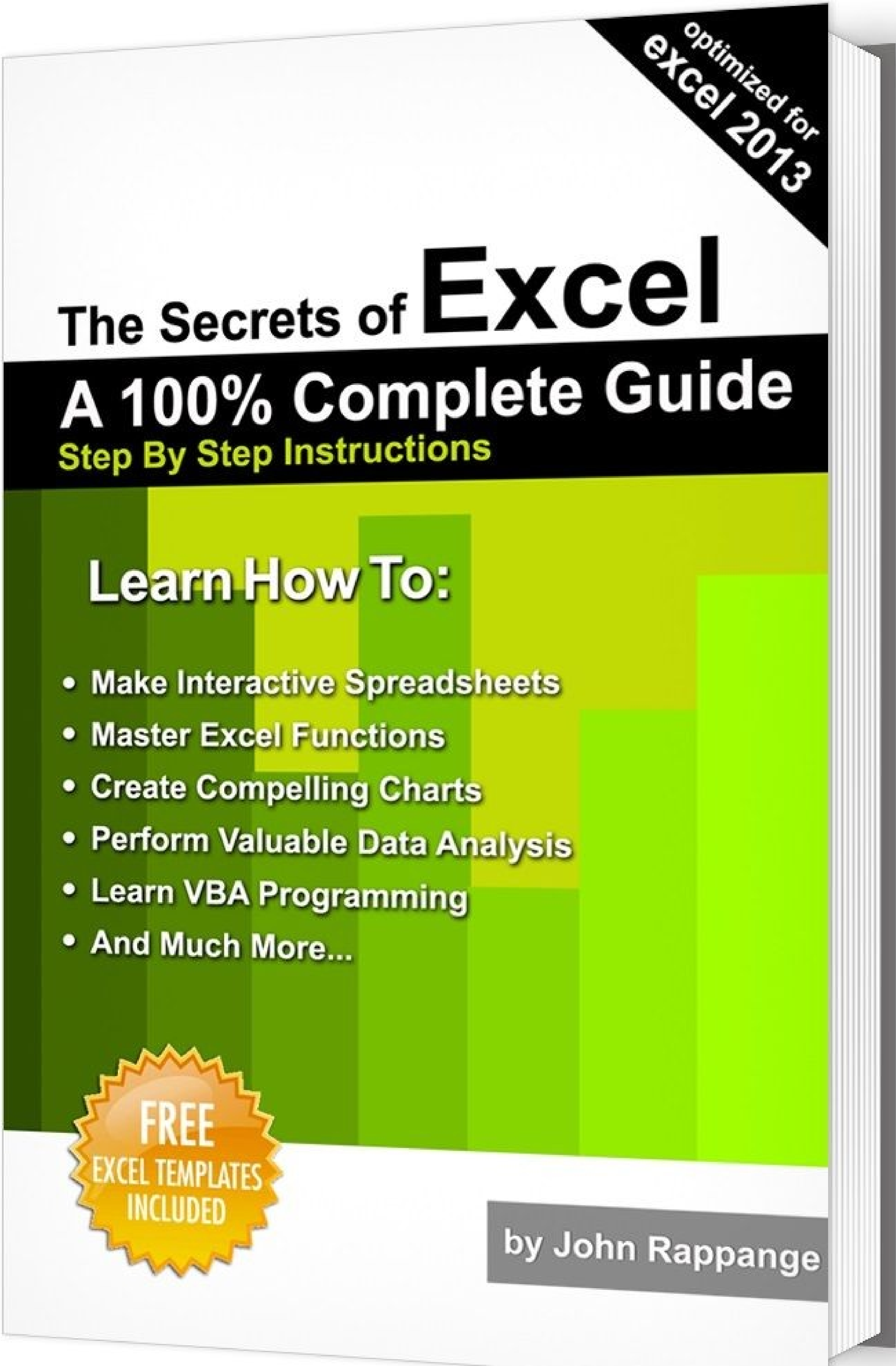
optimized for
excel 2013
The Secrets of Excel
A 100% Complete Guide
Step By Step Instructions
Learn How To:
• Make Interactive Spreadsheets
• Master Excel Functions
• Create Compelling Charts
• Perform Valuable Data Analysis
• Learn VBA Programming
• And Much More...
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INTRODUCTION

Officially released in January 2013, the latest version of Excel 2013 took the market by its amazingly easy-to-user interface and incredibly advanced features. It is no longer a simple spreadsheet calculator. Microsoft Excel has evolved into a full-fledged software that can be applied to any aspect of life, let it be academic, personal or business.

So what do you intend to use Excel for? To maintain your shopping list? Or perhaps some office work like financial analysis, statistics, payroll, billing etcetera? Well, Excel is not just limited to these basic functions. It is a lot more than what you think it is.

Excel allows you to make user forms, generate and sort through unending data lists, create interactive charts and graphs and much more. There is no limit to what Excel can do. And whatever the limitations were in the previous versions have now been removed in Excel 2013.

Excel 2013 is a marvel. You will be amazed to learn what wonders it can do. However none of the Excel features will provide you any benefit if you don't know how to use it. Excel 2013 is definitely miraculous but it does not perform miracles on its own. You need to make a few clicks to make the miracles happen. This is where this book intervenes. It tells you all there is to know, in the easiest way possible about this enigmatic software.

But before you move on to find out what this book contains, you need to know if this book is for you.

Is This Book for You?

The Secrets of Excel offers a detailed walkthrough on all the basic as well as the advanced features of Excel 2013. It is designed for all types of users. Whether you are a beginner, intermediate or advanced user, this book has something to offer to all.

It serves as an excellent guide for users who are new to Excel and are trying it for the first time. It contains everything that a beginner needs to know.

If you have a little know-how of Excel, this book will teach you the advanced usage of Excel 2013 and ways to adapt it to your own needs.

This book contains numerous advanced techniques and exclusive tips that will make the advanced users explore Excel all over again. The examples presented in this book are surely going to make your experience of Excel more exhilarating than ever.

How This Book Is Organized?

The Secrets of Excel is divided into seven parts, each containing several chapters. Following is a brief description of each part to give you an idea of want this book contains.

Part I: Getting Familiar with Excel 2013

This part introduces you to the new and advanced features of Excel 2013. The second chapter of this part sheds light on the basic layout and procedures of Excel. You will also find some handy and exciting tips on customizing your Excel and making it more powerful.

Part II: Let's Get Started

This part of the book contains walkthroughs and tips on the basic applications of Excel 2013. You will learn how to work on a workbook, protect your worksheets, formatting techniques, working with templates, printing worksheets and much more!

Part III: Formulas and Functions

This part of the book talks about the most popular and valuable feature of Excel; that is, the formulas and functions. From the basics of entering formulas, to simple mathematical functions, array formulas and advanced statistical functions, this part of the book covers all you need to know to excel at Excel's formulas. The last chapter of this book gives you some real handy tips on making an error free worksheet.

Part IV: Introducing Charts

This part covers extensively the colorful charting and other exciting pictorial features of Excel. You will discover some exclusive tricks on using Excel's graphical tools and Sparkline graphics.

Part V: Data Management and Analysis

This part introduces you to the powerful data analysis tools of Excel. You will learn to work with the handy *What-If Analysis* tool, the extensive data lists in Excel, the valuable Pivot Table and much more!

Part VI: Working With Macros

This part of the book introduces you to the Excel's amazing macro recorder. We have talked in detail about the recorder's mechanism and applications. You will also learn how to keep your important and frequently needed macros at hand, so that you can use them easily and quickly.

Part VII: Learning VBA Programming

This part talks about the basic and common applications of the official programming language of excel, *Visual Basic for Applications*. You will learn how to use the Visual Basic editor to create and edit macros. The second chapter in this part tells you about a very exciting and handy feature of VBA; that is, its ability to let you create user defined functions in Excel.

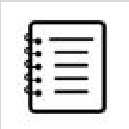
Appendix

The Appendix section of this book contains an extensive list of keyboard shortcuts to perform different tasks in Excel. There is also a list of all the functions built-in Excel 2013.

Know the Important Icons

You will find the following icons throughout the book. These are used to make the book more readable and get your attention to the important points.

	This icon represents a practical tip, something that will make Excel easier, interesting and far more enjoyable. It indicates a more efficient way of doing the task at hand. You will find several unique shortcuts and other handy tips in front of this icon.

	This icon denotes a tidbit that applies to the subsequent topic. Make sure you don't skip the note and read it before moving on. It is fundamental to understanding the subsequent topic and may help you master the task at hand

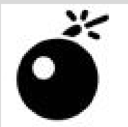
	This icon represents a cautionary note. It is placed with functions that can cause problems if you're not careful. Make sure you read and understand it thoroughly or else you might end up losing your data or mixing up the entire operation.

TABLE OF CONTENTS

PART I: GETTING FAMILIAR WITH EXCEL 2013

This part of the book takes you on a detailed tour of Excel 2013. The first chapter introduces you to the new and advanced features of Excel 2013 that were not borne by its predecessors. It is highly recommended that you go through this part thoroughly even if you have been using Excel in the past. This will not only freshen up your concepts but you will learn some handy and interesting tips on customizing your Excel and making it more powerful.

AT A GLANCE

Chapter 1: What is New in Excel 2013?

Microsoft Excel is by far the most widely used spreadsheet software in the world. A countless number of spreadsheet software have been launched since the advent of MS Excel, yet it has always maintained its position as the world's most popular spreadsheet software.

As you may already know that Excel's forte lies in performing numerical applications; however with the recent few upgrades the world's favorite numeric software has proven itself to be equally helpful in non-numeric functions. You can make graphs, manipulate text data, draw exquisite diagrams, create user forms and much more.

Excel has always been the most preferred spreadsheet software. There are several reasons behind this popularity, the most important one among which is that Microsoft has never stopped improving Excel. Every upgrade has brought some innovative and advanced features, thereby keeping excel always a step ahead the competition.

The latest version that was released in 2013 has been one of successful updates of Excel. It contains a number of highly advanced and innovative features; briefed as follows.

Following is just a brief overview; these features are explained in advance in the upcoming chapters.

Quick Analysis Tools: As the name suggest, the Quick Analysis Toolbar gives you quick access to the data analysis and other formatting tools.

Flash Fill: This feature of Excel 2013 performs several functions, the most popular of which is that it completes your work for you. It constantly compares the data as you type and as soon as it detects a similar pattern, it offers to finish what you were typing. Moreover, Flash Fill also helps you combine data in multiple rows and columns.

Advanced Chart Formatting Tools: Excel 2013 contains some very high-tech formatting tools that makes it pretty easy to modify your charts.

Timeline: If your data contains dates, you can use the Timeline feature to filter the data to your desired date range.

Improved Table Slicers: Table slicers were there in Excel 2010 as well. However then they can just be used in combination with the pivot tables. In excel 2013, this limitation has been removed. You can now use table slicers with other types of data tables as well.

Additions: Excel 2013 contains numerous new animations, sophisticated templates and other useful functions that weren’t there in its predecessors.

One Worksheet Interface: In the previous versions of Excel, each workbook contained multiple worksheets. In excel 2013, every workbook contains a single sheet and has its own window.

Recommended Graphics: Excel now provides recommended pivot tables and recommended charts. Just like flash fill, it detects what you are doing and recommend tables accordingly.

Powerful Add-Ins: There are several new and useful add-ins including Power View, PowerPivot and Inquire.

Automatic Data Labels: You can now create data labels that updates automatically with text.

Chapter 2: Excel 2013 – The Basics

In this chapter, you will learn the basic features and applications that are a must for every Excel user. Do not skip this chapter even if you have some basic knowhow of Excel. This will not only give you a head start but you are also going to find some very useful tricks and techniques.

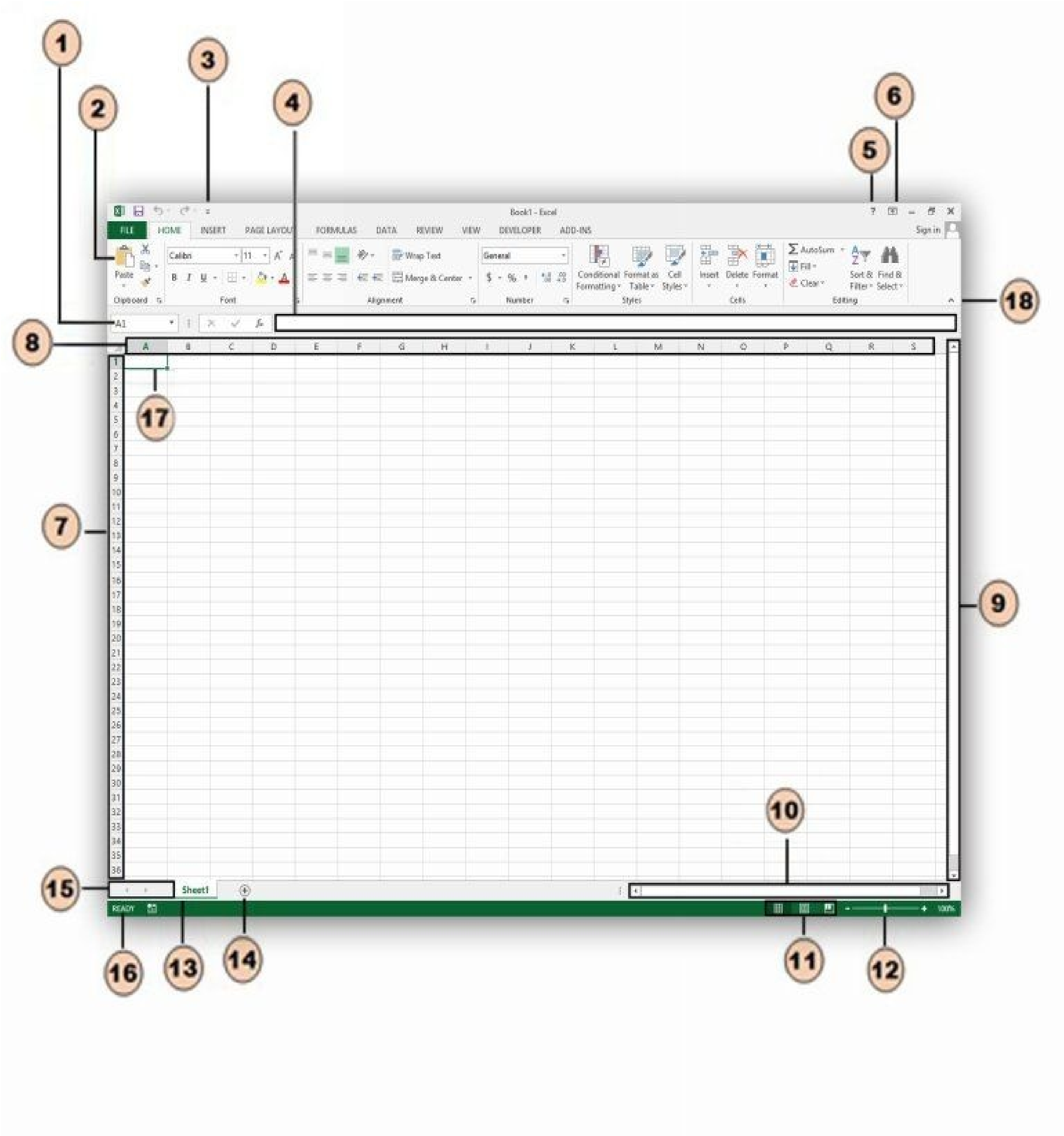
Exploring the Workbook and Worksheets

The work that you do in Excel is carried out in a workbook file, normally represented by the .xlsx. As already said, each workbook contains one worksheet. If you want to add more worksheets, click the plus icon located at the bottom of your workbook.

Each worksheet contains infinite number of cells and each cell can hold a numeric value, text or formula. Moreover, a worksheet also features an invisible drawing layer that carries the charts, images and other forms of graphics.

Now before you actually start working on the worksheets, it is important to familiarize yourself with the excel workspace. Figure 1.2 is the image of a workbook containing a single worksheet. All the important tabs and elements of Excel are marked on the image, followed by a brief description of all the items.

Figure2.1 — ImportantTabs and Elementsin Excel' sWorkbook



1	**Name Box:** This displays the name of the active or currently selected cell
2	**Ribbon:** Most of the excel tools and commands can be found on the ribbon
3	**Customize Quick Access Toolbar:** The Quick Access Toolbar contains all the commonly used commands. You can click this tiny button to customize your quick access toolbar and add/remove tabs in it as per

your preference

4 **Formula Bar:** This bar displays the formula/value carried by the current cell

5 **Launch Help:** Click this button to launch the Microsoft system help

6 **Ribbon Display Options:** Click this tiny button to reveal the 3 options of displaying ribbon

7 **Row Number:** Rows are labeled in numbers, ranging from 1 to 1,048,567

8 **Column Letter:** Columns are labeled in terms of alphabets, ranging from A to XFD

9 **Vertical Scrollbar:** Move it up and down to scroll the worksheet vertically

10 **Horizontal Scrollbar:** Move it left and right to scroll the worksheet horizontally

11 **Page View Options:** You can view your worksheet in 3 different modes, namely the page break preview, normal view and the page layout

12 **Zoom Control Buttons:** Use these buttons to zoom in/zoom out your worksheet

13 **Sheet Tabs:** Each tab display the name of the respective worksheet

14 **New Sheet Button:** Click this button to add a new sheet to the current workbook

15 **Sheet Tabs Scrollbar:** Use this bar to scroll the sheet tabs. Right-click the sheet tabs scrollbar to view the list of all the worksheets

Status Bar: It displays the status of your current project, such as the

16	range of selected cells, messages, the status of Num, Cap and Scroll Lock
17	**Active Cell Indicator:** This shows the currently active cell
18	**Hide Ribbon Button:** Click this button to hide/unhide the ribbon

Table 2.1 - Description of Figure 2.1

	Click a row number or column letter to select the entire row or column respectively.

Navigating In a Worksheet

A worksheet contains rows represented by numeric values and columns labeled by alphabets. Each row and column consists of innumerous cells, each cell having its own unique name that is stated in the name bar.

As you will see that one cell is always enclosed by a dark border. This cell is called the *Active Cell*. Only the active cell accepts the keyboard inputs and values and at any given time, there is only one active cell. If you want to enter any formula or value in any cell, first you need to make it active.

	It is assumed that the reader uses traditional keyboard or mouse to work on excel. Thus the commands and navigation tips mentioned in this chapter do not apply on devices having a touch interface

There are several ways of navigating through a worksheet.

If you are using a keyboard, you can use the standard arrow keys to move around the worksheet. Here are a few common Excel navigation keys along with their functions.

Left Arrow: Click the left arrow on your keyboard to move the active cell to the adjacent cell column on the left

Right Arrow: Click the right arrow on your keyboard to move the active cell to the adjacent cell column on the right

Up Arrow: Click the Up Arrow on your keyboard to move the active cell up one row

Down Arrow: Click the Down Arrow on your keyboard to move the active cell down one row

Page Down: Click the Page Down on your keyboard to move the active cell down one screen

Page Up: Click the Page Up on your keyboard to move the active cell up one screen

Alt + Page Down: Click this combination on your keyboard to move the active cell one screen to the right

Alt + Page Up: Click this combination on your keyboard to move the active cell one screen to the left

Ctrl + Home: Click this combination on your keyboard to jump to cell A1

Ctrl + Page Down: Click this combination to activate the next worksheet in your workbook

Ctrl + Page Up: Click this combination to activate the previous worksheet in your workbook

	Turn ON the Scroll Lock to move around the worksheet without moving the active cell.

Suppose you want to view the next screen without moving the active cell. Just turn on the Scroll Lock and press ***Ctrl + Right Arrow.*** When you want to jump back to the active cell, hit ***Ctrl + Backspace.***

If you are using a mouse, you just need to click a particular cell to make it active. You can use the mouse wheel to scroll up and down the worksheet. If you mouse doesn't have a mouse wheel, use the Excel scrollbar instead.

You can also use the mouse to zoom in/out of the worksheet. There are three ways of doing so,

1. You can magnify or shrink the view of your worksheet by using the zoom in and

zoom out button respectively.

2. Press and hold the Ctrl key on the keyboard, at the same time run the mouse wheel to zoom in and out.
3. Go the **File** > **Options**. Then select the **Advanced** option and place a tick mark next to the *Zoom on Roll with IntelliMouse* box. Now you don't need to hold the Ctrl button. You can zoom in and out the worksheet just by rolling the mouse wheel.

	Scrolling the worksheet with mouse does not move the active cell. You need to click a cell in order to make it active.

Introducing the Infamous Ribbon

If you have some knowhow about Excel, you must be familiar with the legendary Excel ribbon that sent a roar of appreciation in the IT industry the first time it was introduced in Excel 2007. It was a drastic change in Excel's user interface. Though it wasn't customizable at that time, it was an instant success. The same ribbon was made customizable in Excel 2010 and is now made further advanced in Excel 2013.

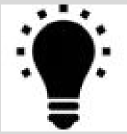
The Ribbon replaced the traditional menus and tools and combines them all in a set of tabs. It is located by default at the top of the workbook. The Ribbon is made up of a number of tabs, each containing sets of different commands, tools, functions and dialog box launchers.

Figure 2.2 is the image is of a Ribbon, except for the File tab. The File tab is not part of the ribbon. Clicking it will take open up another screen known as the Backstage View (*more about the backstage view later in this chapter*). 3

To go back to your worksheet, click the back arrow located at the top of the backstage screen.

Figure2.2 – The Excel Ribbon

You can hide the ribbon or make it visible, it is up to you. As you can see in the above image, the title bar of the workbook contains a tiny button known as Ribbon Display Options. Click it to reveal the three ribbon display options and toggle the ribbon's visibility.

	If you have hidden the ribbon and want it to become visible only when you need to use it, Hit **Ctrl + F1** to reveal it temporarily. It will stay visible as long as the cursor is anywhere over the ribbon. The Ribbon will disappear as soon as you click anywhere else on the worksheet.

What's In the Ribbon?

The Ribbon is the gateway to using Excel. It contains all that Excel has to offer. The features and tools are all categorized into a number of tabs, briefed as follows.

Home Tab: It contains the most commonly needed and used tools of Excel. For example, the basic Clipboard tools, style and formatting commands, editing tools, cell alignment and more.

Insert Tab: As the name suggests, this tab contains commands to insert different things such as tables, graphs, charts, symbols etcetera.

Page Layout Tab: Select this tab to modify the overall look of worksheet such as margins, orientation, colors, background and some print area settings.

Formulas Tab: This tab contains all the formulas, error trapping tools, formula editing tools and watch window.

Data Tab: All the data management and analysis commands are contained in this tab. You can also use this tab to sort and filter the data lists.

Review Tab: Select this tab to use the spell checking tools, MS office translator and thesaurus. It also contains the protection and track changes commands.

View Tab: As the name suggests, this tab allows you to view your worksheet in different manners. It contains commands to hide/reveal the gridlines, zoom in/zoom out, freezing panes and more.

The above explained tabs are present by default in every ribbon. Some ribbons also contain additional tabs, resulting from activating macros and installing add-ins.

Add-Ins Tab: The add-ins tab is visible in two scenarios,

1. If you install any add-ins
2. If you open a workbook saved in the older version. Since the traditional menus are not present in Excel 2013, all these appear in the add-ins tab.

Developer Tab: This tab contains commands and tools that are normally used for advanced programming. The Developer Tab is hidden by default. If you want to make it visible, perform the following steps on Excel.

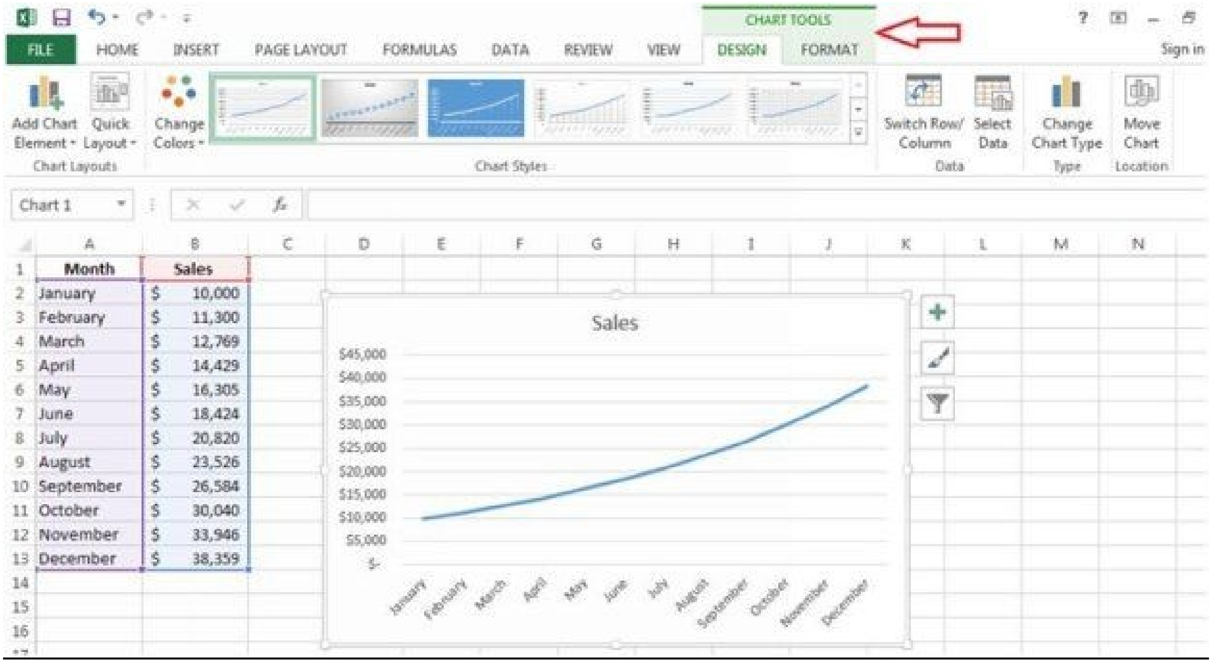
1. Select **Files**
2. Select **Options** > **Customize Ribbon**
3. On the right side, you will find *Customize the Ribbon* section. Under this heading, there will be a *Developer Checkbox*. Place a checkmark next to the Developer checkbox. This should reveal the Developer Tab on the Ribbon.

Improved Contextual Tabs

Apart from the tabs briefed above, Excel also contains contextual tabs. It was there in its previous versions as well; however the latest version comes with smarter context sensitivity.

When you click on any object of your worksheet, all the content related tools and commands appears in the ribbon. Suppose you generate a graph in Excel 2013. Now whenever you will click the graph, Excel will combine all the tools that you may need to work on that graph and will make them available in the Ribbon.

Figure1.3 – Exampleof ContextualTabs

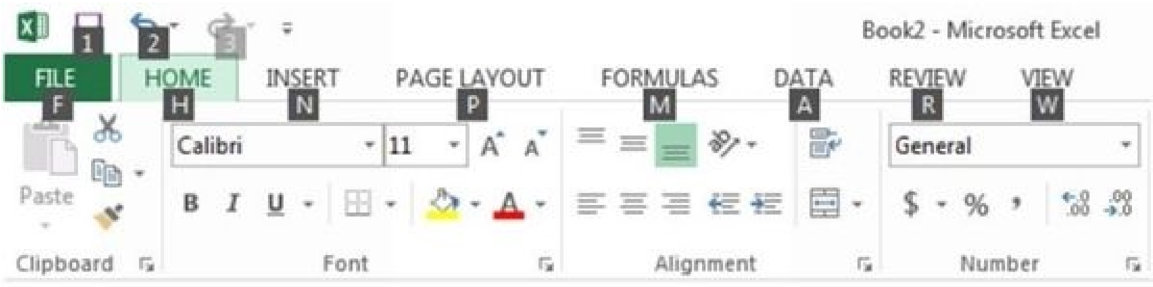


Take the above image as an example. As soon the line chart is clicked, all the needed tools are made available in the ribbon under the tab of Chart Tools. The Green Highlighted Tabs in the above image are contextual tabs. You can also say this as the automatic customized ribbon, as all the tools you need to work on the particular object are automatically gathered in one place.

The Use of Ribbon for Keyboard Users

It may seem to you that the ribbon can be used by mouse only. However this is not true. Ribbon is as friendly to the keyboard users as it is to the mouse users. All you need to do is hit the ***Alt*** *key*. It will display a different letter on each tab. Press the particular letter on your keyboard to select the corresponding tab. There you will see a different letter over each command. Hit the letter on your keyboard to select the corresponding command.

Figure2.4 – KeyboardShortcutsfor Usingthe Ribbon

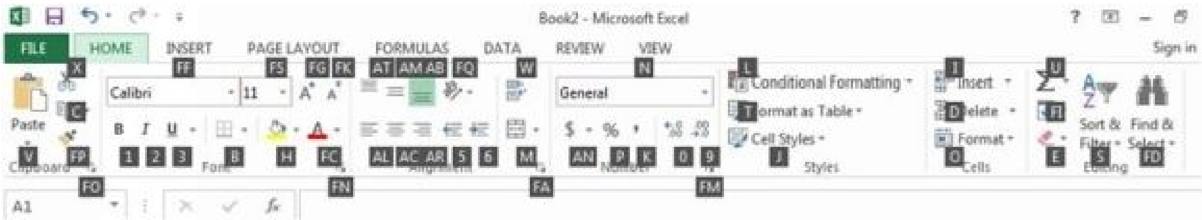


The above image shows what happens when you hit Alt.

Now press the ***H*** *key* to select the Home tab, ***I*** key to open the Insert Tab, ***P*** key to open the Page Layout Tab as so on.

Suppose you hit the ***H*** key. Figure 2.4 shows what happens after you pressed the ***H*** *key.*

Figure2.5 – Hotkeys for DifferentCommands



As you can see in Figure 2.5, the Home Tab is opened and there is a different letter over each command. You just need to hit the particular letter on your keyboard to use the respective command.

Meet the Quick Analysis Tool

One of the top additions to the newest member of the Excel clan is the Quick Analysis Tool. It is a small menu that pops up every time you select a range of more than one filled cell. The Quick Analysis Tool combines the commonly used commands of Excel and put them beside the selected range.

The primary reason behind the heightening popularity of the Quick Analysis Tool is that it solves the commonly faced issue that occurs when menus or commands on the ribbon drop down and obscure the cells you are working on.

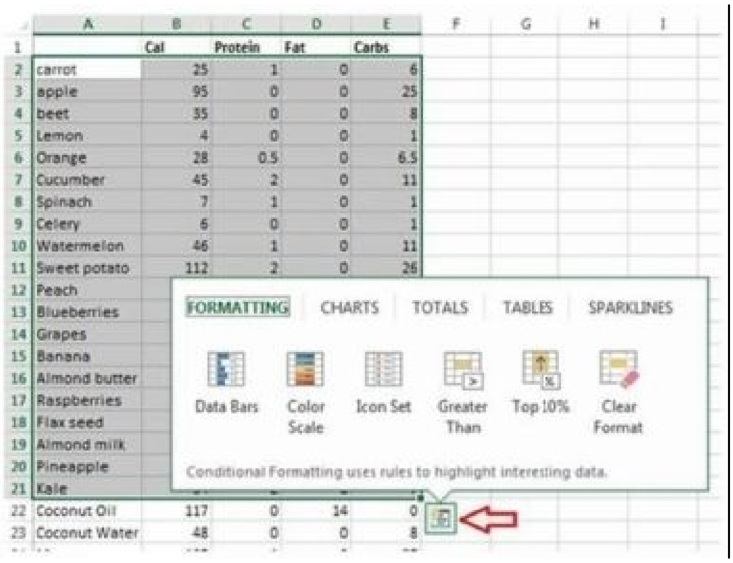


Figure 2.6 - Quick Analysis Tool

A tiny icon will appear at the lower right corner as soon as you select a range of cells. It is the icon pointed by the red arrow in the above image. You need to click this icon in order to reveal the Quick Analysis Tool.

As illustrated in Figure 2.6, the Quick Analysis Tool is like a mini ribbon containing the commands for formatting, charts, total, tables and sparklines.

Introducing the Backstage View

In Excel 2007, Microsoft removed the traditional File button that used to reside on top of the Excel workbook. It replaced the file command with the Microsoft button. However due to the increasing demand and popularity of the former, it was added back in Excel 2010 which remains to be there in the 2013 version as well. Also the office button next to the file tab is gone.

Another major difference with regards to the file tab in Excel 2013 is that now it does not contain the typical menu or dialog box. The File tab, located at the extreme left side of the ribbon, takes to an entirely new screen known as the Backstage View.

Following is the image of a backstage view.

Figure 2.7 - Backstage View

As you can see, it contains the familiar File menu commands along with several other options and settings.

Clicking the arrow button located at the top left of the backstage view will take you back to the worksheet.

The items on the left side are the old file menu commands. Here you will also find the *Account* command to change the settings for your Microsoft account. Clicking *Options* will launch a separate dialog box of the Excel's options.

The extreme right side of the backstage view contains the properties and other information about the underlying workbook.

In between the left and right side are some additional options. Here you will find commands to protect your workbook, inspect your worksheets, manage the different versions, explore the browser view options and more.

Using the Dialog Box

A lot of excel tabs and commands launches a dialog box, which contains further commands pertaining to the main tab.

For example, if you select **Insert** > **Pivot table**, it will open up a dialog box containing further options related to the Pivot Table. Following is the image of the dialog table that we are talking about.

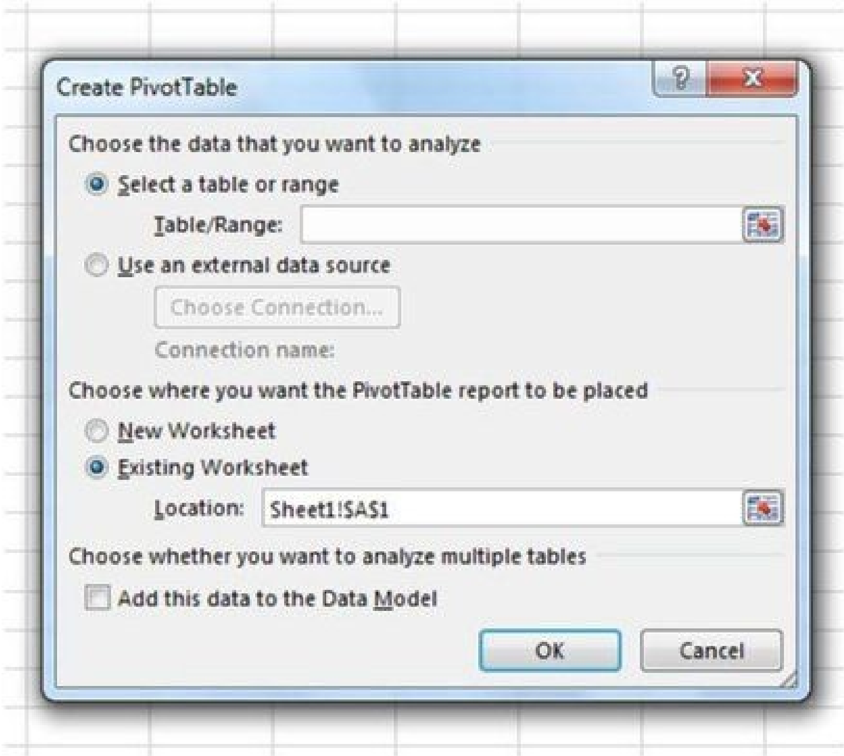


Figure 2.8 - Example of a Dialog Box

There are two types of dialog boxes, in terms of their workability.

Modal Dialog Box

While using Excel, you must have come across small windows asking you to either click **OK** or **Cancel** or any other stated action. These are alert dialog boxes. They appear mostly to alert, notify or warm about an error.

	When a modal dialog box pops up, it freezes your worksheet you

	cannot do anything on it until you close the dialog box

Click **OK** to accept the suggested action or click **Cancel** to dismiss the dialog box without taking any action.

	Hit **Esc** to simply close a modal dialog box without taking any action with regards to the dialog box .

Modeless Dialog Box

This type of dialog box does not still your worksheet till you take any action. It works like a ribbon or toolbar. It stays on your worksheet but does not freeze it. You can continue working on your worksheet as well make any changes you want in the dialog box. The changes that you make in the dialog box will take effect immediately.

Following is the example of modeless dialog box.

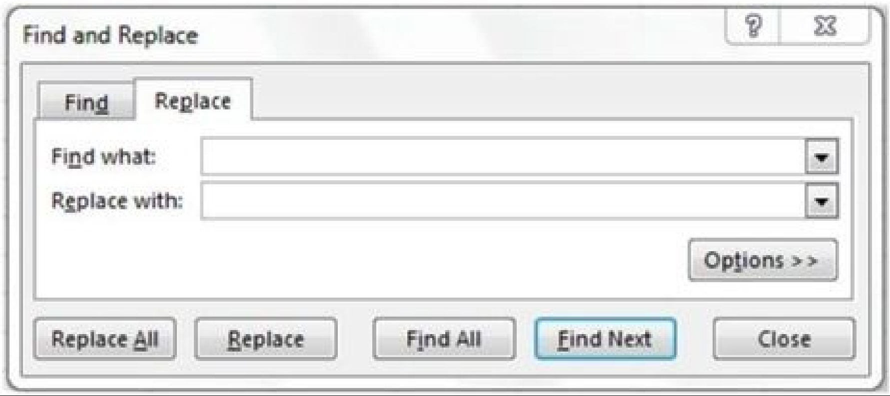


Figure 2.9 - Example of a Modeless Dialog Box

As you can see, it is a *Find and Replace Dialog Box.* You can leave this box open while you work on the worksheet. Whatever value you find and replace in the dialog box will take effect on the worksheet.

Get To Know the Task Panes

Task pane is another very exciting feature of Excel. It was there in the previous versions as well but the task pane in Excel 2013 is far more advanced and comprehensive.

Task pane launches automatically in response to certain functions and commands. For example, if you want to format a picture in Excel 2013, right-click the particular picture and select Format Picture. This will open the Format Picture task pane on the worksheet, as illustrated below.

Figure 2.10 - Example of A Task Pane

The Format Picture Task pane which is located at the extreme right contains all the commands you may need to edit the underlying picture. As you can see, there are four tabs in the Format Picture Task pane. The tabs are located at the top of the pane. Clicking on the tab will reveal further commands and formatting options.

When you are done using the task pane, click the X icon located at the upper right corner of the pane.

To navigate the task pane with keyboard, open the task pane and then hit **F6**. You can now use the arrow keys, the tab key and the spacebar to work around the task pan.

By default, the task pane opens up at the right side of the worksheet. If you want to move it anywhere else, simply click the title bar of the pane and drag it to your desired location.

Excel remembers the location where the task pane was opened last. So if you change the position of any task pane, it will launch at the same position every time you use it

Feel Free to Seek Help

Excel is a very comprehensive and valuable software however one cannot deny the fact that it is pretty much complex as well. No matter how many books and guides you read about it, you may get stuck in a circular error or any unheard feature. Then there is this unending list of formula that you cannot possibly remember all.

While using Excel, there will be times when you would need to try some new function or an advanced formatting feature or a programming command. You don't have to explore a big fat guide every time you need help with Excel. The efficient Microsoft help system is always there at your assistance.

The help system of Excel 2013 is pretty comprehensive as well as interactive. It offers assistance in several ways, the most quick and easy one being the ScreenTips.

ScreenTips contains short description of the pertinent feature. To display a ScreenTip, simply take your cursor over to the command or feature on the ribbon or any other tab.

Take the following image as an example. As soon as the cursor rests on the Margin Command, the ScreenTip containing the application of this command is displayed.

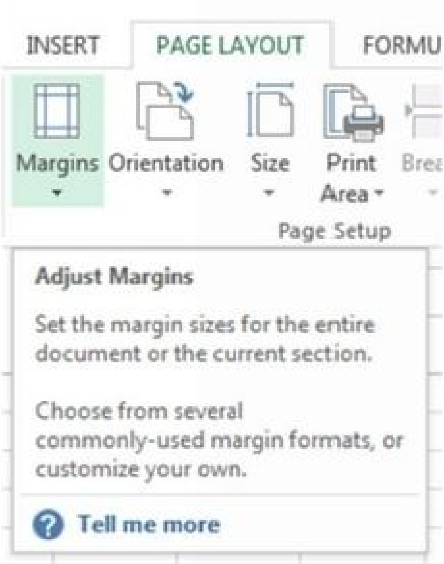


Figure 2.11 - ScreenTip to Adjust Margins

As you can see, the ScreenTip contains a very concise description of the Margin Command. If you are satisfied with this information, click **Tell me more** to learn more about it.

ScreenTips are not only available for the ribbon tabs and commands. You can also find them in some dialog boxes for example the Options Dialog box.

To display these ScreenTips, click the **File** Tab > **Options**. Here you will see that many icons contain a small "**i**" in front of them. Resting your cursor on this "**i**" will display the ScreenTip of the underlying item, as illustrated in the image below.

