

# Microsoft EXCEL 2016

Learn Excel Basics with  
Quick Examples



**James  
Jackson**



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# Introduction

When it comes to working with digital spreadsheets and worksheets, nothing in this living and breathing universe beats the versatility and flexibility that Microsoft Excel has to offer. Ever since its conception, for the last 30 years, it has been standing as one of the pioneering official tools, innovating itself with each new iteration. Excel 2016, which is the latest and possibly the greatest Excel version up until now, is fully ripe and fleshed out with new contents which both interesting for advanced users, and easy to understand for beginners.

A very common question that often plagues the minds of first time learners of this software is that what are they going to do with it? This is a very ambiguous question as whether you will be able to succeed in life using the new software which you have learned, will completely depend on how you plan to utilize your time. But I can certainly guarantee you that not even a single second of your precious time will go in vain if you learn Excel 2016 properly. Excel is

an industry leading software, person who are skilled and adept in Excel are always high in demand in the job market and it will surely help you to get a competitive edge over the crowd.

Regardless of the fact of you being a pro user or an absolute beginner in Microsoft Excel, this book is aimed to help you learn the basics as well as the advanced function such as Quick Analysis Tool, Charts, Pivot Tables and Syntaxes.

I encourage you to begin your journey with Excel 2016 knowing that you are about to learn one of the strongest data-processing and analysis software on this planet.

# Chapter 1

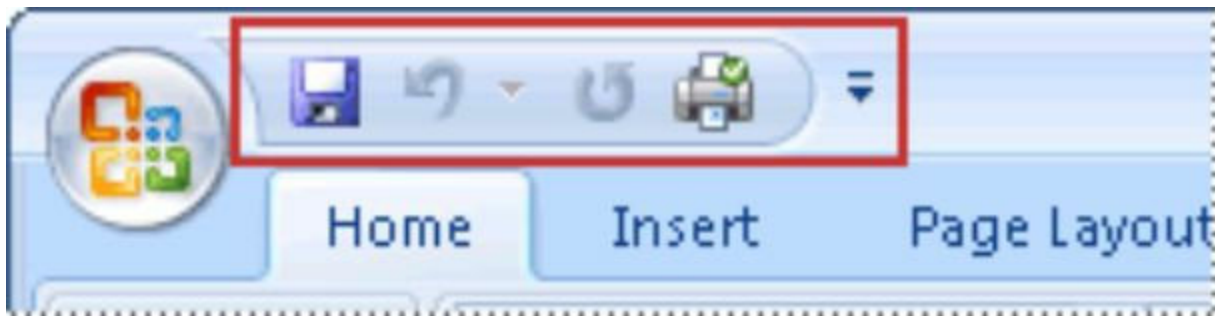
## Introduction to Excel 2016: The New Interface



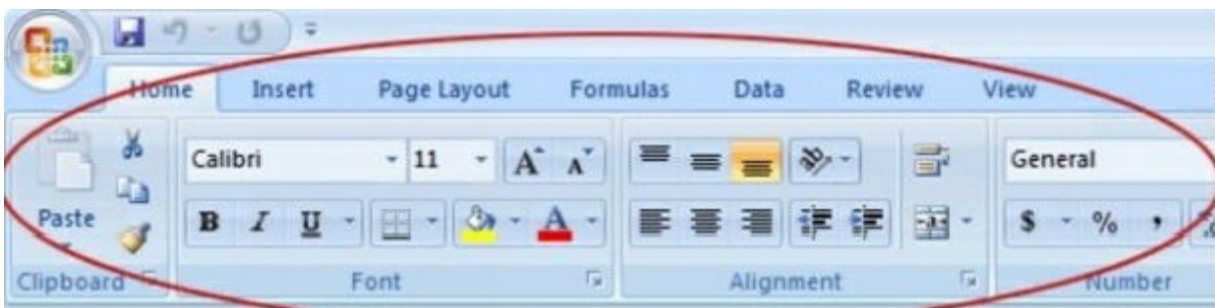
With the launch of Excel 2016, Microsoft has completely revamped how user were able to use the Excel.

You can manage datas in excel though the ribbon and quick access toolbar.

(Picture below shows the **quick access toolbar**)



(Picture below shows the ribbon)



Amongst the further new features that are included in the software, one that particularly stands out is the **Live Preview System**. It allows you to select a style and formatting from their collections. Then it immediately show you how it might look before you even apply it.

When it comes to viewing options, Excel 2016 has a very robust Page Layout view which visualizes all the rulers and margins alongside the worksheet which are accompanied by headers and footers. The Page layout also is packed with a zoom slider at the bottom of the screen that will allow you to zoom in to



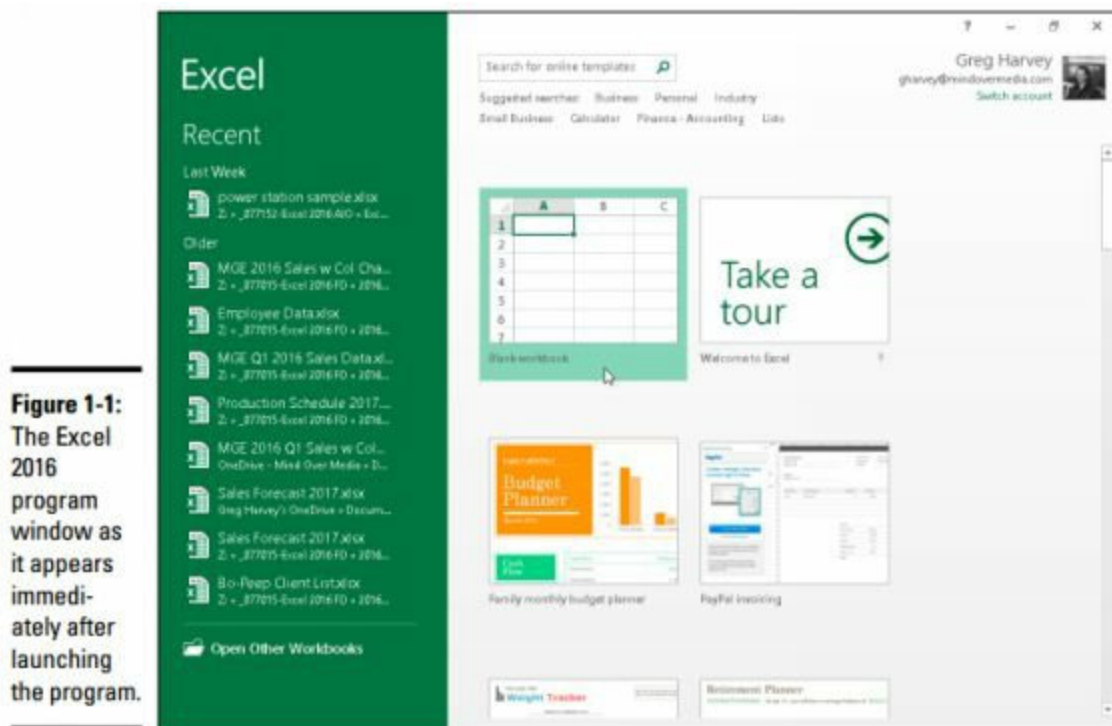
view those tiny fonts, while the backstage view is available to be used via the Excel Ribbon.

If you are a new user who is approaching from the stone ages of Excel 2007 or even 2010, you will immediately notice that the whole interface has undergone a total make over and now it looks really sleek and smooth with a very pretty graphical interface replacing the previous relatively flat display.

# Say Hello To The New Excel

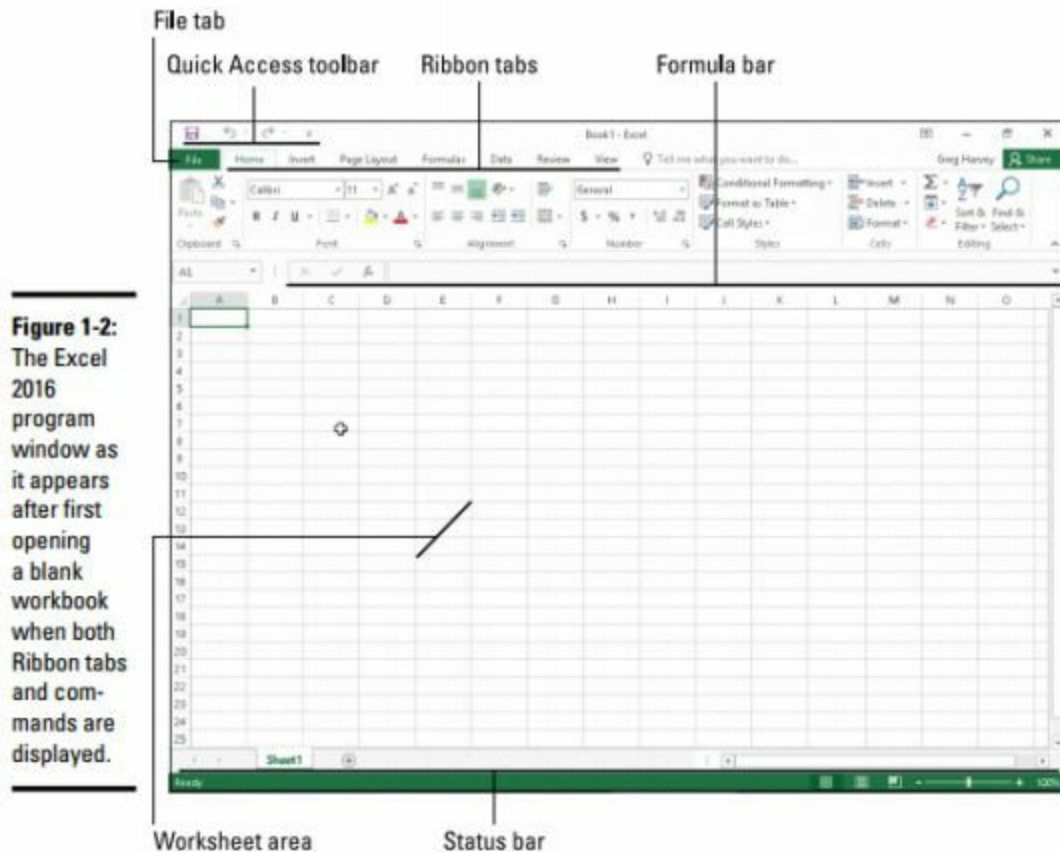
## The Start Screen

In Fig 1-1, the picture shown is the first greeting screen which you will see when you open up Excel. The screen has been carefully divided into two planes for your own accessibility. The left pane lists all the recently opened workbooks while the right pane contains a very easy tool which allows you to search for templates online.



The first thumbnail that you might notice is the ‘Blank Workbook’ thumbnail which is where you should go first to create your own very first spread sheet, while the second thumbnail named “Take a tour” will give you a very brief tour allowing you to experiment and learn about the new features of Excel 2016.

# Anatomy Of The Interface



Once you have opened up a new tab, you will see a screen like the picture shown above (a blank workbook). It is now opened up with a single worksheet that has the given name of Sheet1.

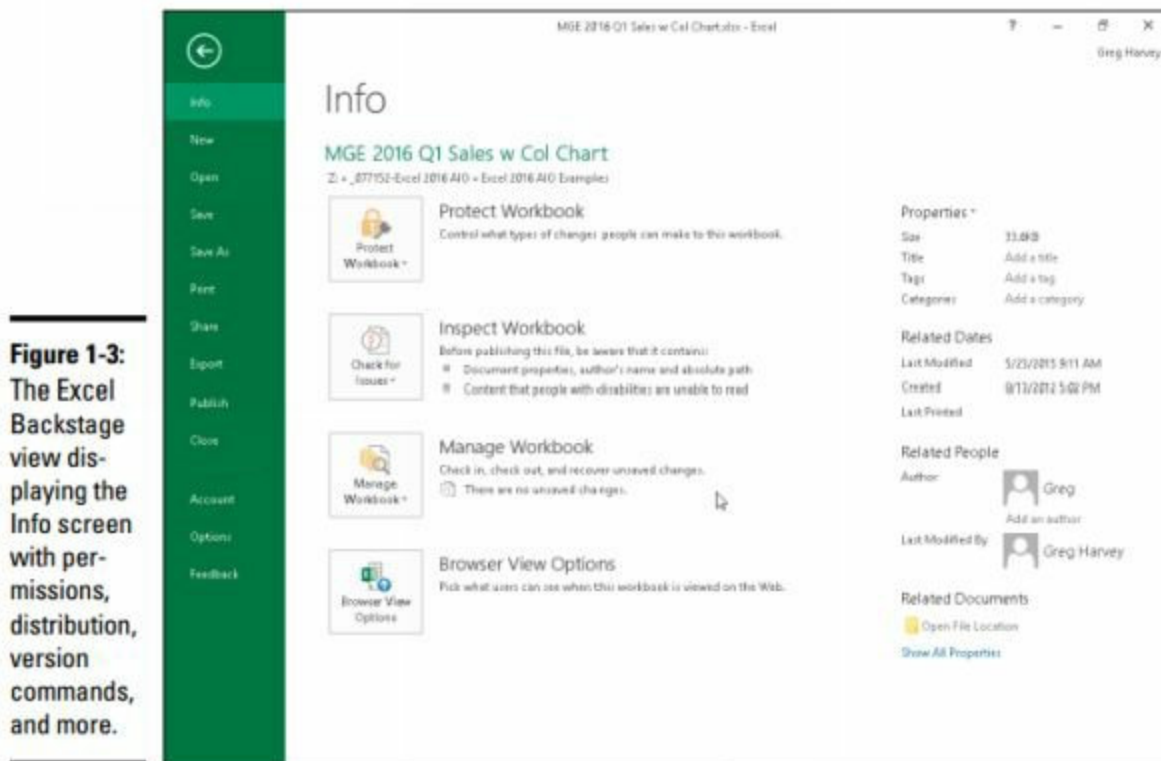
Now, let me break down some of the individual components that you will see in the Excel worksheet.

- **File Tab:** The file tab is a button where you will get all the rudimentary basic file-related options such as New, Open, Save, Save As, Print, Share, Export, Publish, Close, and Account. There also a contingency feature allows you to revert back Excel 2016 to its default form if anything goes wrong.
- **Quick Access Toolbar:** As the name implies, the quick access toolbar has three of the most commonly used options. Through the Quick Access Toolbar, you will be able to Save, Undo and Redo any of your actions performed in Microsoft Excel.
- **Ribbon:** The ribbon is the all-in-one hub for Microsoft Excel where you will find almost all the available features of Excel 2016 in a well-organized tabs system.
- **Formula Bar:** This is where you will get the information of your current selected cell.
- **Worksheet Area:** This is the area where all the cells of the worksheet are presented; they are identified by column headings that use letters at the top, and row headings which use numbers as identifiers that are

situated alongside the left edge. Similar to the new Firefox browser, you can use tabs to open up individual work sheets.

- **Status Bar:** The status bar is another information bar which keeps track of your currently activated mode and shows you if any special keys are engaged.

# Anatomy of the Backstage View



Then next screen with which I want you to be introduced is the backstage view, where you will be spending a lot of time with. This view will appear once you clicked the File button. Let me give you small briefings of the items which are available here. They are very similar to the starting window, these items here are also divided into two individual panes.

On the left-hand side, you will find four command options

- **Protect Workbook:** This option will allow you to encrypt your Excel Workbook file with a password to protect its contents.
- **Inspect Workbook:** This option allows you to check you Workbook for hidden metadata.
- **Manage Workbook:** This option allows you to recover or delete draft versions of your works which are automatically saved via the AutoRecover Feature of Excel 2016.
- **Browser View Option:** Here, you can control what parts of your Excel Workbook can be view online and which parts can be edited by other users.

Moving on to the side of the pane, you have-

- **Properties:** here some very common information about the files is listed here. including Title, tags, Categories, etc.
- **Related Date:** This section lists some important dates such as Last Modified, Created, and Printed.
- **Related People:** This is a section that contains a list of author's who has



worked on the workbook as well as the identity of the person who has last modified it.

- **The Open File Location Check Box:** This check box appears under the related Documents heading. It allows you to open the folder containing the current workbook and find all the other workbooks associated with it.
- **The Show All Properties:** This button will present you with a plethora of options including text fields for Comments, Templates, Status, Categories, Subjects, Hyperlink Bass and Company.

Aside from those, you will find usual command buttons.

- The New Button will immediately open a new Excel Workbook.
- The Save As button will allow you to save the file at a specified location in the computer
- The Print option will allow you to print the file.
- And a new feature called the '**Publish**' enables you to push your Excel Workbooks to power BI or a sharepoint library so that people can view and edit your file without installing the excel in their computer.

# The Anatomy of the Ribbon

**Figure 1-4:** Excel's Ribbon consists of a series of tabs containing command buttons arranged into different groups.



As I have already mentioned, The Ribbon is a very crucial aspect of the new Excel 2016 user interface. Let me break it down its individual components for you:

- **Tabs:** All of the main tasks of Excel's core task buttons can be found here in this All-in-One hub system.
- **Groups:** This section contains sub-buttons related to the core task selected at the tabs section.
- **Command Button:** You will find this command button situated inside every group, which upon selection will perform a specific action or

open up a gallery.

- **Dialog Box Launcher:** This option located at the lower-right corner of some groups. It allows you to open up a dialog box, which will act as an extension containing a number of extra options.

Now that you know about the anatomy of the Ribbon, let's explore the tabs a little bit more.

