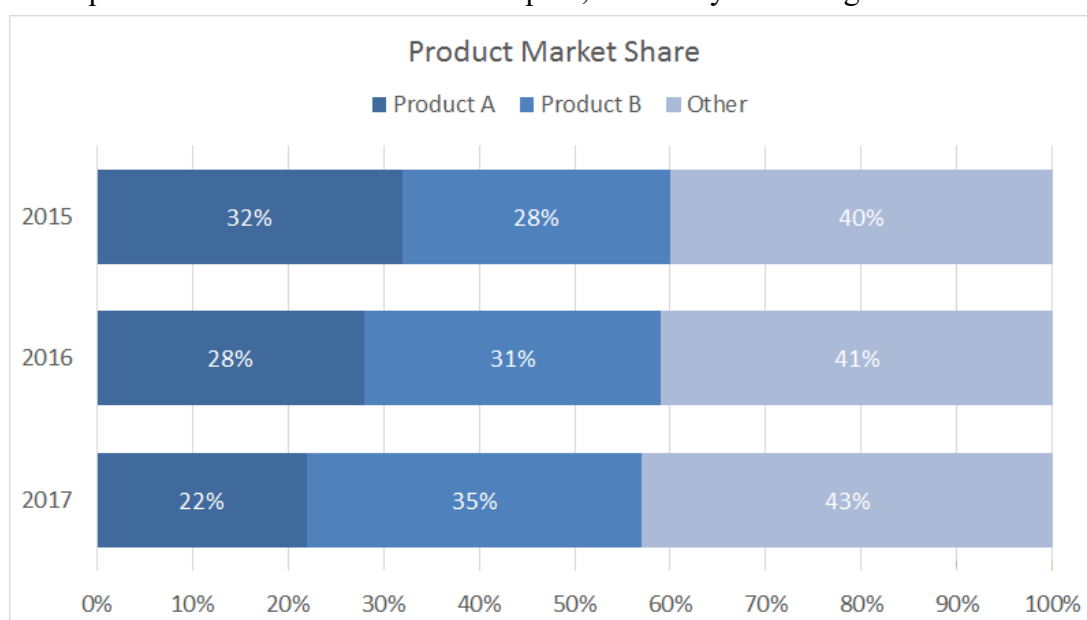
**Cons**

- Difficult to compare all but first series
- Become visually complex as categories or series are added

**4.2.3 100% Stacked Bar Chart**

A 100% stacked bar chart designed to show the relative percentage of multiple data series in stacked bars, where the total (cumulative) of each stacked bar always equals 100%. Like a pie chart, a 100% stacked bar chart shows a part-to-whole relationship. However, unlike a pie chart, a 100% stacked bar chart can show how proportions change over time, for example, product market share changes per year, as shown above.

Like all stacked bar charts, the first data series (next to the axis) is easy to compare visually, but subsequent data series are harder to compare, since they aren't aligned to a common element.

**Pros**

- Able to show part-to-whole changes over time
- Multiple categories and data series in compact space

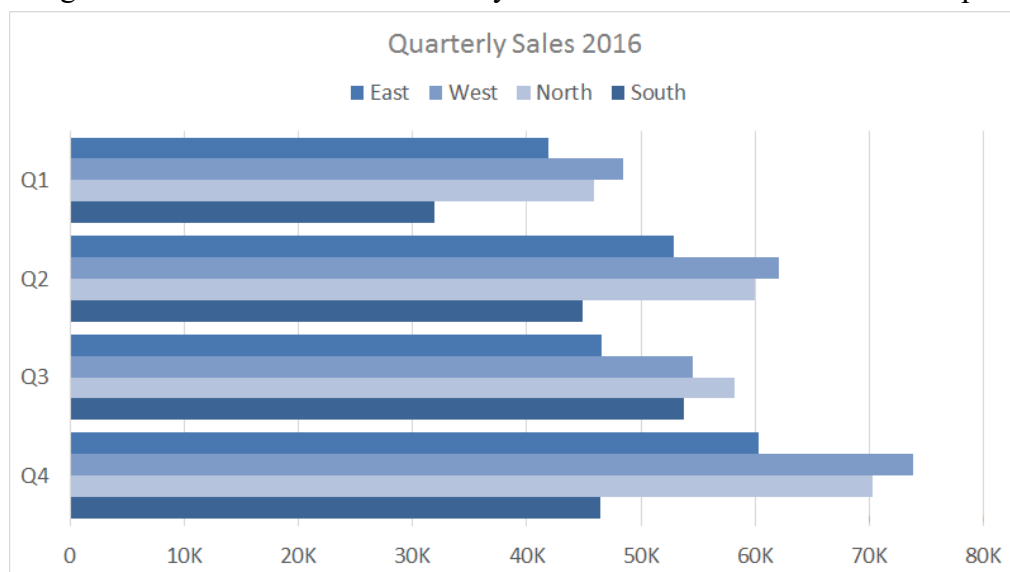
**Cons**

- Difficult to compare all but first series
- Stacked bars normalized to 100% so absolute value dimension is lost
- Become visually complex as categories or series are added

**4.2.4 Clustered Bar Chart**

A clustered bar chart displays more than one data series in clustered horizontal columns. Each data series shares the same axis labels, so horizontal bars are grouped by category. Clustered bars allow the direct comparison of multiple series in a given category, but it's more difficult for the human eye to compare the same data series across categories.

Like clustered column charts, clustered bar charts become visually complex as the number of categories or data series increase. They work best in situations where data points are limited.



### Pros

- Allow direct comparison of multiple data series per category
- Can show change over time

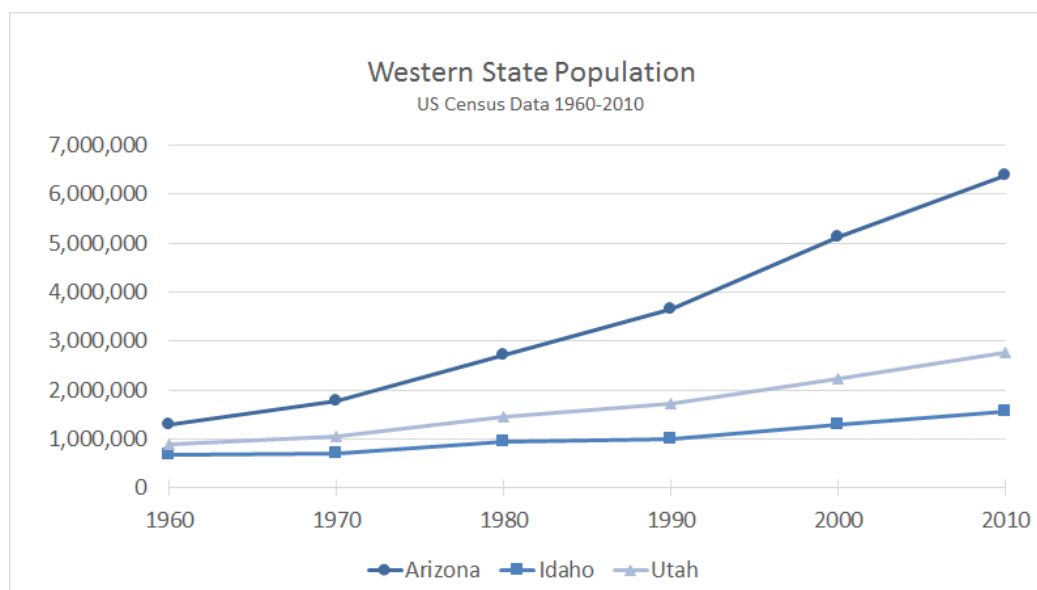
### Cons

- More difficult to compare a single series across categories
- Become visually complex as categories or series are added

## 4.3 Line Chart

### 4.3.1 Line Chart

A line chart plots each data series as a separate line. Line charts are a good way to show change or trends over time. In contrast to column or bar charts, line charts can handle more categories and more data points without becoming too cluttered. Line charts can be customized to show or hide data markers of various shapes and sizes.



**Pros**

- Simple presentation; easy to read and create
- Clean presentation of multiple data series with many data points
- Good for showing trends over periods of time
- Can handle positive and negative values

**Cons**

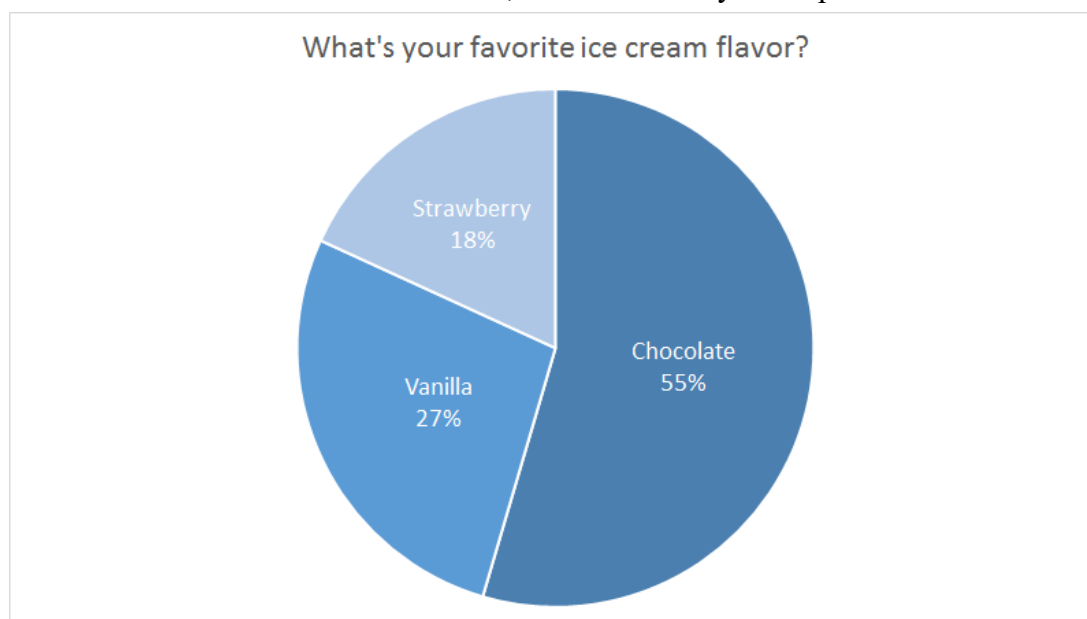
- Harder to read when lines overlap frequently
- Line can imply more data than actually available (compared to bar or column chart)

## 4.4 Pie Chart

### 4.4.1 Pie Chart

The Pie chart expresses a "part to whole" relationship, where all pieces together represent 100%. Pie charts work best to display data with a small number of categories (2-5). For example, survey questions in yes/no format, data split by gender, new and returning visitors to a website, etc.

Pie charts should be avoided when there are many categories, or when categories do not total 100%. The human eye has trouble comparing the relative size of slices in a pie chart, so pie charts should also be avoided when slices are similar, unless similarity is the point.

**Pros**

- Simple, compact presentation
- Can be read "at a glance" with limited categories
- Excel can calculate % values automatically

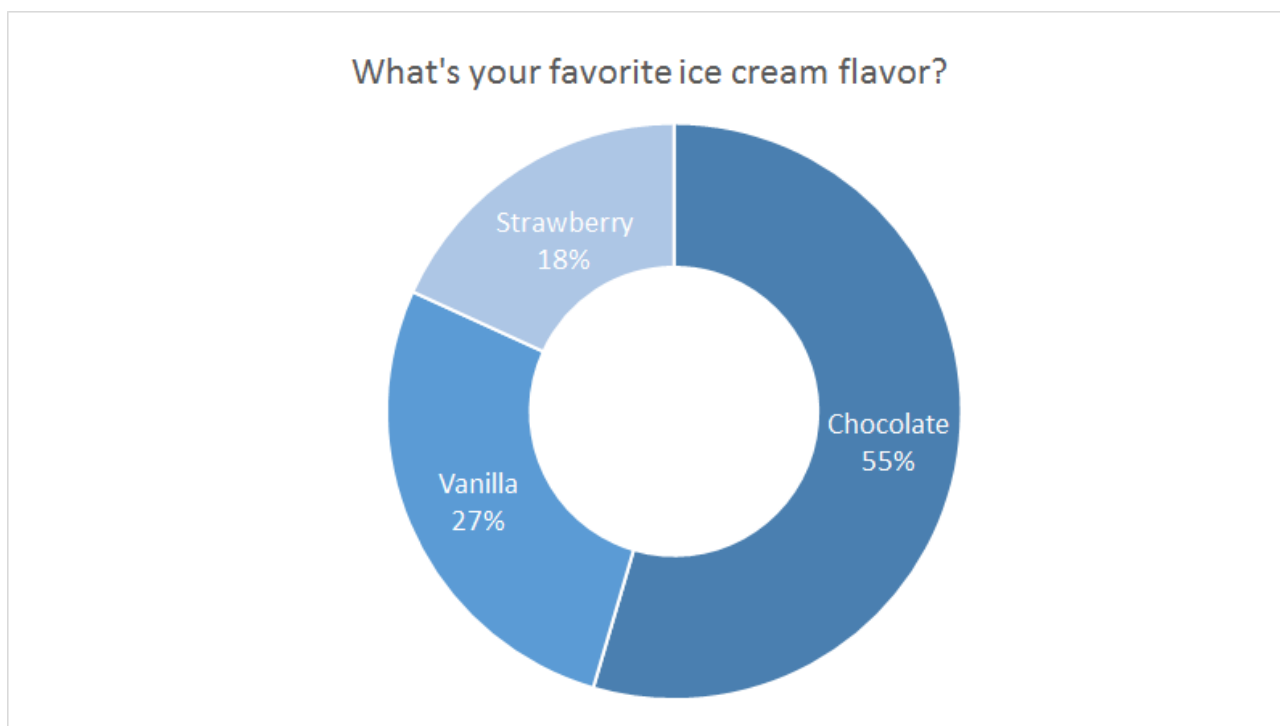
**Cons**

- Difficult to compare relative size of slices
- Become cluttered and dense as categories are added
- Limited to part-to-whole data
- Poor at showing change over time

## 4.4.2 Doughnut Chart

Doughnut charts express a "part-to-whole" relationship, where all pieces together represent 100%. Doughnut charts work best to display data with a small number of categories (2-5). For example, you could use a doughnut chart to plot survey questions with a small number of answers, data split by gender, Windows vs. Mac users, or other data where categories are limited.

Doughnut charts should be avoided when there are many categories, or when categories do not sum to 100%.



### Pros

- Simple, compact presentation
- Can be read "at a glance"
- Excel will calculate percentages automatically

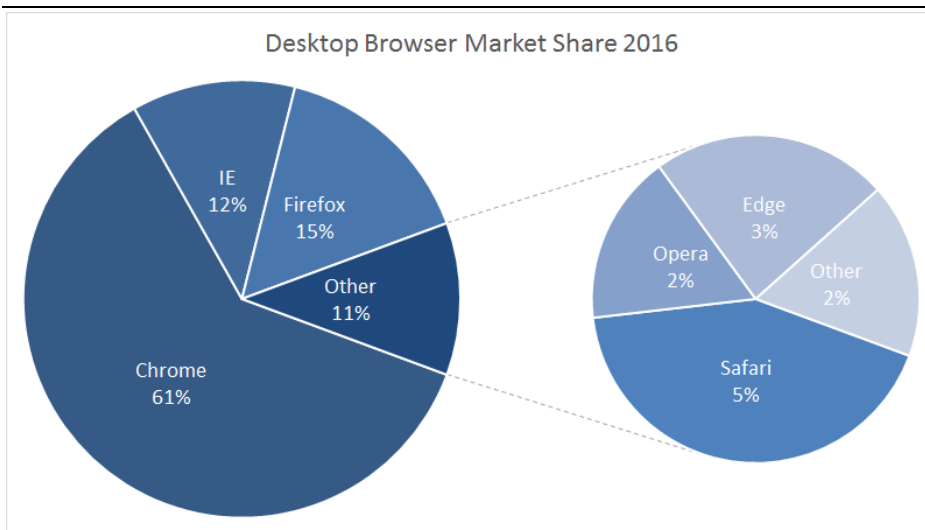
### Cons

- Difficult to compare relative size of slices
- Become cluttered and dense as categories are added
- Limited to part-to-whole data
- Poor at showing change over time

## 4.4.3 Pie of Pie Chart

The Pie of Pie Chart provides a way to add additional categories to a pie chart without generating a pie chart too complex to read. Excel provides a setting that moves the smallest n slices of the pie to another smaller pie, where n can be adjusted to suit the data.

Pie of pie charts should be avoided when there are many categories, or when categories do not total 100%. The human eye has trouble comparing the relative size of slices in a pie chart, and this problem is compounded with the pie of pie variety.



### Pros

- A simple way to handle more categories in a pie chart
- Can be read "at a glance" with limited categories
- Excel can calculate and display percentages automatically as data labels

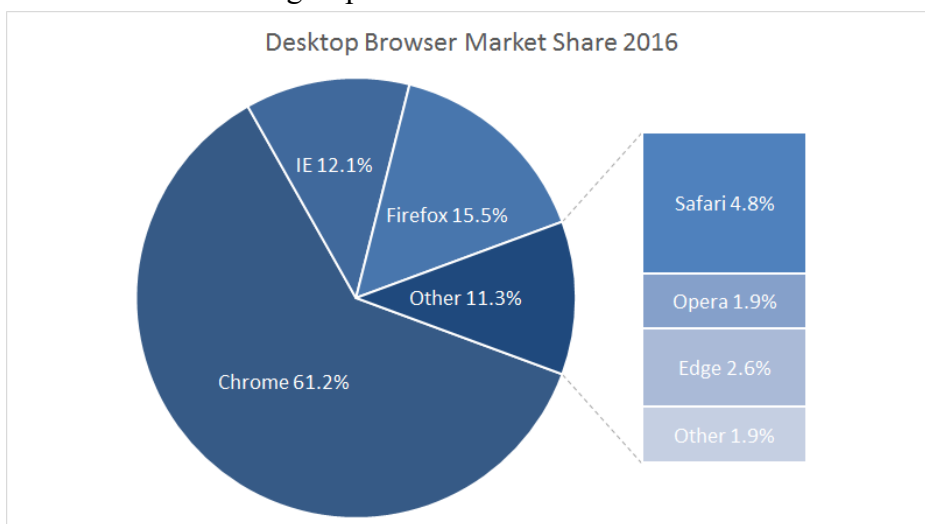
### Cons

- Difficult to compare relative size of slices
- Become cluttered and dense as categories are added
- Limited to part-to-whole data
- Poor at showing change over time

### 4.4.4 Bar of Pie Chart

A Bar of Pie Chart is a type of pie chart that has a bar attached to it. This bar expands a group of values that can't be shown on the same pie chart.