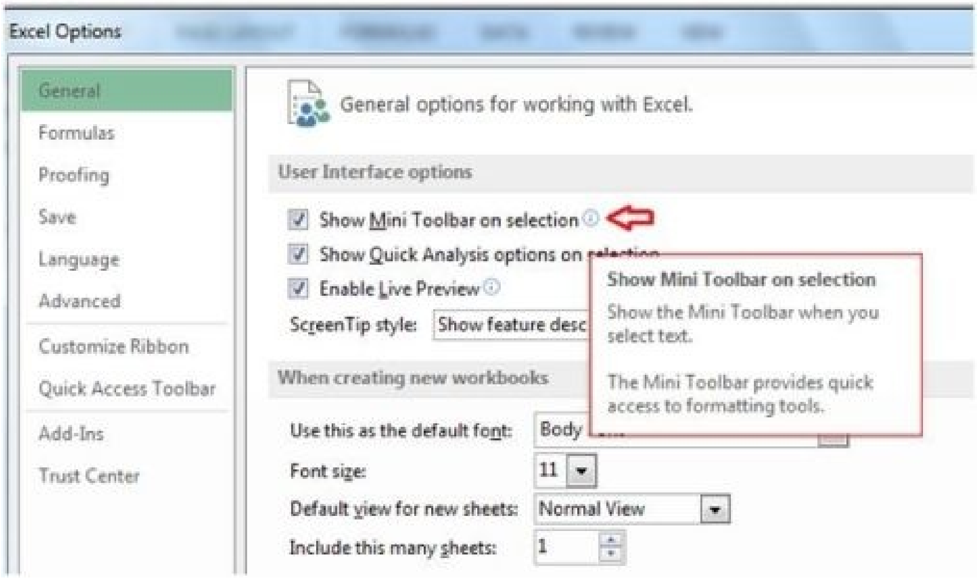


Figure 2.12 - "i" ScreenTips

Likewise, ScreenTips are available in many other dialog boxes.

If you don't want to see the ScreenTips,

1. Click **File** Tab > **Options**
2. Select **General**
3. On the left hand side, you will find an item by the name of **ScreenTip Style**. Next to this item is the drop down list for the ScreenTip settings. You can activate or deactivate the ScreenTips from this drop down menu.

ScreenTips just contains the brief description about the pertinent feature. It does not help you with errors and other advanced functions. If you need more information, hit the question mark icon (**?**) located at the top right of your Excel screen. Doing so will launch the help dialog box, as shown in the image below.

For keyboard users, hit **F1** to open the *Microsoft Help* Dialog box.

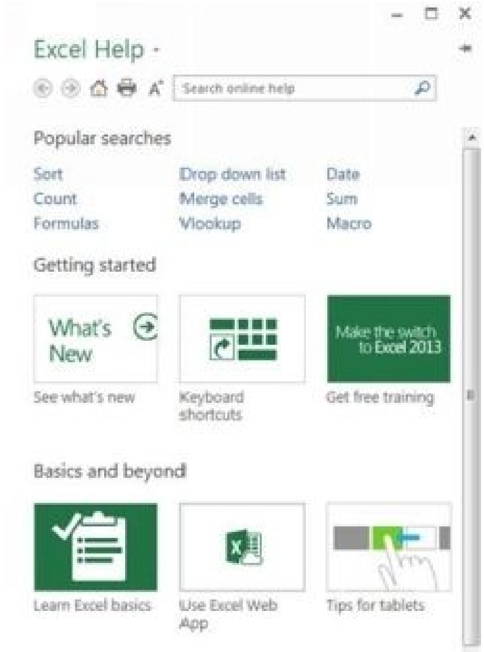


Figure 2.13 - Excel Help Dialog Box

You can search for anything you want regarding Excel. If you don't find what you are looking for in the given heads, you can type for in the search bar located at the top of the help dialog box.

Refer to Appendix "List of Keyboard Shortcuts" to learn the keyboard shortcuts for Microsoft Help related commands.

> You can seek online help only when you are connected to the internet. In case your internet connection is inactive, the help dialog box will contain the offline help topics. The offline help system is also very comprehensive. However the online one contains more updated solutions and information.

Chapter 3: Customizing Your Excel 2013

So far we have introduced to the popular features of Excel 2013. Now before we get on the usage of these features, here is another very interesting thing for you and that is customization.

Excel contains infinite number of features. There may be some features that are quite advanced but you need to use them pretty often. You can keep them handy by placing them in the Quick Access Toolbar. And it is not just the toolbar that you can modify. Just like you personalize your desktop and keep on front all your favorite items, you can do the same with your Excel 2013 as well.

This chapter tells you how you can customize your Excel's ribbon and your Quick Access Toolbar to make them more accommodating and convenient.

Tailoring the Quick Access Toolbar

The Quick Access Toolbar is a small yet a very powerful feature of Excel. It contains the most commonly used commands and items. The best part is that you can customize your toolbar to make it more valuable and handy. You can change its location, add/remove icons in it and also make it a part of your ribbon to free up some screen space.

Playing Around With the Location

By default, the Quick Access Toolbar is located above the ribbon, on the top left of your workbook, as shown in Figure 3.1.

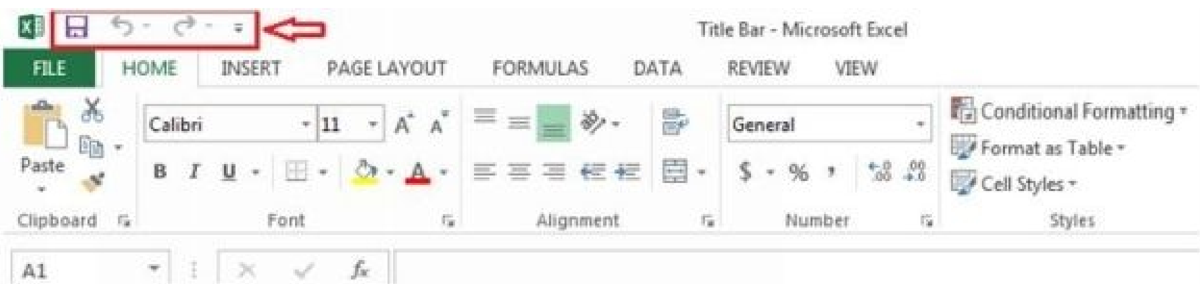


Figure 3.1 - Quick Access Toolbar above the Ribbon

If you want to move this toolbar below the ribbon, click the **Customize Quick Access Toolbar button** (tiny downward arrow at the end of the toolbar) and then click **Show below the Ribbon**. This should move the Quick Access Toolbar below the ribbon as shown in the below image.

Figure 3.2 - Quick Access Toolbar below the Ribbon

Loading the Toolbar

When you first start Excel, there will be three tools (Save, Undo and Redo) in the Quick Access Toolbar. These three are irrefutably the most frequently used commands. However there are other functions too that are used quite often and you might like to keep some of them readily available regardless of which tab or ribbon is currently opened.

Since the Quick Access Toolbar is visible all the times no matter which tab is expanded, it is the ideal place to keep your favorite commands.

There are two ways of adding commands to the Quick Access Toolbar.

The first way allows you to add several commands together to the Quick Access Toolbar. To do so, click the **Customize Quick Access Toolbar button** > **More Commands**. A dialog box as shown in the image below will open up on your screen.

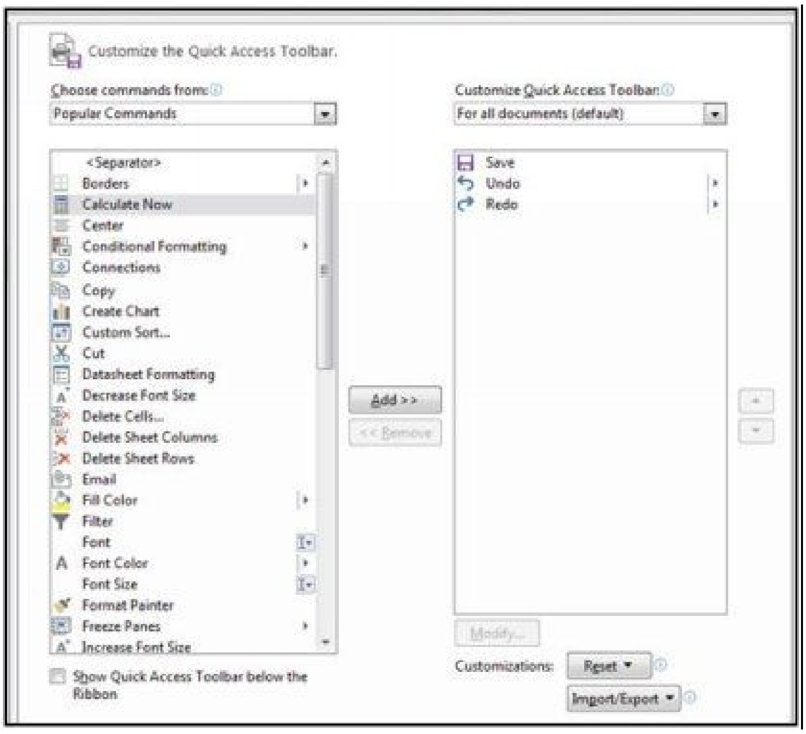


Figure 3.3 - 'Customize the Quick Access Toolbar' Dialog Box

As you can see there is a long list of commands on the left side of the dialog box. Click the command that you want to place in the quick access toolbar and then press the **Add** button located in between. Likewise, you can add other commands too.

The second way is more convenient if you cannot find a particular command in the left-hand side list.

Locate the command you want to add in the ribbon. Right-click the command and then click **Add To Quick Access Toolbar**.

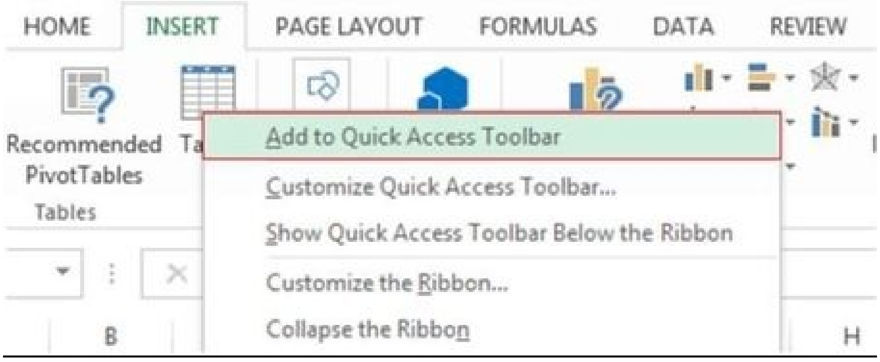


Figure 3.4 - The *Add to Quick Access Toolbar* button under the Insert Tab

This should add the particular command to your Quick Access Toolbar.

How to Save Your Preferences?

There are two ways of saving your customized Quick Access Toolbar.

Import/Export

The first way is by importing or exporting the customization files. This method allows you to copy your customized Quick Access Toolbar on every computer you use.

To do so, select the **File** Tab > **Options** > **Quick Access Toolbar**. There on the bottom-right you will see the **Import/Export button**. It enables you to save and retrieve a file containing all your customizations and use it on other computers.

To save your customizations, click the **Import/Export** button > **Export all customizations.** A dialog box will open up on the screen as shown below.

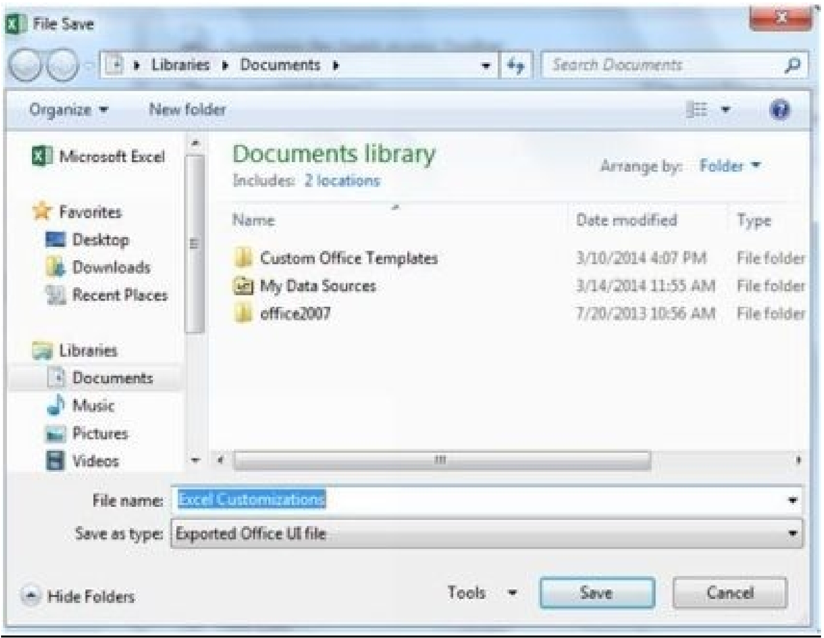


Figure 3.5 - Saving the Customization File As *.exportedUI*

Select the location on your computer to save your customization file. The files will be saved as Exported Office IU file (*.exportedUI* extension)

You can copy this file on any computer you want.

To retrieve your customization file, click the **Import/Export** button > **Import customization file.** It will launch a separate dialog box showing files with the extension .exportedUI. Select the particular file containing your customizations.

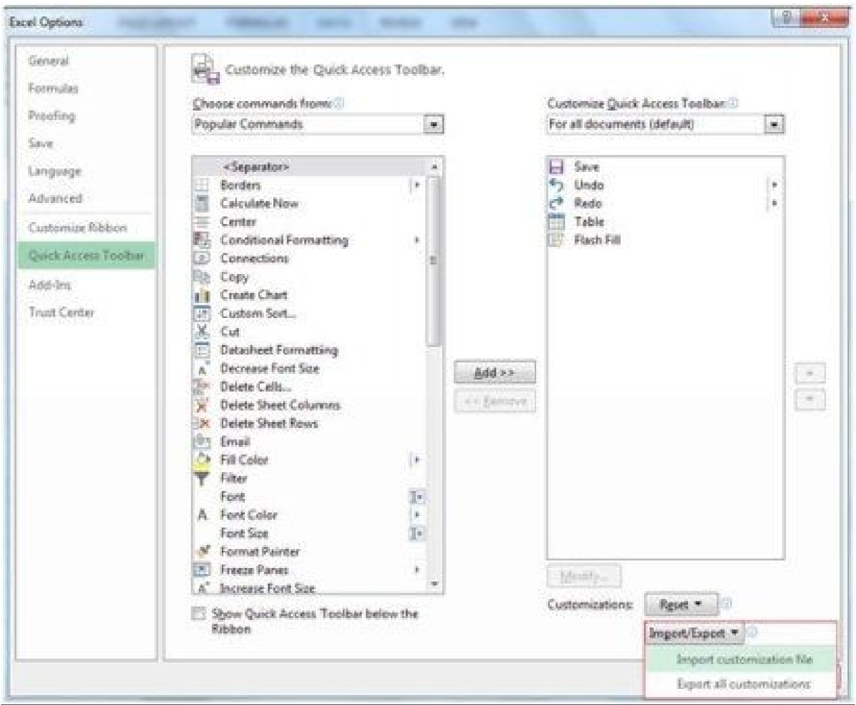


Figure 3.6 - The Import/Export Button for Saving and Retrieving Customization File

Attaching To A Workbook

The second way of saving your customized Quick Access Toolbar is to attach it to a workbook. To do so, select the **File** Tab > **Options** > **Quick Access Toolbar**. Click the Customize Quick Access Toolbar drop-down list located on the right side of the dialog box.

Here you will find two types files; your customization file in the .exportedUI extension and the Excel file with the attached toolbar.

The same dropdown list contains two categories, namely *For all documents (default)* and *For [active workbook name];* illustrated below.

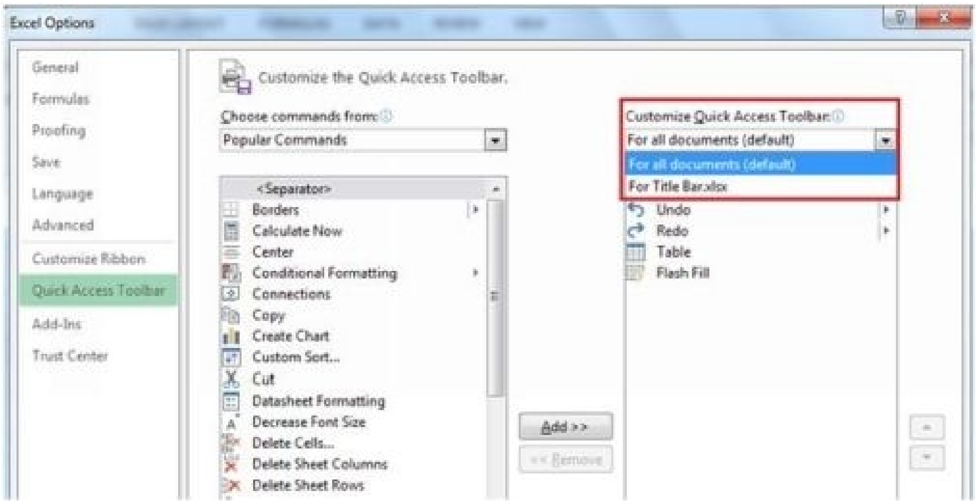


Figure 3.7 - The *Customize Quick Access Toolbar* Drop-Down List

If you select the first option, any changes you make in the Quick Access Toolbar will be applied to all the Excel files in your computer.

If you select the second option, whatever commands you add from left to right side and other customizations you make will be applied in the active workbook only. In this case, the customizations will be saved and reappear every time you open the active workbook.

Undoing What You Did

If you think you have loaded your quick access toolbar with too many unnecessary commands and needs to clean it up, there are several ways to do that.

Resetting The Toolbar

To reset the Quick Access Toolbar of only one workbook, select the **File** Tab > **Options** > **Quick Access Toolbar.** Select the name of the particular workbook in the Customize Quick Access Toolbar drop-down list. Hit the **Reset** button located right above the Import/Export button. Here you have two options, you can either reset the quick access toolbar only or you can reset all the customizations.

> If you select Reset all customizations, it will not only restore the Quick Access Toolbar's default settings but will also reset all the customizations that you made in ribbon.

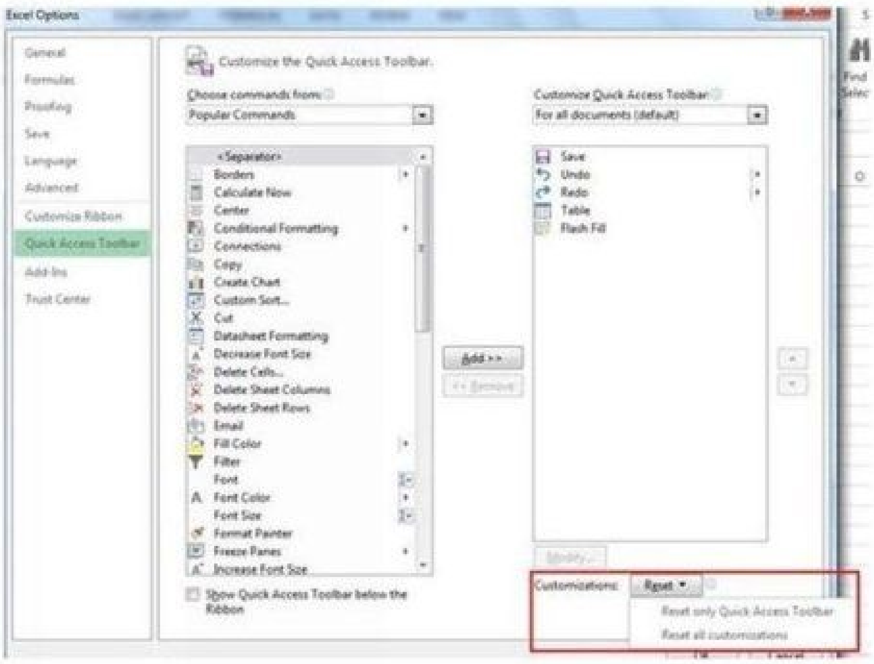


Figure 3.8 - The Reset Button to Restore the Default Quick Access Toolbar

If you select *For all documents (default)* in the Customize Quick Access Toolbar drop-down list and then hit the **Reset** button, it will restore the customizations of all the excel files saved in the computer.

Removing Individual Commands

If you don't want to reset the entire Quick Access Toolbars and just want to remove a few commands, right-click the particular command on the Quick Access Toolbar and hit **Remove from Quick Access Toolbar**.

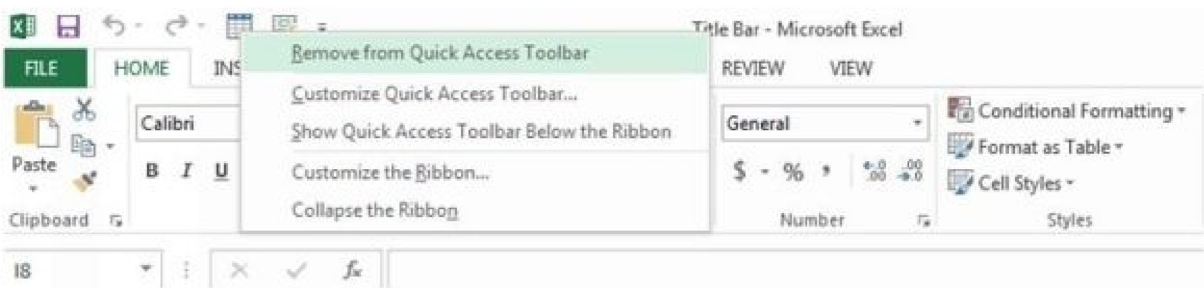


Figure 3.9 - Removing A Command From the Quick Access Toolbar

Tailoring the Ribbon

It is not only the Quick Access Toolbar that you can customize. You can also modify the ribbon as per your convenience. You can add new tabs in your ribbon, relocate the commands and tabs and much more.

How You Can Add Custom Tabs To Your Ribbon?

First, let’s see how you can add new tabs to your ribbon.

1. Select the **File** Tab > **Options** > **Customize Ribbon**

> Keyboard shortcut to open the **Customize Ribbon** tab of the *Excel Options* dialog box: Hit **Alt** then **F** then **T** then **C**

2. You will see that all the commands are listed on the left hand side and all the main tabs on the right side. Select the tab after which you want to add the new tab.

3. Click the **New Tab** button located right beneath the Main Tabs in the Customize the Ribbon list box.

4. Excel inserts a *New Tab (Custom)* beneath the main tab selected in the first step. As shown below, this new tab consists of one *New Group (Custom)*.

5. Now add all the commands you want in this new group. To add a command, simply select a command on the left box and hit the **Add** button located in between both sides. When adding commands, there are several categories you can select from such as Popular Commands, Commands Not in the Ribbon, All Commands, Macros, Office Menu, All Tabs, Main Tabs and so on. You can select any of these categories from the *Choose commands* drop-down list located above the commands-containing list box.

6. As you can see in Figure 3.10, the newly added commands appear under the new group (custom) tab. The commands are displayed in the left-to-right order in which they will appear on the ribbon. In the below example, the *Fill Color* command will appear on the extreme left side in the new ribbon, followed by the *Font* command and so on. To change the placement of the commands, simply click the command you want to relocate and hit the arrow buttons located at the extreme right of the dialog box.

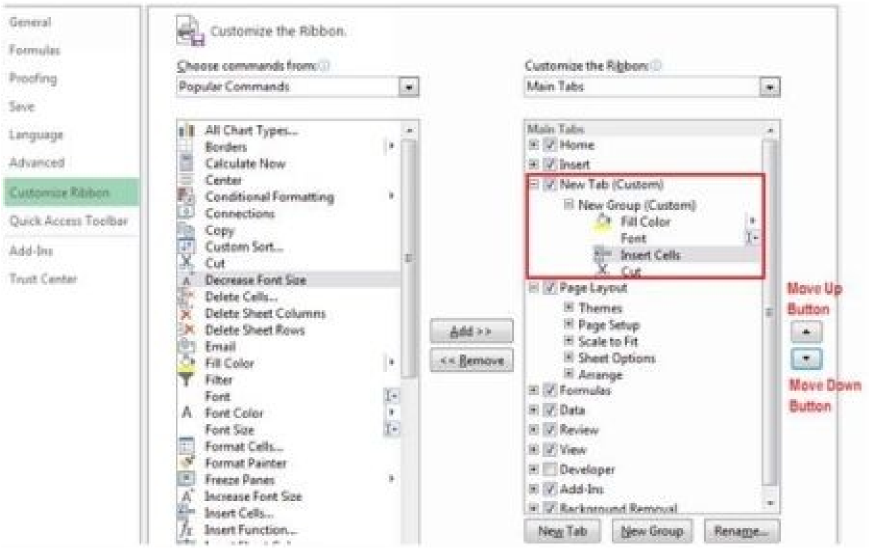


Figure 3.10 - Shifting the Position of the Commands in the New Group (Custom)

You can also rename a group or tab or clicking the **Rename** button and typing the new name in *Rename Dialog Box*. Click **OK** when you are done.

If you want to add more groups to this new tab, hit the **New Group** button. The process of adding commands to the group and renaming it remains the same. Likewise you can add other tabs as well.

For Keyboard users, Excel automatically assigns shortcut key letters to all the new tabs and groups.

Managing the Ribbon's Tabs

If you do not like the default layout of the tabs and commands, you can relocate them in any way you want. Here are a few ways to customize tabs to your liking.

- You can modify the order in which the tabs appear on the ribbon. To do so, open the Customize Ribbon tab of the Excel Options dialog box. Select the tab you want to relocate and then click either the up or the down arrow. The former will move the tab to the left on the ribbon; the latter will move it to the right. Click **OK** once you are done.

- To hide certain tabs on the ribbon, open the Customize Ribbon tab of the Excel Options dialog box. Remove the checkmarks from the tabs that you want to hide. Click **OK** once you are done. To reveal the hidden tabs, click the checkboxes.

- To remove a group from a tab, open the Customize Ribbon tab of the Excel Options dialog box. Click the plus sign to expand the particular tab and select the group you want to remove from it. Hit the **Remove** button located right underneath the Add button.

- It is not only the main tabs that you can modify. You can also customize the contextual tabs. To do so, first open the *Customize Ribbon* tab of the Excel Options dialog box. Select the *Tool Tabs* option on the Customize the Ribbon drop-down list. All the contextual tabs will be listed on the left side box. After this, the procedure to relocate, remove, rename or add a group or tab remains the same.

Saving Your Customizations for Later Use

The procedure to save the ribbon customizations in a file so that they can be used on other computers is the same as it was in the case of Quick Access Toolbar.

You can import the customization file and then export it on any computer containing Excel 2013.

If you want to re-customize your ribbon but might want to use the current customization later on, simply import the customization file and keep it saved in your computer. Now re-

	customize your ribbon and make any changes you want. When you want to use the previously customized version of your ribbon, just export the saved customization file and all your previous customizations will take place. Likewise you can save as many customized ribbons as you want.

You can also restore your customized ribbon and set it back to default. Go to the *Customize Ribbon tab* of the Excel Options dialog box. Hit the Reset button located at the bottom right. Here you have two options. You can either select **Reset only selected ribbon tab**, or you can **Reset all customizations**. The latter will not reset your ribbon to default settings but will also undo any changes you made in the quick access toolbar.

Chapter 4: Loading Your Excel 2013

Customizing the Quick Access Toolbar and Ribbon is not the only way you can make your Excel 2013 more effective and convenient to use. You can install Apps and Add-ins too.

The best part is that you don't have to explore any site for Excel-compatible apps and add-ins. The Office Store is loaded with these.

This is what this chapter is all about. It tells how you can make your Excel more powerful and valuable through Apps and add-ins.

Installing Apps

Apps are small yet advanced application programs that enhance the functionality of certain features and leads to greater productivity. The Office Store is full of Excel related Apps. Most of them are free of cost, whereas a few are offered against a small premium.

Following is the process to install apps in Excel 2013.

Select the **Insert** Tab > **Apps for Office**. This will open a drop-down list. If you are installing apps for the first time, the *Recently Used Apps* section will be blank, as shown below.

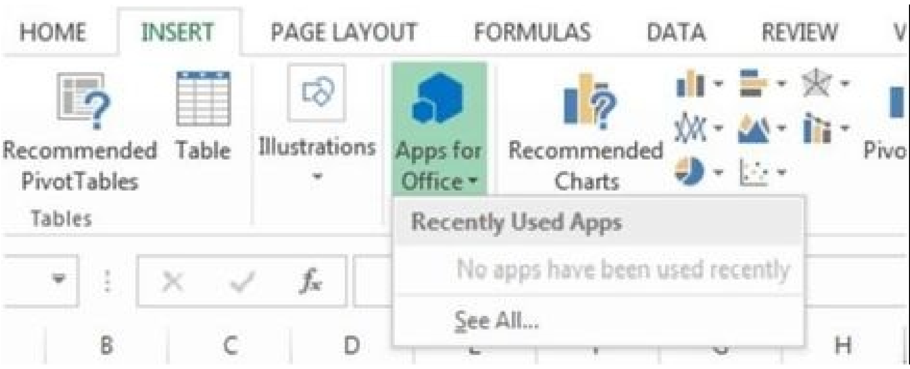


Figure 4.1 - *Apps for Office* Command in the Insert Tab

Click **See All** to open the Office Store. As you can see in the image below, there are two tabs on top, namely My Apps and Featured Apps.

The *My Apps* Section contains the apps that you have already downloaded from the Office store.

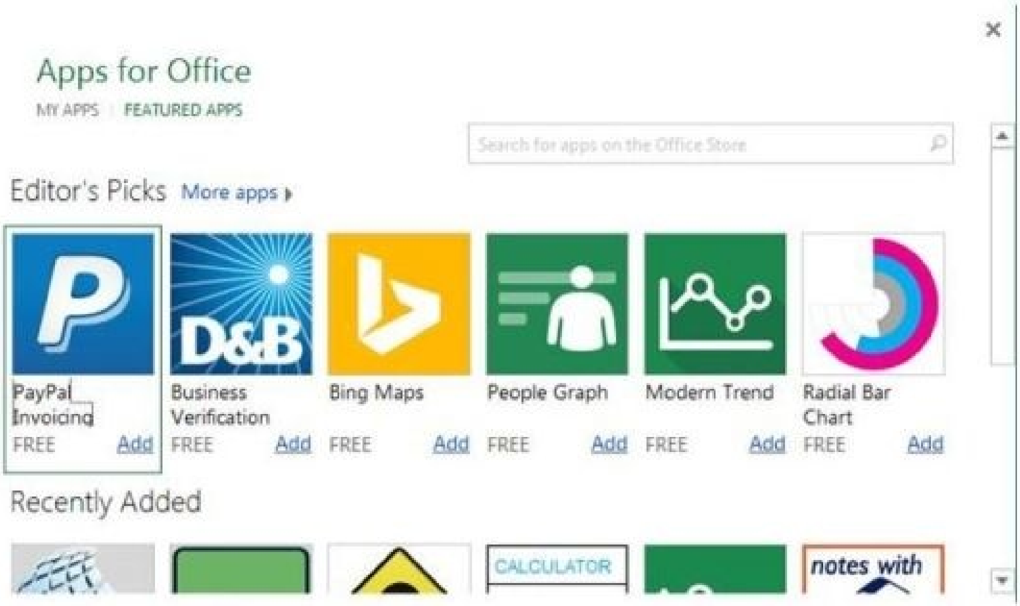


Figure 4.2 - Apps for Office Dialog Box

Click Featured Apps to visit the Office Store. As you can see, there is this *Editor's Picks* section and *Recently Added* section, each having free and paid apps.

If you are not interested in any of the apps displayed upfront, click **More apps** next to the Editor's Pick section. This will take you to the website of the Office Store where you can see all the apps available for Excel 2013.

This is how the Office Store Website looks like.

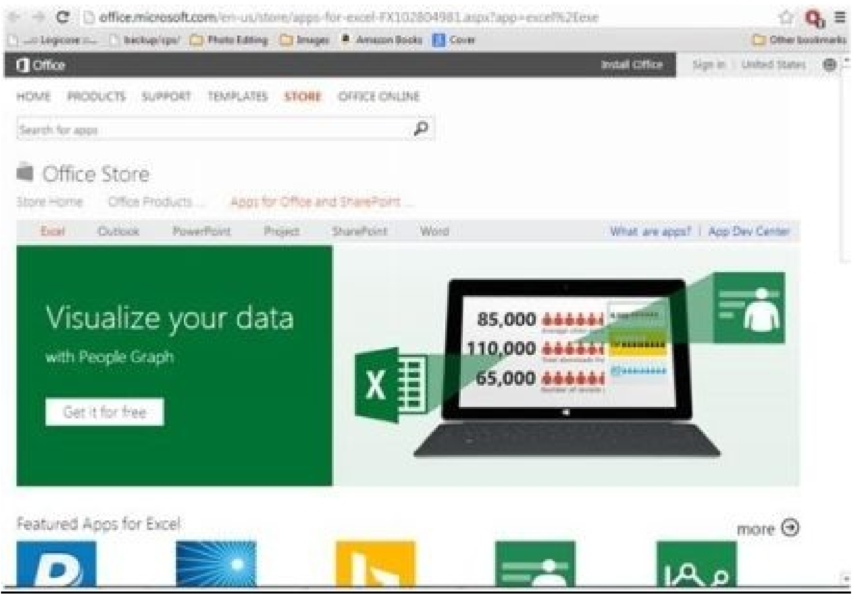


Figure 4.3 - Website of the Official Office Store

Click on any app to know about its functionality, developer, user rating and price.

Whether you liked an app in the Editor's Pick section, the Recently Added Section or the Store website, the procedure to install the apps is the same.

To install any app, click **Add**. You will taken to another page containing details about the app you selected.

If the app you selected is free of cost, you will be taken directly to the download page. If it is a paid app, you will be taken to a page where you need to fill in the payment details. In either, follow the on-screen instructions to complete the installation. Once the installation process is complete, close the browser and return to Excel.

Now you can use the downloaded apps in any of your worksheet. To do so,

1. Open the **Apps for Office** dialog box in the **Insert** Tab.
2. Click **See All** > **My Apps**
3. You will see a list of the apps you have downloaded. Click the app you want to use in the particular worksheet. Click **Insert** > **Enter**.

	If you don't find any of your downloaded apps in the *My Apps* page, Click **Refresh** located at the top right of the *Apps for Office* Dialog Box.

On the left of the Refresh button, you will see **Manage My Apps.** Click it to install any app or to keep tabs of your installed apps for Office 2013 and SharePoint.

	Some apps such as the Mini Calendar and the Bing Maps open up in the form of graphical objects that sways above the worksheet. Others such as the QuickHelp Starter and Merriam-Webster Dictionary open up in a task pane.

To close the task pane apps, hit the close (x) button on the top right of the pane. To close the graphical apps, select the object and then hit the Delete key. Doing so will not delete or uninstall the app, it will only close it.

What's Up With The Add-Ins?

Just like apps, Add-Ins are small programs that enhance the capabilities of several Excel's inbuilt features. A lot of them are meant specifically to empower and modernize the computational abilities of Excel.

To use any add-in program, it must be installed on your hard drive and then you need to open it via the Add-Ins dialog box. Before we elaborate further on this procedure, you need to know the different categories of add-ins that are already installed in your Excel 2013.

Automation Add-Ins

The Automation Add-ins, commonly known as the Excel Add-Ins, are a group of programs that enhance the computational and data analysis features of Excel. Euro Currency Tools, Analysis ToolPak, Analysis ToolPak - VBA and Solver are examples of Automation Add-Ins.

Euro Currency Tools

As the name suggests, these Add-Ins makes it easier to work on currency conversions. You can use these add-ins to format your worksheet values as euro; then apply the EUROCONVERT function to convert all the other currencies into Euro. To use the Euro Currency Tools, select the Formula tab on the ribbon and hit the Euro Conversion or Euro Formatting buttons.

Analysis ToolPak

This group of Add-Ins includes several more statistical, financial and engineering functions to the already unending list of Excel's functions. You can load these add-ins to perform a variety of advanced computational and statistical analysis operations on Excel.

Analysis ToolPak - VBA

This category of Add-Ins is very popular among VBA programmers. It allows them to design and publish their own statistical, financial and engineering functions that they can use in Excel. In other words, the Analysis ToolPak – VBA add-ins enables creating customized functions.

Solver

The Solver Add-In helps you find a solution of What-If scenarios. It analyzes your selected range of cells and then proposes a solution that satisfies the specified constraints and optimizes the objective value.

If you want to take help of the Solver Add-in, just go to the **Data** Tab and click the **Solver** button located in the Analysis group. *Refer to chapter 29 to learn more about Solver.*

Component Object Model Add-ins

The Component Object Model Add-ins, shortly read as COM Add-ins improves Excel’s capabilities to manage and analyze unending data lists and infinitely large amount of data. Power View, PowerPivot and Inquire are examples of the COM Add-Ins.

Power View

The Power View Add-Ins allows analysis and of interactive data and graphical presentation of your data models. It also facilitates ad-hoc data queries.

PowerPivot

This group of add-ins allows you build huge and complex data models. It also extends the capabilities of the DAX (Data Analysis Expressions) functions to ease data queries. *Refer to chapter 28 to learn more PowerPivot.*

Inquire

This group of add-ins makes it easier to analyze a workbook in order to understand their design, identify any broken links, inconsistencies and formula errors. It also allows you to compare two workbooks to identify their differences.

All the above mentioned add-ins are installed in Excel 2013, however they are activated and ready to use.

Following is the process of loading the add-ins in Excel and making them readily available.

Click **File** to open the backstage screen; then select **Options** > **Add-Ins**

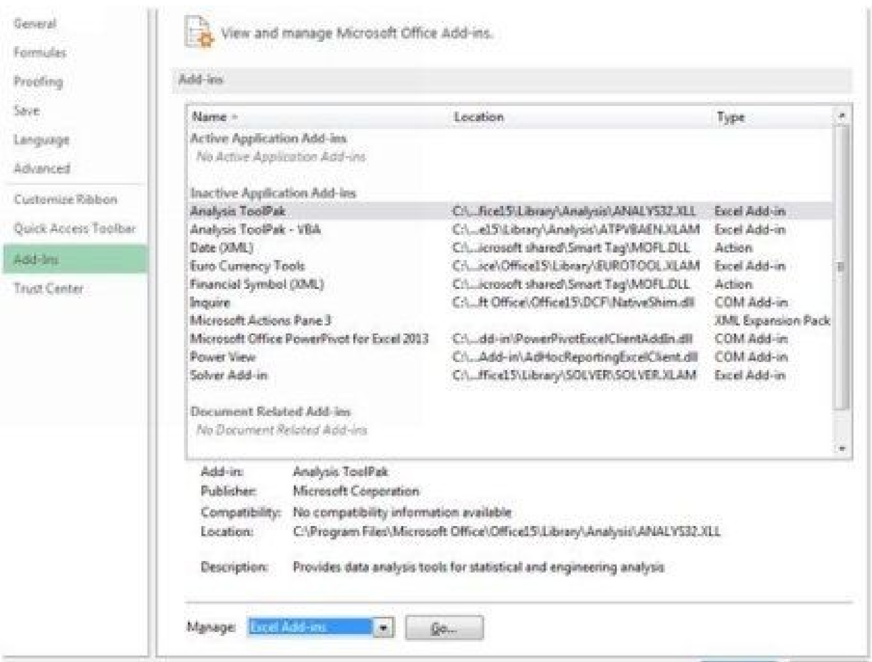


Figure 4.4 - The Add-Ins Dialog Box in Excel Options

As you can see, this dialog box contains the names of all the add-ins that are preinstalled in your Excel, along with location and type of each.

At the bottom of this window is a *Manage* drop-down list containing the type of Add-ins. The *Excel Add-Ins* is selected by default. If you want to load any or all of the COM add-ins, expand this drop down list and select **COM Add-Ins**.

After you select the type of add-ins you want to load, click **Go**.

If you selected the Excel Add-Ins in the Manage drop-down list, the next dialog box would be similar to the image below,

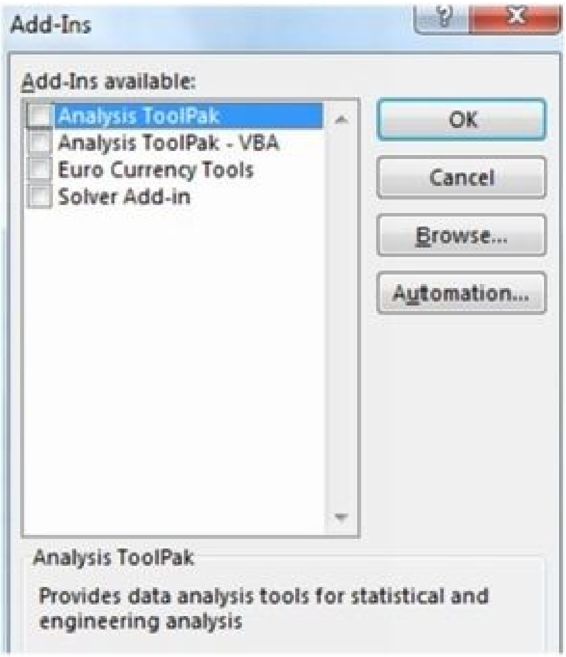


Figure 4.5 - The Automation Add-Ins Dialog Box

If it was COM Add-Ins, the dialog box would open up.