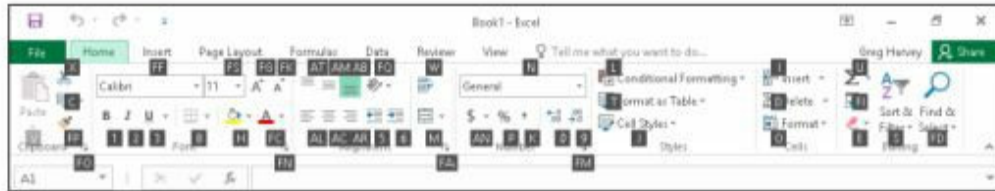
- **Home:** You can use this tab to create, format or edit a spreadsheet.
- **Insert:** You should pay this tab a visit when you are trying to add specific elements to your spreadsheet which might include graphics, pivot tables, charts, hyperlinks, headers, and footers.
- **Page Layout:** This tab is noteworthy when you are going to want to prepare a spreadsheet for printing or organizing all of the graphics that you have placed on your sheet.
- **Formulas:** This tab is going to be essential when you want to add formulas and mathematical functions to your spreadsheet, or you want to check your worksheet for formula errors.

- **Data:** The data should be used when you want to import, query, outline or subtotal all the data that are placed in your worksheet Data list.
- **Review:** This tab is useful when you want to finalize your document and proofread for errors.
- **View:** This tab helps you change the display of the area of your Worksheet and allows you to better view the data according to your convenience.

These are the 7 main tabs available on the Ribbon, Excel 2016 also has the feature to display some contextual tools that have their own tabs. Those tabs appear when you work on things such as a graphic or a pivot chart. They generally appears if you hover your mouse over it.

Below I have indicated the key board hotkeys. They are assigned to the Ribbon by default.

**Figure 1-5:**  
When you select a Ribbon tab by pressing Alt plus the hot key assigned to that tab, Excel displays the hot keys for its command buttons.



## A Glimpse into the Formula Bar

The formula bar allows you to see the contents of a cell.

*SideNote: The address of a cell is determined in the following order-*

*The column letter is shown first which is followed by the row number. So for example, the very first cell will be displayed as A1.*

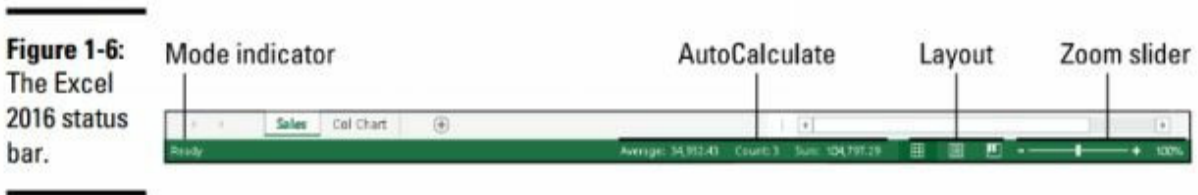
The contents of a currently selected cell are determined by the type of data you have entered, it might be text, numbers, a particular value or even a formula.

Anatomically Speaking, the formula bar is sub-divided in three individual sections:

- **Name Box:** It is displayed at the leftmost section. It shows the address of the currently selected cell.
- **Middle Box:** The second, middle section contains cancel, enter and insert function button which is labeled as fx.
- **Formula Bar:** It's the white area situated at the right side of the Function

Wizard button. It allows you to view and enter extremely large cell contents (for example- long mathematic functions). . It has very flexible size and expands as necessary to display all the present data in a cell.

## A Glimpse Into The Status Bar



The status bar is situated at the very bottom of the Excel Program window. The status bar contains the following-

- **Mode:** The mode button indicated the current state of the Excel Program is, For example – READY, ENTER, EDIT
- **AutoCalculate:** This is an indicative display keeps track of the average, count and sum of the numerical values entered any given and selected cell section.
- **Layout:** This is a selector button. It allows you to select between three different forms of layout.

**Normal:** This is the default view which shows only the worksheet with its cells, column and row headings.



**Page Layout view:** This is a very functional layout version. It adds rulers, page margins and also shows page breaks for you.

**Page Break Preview:** This mode helps you to adjust the paging size of a report which you have created.

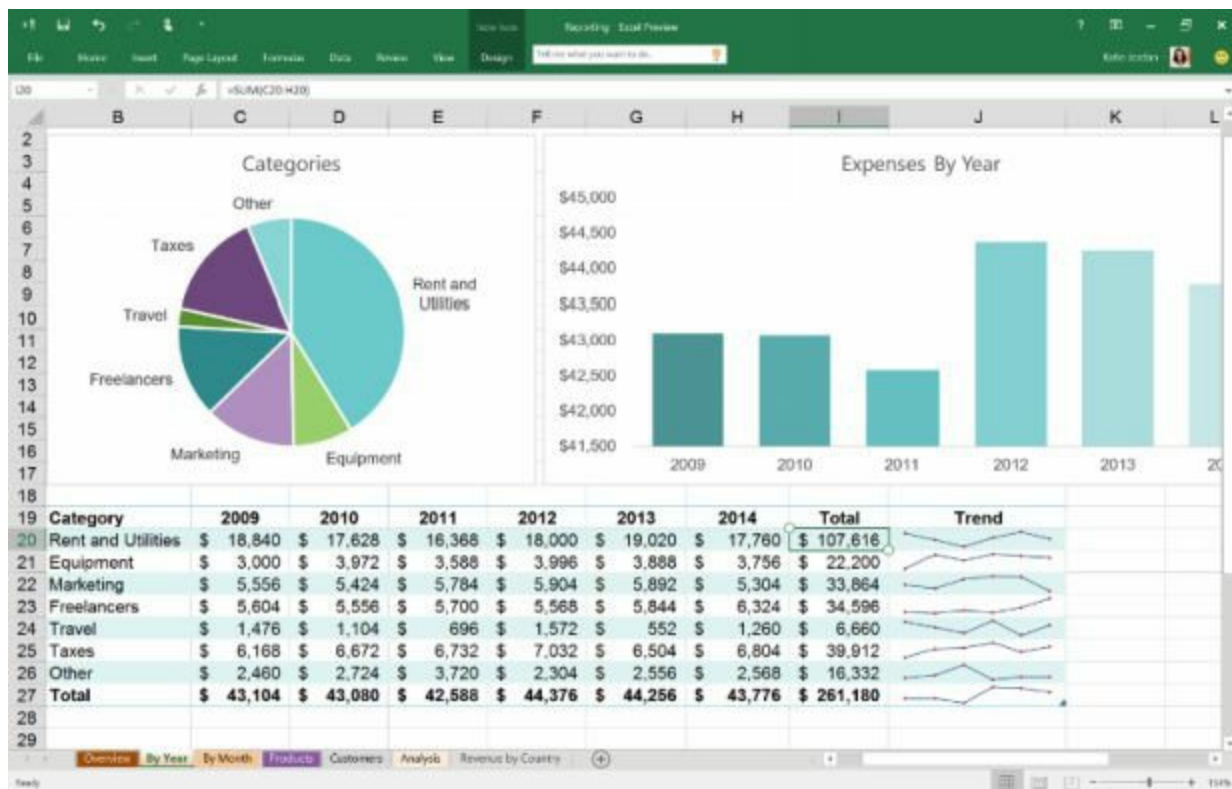
- **Zoom:** This is pretty much trivial in the sense that it does what its name implies, it helps you zoom in and out of the cells in your worksheet area by allowing you to fondle along with the slider.

## **Drill Problems**

- 1) Create a New Spreadsheet and write anything on 5 Cells horizontally and vertically.
- 2) Explain in brief the features of the 7 tabs in the ribbon.
- 3) Explain briefly the functionalities of the backstage view.
- 4) Practice the shortcuts in the Ribbon.
- 5) Point out the key features of the status bar.

## Chapter 2

# The Basics of Charts and Graphics

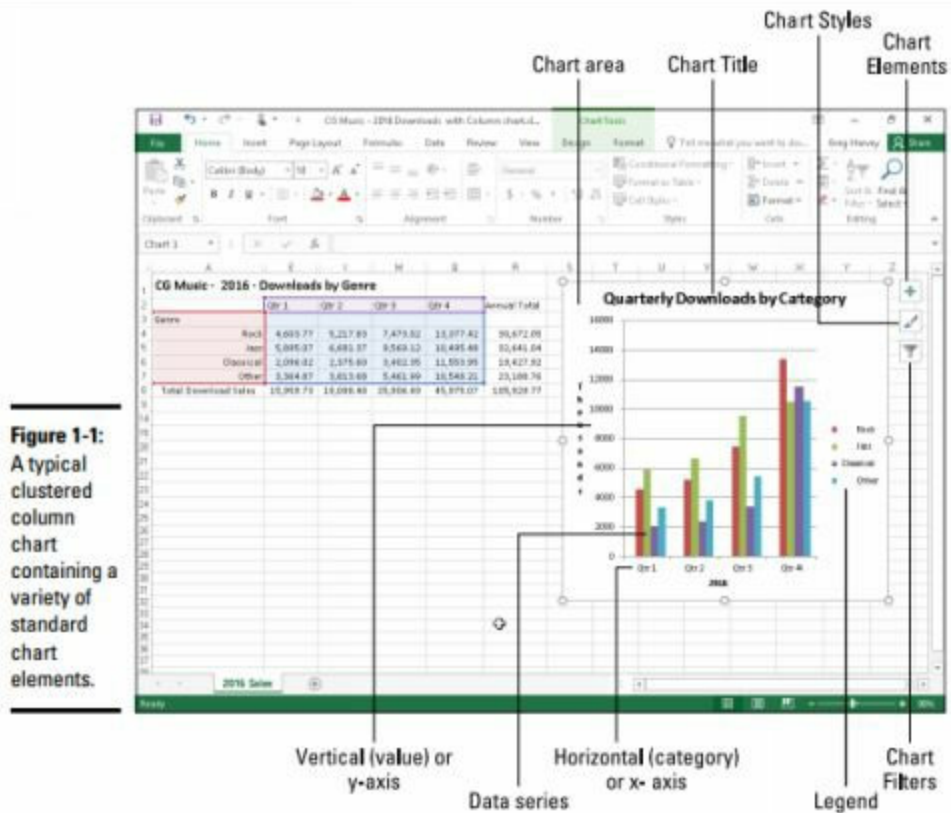


For a really long time now, charts have been walking side by side with spreadsheets and worksheets due to their fantastic ability of representing all the variables in the rows and columns in a visually pleasing and aesthetically appealing manner. People who don't have any idea about what all the statistics

in a given table are about are still able to immediately figure out the condition that is represented in a visual representation, Excel gives you the option to play around with a wide variety of charts such as **pie charts** and **bar charts**. Throughout this chapter, you will learn how to use them. You will also be introduced with several new interlinked terminologies such as data markers and chart data series.

## **Chart**

So, let me begin this chapter by introducing you the very fundamental aspects of a typical chart.

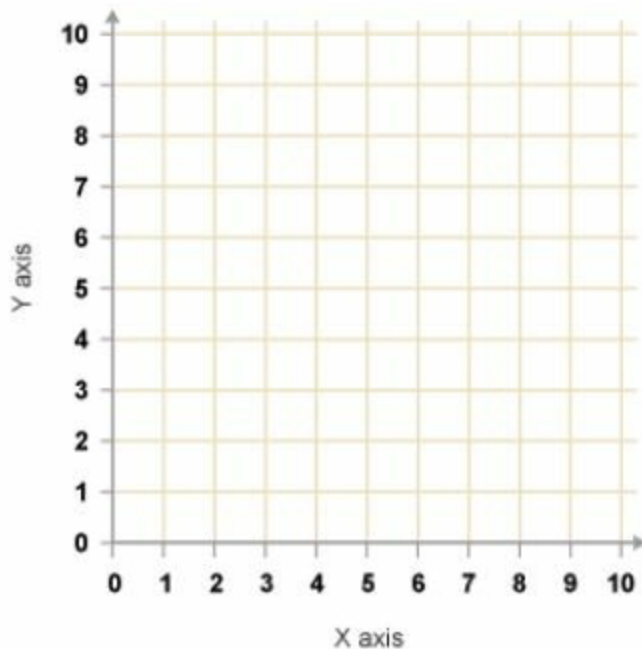


**Figure 1-1:**  
A typical clustered column chart containing a variety of standard chart elements.

There are 7 main components of a chart.

- **Chart Area:** The whole chart. It includes all the elements of the chart such as the labels, data markers, tick marks, etc.
- **Data Marker:** Data Markers are symbols (bar, dot, or area) that represent the data originated from the datasheet. (Data series are related data points)
- **Axis:** Axis is a reference for measurement. In a two-dimensional graph, you will find the x-axis which

is the horizontal axis and the y axis which is the vertical axis.

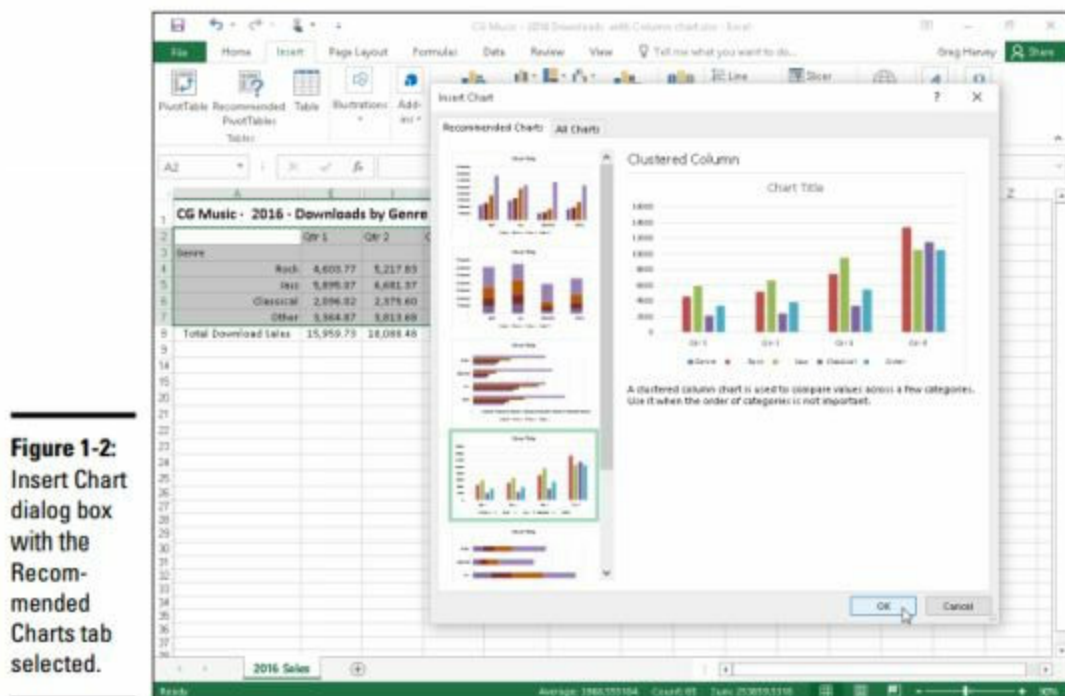


- **Tick Mark:** A tick mark is usually a line intersecting a point of an axis. It indicates a specific category, scale, or a chart series.
- **Plot Area:** This is the area that Excel uses to plot your data. (data series category names, tick-mark labels, and axis titles)
- **Gridlines:** These are optional lines which usually extend from the tick marks; the purpose of these lines is to make it easier for you to view your represented data.

- **Legend:** Legend identifies patterns, colors and/or symbols that are associated with specific markers in the chat.

# Various Ways of Inserting Your Chart

- **Recommended Charts:** One of the easiest methods to create a new chart is to insert it by selecting the command “Recommended Charts” which is placed on the Insert tab of the Ribbon. Once you have selected this option, it will open up a new window. From there you will get a wide arrange of options which Excel 2016 presents to you after analyzing the type of data you provided.



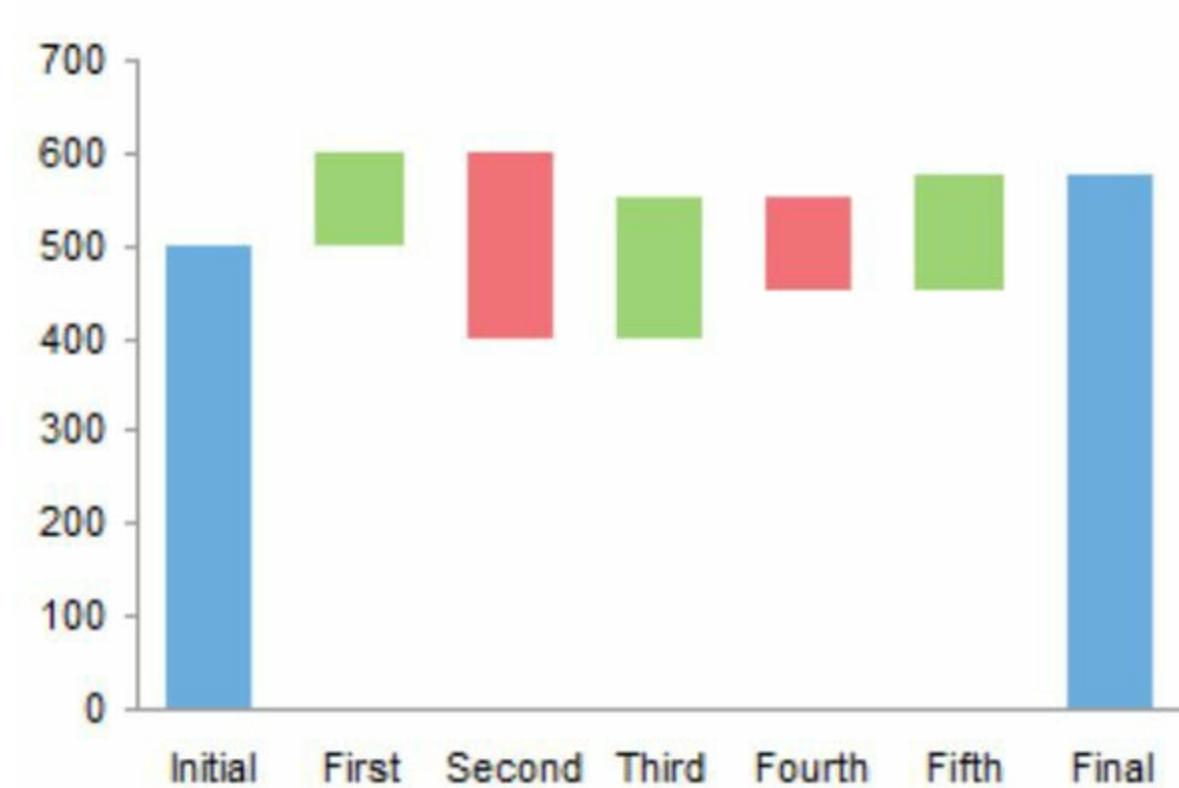
- **Insert Specific Types Of Chart from the ribbon:** On the right side of

the Recommended Charts Button, you will find several tabs. From there, you can insert specific types of charts such as pie chart, bar chart etc,

Bar chart represents your data as 2 dimensional or 3 dimensional vertical columns.