Pie chart is good for showing how much is something part of a whole. But with too many categories or participants, the pie chart gets confusing. We combine the smaller slices of pie chart into and show it as a whole pie chart, by default named another. To see who or what is the part of this other slice of pie chart, we use the bar of pie chart. This bar contains all the members of other groups and shows how that other group was created.



**Pros**

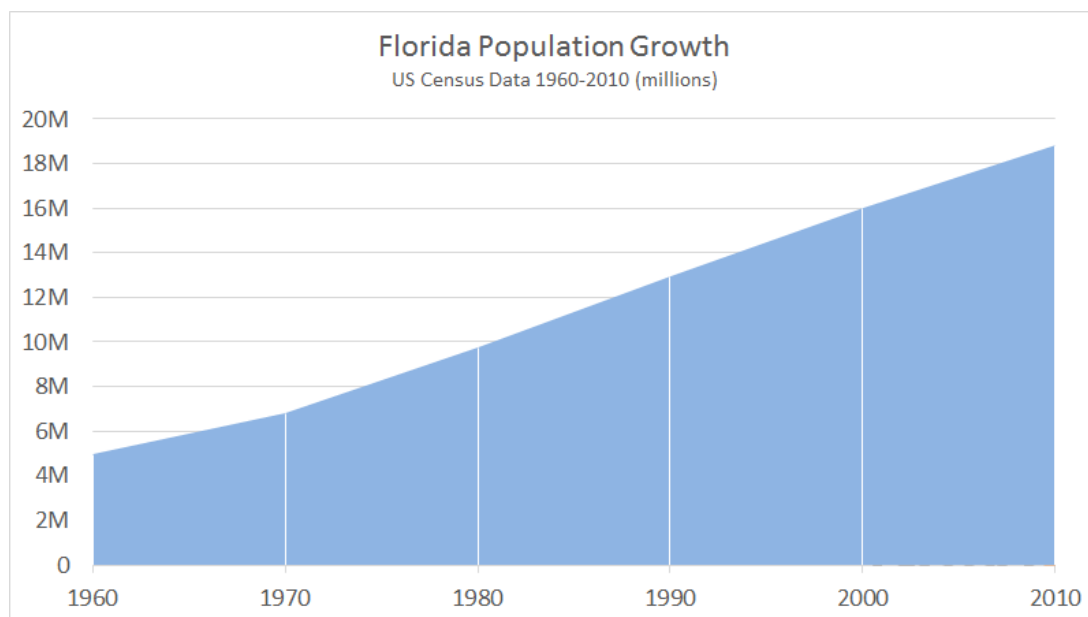
- A simple way to handle more categories in a pie chart
- Can be read "at a glance" with limited categories
- Excel can calculate and display percentages automatically as data labels

**Cons**

- Difficult to compare relative size of slices
- Become cluttered and dense as categories are added
- Limited to part-to-whole data
- Poor at showing change over time

**4.5 Area Chart****4.5.1 Area Chart**

Area charts are much like line charts, but they display different colors in the areas below the lines. This colorful and visual display distinguishes the data more clearly. Area charts are a good way to show change over time with one data series. They offer a simple presentation that is easy to interpret at a glance.

**Pros**

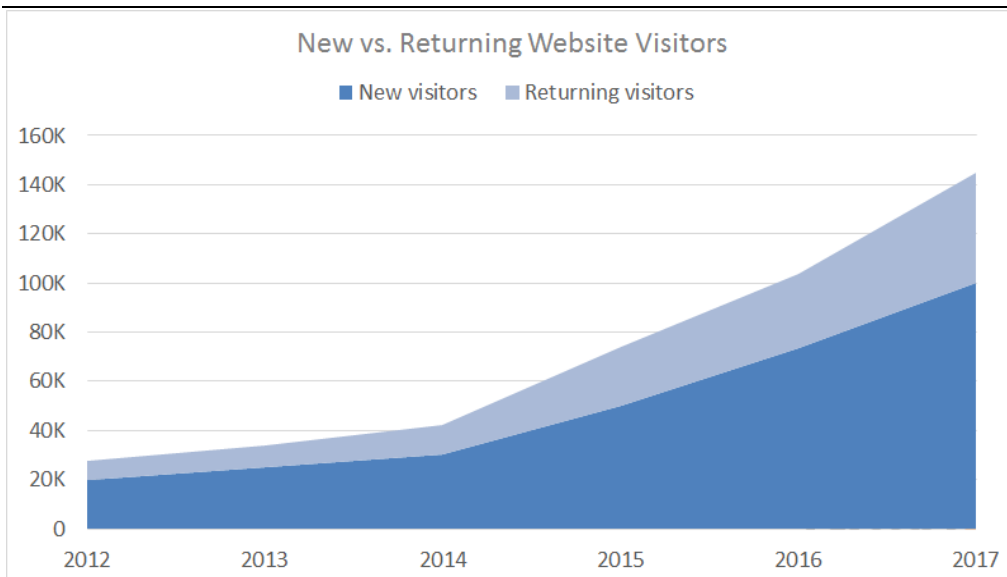
- Simple presentation; easy to read and create
- Good for showing trends over periods of time
- Can handle positive and negative values

**Cons**

- Don't usually work well for multiple data series
- Line can imply more data than actually available (compared to bar or column chart)

**4.5.2 Stacked Area Chart**

A Stacked Area Chart shows data series plotted with filled areas stacked, one on top of the other. A stacked area chart can show how part to whole relationships change over time. They offer a simple presentation that is easy to interpret at a glance.

**Pros**

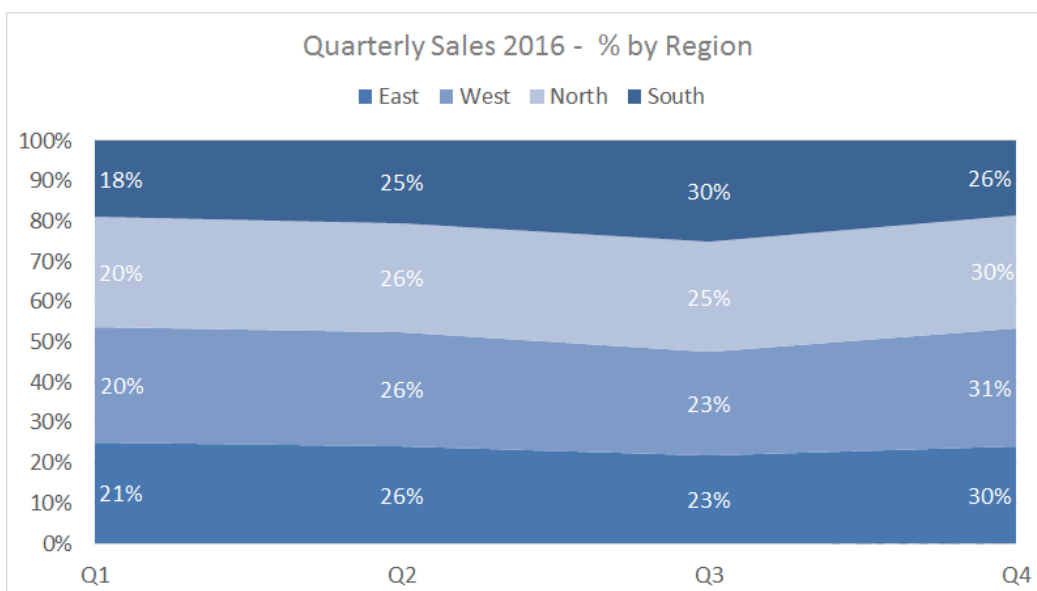
- Simple presentation can be read at a glance
- Can show part to whole changes over time

**Cons**

- Generally harder to add data labels since there is less white space available
- Area charts can imply more data than actually available

**4.5.3 100% Stacked Area Chart**

A 100% Stacked Area Chart plots data as areas and stacked so that the cumulative area always represents 100%. Stacked Area charts can show a progression and composition over time, and the 100% Stacked Area Chart is meant to show the percentage that each component contributes when the cumulative total is not important.

**Pros**

- Can show trends over periods of time
- Can show component contribution changes over time

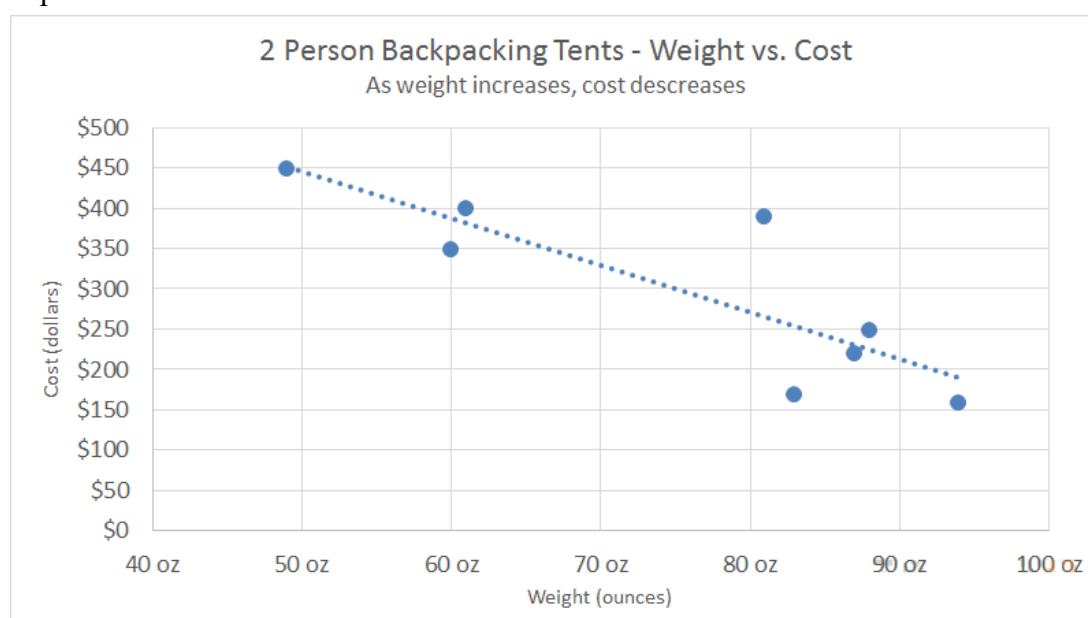
**Cons**

- Non-intuitive presentation may be unfamiliar to many
- Hard to read as data series are added

**4.6 XY (Scatter) Chart****4.6.1 Scatter Plot**

A Scatter Plot shows the relationship between two variables. A scatter plot works by placing one variable on the vertical axis and a different variable on the horizontal axis. Each piece of data is then plotted as a discrete point on the chart. In a scatter plot, both the X and Y axis display values – an XY chart has no category axis.

By convention, the X axis represents arbitrary values that do not depend on another variable, referred to as the independent variable. Y values are placed on the vertical axis and represent the dependent variable.

**Pros**

- Can show the relationship of one variable to another
- Visual display of correlation
- Ideal for many types of scientific data

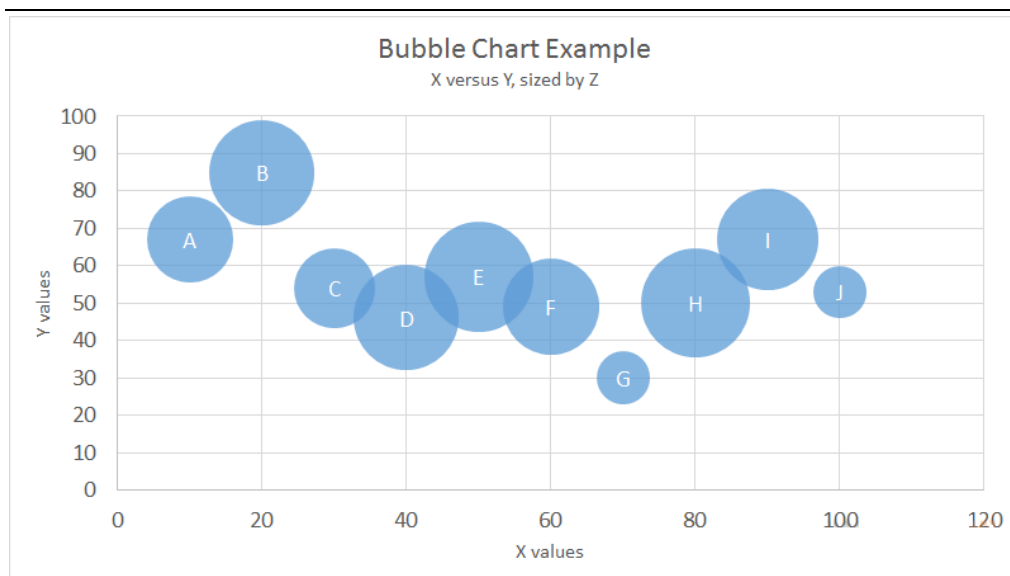
**Cons**

- Not as well understood as many other chart types
- Suitable only for data where correlation is expected

**4.6.2 Bubble Chart**

A Bubble chart is a variation of a scatter chart in which the data points are replaced with bubbles. A Bubble chart can be used instead of a scatter chart if your data has three data series, each of which contains a set of values. In a Bubble chart, the size of the bubbles is determined by the values in the third data series.



**Pros**

- Can show the relationship of one variable to another
- Unique ability to show data about a third dimension
- Can visually display correlation

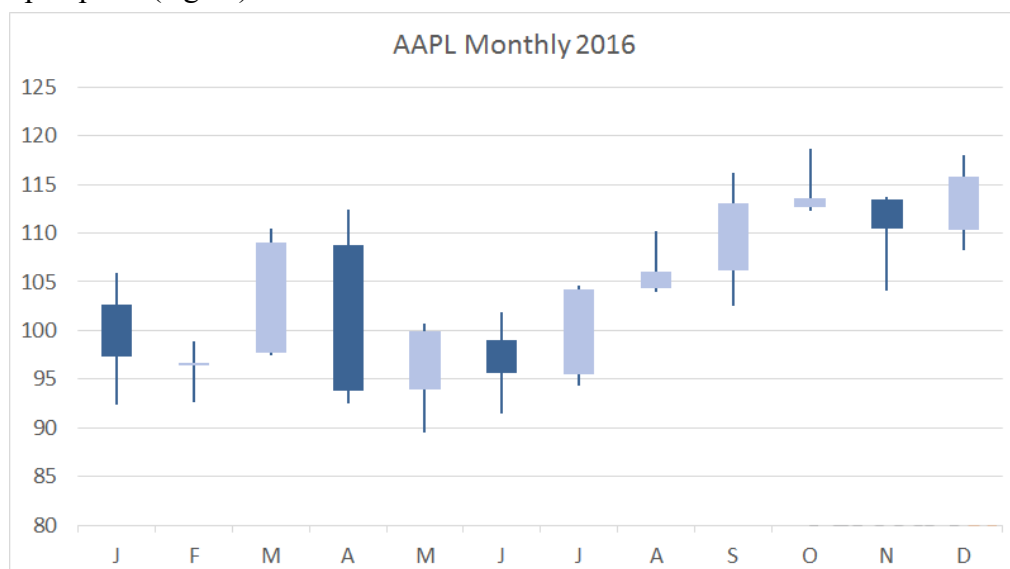
**Cons**

- Unusual chart type may be difficult to ready for many people
- More difficult to set up than other chart types

**4.7 Stock Chart****4.7.1 Candlestick Chart**

A Candlestick chart used to show stock price activity. You'll find this chart under the Stock category of chart types, with the name Open-High-Low-Close, sometimes abbreviated OHLC.

This chart type automatically plots the full range of values as a single line, with indicates high and low in a given time interval. On top of the line is a bar which indicates open and close values. Dark bars indicate close price is less than open price (a loss), light bars indicate a close price greater than open price (a gain).



**Pros**

- Quickly plot stock data in open high low close format
- At a glance indication of stock price activity

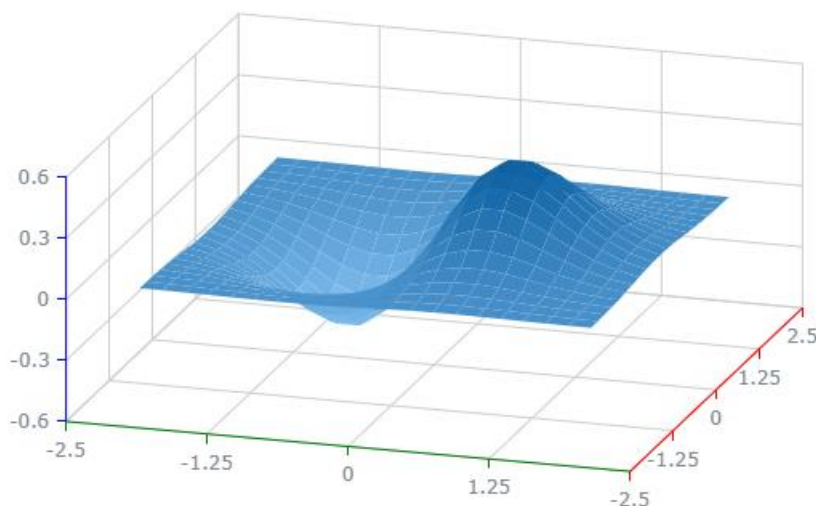
**Cons**

- Not as well understood as many other chart types
- A specific chart type mostly seen in the financial world

**4.8 Surface Chart**

Surface Chart displays a set of three-dimensional data as a mesh surface. It is useful when you need to find the optimum combinations between two sets of data.