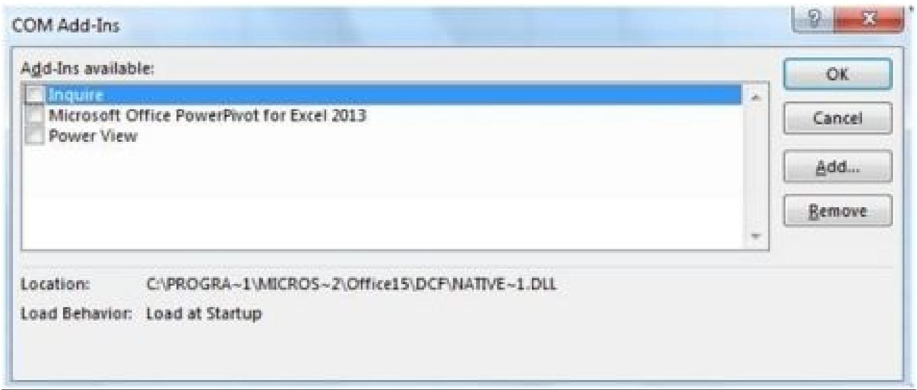


Figure 4.6 - The COM Add-Ins Dialog Box

In either case, mark the check boxes for each add-in that you want to load and use in your Excel 2013.

Click **OK** once you are done.

Go back to your workbook. You will find all your activated add-ins in their respective tabs.

> You won’t find all the add-ins at one place, unless you customize your ribbon and relocate all your favorite add-ins in one tab, By default, the solver and Data Analysis Add-ins are located in the *Data Tab*. Each of the COM Add-ins constitutes an entirely separate tab on the ribbon. The extra financial, statistical and engineering functions that are part of the Analysis ToolPak add-in can be found in their respective groups in the *Formulas Tab*.

To use the Analysis ToolPak additional functions, expand the Formulas Tab and select the required drop down list, as shown below.

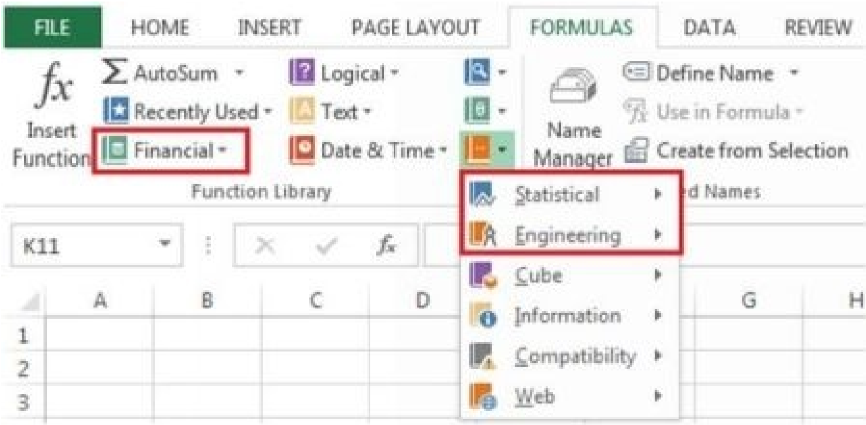


Figure 4.7 - The Analysis ToolPak Additional Functions in the Formulas Tab

You will also find these categories in the dialog box that opens after you click $\mathbf{f_x}$ on the immediate left of the formula bar, as illustrated below.

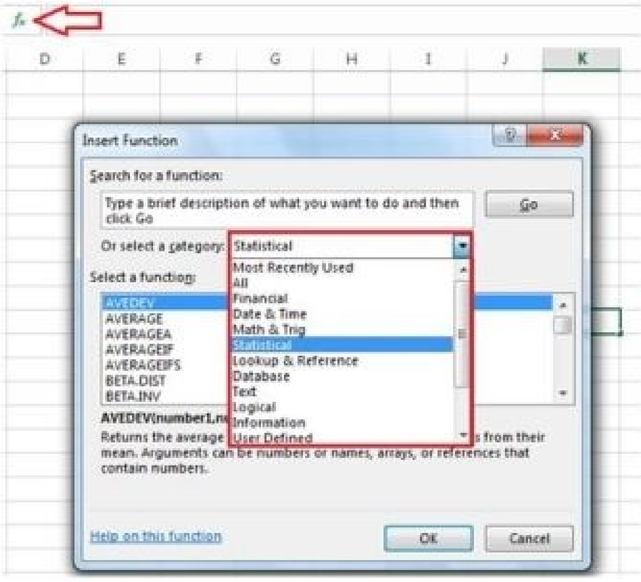


Figure 4.8 - The Analysis ToolPak Additional Functions in the *Insert Function* Dialog Box

Shortcut to Manage the COM Add-Ins

You don’t have to go all the way to the backstage screen and options every time you want to manage the COM Add-Ins. Here is a shortcut for that. Select the **Developer** Tab and then click **COM Add-Ins**. This will launch the COM Add-Ins dialog box. Here you can add/remove the COM Add-Ins as needed.

The *Developer Tab* does is not visible on the Ribbon by default. You need to change the settings in order to display this tab on your ribbon. To do so, select **File** > **Options** > **Customize Ribbon**. Tick the Developer Checkbox located in the right-hand side box. Click **OK** once you are done. This should make the Developer Tab visible on your ribbon, and so the COM Add-Ins dialog box.

Third Party Add-Ins

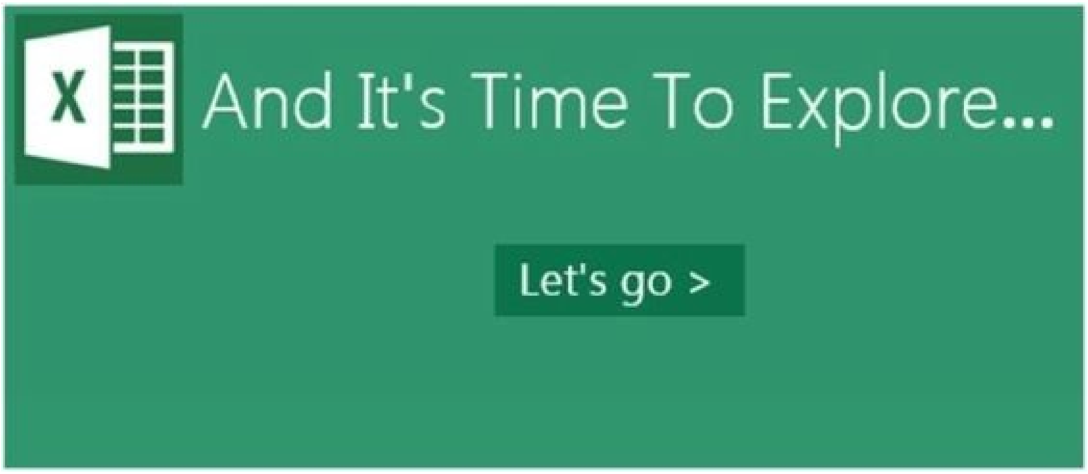
The Automation Add-Ins and the COM Add-Ins are not the only ones that you can use. There World Wide Web is full of Excel Add-Ins that you can download and then load in your Excel 2013. Some of the third party add-ins are free, others need to be purchased.

Just Google for third party Excel add-ins and you will find countless vendors offering add-ins for Excel 2013. One very popular third party add-in is *Name Splitter*. If you entered full names in single cell in a data list, the Name Splitter if activated will split the first, middle and last name and even the initials and put them in separate columns.

When purchasing third party add-ins, make sure the site is real and not a scam. Visit different forums that talks about third party

	add-ins and verify the legitimate existence of the underlying vendor before making any transaction, or in that case even sharing your bank or credit card details that some vendors ask for guarantee purpose.

PART II: LET'S GET STARTED



Up till now we have talked about what makes Excel 2013 stand apart from its predecessors and how can you make your Excel customized and even more powerful than it already is. Well, not it is time to actually get your hands on Excel 2013 and start exploring all it has to offer.

This part of the book contains walkthroughs and tips on the basic applications of Excel 2013. It tells you how to work on a workbook, protect your worksheets, formatting techniques, working with templates and much more! This part is not only a must for beginners but for also those who have some experience of using Excel. You will find many useful tips in here that will make working on Excel even easier and far more interesting. Moreover, there are lots of new basic things in Excel 2013 that weren't there in its previous versions.

AT A GLANCE

Chapter 5: Moving Around the Worksheet

Worksheet is the core element of Excel. Whatever work you do on excel, whether it is simple mathematical calculation or a complex data operation, it is done on the worksheet. Hence it is very important that you get comfortable and proficient on working the worksheet.

While more about working on a worksheet is explained in the next two chapters, this chapter covers the basics including the navigation techniques and ways of selection. Some of you may already know about this stuff but here you will also find some shortcuts and alternative methods.

Navigating Regions

Before you learn different region navigation techniques, you need to know what actually a region is. A region is a rectangular range or block of filled cells. For more understanding, look at the image below.

	A	B	C	D	E	F	G	H
1	Monthly Sales							
2								
3	Month	Sales in 2011	Sales in 2012	Sales in 2013		Total	Average	
4	January	$ 10,000	$ 11,000	$ 12,100		$ 33,100	$ 11,033	
5	February	$ 11,300	$ 12,430	$ 13,673		$ 37,403	$ 12,468	
6	March	$ 12,769	$ 14,046	$ 15,450		$ 42,265	$ 14,088	
7	April	$ 14,429	$ 15,872	$ 17,459		$ 47,760	$ 15,920	
8	May	$ 16,305	$ 17,935	$ 19,729		$ 53,969	$ 17,990	
9	June	$ 18,424	$ 20,267	$ 22,293		$ 60,985	$ 20,328	
10	July	$ 20,820	$ 22,901	$ 25,192		$ 68,913	$ 22,971	
11	August	$ 23,526	$ 25,879	$ 28,467		$ 77,871	$ 25,957	
12	September	$ 26,584	$ 29,243	$ 32,167		$ 87,995	$ 29,332	
13	October	$ 30,040	$ 33,044	$ 36,349		$ 99,434	$ 33,145	
14	November	$ 33,946	$ 37,340	$ 41,074		$ 112,360	$ 37,453	
15	December	$ 38,359	$ 42,194	$ 46,414		$ 126,967	$ 42,322	
16								
17	Total	$ 256,502	$ 282,152	$ 310,367		$ 849,021	$ 283,007	
18	Average - Month Wise	$ 21,375	$ 23,513	$ 25,864		$ 70,752		
19								

Figure 5.1 - Understanding Regions

As you can see, there are 4 regions; highlighted with red for your understanding. The region comprises of only consecutively filled cells. As soon as there is an empty row or column, the region breaks. In figure 5.1, the four regions are A3:D15, A17:D18, F3:G15 and F17:G18.

Though Cell G18 is an empty cell, it is also part of the region as it falls in that rectangular block. The active cell, that is A1, is a one-cell region.

Now that you know what region is, let's learn some really amazing navigation techniques. These techniques will help you navigate around large regions, containing hundreds of consecutively filled rows and columns. You cannot just scroll up and down every time you need to get to the bottom of a 1000-row table.

Navigation Tips for Keyboard Users

Here are a few tips to move around a region with your keyboard.

- Hit the Home Key to jump to the first cell of the current row.
- Hold down **Ctrl** and then press the **Home** key, it will move the active cell to Cell A1.
- To jump from the first cell of the region to the last cell and in between, just press and hold the Ctrl key and then hit any of the arrow keys to move in the direction. For example, **Ctrl +** (right arrow key) will take you to the right edge of the underlying region. If you are already standing at the right corner and then you hit **Ctrl +** , it will take you to the last cell of the current row in the worksheet.
- **Ctrl + End** will take you to the last cell of the last column of the active region. For example, clicking **Ctrl + End** in Figure 5.1 will select G18.
- Hit **End** on your keyboard followed by any of arrow keys to move to the last rows and columns of the current workbook in the respective direction. For example if you press **End +** **,** it will take you to the last cell on the right hand side of the workbook.
- Scroll Lock + Home will jump to the first cell of the current window of the worksheet.
- Scroll Lock + End will jump to the last cell of the current window of the worksheet.

Navigation Tips for Mouse Users

As you can see in Figure, there is a dark border around Cell A1. This border is known as the *selection rectangle*. Moving your cursor to any sides of the selection rectangle will change the cursor into a 4 pronged arrow. Double clicking at this time will move the active cell to the last cell of the region and in between.

It plays the same function that the **Ctrl + Arrow Key** combination does for the keyboard users.

Refer to Appendix "List of Keyboard Shortcuts" to learn the keyboard shortcuts for navigating worksheets.

Learn To Select Different In Patterns

There are many ways other than the traditional click and drag method to select the desired cells. You can select a cell, a range, a region, adjacent rows or columns or multiple ranges as well.

	There is a difference between a range and a region. The former refers to a rectangular block of cells, it could be filled as well as contain empty cells; the latter refers to a rectangular block of filled cells only

To work on any cell, first you need to select it order to make it active. You can do so by simply clicking over the desired cell. You can select one or more ranges, but there will be only one active cell at a time. By default, the active cell is located at the upper left corner of the selected range, unless you move it to any other cell.

These were just the basics. Now let's explore some more interesting ways of selection.

Simple Selection

The simplest way of selecting a range or region is to bring your cursor to the first cell from where you want to start the selection. Then click and drag to select the desired range.

If you are a keyboard user, then use the arrow keys to move the active cell to the upper-corner of the desired selection. Then hold down the **Shift** Key on your keyboard and use the arrow keys to drag the selection. Release the Shift key once you are done selecting.

	To select a range of cells using both keyboard and mouse: Click one corner of the underlying range, hold the **Shift** Key on your keyboard and then click the other corner other corner of the range.

The purpose of telling you several ways of selecting ranges is that you try all and then settle on the one that you feel is most handy.

There is another way to select large worksheet areas and ranges containing thousands of cells. All you need to do is to zoom out the worksheet to expand the selection area.

There are three ways of zooming in/out the worksheet.

1. Click the zoom control buttons (+/-) or drag the zoom slider located at the bottom right of the worksheet.

2. Hold down the **Shift** Key and spin the mouse wheel

3. Click the percentage meter right next to the zoom slider. This will open up the Zoom Dialog box containing more zooming options.

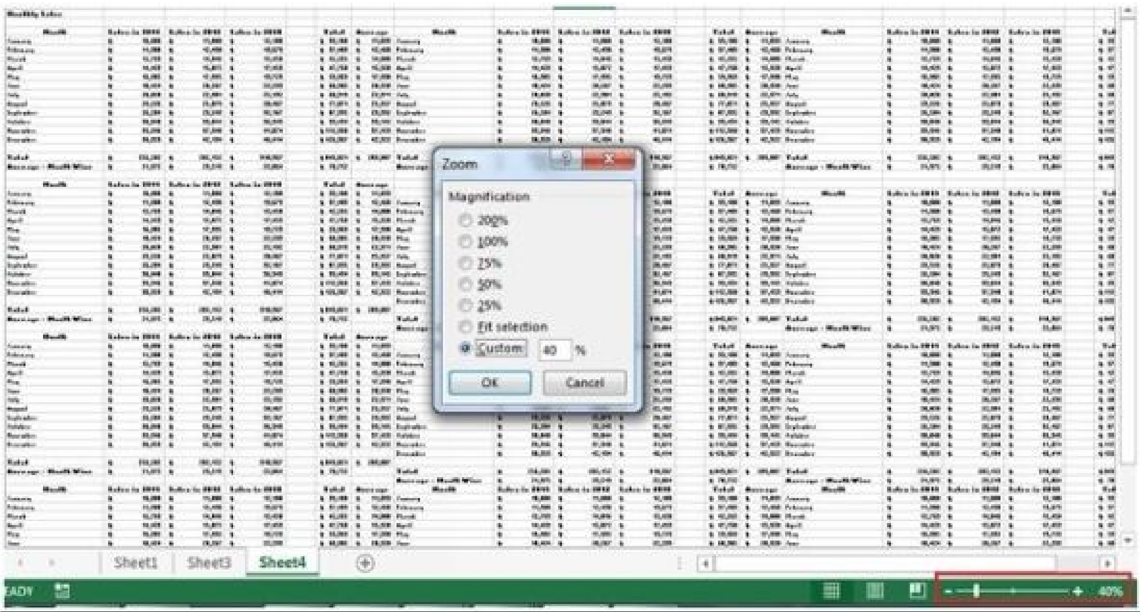


Figure 5.2 - Zoomed Out View of a Worksheet Along With the Zoom Dialog Box

	To select the entire worksheet and all the cells in it, click the small box right beneath the name bar.

The Dual Role of ***Ctrl + A***

Ctrl + A is a very famous and commonly used keyboard combination among the MSOffice users. As you may already know, hitting this combination on the keyboard selects the entire content on the word document, excel worksheet or any other Office file that is currently opened.

Well, the role of *Ctrl + A* has been slightly enhanced in Excel 2013. It can perform two functions;

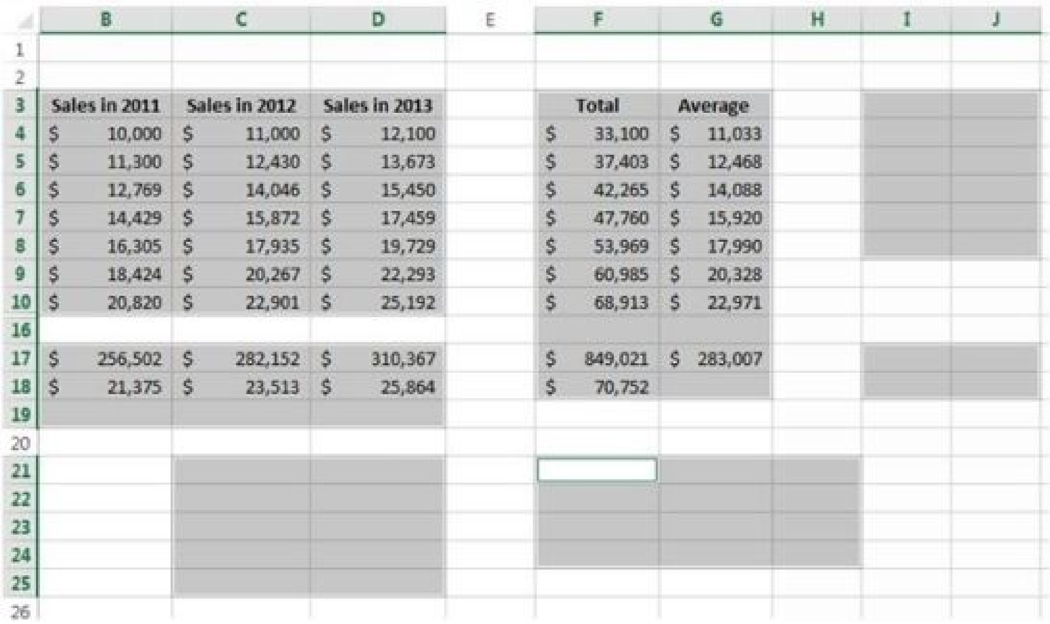
1. If you want to select the entire worksheet, move the active cell to any of the empty cell on the worksheet and then press **Ctrl + A** on your keyboard. In this case, clicking an empty cell is necessary before you hit the specified keyboard combination.

2. If you want to select any one region, take the cursor to any filled cell of the particular region and then press **Ctrl + A** on your keyboard. This will only select the desired region.

Selecting Multiple Ranges

A multiple or noncontiguous range, more commonly known as the nonadjacent range consists of two or more ranges that are not next to each other.

The following image is an example of a nonadjacent range. As you can see, it contains several regions as well empty ranges.



	B	C	D	E	F	G	H	I	J
1									
2									
3	Sales in 2011	Sales in 2012	Sales in 2013		Total	Average			
4	$ 10,000	$ 11,000	$ 12,100		$ 33,100	$ 11,033			
5	$ 11,300	$ 12,430	$ 13,673		$ 37,403	$ 12,468			
6	$ 12,769	$ 14,046	$ 15,450		$ 42,265	$ 14,088			
7	$ 14,429	$ 15,872	$ 17,459		$ 47,760	$ 15,920			
8	$ 16,305	$ 17,935	$ 19,729		$ 53,969	$ 17,990			
9	$ 18,424	$ 20,267	$ 22,293		$ 60,985	$ 20,328			
10	$ 20,820	$ 22,901	$ 25,192		$ 68,913	$ 22,971			
16									
17	$ 256,502	$ 282,152	$ 310,367		$ 849,021	$ 283,007			
18	$ 21,375	$ 23,513	$ 25,864		$ 70,752				
19									
20									
21									
22									
23									
24									
25									
26									

Figure 5.3 - A Nonadjacent/ Multiple/ Noncontiguous Range

To select a multiple range with the mouse, hold down the **Ctrl** key and drag each range you want. Do not release the Ctrl key till you are done selecting all the ranges. The upper left cell in the lastly selected range becomes the active cell. As you can see in Figure 5.3, Cell F21 is the active cell.

How to Select Ranges with Mouse

- If you want to select a few entire rows or columns, press the **Ctrl** key and then one by one click the heading of the particular rows and columns. The first cell of the last selected row becomes the active cell.

- If you want to select a range of adjacent rows or columns, hold down the Ctrl key and click the heading of the first row of the desired range. While the Ctrl key is still pressed, click the heading of the other end of the range.

> For Mouse Users: To change the active cell without disturbing the selection, hold down the **Ctrl** key while the selection is still there and click the desired cell to make it active.

How to Select Ranges with Keyboard

- To select an entire region, click over any filled cell in the particular region and press **Ctrl + Shift + Spacebar**
- Likewise, to select an entire worksheet with the keyboard, click over any empty cell on the worksheet and press **Ctrl + Shift + Spacebar**
- To select an entire column, click over any cell in the particular column and hit **Ctrl + Spacebar**
- To select an entire row, click over any cell in the particular row and hit **Shift + Spacebar**
- If you want to select several adjacent rows, select a range that includes cells of all the rows that you want to select then hit **Shift + Spacebar.** Suppose you want to select 'Row 3 to Row 10' in Figure 5.3. To do so, first you need to select at least one cell in each row from 'Row 3 to Row 10'. Next, press **Shift + Spacebar** to select all the desired rows.
- If you want to select several adjacent columns, select a range that includes cells of all the columns that you want to select then hit **Ctrl + Spacebar.** Suppose you want to select 'Column C to Column F' in Figure 5.3. To do so, first you need to select at least one cell in each column from 'Column C to Column F'. Next, press **Ctrl + Spacebar** to select all the desired columns.

> For keyboard users: To change the active cell without losing the selection, hit **Enter** to move down one cell, hit **Shift + Enter** to move

	up one cell, hit **Tab** to move one cell to the right, hit **Shift + Tab** to move one cell to the left.

Refer to Appendix "List of Keyboard Shortcuts" to learn more keyboard shortcuts for some selecting cell(s).

Selecting Multi-sheet Ranges

In addition to contiguous and noncontiguous ranges on the same worksheets, you can select ranges across multiple worksheets as well. Suppose you want to apply a specific formatting in Row1 and Row2 of Sheet 1 and Sheet 3.

Here is how you can do this,

1. Select Row1 and Row2 in Sheet 1
2. Hold down the **Ctrl** key and select the Sheet 3 tab.
3. Select the **Home** tab and apply the desired formatting.

Excel will apply the particular formatting style to all the selected rows. Likewise you can format similarly the columns and ranges in multiple worksheets.

Find and Select

It is not only the regions and ranges that you can select. You can even select on the basis of the type of data in the cells, formatting, comments and several other elements. The Find & Select drop down list at the extreme right of the Home tab contains many helpful selection commands.

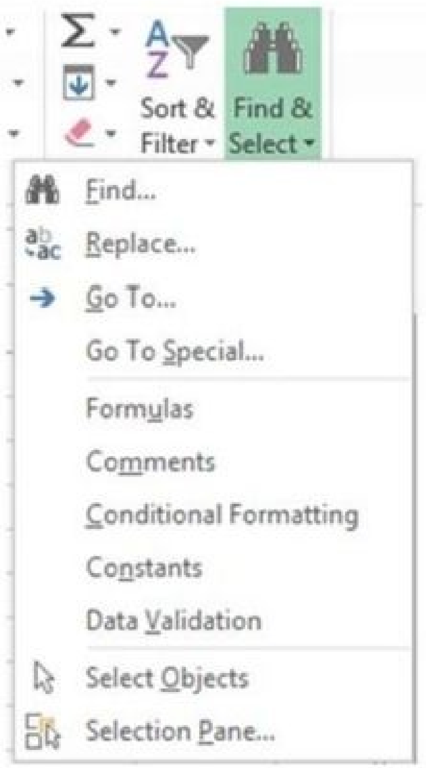


Figure 5.4 - The *Find & Select* Drop Down List

The top two options; namely *Find* and *Replace* works just like the traditional MSOffice

Find and Replace feature. The five commands in the middle, from Formula to Data Validation, are the most commonly used selection commands. They do as their name suggests.

For example, the “Formulas” command selects all the cells containing any formula in them. Likewise, the “Conditional Formatting” command finds and selects all the cells on which there is any sort of Conditional Formatting applied. *More about Conditional Formatting in Chapter 14.*

“Go To” Selection

The “Go To…” command in the Find & Select menu is another very helpful way of selecting different elements in the workbook. The most basic function of this command is that it moves the active cell directly to the desired position. Just open the “Go To” dialog box and enter the name of the cell you want to jump to.

> Hit **F5** or **Ctrl + G** to open the “Go To…” dialog box directly without expanding the ‘Find & Select’ drop down list

Other than the basic active cell selection, the “Go To” command performs the following functions.

1. **It helps you select big range of cells.**

For example, if you click over cell A1, launches the “Go To” dialog box, type G100 and then hit **Shift + Enter** on your keyboard. It will select the range A1:G100.

2. **It helps you go to another worksheet in the same workbook.**

To do so, launch the “Go To” dialog box and type the name of the worksheet you want to move to, followed by an exclamation mark.

Suppose you want to move to Cell G5 of worksheet number 2. Press **F5** on your keyboard to open the ‘Go To’ dialog box and then type **Sheet2!G5**. Hit Enter and this should move the active cell to the desired location.

3. **It helps you go to another worksheet in another workbook.**

If you want to go to another worksheet in any other workbook than the one currently opened, open the Go To dialog box and type in the following format:

[name of the workbook] worksheet!Cell name

For example, to move to cell A1 in worksheet 3 of workbook named Budget list, open the ‘Go To’ dialog box and type in the following command.

‘[Budget list.xlsx]Sheet3’!A1

> As you can see there are single quotation marks enclosing the sheet reference in the above command. You need to put in this if the name of the workbook contains spaces. Conversely, don’t put quotation marks if there are no space(s) in the title of the workbook

“Go To Special” Selection

The “Go To Special” command in the Find & Select menu contains some additional selection options. It is more like the advanced search settings where you can find and select cells that meet exact specifications.

Figure 5.5 - The ‘Go To Special’ Dialog Box

As you can see in the above image, the “Go To Special” dialog box contains some of the

"Go To" command features along with a few more.

After you select any command in the "Go To Special" dialog box, it highlights the cells that meets the specified requirements.

> If you select a range of cells before using any of the "Go To Special" commands, it will highlight the desired cells within the selected range only

Following is a brief description of the "Go To Special" commands.

Comments: It selects the cells containing one or more comments

Constants: This command select cells containing statistical data such as text or numbers; it does not select cells having formulas.

Formulas: It selects all the cells containing the specified type of formula. This selection feature was there in the Find & Select menu as well. Clicking it there selects cells containing any type of formula. The formula command in the "Go To Special" dialog box allows you to be more specific in your selection. You can specify which type of formulas you want to select.

Blank: As the name suggests, it selects all the blank cells within regions.

Current Region: It is another way of selecting the entire region. Click over any cell of the region you want to select then go for the current region command. It will select the entire region.

Current Array: Just like the Current Region command, the Current Array command selects the entire array to which the active cell belongs to.

Objects: This command selects all the graphical objects in your worksheet, regardless of the selected region.

Row Differences and Column Differences: These two options are a bit more advanced but are very useful once you get the hang of it. Also known as the debugging options, these two commands compare the values in the selected range of cells to identify the inconsistencies.

You need to select a range of cells before you go for either of these commands. The active cell serves as the benchmark for comparison.

The Row Differences command compares the cells in the selected range with the cells in the same column as the active cell.

Conversely, the Column Differences command compares the cells in the selected range with the cells in the same row as the active cell.

In either case, it highlights the cells that are not similar to the benchmark cell. For example, if the benchmark cell contains an AVERAGE formula. Excel will select all the cells that contains values and formulas other the AVERAGE formula. Or suppose the benchmark cell is an empty cell. Excel will highlight all the cells in the selected range that are filled.

In simple words, Row Differences and Column Differences commands compare all the cells with the benchmark cell and select all those that do not match it.

Precedents and Dependents: These two commands help you to identify all such cells that either contains a formula or that are linked to any other formula. In other words, Precedents and Dependents select cells that are either dependent on any other cell or vice versa.

The best part about these commands is that they can be used on individual cells also. Suppose there is a formula in Cell G6. To find out the cell upon which this formula depends, click over G6 then select the Precedents command. It will highlight the cell upon which the G6 formula depends.

As you can see in Figure 5.5, there are two sub options of these commands; namely Direct Only and All Levels. By default the first option is selected, whether you go for Precedents or Dependents.

If you select *Direct Only*, Excel will find and highlight cells that directly refer to or are dependent upon active cell.

If you select *All Levels*, Excel will find and highlight cells that are not only directly dependent on the active cell but also that are indirectly linked to it.

If you are stuck in some highly pronged formula and are unable to figure out its precedents or dependents, try the Trace Precedents and Trace Dependents commands in the Formula Tab. Rather than highlighting the linked cells as does the ‘Go To Special’ Commands, the Formula tab commands draws arrows showing the dependents or

	precedents of the selected cell. *More on Trace Precedents and Trace Dependents in Chapter 25*

Last Cell: It selects the lower-right cell in the active area of the worksheet, regardless of the selected region.

Visible Cells Only: As the name suggests, this command exclude the cells in hidden rows and columns from the selected range.

Conditional Formats: This command highlight the cells that have any rules of conditional formatting applied on them. It works the same as the Conditional Formatting Command in the Find & Select menu.

Data Validation: As you can see in Figure 5.5, there are two sub options of the Data Validation Command. If you go by the "All" option, Excel will select all the cells to which any sort of Data Validation is applied to. If you select the "Same" option, it will select the cells containing the same Data Validation rules as the active cell.

The Data Validation command in the Find & Select menu performs the same function as the "All" option explained above. *Refer to Appendix "List of Keyboard Shortcuts" to learn the keyboard shortcuts for some 'Go To Special' commands.*

Chapter 6: What Data Can You Enter?

Excel is not just about numbers. It is about text, graphics, timelines, formulas, special characters and much more. You can work on different types of data that are explained in detail in this chapter. It also tells how to work with special types of numeric values such as Date and Time in Excel. You will be amazed to see how comprehensive and smartly interactive the input system of Excel 2013 is.

Learning the Different Types of Data

An Excel workbook can carry countless number of worksheets and each worksheet contains innumerous cells, 17 billion to be specific. It is these cells that contain all the non-graphical data. The graphical data that includes charts, pictures, buttons and other such objects are contained by the worksheet's invisible draw layer.

The non-graphical data is further divided into three types; namely text, numeric and formula. A cell can hold any of the three types, briefed as follows.

Numeric Data

As the name suggests, numeric data refers to a numeral or any quantity in terms of numbers. It could be the sales revenue, the inventory count, contact number, the test percentage and so on.

> Excel's numeric values and results of formulas are precise up to 15 digits. If you type a large value such as 58,987,654,852,364,759,851 (20 digits), Excel will only display the first 15 digits (589,876,548,523,647), the rest will be replaced by zeros. This normally does not cause much of a problem unless you are entering a card number of any other numeric value that needs to stay as it is.

How to Add Large Numeric Values

If you want to enter numeric values containing more than 15 digits that you do not want to be changed, you need to enter them as text. There are two ways to do that.

1. Before entering the value into the cell, go to **Home** tab and select **Text** from the drop down list located above the *Number* group; as illustrated in the image below.

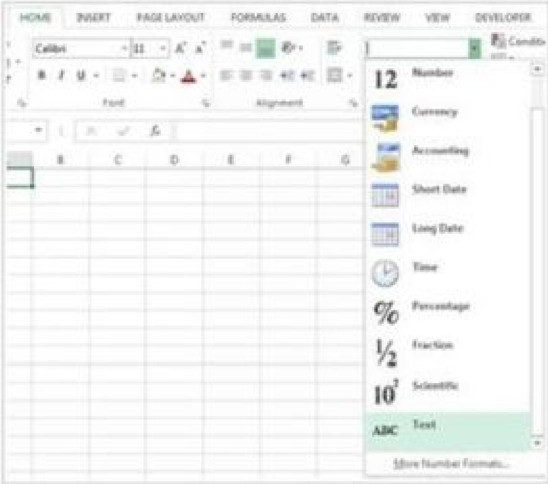


Figure 6.1 - Entering Large Numeric Values As Text

2. Type an apostrophe in the underlying cell followed by the number.

Either ways, the Excel will interpret the value as text and will not make any changes to it.

Apart from precision, Excel also has certain limitations in terms of how large the numeric value can be. The largest positive integer that Excel can hold is **9.9E+307**. Such large numbers are mostly displayed in scientific notations. **9.9E+307** mean “9.9 times 10 to the 307th power”. In other words, “99 pursued by 306 zeros”. Likewise, the largest negative integer that a cell in Excel can hold is **–9.9E+307**.

Text Data

This type of data represents text values such as name of the students, file directory, description of anything and so on.

A text value that starts with a number is considered as text by the Excel. For example, if you enter “50 subjects” in a cell, it will be taken as text by the Excel. As a result, you won’t be able to use this 50 in a formula. To do so, write ‘50’ in one cell and ‘subjects’ in another.

Formulas

Formulas are the core element and primary usage of the spreadsheet. You can maintain a list of employees in Word as well, but you cannot calculate their payroll there.

Excel contains many flexible formulas; by flexible we mean you can modify them as required. You can merge two or more formulas in one cell, change the values and so on. Formulas can use numeric as well as text values. However the latter needs to enclosed in double quotation marks in the formula.

When you enter a formula, the underlying cell displays the results of the formula and not the formula itself. If you want to see the formula or modify it, move to the underlying cell and hit **F2** on your keyboard. You can also view and edit the formula in the formula bar.

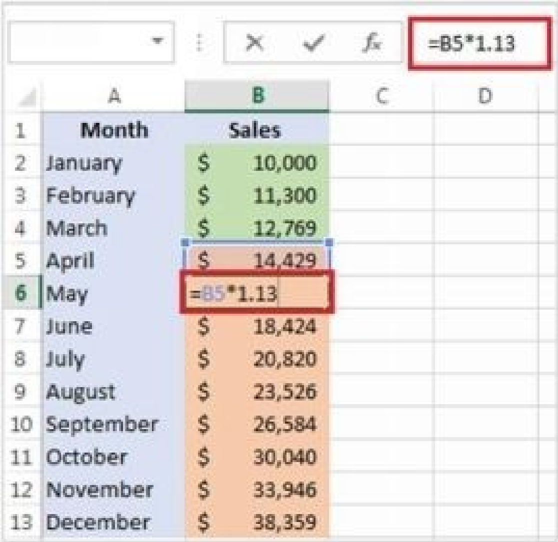


Figure 6.2 - Viewing Formula in the Cell and The Formula Bar

In the above image, the values highlighted in blue are Text values. The green ones are numeric values and the orange cells contain formulas. Apparently it looks like the orange cell contains numeric data, however these are the results of the formula. In Figure 6.2, when the active cell was moved to one of the formula cell (B6) and F2 was pressed, it displayed the formula in the underlying cell. As you can see, the same formula also appears in the formula bar.

Working with Numeric Data

In the previous section, we talked about the different types of values that you can enter in Excel. Now let's explore the techniques for entering those values.

If you want to enter a numeric value into any cell, click over the underlying cell and type in the value. Hit **Enter** or move to any other cell. The value that you enter in a cell will also appear in the formula bar when the appropriate cell is selected.

You can enter any integer, currency, decimal points or any other type numeric value. You can also change the format after entering any number. For example, if you enter 1000 and then wants to change it to currency form, you can do so by selecting the appropriate currency from the currency drop down list in the Home tab. You can increase or decrease decimal points and also add commas to separate thousands. Learn more about number formatting in Chapter 8.

	If you want to enter a negative integer, precede the number with a minus sign or enclose it in parentheses ( ).

Working with Text Data

Just like Excel displays the numeric value of a cell in the formula bar, so it does the text value. But if the text value is exceptionally long, the formula bar displays a part of it unless you increase its area.

There are two ways to expand the formula bar and view the full text in it.

1. Take the cursor to the bottom edge of the formula bar and drag it down, as shown below.

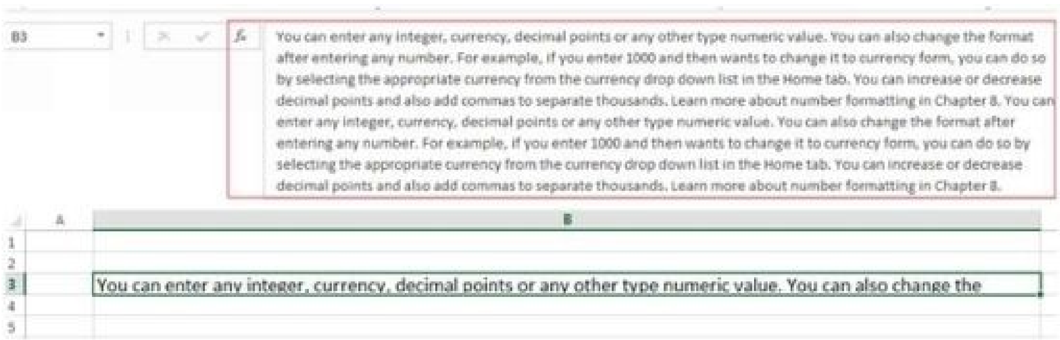


Figure 6.3 - Increased Height of the Formula Bar

2. Hit **Ctrl + Shift + U** to toggle the height of the formula bar. In order to use this shortcut, you need to expand the formula bar at least once using the first method. This keyboard combination will then expand the formula bar to the previous height or to single row-default size.

You can enlarge the formula bar to view the full text but what happens to the corresponding column? When you enter a text value that takes up more space than the column width, either of the two things may happen.

1. If the cell right next to the text-containing cell is filled, Excel will display the text

only as much as it fits in the pertinent column.

2. If the adjacent cells are empty, Excel will split the display into the adjoining cells. Remember that it is only the display of the text that is expanded to adjacent cells. The value itself resides in one cell only. So if you want to make any changes in the text, you need to click the underlying cell to do it. The adjacent cells just contain the display and not the value, actually they are still empty.

So what if the adjacent cells are not empty and still you need to display the entire text. Well, here are a couple of things that you can try.

- Decrease the size of the font.
- Wrap the text into multiple lines within the same cell. The *Wrap Text* command can be found in the *Alignment* group of the Home tab.
- If possible, edit the text to make it shorter.
- Increase the width of the column. You can do so by right clicking the underlying column and manually entering the desired width. Or you can drag the edge of the column to expand it.

Working With Special Numeric Data

Date and time values are a subtype of numeric data. Excel considers them as special numeric values that are formatted in accordance with the standard date and time pattern, unless specified otherwise.

If you want to enter date or time in any cell, you need to understand the Excel's mechanism in this regard.

First we will talk about Excel's date management system which is based on serial numbers. The earliest date that Excel recognizes is January 1, 1900. It carries a serial number "1". Likewise January 1, 1900 has a serial number "2" and so on.

Now you don't have to learn all these serial numbers. This mechanism helps Excel interpret dates in formulas. You just need to enter the desired date in the standard date format.

The default date format of Excel depends upon the regional date settings of your computer. For example, if the regional date format of your computer is (Day/Month/Year), then you need to follow the same pattern when typing in the date in any cell.

> You can change the date pattern in Excel without disturbing your computer’s date settings. To do so, right click the appropriate cell and select **Format Cells** > **Date**.

Just like the date system, the time system of Excel is also based on serial numbers. This one however is in decimals. For example, the serial number for noon (half day) is **0.5**. Again you don’t need to get in much detail about these serial numbers. Just enter the desired time into the cell in the recognized format. You can change the time format settings by right clicking the appropriate cell and selecting **Format Cells** > **Time**.

Refer to Chapter 19 to learn more about Date and Time formatting and formulas.

Chapter 7: Working a Worksheet

Entering, editing, undoing and deleting data are the core activities of every spreadsheet you make. Whether you make a payroll system on Excel, generate graphs and charts or do VBA programming, whatever you do on Excel requires you to enter the relevant data, format and edit it and delete the wrong entries.