Hierarchy Chart (organization chart) allows you to represent your data on a Treemap or Sunburst Hierarchy.

The Waterfall or Stock chart allows you to create 2 dimensional waterfall charts. (see example below)

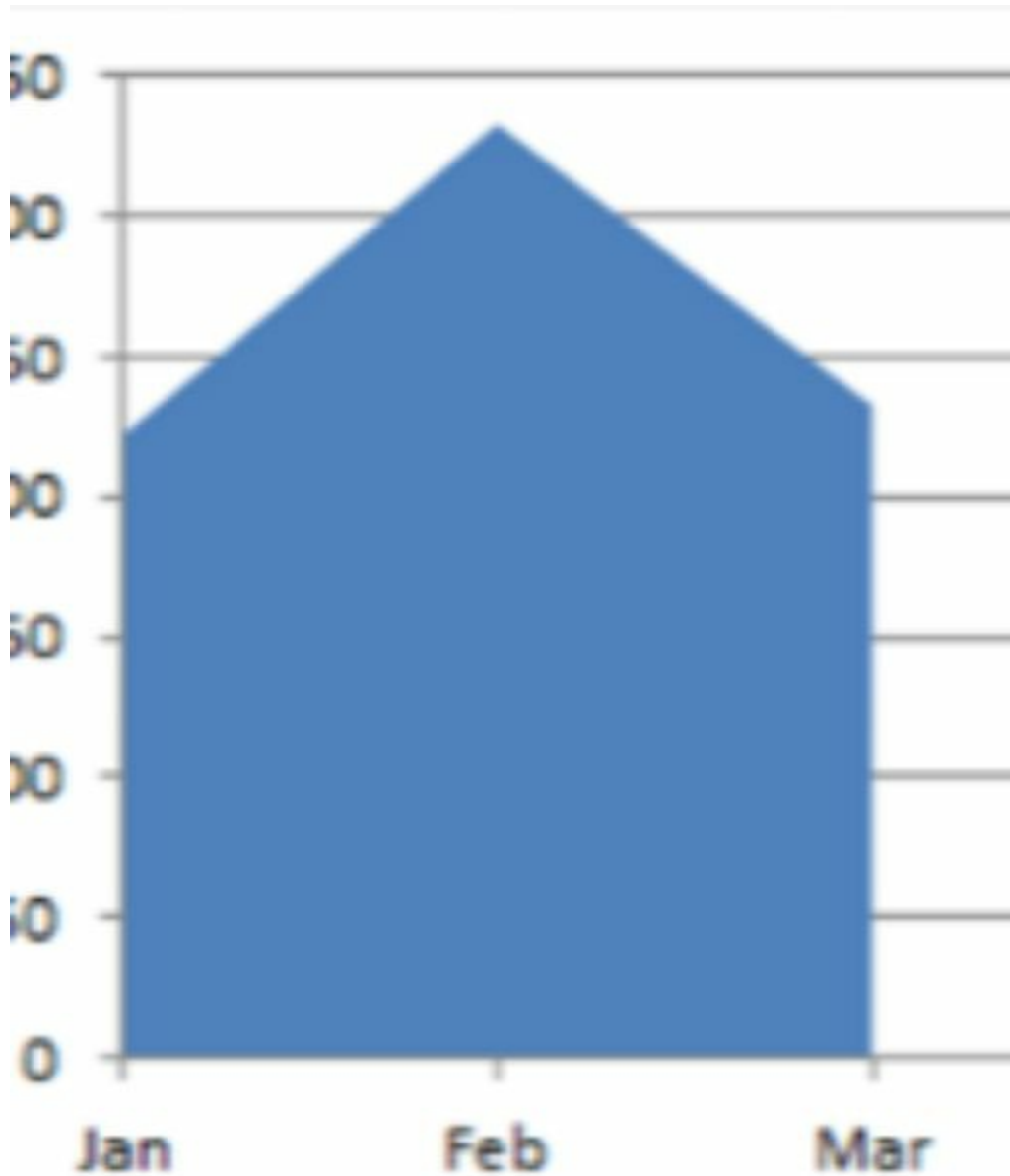


Insert Line or Area Chart will allow you to create simple 2 dimensional



or 3 dimensionalline or area charts.

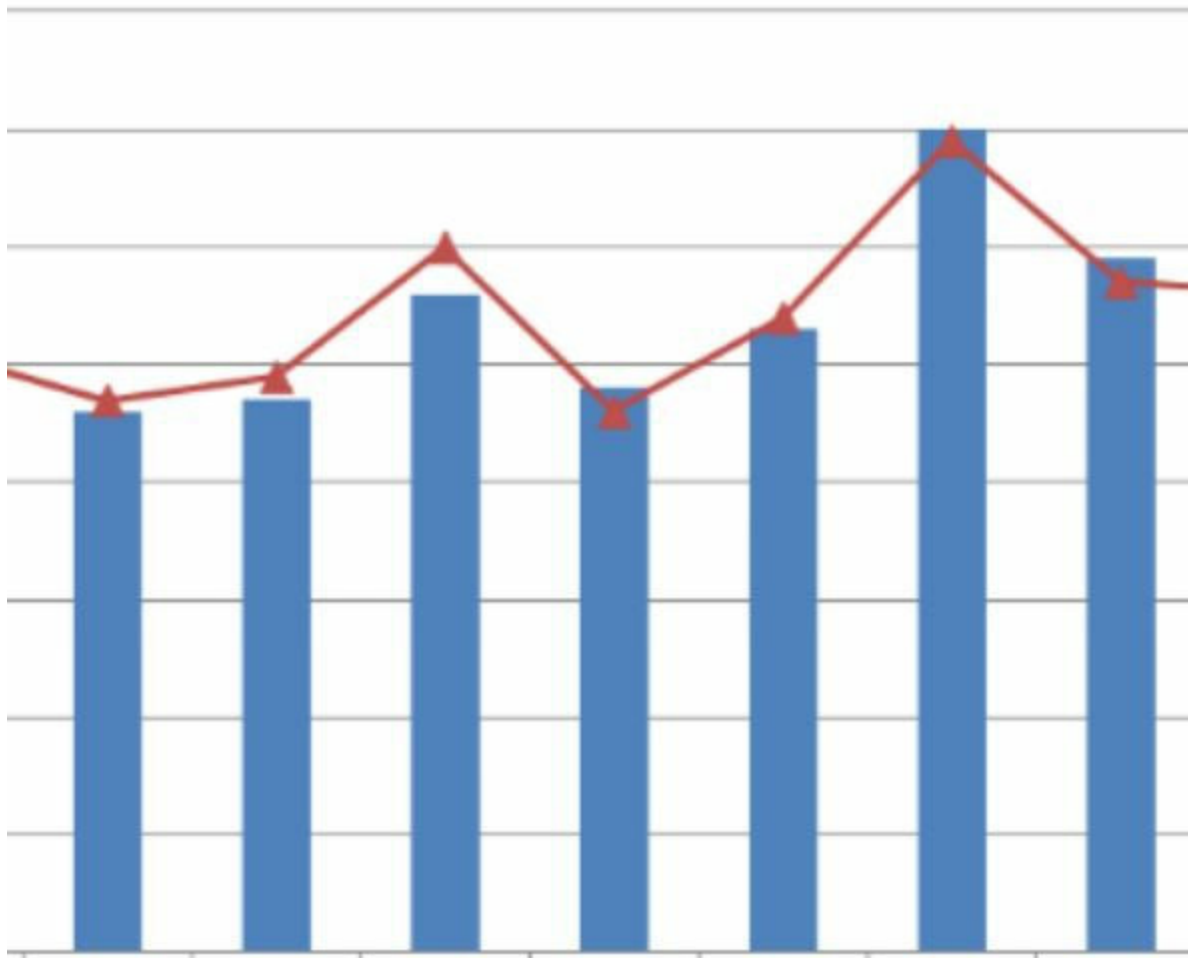
## Area Chart Example



Insert Statistic Chart will allow you to create histograms.

Insert Combo Chart will allow you to represent your information on a 2 dimensional combo of either column and line chart, or cluster column and

stacked area chart.



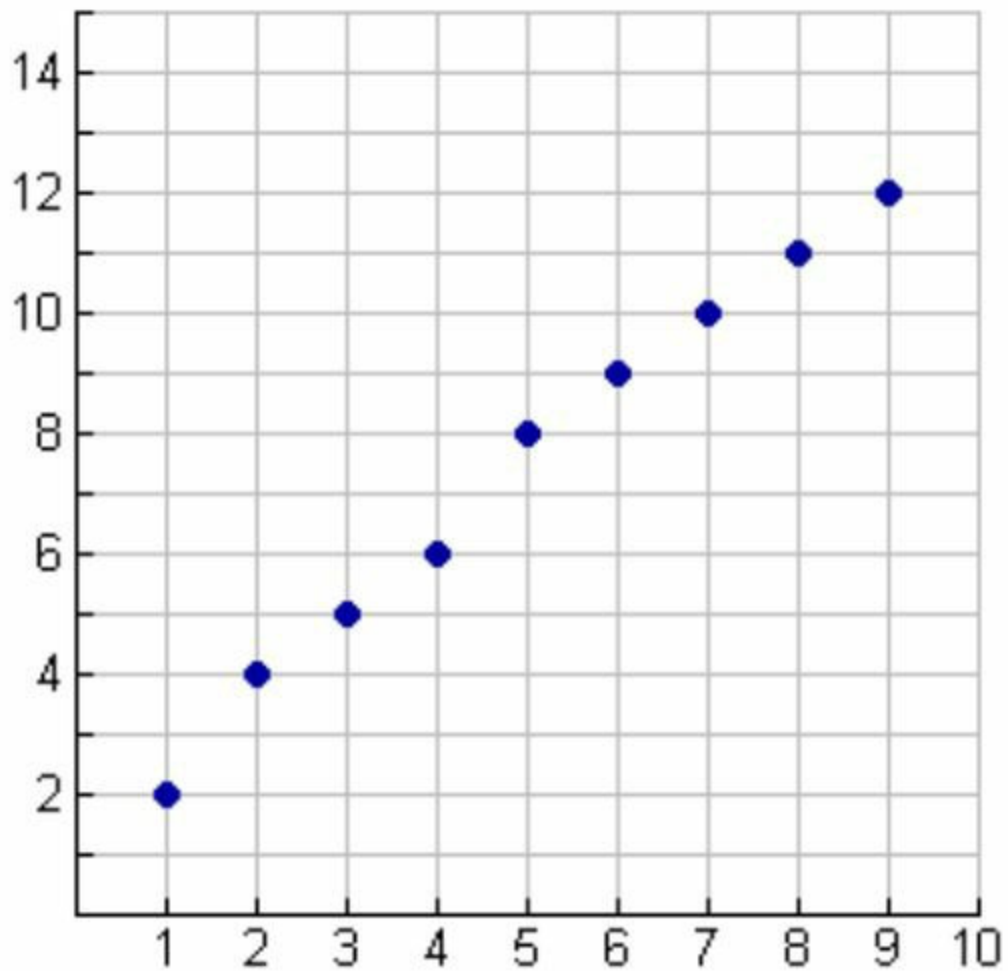
The Insert Pie or Donut Chart option will allow you to create either a 2 dimensional or 3 dimensional pie chart.

**Donut chart example:**



Insert Scatter (x, y) or Bubble chart will allow you to create a bubble chart.

### Scatter Chart Example:

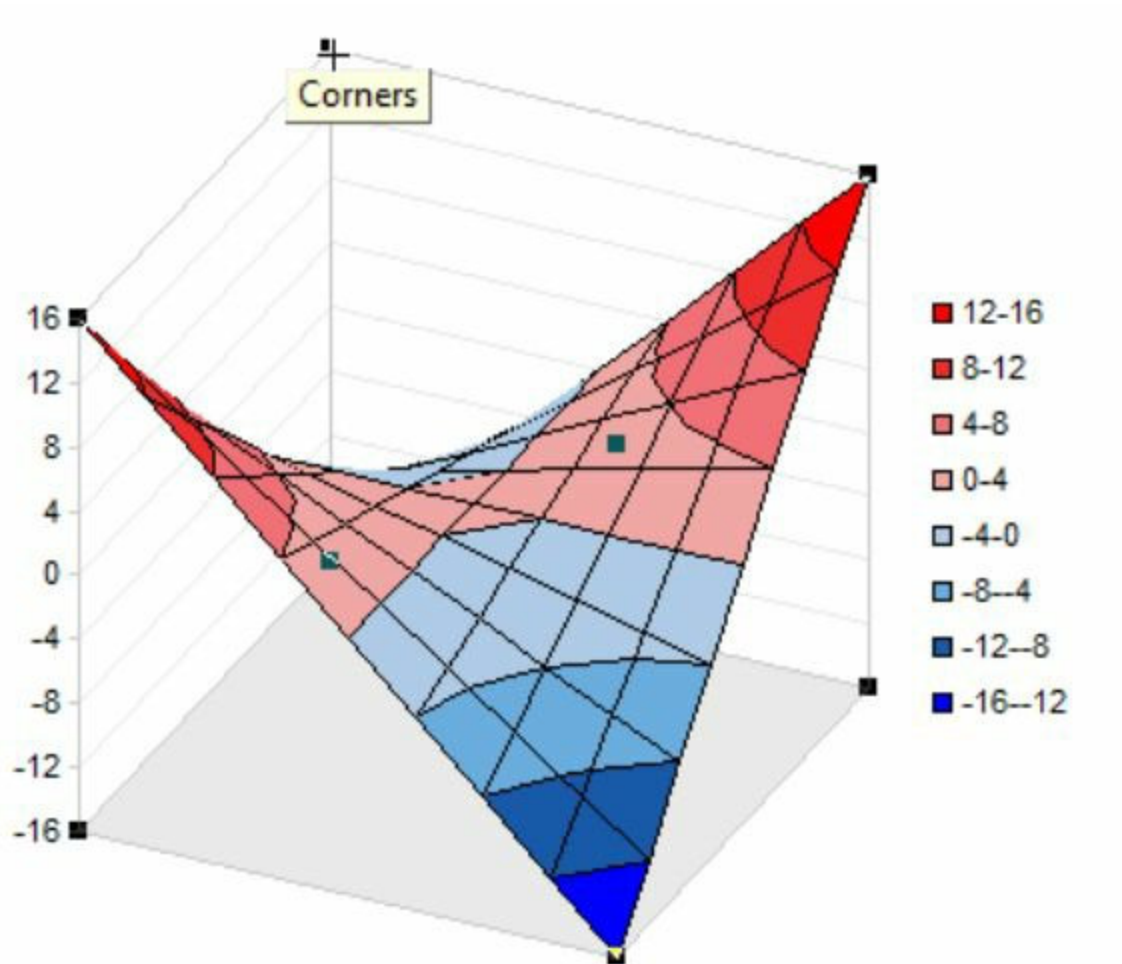


### Bubble Chart Example:

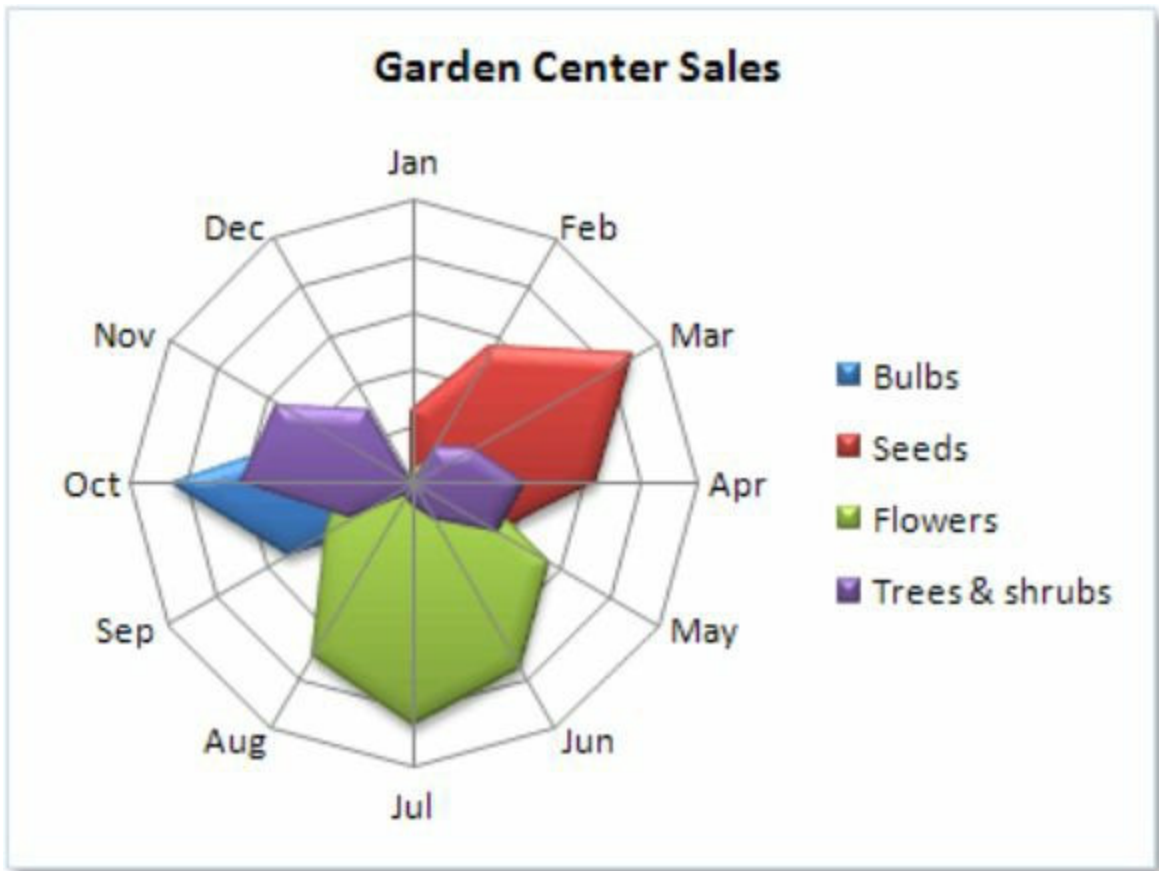


Insert Surface Or Radar Chart will allow you to view your data as 2 dimensional or 3 dimensional surface charts or 2 dimensional radar charts.