Surface charts are common for temperature analysis. The chart works on numbers and requires at least two series for its generation. The chart allows easy visualization-based analysis as it rests on the idea of three dimensions. The crucial elements of a surface chart are dimension values or categories that are represented on the x-axis, the measure in the context which is represented by the y-axis, and the third axis i.e. z-axis represents different series in the given context.

**Pros:**

- 3d allows you to see objects from different angles, or perspectives.
- 3d illustrations offers more depth due to its added dimension.

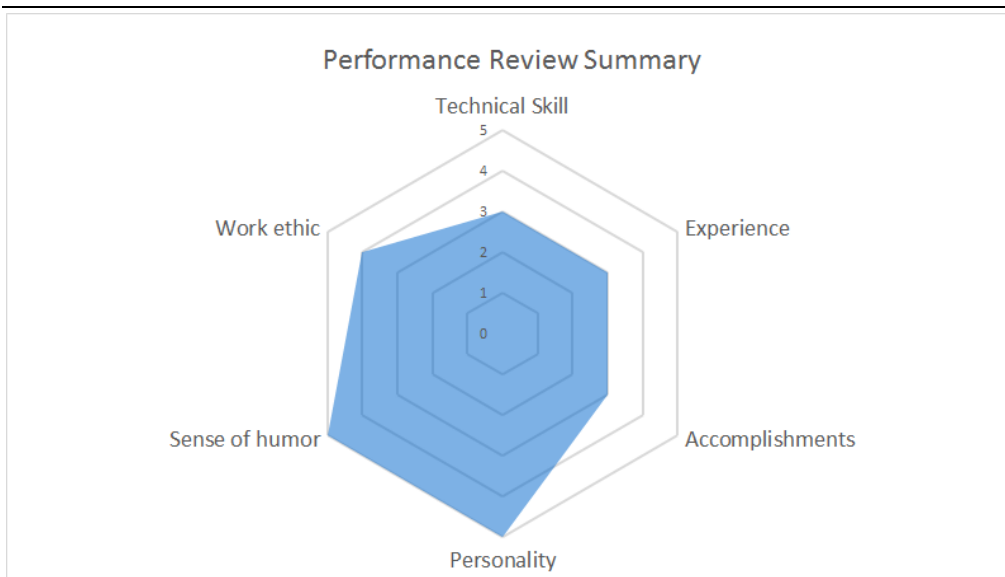
**Cons:**

- Time-based 3d charts are harder to read.
- 3d charts don't automatically add anything new to your existing charts.

**4.9 Radar Chart**

The Radar Charts, sometimes called spider charts, have one axis per category which all use the same scale. The axes of a radar chart radiate out from the center of the chart and data points are plotted on each axis using a common scale. The result is a geometric shape that shows "at-a-glance" performance across all categories.

Radar charts can be used to plot the performance of employees, athletes, products, and companies in various categories. They can be used for performance evaluations and satisfaction surveys.



### **Pros**

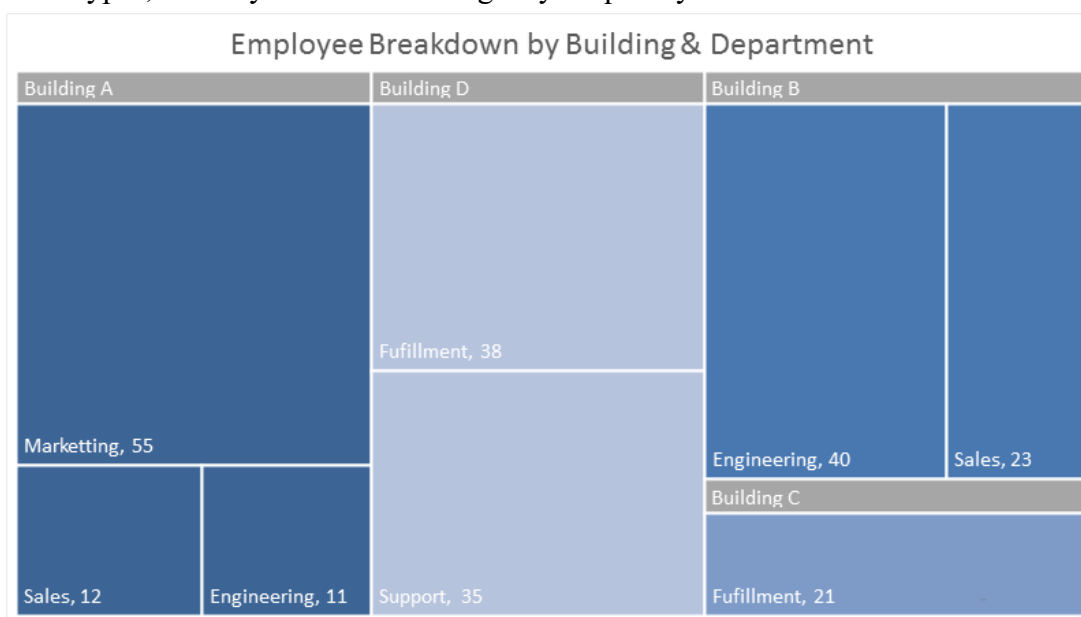
- Compact presentation
- Can show at-a-glance strength or weakness
- Can handle more than one data series

### **Cons**

- Unusual chart type may confuse audience
- More difficult to read for most people

## **4.10 Treemap Chart**

A treemap chart displays hierarchical data in rectangles proportionally sized according to the amount of data in each category. Treemap charts are lacking many of the controls available in other chart types, but they are an interesting way to quickly visualize certain kinds of data.



### **Pros**

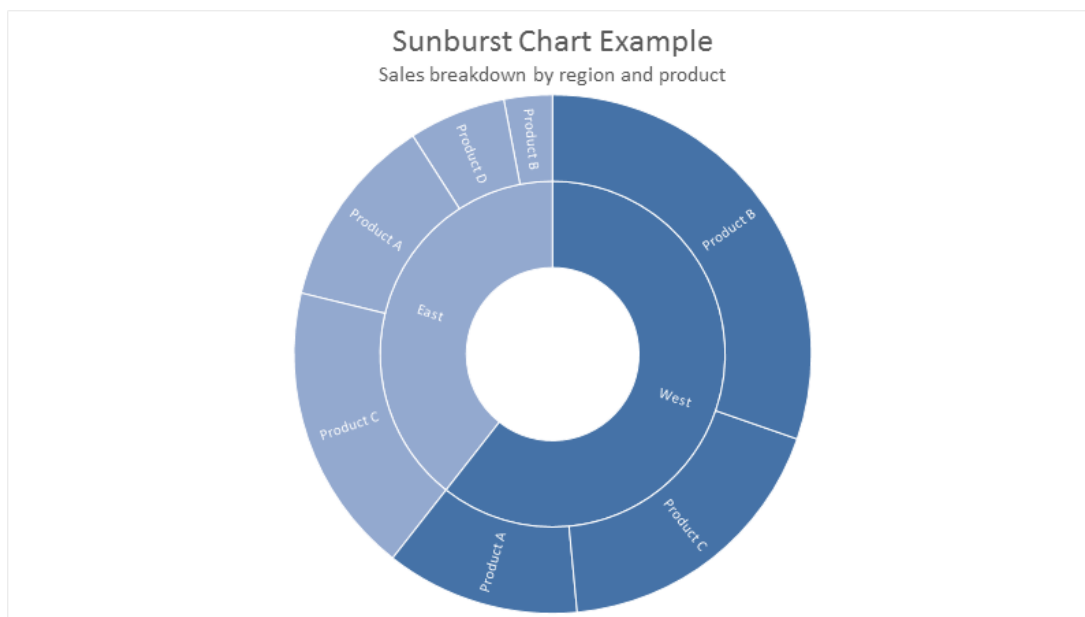
- Quick visualization of hierarchical data
- At-a-glance breakdown data in categories

**Cons**

- Data must be sorted by category
- Missing many of the options available in other chart types

**4.11 Sunburst Chart**

A sunburst chart is used to display hierarchical data in a circular format where each level of the hierarchy is represented as a ring. Top level categories make up the inner ring, and sub-categories are plotted as outer rings. Segments in each ring are sized proportionally using a value series. Like a treemap chart, the sunburst chart can be used to compare relative sizes.

**Pros:**

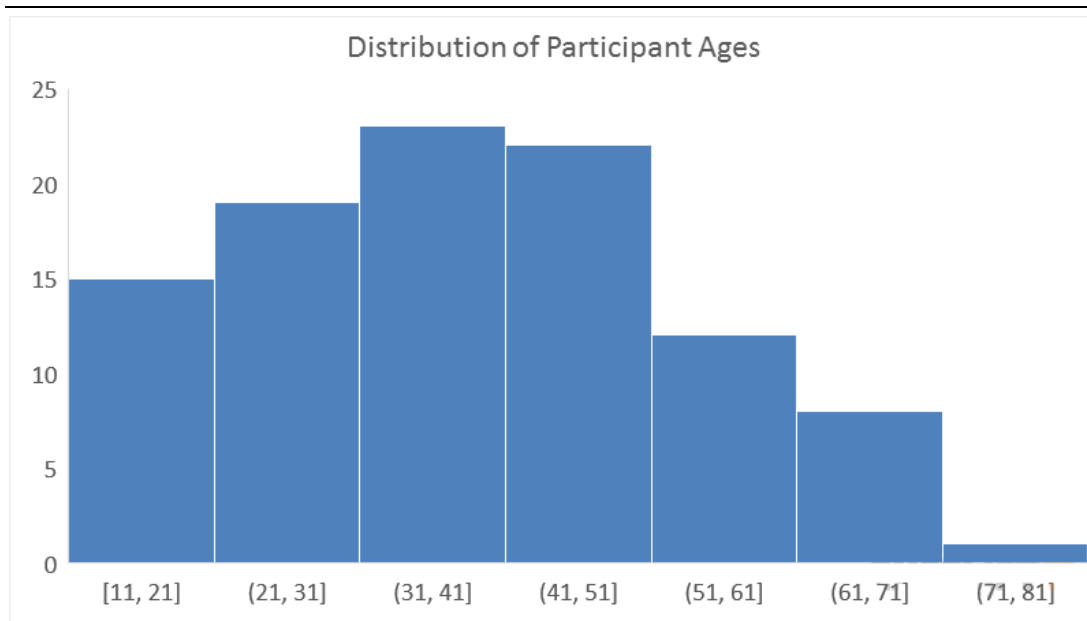
- Quick visualization of hierarchical data
- At-a-glance breakdown of data in categories

**Cons:**

- Data must be sorted by category
- Limited options for controlling format and presentation

**4.12 Histogram****4.12.1 Histogram**

A histogram is a visual representation of the distribution of numerical data. It is a special kind of bar graph where bars represent bins that group together values at specific intervals. The height of each bar shows the proportion of values in that bin. Typically, there are no gaps between bins to represent continuous data.



### Pros

- At-a-glance visualization of the distribution of numerical data

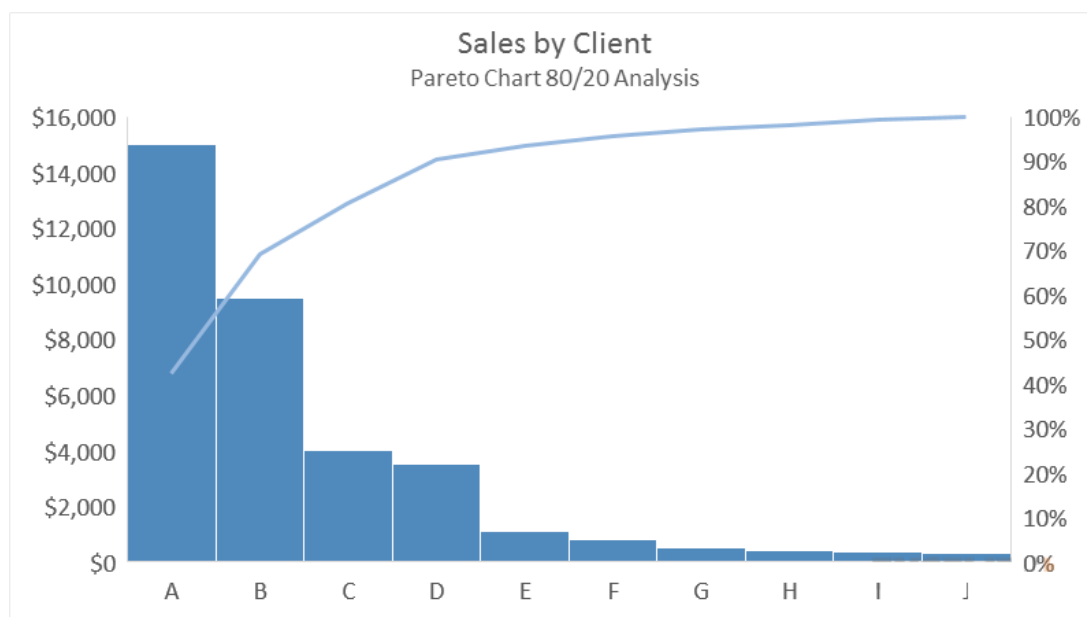
### Cons

- Less common chart type not as familiar to many people
- Built-in histogram chart type has limited options

## 4.12.2 Pareto Chart

A Pareto chart is a variant of the histogram chart, arranged in descending order for easy analysis. The sequencing is performed automatically, and a separate line is added on a secondary axis to make it easy to see contribution toward 100% as columns are plotted to the left.

Pareto charts highlight the biggest factors in a set of data. Following the idea of 80/20 analysis, they try to show which (approximately) 20% of the categories contribute 80% of the data being measured. They are often used in process improvement to show which factors deserve the most attention.



**Pros**

- Quickly highlights most important data
- Excel automatically builds histogram and adds Pareto line

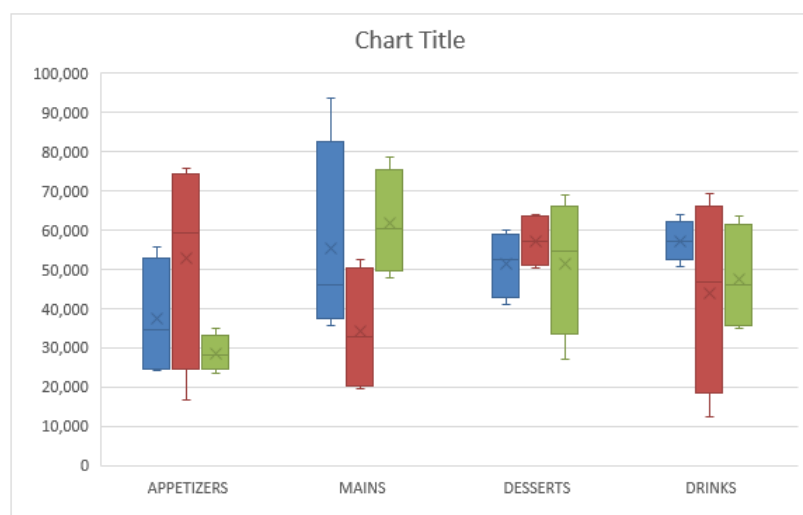
**Cons**

- Less common chart type may be difficult to ready for many people
- Built-in Pareto Chart is not as easy to customize as a standard combo chart

**4.13 Box and Whisker Chart**

A box and whisker chart shows distribution of data into quartiles, highlighting the mean and outliers. The boxes may have lines extending vertically called “whiskers”. These lines indicate variability outside the upper and lower quartiles, and any point outside those lines or whiskers is considered an outlier.

Box and whisker charts are most commonly used in statistical analysis. For example, you could use a box and whisker chart to compare medical trial results or teachers' test scores.

**Pros**

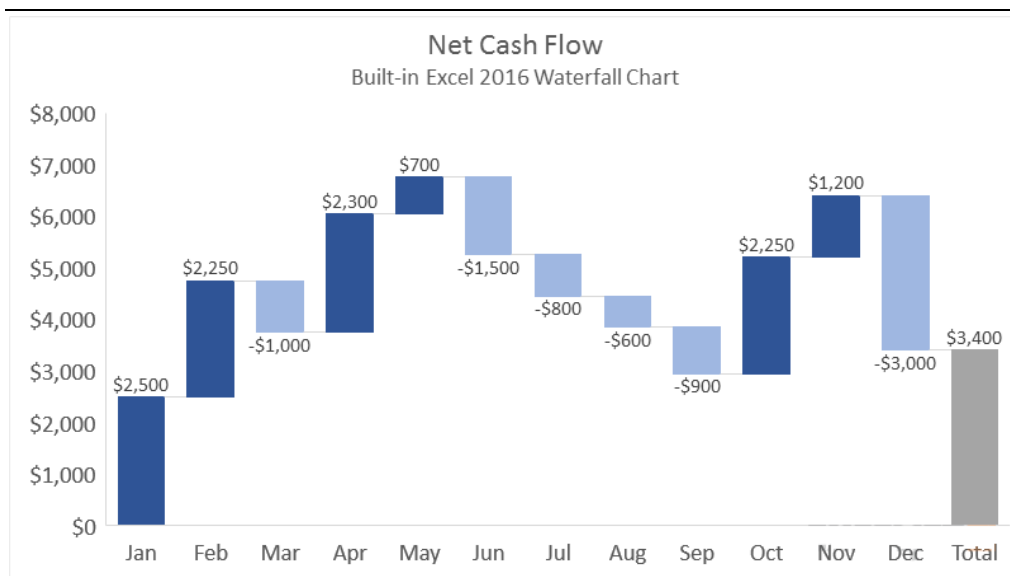
- Handles large data easily
- Clear summary
- Display outlier

**Cons**

- Exact values not retained

**4.14 Waterfall Chart**

Waterfall charts are used to plot the cumulative result of values as a visual running total. The initial and final values sit directly on the horizontal axis and intermediate values are plotted as floating columns - positive values extend upward, and negative values extend downward. The effect is a staircase like display is useful for showing how an initial value is affected by subsequent positive and negative changes. Waterfall charts are sometimes called bridge charts.