The preceding chapter has already covered the basics of data entry. This chapter talks about the editing and deleting part. It also contains some practical and efficient data entry tips. This may seem a basic chapter to some of you. However you might find a better or quicker way of doing something in Excel that you do frequently.

Editing Entries

> This section talks about the editing of values in a cell. You can also edit the formatting of the cells (explained in the upcoming chapters). Editing the value does not affect the formatting and vice versa.

There are several ways of editing values, depending upon the length and nature of data. If the cell contains a few words or numbers or a simple formula, you can easily overwrite it. Just move to the underlying cell and type in the new value. This strategy however is not recommended if the cell contains lengthy text or a complicated formula.

In case where overwriting the data is not feasible or may take up a lot of time, you may want to consider editing it.

To do so, just select the cell and then make the changes in the Formula bar. What edits you do in the formula bar will simultaneously update in the corresponding cell. Now many users don't like to edit in the Formula bar. They rather prefer to make the changes directly in the cell. If you want to edit this way, just move to the appropriate cell and hit **F2**. For mouse users, double click the underlying cell and make the changes.

> If you want to edit in the cell directly, make sure it is enabled in the Excel options. To do so, select **File** > **Options** > **Advanced**. There you will an "Allow Editing Directly in Cells" option. Make sure the corresponding box is check marked.

Whenever a cell is in the edit mode, you will notice that the two icons (X and) in the formula bar are activated. These are illustrated in Figure 7.1.

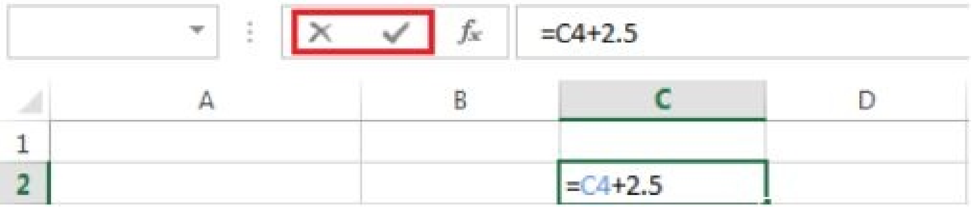


Figure 7.1 - Two icons in the Formula Bar

Clicking “**X”** will close the edit mode without accepting the changes made in the cell. The keyboard shortcut for this tool is **Esc**

Clicking **“ ”** will accept the changes and then close the editing mode. You can also hit **Enter** on your keyboard to do this.

Deleting Entries

If you want to delete any entry, just click over the cell and hit the **Delete** key on your keyboard. To delete more than one cell, select the range of cells you want to get rid of and then press **Delete**. This method however deletes the content of the cell only. It does not clear the formatting.

For advanced deleting options, select the Home tab and click the *Clear* drop down list. It is the small pink tilted eraser like icon located in the Editing group of the Home tab, as shown in the image below.

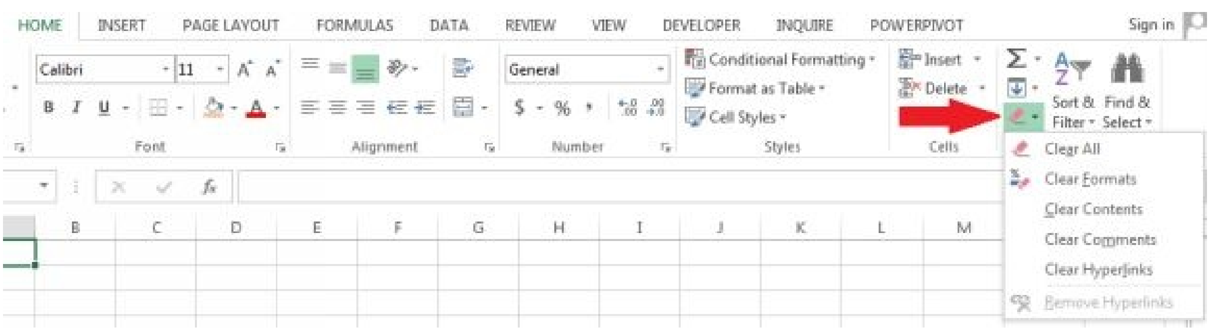


Figure 7.2 - The ‘Clear’ Drop Down List

As you can see, this list contains six options.

Clear All clears everything contained within the cell. This includes the value, formatting, comments, hyperlinks and any other objects.

Clear Formats clears only the formatting, leaving behind the content untouched. .

Clear Contents deletes the content only. It does not disturb the formatting. Pressing the

Delete key on the keyboard gives the same effect.

Clear Comments deletes the comment, if there is any attached to the selected cell.

Clear Hyperlinks removes the hyperlink leaving behind the content. It does not delete the value in the cell, just takes away its hyperlink. The formatting is also untouched.

Remove Hyperlinks works similar to the *Clear Hyperlinks* command. However it removes the formatting of the cell as well.

Playing with Special Characters

Minus, plus, parentheses, comma and few characters are considered as special values by Excel. Entering them with numeric values changes the nature of the content.

Following are some brief guidelines on how Excel interprets special characters.

If you want to enter a formula, it must begin with an equals (=) sign or else Excel will consider it as plain numeric or text value.

A plus sign has no value for Excel if entered before a numeric value. However if a formula is preceded by a plus sign, it is equivalent to the equals (=) sign.

You can enter commas to separate thousands in numeric values, however they do not appear in the edit more. For example, 2,543,415 would display as 2543415 in the formula bar.

'E' or 'e' in numeric values represents the exponent of scientific notation. To enter a positive exponential number, put a plus sign (+) after 'E'. For example, 3E+5 means 300,000. Likewise if you want to enter a negative exponential number, put a minus (-) sign after 'E'. For example, 3E–5 means 0.00003.

If you enter a dollar sign ($) followed by the numeric value, it will automatically be converted into the currency format, containing the dollar sign and comma separators.

Numeric entries that are preceded by a minus sign (-) or those enclosed in parentheses are considered as negative values by Excel.

If you enter slash (/) between numbers, it will be converted into the Date format by Excel. For example, if you enter 5/13 then depending upon the regional date settings of your computer, Excel will either convert this value into 13-May or May

2013.

Slash (/) can also be used to display a fraction, however to make sure that Excel does not interpret the slash (/) as a date, put a space between the number and the fraction. For example, **32 4/9**. As you can see, there is a space between **32 and 4/9**. This way it won’t be considered as a date by Excel.

> If you want to enter a fraction without any number, begin with a zero and a space. For example, if you want to enter 5/10 as a fraction then type in **0 5/10** in the appropriate cell. This way it won’t be considered as 10th May by Excel.

Some Valuable Data Entry Tips

When working on large data and spreadsheets, data entry may get boring. Here are a few more tips that will make data entry quicker and interesting for you.

Settings for Moving Active Cell

When you press **Enter** on your keyboard, the current cell automatically moves down one cell. If you want to change this setting, select File > Options > Advanced. There the first checkbox is **After Pressing Enter, Move Selection**, followed by a Direction drop down list containing Down, Right, Up and Left; as shown in the image below.

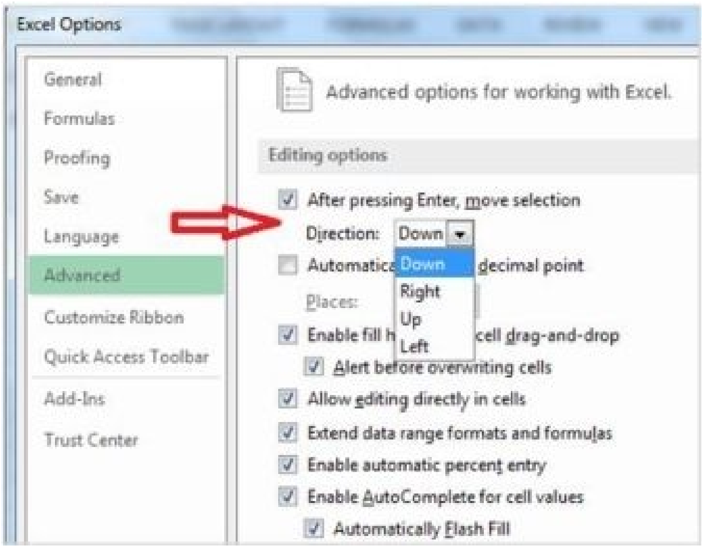
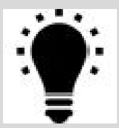


Figure 7.3 - Settings for Moving Active Cell

Make sure the checkbox is marked and then select the desired direction. For example, if you select **Right**, then the next time you hit **Enter** on your keyboard, the current cell will move one cell to the right.



You can also keep this option turned off and instead use the arrow keys on your keyboard to move the active cell in the corresponding direction.

Magical Trick to Enter Decimal Points

When you need to fill large spreadsheets with numeric data that contains decimal points at fixed places, you can use the Auto Decimal feature of Excel that inserts a decimal point automatically in every numeric value you enter.

To use this tool,

1. Select **File** > **Options** > **Advanced**
2. There on the second number you will find a checkbox labeled **Automatically Insert a Decimal Point**. This option is unchecked by default.
3. Tick this checkbox and enter the number of places at which you want the decimal point to be, as shown in Figure 7.4.
4. Click **OK**
5. Now go back to your worksheet and start entering the numeric values. If you selected two decimal places in the settings, entering 98756 into a cell will convert into 987.56. Likewise whatever value you enter will contain a decimal point before two places.
6. Once you are done entering the decimal values, go back to the **Advanced** settings and unmark the **Automatically Insert a Decimal Point** checkbox. Don't worry, reverting the settings won't affect your decimal values. The ones that you entered while the Auto Decimal feature was activated will stay as is with decimal points.

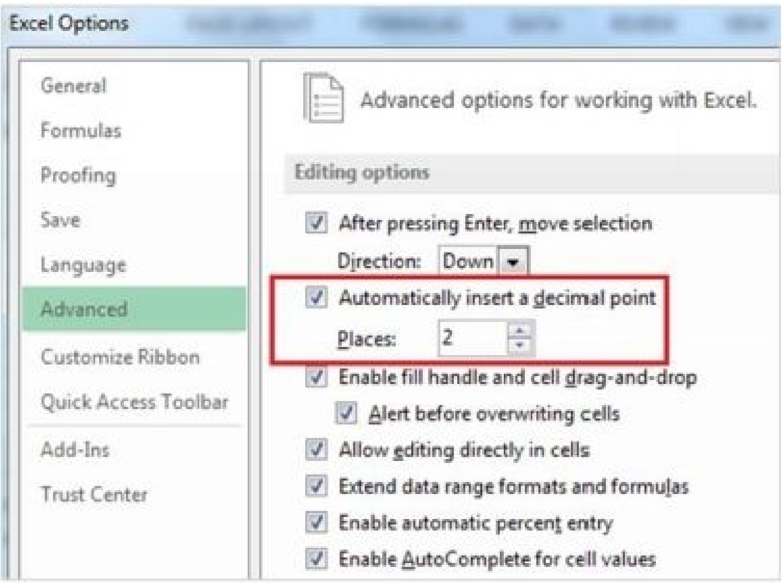


Figure 7.4 - Activating the Auto Decimal Feature

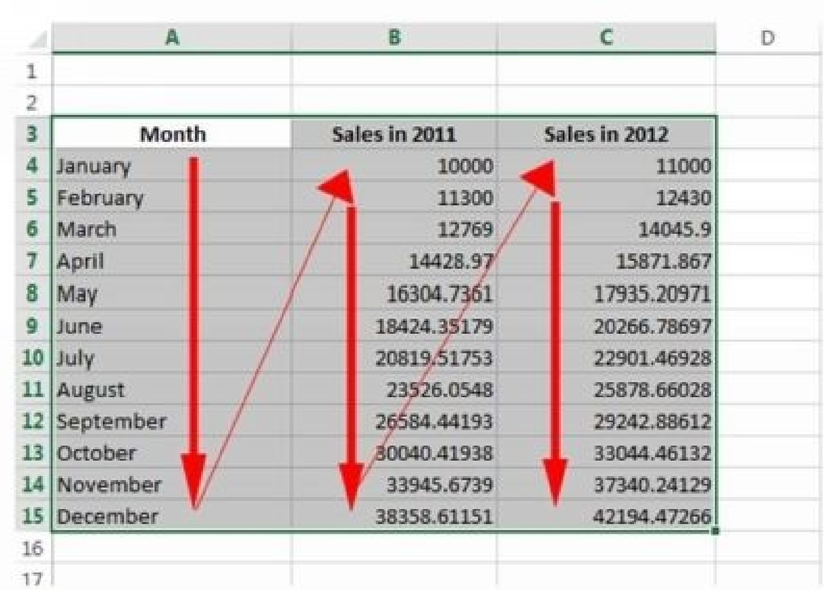
Make sure you deactivate the Auto Decimal feature as soon as you are done using it as it applies to all the workbooks saved in your computer rather than the one currently opened. If you forgot to turn off the feature and start working on any other workbook, it may

	cause confusion and mess up the entire data

Moving Active Cell within a Range

If you want to edit a specific range of cells, it is recommended to select it first before making any entries in any cell. Doing so will restrict the active cell within the selected range.

If you select a specified range of cells and then press Enter, the active cell will move to the next cell within the range. When it will reach the last cell in the first column of the selected range, it will jump to the first cell of the next row and so on.



	A	B	C	D
1				
2				
3	Month	Sales in 2011	Sales in 2012	
4	January	10000	11000	
5	February	11300	12430	
6	March	12769	14045.9	
7	April	14428.97	15871.867	
8	May	16304.7361	17935.20971	
9	June	18424.35179	20266.78697	
10	July	20819.51753	22901.46928	
11	August	23526.0548	25878.66028	
12	September	26584.44193	29242.88612	
13	October	30040.41938	33044.46132	
14	November	33945.6739	37340.24129	
15	December	38358.61151	42194.47266	
16				
17				

Figure 7.5 - Movement Pattern of the Active Cell within the Selected Range

Figure 7.5 shows how active cell moves within a selected region. When the active cell reaches the last cell in the selected range, which is Cell C15 in the above image, it goes back to the first cell of the underlying range on pressing another Enter. No matter how many times you press enter, the active cell will roam within the selected range, unless you click outside the range or hit any navigation key.

To move back a cell, hit **Shift + Enter**.

Entering Same Value in Multiple Cells

If you want to enter the same value in more than one cell, there are three ways to do that.

1. You can copy the value and paste it individually in all the desired cells. However this way of copying data is not feasible when you are working on large spreadsheets and needs to copy the same value in hundreds of cells.
2. Another way is to enter the value in one cell, then take the cursor to the bottom

right edge of the underlying cell and click and drag it to the desired number of cells. This method is appropriate for copying data in adjacent ranges and consecutive cells. You cannot drag the same value into a noncontiguous range or cells located apart one another.

3. The third and best way to copy a value into multiple cells is **Ctrl + Enter**. First, select the range of empty cells where you want to enter the same value. By default, the active cell will be the first cell of the selected range. Do not click anywhere else, just select the range, enter the value and then hit **Ctrl + Enter** on your keyboard. This should insert the same value into all the cells of the selected range.

Let AutoFill Do Your Work

AutoFill is one of the most handy and popular feature of Excel. It helps you to fill data in a series of cells. It uses the AutoFill handle to do this.

AutoFill handle is a small box located at the lower right edge of the active cell, as shown in Figure 7.6

The AutoFill feature is pretty easy to use. All you have to do is click and AutoFill handle and drag it to copy the value in the active cell to the desired series of cell. Take a look at the Figure 7.6

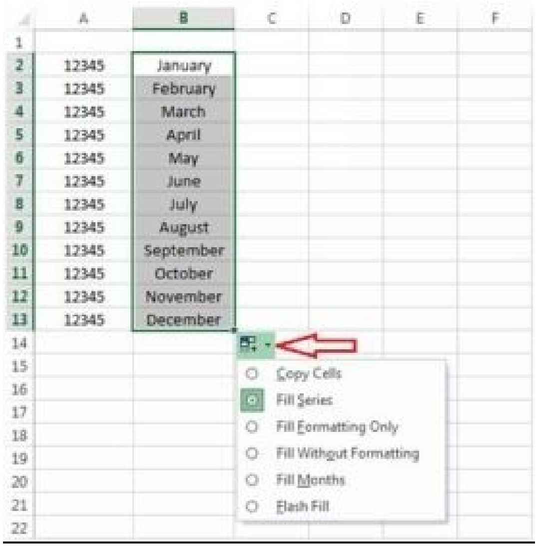


Figure 7.6 - The AutoFill Feature and the Additional AutoFill Options

In this image, a numeric value 12345 is entered in Cell A2. When the AutoFill handle of this cell was dragged below, the same value was copied in all the cells up to which the handle was dragged to. This tool can be used to copy text values and formulas as well.

AutoFill handle does not only copy the same value. It fills a consecutive pattern of series as well. In Figure 7.6, the first two months were entered manually in Cell B2 and B3. Then both these cells were selected and their combined AutoFill handle was dragged to complete the series of months.

> If the AutoFill handle is not visible on your worksheet, it may be turned off. To turn on the AutoFill handle, Select **File** > **Options** > **Advanced**. There you will find a checkbox labeled **Enable Fill Handle and cell drag-and-drop**. Place a tick mark next to this check box to enable the AutoFill handle.

In Figure 7.6, there is a small box pointed by the red arrow. This box appears when you drag the AutoFill handle. Clicking this will open up additional AutoFill options such as Copy Cells, Fill Formatting Only, Fill without Formatting and so on. All the options are self explanatory. For example if you just want to copy the formatting of active cell and not the value itself, click **Fill Formatting Only**. Likewise clicking **Copy Cells** will copy the value as well the formatting in the dragged upon cells.

Adding a Line Break

If you want to enter a lengthy text value in a cell but do not want it to take up too much of the column width, you can add a Line Break. It will break the text up into multiple lines within the same cell.

To enter a Line Break, press **Alt + Enter**. Doing so will add another line in the same cell. You can enter a line break after you have entered the value or while entering.

> When you enter a Line Break, Excel automatically converts the underlying cell's formatting into Wrap Text. However unlike normal text wrap the one that you do by clicking the Wrap Text icon in the Home tab, this one gives you control over where you want to add the Line Break.

If you want to remove a Line Break, bring the cell into the edit mode and go to the insertion point of the particular Line Break, then hit **Delete** on your keyboard. The text that was there after the line break will move up along the preceding text.

Automating the Data Entry

AutoComplete is another very helpful feature of Excel. It automates the data entry by remembering your entries and then inserting the same text in multiple cells.

Suppose you entered the word **Company** in a cell. Excel remembers it. As soon as you will enter **Co** in the any other cell, Excel will offer to fill in **Company** there. If it is the same word that you want to insert, just hit **Enter**.

If there are several words that start with Co and the word offered by Excel is not the one you are looking for, right click the cell and select **Pick From Drop-down List**. This will attach a drop down list to the underlying cell containing all the words starting with **Co** that you have at sometime entered in the same worksheet

You can turn off the AutoComplete feature by selecting **File** > **Options** > **Advanced**. Unmark the checkbox **Enable AutoComplete for cell values.**

Refer to Chapter 17 to learn more about the handy AutoComplete Feature.

Creating Your Own Shortcuts

Just like the AutoFill and AutoComplete, the AutoCorrect feature of Excel is another very handy tool. It allows you to create shortcuts for words that you commonly use, so that you don't have to type them again and again.

For example, if you are making a spreadsheet or Excel based report on different types of "environment friendly colorful plastic bags" and you need to type this phrase frequently, you can create an AutoCorrect shortcut such as "efb" or "env" or any other abbreviation that you can easily remember. Suppose you created **env**. Now whenever you type **env** in any of the cell, the AutoCorrect feature will automatically change it into **environment friendly colorful plastic bags**.

To setup your own AutoCorrect shortcuts:

1. Select **File** > **Options** > **Proofing**
2. There you will see the **AutoCorrect Options** button. Click it to open the AutoCorrect dialog box; as shown in Figure 7.7.
3. Make sure the “**Replace Text as You Type checkbox**” is marked.
4. Enter the original word in the **Replace** box and its desired shortcut in the **With** box. Figure 7.7 illustrates the example discussed above. Likewise you can create as many shortcut entries as you want.

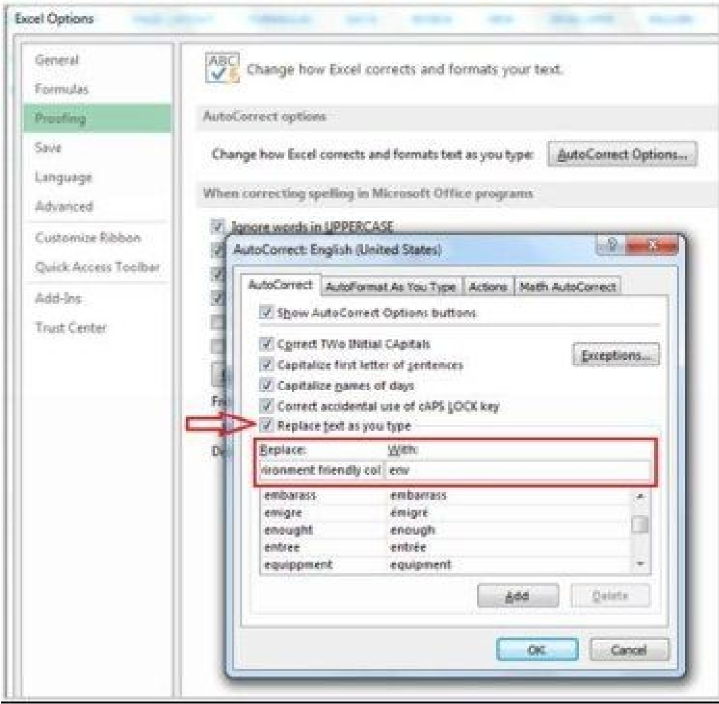


Figure 7.7 - Creating A Shortcut Entry Using The Autocorrect Feature

The AutoCorrect entries are applied to all the Microsoft Office Applications. It means whatever shortcuts you create in Excel will work in MS Word and other MSOffice apps as well, and vice versa.

Refer to Appendix “List of Keyboard Shortcuts” to learn the keyboard shortcuts for Data Entry.

Chapter 8: The Magical Number Formatting

Formatting is of numerous types; changing fonts, adding colors, shading, borders and so on, all this comes under formatting. However there is one more type of formatting that is exclusive to Microsoft Excel only and that is number formatting. While more about number formatting is explained in the upcoming headings, it simply refers to changing the appearance of the numbers in the cells.

This chapter explains in detail the concept of number formatting. It covers the categories of number formatting, different methods of formatting numbers and some handy shortcuts as well.

What Is Number Formatting?

As just mentioned, Number Formatting is the process of modifying the appearance of numeric values. By appearance we mean comma separators, decimal points, percentage sign, currency symbols and so on. The purpose of all this is to make the values more understandable.

> Number formatting just changes the look of the cells. It does not affect the actual underlying values.

When you enter any numeric values in Excel, they are unformatted by default. They represent nothing but a simple string of numbers. There are countless ways in which you can format them, as explained in the upcoming section.

Get To Know the Main Formatting Categories

The innumerous ways of Number Formatting are classified into several categories, as briefed below.

General: Every numeric value that you enter in a cell carries a general format by default. Normally, it refers to the plain string of numerals. However if the number is too large, the general format is automatically converted into the scientific notation.

Number: This category of format is mostly used to display precise values and decimal points. The Number Format also contains the option to add comma to separate thousands. Another very interesting thing about this format is its red coloring of negative values. In other words, if you enter any negative values or values enclosed in parentheses and then apply number formatting to it, all the negative values will turn red.

Currency: As the name suggests, this format is used to display monetary values. Just like the number format, this one also contains the decimal, thousand separator and negative value-red color option.

Accounting: It is similar to the currency format. The only difference between the two is that the Accounting format lines up the currency symbols and decimal points in a column.

Date: This format turns the underlying values into the default date format. The best thing about this format is that it allows you to select your native date format; as shown in Figure 8.1

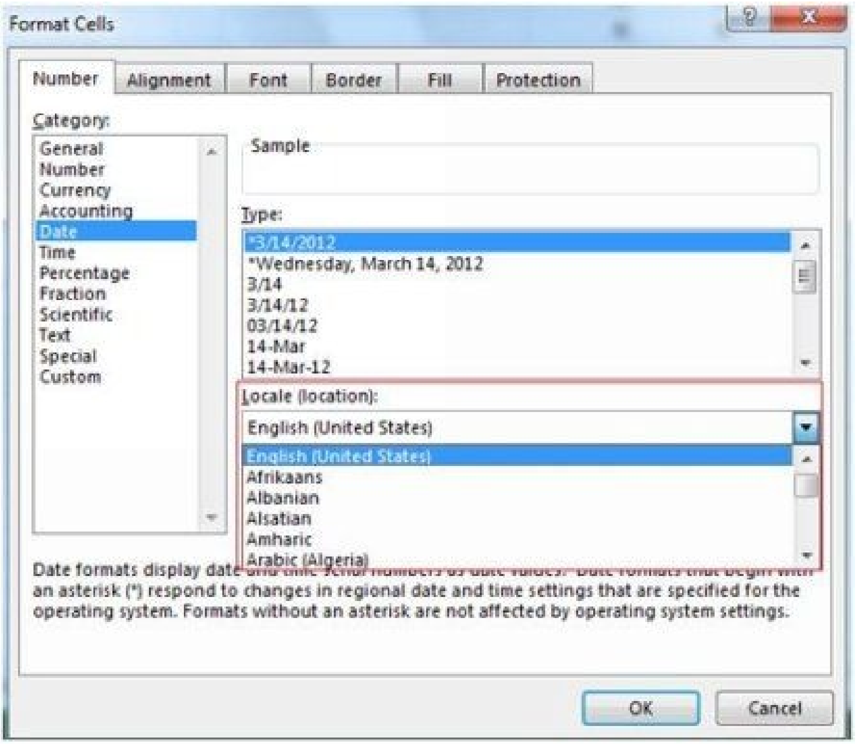


Figure 8.1 - Selecting the Location and Regional Date Format

Time: This format is used to represent time values. Just like the Date format, this one offers options to select your country based recognized date format

Fraction: It allows you to select from nine different fraction based formats.

Percentage: If this format is applied before entering a value, it will put a percentage sign in front of any value you enter in the selected cells. It also contains the option to determine decimal places.

	It is highly recommended that you apply the percentage formatting before entering the values. If done afterwards, it will multiply all the

	underlying values with 100 and then put a percentage sign with them. For example, if you enter 80 in a cell and then apply Percentage formatting to it, it will change the value to 8000%. On the other hand, if you would have changed the formatting beforehand, 80 would have become 80% and nothing more!

Scientific: Applying this format will change the value into scientific notations. For example if you enter 500,000 and then apply this formatting, it will convert the value into exponential form (5.00E+0.5)

Text: This format is used to display the numeric values as text. Excel's numeric values are precise up to only 15 digits. If a value contains more digits, the numerals after the 15th digit are replaced by zeros. So if you want to enter a numeric value containing more than 15 digits that need to stay as it is, apply Text formatting to the appropriate cell and then enter the value in it.

This format is mostly used to enter credit card numbers and other such values.

Special: This category contains four additional formats, including Zip Code, Zip Code +4, Phone Number, and Social Security Number.

	The four formats are only available for some particular locations. If it does not appear in your location, just change the location to English (United States) and all the four formats will appear in the dialog box, as shown in Figure 8.2.

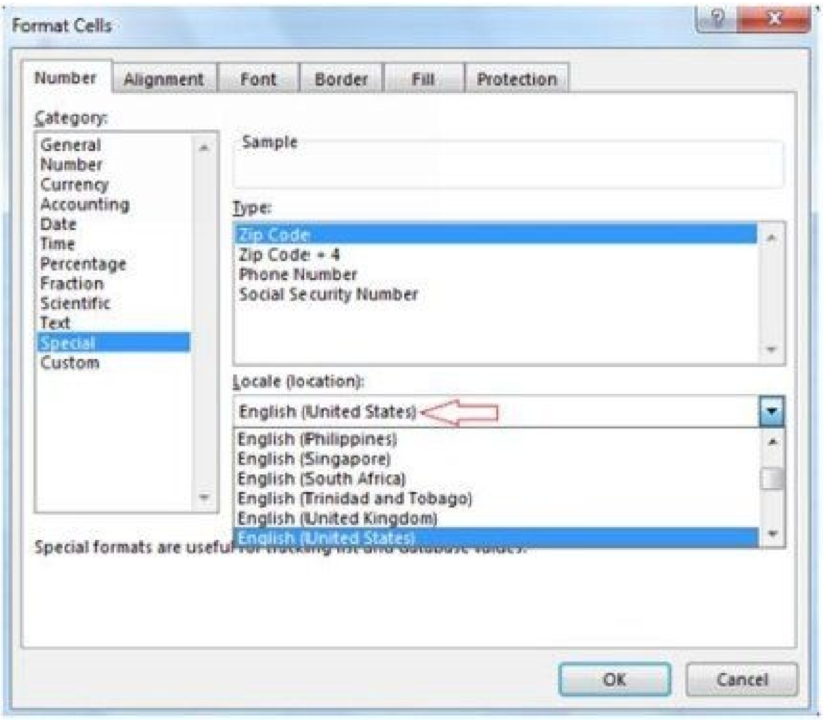


Figure 8.2 - Four Types of Special Formats

Custom: This option allows you to create your own number formats that are not available in any other category. C*ustomized number formatting is explained in detail later on in this chapter.*

When a cell is in edit mode, it displays the value in the unformatted state. Same is with formula bar. It shows the value in is unformatted form. However this rule does not apply to date, time and percentage format. Once you apply any of the three mentioned formats, the resulting value will appear this way in the edit mode as well as the formula bar.

Different Ways of Number Formatting

Now that you know the different types of formatting that you can apply on numeric values, let's see how you can actually perform Number Formatting in Excel.

Make sure you select a cell or range of cells before applying any type of formatting to it. The formatting that you apply works on the selected cell(s) only. It is not applied on all the cells in the worksheet, unless you select the entire worksheet and then apply the desired formatting style.

Excel’s Smart Auto Number Formatting

There are several ways of doing number formatting, the easiest one of which is by using Excel’s built-in Auto Number Formatting feature. When you enter any value, Excel tries to identify its nature and formats accordingly. For example, if you enter 15.8 and then hit the % key on your keyboard, Excel will automatically change it into percentage formatting. Likewise if you precede a value with a dollar sign ($), Excel will convert it into the currency format and add commas and decimal points to it.

If you are entering numeric values and yet your values are not automatically turning into the percentage format, select **Home** > **Options** > **Advanced**. Locate the checkbox labeled as **Enable Automatic Percent Entry** and put a tick mark in it.

Handy Shortcuts for Number Formatting

Shortcuts always make ones work easy and fun. And like every other feature, there are keyboard shortcuts for number formatting as well.

The most commonly used shortcuts for Number Formatting are as follows.

Keyboard Shortcut	Description
Ctrl + Shift + ~	Apply the General Format
Ctrl + Shift + $	Apply the Currency Format with two decimal places
Ctrl + Shift + %	Apply the Percentage Format
Ctrl + Shift + !	Add two decimal places, commas and minus sign (-) for negative values

Table 8.1 - Common Keyboard Shortcuts for Number Formatting

However these are not the only ones. *Refer to Appendix for the complete list of Number Formatting shortcuts.*

Number Formatting Via Ribbon

The Home Tab in the Ribbon also contains the frequently used number formatting commands. You will find them in the Number group of the Home tab, as shown in the image below.

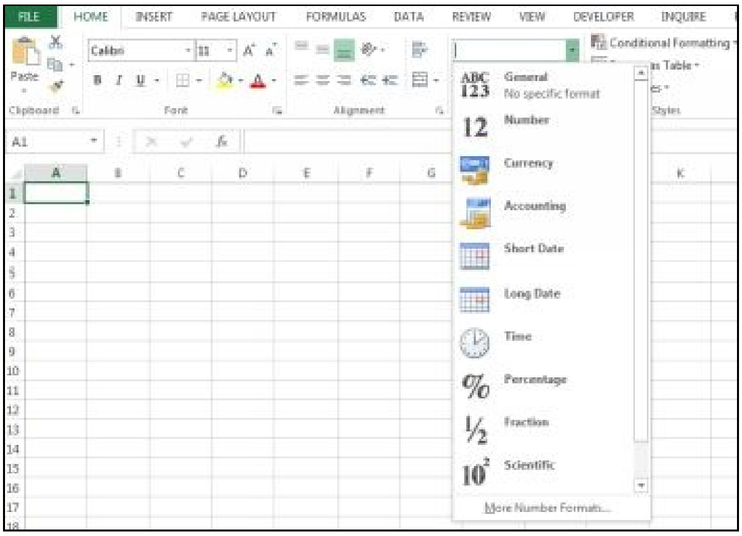


Figure 8.3 - Number Formatting Commands in the Home Tab

This drop-down list contains 11 number formats. However as you already know, these are not all the type of formats available in Excel. So if you could not find your required number format here, click **More Number Formats** located at the bottom of this drop-drown list.

Just beneath this drop-down list, there are icons for the five most commonly used number formats, as shown in Figure 8.4

Figure 8.4 - Icons for the Five Commonly Used Number Formatting Commands

Starting from the left in the above image, the icons are for currency, percentage, thousand separator, increase decimal and decrease decimal. If you want to apply any of the mentioned formats, just select the underlying cell(s) and click the respective icon. You can apply formatting before as well as after entering the values. However the former is highly recommended in case of percentage format.

Exploring the Comprehensive Format Cells Dialog Box

The drop-down list in the ribbon and the shortcuts do not contain all the Number Formatting options Excel has to offer. The Format Cells dialog box is right place for it.

There are four ways to launch the Format Cells Dialog box, as explained below.

1. Right click the selected cell(s) and then select **Format Cells**.
2. Press **Ctrl + 1** on your keyboard
3. Click the small downward diagonal arrow located at the bottom right corner of the Number group in the Home tab.
4. Open the Number Format drop-down list in the Number group in the Home tab, then click **More Number Formats** located at the bottom of the list.

> Make sure to select the cell or range of cells in which you want to apply the formatting before opening the Format Cells dialog box through any of the ways.

In the *Format Cell* dialog box, all the formatting categories are listed on the left hand side. Click a category to open its sub-options. At the bottom of the dialog box is the brief description of the format category that you select.

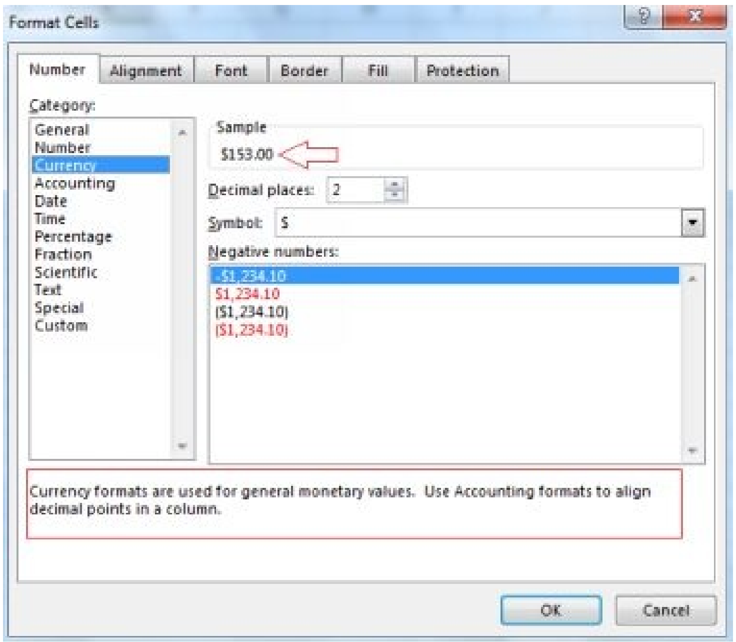


Figure 8.5 - The Format Cells Dialog Box

The value beneath **Sample** shows how your selected value will look like after applying the particular formatting. You can scroll up and down and check different formats till you find the one you are looking for. Click **OK** once you are done selecting the desired format.

Custom Number Formatting

The number formats of Excel are very comprehensive and elaborate. You will find a built-in format of almost every type you need. These are also pretty easy to use. So try to find the one you are looking for in the already available ones. In case if you are unable to find one, you can always create your own format.

> Custom number formats are saved only in the workbook in which you create them. To copy your custom formats to any other workbook, copy the cell carrying the particular custom format and then paste it to the appropriate cell in the other workbook.

Learning the Custom Format Language

Custom number formatting is a bit complex. It has its own set of codes and symbols that you need to understand before you try making a format of your own.

0 (zero)

Known as the Digit Placeholder, this symbol makes sure that the specified number of digits are displayed in the underlying value. Now there could be either of the two scenarios.

1. If a numeric value has lesser digits than the number of zeros specified in the format, then this digital placeholder displays the insignificant zeros. For example, if you create a format 0.00 and the value is 0.58, it will be displayed as 0.58. On the other hand if the format is 0.0000 and the value is still 0.58, then it will be displayed as 0.5800.

2. Conversely, if a numeric value has more digits than the number of zeros specified in the format, it rounds of the value. For example if the format is 0.00 and the value is 0.587, it will be displayed as 0.59. Likewise if the format is 0.0 and the value is 0.587, then the value will be displayed as 0.6

In short, the purpose of the 0 digit placeholder is to equate the number of digits in a value to the number of zeros in the format.

?

Also known as the Digit Placeholder, this symbol hides insignificant values and displays only the main value. Moreover, this placeholder ensures that the values are aligned on the decimal points. For example, if there are three values (**1.25, 1.2** and **1.229**) and all three are formatted **0.???**, then they will be aligned as **1.2**, **1.25** and **1.229** on the worksheet.

You can use this digit placeholder for fractions that have varying numbers of digits. This symbol will not only eliminate the extra insignificant zeros in individual values but will also align them in terms of their decimal points.

#

This is another Digit Placeholder. It works almost like the 0 (zero) placeholder except that is does not display the insignificant zeros if the value has lesser digits than the number of # specified in the format. You can also put thousand separators in this symbol. For example, **#,###** means that Excel should put a comma after every third digit to the left side of the decimal point.

. (Decimal Point)

It works just like a normal decimal point. You can place it in your customized format to determine how many digits you want to the left and right of the decimal point.

%

Known as the percentage indicator, this symbol multiples the underlying value by 100 and place a % sign next to it.

, (comma)

The basic usage of this symbol is to place thousand separators in the numeric values. However you can also use comma to round a value. If you place one comma at the end of a format, it will round of the underlying value and will display it in thousands. Likewise, if you place two commas at the end of a format, it will round up the value to the nearest million.

$ – + ( ) space

Add any of these characters in your formula to display them in the value. The character will be placed at the same position where you entered it in your formula.

\

Just like the previous symbols, a backslash helps you to display characters in the value. For example, if a cell is formatted with **###\P**, the value in the formatted cell will contain a **P** with it. The backslash is not displayed in the cell.

Do not use a backslash to display any of these characters: **$ – + ( ) space**. Just put them as it is in the formula to make them appear in the pertinent cell.

“Text”

It works just like backslash except for the fact that it displays all the text within the quotation marks rather than just one character. For example if you want to display USD in a cell after a numeric value, you can format it with **###“USD”**. You can also perform the same function with a backslash but in that case you would have to put a backslash before each character, for example, **###\U\S\D**

/

This Fraction Format symbol is used to display a number in a fraction format.

Just like the decimal places precision, you can also determine the accuracy of a fraction value. For example, if 0.415 is formatted with **# ?/?**, it will be displayed as 2/5. However if you format the same value with **# ???/???** then it will be displayed as 83/200

[color]

It displays the characters in the specified color.

[Color n]

It displays the data entries in **n** color where **n** is the number of color in Excel’s color palette. It could be anywhere in between 0 – 56.

*** (asterisk)**

This is the repetition indicator. It repeats the next character in the format as many times as required to fill the column width. You can put only one asterisk per format.

_ (underscore)

This symbol is used for alignment purposes. It puts space equal to the width of the next character in the format.

@

This is a text placeholder. If a cell contains a text value and is formatted with this symbol, it will display the text in the position where **@** stands in the format. For example, if a cell contains Paul and is formatted with **“My Name is”@**, it displays as **My Name is Paul** in the underlying cell. Text placeholder is very helpful in cases when you need to display the same text in every cell with just one word difference. You can put the same text in the format and the different words in the formatted cells.

E– E+ e– e+ (Exponents)

If a format contains either of these symbols, it will display the value in the scientific notation format. The number of digit placeholders at the right side of **E** or **e** determines the minimum digits in the notation**. E-** and **e-** displays a minus sign before negative exponential values, whereas **E+** and **e+** recognizes the nature of the exponent and displays a plus or minus accordingly.

Codes for Creating Date and Time Custom Formats

You can create custom formats for date and time values as well. But for that you need to learn a different set of codes.