### Surface Chart Example:



### Radar Chart Example:

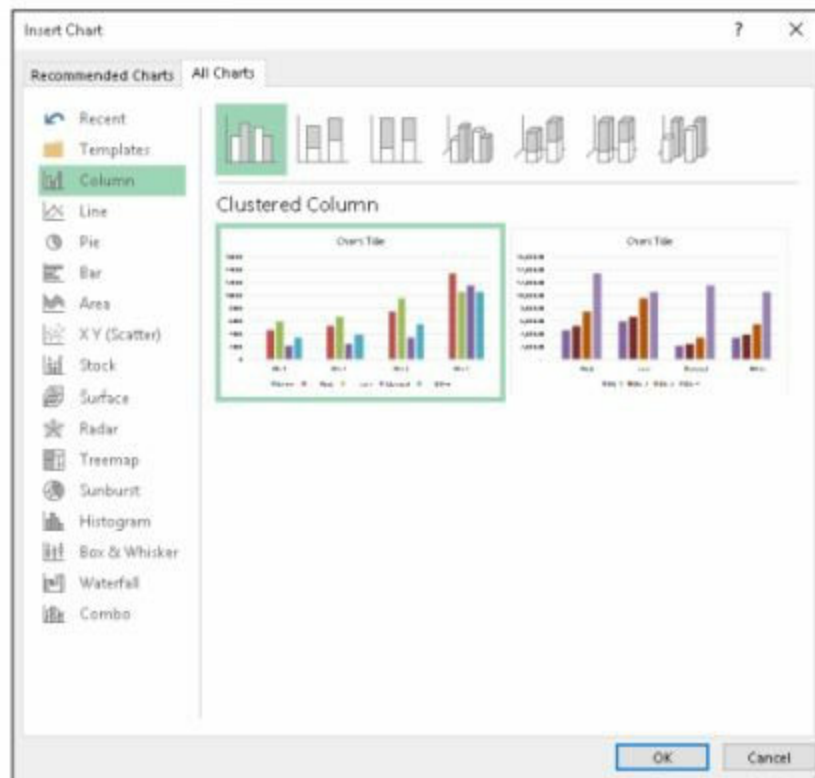


- **Inserting Charts Through The Quick Analysis Tool:** When you are in need of selecting a subset of data table as a range, then the Quick Analysis Tool will be very helpful for you.

The first thing you will have to do is click on the Quick Analysis tool which is situated at the lower-right corner of the cell selection when data are selected (📊).



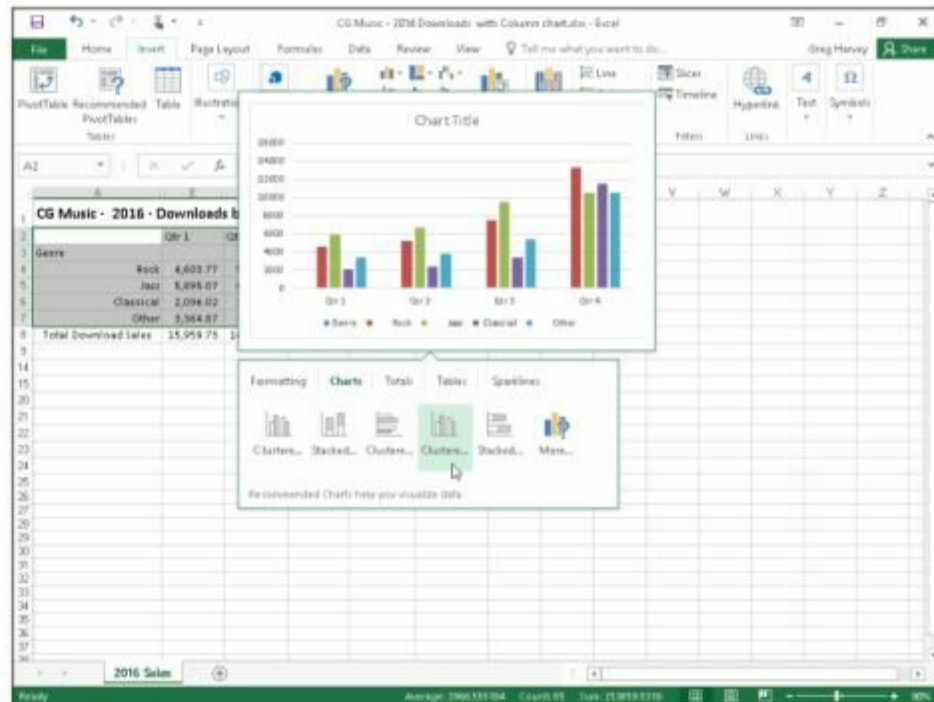
**Figure 1-3:**  
Insert Chart  
dialog box  
with the All  
Charts tab  
selected.



After that, you are going to want to click the charts tab. You will then be given the options to choose from different types of charts such as column, stacked, clustered and even more.

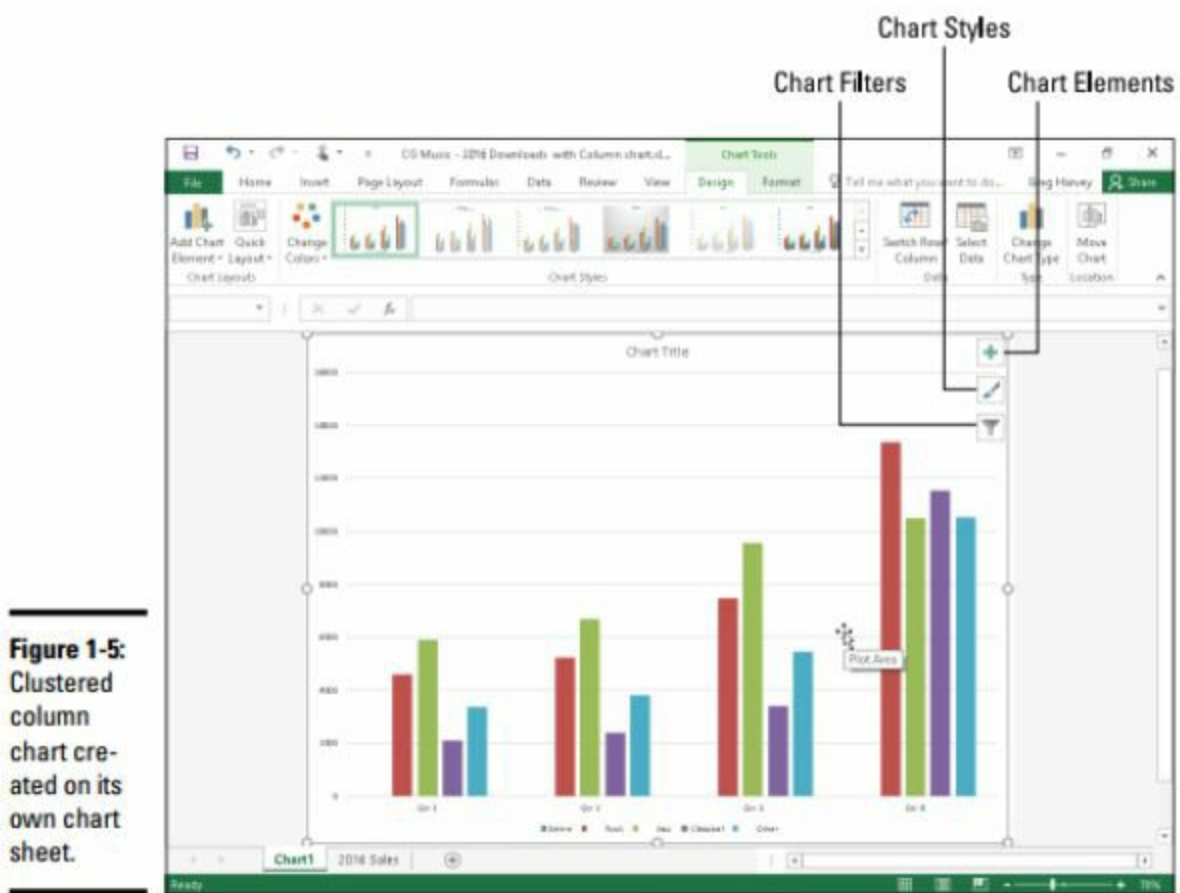
If you just want to get a glimpse of what your data might look like on the any given chart type, all you have to do is put your mouse pointer on top of the chart type, and Excel will give you a large thumbnail showing how your data will look like.

**Figure 1-4:**  
Previewing  
the embed-  
ded chart to  
insert from  
the Quick  
Analysis  
tool.



# Customize Your Chart

Now that you have learned how to create your chart, let's talk a little bit about the various ways you can use to modify the various components of the chart.



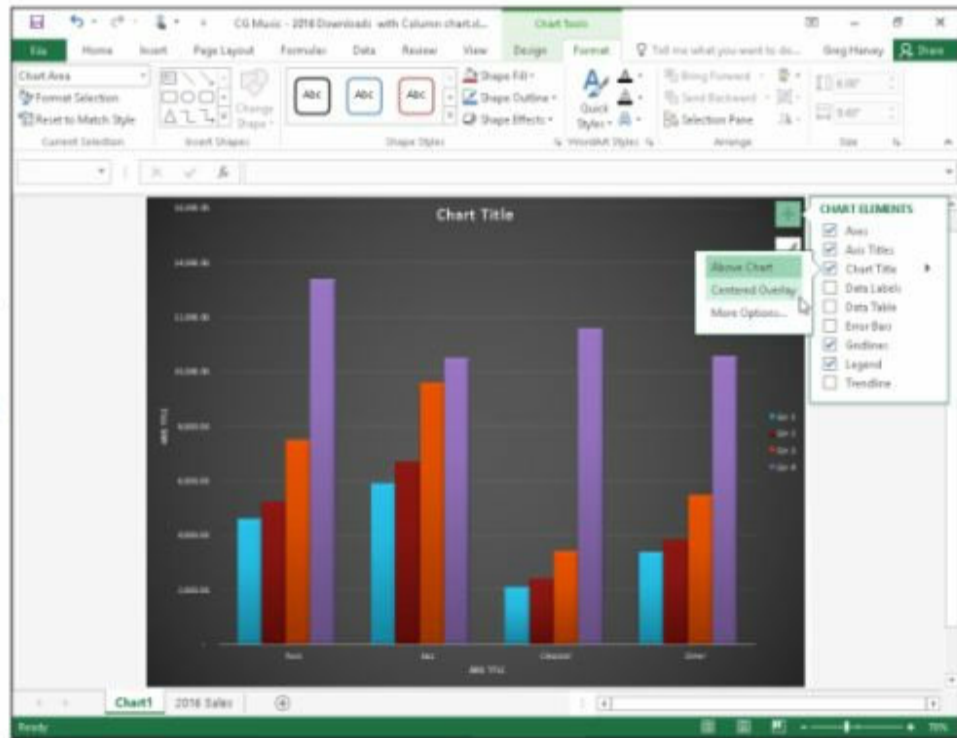
The basic elements of chart customizing are:

- **Chart Layouts:** You can change the chart layout by clicking on the Add

Chart Elements button to choose the type of elements which you want to be added.

- **Chart Styles:** If you want to chart to be a little bit funky, you can click on the Change colors button where you will get a drop-down gallery presenting a number of color scenes for you to choose from.
- **Switch Row/Column:** This button will allow you to immediately interchange between worksheet data and Legend Entries.
- **Select Data:** This button will open up a Data Source Dialog box for you where you will be able to modify the data area you selected to create the chart.
- **Change Chart Type:** Using this button, you will be able to change the chart type. If you want to go for a pie chart instead of a stacked bar chart, you can do it here.
- **Move Chart:** It allows you to move your chart around the worksheet.
- **Elements:** The elements button is situated at the upper-right corner of the chart, signified by a plus sign, which allows you to add or remove any particular element from your chart.

**Figure 1-9:**  
Reposition-  
ing the chart  
title in the  
example  
clustered  
column  
using the  
Chart  
Element  
button's  
menus.

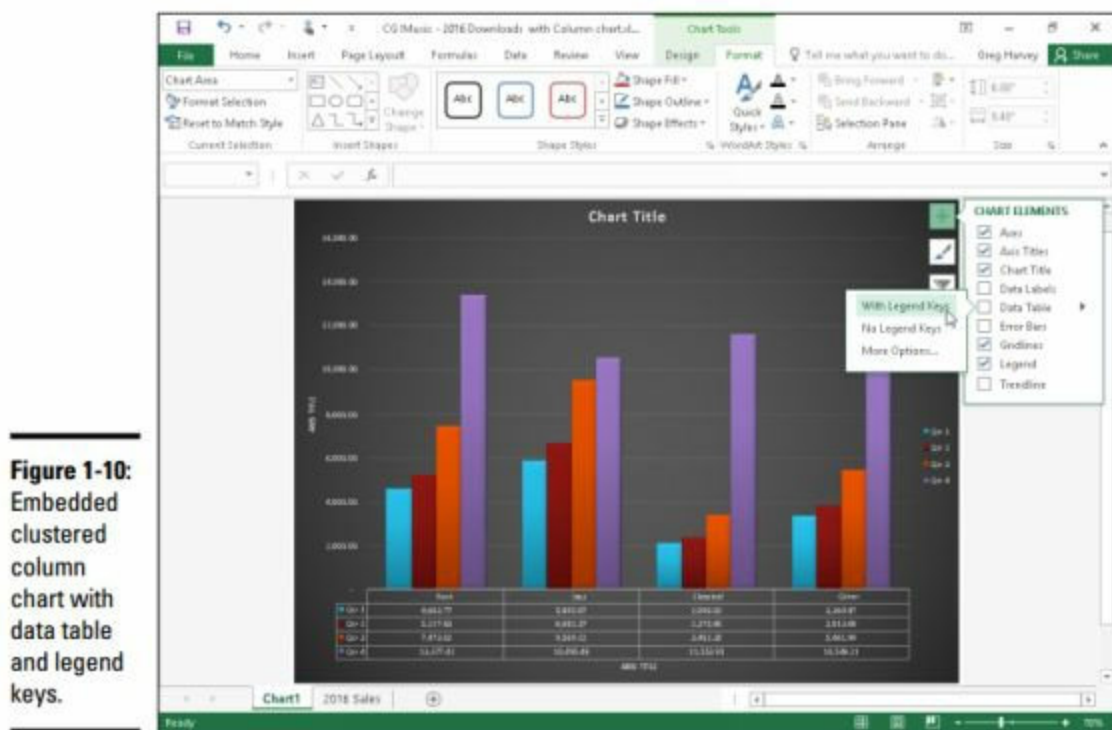


So, say for example if you want to reposition the Chart's title, after clicking the bottom, you will be offered with two options **Above Chart** which will reposition the title above the plot area; **Centered Overlay** that will reposition the title at the center and top of the plot area. A third button **More Options** should be clicked if you want to edit your chart further by adding Lines or effects etc.

- **Labels:** This is very straightforward, all you have to do to add labels is to click on the Chart Elements button next to your chart and click Data Labels box, after which you will be presented with a variety of options such as

**Center, Inside End, Inside Base, Outside End,etc.** all of which will allow you to reposition your label according to your needs.

- **Data Table:** To add data tables to your chart, you will need to click the Chart Elements button next to the chart button and then select if you want your data table to have **legend keys or not have legend keys**. Just like before, the more options will give you further control over the format of your data table.