**Pros**

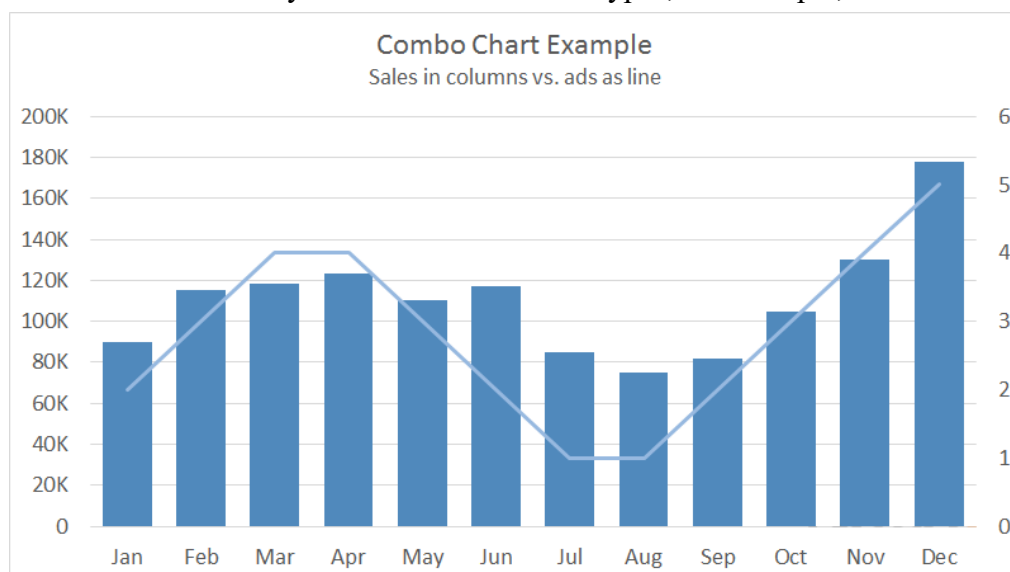
- At-a-glance visual display of positive and negative changes

**Cons**

- Less common chart type not as familiar to many people
- Built-in waterfall chart type has limited options

**4.15 Combo Chart**

A Combo Chart is a hybrid of two more chart types, for example, a column chart plus a line chart.

**Pros**

- Able to display multiple chart types in a single chart
- Able to plot values with completely different sales
- Can show how one factor is influenced by another

**Cons**

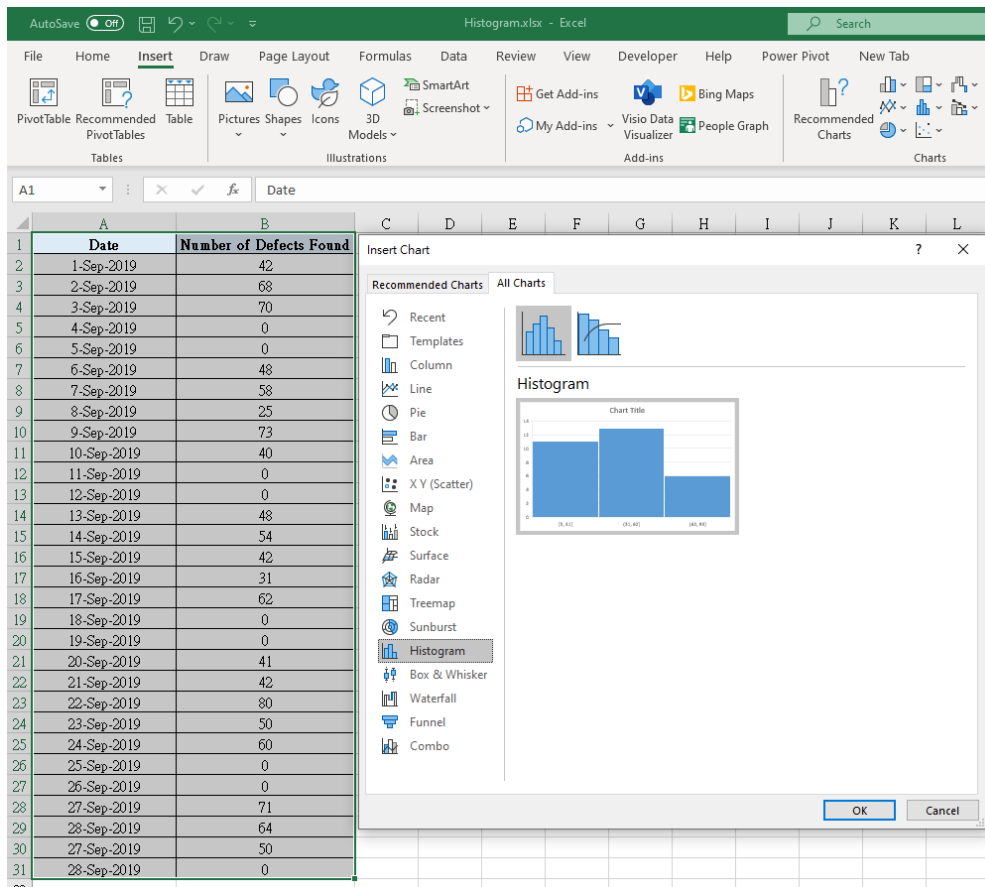
- Inherently more complex than other chart types
- Can become complicated quickly

## 5. Advanced Charting Skill

### 5.1 Histogram

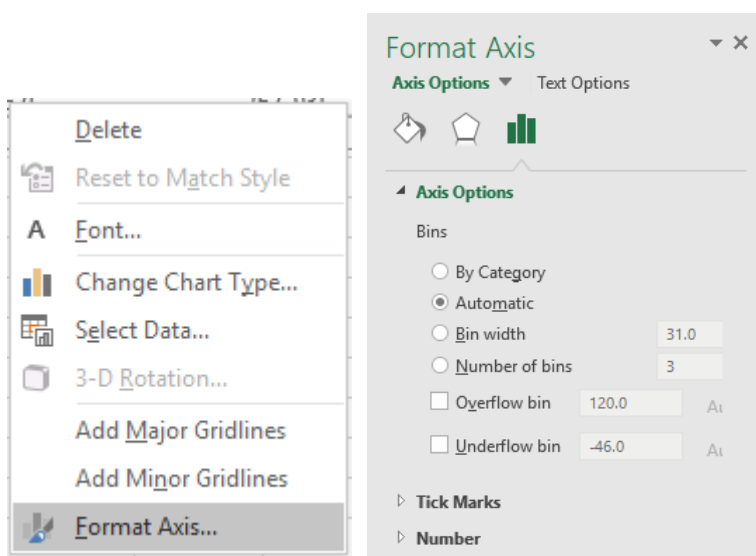
A histogram is a common data analysis tool in the business world. It's a column chart that shows the frequency of the occurrence of a variable in the specified range.

1. Select the entire dataset and insert a Histogram.



	A	B	C	D	E	F	G	H	I	J	K	L
1	Date	Number of Defects Found										
2	1-Sep-2019	42										
3	2-Sep-2019	68										
4	3-Sep-2019	70										
5	4-Sep-2019	0										
6	5-Sep-2019	0										
7	6-Sep-2019	48										
8	7-Sep-2019	58										
9	8-Sep-2019	25										
10	9-Sep-2019	73										
11	10-Sep-2019	40										
12	11-Sep-2019	0										
13	12-Sep-2019	0										
14	13-Sep-2019	48										
15	14-Sep-2019	54										
16	15-Sep-2019	42										
17	16-Sep-2019	31										
18	17-Sep-2019	62										
19	18-Sep-2019	0										
20	19-Sep-2019	0										
21	20-Sep-2019	41										
22	21-Sep-2019	42										
23	22-Sep-2019	80										
24	23-Sep-2019	50										
25	24-Sep-2019	60										
26	25-Sep-2019	0										
27	26-Sep-2019	0										
28	27-Sep-2019	71										
29	28-Sep-2019	64										
30	27-Sep-2019	50										
31	28-Sep-2019	0										

2. In order to configure histogram bins, right-click the horizontal axis of the chart, click **Format Axis**, and then click **Axis Options**.



Delete

Reset to Match Style

Font...

Change Chart Type...

Select Data...

3-D Rotation...

Add Major Gridlines

Add Minor Gridlines

Format Axis...

**Format Axis**

Axis Options Text Options

**Axis Options**

Bins

By Category

Automatic

Bin width 31.0

Number of bins 3

Overflow bin 120.0 At

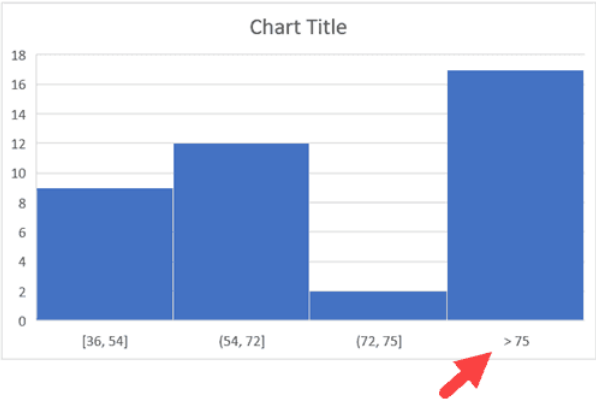
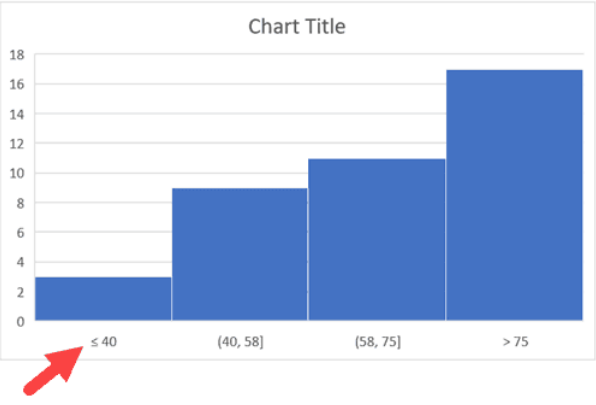
Underflow bin -46.0 At

Tick Marks

Number



3. Use the information in the following table to decide which options you want to set in the Format Axis task pane.

Option	Description
By Category	This option is used when you have text categories. This could be useful when you have repetitions in categories, and you want to know the sum or count of the categories. For example, if you have sales data for items such as Printer, Laptop, Mouse, and Scanner, and you want to know the total sales of each of these items, you can use the By Category option.
Automatic	This is the default setting for histograms. The bin width is calculated using Scott's normal reference rule.
Bin width	Here you can define how big the bin should be. Enter a positive decimal number for the number of data points in each range.
Number of bins	Here you can specify how many bins (including the overflow and underflow bins) you want. It will automatically create a chart with that many bins.
Overflow bin	<p>Select this check box to create a bin for all values above the value in the box to the right. To change the value, enter a different decimal number in the box.</p> 
Underflow bin	<p>Select this check box to create a bin for all values below or equal to the value in the box to the right. To change the value, enter a different decimal number in the box.</p> 

## 5.2 Bubble Chart

### 5.2.1 When to use a Bubble chart

Bubble charts are often used to present financial data. Use a Bubble chart when you want specific values to be more visually represented in your chart by different bubble sizes. Bubble charts are useful when your worksheet has any of the following types of data:

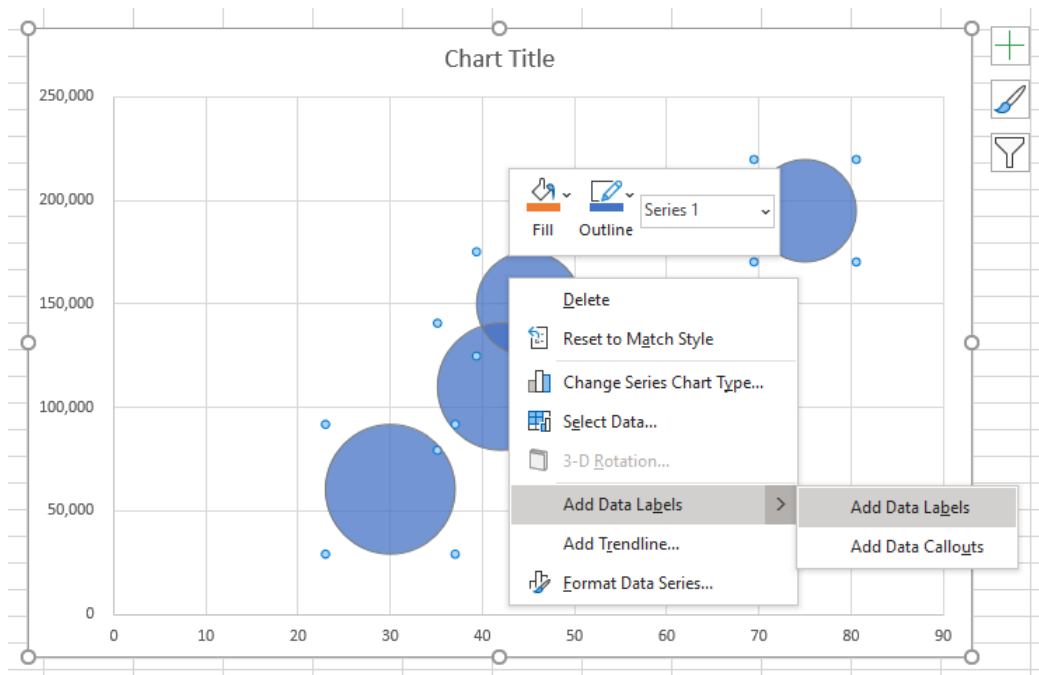
- **Three values per data point** – Three values are required for each bubble. These values can be in rows or columns on the worksheet, but they must be in the following order: x value, y value, and then size value.
- **Negative values** – Bubble sizes can represent negative values, although negative bubbles do not display in the chart by default. You can choose to display them by formatting that data series. When they are displayed, bubbles with negative values are colored white (which cannot be modified) and the size is based on their absolute value. Even though the size of negative bubbles is based on a positive value, their data labels will show the true negative value.
- **Multiple data series** – Plotting multiple data series in a Bubble chart (multiple bubble series) is similar to plotting multiple data series in a Scatter chart (multiple scatter series). While Scatter charts use a single set of x values and multiple sets of y values, Bubble charts use a single set of x values and multiple sets of both y values and size values.

### 5.2.2 Create a Bubble Chart

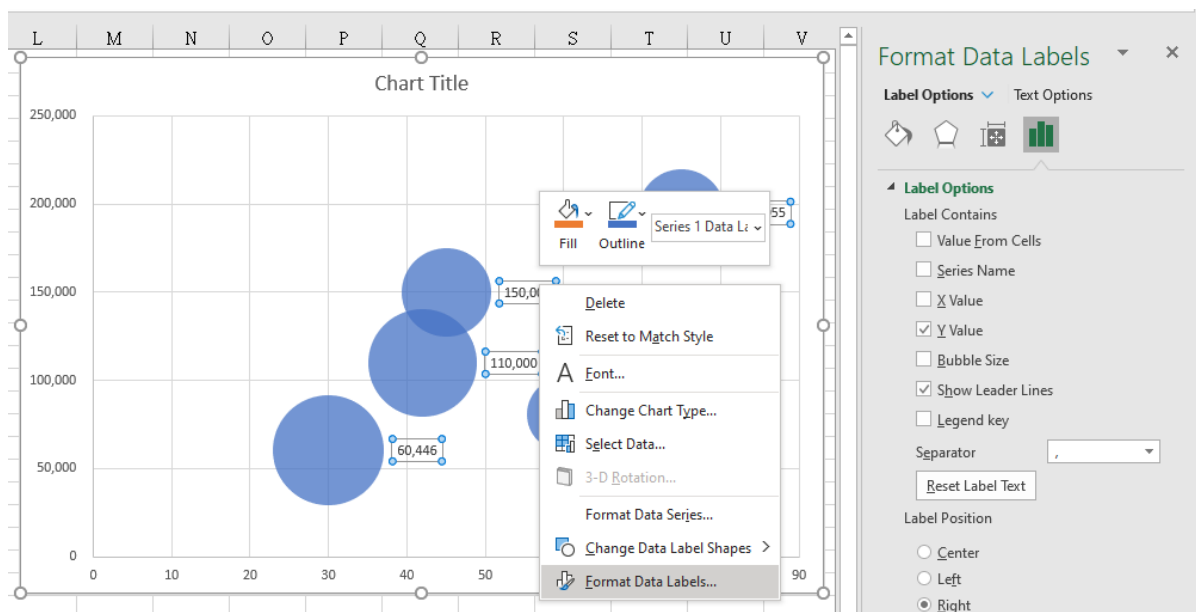
1. Select the data (without heading). Then choose **Insert** → **Recommend Chart**. In the chart type **XY (Scatter)**, select **Bubble** under sub-type.

Region	Quantity Sold	Turnover	GTN%
Europe	45	150,000	22.22%
Middle East	42	110,000	33.00%
Africa	60	80,637	15.20%
USA	75	195,055	21.45%
Asia	30	60,446	34.45%

2. In order to add the data label, select the data series, right click and select **Add Data Labels** → **Add Data Labels**.