Code	Description
d	Display the day number without leading zeros (1 - 31)
dd	Display the day number with leading zeros (01 - 31)
ddd	Display the day of the week as an abbreviation (Sun - Sat)
dddd	Display the full name of the day (Sunday - Saturday)
m	Display the month number without leading zeros (1 - 31)
mm	Display the month number with leading zeros (01 - 31)
mmm	Display the name of the month in abbreviated form (Jan - Dec)
mmmm	Display the full name of the month (January - December)
mmmmm	Display the first letter of the month’s name (J - D)
yy	Display the last two digits of the year (00 - 99)
yyyy	Display the full four-digit year number (0000 - 9999)
h	Display the hour without leading zeros (0 - 23)
hh	Display the hour with leading zeros (00 - 23)
m	Display the minute without leading zeros (0 - 59)
mm	Display the minute with leading zeros (00 - 59)
s	Display second without leading zeros (0 - 59)
ss	Display second with leading zeros (00 - 59)
s.0	Display second and tenths of a second without leading zero

s.00	Display second and hundredths of a second without leading zero
ss.0	Display second and tenths of a second with leading zero
ss.00	Display second and hundredths of a second with leading zero
[ ]	Display the absolute elapsed time; that is, it display hours greater than 24 and minutes or second greater then 60
AM/PM or am/pm	Display time in AM/PM or am/pm respectively. If this is not specified in the formula, Excel display the time using the 24-hour clock
A/P or a/p	Display time in A/P or a/p respectively

Table 8.2 - Codes for Creating Date and Time Custom Formats

Creating Custom Format

Now that you know the language of custom formatting, let's see how you can actually make your own number format. There are two ways of creating customer formats; you can do so by using the built-in number formats or using the 4-part custom format concept.

Using Existing Formats

The easiest way of creating a custom format is to build on the built-in Excel formats. Here is how you can use the available number formats as the starting point and modify them to make one of your own.

1. First, type a numeric value in an empty cell. For example, **0.259**
2. Apply the appropriate number format on it. By appropriate we mean, the one that resembles the custom format you want to create. In this example, the fraction format is applied. This changed the value to **1/4.**
3. Select this cell and then open the *Format Cells dialog box*.
4. Select the **Custom** category. Here you will see that format you selected is highlighted in the list of formats. The highlighted format will also appear in the *Type text box* located just right above the list of formats, as shown in Figure 8.6

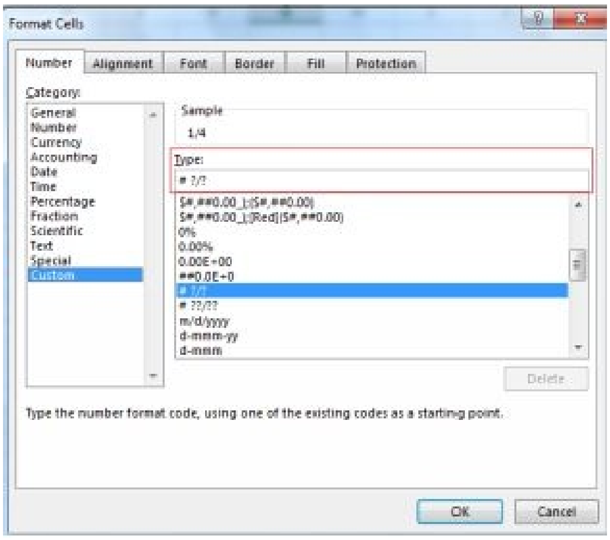


Figure 8.6 - The *Type Text Box* In the Custom Format Category

5. Edit the format as desired, in the *Type text box*. You can use the custom format symbols explained in the previous section to modify the format. In this example, we added two more digits placeholders to the format. As you can see in Figure 8.7, putting placeholders increased the precision of the fraction value and now it appears as **223/861** in the underlying cell.

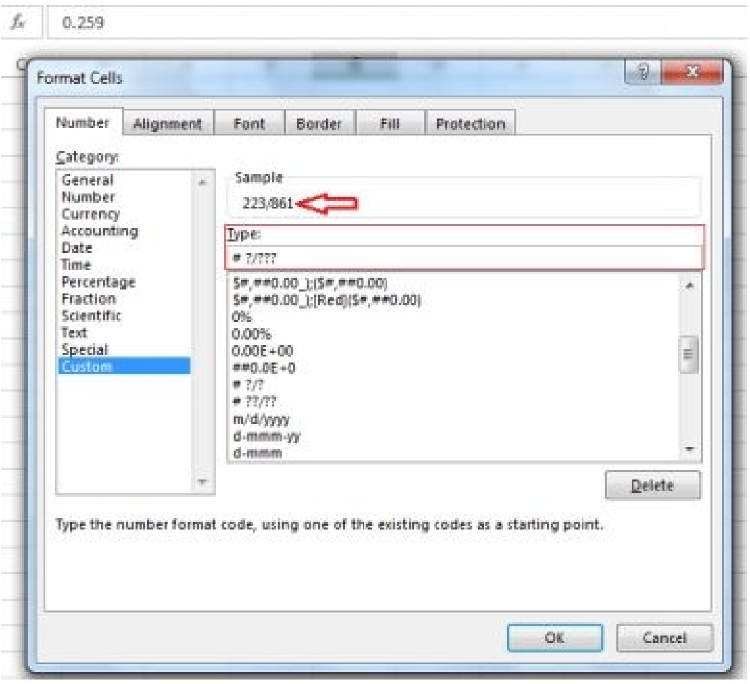
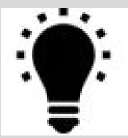


Figure 8.7 - Creating a Custom Format Using an Available Format

Click **Ok** to confirm. This won't affect the original format. The format that you create will appear at the bottom of the list.

	To delete a custom format: Select the format and hit the **Delete** button located at the bottom right outside the formats list. Remember, you

cannot delete the built-in number formats.

4-Part Custom Format

If you are unable to find a resembling number format to customize, you can create one of your own. A custom format can have up to 4 sub-formats. In other words, you can make four different formats and then combine them in all one single format.

The 4-part custom format is meant to differentiate four different types of values; positive, negative, zero and text values. You can specify as many as four formats; just make sure to separate the sub-formats with semicolons.

Here are a few points that you need to remember while creating a 4-part custom format.

- If you specify any one format, Excel will apply that to all the values within the selected range.
- If your custom format contains two parts, the first applies to the positive values and zeros, and the second to the negative values.
- If you specify three formats within your custom format, the first applies to the positive values, the second to the negative values and the third to the zeros.
- If you custom format contains four parts, it is applied and interpreted in the following sequence: Positive values; Negative values; Zero values; Text value. In other words, the first format applies to the positive values, the second to the negative values and so on.

If your custom format contains less than four parts, it will have no effect on the text values.

Table 8.3 illustrates a few examples of custom formatting. The first column contains a few different types of values, the second column contains a custom format and third one shows how the original values will be displayed in the cell after the respective custom format is applied to them.

Original Cell Entry	Custom Format	Formatted Value
5500	#,##0 “USD”	5,500 USD
987.569	_($(#,##0.00)	$(987.57)

9876543215	#,##0	9,876,543,215
856	“Extension:“_###	Extension: 856
8009985436	(###) ###-####	(800) 998-5436
42163956	####-##-###	421-63-956
3/31/2014	mmmm-d, yyyy	March-31, 2014

Table 8.3 - Examples of Custom Formatting

Applications of Custom Number Format

Custom format is a lot more than just a few examples illustrated in Table 8.3 While you need to practice making different formats to get the hang of custom formatting codes, here a few more applications along with examples of custom formatting.

Creating a Null Format

You can create a null format to hide the values in a worksheet. All you have to do is type a semicolon for that part of the format.

Remember, just like every other custom format, the null format is also interpreted in the following order:

Positive value format; Negative value format; Zeros format; Text value format

For example, if you want to hide negative values, zeros and text from a selected range of cells, select the appropriate range and format it with ###;;;

Three semicolons mean that it hides the last three types of values in the selected range. Likewise, if you put two semicolons in the starting followed by the format for zeros and text values, it will hide the positive and negative values within the selected range of cells.

To display only text values, format the underlying with nothing but a single semicolon (**;**). To hide all the values, format with **;;;**

The null format only hides the values in the cells. The entries are still visible in formula bar. *To learn how you can hide the values in cells as well in the formula bar, refer to Chapter 16*

Colorful Custom Format

You can create a custom format to give different colors to different types of values. All you have to do is precede the appropriate format with the name of the desired color. For example, if you want to apply a red colored telephone number format to a string of numeric values, edit the appropriate cell with the following format:

[Red](###) ###-####

Likewise, if you have a spreadsheet full of mixed-up values and need to differentiate positive, negative, zero and text values, select the entire worksheet and type the following format in the custom format type box:

[Red];[Green];[Blue];[Yellow]

The above custom format displays all the positive values in red, negative values in green, zeros in blue and text values in yellow.

You do not necessarily have to use the same colors in your custom format. You can select from the following colors: Yellow, Black, Cyan, Magenta, Green, Blue, Red and White. You can also specify the number of the color.

> If you specify a color or color number that is not in Excel’s built-in range of colors, it produces the specified color by mixing up some built-in shades. Such colors are called dithered. These colors are good for shading the cells but done work very well for coloring the values and lines.

Creating Custom Formats To Scale Values

You can create custom formats to scale large values. For example, suppose you are working with large numbers such as 1,500,000,000. If you want, you can display these numbers in thousands (1,500 in this example). The underlying value would still remain 1,500,000,000 and the same would be used in calculations. The formatting only makes it look shorter on the worksheet, hence taking up less of the column width.

Here are a few custom formats to scale down numeric values.

#,###,

It removes from the display, the last three digits to the left of the decimal place. For example, 987654 displayed as 987

#,###.00,

It removes from the display, the last three digits to the left of the decimal place and rounded to two decimal places. For example, 987654 displayed as 987.65

#,###,,

The above format displays the value in millions with no decimal places. For example, 987654321 displayed as 987.

#,###.00,,

The above format displays the value in millions with no decimal places and rounded to two decimal places. For example, 987654321 displayed as 987.65

#,###,,M

This format also displays the value in millions however it also puts an **M** with the value. For example, 987654321 displayed as 987M

0”.”00

This format removes from the display, the last two digits to the left of the decimal place and rounded to two decimal places. For example, 9876 displayed as 98.76.

Just like you can create custom formats to scale down values, you can do the same to scale up as well. Here are a few custom formats to scale up numeric values.

#”,000”

This format displays three more zeros with the value. For example, 9 displayed as 9,000

#”,000,000”

This format displays six more zeros with the value. For example, 9 displayed as 9,000,000

Chapter 9: Managing Your Worksheet

Worksheet is the face of the Excel. Whatever work you do on Excel is done on a worksheet. In the previous versions of Excel, each workbook contained three worksheets. However in Excel 2013, every workbook contains a single sheet and has its own window. So instead of placing all the work in one worksheet, you can create a different one for each element for your project.

For example, if you are maintaining a sales record of your store, you can create a different worksheet for every month and product, perhaps for every sales agent too. Multiple worksheets might sound complex to you but not when you can rename each of them, set a different color for every worksheet's label and so on.

This chapter covers all such things that you need to know to manage your worksheets. It gives you handy tips for some of the basic worksheet operations along with some colorful and interesting tricks for managing your worksheets.

Adding New Worksheet

There are four ways of adding a worksheet to a workbook.

1. Click the plus sign located at the right side of the last sheet tab. This will add a new sheet to the active workbook.

2. Hit **Shift + F11** on your keyboard. This will add a sheet tab to the left of the current worksheet.

3. Right click the sheet tab and click **Insert**. This will open the *Insert dialog box* on the Excel screen. Select **worksheet** in the *General tab* and click **OK**. A new worksheet will be added just right before the active worksheet.

4. Select the **Home** Tab. Click the **Insert** drop down list and select **Insert Sheet**. This will add a new worksheet to the left of the current sheet.

Deleting a Worksheet

If you have added a worksheet by mistake or no longer need one, you can delete it very easily.

There are two ways of deleting a worksheet from a workbook.

1. Open the worksheet you want to delete. Go to **Home** tab. Select **Delete Sheet** in the

Delete drop down list.

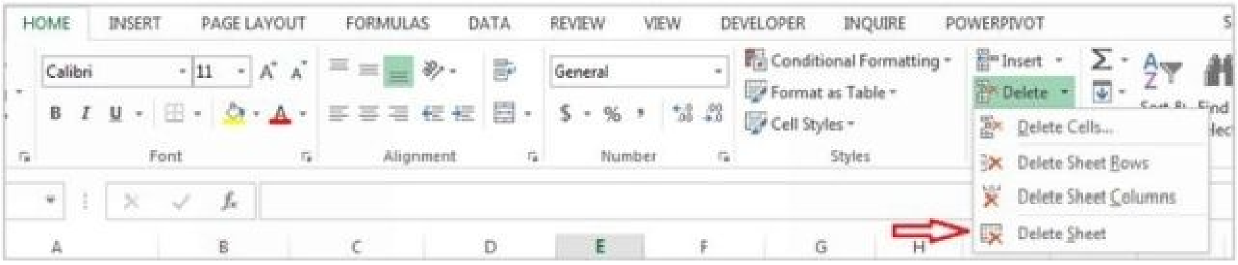


Figure 9.1 - Deleting a Worksheet Using the Ribbon Commands

2. Right click the sheet tab and click **Delete**.

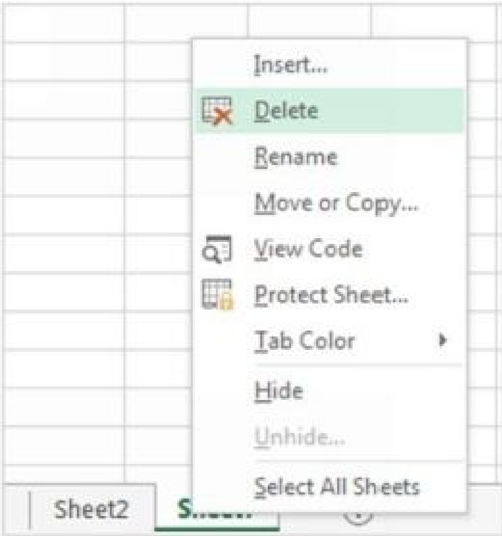


Figure 9.2 - Deleting a Worksheet by Right-Clicking the Worksheet's Tab

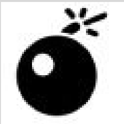
Either ways, if the underlying worksheet contains any data, Excel asks you to confirm once again if you want to delete the worksheet. Click **Delete** if you surely want to delete it. Click **Cancel** otherwise.

Figure 9.3 - Confirmation to Delete

If the worksheet is blank and never used before, Excel deletes it without asking for confirmation.

You can also delete multiple sheets at a time. To do so, press and hold the **Ctrl** key and one by one select all the tabs you want to delete. The selected sheets' names are bold and underlined. Then delete by either of the abovementioned ways.

To delete an adjacent group of sheets, click the first sheet of the group, hit and hold **Shift** on your keyboard then select the last tab of the group. Doing so will select all the sheet tabs in between. Then delete using either of the two methods.



Make sure the worksheet is of no use to you or you have a backup of the data before you delete any worksheet. Deleting a worksheet in Excel cannot be undone. You won’t be able to recover a worksheet once it is deleted.

Naming/Renaming a Worksheet

When you open a workbook or add more worksheets in it, Excel labels them with their respective number. By default, worksheets are named as Sheet1, Sheet2 and so on. Now these names are very plain and non-explanatory. So if you want, you can rename the sheets as desired.

Renaming worksheets makes it easy for the users to locate data. For example, it is easier to find out the sales glitch in a particular month when the sheets’ are renamed as months rather than just sheet numbers.

There are two ways of renaming a sheet;

1. Right click the sheet’s tab you want to rename and click **Rename**. This will activate the edit mode of the sheet’s tab where you can type in the new name. Hit **Enter** once done.
2. Double click the appropriate sheet’s tab. Type in the new name and press **Enter**.

Note that the sheet names cannot exceed 31 characters. You can add spaces in the names but you cannot use the following characters in a sheet’s name:

***** Asterisk	**:** Colon	\ Backslash
? Question Mark	/ Slash	**[ ]** Square Brackets

Try to keep a short name as it would consume less space on the screen. The lengthier the name is, the wider the tab will be and the fewer number of tabs you will be able to see on the tab list without scrolling.

Dragging Worksheets

You can rearrange the worksheets in any order you want. For example, if you have a separate worksheet for each employee’s performance, you may want to rearrange the tabs in alphabetical order to make it easier to locate any particular employee’s worksheet.

You can also make a copy of a worksheet in the same workbook. For example, if you have made a performance appraisal sheet for an employee, you may want to use the same template for all the employees but in a different worksheet. Excel allows you to copy the same worksheet as many times as you want in the same workbook. So just copy the same performance appraisal sheet for every employee and edit the data as required. This way you won’t have to type the same template in every employee’s performance appraisal worksheet.

There are several ways of rearranging and copying worksheets in Excel, as explained below.

- To move a worksheet, just click and hold the worksheet tab and drag it to the desired location. You will see that the mouse pointer changes to small note while you drag. Take this pointer to the desired location and drop it there.

- To copy a worksheet within the same workbook, press and hold **Ctrl** on your keyboard while you click and drag the appropriate worksheet to the desired location. The original worksheet will stay in its place while a copy of it will be created in the position where you dragged it. In this case, the small note like pointer will carry a plus sign on it.

- Right click the appropriate worksheet and click **Move or Copy**. This will open the *Move or Copy dialog box* as shown in Figure 9.4. As you can see, this dialog box contains the names of the all worksheets in the selected workbook. Just select the worksheet before which you want to relocate the underlying worksheet.
- If you want to copy a worksheet, click the checkbox **Create a copy** located at the bottom of the *Move or Copy* dialog box. The first two methods are easier. The dialog box is normally used to move or copy the worksheet in any other workbook, as explained in the next section.

To move or copy a group of worksheet simultaneously, press and hold **Ctrl** while you select all the appropriate worksheet tabs. Then drag the

	group to the desired location.

Relocating Worksheets

It is not the same workbook where you can copy or move worksheets to. You can also move or copy a worksheet to any other workbook.

	To move or copy a worksheet to any other workbook, it is important that the other workbook to which you want to copy is also open.

1. To relocate a worksheet to any other workbook, right click the appropriate worksheet and click **Move or Copy**. This will open the *Move or Copy dialog box* as shown in Figure 9.4

Figure 9.4 - The *Move or Copy* Dialog Box

2. Click the **To Book** drop down list and select the target workbook. This will display the names of the all worksheets in the selected workbook.

	The **To Book** drop-down list does not contain the names of all the workbooks on your system. It only includes the workbooks that are currently open.

3. Just select the worksheet before which you want to relocate the underlying worksheet. If you want to copy the worksheet, click the checkbox **Create a copy** located at the bottom of the dialog box.

> When you move or copy a worksheet to any other worksheet, the custom formats, if any contained in it, are also copied to the other workbook.

This is not the only way to move or copy worksheets to other workbooks. You can do so by the *Click and Drag* method as well. First, open both the workbooks and then align them horizontally on the screen. Now drag the worksheet from one workbook to another. If you want to copy a worksheet, hold down the **Ctrl** key on your keyboard and then start dragging.

> To align the workbooks in horizontal panes, minimize all the windows on your desktop except the two workbooks. Right click your desktop's taskbar and click **Show windows stacked.**

Make Your Worksheet's Tab List Colorful

If names are not enough to differentiate the sheet tabs, you can also color them. You can specify a different color for each tab.

To change the color of a sheet tab,

1. Right click the appropriate tab
2. Select **Tab Color** and then click the desired color.

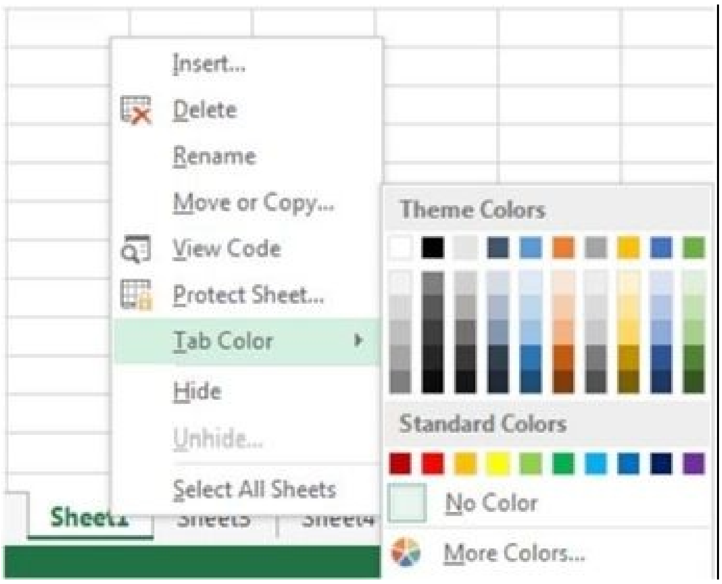


Figure 9.5 - Coloring the Worksheet's Tabs

If you don't like any of the available colors, click **More Colors** located at the bottom of the color palette. To remove a color from a tab, click **No Color**.

	This operation colors the tab itself and not the font. However Excel automatically changes the color of the font to make it visible on the selected tab color. For example, if you choose black color for your tab, Excel will change the color of the tab's name font to white.

Chapter 10: Additional Worksheet Operations

The previous chapter elaborated the basic operations regarding worksheets. These are a must to learn if you plan to work on Excel. However there is a lot more that you can do than just managing worksheets. You can compare different worksheets, split them up into different panes and so on. This chapter covers all such advanced operations. It also introduces you to the amazingly accommodating and high-tech Watch Window of Excel 2013.

Adjusting the View

When you open a workbook for the first time, by default the page view is set to 100%. That is everything you see on screen is showed at 100% view. You can zoom in and zoom out to magnify or shrink the view respectively. The smallest view in Excel is 10% and the largest is 400%.

If your worksheet contains numerous pages and ranges spread throughout the worksheet, you can shrink the view to get a bird's-eye view of your worksheet. Conversely you can zoom in to make out the tiny codes and formulas.

Zooming in and zooming out the view of a worksheet does not change the font size, formatting or printing setup. It just changes the view.

Figure 10.1 shows a worksheet zoomed out to 10%.

Figure 10.2 shows a worksheet zoomed in to 400%.

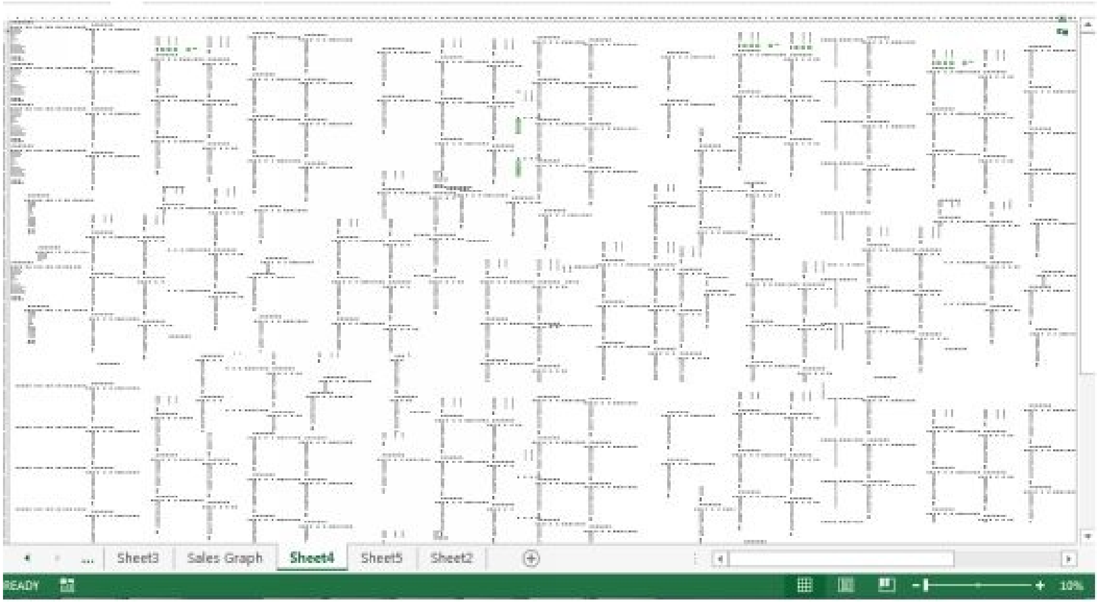


Figure 10.1 - Worksheet Zoomed Out To 10%

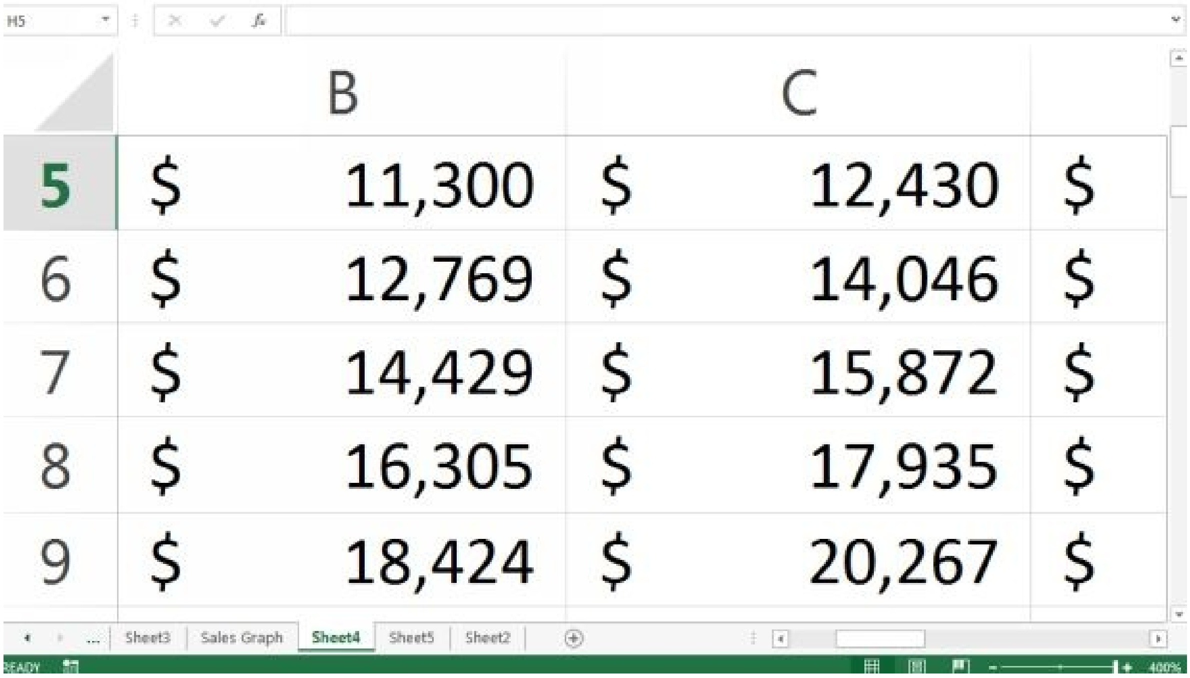


Figure 10.2 - Worksheet Zoomed Out To 400%

There are three ways of changing the view of a worksheet:

1. Press and hold the **Ctrl** key on your keyboard and spin your mouse wheel to shrink or magnify the view.

2. Click and drag the zoom slider located at the bottom right of your worksheet. Slide to the right side to zoom in. Slide to the left to zoom out.

3. Select the View tab on the ribbon. Here you have three options in the zoom group; namely Zoom, 100% and Zoom to Selection.

If you select **100%**, it will revert the view to normal if was changed.

If you want to see a particular range of cells in one pane, select it first and then select

Zoom to Selection. Excel will change the view to fit the selected range in the window. If the selection is large, it will shrink the view. On the other hand, if the selected range comprises of few cells only, it will magnify the view to fill the entire window with the selected cells. In short, this zooming option displays the selected range of cells only.

The third option in the View tab is **Zoom**. Clicking it will open the *Zoom dialog box* where you can specify the desired percentage. If you do not find your desired view percent in the dialog box, simply type it in the *Custom type box*. The Fit Selection round checkbox yields the same effect as the *Zoom to Selection* command.

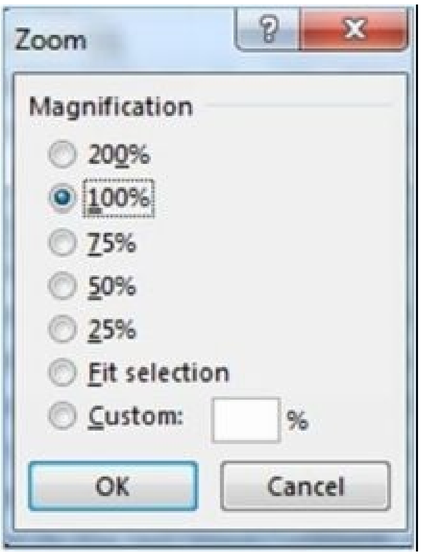


Figure 10.3 - The *Zoom* Dialog Box

If you zoom in/zoom out a worksheet, it will change the view of the current worksheet only. It won't affect the display of other worksheets in the workbook. As a matter of fact, Excel allows you to set different a zoom percentage for every worksheet.

The first time you open a new worksheet, its zoom factor is 100%. However once you change it, it will stay this way even if you close the entire workbook. The display would remain the same every time you open the particular worksheet, unless you change it again. Excel opens up on the last changed zoom factor.

Same Worksheet – Multiple Windows

At times, you may need to compare two different ranges of the same worksheet. Or you may want to modify a worksheet and observe its effect on any other worksheet of the same workbook. In either case, don't you think it would be very time consuming and hectic to toggle between two ranges or two worksheets again and again. Well, Excel 2013 solves this issue for you. It allows you to view the same worksheet in two different windows on the same screen.

Or you can also view two different worksheets of the same workbook on one screen. This option comes very handy when you need to compare two ranges or in cases where you need modify the values in one sheet and analyze its effect on the values linked in any other worksheet.

In either case, the process to display two worksheets or two ranges of the same worksheet on one screen is the same.

Select the **View** tab > **New Window.**

Excel will open up a new workbook exactly the same as the active workbook. Now click **Arrange All** located right beneath the *New Window* button in the View tab.

This will open up the Arrange Windows dialog box, as shown in Figure 10.4

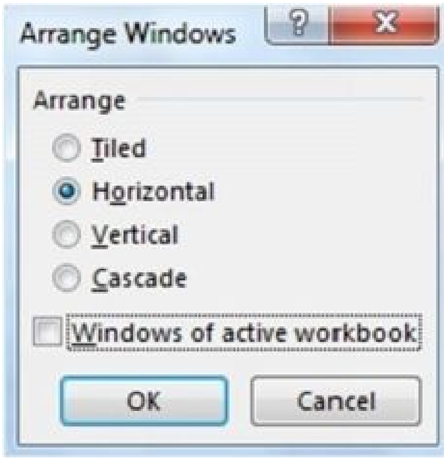


Figure 10.4 - The *Arrange Windows* Dialog Box

Click any of the round checkboxes to display the worksheets in the desired arrangement. For example, if you select *Horizontal*, it will stack both the workbooks horizontally, as illustrated in Figure 10.5

If you select the **Windows of Active Workbook** checkbox, Excel will arrange windows of the active workbook only.

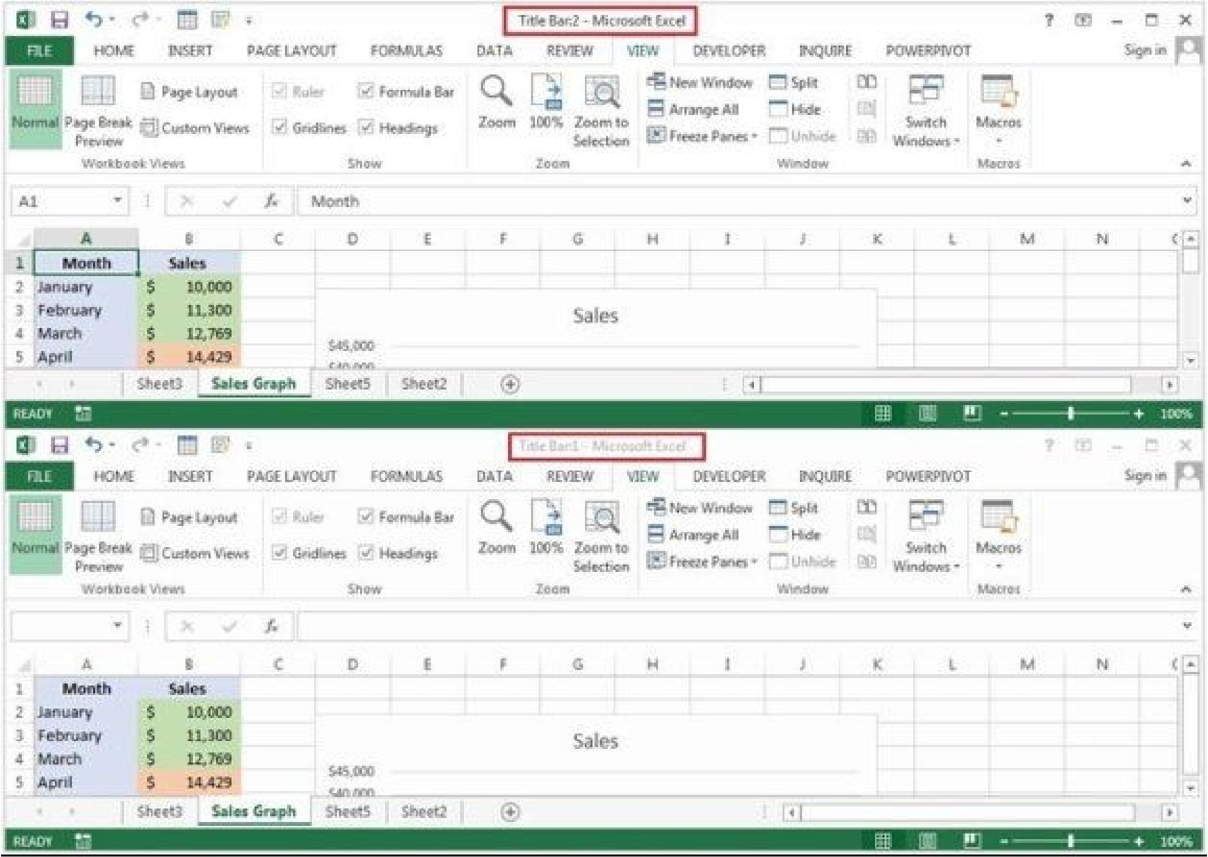


Figure 10.5 - Two Same Worksheets Arranged Horizontally

As you can see in Figure 10.5, two same worksheets are arranged horizontally. Notice the name in the Title bars. As you can see, Excel renames the titles when you view a worksheet in multiple winos. It appends a colon and a number to each window; the original workbook is assigned number 1 and the other one is represented by number 2.

	The worksheets in multiple windows are linked to one another. So whatever changes you make in one are automatically updated in the other. Note that the other window is just the display copy and closing it won't affect the original workbook. However the changes would remain there.

How to Compare Worksheets

The *Arrange Windows feature* of Excel 2013 is very helpful if you want to compare two worksheets. Even more valuable is the *View Side by Side feature* that makes the comparison easier. Apparently this feature arranges the open windows horizontally; however it contains several other useful features that make comparing two windows quicker and interesting.

Here is how you can use the *View Side by Side* feature,

First, open the worksheets that you need to compare.

> Make sure the two worksheets are opened in separate windows. In case of same worksheets of the same workbook, select the **View** tab > **New Window** to open another window for the same workbook, as explained in the previous section.

When the two windows are opened separately, go to the **View** tab and select **View Side by Side**. You will find this command in the *Window* group, represented by two-stacked worksheets icon, as shown in Figure 10.7

If there are only two workbooks open, Excel will align them horizontally on the same screen. But if more than two Excel windows are opened, it will open up the *Compare Side by Side dialog box* containing the names of the open workbooks. Select the workbook to which you want to compare the active one with and press **OK**.

Figure 10.6 - The *Compare Side by Side* Dialog Box

So far, the *View Side by Side feature* works similar to the *Arrange Windows feature*. The difference is that the former links the two windows together in such a way that scrolling in one of the windows scrolls the other window as well. If you want to turn off the simultaneous scrolling, hit the **Synchronous Scrolling** button located right beneath the **View Side by Side** command. The Synchronous Scrolling command is switch button that can be used to toggle on/off the simultaneous scrolling feature.

If you have relocated the windows or made some changes in their arrangement while the *View Side by Side feature* is On and now you want to view them back in the horizontal panes, click the **Reset Window Position** command located just below the Synchronous Scrolling button.

Figure 10.7 - Highlighting Commands for Comparing Worksheets

To revert the display and turn off the side by side feature, simply click the **View Side by Side** button one more time.

	The View Side by Side feature enables manual comparison. It does not point the differences between the two worksheets.

How to Split Worksheets into Different Panes

The Split feature of Excel is another way of viewing on one screen, the different parts of a same worksheet. You can split the display vertically or horizontally or both.

Here is how you can use the amazing Split feature,

First, select the cell where you want the split to occur

Now go to the **View** tab and click **Split**. This will split the worksheet into four panes, as shown in Figure 10.8

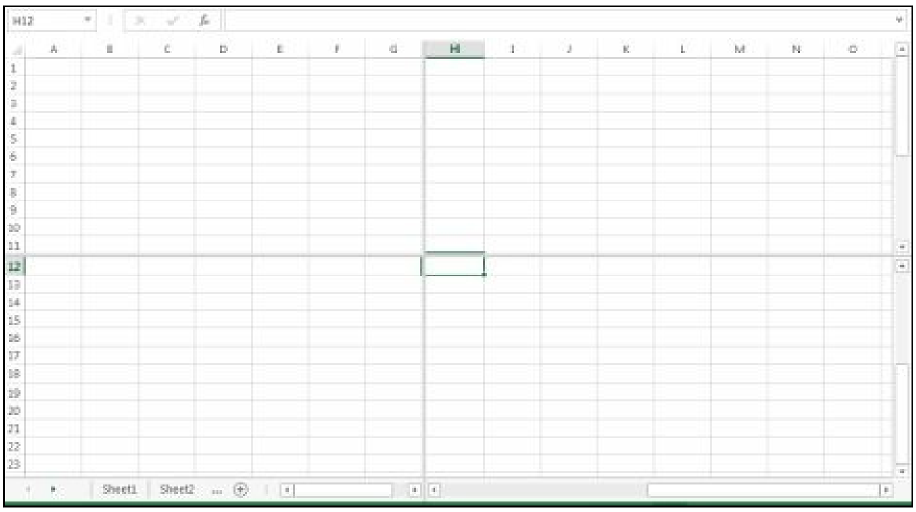
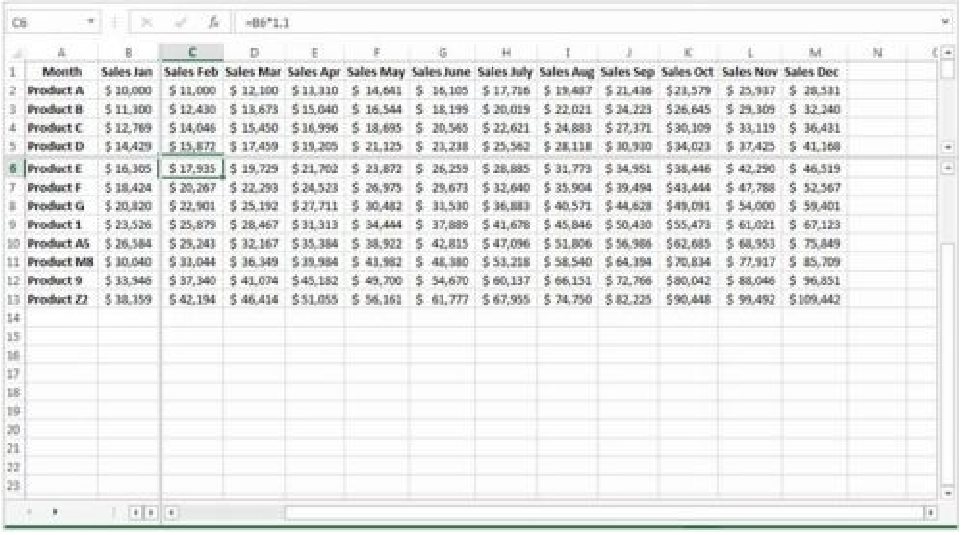


Figure 10.8 - Showing Split Panes

Split occurs at the active cell. In Figure 10.8, cell H12 was selected so the split occurred there. Likewise, in Figure 10.9, the active cell is C6 so the split occurred there.