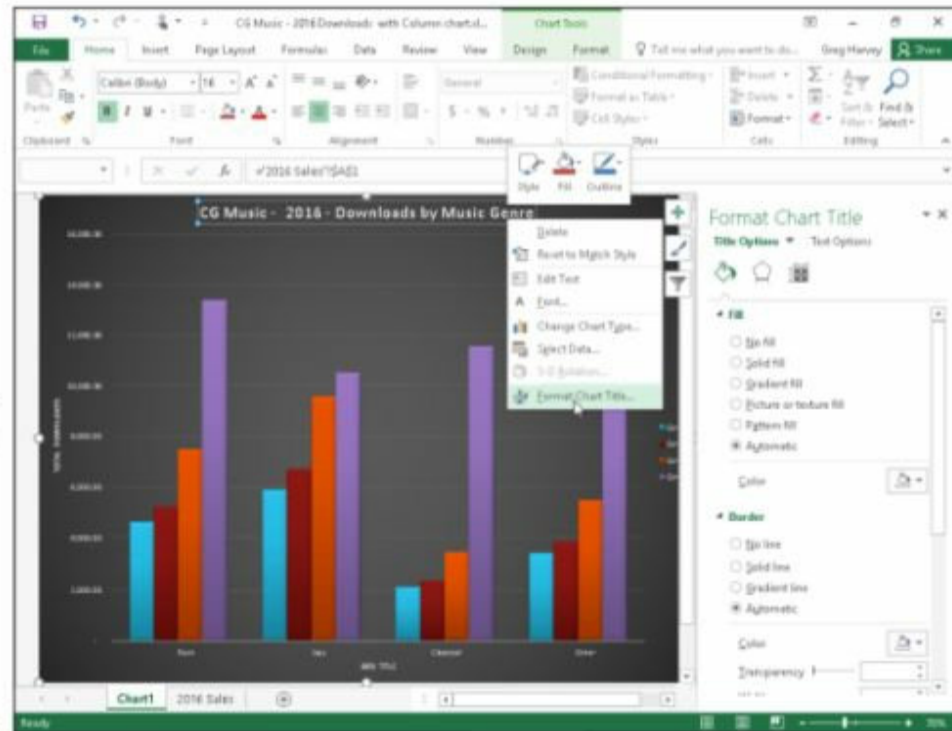


# Different Ways of Formatting Your Chart

At this point, you should be very familiar with how you are going to create and employ your charts with some basic customizing methods. Next, let's say hi to different methods to format your chart.

- **The Direct Way For Your Chart Elements:** This is definitely by far the most simplified method of changing your chart element, all you need to do is right click on the elements of which you want to change and then choose the format option.

**Figure 1-11:**  
Formatting  
the Chart  
Title with  
the options  
in the  
Format  
Chart Title  
task pane.



- **Using The Task Pane For Your Chart Title:** Similar to the previous one, if you right click your Chart title and go to the Format Task Pane shortcut, you will get a number of options that will allow you to further personalize the texts of your label. For example, if you click the text options, you will get a –

**Text Fill & Outline Option** will allow you to choose the type of color and outlining used for the text

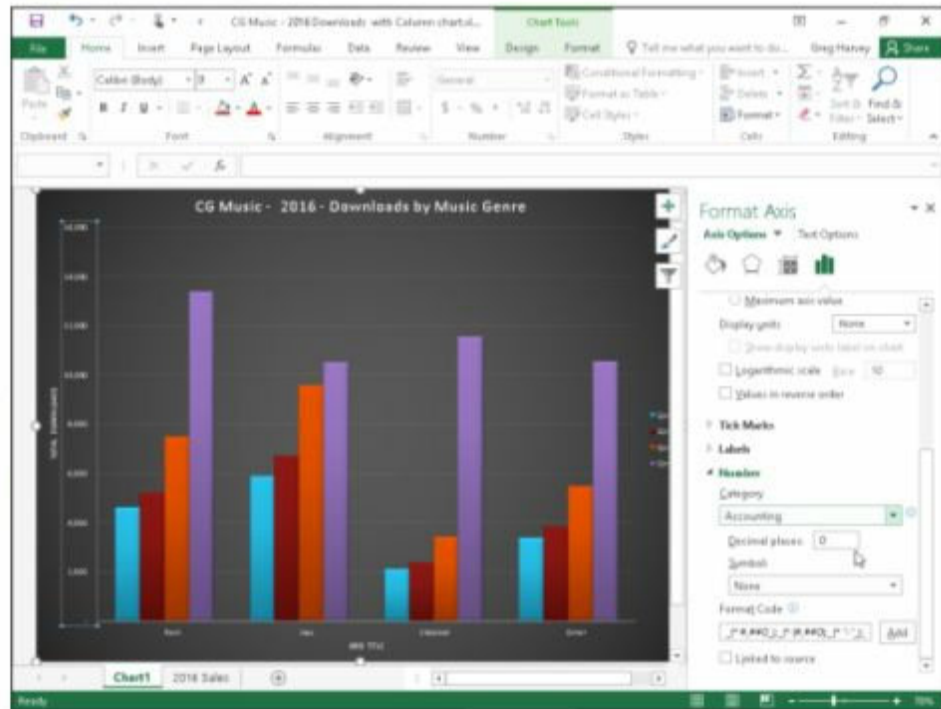
**Text Effects** will allow you to add shadows, reflections, soft edges and other fancy stuffs.



**Textbox**Through textbox, you will be able to control the alignment, direction, angle, fonts and also the size of the text.

- **Formatting The Chart Axis using Format Axis Task Pane:**There are various ways to format your axis, but perhaps the most common one is to change the intervals between your tick marks and decide where you want both axes interactwith each other. Regardless of what kind of change you want to make, to do it, you have to first right click the axis in the chart, then choose Format Axis Option and go to Axis Option. It will give you four groups of option. From here, you can experiment with the options to change the axes properties.

**Figure 1-12:** Formatting the Vertical (Value) Axis with the options in the Format Axis task pane.



The options that are available for you to manipulate differs based on which axis you are playing with. Let's first see the options for the horizontal axis:

- **Bounds:** This is used to determine the maximum and minimum boundaries on your axis.
- **Units:** The units are used to separate the distance between the tick marks on your axis. Different units of how you are calculating your data will result in different distances between the tick marks.
- **Horizontal Axis Cross:** This option is used to determine the point

where the horizontal and vertical axes will cross each other.

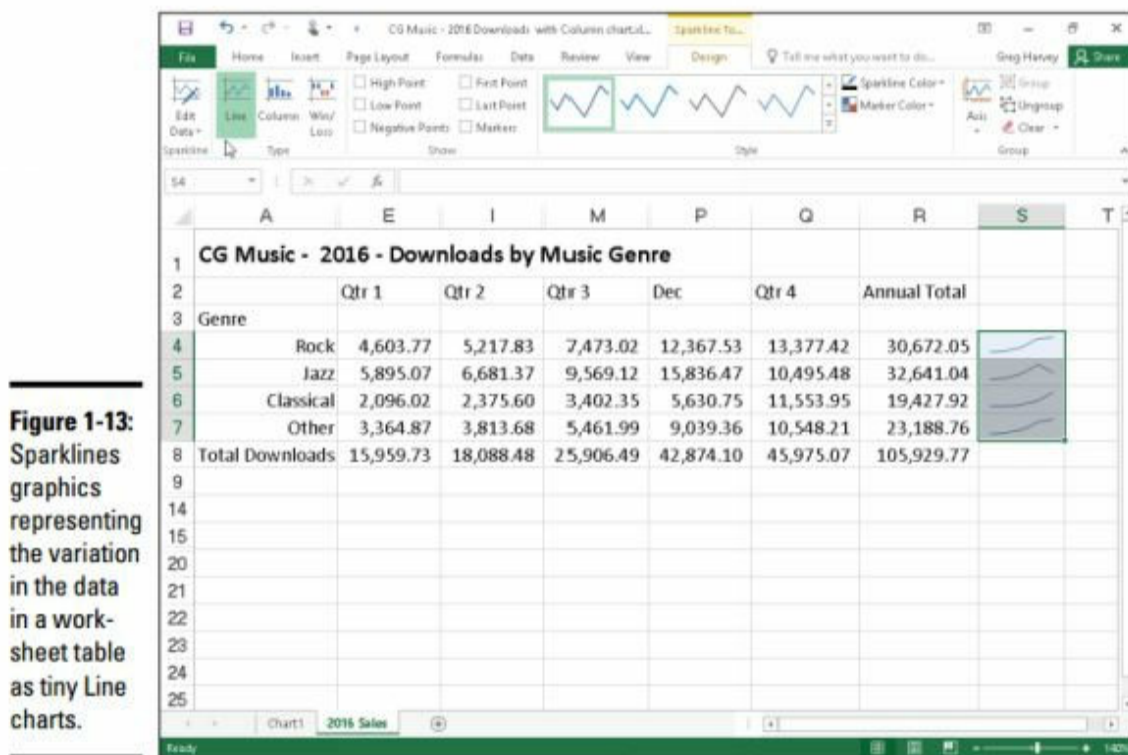
- **Logarithmic Scale:** This option allows you to base the values on your scale.
- **Values In Reverse Order:** This simply allows you to put the lowest value at the top of your chart (Inversing the whole chart).

Also, the options for horizontal scale include:

- **Axis Type:** This helps to choose an axis depending on the purpose of your format.
- **Vertical Axis Crosses:** This option is used to choose where the vertical axis will cross the horizontal axis.
- **Axis Position:** This allows you to reposition the axis
- **Categories In Reverse Order:** This allows you to reverse the order of the data markers in the horizontal axis.

# Sparkline

Sparkline.is used to see the trends of a set of data selected.



The easiest way to add Sparkline graphics to your worksheet is by going through the following steps:

- Select the cells containing the data you want to be represented as Sparkline.
- Click on the type of chart that you want for your Sparkline in the

sparklines group of the insert tab.

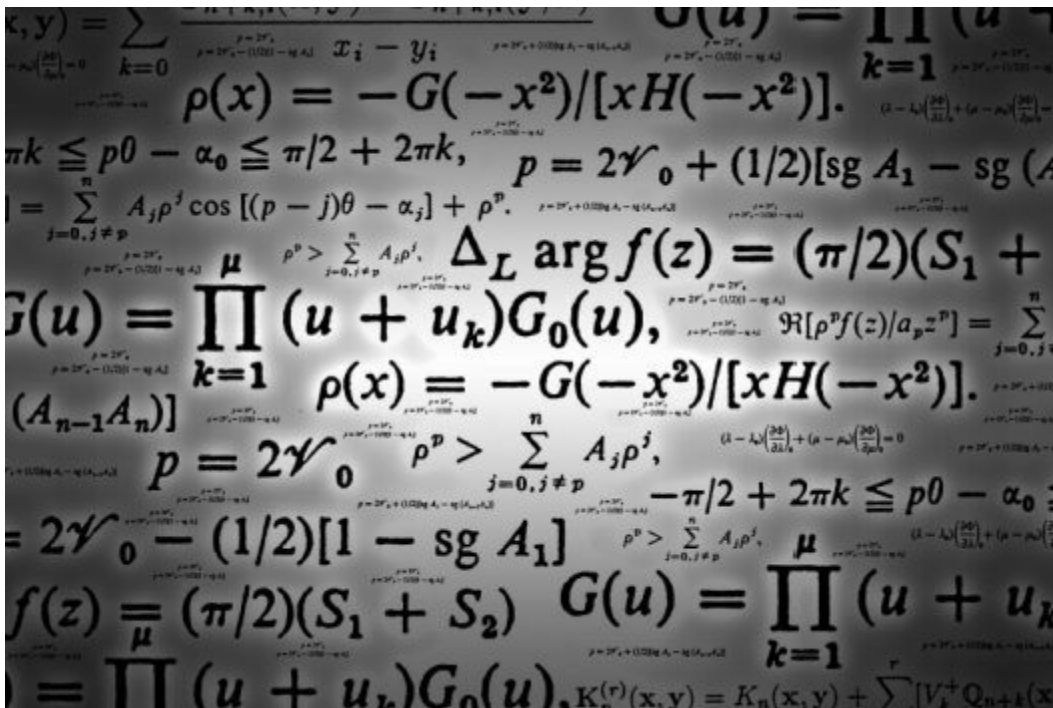
- Select the data range you want to be represented as sparkline, click OK.

## **Drill Problems**

- 1) Explain The Different Parts Of A Chart
- 2) Practice The Various Ways Of Inserting A Chart
- 3) Create a Bar chart.
- 4) Create a sparkline

## Chapter 3

### Into The World of Functions and Formulas



There is no way to simply present to you the importance of using formula in a spreadsheet. There are the bread and butter of excel.

Excel 2016 gives you the freedom to build your own formula using simple operators as well as the built-in functions.

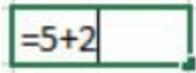
## **At The Heart of a Formula**

Regardless of what kind of formula you are going to use, whether it is a very simple addition formula or a much more complex equation, all of the formulas have one thing in common, and they all begin with one thing, that is an (=) equal sign. The moment you put up an equal sign at the beginning of a cell, Excel will immediately acknowledge it to itself that a formula is to be followed.

## Define a Formula

While there are many ways that you to calculate in excel.these two are the most common:

- Type “=” and then type in the formula in the cell addressed box.(for

example:  (make sure to hit enter after you enter the values)

- Or, you can type in the cell address or selectthe cells to calculate, for

example:



	A	B
1		
2		
3	5	
4	2	
5	=A3+A5	
6		

(make sure to hit enter in order to let cell show the calculated value)

The second method mostly recommended as it greatly eliminates the risk of making an error during your formula building period.

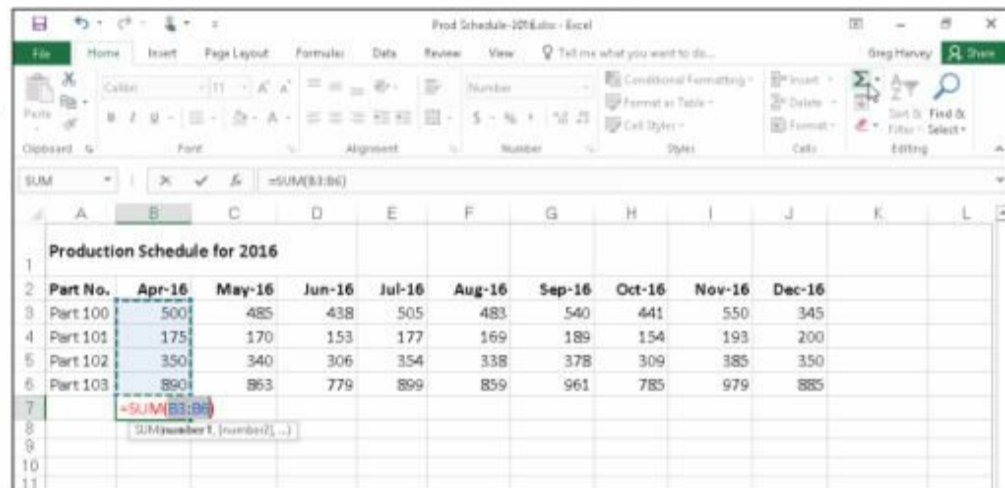
After entering the value and hit the enter the cell will show the calculated result, However, if you want to see the formula or fix something in the formula, you can still access your through the formula bar by clicking on the cell with the calculated result.

# Using the Ribbon to Build Formulas

The most used and the easiest formula in excel is the SUM formula. It gives you the sum total of all the rows or columns you have selected. The sigma ( $\Sigma$ ) button on the Editing group of the home tab of the Ribbon allows you to use this function.

You can also do it by type in “=SUM()”, move your mouse pointer in the bracket, and then highlight the cells of which you want to add the value together.

**Figure 1-1:**  
Using the  
AutoSum  
feature  
to create  
a SUM  
formula  
that totals  
a column of  
numbers.

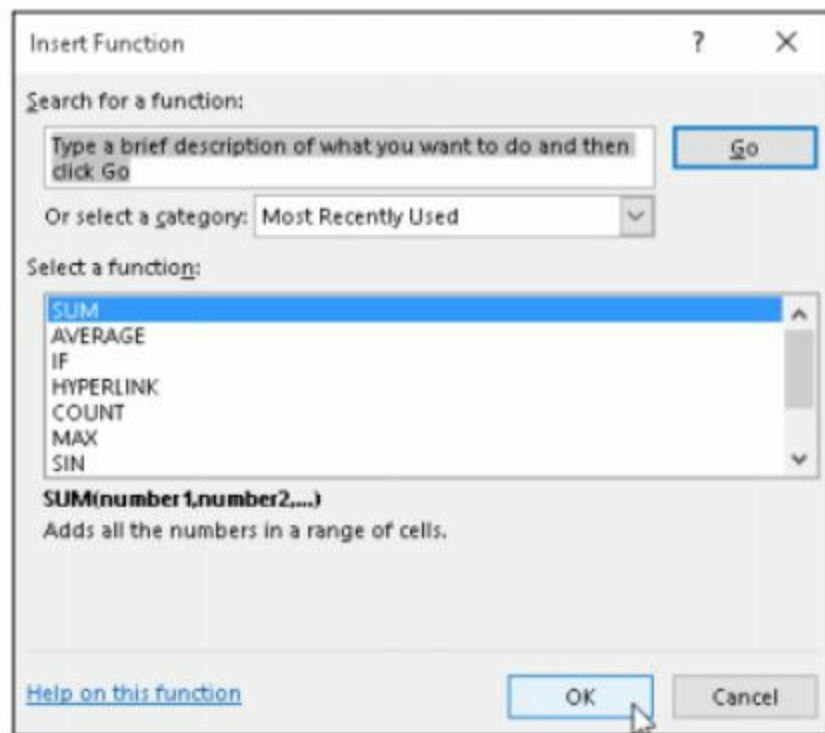


	A	B	C	D	E	F	G	H	I	J	K	L
1		Production Schedule for 2016										
2	Part No.	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16		
3	Part 100	500	485	438	505	483	540	441	550	345		
4	Part 101	175	170	153	177	169	189	154	193	200		
5	Part 102	350	340	306	354	338	378	309	385	350		
6	Part 103	890	863	779	899	859	961	785	979	885		
7		=SUM(B3:B6)										
8												
9												
10												
11												

Aside from the SUM function; you will also find a wide range of other

functions are available to be used. For example, AVERAGE, COUNT, MAX, and MIN. They calculate the average value of the selected cells, number of cells for selected area, biggest number from selected cells, and smallest number from selected cells, respectively.