3. Right click the data series and select Format Data Labels. Select “Value From Cells” in Label Option.



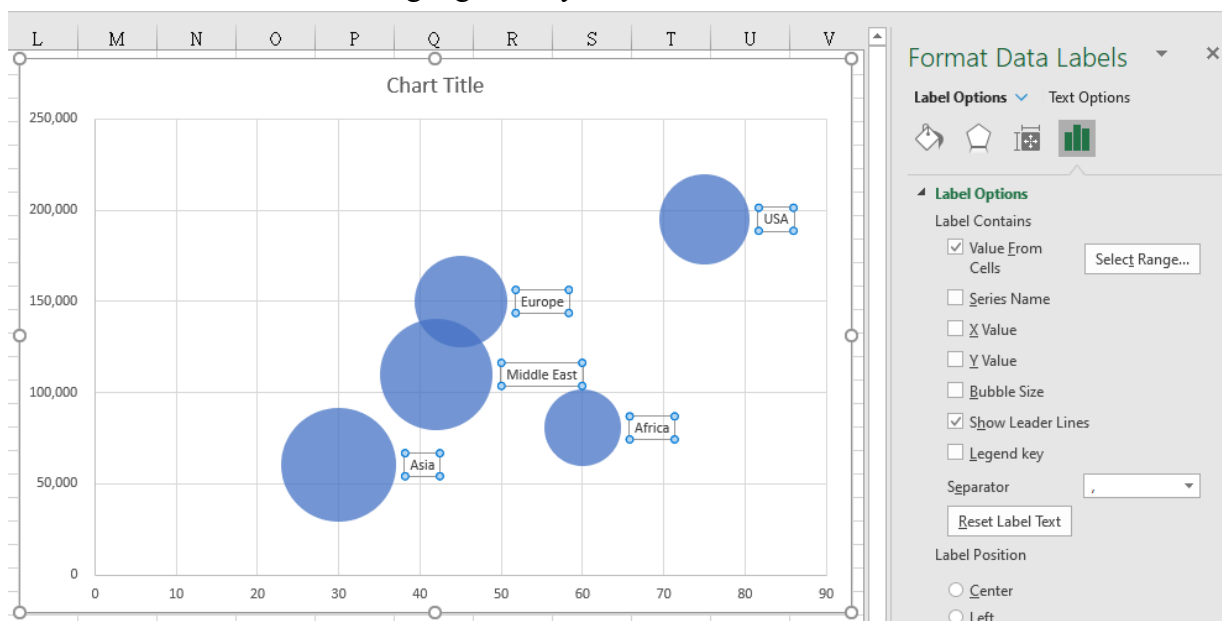
4. Select the data label range

	A	B	C	D	E	F	G	H
1	<b>Region</b>	<b>Quantity Sold</b>	<b>Turnover</b>	<b>GTN%</b>				
2	Europe	45	150,000	22.22%				
3	Middle East	42	110,000	33.00%				
4	Africa	60	80,637	15.20%				
5	USA	75	195,055	21.45%				
6	Asia	30	60,446	34.45%				
7								

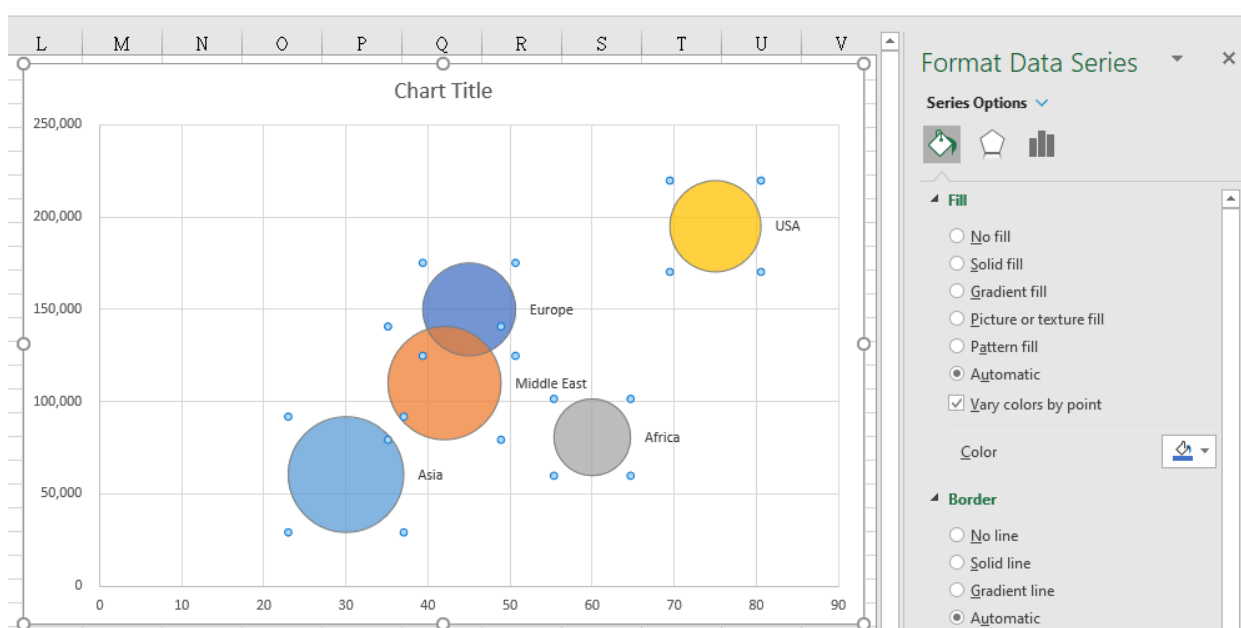
  

Data Label Range		?	X
Select Data Label Range			
=Sheet1!\$A\$2:\$A\$6			
OK		Cancel	

## 5. Uncheck "Y Value" for showing region only in data label



## 6. If the checkbox "Vary Colors by points" is ticked, then all bubble will be painted in different colors.



Note that smaller bubbles may be hidden by larger bubbles, making it seem that Excel has not drawn all of the data markers. When an entire data series contains negative bubble sizes, the series is not displayed by default. If you want to see the negative bubbles, select the series you want in the Chart Objects list on the Chart toolbar, and then click Format Data Series on the same toolbar. On the Options tab, select the Show Negative Bubbles check box.

## 5.2.3 Formatting Bubble charts

There are several ways to change the format of a Bubble chart:

- **Display bubbles with a 3-D visual effect** – By selecting the 3-D Bubble chart sub-type, bubbles are formatted with a 3-D visual appearance. A 3-D Bubble chart is 3-D in appearance only — it actually remains a 2-D chart type. Unlike other 2-D chart types, however, this chart type cannot be used in a combination chart.
- **Adjust the size of bubbles** – The size of the bubbles can represent the area of the bubbles or the width of the bubble, which affects the relative size of one bubble to another. The Width of bubbles option can be used for representations such as market share between products. You can also scale the bubble size for a data series by specifying a percentage between 0 and 300 — the larger the percentage, the larger the bubbles.
- **Display error bars** – To graphically express potential error amounts relative to each bubble in a bubble series, you can display error bars for the X values, the Y values, or both.
- **Change the color and fill effects of bubbles** – You can assign different colors and fill effects (such as pattern, texture, and gradient) to individual bubbles or an entire bubble series.
- **Replace bubbles with pictures** – You can replace each bubble or all bubbles in a series with a picture. The size of the picture is automatically adjusted to match the bubble size for each corresponding value.

## 5.3 Radar Chart

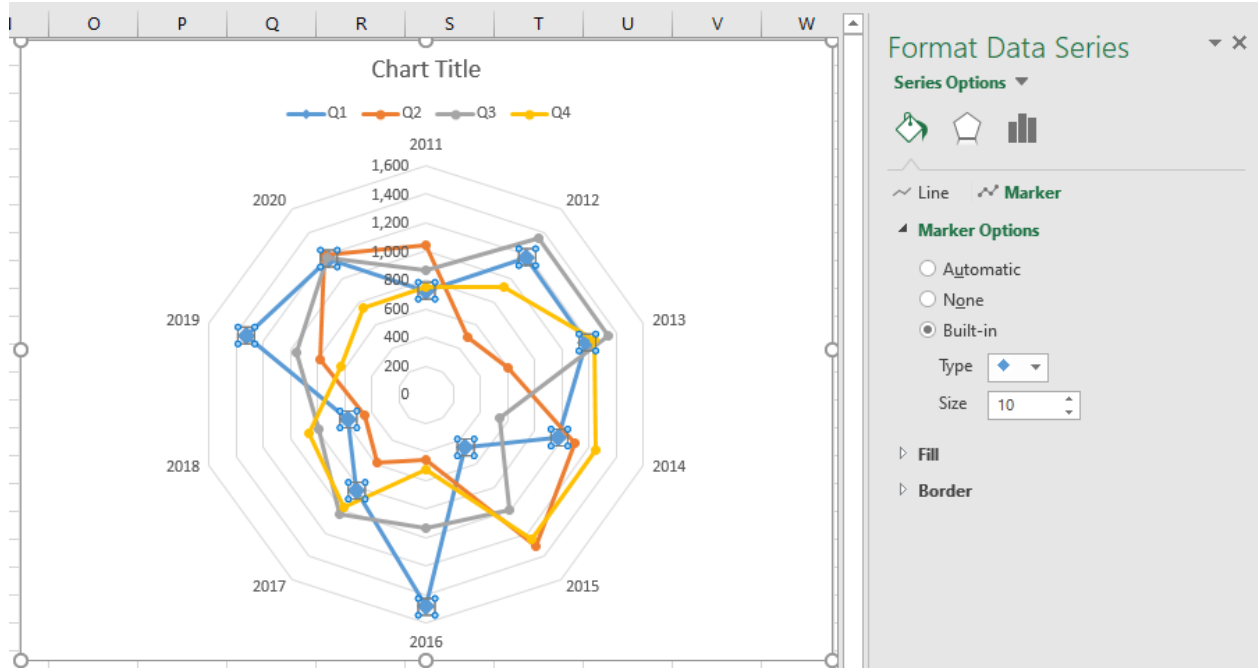
When you are presenting two-dimensional data, it is very useful to tell the story of the data set just by creating the radar chart. The radar chart in excel is more suitable when the exact values aren't critical for a reader, but the overall chart tells some story. Each category can be easily compared, each along with its own axis, and overall differences are apparent by the size of each radar.

In order to present the sales performance over a period of 10 years in a spider chart,

1. Go to **Insert** ➔ **Recommended Charts**, select “Radar with Markers”.

Year	Q1	Q2	Q3	Q4
2011	727	1,043	864	747
2012	1,184	491	1,345	930
2013	1,177	600	1,339	1,242
2014	974	1,092	539	1,250
2015	454	1,305	992	1,254
2016	1,481	453	937	528
2017	825	592	1,035	974
2018	573	453	792	865
2019	1,326	783	954	626
2020	1,170	1,207	1,184	745

## 2. Change the marker type and size in “Format Data Series”.



By looking at the outset of the spider, we can clearly find out in 2016, Q1 revenue was the highest among all the 10 years' revenue. And in 2015, Q1 revenue was the lowest.

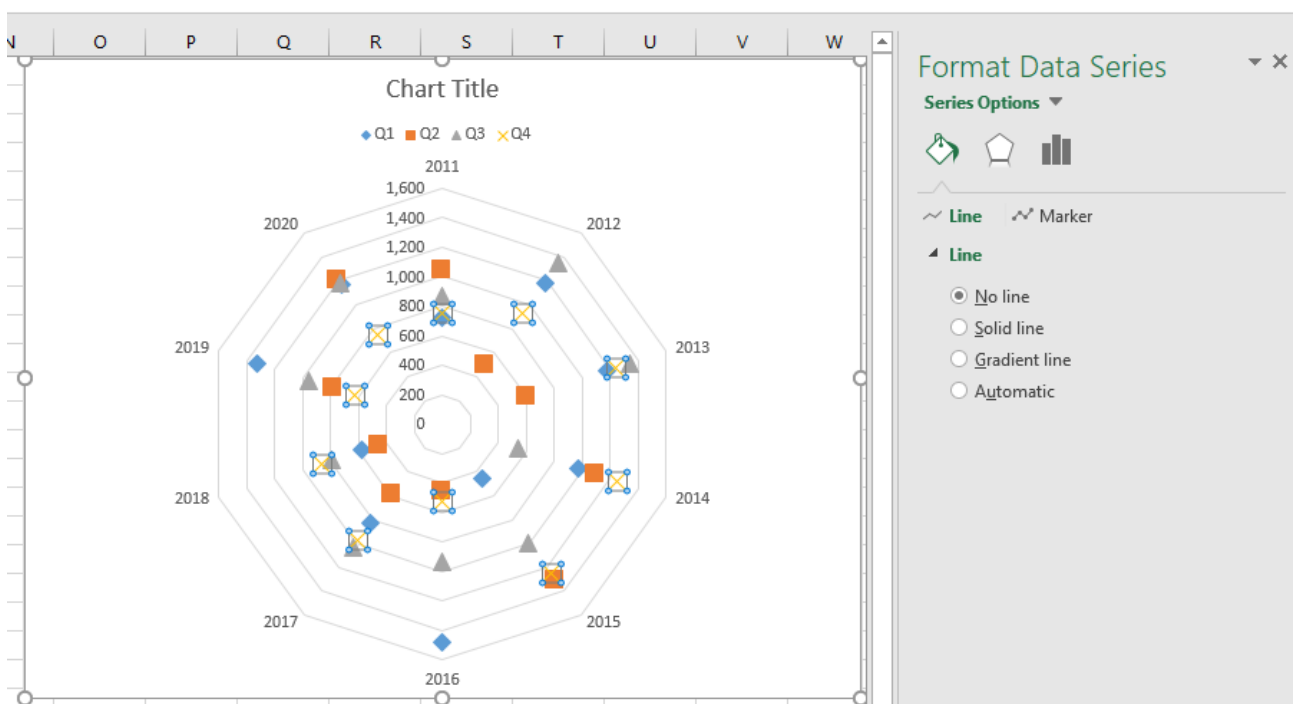
In Q2, the highest revenue was in 2015, and the lowest point is the year 2019.

In Q3, the highest revenue was in 2013, and the lowest revenue was in 2014.

In Q4, the highest revenue was in 2015, and the lowest revenue occurred year is 2016

In none of the years, there is a consistent growth of the revenue over 4 quarters. There is always volatility in revenue generation across quarters.

If you want to remove the line of the chart but highlight only the markers, you can use the advanced formatting:



## 5.4 Gauge Chart (Speedometer)

### 5.4.1 Introduction

Gauge chart is also known as speedometer chart because of its resemblance to a speedometer, because it resembles a speedometer it uses dials to visualize the information on the data, it is basically a combination of two different types of charts which are doughnut chart and pie chart, it can be used by creating a combo chart option in excel.

Let's begin by preparing our dataset. We're going to need data points for plotting them on the gauge, as well as additional helper numbers to draw a needle (pointer).

Name	Stats Total	Tier	Stats Minimum	Pointer	
Charizard	534	Weak	175	Start	529
		Average	200	Width	10
		Good	200	End	1021
		Strong	125		
		Epic	80		
		Total	780		

Annotations in the image:  
 - Green arrow: Data to show (points to Stats Total: 534)  
 - Blue arrow: Labels and value for Levels (points to Tier and Stats Minimum columns)  
 - Yellow arrow: Helper for Pointer (points to Start, Width, and End values)

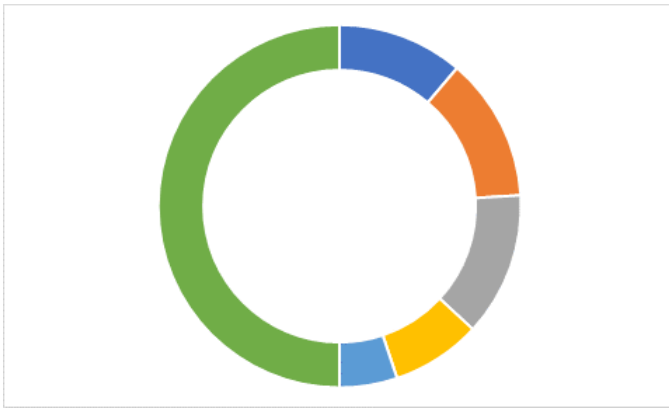
- Data to show: Basically, the value the dial (pointer) will be displaying.
- Labels and value for Levels: The value ranges that represent the levels. You can think of this as speed values on a speedometer. Remember to add totals to last row as this total will be the lowest part of the half-circle gauge.
- Helper for Pointer: The helper values which will replace our pointer. These values help us determine where to place the needle of the speedometer.
  - Width: The width of the needle.
  - Start: The point at which needle will start.
  - End: The value of the remaining arc of the pie. The needle is a part of a pie chart where the needle is only partially visible. To complete the pie chart and place the needle, the End value should be calculated by subtracting the width and start points from the sum of values of levels.

### 5.4.2 Creating Gauge Chart

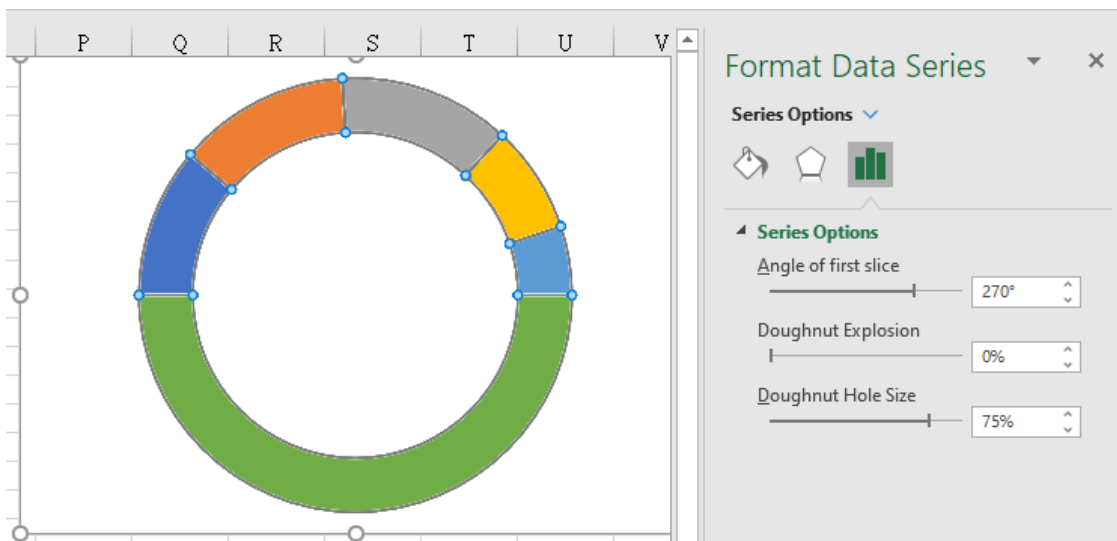
1. Select the data and insert a doughnut chart for the level data.

The screenshot shows the Excel interface with the 'Insert Chart' task pane open. The 'Doughnut' chart type is selected, and a preview of the chart is shown. The chart visualizes the 'Tier' data from the dataset, with segments representing Poor, Weak, Average, Good, and Excellent. The 'Stats Minimum' values are also visible in the background table.