Month	Sales Jan	Sales Feb	Sales Mar	Sales Apr	Sales May	Sales June	Sales July	Sales Aug	Sales Sep	Sales Oct	Sales Nov	Sales Dec
Product A	$ 10,000	$ 11,000	$ 12,100	$ 13,310	$ 14,641	$ 16,105	$ 17,716	$ 19,487	$ 21,436	$ 23,579	$ 25,937	$ 28,531
Product B	$ 11,300	$ 12,430	$ 13,673	$ 15,040	$ 16,544	$ 18,199	$ 20,019	$ 22,021	$ 24,223	$ 26,645	$ 29,309	$ 32,240
Product C	$ 12,769	$ 14,046	$ 15,450	$ 16,996	$ 18,695	$ 20,565	$ 22,621	$ 24,883	$ 27,371	$ 30,109	$ 33,119	$ 36,431
Product D	$ 14,429	$ 15,872	$ 17,459	$ 19,205	$ 21,125	$ 23,238	$ 25,562	$ 28,118	$ 30,930	$ 34,023	$ 37,425	$ 41,168
Product E	$ 16,305	$ 17,935	$ 19,729	$ 21,702	$ 23,872	$ 26,259	$ 28,885	$ 31,773	$ 34,951	$ 38,446	$ 42,290	$ 46,519
Product F	$ 18,424	$ 20,267	$ 22,293	$ 24,523	$ 26,975	$ 29,673	$ 32,640	$ 35,904	$ 39,494	$ 43,444	$ 47,788	$ 52,567
Product G	$ 20,820	$ 22,901	$ 25,192	$ 27,711	$ 30,482	$ 33,530	$ 36,883	$ 40,571	$ 44,628	$ 49,091	$ 54,000	$ 59,401
Product 1	$ 23,526	$ 25,879	$ 28,467	$ 31,313	$ 34,444	$ 37,889	$ 41,678	$ 45,846	$ 50,430	$ 55,473	$ 61,021	$ 67,123
Product A5	$ 26,584	$ 29,243	$ 32,167	$ 35,384	$ 38,922	$ 42,815	$ 47,096	$ 51,806	$ 56,986	$ 62,685	$ 68,953	$ 75,849
Product M8	$ 30,040	$ 33,044	$ 36,349	$ 39,984	$ 43,982	$ 48,380	$ 53,218	$ 58,540	$ 64,394	$ 70,834	$ 77,917	$ 85,709
Product 9	$ 33,946	$ 37,340	$ 41,074	$ 45,182	$ 49,700	$ 54,670	$ 60,137	$ 66,151	$ 72,766	$ 80,042	$ 88,046	$ 96,851
Product Z2	$ 38,359	$ 42,194	$ 46,414	$ 51,055	$ 56,161	$ 61,777	$ 67,955	$ 74,750	$ 82,225	$ 90,448	$ 99,492	$ 109,442

Figure 10.9 - Showing Split Panes at a Different Location of Active Cell

Click and drag the pane boundary to resize individual panes.

As you can see in both the images, every pane has a different scrollbar. You can scroll through each pane and work on four different parts of a worksheet at the same time.

To remove the split panes, simply re-click the **Split** button in the **View** tab.

Splitting into Freezing Panes

Sometimes you may want to lock a certain rows and columns at their place while you scroll throughout the worksheet. This is mostly required when you write a heading or a descriptive text in the first row or column and want it to stay in view while you fill up data against it.

The difference between Split and Freeze Panes is that the former gives you a scrolling bar for each pane. Since the purpose of the latter is to lock a certain pane so that it is displayed throughout the worksheet, it does not give separate scroll bar for the frozen panes.

To freeze panes, select the cell below the row or column that you want to stay on screen while you scroll vertically or horizontally respectively.

Now go the **View** tab and click the **Freeze Panes** drop down list.

As you can see in Figure 10.10, there are three freezing commands.

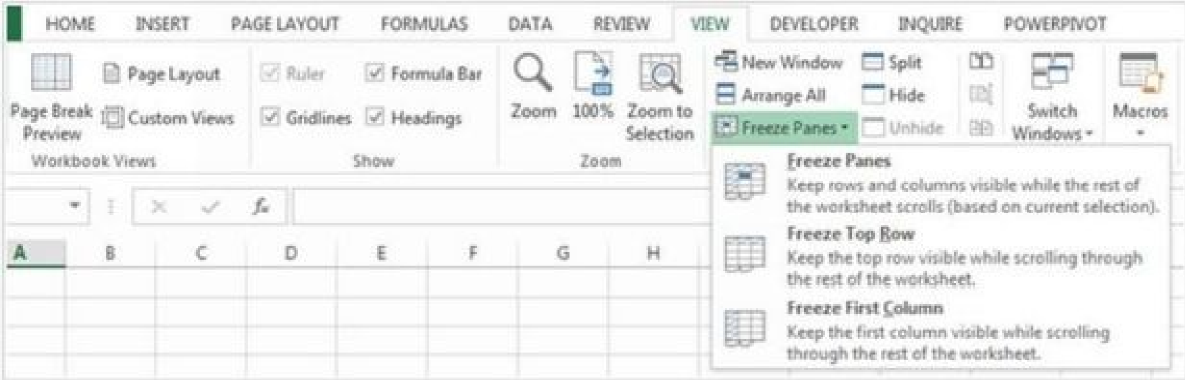
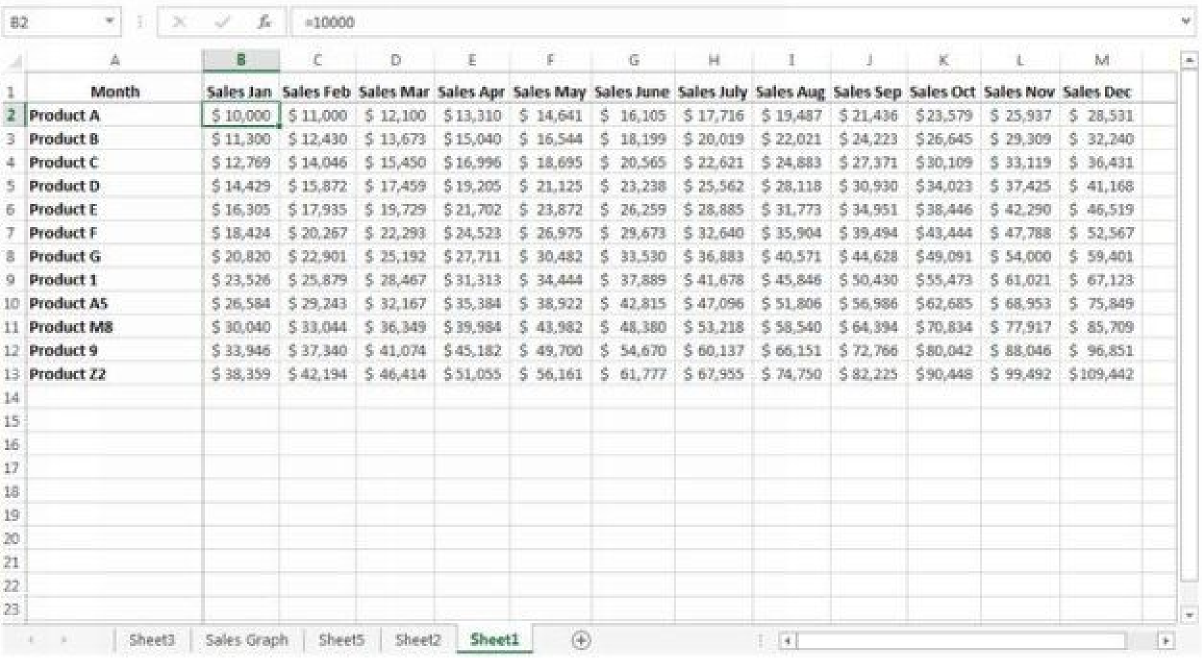


Figure 10.10 - Showing the Three *Freeze Panes* Commands

Freeze Panes will freeze the rows and columns above the selected cell. The other commands, as their name suggests, freezes the top row and column respectively.

As shown in Figure 10.11, the frozen rows columns are separated by dark lines. The frozen panes remain visible no matter how far you scroll away from them.



Month	Sales Jan	Sales Feb	Sales Mar	Sales Apr	Sales May	Sales June	Sales July	Sales Aug	Sales Sep	Sales Oct	Sales Nov	Sales Dec
Product A	$ 10,000	$ 11,000	$ 12,100	$ 13,310	$ 14,641	$ 16,105	$ 17,716	$ 19,487	$ 21,436	$ 23,579	$ 25,937	$ 28,531
Product B	$ 11,300	$ 12,430	$ 13,673	$ 15,040	$ 16,544	$ 18,199	$ 20,019	$ 22,021	$ 24,223	$ 26,645	$ 29,309	$ 32,240
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Product D	$ 14,429	$ 15,872	$ 17,459	$ 19,205	$ 21,125	$ 23,238	$ 25,562	$ 28,118	$ 30,930	$ 34,023	$ 37,425	$ 41,168
Product E	$ 16,305	$ 17,935	$ 19,729	$ 21,702	$ 23,872	$ 26,259	$ 28,885	$ 31,773	$ 34,951	$ 38,446	$ 42,290	$ 46,519
Product F	$ 18,424	$ 20,267	$ 22,293	$ 24,523	$ 26,975	$ 29,673	$ 32,640	$ 35,904	$ 39,494	$ 43,444	$ 47,788	$ 52,567
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Product 1	$ 23,526	$ 25,879	$ 28,467	$ 31,313	$ 34,444	$ 37,889	$ 41,678	$ 45,846	$ 50,430	$ 55,473	$ 61,021	$ 67,123
Product A5	$ 26,584	$ 29,243	$ 32,167	$ 35,384	$ 38,922	$ 42,815	$ 47,096	$ 51,806	$ 56,986	$ 62,685	$ 68,953	$ 75,849
Product M8	$ 30,040	$ 33,044	$ 36,349	$ 39,984	$ 43,982	$ 48,380	$ 53,218	$ 58,540	$ 64,394	$ 70,834	$ 77,917	$ 85,709
Product 9	$ 33,946	$ 37,340	$ 41,074	$ 45,182	$ 49,700	$ 54,670	$ 60,137	$ 66,151	$ 72,766	$ 80,042	$ 88,046	$ 96,851
Product Z2	$ 38,359	$ 42,194	$ 46,414	$ 51,055	$ 56,161	$ 61,777	$ 67,955	$ 74,750	$ 82,225	$ 90,448	$ 99,492	$ 109,442

Figure 10.11- Showing Frozen Panes

As you can see in Figure 10.11, the active cell is B2 and therefore the row above it and column beside is split into a pane and then frozen. If scrolled downwards, all the columns will scroll together but the top row (one containing the months) will stay visible throughout. Likewise, when scrolled to the right, all the rows will scroll together but the first column (one containing the product codes) will remain visible throughout.

To unlock the frozen panes, select **View** Tab > **Freeze Panes** drop down list and then click **Unfreeze Panes.**

	If you want to split and freeze both, then directly click the Freeze Panes command. This splits and freezes the panes simultaneously. Likewise clicking it back will remove the split panes and unfreeze the locked ones at the same time.

As you can see in Figure 10.11, the frozen pane boundaries are nothing but a darker version of the cell borders. In cases where your worksheet is full of values, you may find it difficult to distinguish the frozen panes. To make the frozen panes easier to view, fill them with any color of your choice.

Meet the Incredible Watch Window

At times you may need to monitor a value as you work on other cells. For example, if you are making a spreadsheet report on the effect of different expenses on the total revenue of your company. You want to check the effect on revenues after entering or modifying any expenditure value.

Off course you can toggle back and forth to the cell containing the revenue but don't you think that you would be too time consuming? How about if you can view the particular cell on the screen while you scroll throughout the worksheet? This is what the Watch Window does. If enables you to view particular cell(s) on the screen at all times.

To use the incredible Watch Window,

Select the **Formula** Tab, there in the *Formula Auditing group* you will find the **Watch Window** button. Click it to open the *Watch Window Task Pane*, as illustrated in Figure 10.12

Figure 10.12 - The Watch Window

You can dock it to any side you want. Just drag it and drop it to the desired location.

To add cell(s) in it, Click **Add Watch** and then select the pertinent cell(s) on the worksheet.

> To add more than one cell in the Watch Window, hold down **Ctrl** while you select the cells in the worksheet.

In Figure 10.13, there are four cells in the Watch Window. This window will stay on your workbook no matter how far away cell or any other worksheet you scroll to.

Figure 10.13 - Adding Cells in the Watch Window

Once you add a cell to the Watch Window, it stays even after you close the pane. It will be there every time you open the Watch Window of the particular workbook. To delete a cell from the Watch Window, select it in the task pane and hit the **Delete Watch** button.

> If you want to move to any of the Watch cells in the worksheet, just click it in the Watch Window pane and it will take you to the selected cell.

Chapter 11: Learn to Work with Rows and Columns

So far we have discussed the worksheet operations and features. Digging a bit deeper now, each worksheet contains 1,048,576 rows and 16,384 columns.

> If you save a workbook in any of the previous versions of Excel and then open it in Excel 2013, it will be opened in the compatibility mode. Such workbooks contain 65,536 rows and 256 columns.

> If you want to increase the number of rows or columns in compatible mode workbooks, save the workbook as **.xlsx** or **.xlsm** and then reopen it in the specified mode.

Every individual cell is a part of a row and column. We have already talked in detail about the basic operations of individual cells. This chapter covers features and tips that involve complete rows and columns.

After going through this chapter, you will be able to manage the rows and columns in your worksheet. You will learn how to hide and unhide them, adjust their size and much more.

How to Add Rows and Columns

As already mentioned, every worksheet contains a fixed number of rows and columns by default. You cannot increase the number of rows or columns however you can insert them to make room for additional data.

Inserting a new row deletes the blank row from the bottom of the worksheet and inserts it in the specified location. Likewise, if you insert a column, the last blank column to the right is removed automatically.

> You cannot insert a new row or column if the last row or column of

	the current worksheet is filled, respectively.

If the last row or column is not blank, Excel does not allow you to insert new ones. A warning dialog box pops up on the screen, as displayed in Figure 11.1

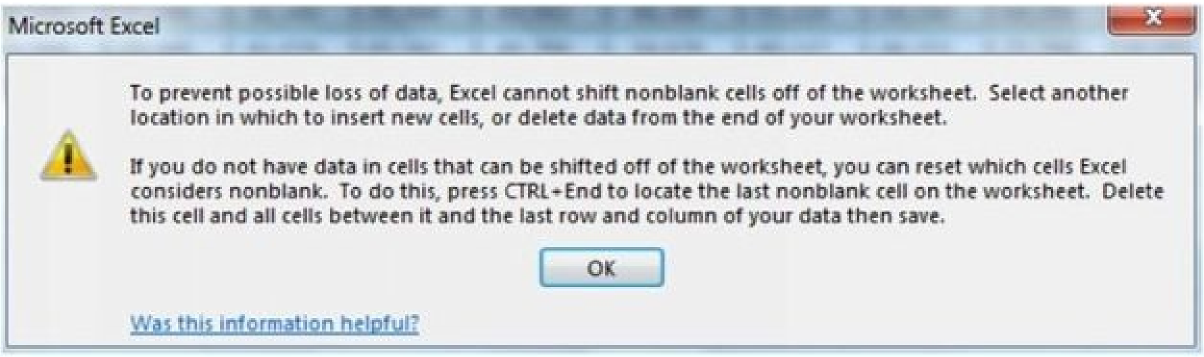


Figure 11.1 - Warning Box on Inserting New Row/Column if the Last Row/Column is not Empty

In other words, having an empty row/column as the end of the worksheet is a prerequisite for having new ones.

	The number of blank rows/columns at the end must be equal or more than the number of rows/columns you want to insert in the worksheet

There are several ways of inserting new row(s):

Select an entire row, right click and select **Insert**. A new row will be inserted above the selected row.

To add multiple rows at once, select as many rows as you want to insert, right click and then select Insert. This will insert as many rows as you selected.

Move the active cell to the row above which you want to insert a new row, then go the **Home** tab. Click the **Insert** drop down list and then **select Insert Sheet Rows.**

Likewise, if you want to enter multiple rows, select the equivalent number of cells in the corresponding column and then select **Home** > **Insert** drop down list > **Insert Sheet Rows**. This will add new rows equal to the number of cells you selected.

Select cell(s) above which you want to insert new row(s). Go to Home Tab.

Click the **Insert** drop down list > **Insert Cells**. Then select **Entire Row** in the dialog box. Click **OK** Click **OK**.

The aforementioned were ways for inserting rows. Following are for inserting columns.

Select an entire column, right click and select **Insert**. A new column will be inserted to the left of the selected row.

To add multiple columns at once, select as many columns as you want to insert, right click and then select Insert. This insert new columns equivalent to the number of columns selected.

Move the active cell to the column on the left of which you want to insert a new one. Go the **Home** tab. Click the **Insert** drop down list and then **select Insert Sheet Columns.**

If you want to enter multiple columns, select the equivalent number of cells in the corresponding row and then select **Home** > **Insert** drop down list > **Insert Sheet Columns**. This will add new columns equal to the number of cells you selected.

Select cell(s) to the left of which you want to insert new column(s). Go to Home Tab. Click the **Insert** drop down list > **Insert Cells**. Then select **Entire Column** in the dialog box. Click **OK**.

How to Add Cells

If you don't want to add entire rows or columns, you can add just a few cells as well. Here is how you can do that.

Select the range in which you want to add the new cells.

Select **Home** > **Insert** drop down list > **Insert Cells**. This will open an Insert Dialog box, as illustrated in Figure 11.2

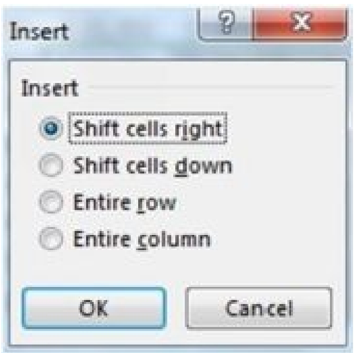


Figure 11.2 - The *Insert* Dialog Box

To insert new cells, the existing cells must be shifted either to the right or down. If you select **Shift Cells right**, it will insert new cells to the left of the selected range which in turn will shift to the right. Likewise if you select **Shift Cells down**, it will insert the new cells above the selected range. The number of new cells will be equal to the number of selected cells.

Click **OK** once done.

How to Get Rid Of Individual Rows and Columns

If you have added any extra rows/columns, or you think that some of them contain obsolete unneeded data, you can delete them very easily.

There are several ways of deleting rows or columns in a worksheet; as briefed below.

- Select the entire row(s) or column(s) that you want to delete, right click and select **Delete**.
- To delete a row, move the active cell to the row you need to delete, select **Home** tab > **Delete** drop down list > **Delete Sheet Rows.** If you want to delete multiple rows, select a cell in each row and then click **Delete Sheet Rows** in the **Delete** drop down list.
- To delete a column, move the active cell to the column you need to delete, select **Home** tab > **Delete** drop down list > **Delete Column Rows**. Likewise, select multiple cells to delete the corresponding columns altogether.

	If you have deleted a row or column by mistake, press **Ctrl + Z** on your keyboard or click the **Undo** button on the Quick Access toolbar

How to Hide Individual Rows and Columns

At times you may want to hide some rows or columns. For example, while showing the performance appraisal sheet to employees, there may be some values that you have entered for your reference and don't want the employees to see. Or if your spreadsheet needs to be shared with multiple users whom you don't want to see particular details. Or you may need to print some particular rows and columns of a worksheet.

In such cases, you can easily hide the rows and columns that you want others to see or that you don’t want to print.

> When you use the arrow keys to move around the worksheet, it skips the hidden rows and columns. To select or work on them, you need to unhide them first.

There are several ways of hiding row(s):

- Select the row(s) you want to hide, right click and select **Hide**.
- Move the active cell to the row you need to hide, select **Home** tab > **Format** drop down list > **Hide and Unhide** > **Hide Rows.** If you want to hide multiple rows, select a cell in each row and then click **Hide Rows** in the **Format** drop down list.
- Place the cursor at the bottom border of the row you want to delete and drag it upward; drag till the height is zero.

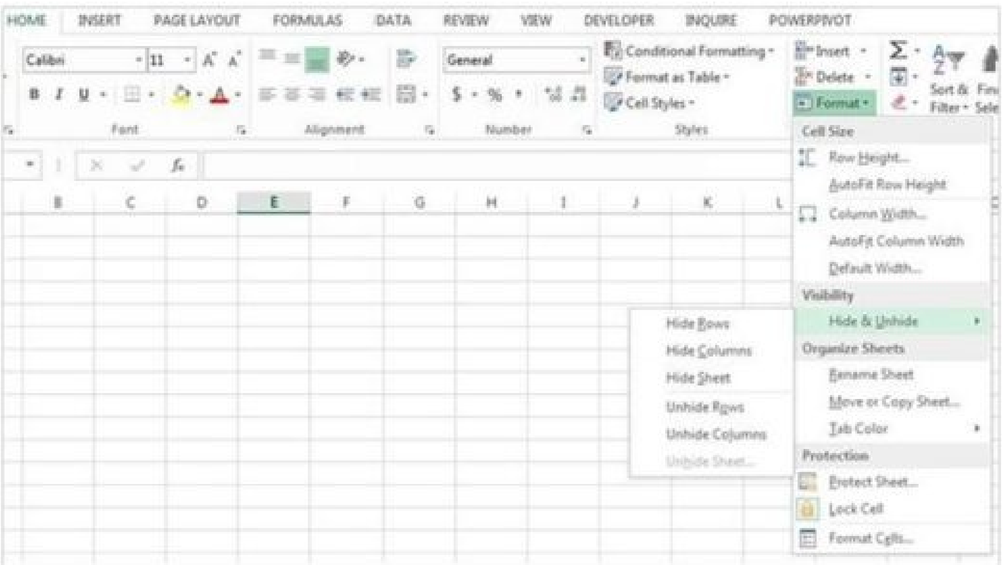


Figure 11.3 - Hide and Unhide Commands in the Ribbon

The abovementioned ways were for hiding rows. The following are for hiding columns.

- Select the column(s) you want to hide, right click and select **Hide**.
- Move the active cell to the column you need to hide, select **Home** tab > **Format** drop down list > **Hide and Unhide** > **Hide Columns.** If you want to hide multiple columns, select a cell in each column and then click **Hide Columns** in the **Format** drop down list.

- Drag the border of the appropriate column to the left till its width is zero.

Excel displays a small space in the heading bar in place of the hidden rows and columns.

How to Unhide the Hidden Rows and Columns

Use either of the following methods to unhide the hidden rows.

- Drag down the small space in the row heading to increase its height and make it visible.
- Select **Home** tab > **Format** drop down list > **Hide and Unhide** > **Unhide Rows**
- Select one entire row above and one below the hidden row, then right click and select **Unhide**.

To unhide the hidden columns,

- Drag the small space in the column heading to the right to increase its width and make it visible.
- Select **Home** tab > **Format** drop down list > **Hide and Unhide** > **Unhide Columns**
- Select one entire column to the left and one to the right of the hidden column, then right click and select **Unhide**.

Adjusting Width and Height

Sometimes you may need to increase or decrease the width and height of a column or row respectively. For example, you can shorten the height of a row to fit more rows in a printable page. Or if a column contains serial numbers or such small characters, you can decrease its width to enhance its appearance. Or you can also increase the height a row to highlight the headings or wrap the text in one cell.

Adjusting Row Height

In Excel, the height of a row is measured in pt as well as pixels (1 inch is equal to 72 pt)

The height of a row by default is 15.00 pt and 20 pixels. This height can vary depending upon the default font in your Excel.

For example, the default font of Excel is Calibri in size 11. With this font, the default height of a row is 15 pt. Now if you have set a different font in your Excel, let's say Times New Roman in size 14. In this case, the default height of each row will be 18.75 pt and 25 pixels.

In short, Excel automatically adjusts the height of a row in accordance to the font type and size. However, if you want, you can change the height manually as well. Following are a few ways to do that.

- Click and drag the bottom edge of a row till it reaches the desired height.
- Move the active cell to the appropriate row, select **Home** tab > **Format** drop down list > **Row Height**. Enter the desired row height in points. Click **OK.** The *Row Height Dialog Box* can also be opened by selecting the entire row, right clicking and selecting **Row Height.**

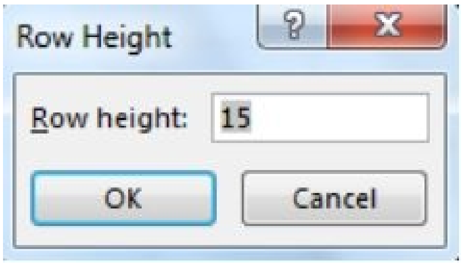


Figure 11.4 - The *Row Height* Dialog Box

- To change the height of multiple rows at once, select them together and then enter the desired height in the *Row Height Dialog Box*

At times you use different fonts and formatting throughout the row, for example, the first cell of the row contains a text value in larger font and the rest are formatted with smaller fonts. In such cases, you can have Excel adjust the height automatically. There are two ways to do that, as listed below.

- Move the active cell to the appropriate row, then select **Home** tab > **Format** drop down list > **AutoFit Row Height**
- Double click the bottom border of the underlying row

Either ways, Excel will adjust the selected row's height to the tallest entry in the row.

Adjusting Column Width

In Excel, the width of a column is measured in units which equate to the number of characters of a monospaced font that will fit in a cell. It is also measured in pixels. The default width in Excel 2013 is 8.43 and 64 pixels. It means that a cell by default can carry 8.43 characters of a monospaced font.

> If a numerical value is displayed as hash symbols (#), it means the value is wider than the column's width. In such cases, you need to increase the width of the column to display the complete numerical value.

Just like rows, Excel automatically adjusts the width of a column in accordance with the number of characters in it. However you can change the width manually as well.

To change the default width of columns in your Excel, Select **Home** tab > **Format** > **Default Width**. This will open up the *Standard Width dialog box*. Enter the desired width in **units** and hit **OK**.

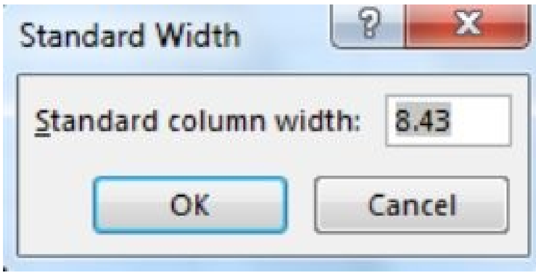


Figure 11.5 - The *Standard Width* Dialog Box

If you don't want to change the default width but the width of a few particular columns, follow either of the below listed ways.

- Click and drag the right edge of the column till it reaches the desired width.
- Move the active cell to the appropriate column, select **Home** tab > **Format** drop down list > **Column Width**. Enter the desired column width in units. Click **OK.** The *Column Width Dialog Box* can also be opened by selecting the entire column right clicking and selecting **Column Height.**
- To change the width of multiple columns at once, select them together and then enter the desired height in the *Column Width Dialog Box*

If you don't want to adjust the width manually, have Excel do it for you. You can use either of the following ways.

- Select a cell(s) in the appropriate column(s), then select **Home** tab > **Format** drop down list > **AutoFit Column Width**

- Double click the right border of the underlying column

Either ways, Excel will adjust the selected column’s width to the widest entry in the column.

	If you have already manually changed a column’s width, Excel will no longer adjust it automatically. You need to change it manually if you see any hash symbols in it.

Chapter 12: Working With Cells and Ranges

You have already learned about data entry. It is one of the most basic things one needs to know in order to work on Excel. However this is not the only way to enter values into cells. You can copy and move values into cells as well. You can rename your cells and attach comments to them. These are what this chapter talks about.

Not only one or two, this chapter contains numerous ways of copying and moving data between cells. You may learn some unique handy tips for filling in adjacent and nonadjacent ranges. Moreover, you will get to know the amazing name manager and commenting feature.

Learn to Copy/Move Ranges

While you work on Excel, you may at times find it necessary to copy or move certain values. For example, you may need to copy a payroll template on every worksheet or at multiple places in the same worksheet. It makes no sense to retype exactly the same thing again and again, and you don't even need to! Excel's copy pasting feature enables you to copy or move values from one cell to another.

> The major difference between copying and moving is the effect on the source of data. In copying, you just copy the selected cells. The original data is unaffected. In moving, the selected data is first removed from the original location and then pasted on the new place.

Here are some common copy/pasting operations that you can perform in Excel 2013.

- Copying/moving a cell to another location in the same or different worksheet.
- Copying a same value in a range of cells.
- Copying/moving a range to another range in the same or different worksheet.

> When you copy/move a cell, not only the underlying value is copied or moved but the formatting, comments, data validation and conditional formatting is copied/moved as well.

When you select cell(s) to copy, the selected area is bordered by an animated dotted line. As long as the animated line is there, the selected cells can be pasted. Once the border is gone, you cannot paste them unless you copy them again. There is not any time period for the animated border. It stays there till you hit **Esc** on your keyboard or start working on any other cell.

When you paste cells, Excel first deletes the cells in the target location and then pastes the new ones. In other words, it overwrites the cells without even warning you once. So if you find that you have pasted cells over some important cells, immediately click **Undo** on the Quick Access toolbar or **Ctrl + Z** on your keyboard to revert the pasting operation.

Since copying and moving are one of the most commonly performed activities on Excel, there are several ways for it; explained as follows.

Shortcut Commands

The first way of copying and pasting is by using the shortcut menu commands.

To copy; select the cell or range of cells that you want to copy, right click and select **Copy**. Then move to the location where you want to copy them. Right click again and select the first icon in the Paste options; as shown in Figure 12.1

To move; select the cell or range of cells that you want to move, right click and select **Cut**. Then move to the location where you want to move them. Right click again and select the first icon in the Paste options. *The other Paste options are explained later on the in this chapter.*

Instead of right clicking and then selecting Paste, just move to the desired location and hit **Enter** on your keyboard. This will also paste the copied cells. However this method removes the animated dotted line as well, thereby making the selected cell(s) unavailable for pasting again. So use this way only if you want paste the selected data once.

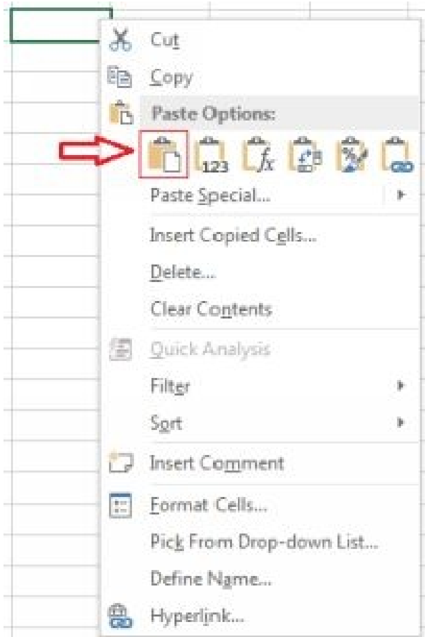


Figure 12.1 – Showing the First Icon in the Paste Options

Ribbon Commands

You can copy/move cell(s) using the Ribbon commands as well.

1. *To copy;* select the cell(s) you want to copy. Choose **Home** tab and click the copy icon located in the clipboard group. The said icon is shown in Figure 12.2.

2. Now go to the location where you want to copy, choose the **Home** tab and select the icon right beneath where it is written Paste. Or you can also move to the destination cell and hit **Enter** to paste. The latter way of pasting removes the copied cells from the clipboard, hence they cannot be pasted again.

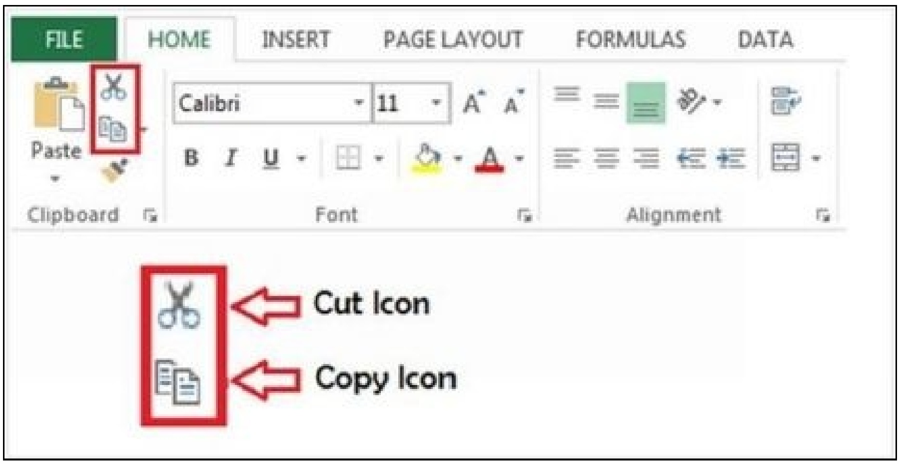


Figure 12.2- Showing the Cut and Copy Icon

To move a cell or range of cells, follow the same procedure explained above except for one difference: Instead of the copy icon, click the Scissor-like Cut icon in step 1. The said icon is shown in Figure 12.2

Advanced Copying Options

The copy icon in the clipboard of the Home tab contains a drop down list which gives you two options to copy the selected cells. The first option is the simple Copy command which is explained in the previous heading. The second option "Copy as Picture" allows you to select the cells as image.

Once you click **Copy as Picture** in the drop down list, Excel displays the *Copy Picture Dialog box*, as shown in Figure 12.3

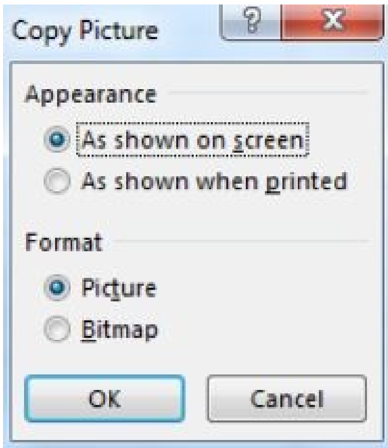


Figure 12.3 - Showing the *Copy Picture* Dialog Box

Selecting **As shown on screen** copies the data with Excel's borders. When you will paste the selected data, the pasted image will contain the gridlines.

Selecting **As shown when printed** copies the data without the Excel's borders. So when you will paste the selected data, the pasted image will not contain the gridlines.

Shortcut Keys

You can also copy and move cells using the traditional MS Office copy pasting keyboard shortcuts.

To copy cells:

1. **Select the cell(s) you want to copy and hit Ctrl C**
2. **Move to the destination cell and hit Ctrl + V**

To move cells:

1. Select the cell(s) you want to move and hit **Ctrl X**
2. Move to the destination cell and hit **Ctrl + V**

Drag and Drop

This is a very interesting way to copy and paste cells in Excel. It is also a bit different than others. Unlike other ways of copying and moving, this one does not save the information on the clipboard.

The best thing about the *drag and drop* method is that it displays a warning dialog box if a move operation tends to overwrite the existing cells at the new location.

> The warning dialog box only appears in case of moving. Excel does not warn you if a copying operation is overwriting existing cells.

Here is the drag and drop method to copy cells in Excel:

1. Select the cell or range of cells that you want to copy.
2. Hold down the **Ctrl** key and move the cursor to the edge of the selected range.
3. When the cursor reaches the edge, you will notice that a small plus sign is attached to the mouse pointer. At this point, click and drag the selected range to the new location. Make sure the **Ctrl** key is pressed all the time while you are copying the particular range.
4. Release the **Ctrl** key and the mouse button after you have dragged the selected cells. Excel will copy the particular range to the location while the underlying cell(s) will still be there in their original location.

The process to move a cell or range using the *drag and drop* method is the same except for one difference: Here you do not need to press the Ctrl key. Just select the cell(s), move the cursor to the edge of the selected range, then drag and drop to the new location.

> If you are unable to use the drag and drop method, select **File** > **Options** > **Advanced**. Put a checkmark on the checkbox labeled **Enable Fill Handle and Cell Drag-and-Drop**. Just write below this checkbox, there is another checkbox labeled **Alert before overwriting cells**. Make sure it is marked as well or else Excel will not alert you when a moving operation will overwrite existing cells.

Moving To Other Sheets

It is not only the same worksheets where you can copy or move cells. All the copying and moving methods explained in this book can be used to copy or move cells to another worksheet as well, whether it is in the same workbook or other. Just make sure the workbook that contains the new location is open before you select the cell(s) to copy or move.

Apart from the other methods of copying, there is one exclusive way to copy cells in between worksheets of the same workbook.

1. First, select the cell(s) you want to copy
2. Hold down the **Ctrl** key and select the sheet tabs of the worksheets in which you want to copy.
3. Select **Home** > **Fill** > **Across Worksheets**. You will find the Fill icon in the Editing group. It is the downward arrow icon enclosed in a square. You will find it right above the pink eraser icon.
4. The *Fill Across Worksheets* dialog box will open up, as shown in Figure 12.4. Select **Contents** if you just want to copy the values; Select **Format** if you want to copy the format only; Select **All** if you want to copy both.
5. Click **OK** once done.

Figure 12.4 - The *Fill Across Worksheets* dialog box

Excel will copy the selected range at the same location in the selected worksheets. For example, if the original cells occupied the first five cells in Row1, then the copied cells will also take the same position in other worksheets.

This method allows you to copy a range in more than one worksheet at the same time. For example, if you want to copy cell(s) in Sheet1, Sheet2 and Sheet3, select the cells you want to copy and click the sheet tabs of the corresponding worksheets while the **Ctrl** key is pressed. After this, follow the same procedure as explained above from step 3 onwards.

You need to be careful while using this copying procedure. You can overwrite important data in other worksheets without even realizing. So don’t forget to check the destination cells in the worksheets before performing this operation. Make sure they are blank or contain unneeded data. Just like the other copying methods, this one does not warn you before overwriting existing cells

Filling In Contiguous Cells

Copying values and formulas to adjacent cells is a very common operation that is done very frequently in Excel. It is mostly performed while copying formulas.

When you copy/move a cell that contains a formula, it only copies/moves the underlying formula. The cell references in the formula are automatically changed in pertinence to the new location.

Take a look at Figure 12.5 for example. In this worksheet, Column D contains the sum of values in Column B and Column C. Now you can enter a sum formula for every product but that would be very time consuming. A far better alternative is to enter formula in Cell D2 and then copy the same formula in all the cells below it. As you can see in the image, only the formula is copied down the range. The values are not same; they are changed in relevance to the new location. Column E shows the formulas that are contained in the corresponding cells in Column D. This is how the formulas are changed when you copy them down in adjacent cells.

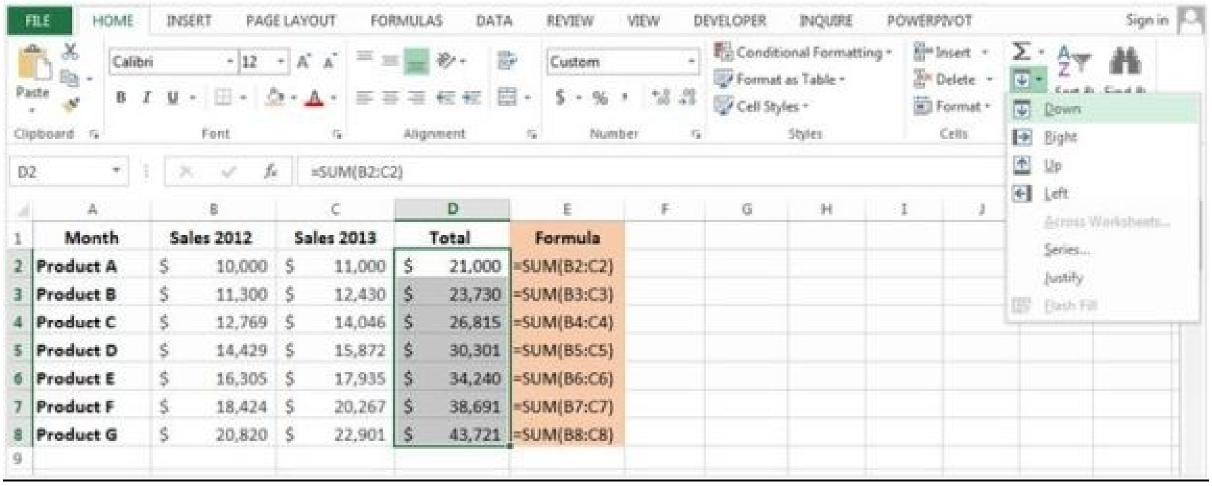
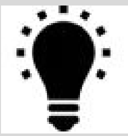


Figure 12.5 - Example of Copying Formula in Contiguous Cells

Now that you know the application of adjacent cell copying, here is how you can actually perform it.

Select the range in which you want to copy including the cell that you want to copy (In Figure 12.5, it is Cell D2 to Cell D8). Now perform either of the following actions:

- To copy the cell(s) to the selected range below, Select **Home** > **Fill** > **Down**. Or you can also hit **Ctrl + D** on your keyboard.
- To copy the cell(s) to the selected range to the right, Select **Home** > **Fill** > **Right**. Or you can also hit **Ctrl + R** on your keyboard.
- To copy the cell(s) to the selected range above, Select **Home** > **Fill** > **Up**.
- To copy the cell(s) to the selected range to the left, Select **Home** > **Fill** > **Left**.



You can copy to adjacent cells using the AutoFill feature as well. Select the cell you want to copy and drag the AutoFill handle to the destination cells. Or you can also double click the AutoFill handle to copy the value or formula to the underlying range.