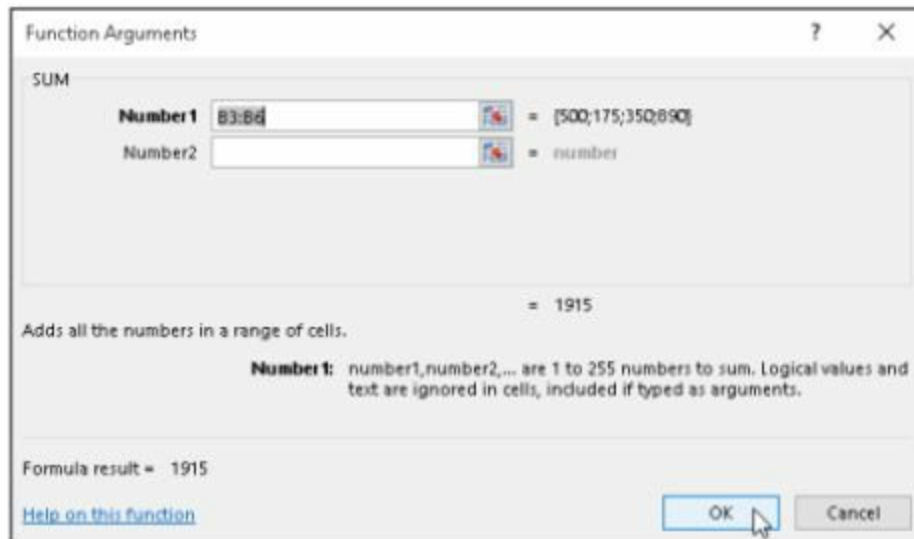
**Figure 1-4:**  
Selecting  
a function  
to use in  
the Insert  
Function  
dialog box.



To use these function, first, you will have to click on the formula button from the ribbon, and then click on insert formula (Fx). Then, you will see a dialog box. From here, you will be able to choose from different types of formulas.

After you have chosen your formula, it will close and open up another dialog box where you will have to choose the arguments (if any) that you want your function to be accompanied with.

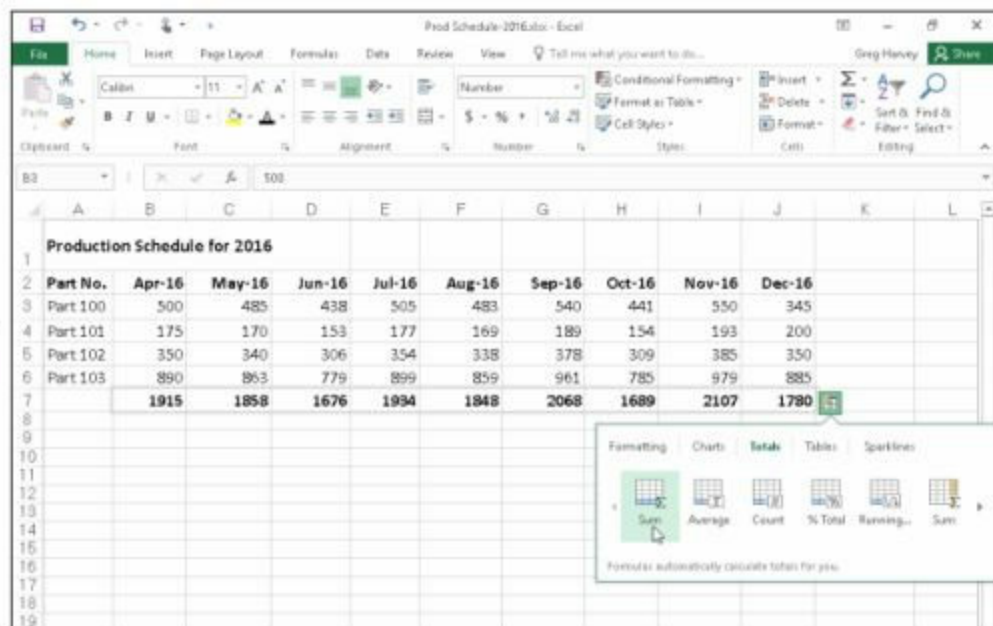
**Figure 1-5:**  
Selecting  
the  
arguments  
for a  
function in  
the Function  
Arguments  
dialog box.



## A Handy Way to insert formulas

If you think that the clicking on the Autosum button is too much of a hassle for you, then luckily you have the all-rounder Quick Analysis Tool hand to help you. To add values up using the Quick Analysis tool, what you have to do first is to select the cells that you want to add up, and then click the quick analysis tool that will automatically appear on the lower right corner of the very last cell which you have selected.

**Figure 1-3:**  
Adding  
a row of  
totals with  
the Quick  
Analysis  
tool's Sum  
button.



After that, all you have to do is to click on the totals tab, and you can chose

from different functions from there and get your result.

# Operators

Whenever you want to create a formula, there will be many different symbols you can use in a formulas. Excel's operators are mathematical symbols that aid in the computations.

Generally speaking, there are four different operator types that are available for you to use in Excel. They are summarized in the table below.

<b>Table 1-1                      The Different Types of Operators in Excel</b>			
<i>Type</i>	<i>Character</i>	<i>Operation</i>	<i>Example</i>
Arithmetic	+	Addition	=A2+B3
	- (minus sign)	Subtraction or negation	=A3-A2 or -C4
	*	Multiplication	=A2*B3
	/	Division	=B3/A2
	%	Percent (dividing by 100)	=B3%
	^	Exponentiation	=A2^3
Comparison	=	Equal to	=A2=B3
	>	Greater than	=B3>A2
	<	Less than	=A2<B3
	>=	Greater than or equal to	=B3>=A2
	<=	Less than or equal to	=A2<=B3
	<>	Not equal to	=A2<>B3
Text	&	Concatenates (connects) entries to produce one continuous entry	=A2&" "&B3t
Reference	:	Range operator that includes	=SUM(C4:D17)
	,	Union operator that combines multiple references into one reference	=SUM(A2,C4:D17,B3)



## The Level of Precedence

When I was a kid, I used to mess everything up whenever I was given a equation full of different signs. The confusion that arrived from choosing whether I should add up the two values or divide the values first always gives me headache. This is why, I'm attaching the below table to give you guys a reference. Don't get confused with so many different types of operators, in this chapter, mostly, we focus only on precedence 4,5. (The smaller the number of precedence, the earlier it's calculated in a formula)

<b>Table 1-2    Natural Order of Operator Precedence in Formulas</b>		
<i><b>Precedence</b></i>	<i><b>Operator</b></i>	<i><b>Type/Function</b></i>
1	–	Negation
2	%	Percent
3	^	Exponentiation
4	* and /	Multiplication and Division
5	+ and –	Addition and Subtraction
6	&	Concatenation
7	=, <, >, <=, >=, <>	All Comparison Operators

So, for example, let's say that you enter a formula in cell A4 which is

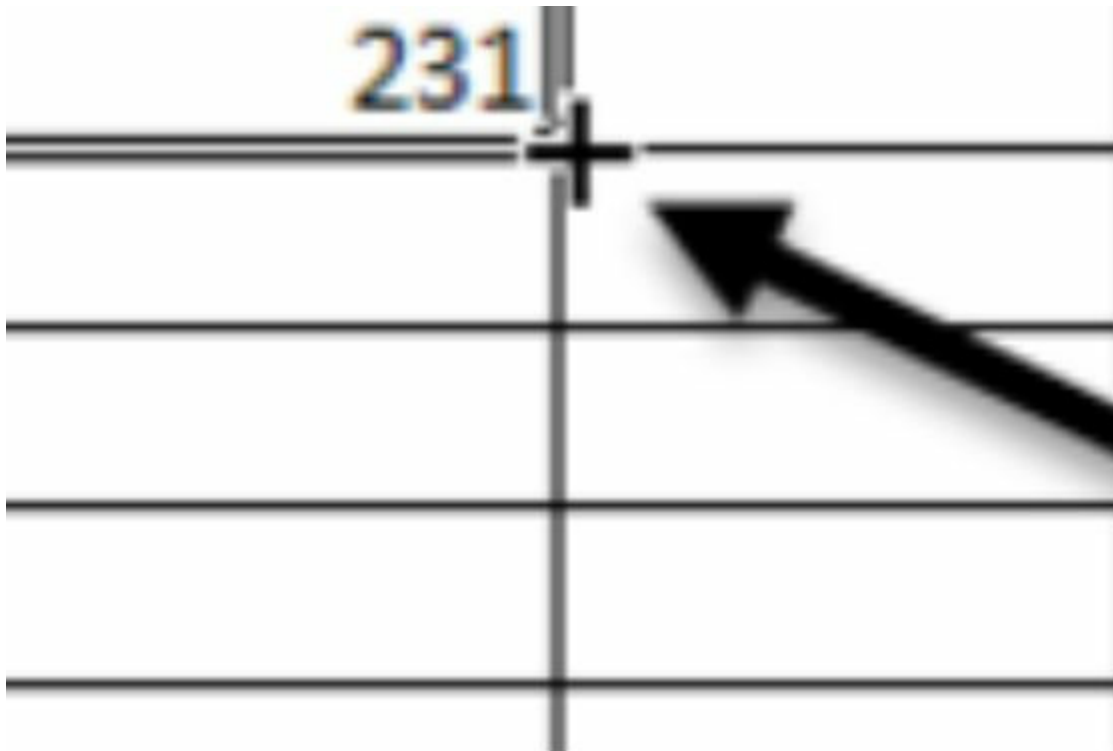
$$= B4 + C4/D4$$

Since the division operator has a smaller precedence number than the addition operator, the cells between C4 and D4 will first divide, after which the result will be added to the cell in B4.

## Formula Copying ShortCut

Once you have created a formula, you will be able to copy the formula to to another cell or a cell range, and it will work the exact same way as it worked on the previous cell.

The shortcut of doing it is by clicking on the cell, and moving your mouse pointer to the right lower corner of the cell, when your mouse pointer changed to a a black cross symbol(Refer to the picture below)



You can then drag it horizontally or vertically. The formula will then be calculated for all the cells covered.

## A Little Bit Trouble Shooting

Imagine that you are working on a really huge spreadsheet and all of the sudden you see a random scary looking error popping at you. At that moment, it would actually feel quite upsetting right? In this section, I am going to introduce you to some of the common types of error which you will probably face while working on your formulaes, and some simple ways to tackle them.

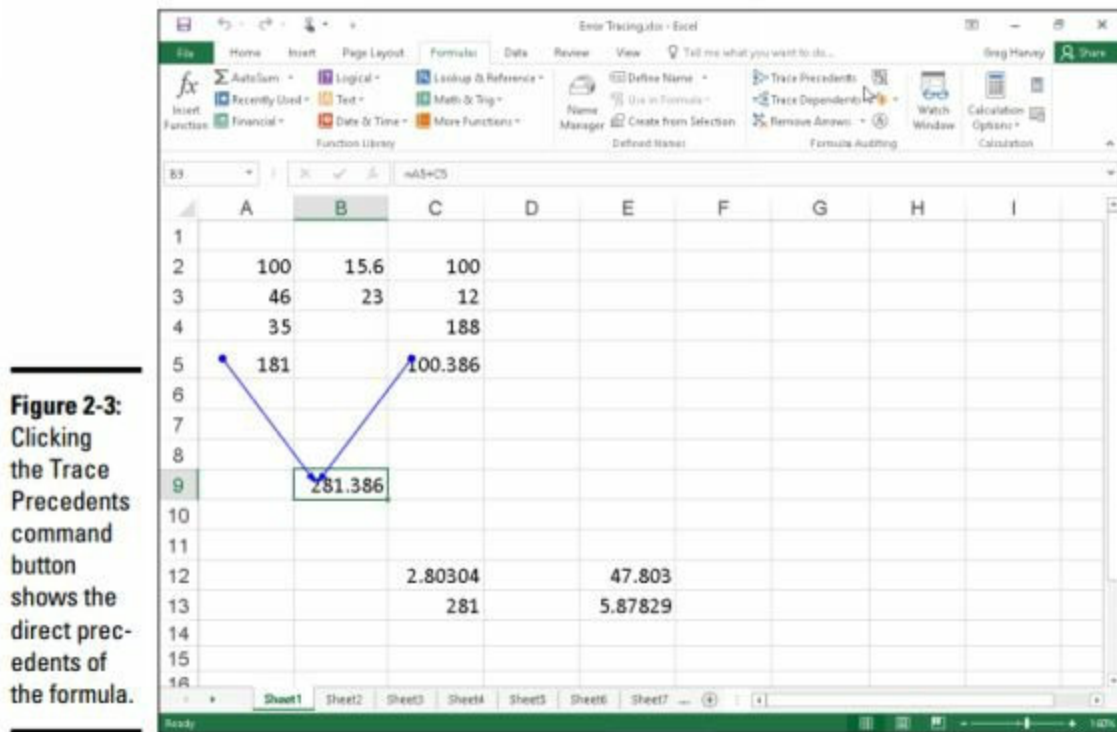
First, have a look a look at the table below, this table contains the most common error messages which you might face.

<b>Table 2-1 Error Values in Excel</b>		
<i>Error Value</i>	<i>Meaning</i>	<i>Causes</i>
#DIV/0!	Division by zero	The division operation in your formula refers to a cell that contains the value 0 or is blank.
#N/A	No value available	Technically, this is not an error value but a special value that you can manually enter into a cell to indicate that you don't yet have a necessary value with the function, =NA().
#NAME?	Excel doesn't recognize a name	This error value appears when you incorrectly type the range name, refer to a deleted range name, or forget to put quotation marks around a text string in a formula (causing Excel to think that you're referring to a range name).
#NULL!	You specified an intersection of two cell ranges whose cells don't actually intersect	Because the space is the intersection, this error will occur if you insert a space instead of a comma (the union operator) between ranges used in function arguments.
#NUM!	Problem with a number in the formula	This error can be caused by an invalid argument in an Excel function or a formula that produces a number too large or too small to be represented in the worksheet.
#REF!	Invalid cell reference	This error occurs when you delete a cell referred to in the formula or if you paste cells over the ones referred to in the formula.
#VALUE!	Wrong type of argument in a function or wrong type of operator	This error is most often the result of specifying a mathematical operation with one or more cells that contain text.

But knowing only the basics is not enough as you will also need to know how to trace back to the source of your problem, and this is where the technique of formula auditing comes in. This is simply Excel's personalized way of helping you figure out what's wrong with your formula and where the root of all evil is hiding in your Spreadsheet. Excel offers a wide range of methods through which formula auditing can be done, the most prominent one's are noted below:

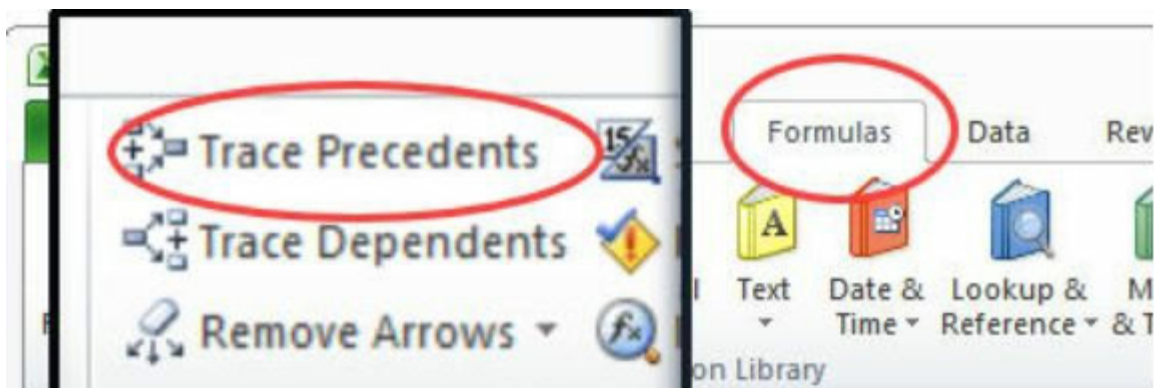
- **Trace Precedents:** When you press this button, Excel will draw some

arrows to the cells that are referred in the formula, these tracer arrows will help you to pin point the location of your error.

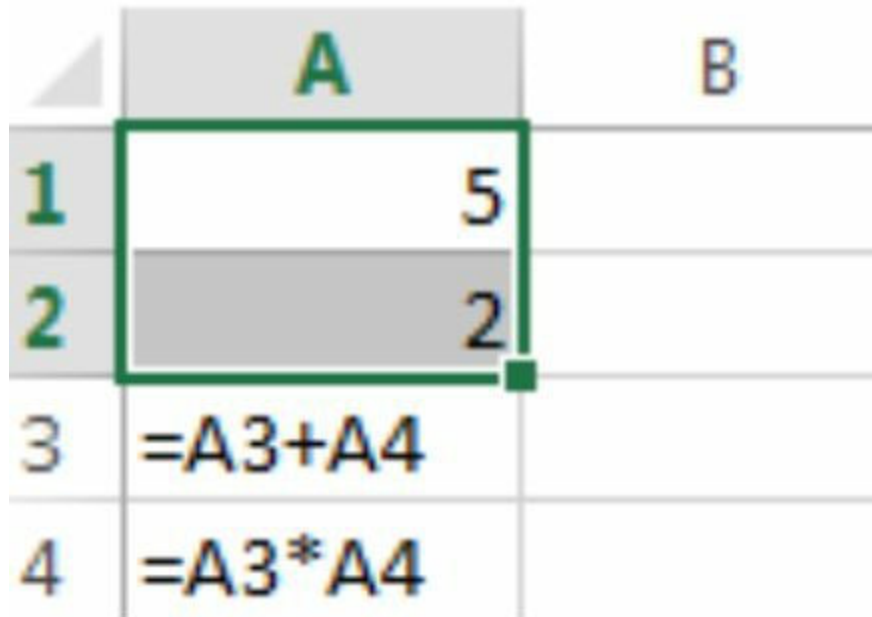


You can do it by clicking on the cell with formula, and then click the track precedents tab.