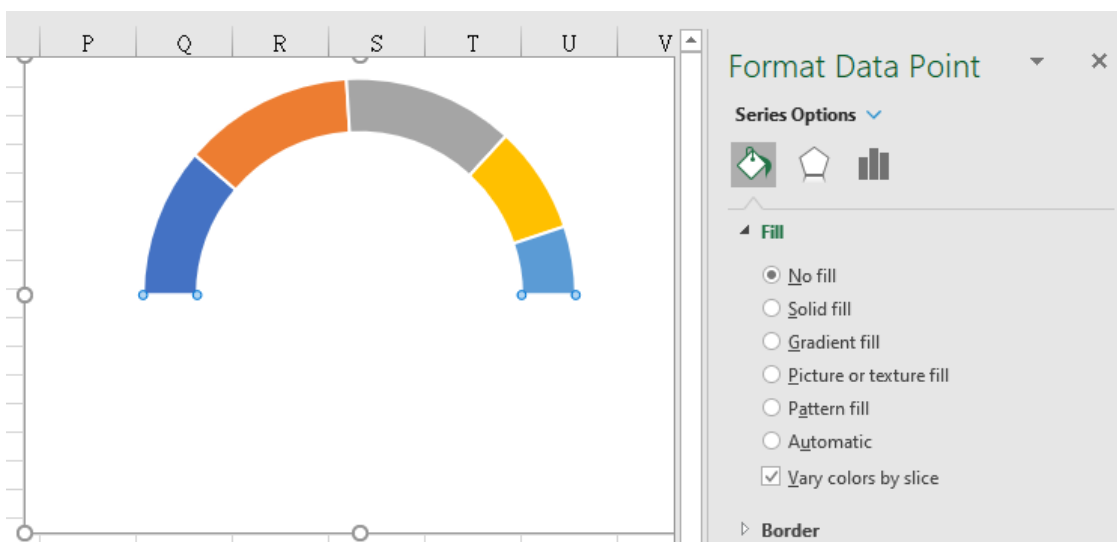
2. After removing the title and the legend, you will get a chart that is a half-circle on one side, and the remaining parts on the other.



3. The solid half will be the bottom section of the gauge, so we need to rotate the chart. Right-click on a colored part and click on Format Data Series. This will make the right-side panel visible for the chart. Set Angle of first slice to 270°.

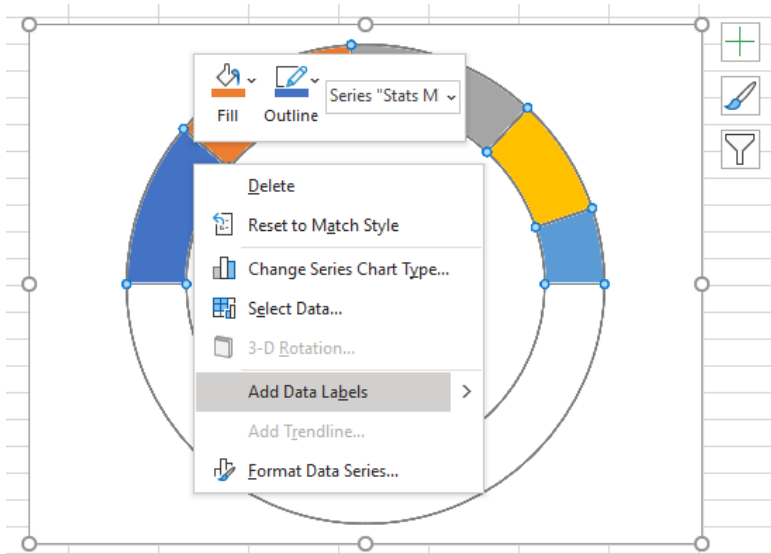


4. In order to hiding the bottom part, right-click on the bottom half and click on Fill to see the color options. Select No Fill to make the half-circle transparent.

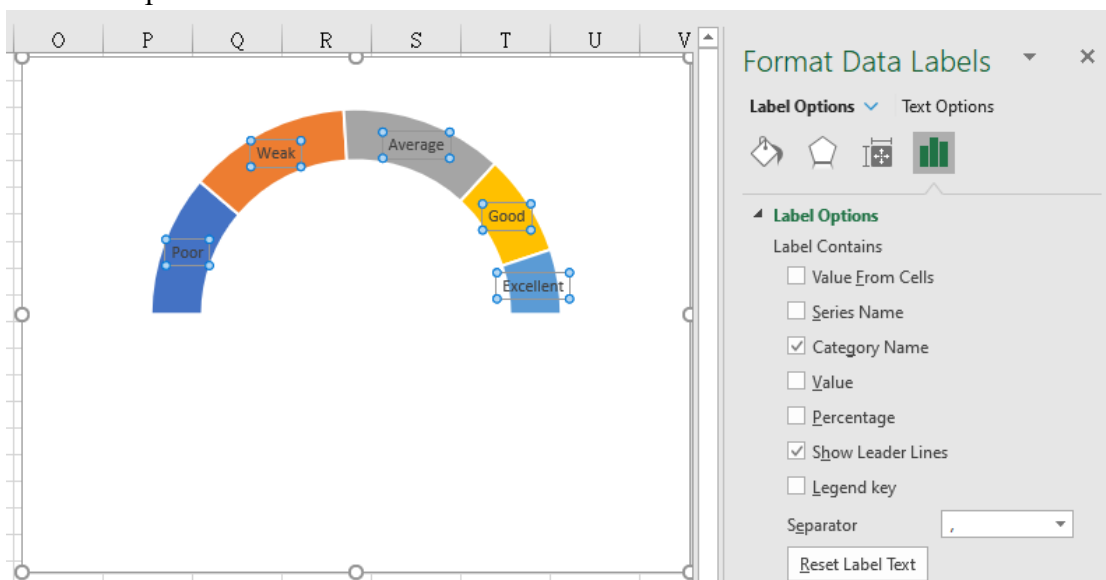




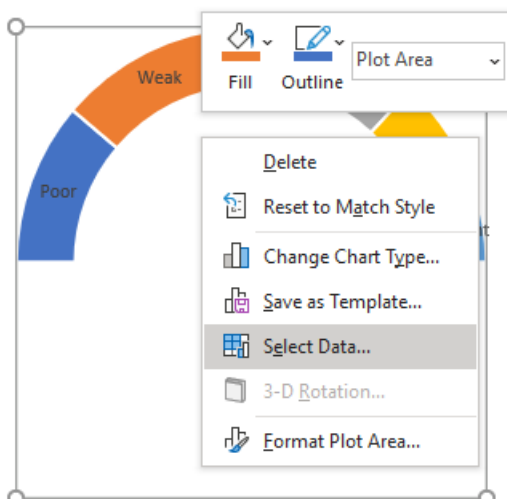
5. Now you have the first part of your gauge. You can also add data labels to make the gauge easier to read.



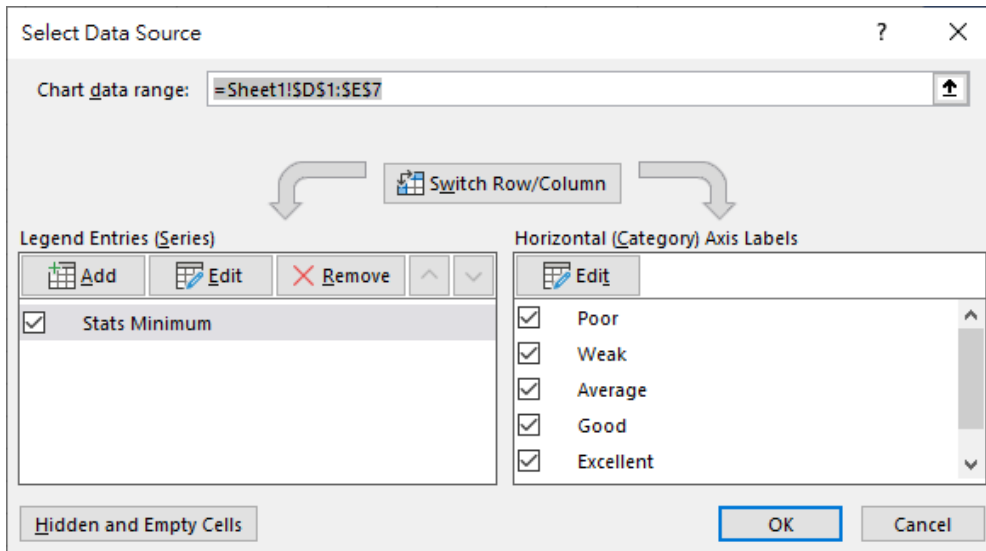
6. Use the “Category Name” as the label. Remember to remove the label for the Total in the half-circle part.



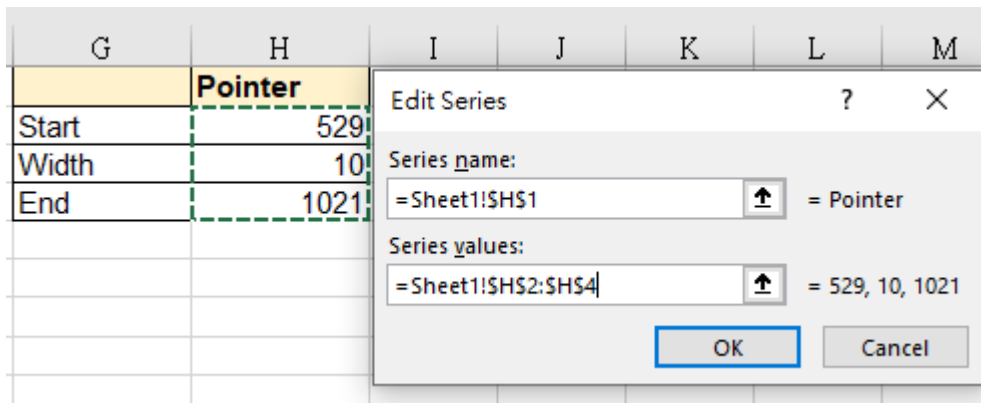
7. Right-click on a chart area and click on **Select Data**.



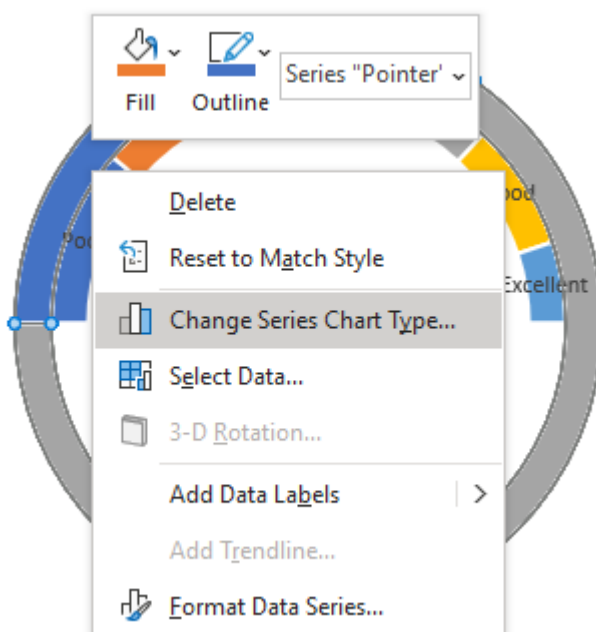
8. In Select Data Source dialog, click on **[Add]** button.



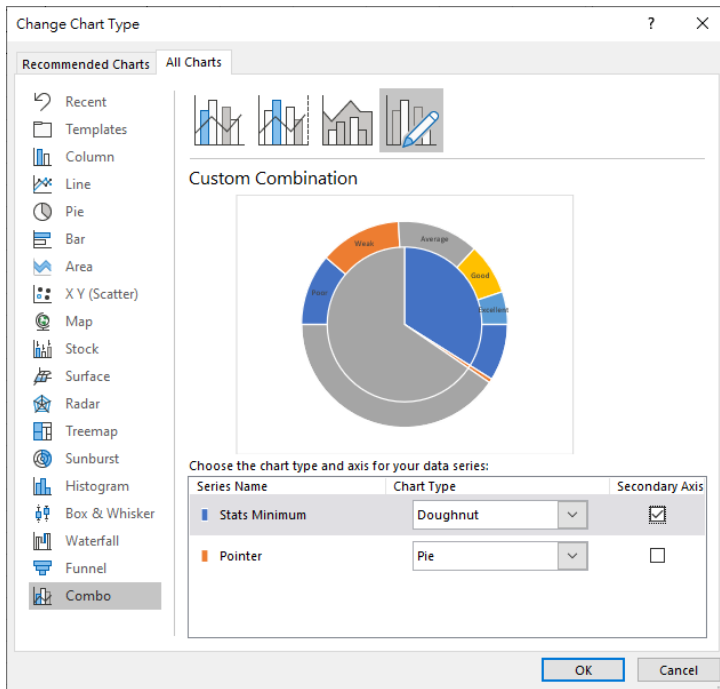
9. Select the range that contains Width, Start, End for the Series values input. Also remember to enter a name for Series name.



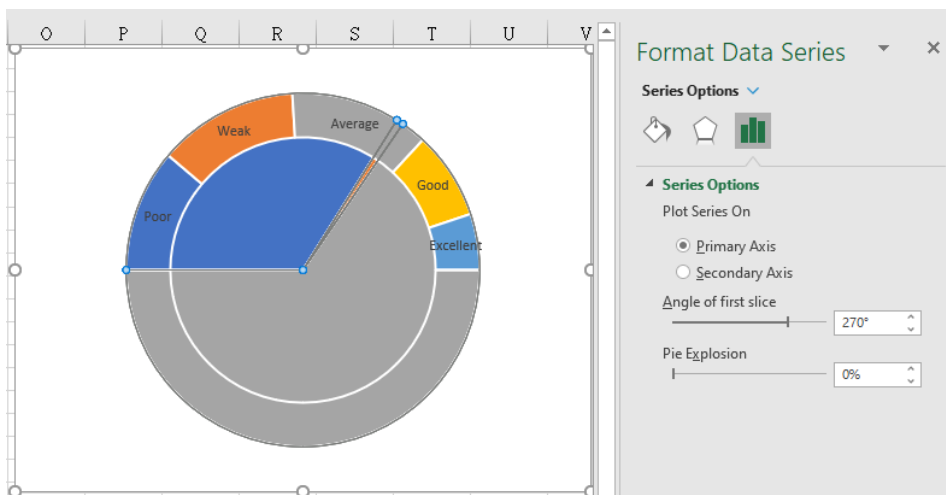
10. Right click the chart, and select “**Change Series Chart Type ...**”



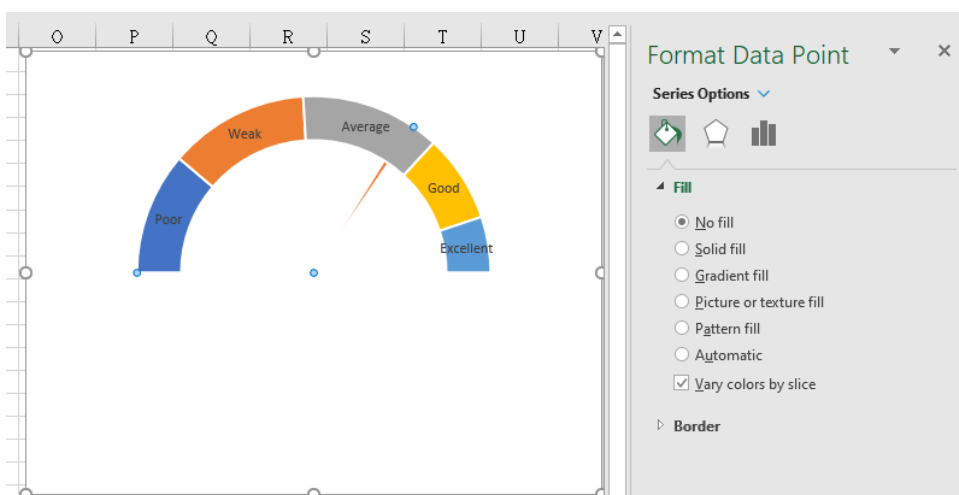
11. Select **Pie** option for the pointer values and tick the “**Secondary Axis**” for the doughnut chart.



12. Change the “**Angle of first slice**” to **270°** for the Pie chart.



13. Set the other area as “**No Fill**”. Then the Gauge Chart is completed.



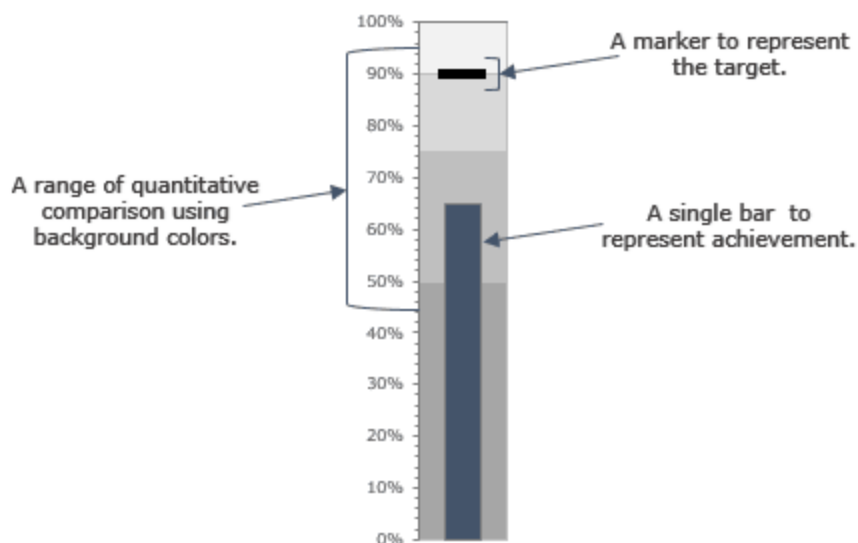
## 5.5 Bullet Chart

### 5.5.1 Introduction

Bullet Chart is used to display key performance indicators. Use them to replace speedometers if you want a more compact visual that can be stacked to better compare KPI. Also, speedometers suck.

A bullet chart has three components.

- **Target Marker:** A marker to represent the target.
- **Achievement Bar:** A single achievement bar to represent the actual value. This bar should have a solid color & little bit narrow than comparison range color bars.
- **Comparison Range:** A comparison range of a color theme to use at the background of achievement bar. The main idea to use this range is to create a comparison for achievement, like stages.