Pasting From the Office Clipboard

Whenever you copy or cut any cells in Excel, they are saved on two Clipboards; namely the Windows Clipboard and the Office Clipboard.

The Clipboard copy-paste method is not valid for "*drag and drop*" and “*Filling in Contiguous Cells*” methods. If you copy data using any of the two methods, it will not be saved in the Clipboard.

The Windows Clipboard is a part of your computer’s memory. All the copied data is saved there in a particular format. The information saved in Windows Clipboard can be pasted to other Window’s apps as well.

The Office Clipboard is the built-in clipboard of Microsoft Office. It is available and can be used in Office apps only. It is one of the ways to copy and move cells in Excel.

If you want to use the Clipboard for copying or moving, first you need to open it on your Excel. Just click the small downward diagonal arrow located at the bottom right corner of the clipboard group in the home tab; as shown in Figure 12.6. This icon opens and closes the Office Clipboard.

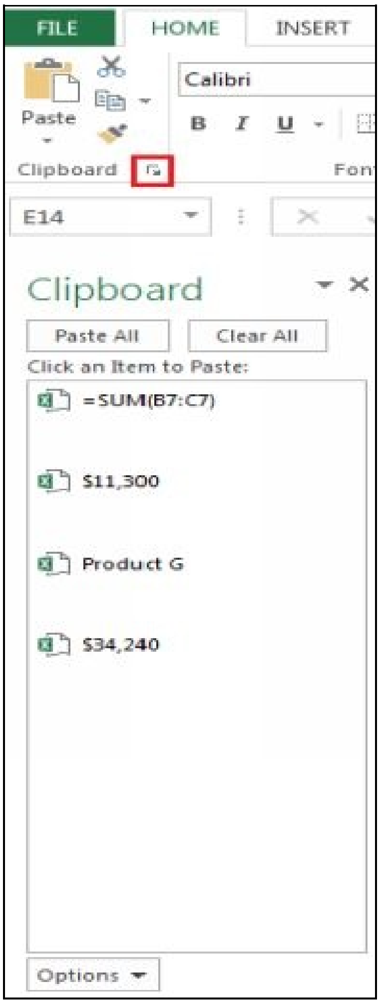


Figure 12. 6 - Showing the Office Clipboard

For keyboard users, press **Ctrl + C** twice to open the Clipboard. If this shortcut key is not working, open the clipboard by clicking the small downward diagonal arrow in the clipboard board of the home tab, click **Options** located at the bottom of the Clipboard and select **Show Office Clipboard When Ctrl+C Pressed Twice**.

Once your clipboard is open, select the cell(s) you want to copy or move and copy or cut using any of the methods explained in this book. The simplest one is clicking **Ctrl + C** to copy and **Ctrl + X** to cut.

The copied items will appear in the Clipboard. The Office Clipboard can hold up to 24 items at a time. If you add more items, it will start deleting items from the bottom of the clipboard.

Move the cell pointer to the location where you want to place the copied cells.

If you want to paste just one item, click it in the clipboard. If you want to paste all the items, click **Paste All** located at the top of the Clipboard task pane. The items are pasted from bottom up; that is the bottom item in the clipboard will be pasted first followed by the second last item and so on.

The **Paste All** command is very useful when you need to copy cells from multiple ranges and paste them on one worksheet. For example, if you want to make a list of data entered in Cell A1 in all the worksheets, select the cells one by one, then move to the new location and click **Paste All**.

The **Paste All** command does not work if any image is copied in the clipboard.

To clear all the items in the Office Clipboard, click the **Clear All** button located just right next to the **Paste All** button

Here are a few more things that you need to know about the mechanism of the Clipboard.

- The last item that you copy or cut to the Office Clipboard is also saved in the Windows Clipboard.
- If you paste a data from the Office Clipboard, Excel pastes the same data on the Windows Clipboard as well.
- Whatever items you clear from the Office Clipboard, the same are removed from

the Windows Clipboard as well.

> The Office Clipboard of Excel cannot hold up formulas. In other words, it cannot be used to copy and move formulas in Excel. If you copy any formula in the Office Clipboard, it will just copy the value in the underlying cell and will paste the same in the new location.

Pasting Options

You may not always want to copy everything of the selected cell. At times, you may need to copy the formula only, or the formatting only or you may want to copy the results of the formulas rather than the complete formula itself.

Excel gives you several options to paste other than the default pasting option that copies/moves everything in the selected cells. You can find these options in the Paste drop down list located in the clipboard group of the home tab.

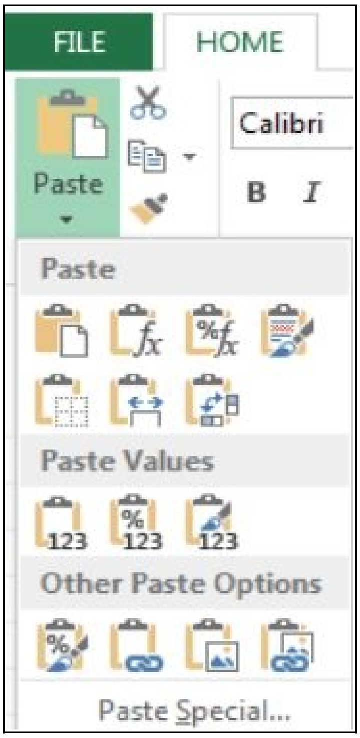


Figure 12.7 - Additional Pasting Options

Paste (P): The first option is the simple Paste option. It pastes the entire cell’s content and everything in it including the formatting and data validation.

Formulas (F): It pastes just the formula; no values and no formatting.

Formulas & Number Formatting (O): This command pastes the formula as well as the number formatting.

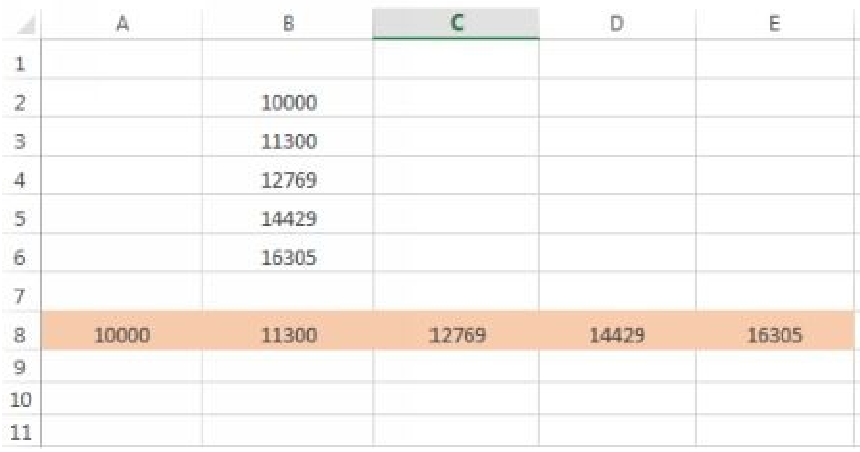
Keep Source Formatting (K): This command pastes the formula and all formatting.

No Borders (B): This command pastes the entire cell’s content and everything in it except the borders in the selected range

Keep Source Column Width (W): It pastes the formula and applies the same column width to the new location as it was of the selected cells.

Transpose (T): It changes the alignment and orientation of the selected cells. Rows are pasted as columns and vice versa. If there are any formulas in the selected range, they are also adjusted in relevance to the corresponding values when transposed.

In Figure 12.8, the values in Column B are original values and those highlighted in Row 8 are the transposed values.



	A	B	C	D	E
1					
2		10000			
3		11300			
4		12769			
5		14429			
6		16305			
7					
8	10000	11300	12769	14429	16305
9					
10					
11					

Figure 12.8 - Illustrating the Transpose Pasting Command

Values (V): This command pastes the values only; no formatting. If you have copied a range of formulas, this option will paste only the result of formulas.

Values & Number Formatting (A): It pastes the values only or the results of the formula plus the number formatting.

Values & Source Formatting (E): It pastes the values or the results of the formula plus the entire formatting.

Formatting (R): It only pastes the formatting of the selected cells.

Paste Link (N): It paste the formulas contained in the selected cells.

Picture (U): This command pastes the selected range as an image.

Linked Picture (I): This pasting command pastes the copied cells as an animated live image the values in which are updated in accordance to the source of the data. In other words, if you make any changes in the copied cells, the same will be updated in the live image.

Merge Conditional Formatting (G): This icon appears in the pasting option only when the copied cells contain any type of conditional formatting. This command merges the conditional formatting of the selected cells to the conditional formatting, if any, in the new location.

Paste Special: This command is located at the bottom of the pasting options. It opens the *Paste Special* dialog box, which is explained in the next section.

Paste Special

The Paste Special dialog box is yet another way of pasting the copied cells. It contains all the pasting options explained above plus a few more.

> To open the Paste Special dialog box, you need to copy the particular cells. This dialog box cannot be used to move cells. In other words, the Paste Special option won’t display if you have cut cells

To open the Paste Special dialog box, copy the cell(s) you want to paste, then select **Home** > **Paste** drop down list > **Paste Special**. Or you can also right click the copied cells and select **Paste Special** from the shortcut menu.

Select the desired pasting option in the Paste Special dialog box and click **OK**.

> For keyboard users, hit **Ctrl + Alt + V** to open the *Paste Special* Dialog Box

Figure 12.9 shows a Paste Special Dialog box.

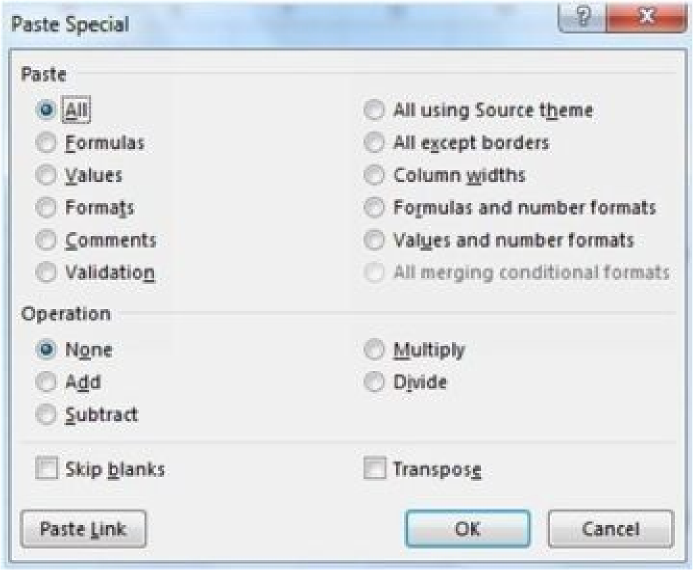


Figure 12.9 - The *Paste Special* Dialog Box

As you can see in the above image, the Paste Special dialog box contains several pasting options. While some of them have already been explained in the previous section, following is a brief description of all the Paste Special options.

All: This command pastes the entire cell's content and everything in it including the formats and data validation.

Formulas: It pastes formula and values; no formatting

Values: This command pastes the values only; no formatting. If you have copied a range of formulas, this option will paste only the result of formulas.

Formats: It pastes only the formatting of the selected cells.

Comments: It pastes the comments attached to the copied cells. This option pastes only the comments; no values and no formatting.

Validation: It pastes the data validation rules of the copied cells to the target cells.

All using Source theme: This command pastes the entire cells' content and everything in it except the formats. It uses the same formatting as the document theme of the source. This pasting command is useful when you are copying cells from a different workbook that uses a different document theme than the current one.

All except borders: This command pastes the entire cell's content and everything in it except the borders in the selected range

Column widths: It applies the column width settings of the copied cells to the destination cells.

Formulas and number formats: This command pastes the formula as well as the number formatting.

Values and number formats: This command pastes the values or results of the formulas and the number formatting.

All merging conditional formats: This pasting command is active only when the copied cells contain any type of conditional formatting. This command merges the conditional formatting of the selected cells to the conditional formatting, if any, in the new location.

Operation: As you can see in Figure 12.9, the operation section of the Paste Special dialog box contains 5 commands; namely, *None*, *Add*, *Subtract*, *Multiply* and *Divide*. By default, *None* is checked. The other commands allow you to perform simple mathematical operations in the destination cells.

To use the operation commands, copy cell(s) and move the cell pointer to the destination cell, then open the Paste Special dialog box and select the appropriate operation command. Click **OK** once done. This will apply the selected operation on the copied cells and the values contained in the destination cells.

Suppose a cell contains a numeric value of 500. You want to add 250 to this value and paste the result in another cell. To do so, copy the cell containing 500, then move the cell pointer to the cell containing 250 and open the Paste Special dialog box. Select **Add** and Click **OK**. The cell that previously contained 250 will now be replaced with 750 (500+250).

You can also use these commands to perform a mathematical operation on one copied cell and paste to a range of cells. Suppose that a range of cells contains numeric values and you want to increase all these values by 10%. To do so, first type **110%** in a cell and copy this cell. Now select the range that you want to increase and open the Paste Special dialog box. Select **Multiply** and Click **OK**. Each value in the selected range will be multiplied by 110%.

> It replaces the values in the destination cells as well as the formulas, if there are any. Make sure to check the destination range before applying any operation command as it may modify the formula in it.

Skip blanks: This pasting command saves the destination cells from being overwritten with blank cells in the copied range. In other words, if your copied range contains blank cells, they won't overwrite the values in the destination cells. It skips the empty cells and pastes only the filled ones.

Transpose: It changes the alignment and orientation of the selected cells. Rows are pasted as columns and vice versa. If there are any formulas in the selected range, they are also adjusted in relevance to the corresponding values when transposed.

Paste Link: This option creates a formula that links the destination range to the source range. In other words, if you make any changes in the underlying cells, the same will be updated in the destination cells.

Commenting to Document Your Work

Adding comments is a way to document to your work. You can attach comments to cells to explain the assumptions, formulas, calculations or any other details. You can also put comments as reminders or alerts for errors.

Here is how you can attach comments to cells in Excel.

1. Select the cell that you want to document
2. Select the **Review** tab and click the **New Comment** button.
3. A small comment box will appear next to selected cell. Type your comment in it.

> For keyboard users, press **Shift + F2** to attach a comment box to the selected cell.

Figure 12.10 shows cells containing comments.

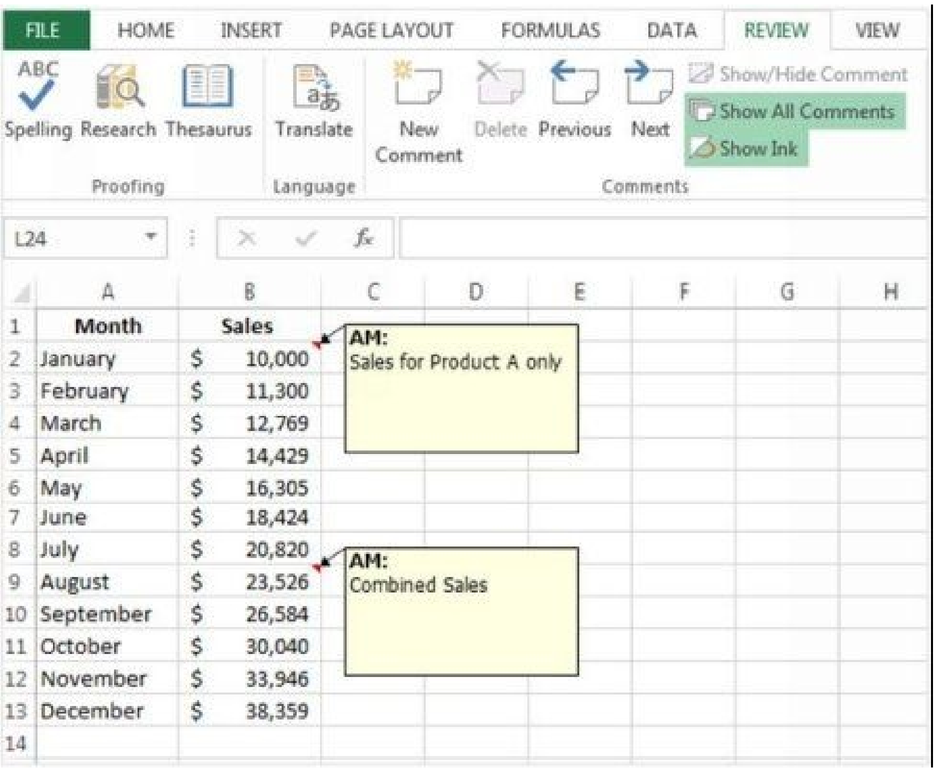


Figure 12.10 - Showing Comments in Excel

The comment box shows your name at the top. To delete your name from the comment, take the cursor there and simply delete it by hitting backspace on your keyboard. You can also enter any other name, if you want.

If you want any other name to display in every comment box, select **File** > **Options** > **General**. There you will find a user name type box containing your name in it. Type the name that you want to appear in the comment box and hit **OK**. From then onwards, any comment box you add will display the new user name.

Formatting Comments

Comments are not carved on stone. They can be formatted and edited. You can even change the shape of your comment as well as add a picture in it.

Let's start with the basic formatting and then we will move on to some advanced comment formatting tricks.

To edit a comment, right click the particular cell and select **Edit Comment**. This will put the comment in the edit mode. You can make the changes in the text of the comment.

If you want to change the formatting, right click a comment in its edit mode and select **Format Comment**. This will open the *Format Comment dialog box*.

You can change the font type, size, color and can even add some effects to the text. Click **OK** once done.

Adding Pictures in A Comment Box

To add any image in a comment box, first put the comment in the edit mode, then right click the comment's border and select **Format Comment**. This will open the Format Comment dialog box, as shown in Figure 12.11

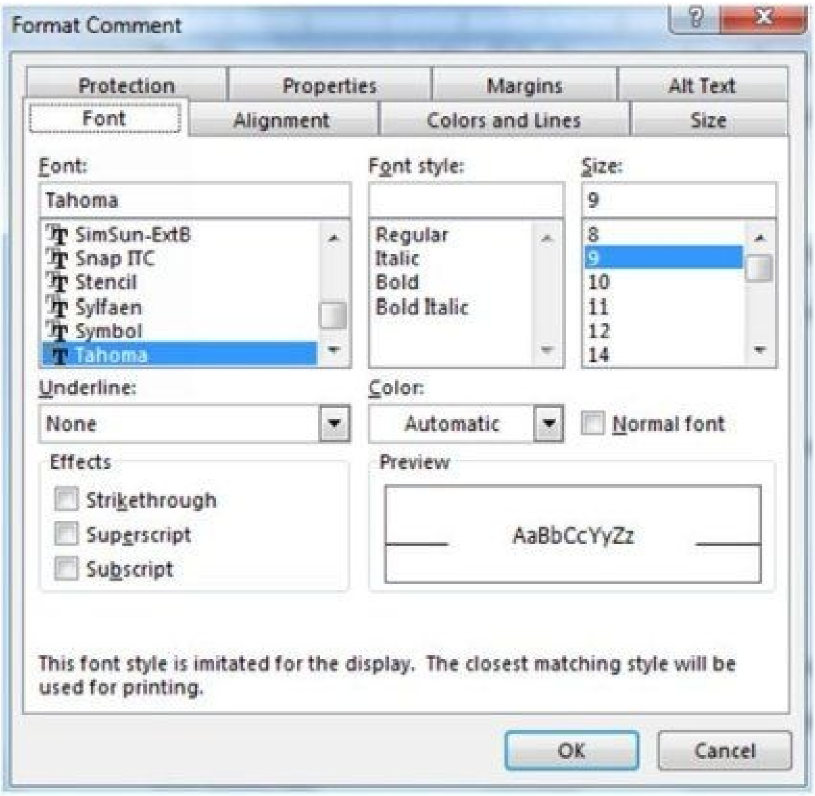


Figure 12.11 - Showing the Format Comment Dialog Box

Click over the Colors and Lines tab. Click the Color drop down list and select **Fill Effects**. This will open the Fill Effects dialog box. Select the **Picture** tab and click **Select Picture**.

You will get three options; you can insert images from your computer or from Office.com Clip Art or you can search and get images from the web. Click over the appropriate option and select the desired image.

If you are unable to find the *Colors and Lines* tab in the Format Comment dialog box, it means you have not right clicked the border of the comment. It is very important that you right click the edge of the comment to open the complete Format Comment dialog box. If you will right click anywhere else on the comment, it may just open the *Font* tab in the Format Comment dialog box.

Giving New Shape to the Comment Box

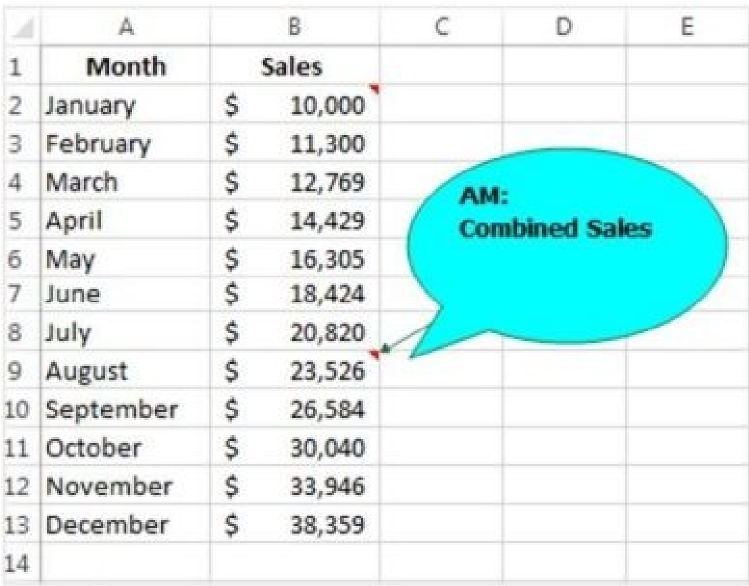
Comment boxes are rectangular by default. However you can give them any shape you want. To do so, first you need to add the *Change Shape* command in the Quick Access toolbar. Here is how you can do that.

1. Right click the Quick Access toolbar and select **Customize Quick Access Toolbar**. This will open the Quick Access toolbar category of Excel options.
2. Select **Drawing Tools | Format Tab** from the *Choose Commands drop down list*.
3. Select **Change Shape** in the list underneath and click **Add**. Click **OK** to close the dialog box.

Now that you have added the Change Shape command to the Quick Access Toolbar, here is how you can use it to the change the shape of your comment box.

1. Make sure the comment is in the visible mode. You can do so by right clicking the particular cell and selecting **Show/Hide Comments**
2. Now click the comment's border and then click the **Change Shape** button in the Quick Access Toolbar.
3. Select the desired shape.

Figure 12.12 shows a comment box in an oval callout shape filled with blue color.



	A	B	C	D	E
1	**Month**	**Sales**			
2	January	$ 10,000			
3	February	$ 11,300			
4	March	$ 12,769			
5	April	$ 14,429			
6	May	$ 16,305			
7	June	$ 18,424			
8	July	$ 20,820			
9	August	$ 23,526			
10	September	$ 26,584			
11	October	$ 30,040			
12	November	$ 33,946			
13	December	$ 38,359			
14					

Figure 12.12 - Changing the Shape of a Comment Box

Managing Comments

The presence of a comment is indicated by a small red triangle located in the top right corner of the particular cell. To reveal a comment, move the cell pointer or cursor to the particular cell.

Managing Individual Comments

If you want a comment to display at all times, even when a cell is not selected, right click the cell and select **Show/Hide Comments**. To revert to normal settings, right click again and select **Hide comments**.

Another way of revealing a comment is to select Review tab > **Show/Hide Comment**. Clicking it again will hide the comment. This process is for individual cells. In other words, you need to do this with every comment you want to show or hide.

Managing All Comments

To apply the same Show/Hide settings to all the comment boxes, select **File** > **Options** > **Advanced**. There in the display section, you will find a heading **"For cells with comments, show**:" This heading contains three sub-options as shown in Figure 12.13

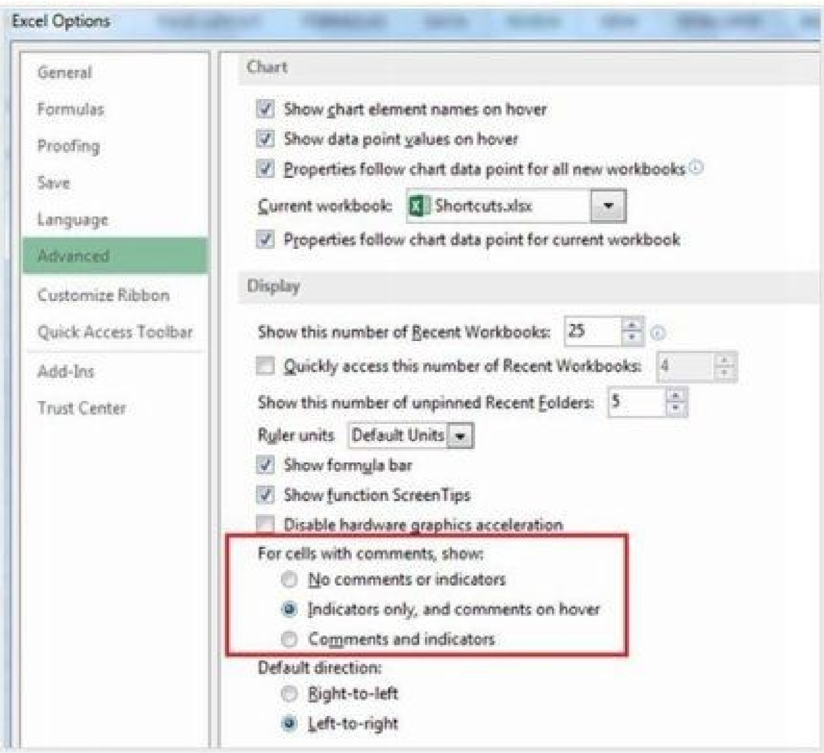


Figure 12.13 - Show/Hide Settings for Comments in Excel

If you select **No comments or indicators**, it will hide all the comments as well as the red triangle indicators.

If you select **Indicators only and comments on hover**, it will show the red triangle indicators while the comments will be displayed when the cursor is taken over the particular cell.

If you select **Comments and indicators**, it will show the indicators as well as the comments regardless of where the mouse pointer is.

Another way of showing all the comments regardless of the location of the mouse pointer is to select **Review** tab > **Show All Comments**. Click it again to hide all the comments.

Here are a few more tips for managing comments.

- To expand the comment box, click and drag it from the edges to the desired size.
- To select all the cells containing comments, go to the Home tab. Click **Find & Select** > **Comments**.
- To delete a comment, right click the pertinent cell and select **Delete Comment**. Or click **Delete** in the **Review** tab.
- To read all the comments in a workbook without having to click on each cell individually, select the **Review** tab and click the **Next** button to cycle through all the comments. Click **Previous** to read all the comments one by one in a reverse order.
- Click the **Show Ink** button to reveal the ink annotations, if any.

Printing Comments

If you want, you can print the comments along with the worksheet. Here is how you can do this.

Select the **Page Layout** tab on the ribbon. Click the small downward diagonal arrow located at the bottom right corner of the *Page Setup* group.

This will open the Page Setup dialog box. Click the **Sheet** tab and expand the **Comments** drop down list.

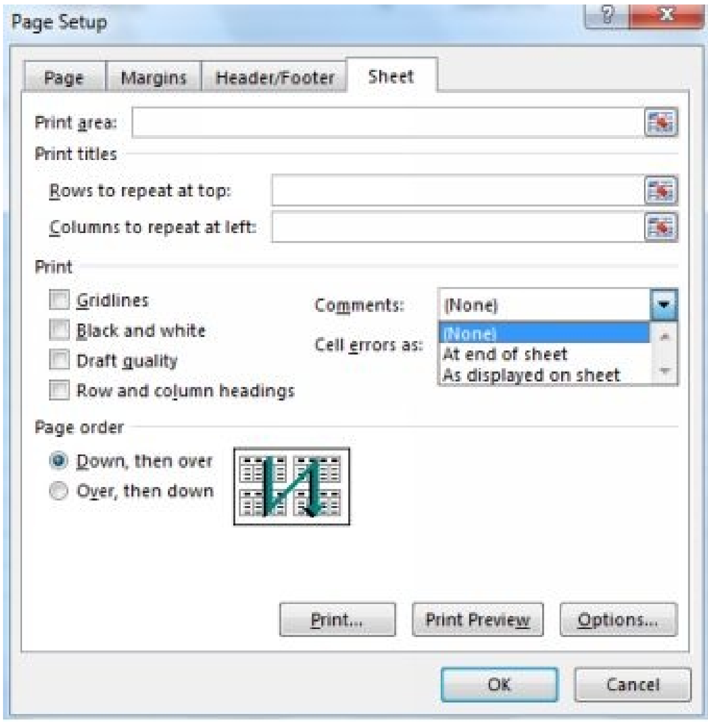


Figure 12.14 - Showing the *Comments* Drop-Down List In the Page Setup Dialog Box

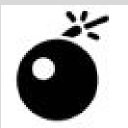
As you can see in Figure 12.14, there are three options in the Comments drop-down list.

If you select **None**, Excel will print none of the comments.

If you select **At end of sheet**, Excel will print all the comments in simple text form at the end of the printed document.

If you select **As displayed on sheet**, it will print the comments on the same location as they are on the worksheet.

Select the desired option and confirm the Print operation.



If you are selecting the **As displayed on sheet** option, keep in mind that the comments may obscure some cells of the worksheet in the print version. Moreover, if there are too many comments on a worksheet, they may overlap in the hard copy.

To see how the comments would appear in the print form, check the Print Preview before printing. *Refer to Chapter 15 for more explanation on printing in Excel.*

Naming Ranges

When working on large spreadsheets containing innumerous cells and formulas, typical cell address can make the work more confusing and complicated. You cannot possibly memorize all the cell names. Even if you do, moving back and forth to refer a formula in far end of sheet to a cell in the first row can be quiet hectic.

Suppose you need to enter a formula in the Cell XC104 and the formula needs to be referred to the value in Cell A5. Now both these cells are quite far from each other in the worksheet. You would either have to memorize the cell name that you need to refer to or move the active cell all the way to the particular cell. Don’t you think moving back and forth between such huge gaps in the worksheet would be very time consuming, especially if a same value needs to be used frequently throughout the worksheet?

How about renaming the cell so that you can memorize it easily and then put it in the formula without having to move all the way to the particular cell? Excel allows you to rename individual cells as well as ranges. Continuing the above example, you can name cell A5 as **Discount_Rate**. Now this is very easy to remember and would save a lot of your time.

Moreover, working with names makes navigating worksheet easier. You can move to any cell or range by entering its name in the Name box, located at the left side of the formula bar. The best thing about naming ranges is that you don’t even have to memorize them. Just click the drop down list of the name bar and it will list down all the defined names.

Above all, naming ranges makes the formulas more readable and easier to understand. For example, **Sales + Cost** is more understandable than **C13+C19.**

Now that you know the advantages of naming cells, let’s see how you can actually do that.

Quick Rules of Thumb

There are several ways of naming cells and ranges in Excel, each having their own characteristics and mechanism. However one thing is common among all, the rules. Regardless of which method you opt for, there are some basic rules that you need to follow while naming cell(s) in Excel.

> Excel does not accept names that exceed 255 characters. So make sure your name is limited to it. Moreover it is highly recommended to keep the names as short as possible. Shorter names are easy to remember and take up less time in typing.

You cannot put any spaces in names, Excel will not accept that. Instead of space, you can use an underscore character (_).

Names can’t contain any symbols, except for backslash, underscore and period.

You can make any combination of letters and numerals but make sure your name begins with a letter, a backlash or an underscore. You cannot start a name with a number.

You cannot use any other cell’s name. For example, you cannot name a cell BZ34. This is already the name of a cell, hence cannot be given to any other cell. If still you want to give this name to a cell, precede it with an underscore or a backslash.

Avoid using the following names: Print_Area, Consolidate_Area, Print_Titles and Sheet_Title. It is because Excel already uses these names for some technical purpose.

How to Name Cells and Ranges?

There are several ways of naming cells and ranges in Excel, as explained below.

Defining Names Using the Name Box

The easiest and commonly used ways of naming cells in Excel is the **Name Box**. It is located on the immediate left side of the formula bar.

Follow the below process to use the Name Box in Excel.

1. Select the cell or the range that you want to name.
2. Go to the Name Box and enter the desired name.
3. Hit **Enter** on your keyboard to confirm the name.

> Pressing **Enter** after typing the name is a very important step. If you don't hit **Enter** and click just anywhere else on the worksheet, Excel will not save that name.

Keep in mind the following while using the Name Box:

- If you use a name that is already in use by any other cell or range, Excel does accept it neither it notifies you of it. So make sure to click the newly named cell or range to check if it is actually named or not.
- If you give a name to a range of cells, the name will not appear in the Name Box unless you select the particular range.
- If you use any invalid character in the name, Excel displays an alert window informing that the reference name is invalid.
- To select a named cell or range, simply click the Name Box drop down list and click over the particular name.

Defining Names Using the New Name Dialog Box

The *New Name* Dialog Box is another way of naming cells and ranges. It is an advanced comprehensive naming tool and gives you more control over the naming feature. For example, it gives you the option to apply the defined name in the entire workbook or just one worksheet.

Follow the below process to use the advanced *New Name* Dialog Box in Excel.

1. Select the cell or range that you want to name.

2. Click over the **Formula** Tab > **Define Name**. This will open the New Name Dialog Box, as shown in Figure 12.15 Right clicking a cell or range and selecting **Define Name** also opens up the New Name Dialog Box.

3. Type the desired name in the '**Name'** type text box. You can also use the name suggested by Excel.

Figure 12. 15 - The New Name Dialog Box

4. Next, select the '**Scope'** for the new name. For example, if you select Workbook, it will name the same cell or range in all the worksheets of the current workbook. Likewise, you can select the worksheet in which you want to name the particular cell or range.

5. If you want, you can add a comment in the '**Comment'** type text box. For example, you can put in a comment to explain the formula used in the particular cell or range.

6. Finally, is the '**Refers to'** type text box. It contains the cell or range you have selected for naming. If you want, you can change the selection here.

7. Click **OK** to confirm the name and close the Dialog Box.

Keep in mind the following while using the *New Name* Dialog Box:

- Once confirmed, you cannot change the scope of a name.

- If a cell or range contains two names one with workbook scope and other with a worksheet scope, the latter will take precedence over the former, hence rendering the workbook-scope name useless.

- If you have defined a name with a worksheet scope but need to use it in other worksheets as well, you can do so by typing the sheet name followed by an exclamation mark and then the name of the cell or range you want to refer to. For example, **Sheet5!Name**. You can type this in the formula bar of any sheet and it will refer to the Name cell or range in Sheet 5.

Defining Names From Selection

The *Create From Selection* button in the Formula tab of the ribbon is the most intuitive and accommodating naming tool in the Excel. It enables you to name several cells and ranges at once.

You can also use the values in one cell to name the corresponding cells. For example, if you want to use the text values in Row 1 to give names to the adjacent cells in Row 2, you can do so by using the *Create From Selection* dialog box.

Follow the below process to define names using the corresponding text values:

Select the cells containing the text values and the cells that you want to name. In Figure 12.16, Column A contains the prospective name and Column B contains the cells that need to be named. Both of them are selected.

Select the **Formulas** Tab. Click **Create From Selection** button. This will open the *Create Names From Selection* dialog box, as shown in Figure 12.16

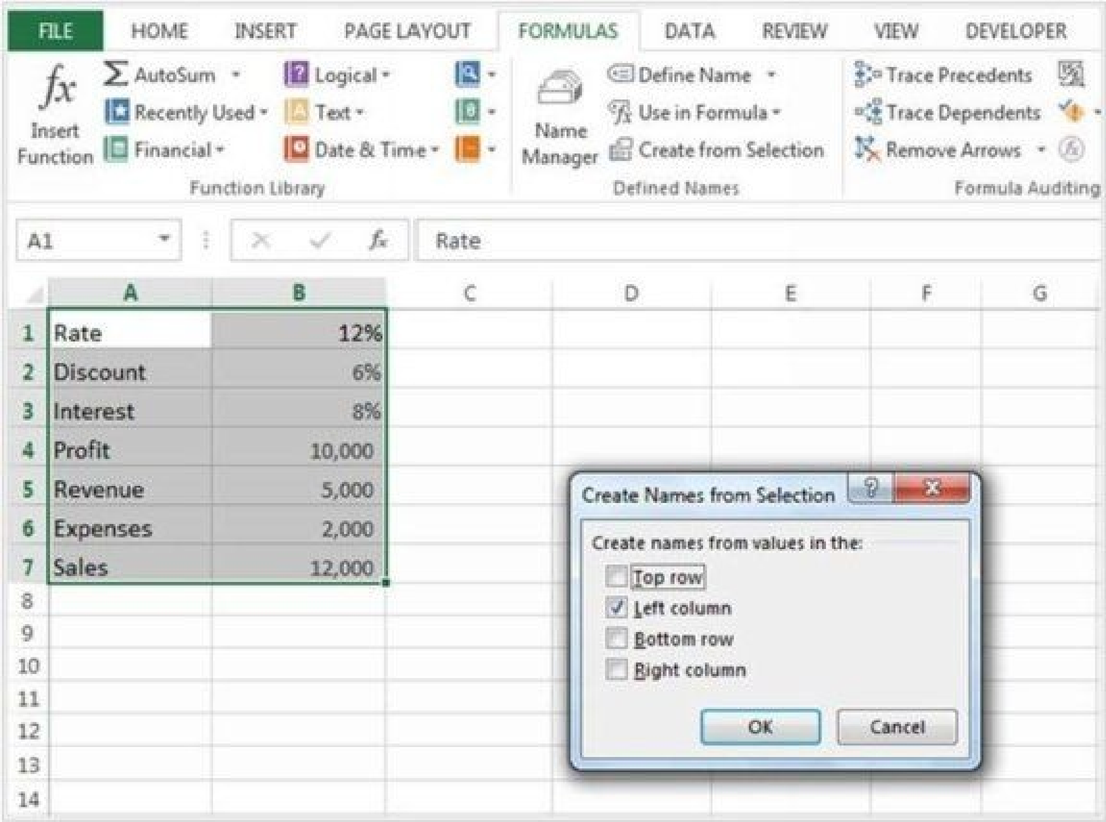


Figure 12.16 - The *Create Names From Selection* Dialog Box

Excel suggests an option based on its analysis of the selected cells. In Figure 12.16, it suggests **Left column**. It means that Excel detects the prospective names to be in the left column of the selected range. If the option suggested by Excel is not correct, select the desired option. If you select **Top row**, Excel will define names based on the text values in the top row. Likewise is for the other options.

Click **OK** to confirm and close the dialog box.

Using the data in Figure 12.16, Excel defined seven names: **Rate** for **Cell B1**, **Discount** for **Cell B2** and so on.

Keep in mind the following while using the *Create From Selection* dialog box:

- If a prospective name is incorrect or contains any invalid characters, Excel edits to make it valid. Suppose the text value is **Discount Rate**. Now this is invalid as it contains a space in it. Excel will put an underscore in place of the space (**Discount_Rate**) to make it valid.

- If a row or column that is supposedly containing text values carries a numeric value as well, Excel simply ignores it and does not create a name for the corresponding cell.

Befriending the Name Manager

The *Create From Selection* is a helpful yet a bit complicated feature. You need to practice it a couple of times with different selections and options to understand it clearly. Don't worry if you mix up names in the selected cells or may need to delete a name. You can delete and edit the names as many times as you want. The *Name Manager* of Excel helps you manage the names of your cells and ranges.

To launch the Name Manager, select the Formulas Tab in the ribbon. Click the **Name Manager** button.