You can find the Trace Precedents Tab under Formula Tab:



- **Trace Dependents:** In excel, sometimes change the value of one cell can affect the value of other cells.



	A	B
1	5	
2		
3	=A3+A4	
4	=A3*A4	

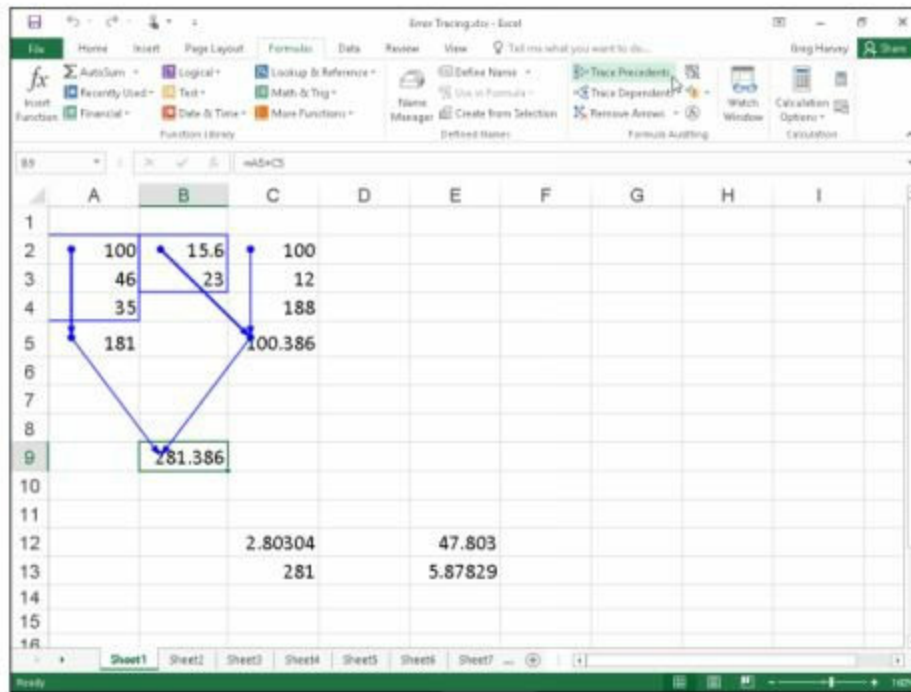
(PS. The “return” key was not pressed for both A3 and A4.)

For example, the change of value in A1 will result in the change of value in A3 and A4.

If we select the cell A1 and press Trace Dependents button, a line will be drawn from A1 to A3 and A4. The cell that the arrows point at are the dependents of the selected cell.

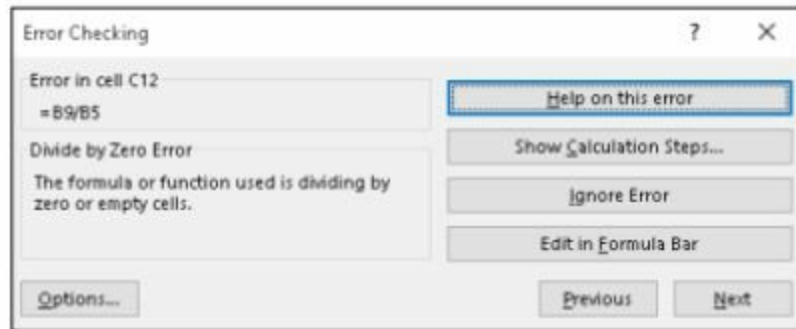


**Figure 2-4:** Clicking the Trace Precedents command button again shows the indirect precedents of the formula.



- **Remove Arrows:** This will cause all of the arrows that are drawn to be omitted.
- **Show Formula:** This button will display all the formulas used in the cells of the worksheet.
- **Error Checking:** This command will open up a dialog box with very detailed information about the errors, the box also contains suggestion and ways as to troubleshoot the errors.

**Figure 2-8:**  
Flagging  
an error  
value in a  
worksheet  
in the Error  
Checking  
dialog box.



**Evaluate Formula:** This command will open up another dialog box that will help you to carefully evaluate every single part of your formula in a specified cell, to find any errors within the formula itself.

All of these buttons are accessible from the formula-auditing tool found in the command buttons situated in the Formula Auditing Group on the Formula's tab of the Ribbon.

## The basic concepts of Date and Time

	A	B	C	D	E	F
1	Actual	As Entered	Number	Conversion	Text	Adj Serial
2	Date	In Excel	To Text	Problem	Value	Number
3	21 Nov 2001	21-Nov-01	21 Nov 2001	FALSE	2001-11-21	37,216
4	Mar 1, 1900	1-Mar-00	01 Mar 1900	FALSE	1900-03-01	61
5	Feb 29, 1900	29-Feb-00	29 Feb 1900	FALSE	1900-02-29	1900-02-29
6	Feb 28, 1900	28-Feb-00	28 Feb 1900	FALSE	1900-02-28	60
7	Jan 1, 1900	1-Jan-00	01 Jan 1900	FALSE	1900-01-01	2
8	1 Sep 1841	1 Sep 1841	1 Sep 1841	FALSE	1841-09-01	-21,304
9	Aug 22, 1763	Aug 22, 1763	Aug 22, 1763	FALSE	1763-08-22	-49,803
10	Sep 1601	Sep 1601	Sep 1601	FALSE	1601-09-01	-108,962
11	Abt 1533	Abt 1533	Abt 1533	TRUE	1533-01-01	-134,042
12	Circa 1492	Circa 1492	Circa 1492	TRUE	1492-01-01	-149,017
13	Feb 29, 1200	2/29/1200	2/29/1200	FALSE	1200-02-29	-255,609
14	Jan 1, 0100	Jan 1, 0100	Jan 1, 0100	FALSE	0100-01-01	-657,434

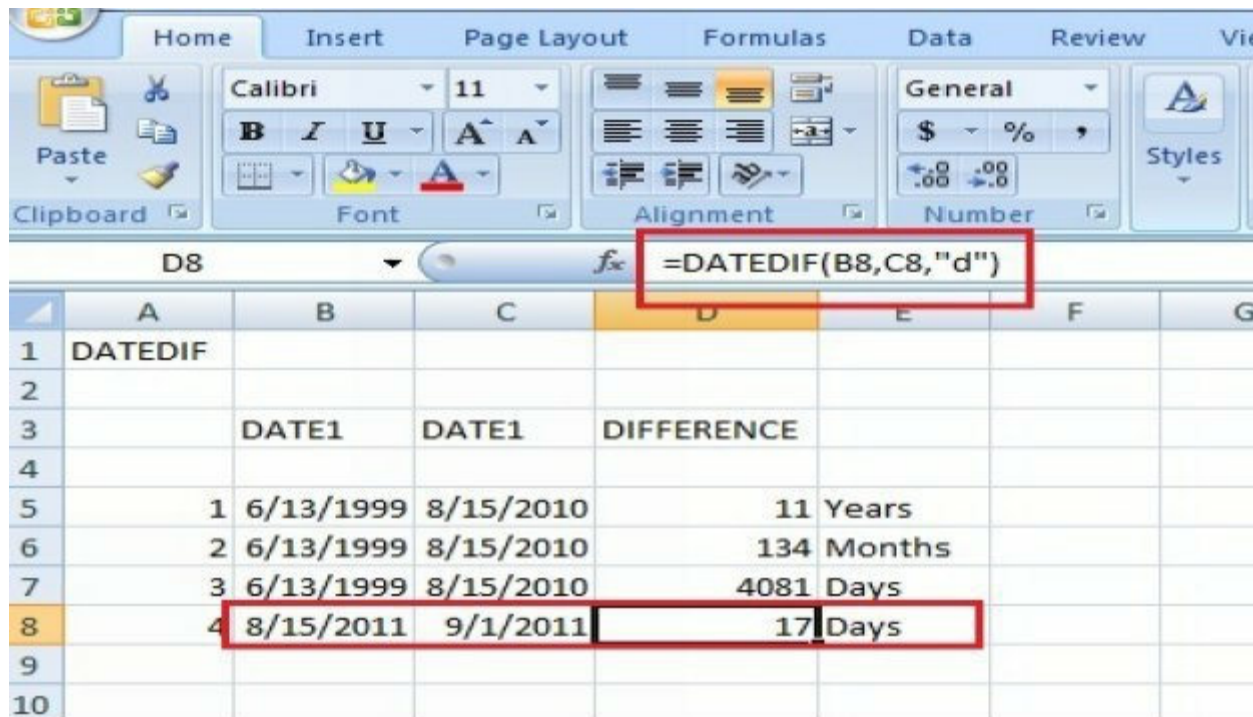
A very strong grasp of the basic concepts of how Excel treats its formula creation methodology when it comes to Dates and Times is really important because with those knowledge you are going to gain, you will be able to save tones of time.

The first and most important thing you should know is that whenever you enter something Excel think its related to Time or Date, it will automatically start working behind the curtains and convert that value into a serial number, rather than keeping how it is (The inserted numerical value). For example, This serial

number in the worksheet shown above represents the number of days that have elapsed since the beginning of the 20<sup>th</sup> century. Which means, the adj serial number of 1<sup>st</sup> January 1900 is going to be 1, 2<sup>nd</sup> January is 2 and so on, again when comparing time, the serial numbers are converted into fractions, so 12:00:00 pm is denoted as 0.5000000(one day is 1, so 0.5 is half day, which means 12 pm).Another example, 11:00:000 pm is 0.95833333.

let's now have a look at how you can actually build the date formula.

## Formula for Date



The screenshot shows the Microsoft Excel interface. The formula bar at the top displays `=DATEDIF(B8,C8,"d")`. Below it, a table illustrates the use of the DATEDIF function with various date ranges and units.

	A	B	C	D	E	F	G
1	DATEDIF						
2							
3		DATE1	DATE1	DIFFERENCE			
4							
5	1	6/13/1999	8/15/2010		11 Years		
6	2	6/13/1999	8/15/2010		134 Months		
7	3	6/13/1999	8/15/2010		4081 Days		
8	4	8/15/2011	9/1/2011		17 Days		
9							
10							

What you need to keep in mind is that most of the formulas that you come up with that will help you to measure time, are going to be the elapsed days or years between two given dates. So, in a nutshell, you have to come up with a formula that will subtract the earlier date from the later one. For example, let's assume that the cell B4 has a date of 4/25/95 and C4 has a date of 6/3/15. All you will have to do is write the formula `= C4 – B4` on the cell D4 and voila!

## Formula for Time

	A	B	C	D	E	F	G	H
1	Start Date	End Date	Difference	Round to nearest day	Round to nearest hour	Round to nearest 15 minutes		
2	3/11/2009 2:14	3/13/2009 20:25	66:10	3	66:00	=mround(C2,"0:15")		
3	6/21/2009 7:23	6/25/2009 21:53	110:29	5	110:00			
4	12/25/2009 20:13	12/30/2009 16:19	116:05	5	116:00			
5	2/15/2010 6:03	2/17/2010 23:25	65:21	3	65:00			
6	2/25/2010 5:32	2/27/2010 9:53	52:20	2	52:00			
7	5/3/2010 10:57	5/8/2010 18:27	127:29	5	127:00			
8	7/6/2010 19:10	7/9/2010 17:21	70:10	3	70:00			
9	1/16/2011 11:19	1/21/2011 6:12	114:52	5	115:00			
10	8/17/2011 18:18	8/22/2011 4:39	106:20	4	106:00			
11	8/26/2011 14:49	8/31/2011 6:47	111:57	5	112:00			
12	10/14/2011 0:19	10/17/2011 16:52	88:32	4	89:00			
13								
14								

The concept for time is exactly the same as date. To build a formula for the time, you will need to subtract the value of the earlier time from the later time.

As an Example, let's assume that your cell B6 contains 9:15 am and the cell C6 contains 3:45pm.

If you used the formula = C6 – B6 on the cell D6, then it will return the time 6 :30 (6 hours and 30 minutes difference)

# Financial Function

If you are working with a spreadsheets with large amount numbers and informations, most of the time, you will need the help of financial function.so it is important to understand the basics of financial calculations that can be done in Excel.

The first thing you have to be aware of is the basic terminologies that are being used in Excel throughout the financial calculations.

- **PV:** This is the present value of the capital amount.
- **NPV:** This is used to calculate the profitability of an investment.
- **FV:** This is the future value of the capital amount including the interests.
- **PMT:** This is the yearly payment made.
- **RATE:** This is the interested rate/ period which is often expressed as being an annual percentage.
- **NPER:** To pay off the laon, or to reach a future value, this function can help you to calculate the number of periods required.

## The Usage of PV, NPV and FV Function

The PV, NPV and FV functions are all related to finance, and they are found under the Financial Drop-down menu of the Ribbon's Formula Tab. A dialog will show up to guide you through the process of setting up your formula, or you can type your formula in the cell manually.

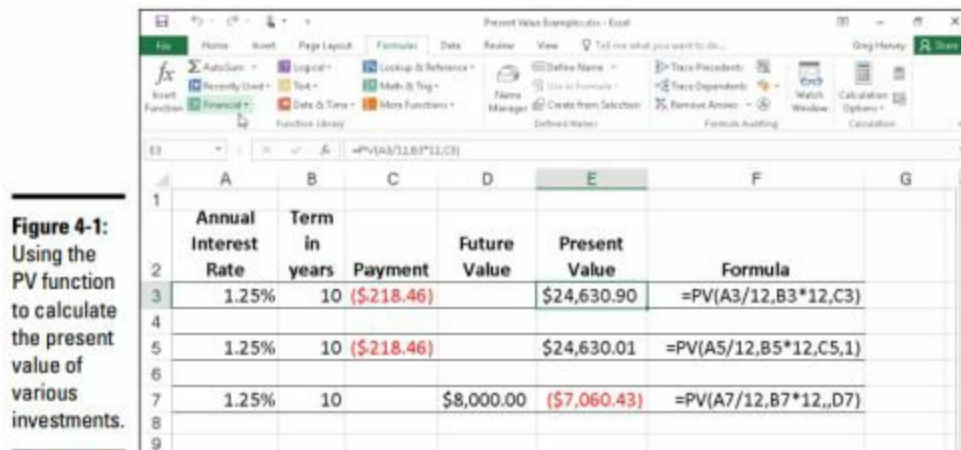
- **Present Value :** The basic format for The Present Value formula is

= PV (rate, nper, pmt, [fv], [type])

In PV'S formula, "fv" and "type" are optional, meaning you can put them if you have the value, otherwise it's fine if you don't(I don't usually use them), the syntax will still work. Below is an example of this function-

NOTE: type indicates the the due date of a pament. 0 or nothing entered means payment due at the end of the period, 1 means at the beginning of the period.





(“Term in years” means how many years are needed to pay the loan off)

- **Net Present Value:** for the net present value, the formula is as follows

$$=NPV(\text{rate}, \text{value1}, [\text{value2}], [\dots])$$

**Note:** The rate here is monthly rate, if you are given a yearly rate, you can divide it by 12. (12% yearly rate means 1% monthly rate.)

For the value1, value2 and so on are always numbers. It represents a payment if the values are negative and an income if the values are positive.

**Figure 4-2:**  
Using  
the NPV  
function to  
calculate  
the net  
present  
value of an  
investment.

Net Present Value of a Five-Year Investment							
	NPV	Year 1	Year 2	Year 3	Year 4	Year 5	Initial Investment
	\$49,490.96	(\$22,000)	\$15,000	\$25,000	\$32,000	\$38,000	(\$30,000)

- **Future Value:** The syntax for the Future value function is very similar to the present value syntax.

$$= \text{FV}(\text{rate}, \text{nper}, \text{pmt}, [\text{pv}], [\text{type}])$$

Below is an example-

	A	B	C	D	E	F	G	H
1	<b>Future Value of a Graduated Annuities</b>							
2	Initial Cash Flow	1000	Period	Due	Regular			
3	Growth Rate	3%	0	1,000.00				
4	Discount Rate	8%	1	1,030.00	1,000.00			
5	Years	5	2	1,060.90	1,030.00			
6			3	1,092.73	1,060.90			
7			4	1,125.51	1,092.73			
8			5		1,125.51			
9	<b>Graduated Annuity Due</b>							
10	FV Function	\$6,697.17	←	=FV(B4,B5,0,PV((1+B4)/(1+B3)-1,B5,B2,0,1))				
11	FV of NPV Function	\$6,697.17	←	=(NPV(B4,E4:E7)+E3)*(1+B4)^B5				
12								
13	<b>Graduated Regular Annuity</b>							
14	FV Function	\$6,201.08	←	=FV(B4,B5,0,PV((1+B4)/(1+B3)-1,B5,B2)/(1+B3))				
15	FV of NPV Function	\$6,201.08	←	=NPV(B4,F4:F8)*(1+B4)^B5				

# Depreciation Function

Some terminologies which you should be familiar with before going into the formula are:

- **Cost:** This is the initial cost of the Asset that you are calculating to be depreciated.
- **Salvage:** This is the value of the asset that remains at the end when the depreciative period is over.
- **Life:** This is simply the number of circulating periods over which the depreciation is being considered.
- **Per:** This is the period over which the asset is being depreciated.