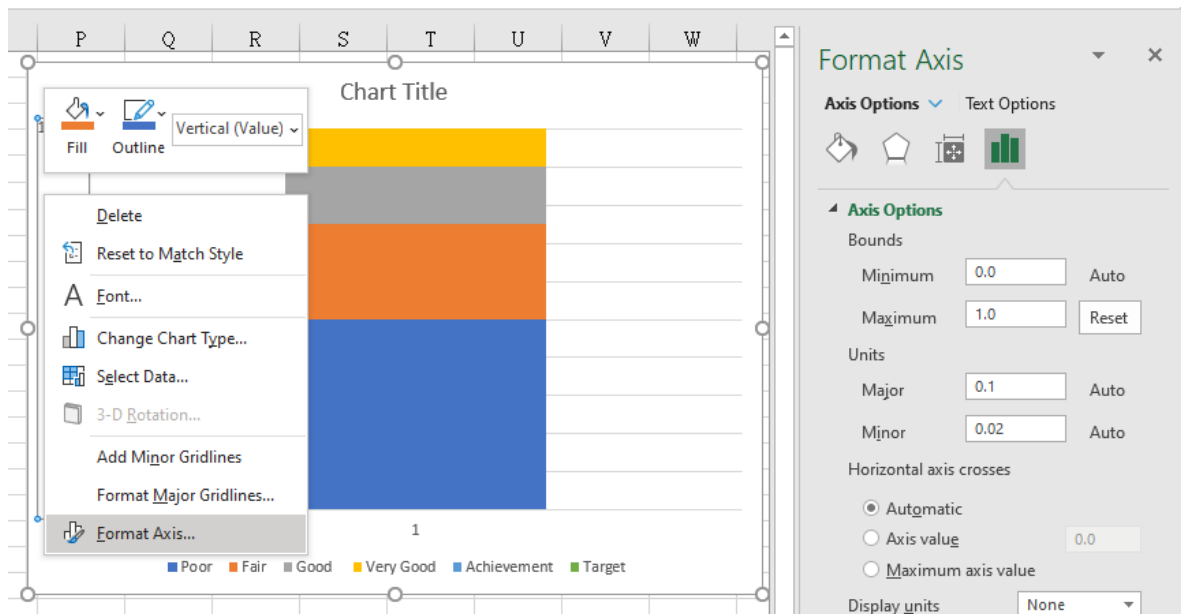


### 5.5.2 Create Bullet Chart

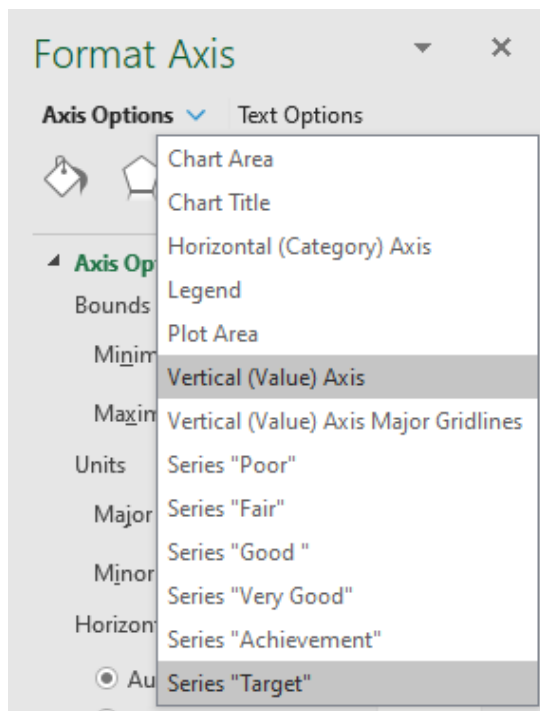
1. Select the data, Go to **Insert** → **Recommended Charts**, select “Stacked Column” .

Category	Percentage
Poor	50%
Fair	25%
Good	15%
Very Good	10%
Achievement	65%
Target	90%

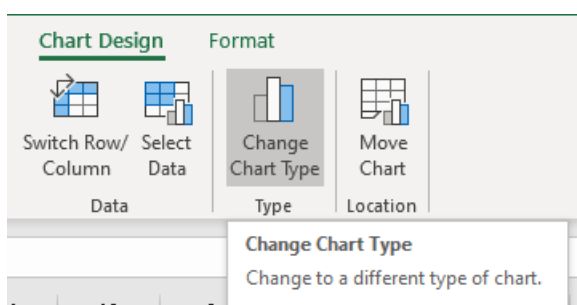
2. Right click the axis and choose “Format Axis”, then change the maximum bound to “1.0”.



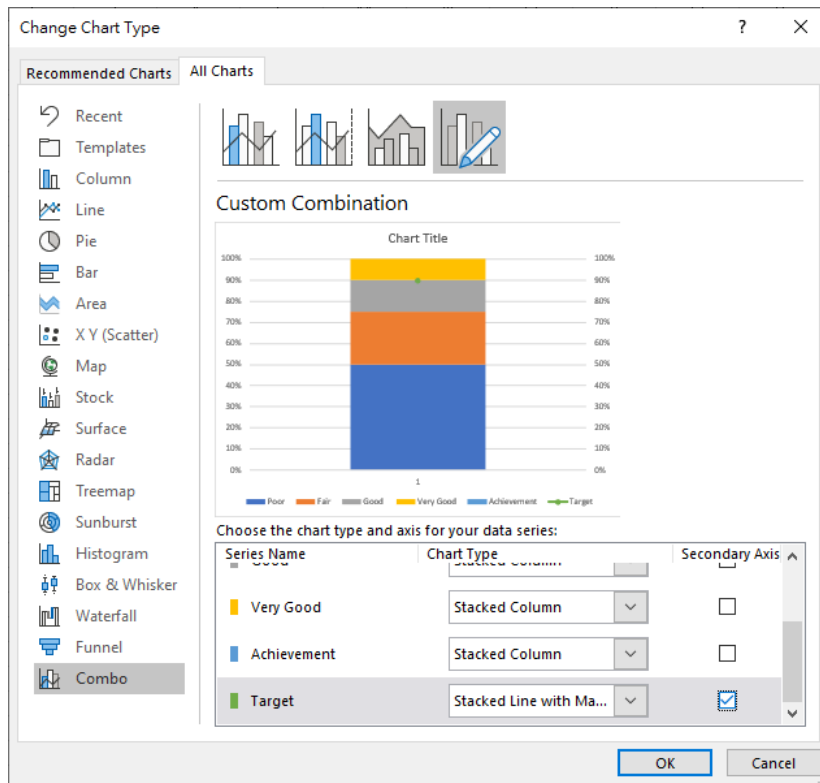
3. In the right panel, select Series “Target” from “Axis Options”



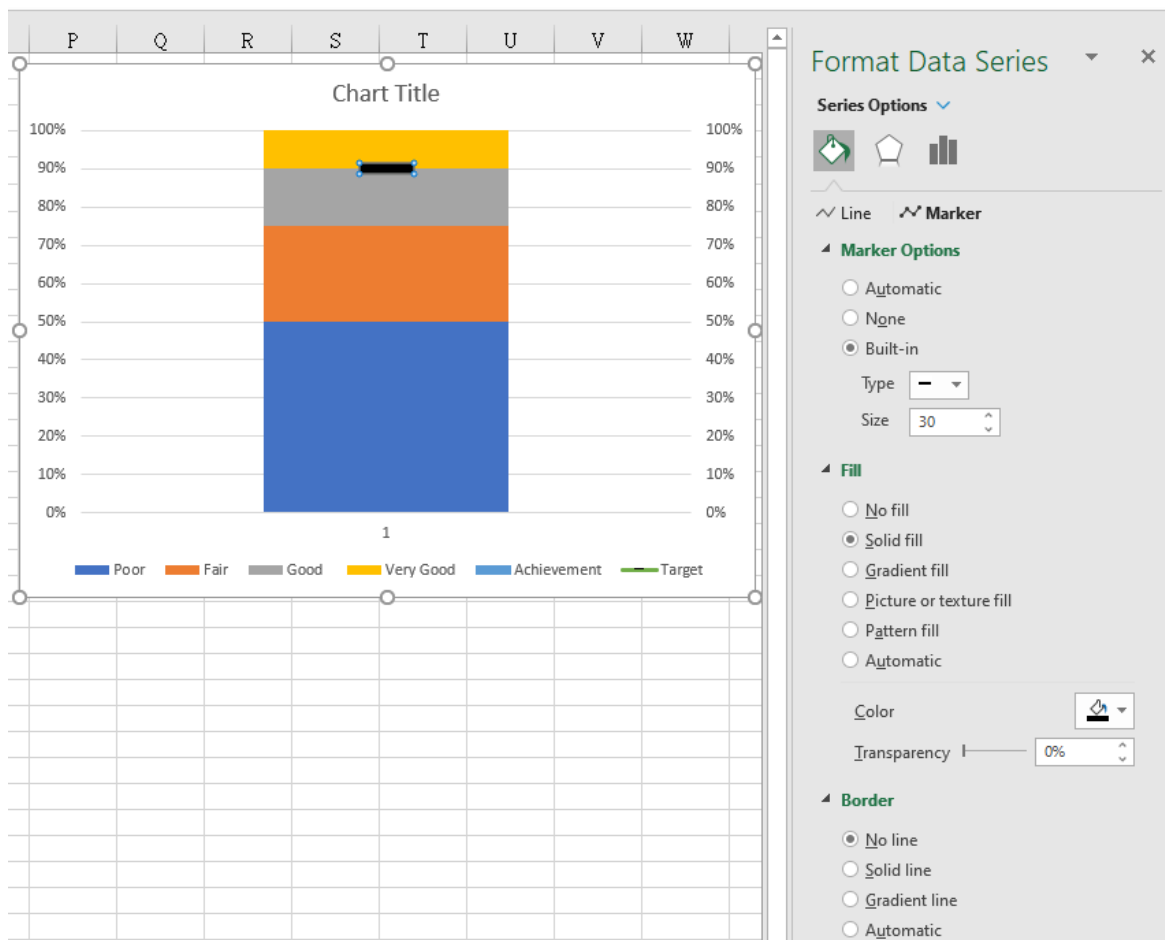
4. Select **Design** → **Change Chart Type**.



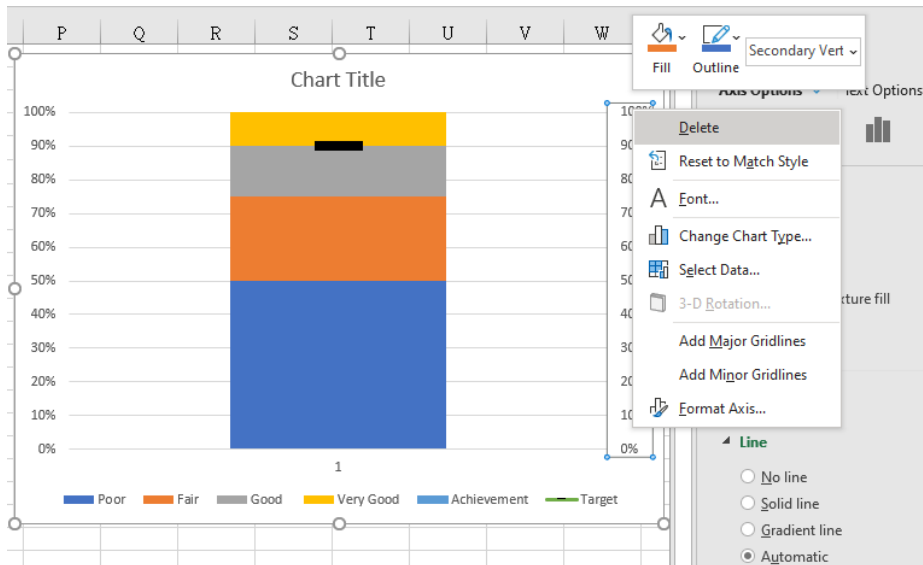
5. Change the “Target” to “Stacked Line with Marker” and tick the “Secondary Axis” checkbox.



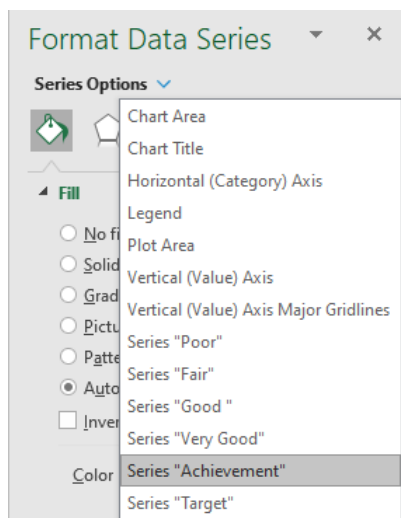
6. Change the marker to bigger size rectangle. Bar with blank color fill without border.



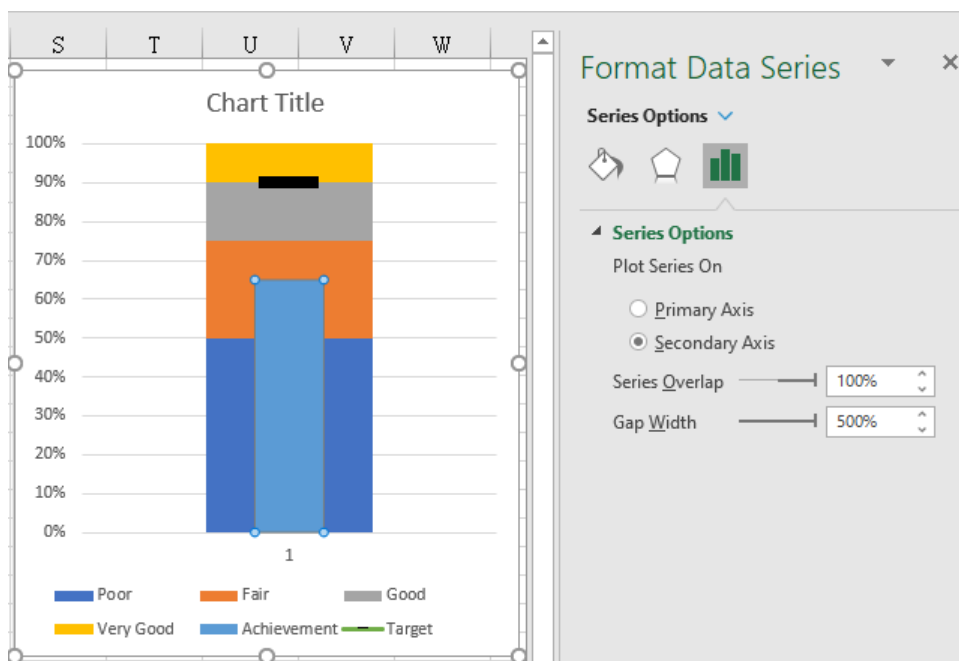
## 7. Delete the secondary axis



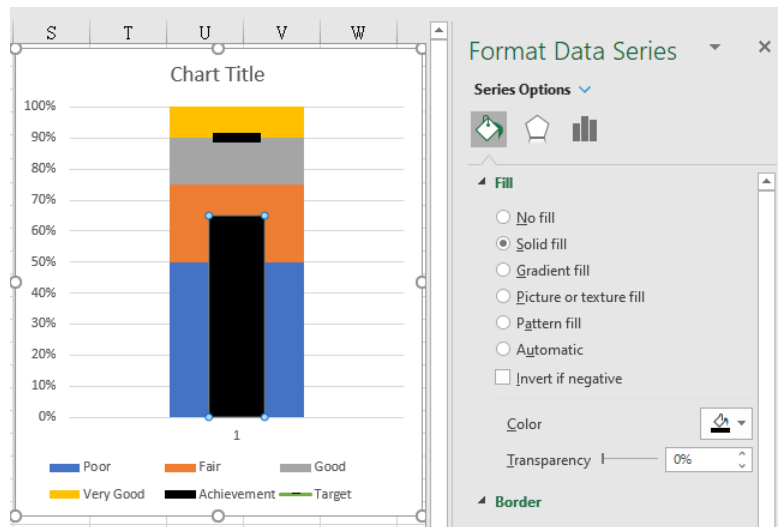
## 8. In the right panel, select Series "Achievement" from "Axis Options"



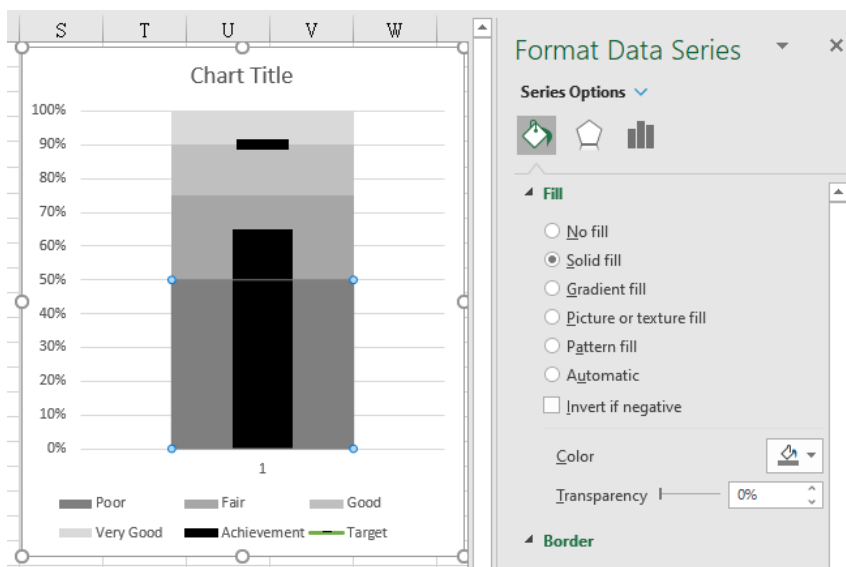
## 9. Select "Secondary Axis" and change gap width to 500%.



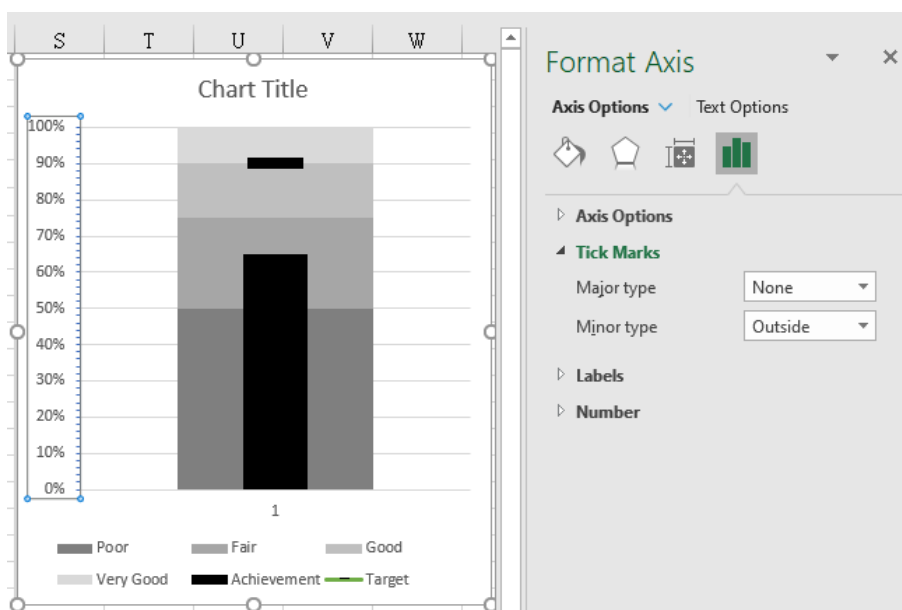
10. Use a solid fill black color for achievement bar.



11. For creating a comparison range you have to select a color and use four different shades of that. For example, you can use four different gray color as follow:



12. Add the “Outside” tick marks in minor type.





## 5.6 Step Chart

Step chart is useful if you have to display the data that changes at irregular intervals and remains constant between the changes. For example, Step chart can be used to show the price changes of commodities, changes in tax rates, changes in interest rates, etc.

A Step Chart shows the trend shows the exact time of change along with the trend of the data points as well. While Line Chart only shows the trend of data points, and it will not focus on the exact time of change or fluctuation of data points from one period to another.

1. Insert two new columns with the same headers, then copy the date values from column A to column D by ignoring the first date value.

	A	B	C	D	E
1	Date	Stock Price		Date	Stock Price
2	31-Jan-2020	56.85		28-Feb-2020	
3	28-Feb-2020	53.15		31-Mar-2020	
4	31-Mar-2020	44.15		29-Apr-2020	
5	29-Apr-2020	40.25		29-May-2020	
6	29-May-2020	35.85		30-Jun-2020	
7	30-Jun-2020	36.20		31-Jul-2020	
8	31-Jul-2020	34.95		31-Aug-2020	
9	31-Aug-2020	33.80		30-Sep-2020	
10	30-Sep-2020	29.80		30-Oct-2020	
11	30-Oct-2020	32.10		30-Nov-2020	
12	30-Nov-2020	41.50		30-Dec-2020	
13	30-Dec-2020	40.60			

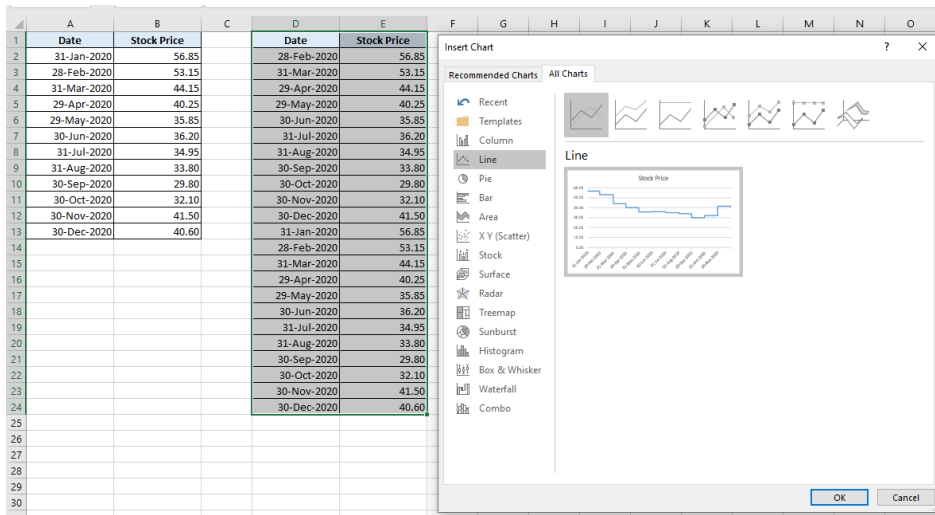
2. Copy the Stock Price from column B to column E by ignoring the last value.

	A	B	C	D	E	F
1	Date	Stock Price		Date	Stock Price	
2	31-Jan-2020	56.85		28-Feb-2020	56.85	
3	28-Feb-2020	53.15		31-Mar-2020	53.15	
4	31-Mar-2020	44.15		29-Apr-2020	44.15	
5	29-Apr-2020	40.25		29-May-2020	40.25	
6	29-May-2020	35.85		30-Jun-2020	35.85	
7	30-Jun-2020	36.20		31-Jul-2020	36.20	
8	31-Jul-2020	34.95		31-Aug-2020	34.95	
9	31-Aug-2020	33.80		30-Sep-2020	33.80	
10	30-Sep-2020	29.80		30-Oct-2020	29.80	
11	30-Oct-2020	32.10		30-Nov-2020	32.10	
12	30-Nov-2020	41.50		30-Dec-2020	41.50	
13	30-Dec-2020	40.60				

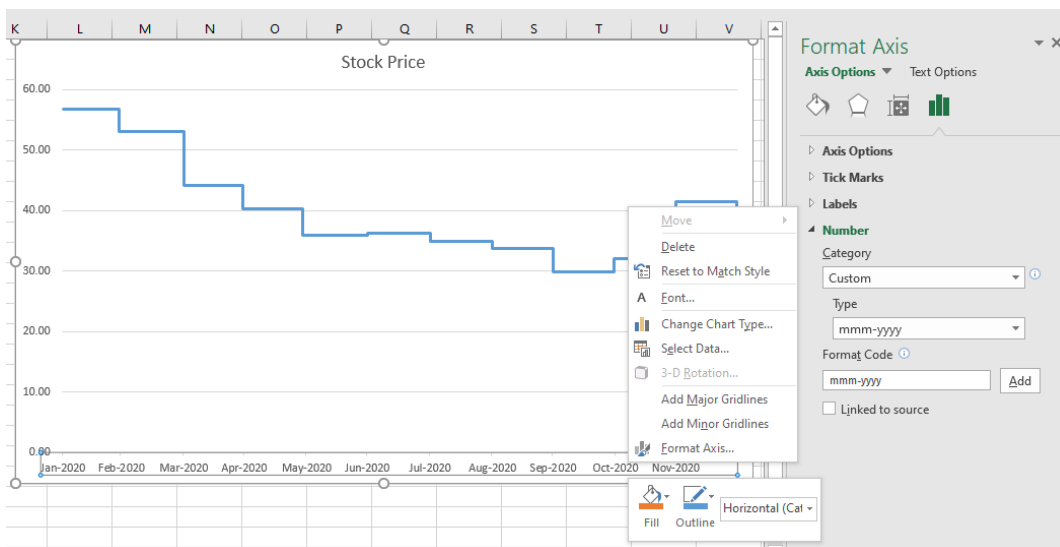
3. Copy the original data under the new create one.

	A	B	C	D	E	F
1	Date	Stock Price		Date	Stock Price	
2	31-Jan-2020	56.85		28-Feb-2020	56.85	
3	28-Feb-2020	53.15		31-Mar-2020	53.15	
4	31-Mar-2020	44.15		29-Apr-2020	44.15	
5	29-Apr-2020	40.25		29-May-2020	40.25	
6	29-May-2020	35.85		30-Jun-2020	35.85	
7	30-Jun-2020	36.20		31-Jul-2020	36.20	
8	31-Jul-2020	34.95		31-Aug-2020	34.95	
9	31-Aug-2020	33.80		30-Sep-2020	33.80	
10	30-Sep-2020	29.80		30-Oct-2020	29.80	
11	30-Oct-2020	32.10		30-Nov-2020	32.10	
12	30-Nov-2020	41.50		30-Dec-2020	41.50	
13	30-Dec-2020	40.60		31-Jan-2020	56.85	
14				28-Feb-2020	53.15	
15				31-Mar-2020	44.15	
16				29-Apr-2020	40.25	
17				29-May-2020	35.85	
18				30-Jun-2020	36.20	
19				31-Jul-2020	34.95	
20				31-Aug-2020	33.80	
21				30-Sep-2020	29.80	
22				30-Oct-2020	32.10	
23				30-Nov-2020	41.50	
24				30-Dec-2020	40.60	
25						

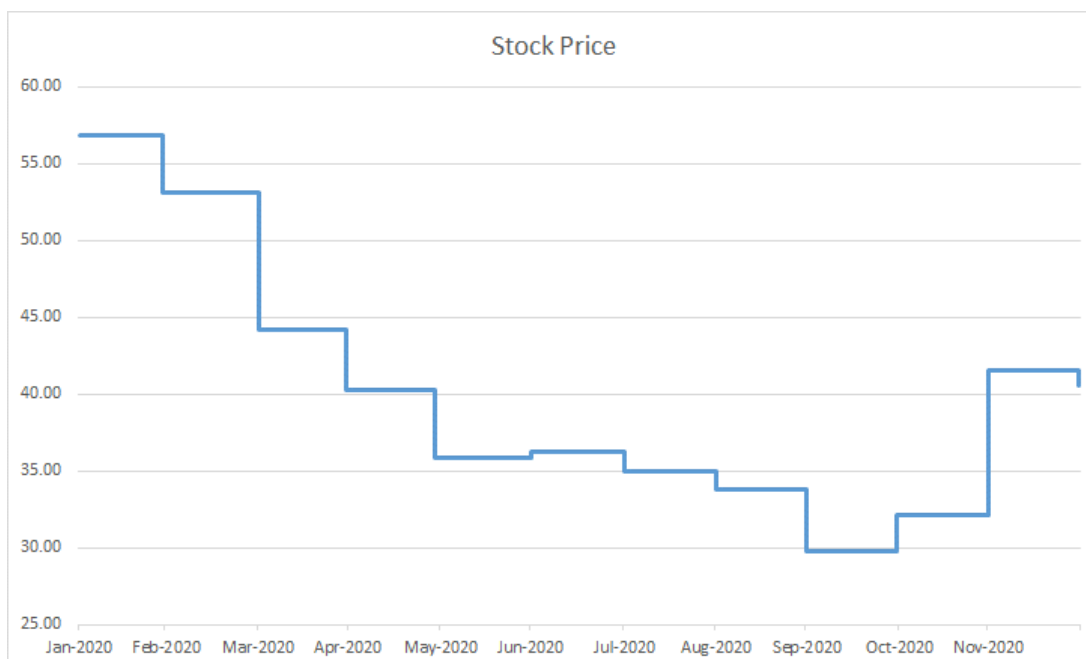
## 4. Select the data and insert Line Chart.



## 5. Click on the horizontal axis and change the date format to mmm-yyyy.



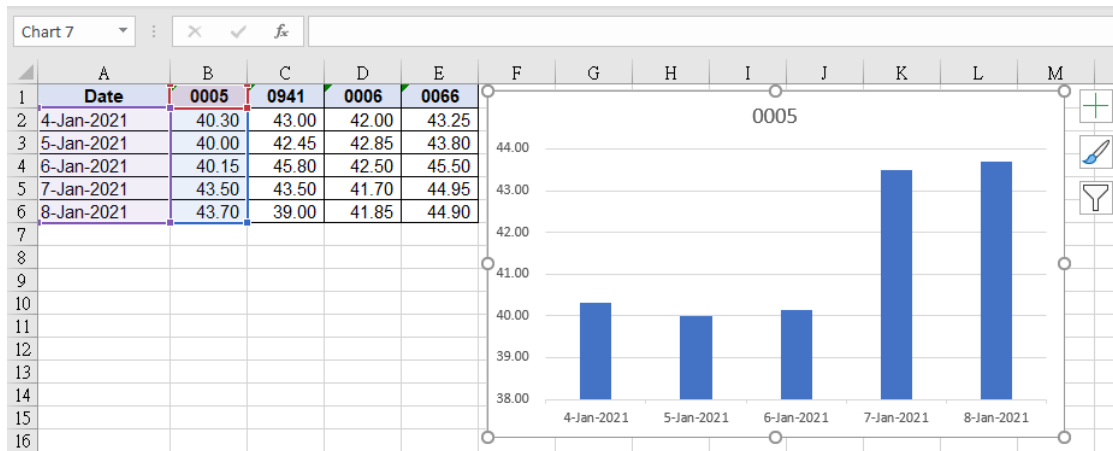
## 1. Adjust the bound in Axis for better presentation.



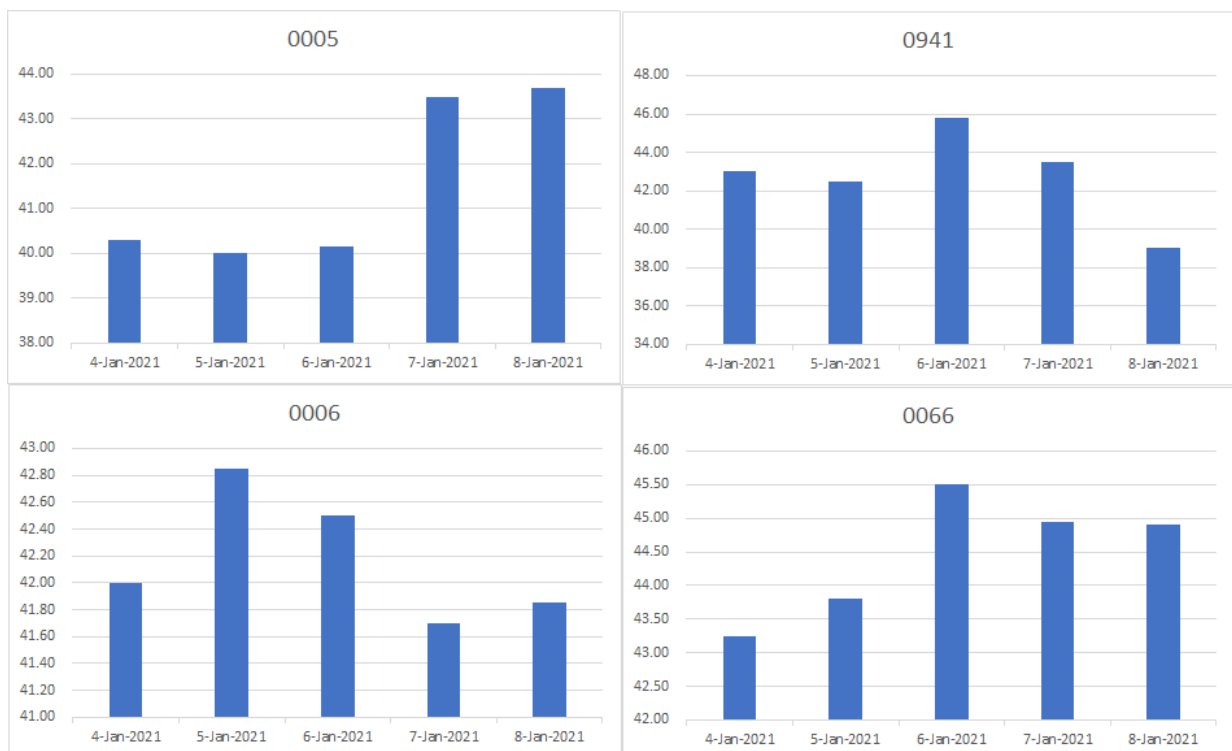
## 5.7 Panel Chart

### 5.7.1 Create Panel Chart by Grouping

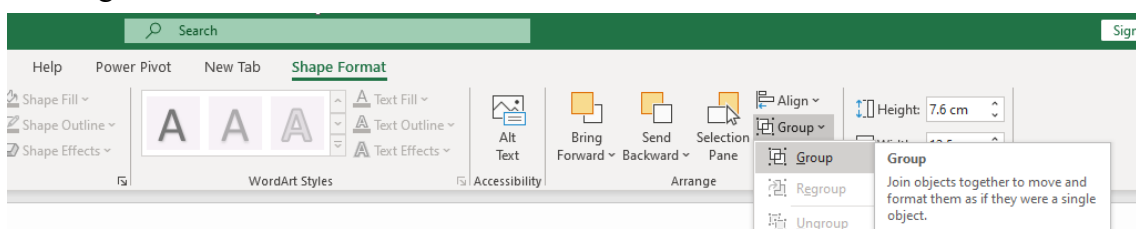
1. Create a column chart for the first stock. Select the “Date” and first stock columns only.



2. Create the other three charts for the remaining companies. You can use the [Ctrl] button to select the column.



3. Select all the charts (Select one chart first and press [Ctrl] + [A]), make the height and width of the chart equal under the “Format” tab. Then select **Group** all the charts together and makes it one single chart.



## 5.7.2 Create Panel Chart by Blank Row

- Adjust the data in following format:
  - Change the date column to “dd-mmm” format
  - Create a blank row between different company.

	A	B	C
1	<b>Company</b>	<b>Date</b>	<b>Stock Price</b>
2	<b>0005</b>	04-Jan	40.30
3		05-Jan	40.00
4		06-Jan	40.15
5		07-Jan	43.50
6		08-Jan	43.70
7			
8	<b>0941</b>	04-Jan	43.00
9		05-Jan	42.45
10		06-Jan	45.80
11		07-Jan	43.50
12		08-Jan	39.00
13			
14	<b>0006</b>	04-Jan	42.00
15		05-Jan	42.85
16		06-Jan	42.50
17		07-Jan	41.70
18		08-Jan	41.85
19			
20	<b>0066</b>	04-Jan	43.25
21		05-Jan	43.80
22		06-Jan	45.50
23		07-Jan	44.95
24		08-Jan	44.90

- Select the entire data range and insert the Column Chart.