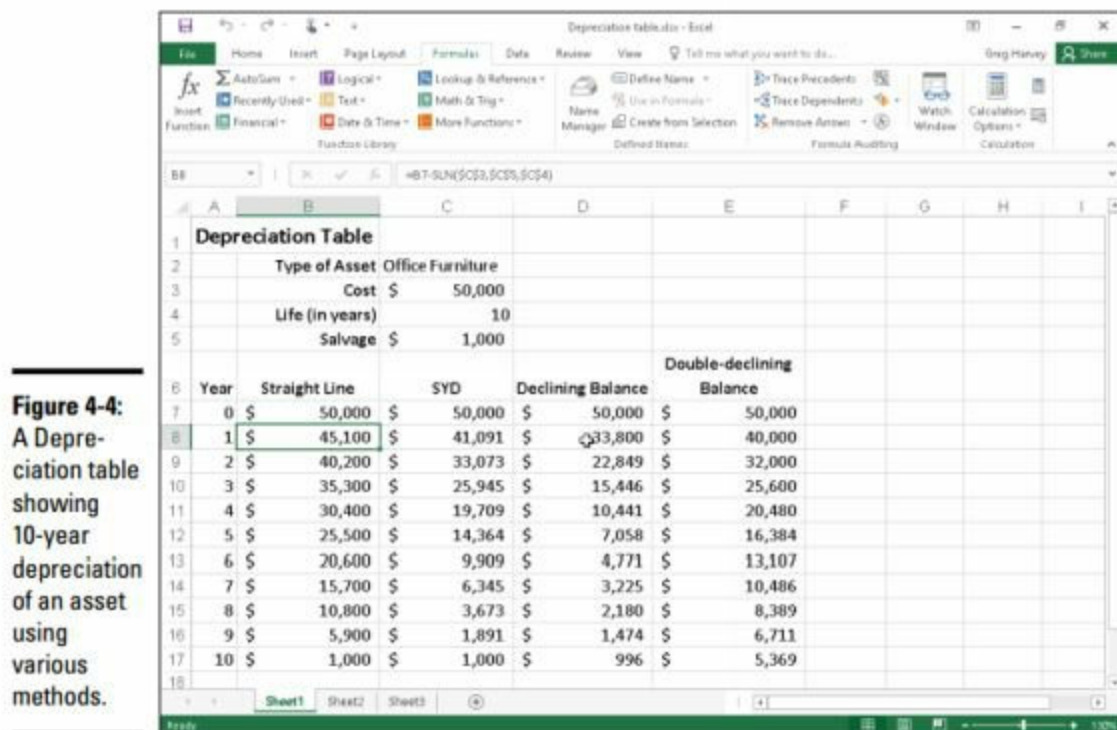
And the formulas are -

- **SLN (cost, salvage, life) :** use this if you want to evaluate a straight line depreciation.
- **SYD (cost, salvage, life, per):** this is used for sum-of-year-digits depreciation.

- **DB (cost, salvage, life, period,[month]):**this is used to calculate the vanilla declining balance depreciation.
- **DDB (cost, salvage, life, period, [factor]):** this is used to calculate the double-declining balance depreciation.

If you are not accountant, you might not know what those different types of depreciation means, here is a youtubevedio for your reference if you are curious: <https://www.youtube.com/watch?v=vnWtAchWP1c>

Below is an example as to how to implement this formula:

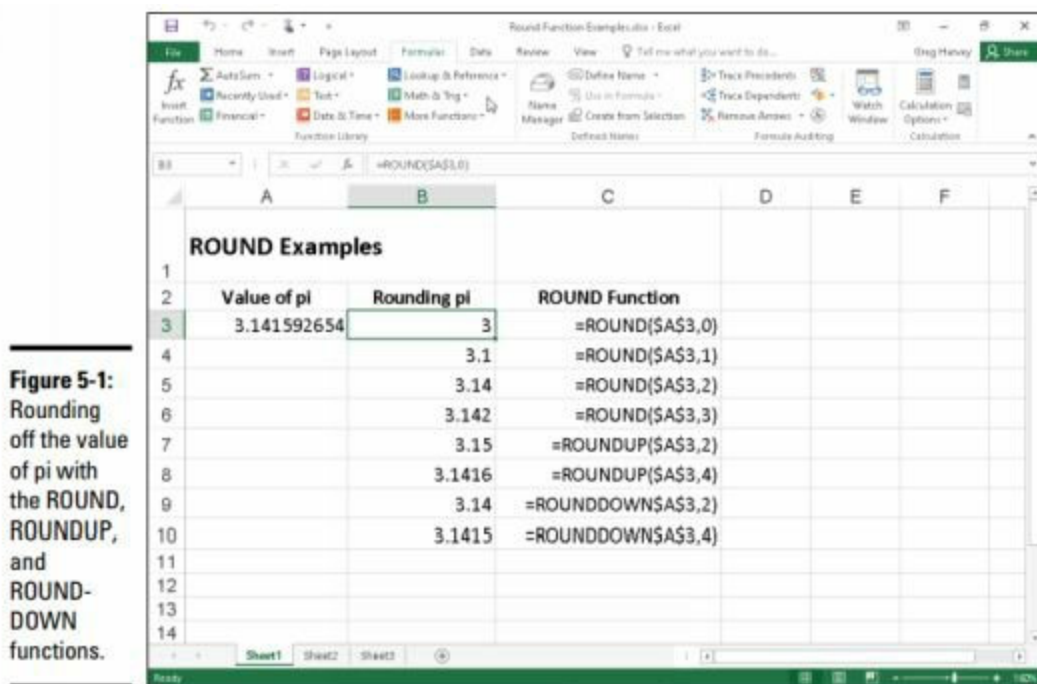


## Some Important Mathematical functions

Excel 2016 is a mathematical powerhouse, and through various built-in commands, you will be able to easily perform various mathematical evaluative tasks. We are going to have a look at some of the popular functions that are used.

- **Rounding Off a number:** The work of this function is to round up or down the given fractional value to a whole number. The syntax for this is

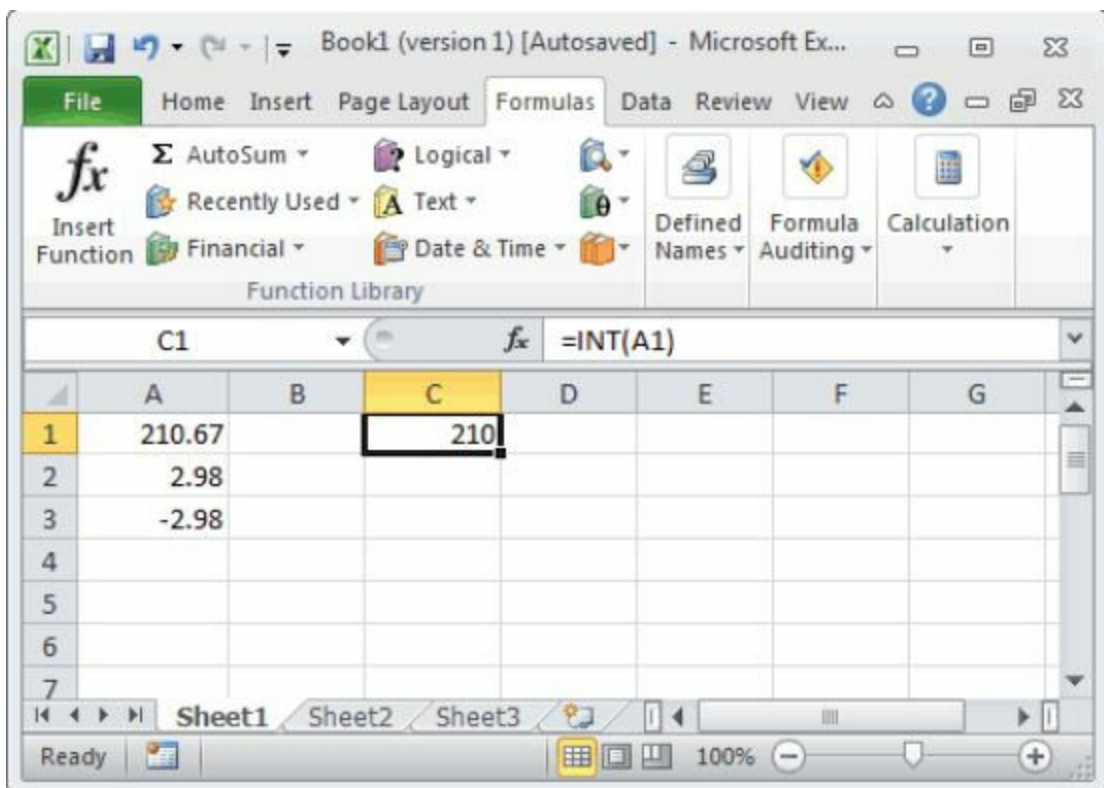
= ROUND (number, num\_digits)



- **Only Whole Number:** The function INT is used if you want to achieve only whole numbers.

=INT (A3)

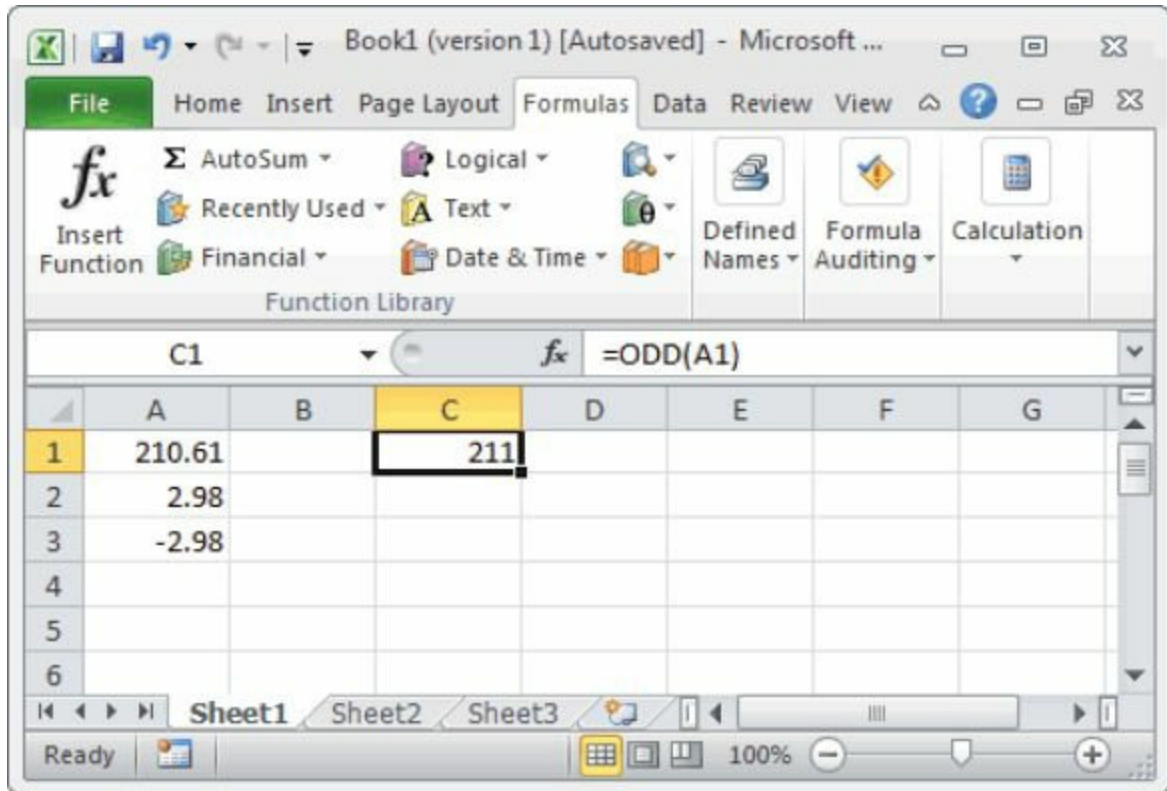
The above equation will return the value of the cell A3 in whole numbers.



- **ODD and EVEN :** If you are using either of these functions, then depending on which one you use, your value is going to rounded up either the nearest odd or nearest even number.

= EVEN (C18)

= ODD (C18)



- **Power and Square Root:** If you are doing mathematical evaluations, then you are bound to come across scenarios where you will be needed to use the Square Root and Power functionalities.

The Equation for Power

$$5^3$$

$$= \text{POWER}(5, 3)$$

The Equation for Square Root

$$\sqrt{9}$$



= SQRT(144)

- **Average, Maximum and Minimum:** When it comes to statistical enumerations, these three functions are perhaps the most popular ones.

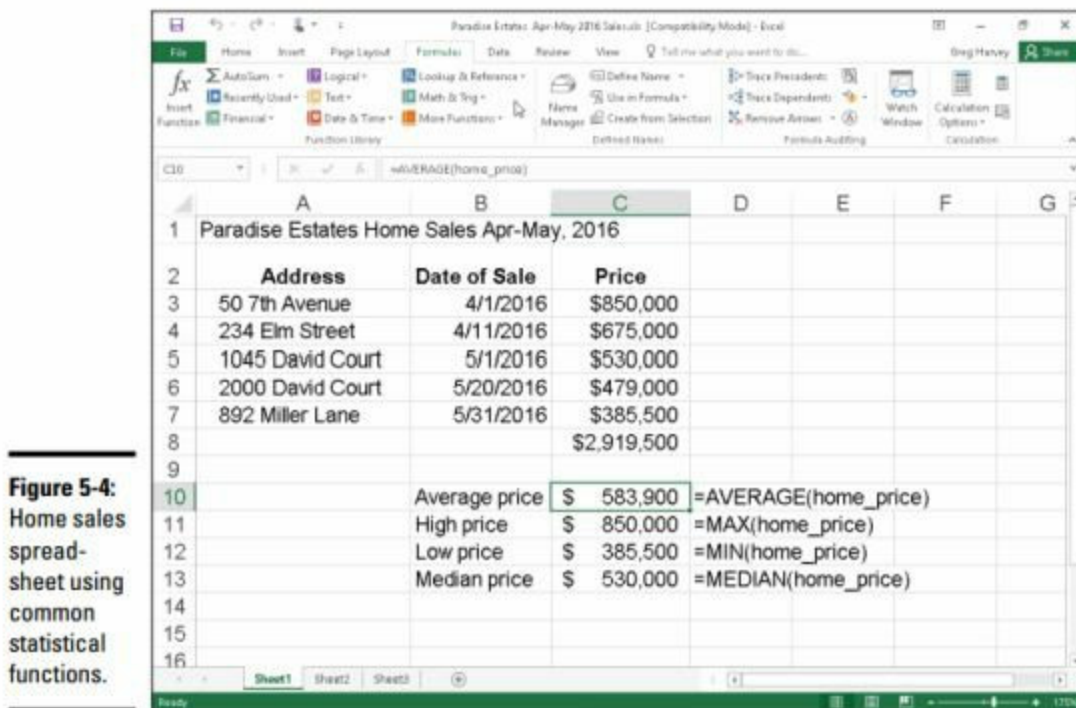
The functions are self-explanatory and the syntax for these are –

=AVERAGE (number1, [number2], [...])

=MAX (number1, [number2], [...])

=MIN (number1, [number2], [...])

Below is an example.





## Drill Problems

- 1) Use The Sum formula to add up 10 values.
- 2) What are some of the most common operators in Excel 2016?
- 3) Discuss the six levels of precedence and draw a chart to outline and relate them to the operators.
- 4) What is the meaning of - #NUM! #REF! And #VALUE!?
- 5) What are Trace Precedents and Dependents? How are they used to trace back to an error?
- 6) How are time and date represented in Excel 2016?
- 7) Build a formula for a time which will show the difference between 12:00AM and 7:00PM show the result in the serial number form.
- 8) Define the terms PV ;FV; RATE and NPER
- 9) How do you calculate future value?
- 10) Use an example of your own to show the methodologies of the Power and Square Root Function.
- 11) Enter some random number in 5 excel cells, and calculate

the Average, Minimum and Maximum values using the excel formula.

## Conclusion

Assuming that you have gone through the whole book, at this point, I would like to take a moment of your time to thank you for purchasing this E-book and taking the time to go through it.

I do believe that this book was able to help you gain the knowledge you were seeking and learn the basics and some advanced concepts of Microsoft Excel 2016.

Microsoft Excel has been Microsoft Flagship data-analytical software. It's has millions of user now. But the problem is, not all of them are fully aware of the limitless possibilities and potential which Microsoft Excel has. What you got from this book, was just the tip of the ice berg, a mere glimpse of all the functionalities which are hidden behind the curtains of Excel 2016. For example, IF function, VLoopupFuntion etc. If you want to learn more about those functions, one useful tool I use is youtbevedios. There are couple of vedios I recommend for you if you want to dig further on this subject.

Most common Excel functions used in accounting

<https://www.youtube.com/watch?v=wJyV2gvRKuE>

## Excel Logic Functions - IF, AND, and OR

[https://www.youtube.com/watch?v=TyG\\_vJfpWEc](https://www.youtube.com/watch?v=TyG_vJfpWEc)

## VLOOKUP and HLOOKUP

<https://www.youtube.com/watch?v=8GtdW4Ns5bg>

## INDEX and MATCH

<https://www.youtube.com/watch?v=VSMJO4iXRvw>

I encourage you to take what you have learned from this book, and try to apply them in your real life. Discover all of the secrets of Microsoft Excel 2016 and have fun.

This is not the end of your journey in learning the Excel, this only the beginning.