	For keyboard users, press **Ctrl + F3** to open the Name Manager

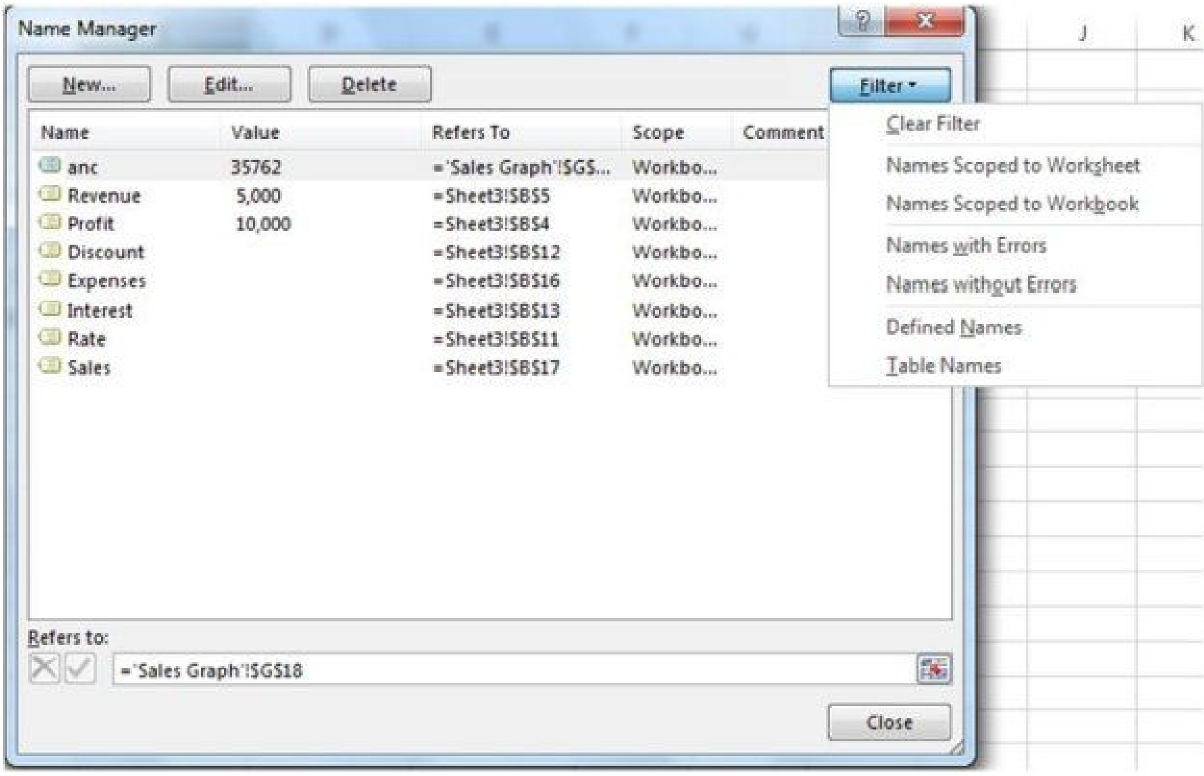


Figure 12.17 - Showing the Name Manager and the Filter Options

As you can see in Figure 12.17, the *Name Manager* displays information about every name in every worksheet of the current workbook. It contains the complete cell address of the names, the values contained in the respective cells, their scope and comment, if any.

There is a **Filter** button at the top right of the Name Manager. You can click this to find more sorting options. For example, you can ask the Name Manager to show only the names with the current worksheet scope, or the names with or without errors and so on.

The Name Manager also contains a direct access to the New Name dialog box. Click the **New** Button to open the *New Name* dialog box and create more names.

If you want to modify any name, Click **Edit**. This will open the *Edit Name* dialog box. It looks exactly the same as the New Name dialog box. The only difference is that the Scope and Comment boxes are locked. In other words, you can edit the name and range only. You cannot make any changes in the scope or comments of the selected name.

To delete any name, simply select the name in the Name Manager and hit the **Delete** button located right next to the Edit button. Or you can also hit **Delete** on your keyboard. In either case, Excel will display an alert window asking you to confirm the requested activity. If you have hit Delete by mistake, click **Cancel** or else Click **OK** to confirm the deletion.

> If you have used a name in any formula, deleting that name would render the respective formula invalid. Excel does not replace the name with the original address of the cell or range. So be careful while deleting any names. If you have deleted any name accidently, immediate click the **Undo** button in the Quick Access toolbar or press **Ctrl + Z** on your keyboard to get back the name.

Generating A List Of Names

At times you may want to keep a record of all the names in the spreadsheet or to print them in hard copy. In either case, you need to generate a list of all the names in Excel as you cannot print the names directly from the Name Manager.

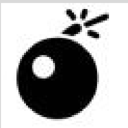
To create a list of the defined names of cells and ranges,

1. Select any empty cell in a worksheet.
2. Hit **F3** to open the *Paste Name* dialog box, as shown in Figure 12.18

Figure 12.18 - The *Paste Name* Dialog Box

3. Click **Paste List**.

This will create a list of all the names along with their cell addresses.

	Be careful while selecting the cell for creating list of names. Excel pastes the list vertically and it overwrites any existing data without informing or asking for permission. So make sure the cells beneath the selected cell and adjacent to them are either blank or does not contain any important data.

Chapter 13: Using Templates in Excel 2013

A template is a model that serves as a basis for creating workbooks and worksheets. Templates can carry values as well as formatting. They not only save time but help you to maintain a consistent theme and appearance of spreadsheets that needs to be created on regular basis.

For example, if you make payroll sheets every month, you can create a payroll template and use it to create every month's payroll sheet. This will save you from typing the same headings and doing the same formatting every month. All of it will be saved in your payroll template. You just have to change the values.

If you don't want to create your own template, you can use the ones provided in Excel 2013 or you can also get them online. This chapter tells you all you need to know about templates. It introduces you to Excel's amazing templates. You will also learn different ways of customizing and creating templates.

Finding Your Required Template

Templates were there in the previous versions of Excel as well, however this time they are more intuitive and in huge variety. Excel 2013 offers numerous templates including Online sales tracker, Simple monthly budget, Daily work schedules, Flowcharts, Wedding Invite Tracker and so on. Whether you are creating a spreadsheet for academic purpose, office work or personal use, you will find a template in Excel for all categories.

There are templates for grocery list, class attendance, coloring book and much more. Excel's list of templates is ending. You just need to find the right one of you. And this is very simple.

There are several ways to find the template you are looking for.

- When you open Excel 2013, on the left side are the recently opened files and on the right side are the templates. Scroll down and look for the desired file.
- You can also open the templates window by clicking **File** > **New**.
- If you are unable to find the template you need, search for it in the "*Search for online templates*" text box, as shown in Figure 13.1

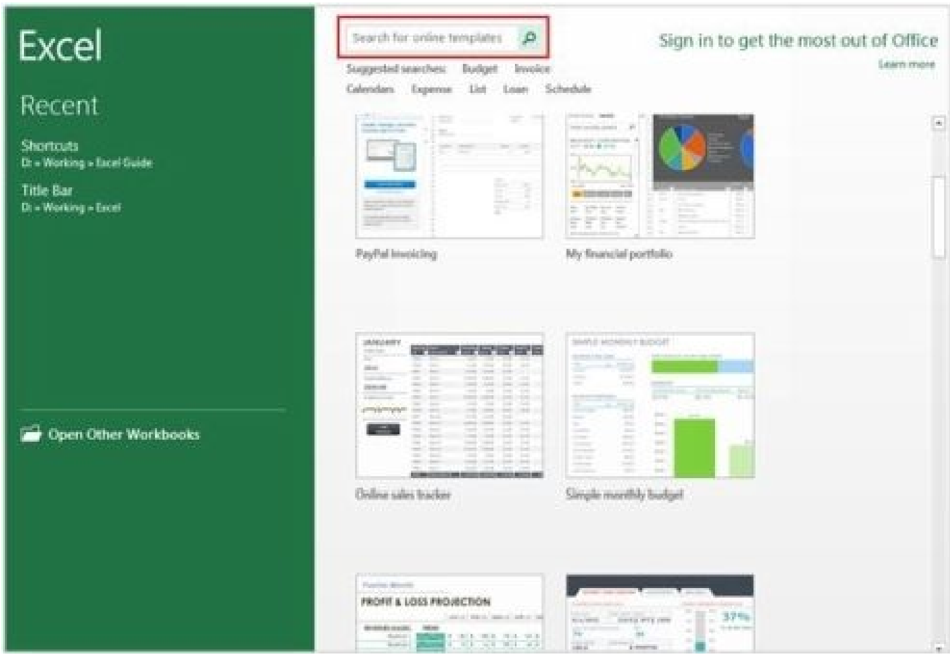


Figure 13.1 - Searching For Templates

Another way of finding the required template is to click any of the suggested searches. Doing so will open the category page of templates. As shown in Figure 13.2, on the right side is the list of categories. Click on any category to open the pertinent templates.

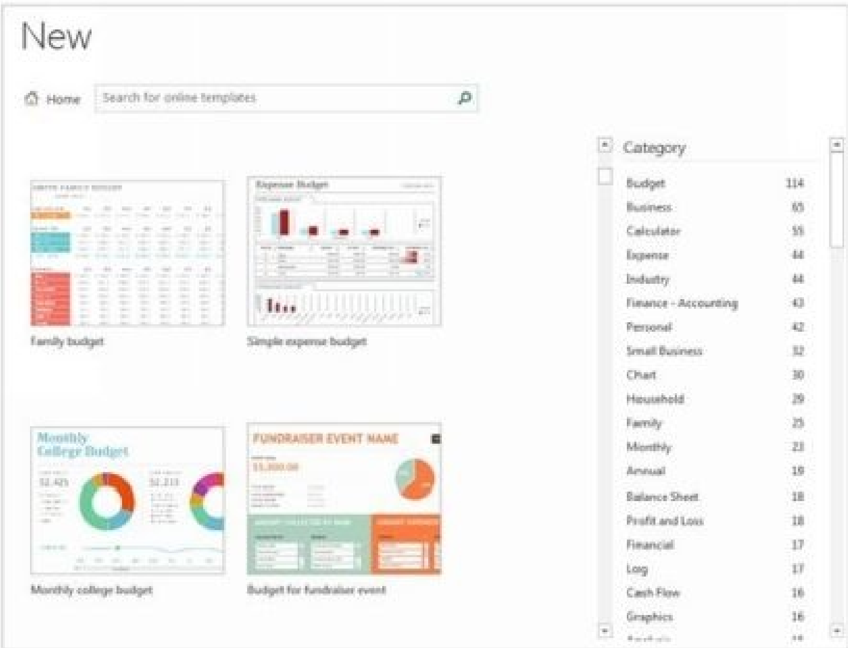


Figure 13.2 - Categories of Available Templates

How to Use Templates in Excel 2013

Now that you know you how to find the required templates in Excel, let's see how you can create a workbook from a template.

1. First, find the template you are looking for.

2. Click the thumbnail of the pertinent template. This will open a small window displaying description about the template along with its rating and download size. Figure 13.3 shows the description window of family budget template.

Figure 13.3 - Showing the Description Window of a Template

	To view details about more templates without going back to the thumbnail page, click the arrows located at either side of the description window.

3. If you like the template, click the **Create** button. Excel will download the particular template and then open a workbook based on that.

4. What you do next depends upon your needs. Every template is editable. You can change the headings, colors, values, formatting and whatever you want.

Figure 13.4 shows a workbook created from the Family Budget Template.

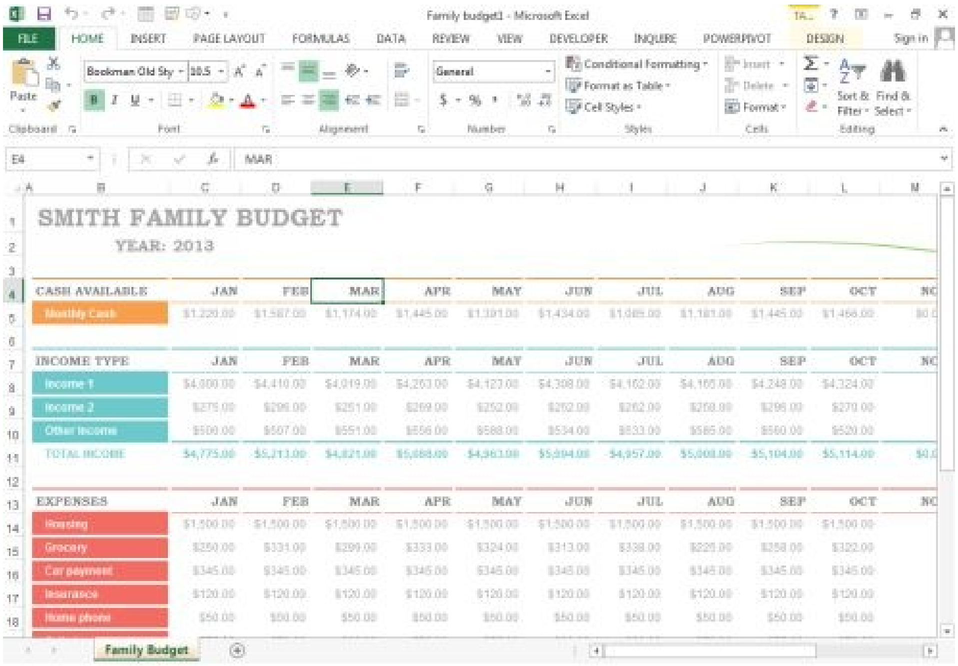


Figure 13.4 - Workbook Created From a Template

Remember the following things while you work on template based workbooks.

- There are not any hard and fast rules to work on a template based workbook. As you can see in Figure 13.4, the template is nothing but a workbook already created by Excel. You have to work on it just like you would work on any workbook.
- Once you download a template, it is saved in your system. Whatever changes you make in it will not affect the original template. It will be there as it is when you need it next time.
- It is the template that is saved in your system and not the workbook. So once you open a template based workbook, save it first so that any changes you make are saved in it.

Managing the Templates

To find out where the original templates are saved after downloading

1. Select **File** > **Options** > **Trust Center**.
2. *Click the **Trust Center Settings** button. This will open the Trust Center dialog box.*
3. Now select the **Trusted Locations** tab on the left.
4. There you will find the location of the saved templates. To change the path of the downloaded templates, click the **Add new location** button and browse the new location.

The commands to modify or delete a template can also be found in this dialog box.

Making Your Own Templates

So far in this chapter we have talked about using the default templates given by Excel. Though there are numerous templates available, yet at times you may not find exactly the one you were looking for or you may not a like a template.

In such cases, you can create your own templates. Now there are two ways to do so; you can modify the available template or you can create a totally new template.

Customizing Default Templates

The first and comparatively easier way of creating templates is to modify the existing ones.

For better understanding, consider the *Family Budget* template example as shown in Figure 13.4

In this template, you can change the colors, the main heading and other text values. Now you must be thinking that all these changes would just affect the workbook and not the template, as we said in the previous section. Well, the keyword here is **Save As**.

Select **File** and click **Save As** located on the left side. This will open the *Save As dialog box*, as shown in Figure 13.5

Click the **Save As Type** drop down list. Now as you can see in the Figure 13.5, there are several formats for you to save the file in. If you save the file as **Excel Workbook**, all the changes that you made will be saved in the particular workbook only. The original template will remain as it is.

To save the changes permanently in the template, select **Excel template** from the drop down list and then click **Save**. This will incorporate all the changes in the template. If you want to use the particular template in older versions of Excel as well, save it as **Excel 97-2003 Template**.

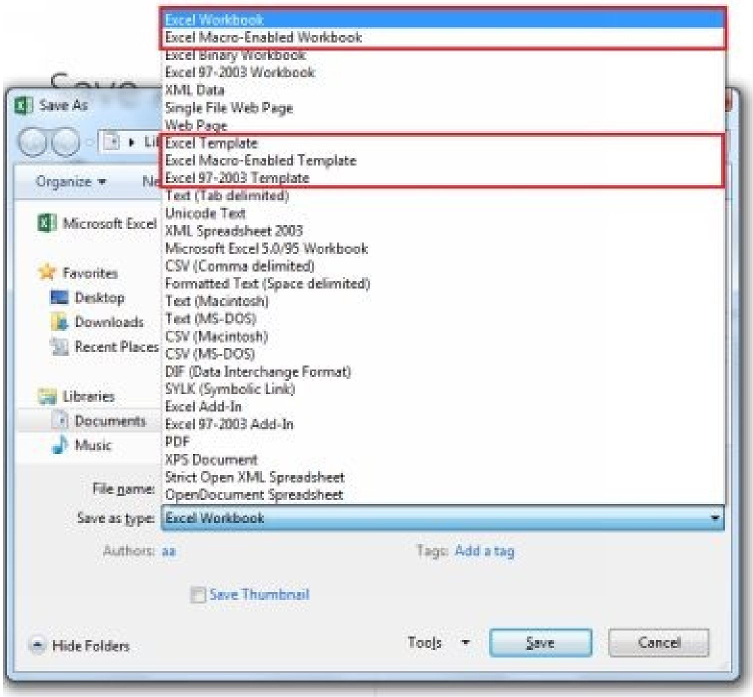


Figure 13.5 - The *Save As* Dialog Box

	If you have recorded any macros in your template, save the file as **Excel Macro-Enable Template**. The same goes for the workbook.

Creating Your Own Templates

The above method for creating customized templates is good if you already like the available template and making a few changes in it will render it exactly the way you need. However at times the available template may be totally different from what you are looking for. In such cases, modifying the existing template would take more time than creating one of your own. Hence it is recommended that you for the latter option and make your own template.

Here is how you can make your own template,

1. Open a new workbook.

2. Format it as you desire, increase/decrease the width of columns, change the height of columns, add or delete worksheets to give the workbook the number of sheets you want, enter values, headings, formulas and apply whatever settings and page setup options you want. In short, put all the things in it that you want to see in other workbooks based on this one. Just don’t put the variable values.

3. When you have made the workbook to your liking, select **File** > **Save As**.

4. Enter a name for your template.

5. Select **Excel Template (.xltx)** from the **Save As Type** drop down list. Alternatively, Save As **Excel Macro-Enabled Template (*.xltm)** if your workbook contains macros.

6. Close the file.

You can use this template just like you use the available Excel templates.

	If you select **Save** rather than **Save As** in the backstage screen, by default it will be saved as *Excel Workbook*. To save it as a template or if it contains macros, it is essential that you click **Save As** and select the appropriate format.

Chapter 14: Formatting Techniques

Formatting may be not necessary however it is very important when it comes to presenting the spreadsheet. Not only does it enhance the appearance of the worksheet but also makes is easy to read and understand.

Consider Figure 14.1 and 14.2 as an example.

	A	B	C	D	E	F	G
1	XYZ Corporation						
2	Sales Report Jan '13 - June '13						
3	Month	Jan	Feb	Mar	Apr	May	Jun
4	Product A	$ 10,000	$ 11,000	$ 12,100	$ 13,310	$ 14,641	$ 16,105
5	Product B	$ 11,300	$ 12,430	$ 13,673	$ 15,040	$ 16,544	$ 18,199
6	Product C	$ 12,769	$ 14,046	$ 15,450	$ 16,996	$ 18,695	$ 20,565
7	Product D	$ 14,429	$ 15,872	$ 17,459	$ 19,205	$ 21,125	$ 23,238
8	Product E	$ 16,305	$ 17,935	$ 19,729	$ 21,702	$ 23,872	$ 26,259
9	Product F	$ 18,424	$ 20,267	$ 22,293	$ 24,523	$ 26,975	$ 29,673
10	Product G	$ 20,820	$ 22,901	$ 25,192	$ 27,711	$ 30,482	$ 33,530
11	Product 1	$ 23,526	$ 25,879	$ 28,467	$ 31,313	$ 34,444	$ 37,889
12	Product A5	$ 26,584	$ 29,243	$ 32,167	$ 35,384	$ 38,922	$ 42,815
13	Product M8	$ 30,040	$ 33,044	$ 36,349	$ 39,984	$ 43,982	$ 48,380
14	Product 9	$ 33,946	$ 37,340	$ 41,074	$ 45,182	$ 49,700	$ 54,670
15	Product Z2	$ 38,359	$ 42,194	$ 46,414	$ 51,055	$ 56,161	$ 61,777

Figure 14.1 - Worksheet without Formatting

	A	B	C	D	E	F	G
1	XYZ Corporation						
2	Sales Report Jan '13 - June '13						
3	Product/Month	Jan	Feb	Mar	Apr	May	Jun
4	**Product A**	$ 10,000	$ 11,000	$ 12,100	$ 13,310	$ 14,641	$ 16,105
5	**Product B**	$ 11,300	$ 12,430	$ 13,673	$ 15,040	$ 16,544	$ 18,199
6	**Product C**	$ 12,769	$ 14,046	$ 15,450	$ 16,996	$ 18,695	$ 20,565
7	**Product D**	$ 14,429	$ 15,872	$ 17,459	$ 19,205	$ 21,125	$ 23,238
8	**Product E**	$ 16,305	$ 17,935	$ 19,729	$ 21,702	$ 23,872	$ 26,259
9	**Product F**	$ 18,424	$ 20,267	$ 22,293	$ 24,523	$ 26,975	$ 29,673
10	**Product G**	$ 20,820	$ 22,901	$ 25,192	$ 27,711	$ 30,482	$ 33,530
11	**Product 1**	$ 23,526	$ 25,879	$ 28,467	$ 31,313	$ 34,444	$ 37,889
12	**Product A5**	$ 26,584	$ 29,243	$ 32,167	$ 35,384	$ 38,922	$ 42,815
13	**Product M8**	$ 30,040	$ 33,044	$ 36,349	$ 39,984	$ 43,982	$ 48,380
14	**Product 9**	$ 33,946	$ 37,340	$ 41,074	$ 45,182	$ 49,700	$ 54,670
15	**Product Z2**	$ 38,359	$ 42,194	$ 46,414	$ 51,055	$ 56,161	$ 61,777

Figure 14.2 - Worksheet with Formatting

As you can see, both the worksheets are same. They contain the same values, text and formulas. The only difference lies in the formatting. It is the formatting that makes the worksheet in Figure 14.2 more visibly attractive and readable than the worksheet in Figure 14.1.

This was just one example of formatting in Excel. Formatting is a vast term that encompasses many features of Excel. Font type, font size, borders, shading, styles, themes, text alignment, background images and so on; it all falls under formatting. You can highlight ranges, merge cells, change the direction of values and much more. And then there is the amazing Conditional formatting feature which in simple words is automatic formatting. All of this is explained in detail in this chapter.

Formatting Basics

Formatting is a quite easy yet a very exciting activity. You can format individual cells, ranges, rows, columns and even the entire worksheet. Just select the range you need to format and apply the desired formatting style.

There are numerous tools and styles of formatting, explained in the upcoming sections. But before we move on to that, you need to understand and remember the following basics about formatting in Excel.

- While formatting enhances the appearance of a worksheet, the main purpose of it is to make the data more understandable and readable. Keep this goal in mind while formatting. Do not go overboard with colors and themes as it may distract the readers.

- When you format a cell or range in Excel, it stays that way till you clear the formatting or apply any other formatting over it.

- Deleting a value does not remove the formatting unless you delete the entire range or clear the formatting.

> To remove formatting, select the particular cell or range. Click the *Clear drop down list* represented by a small pink eraser in the *Editing* group of the **Home** tab. Select **Clear Formats**.

- If you enter or edit a value in a formatted cell, it won't affect the formatting of the particular cell.

- If you copy or move a formatted cell, the applied formatting style copies or moves to the new location unless you choose an advanced pasting option.

How to Copy Formats In Excel

Before we move on the formatting tools, there is one more thing you need to and that is the trick to copy formats in Excel. At times you may need to copy the same formatting style in different cells. Suppose you applied the percentage number font, bold text and 14 font size in a cell and the same formats needs to be applied in a particular range.

You can of course apply the formats separately on each cell, but that would be very time consuming especially if the particular range consists of hundreds of cells. So why not copy the formatting style when you have the option to do so!

Just like you can copy and paste values in different cells, you can do the same with formatting as well.

To copy a formatting style from one cell to another cell or range,

1. First select the cell the format of which you want copy
2. Hit the **Format Painter** button located in the bottom right of the Clipboard group in the **Home** tab.
3. Now select the cell or range to which you want to apply the copied formats.

Commonly Used Formatting Tools

Excel features innumerous formatting tools located at different places. Font type, size, color, bold, italic and other font related commands are the widely used formatting tools in Excel. They are so commonly used that the developers of Excel have placed them in the first tab of the Ribbon.

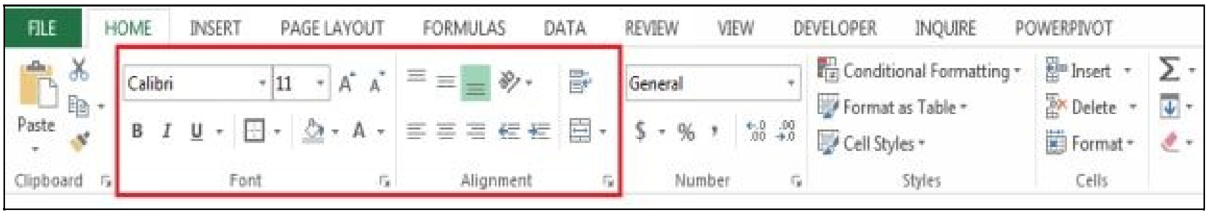


Figure 14.3 - Showing the Commonly Used Formatting Tools in the Home Tab

You will find all the basic font formatting tools along with the text alignment commands in the Home tab. Just select the cell(s) you want to format and hit the appropriate formatting icon in the Home tab. Some of the commands also contain a drop down list. For example, the font type and font size icons carry a drop down list containing options pertinent to the corresponding command.

Formatting Via the Mini Toolbar

The commonly used formatting tools can also be found in the mini toolbar. It is the small menu that appears when you right click a cell or range.

Select the cell(s) you want to format, right click and then select the desired formatting command in the Mini Toolbar.

Clicking anywhere on the mini toolbar will make the right click shortcut menu to disappear. However the mini toolbar would still be there. So once you are done using the mini toolbar, click on any other cell or hit **Esc** on your keyboard to hide it.

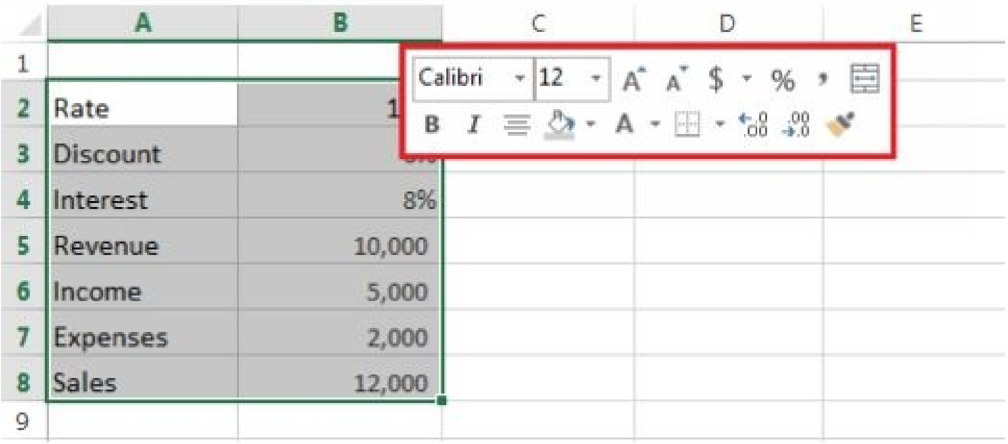


Figure 14.4 - The Mini Toolbar

Exploring the Format Cells Dialog Box

As already mentioned, the Home Tab and the Mini Toolbar contains only the basic formatting tools. Formatting is far more comprehensive and features numerous advanced tools all of which are not available in either of the two places explained above.

So if you are unable to find the required formatting command in the Home Tab or the Mini Toolbar, look for it in *the Format Cells Dialog Box*. It allows you to do much more than the basic font formatting.

There are several ways to open the Format Cells Dialog Box:

1. Select the cell(s) you want to format, then right click and select **Format Cells**.
2. Press **Ctrl + 1** on your keyboard
3. Click the small downward diagonal arrow located at the bottom right corner of the Font group or the Alignment Group or the Number group in the Home tab.
4. Select the *More Borders drop list* in the *Font* group of the **Home** tab and click over **More Borders**

Either ways, Excel will open the Format Cells dialog box, as shown in Figure 14.5.

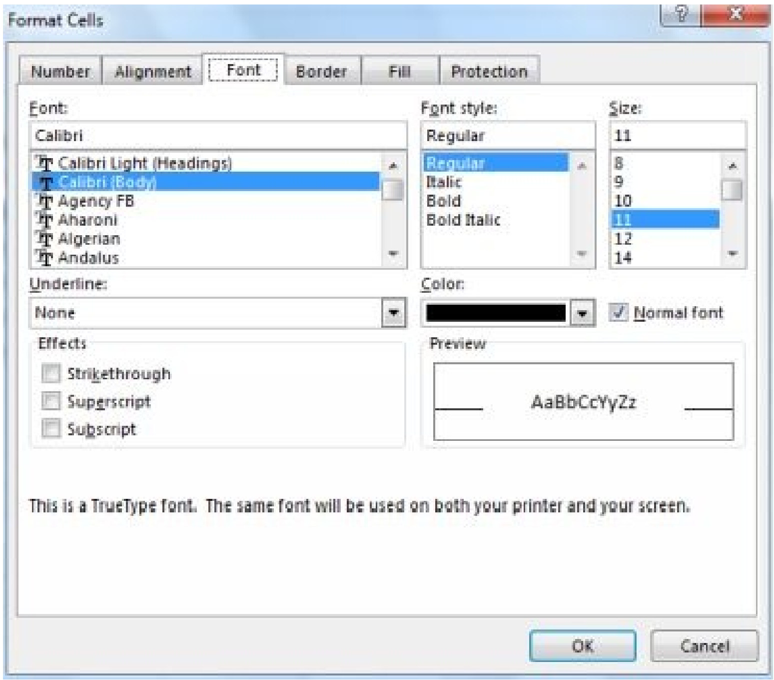


Figure 14.5 - The *Format Cells* dialog box

As you can see in the above image, the Format Cells dialog box contains six tabs, namely; Number, Alignment, Font, Border, Fill, and Protection. The Number tab has already been explained in Chapter 8. The upcoming sections talks about the formatting commands in the remaining tabs of the Format Cells dialog box.

Formatting Shortcuts

Formatting is easier and far more fun if you get the hang of keyboard shortcuts. For example, **Ctrl + B** apply bold formatting to the font. Likewise **Ctrl + I** make the text italic and so on.

Refer to Appendix "List of Keyboard Shortcuts" to learn the keyboard shortcuts for Formatting.

Working with Different Fonts

Now that you know where to find the different tools of formatting in Excel 2013, let's see how you can actually use them.

The first and most basic formatting tool is Font. You can change the typeface, size and color of the font of the values in cells. The primary purpose of using different fonts is to make various values, such as headings in the worksheets, stand out. You can also decrease the size of the font to make more data fit in one printable page.

By default, Excel uses Calibri font in size 11. You can of course change it to any type and size. You can find the font formatting commands in the Mini Toolbar, in the Home tab of the ribbon and the Font tab of the Format Dialog box.

Figure 14.6 shows the formatting commands in the Home tab.

Figure 14. 6 - Showing the Formatting Commands in the Home Tab

For better understanding, the formatting commands in Figure 14.6 are numbered. Here is their description.

1 **Font type:** It is a drop down list that contains the types of fonts available in Excel 2013.

2 **Font Size:** This one is also a drop down list. Click this to select the desired font size.

3 **Bold:** Click this to make the values in the selected cell(s) **Bold**. Alternatively you can hit **Ctrl + B** on your keyboard.

4 **Italic:** Click this to make the values in the selected cell(s) *Italic*. Alternatively you can hit **Ctrl + I** on your keyboard.

5 **Underline:** Click this to Underline the values in the selected cell(s). Alternatively you can hit **Ctrl + U** on your keyboard. This icon also carries a drop down list containing the options for single underline and double underline. Apart from these, there are two more underline options, namely, single accounting and double accounting. These are available in the *Font* tab of the *Format Cells* dialog box.

6 **Bottom Border:** Clicking this icon will put a bottom border in the selected cell(s). This command also carries a drop down list containing several other border options such as thick borders, colorful borders and so on. *More about using borders is explained later on in this chapter.*

7 **Fill Color:** As the name suggests, this drop down list contains colors that you can fill in the selected cell(s).

8 **Font Color:** Select this command to open the color palette for fonts. If you don't like any color in the given palette, click **More Colors**.

9 Decrease Font Size/**10 Increase Font Size**: If you are not sure as to which font size you should select, you can click either of these commands to decrease or increase the font size one point at a time.

The small downward diagonal arrow located at the bottom right corner opens the Font tab in the Format Cells dialog box.

Apart from the above explained formatting commands, you can also strikethrough, subscript and superscript the values. These formatting commands can be found in the *Font* tab of the *Format Cells* dialog box.

Formatting Text Values in Individual Cells

If a cell contains a text value, you can apply multiple formatting styles to it. This is mostly done when a cell carries a large text value distributed in different lines or is text wrapped.

To format the text values in individual cells, double click the particular cell or hit **F2** to put the cell in the editable mode. Now select the characters that you want to format and apply the desired formatting style to them.

Figure 14.7 illustrates an example this formatting technique.

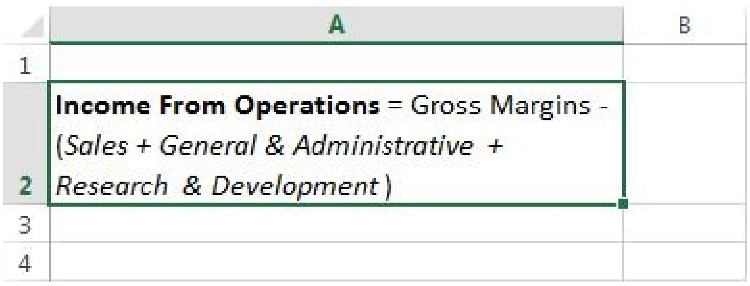


Figure 14. 7 - Example of Applying Multiple Formatting Styles in a Single Cell

As you can see in Figure 14.7, Cell A2 carries a large text value which is formatted with multiple styles to make it more readable.

> You cannot apply multiple formatting styles in a cell if it contains numeric or text values. This technique is applicable to text values only.

Aligning the Text

When you enter any numeric value in a cell, by default it is aligned to the right. Likewise in case of a text value, Excel aligns it to the left. However you can change the alignment very easily.

Excel allows you to align the values in a cell horizontally and vertically. The commonly used alignment commands are located in the Home tab of the ribbon. For more alignment options, open the corresponding tab in the Format Cells dialog box.

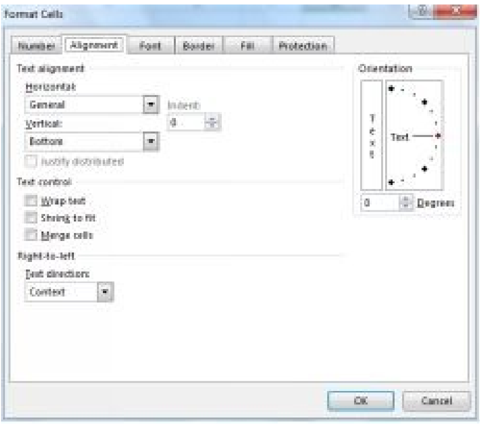


Figure 14. 8 - The Alignment Tab in the Format Cells Dialog Box.

Vertical Alignment

The vertical alignment options are used to control how the contents are distributed across the height of the cells.

Following are the three commonly used vertical alignment options. These can be found in the Home Tab as well in the Format Cells dialog box.

Top Align: It is the first icon located at the top left corner of the Alignment group in the Home tab. It arranges the cell contents at the top of the cell.

Middle Align: This command is located right next to the Top Align icon. In the Format Cells dialog box, it is the *Center* option in the Vertical drop down list. This option aligns the values height wise in the center of the cell.

Bottom Align: Located right next to the Middle Align command, it is also the default vertical alignment setting in Excel. It aligns the cell contents to the bottom of the cell.

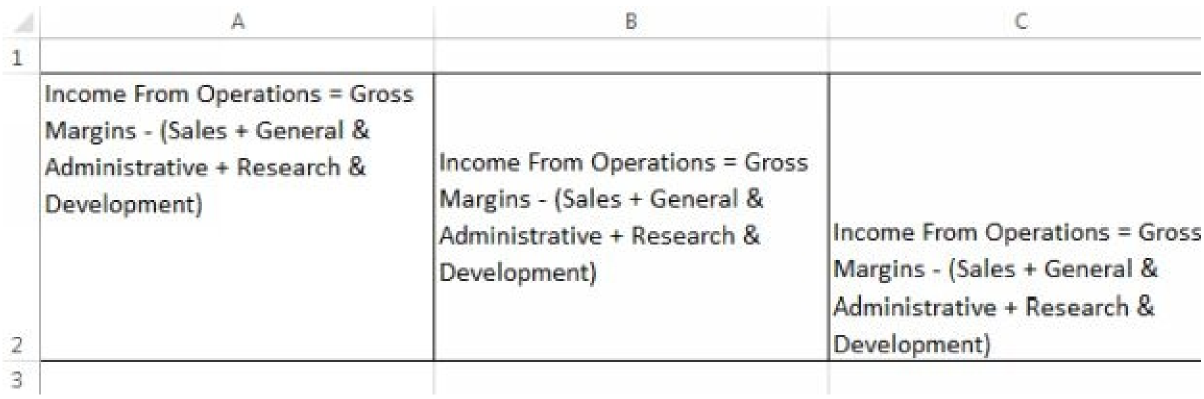


Figure 14.9 - Showing Examples of the Three Commonly Used Options for Vertical Alignment

Figure 14.9 illustrates examples of the three basic types of vertical alignment. Staring from the left, the cells are aligned top, middle and bottom respectively.

Apart from the above three options, there are two more that are located in the Alignment tab of the Format Cells dialog box.

Justify: This option justifies the contents vertically. This command is valid only if:

The cell contains text values

The selected cell is formatted as wrapped text

The contents are distributed in two or more lines

Distributed: As the name suggest, this option distributes the text vertically even in the cell.

Horizontal Alignment

The horizontal alignment commands helps you control how the values are distributed across the width of the cells.

While all the options are available in the Alignment tab of the Format Cells dialog box, the first three commands are commonly used, hence can be found in the Home tab as well.

General: If you select this option, Excel will apply the default alignment settings to the selected cell(s). The numeric values will be aligned to the left, text to the right and errors and logical values in the center.

Left (Indent): This option aligns the values in the selected cell(s) to the left side of the cell(s). In the Home Tab, it is located in the bottom left corner of the Alignment group.

Center: It arranges the cell contents in the center of the cell. In the Home Tab, it is located right next to the Left Align icon.

Right (Indent): This option aligns the values to the right side of the cell(s). This command can also be found in the Home tab, right next to *Center Align* icon.

Fill: This option repeats the same value in the same cell till the cell is completely filled.

Justify: This option aligns the text in such a way that the values are spread equally to the left and right of the cell.

Center Across Selection: It adjusts the text content in the center of the selected columns. This alignment command is mostly used to locate a heading exactly in the center over the corresponding columns.

Distributed (Indent): This option justifies the cell content horizontally even, across the selected columns.

The indent options in the Home tab and the Format cells dialog box can be used to put space(s) between the cell border and the content. These are mostly used when cells in adjacent rows contain headings and subheadings. The latter are indented to stand out from the former.

Merging Cells

Regardless of which alignment option you select, if the value is larger than the width of the selected cell, the content will brim over to the adjacent cell on the right. However if the adjacent cell is already filled, the excess text will hide underneath it.

There are several ways to fit large content in one cell. You can increase the height and width of the cell but to do so you would have to increase the height/width of the entire corresponding row or column.

Merging is another way to fit large values in one cell. It allows you to expand a cell without affecting its corresponding row and column. The Merge feature of Excel combines the selected cells and merges them into a single cell. This is turn renders more space for the content.

To merge cells in Excel, select the cells that you want to merge.

Choose the **Home** tab. There in the bottom right corner of the *Alignment* group, you will find the *Merge and Center* command. Click it to merge and unmerge the selected cells. By default, Excel aligns the cell contents in the center of the merged cell.

To change the alignment of the cell content and for more merging options, click the drop down arrow in the Merge and Center icon.

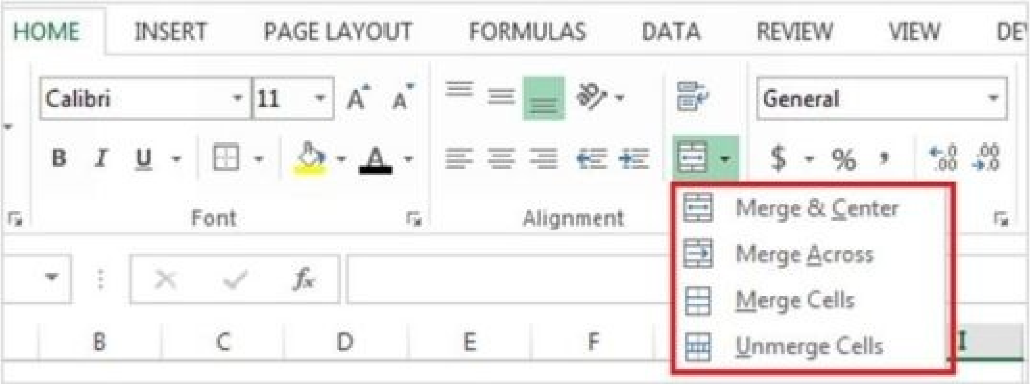


Figure 14.10 - The *Merge and Center* Drop Down List.

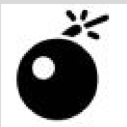
As shown in Figure 14.10, there are four options in the Merge and Center drop down list.

Merge & Center: This option merges the selected cell and centers the cell content.

Merge Across: This option is useful when you need to merge a range containing multiple rows. This feature creates multiple merged cells, one for each row in the selection.

Merge Cells: This command merges the selected cells without centering the cell's content.

Unmerge Cells: It unmerges the selected cells.



Make sure the cells that you want to merge are all empty except for the top left cell in the range. If the other cells are not blank, Excel will display a warning window which says that *Merging cells only keeps the upper-left cell values, and discards the other values*.

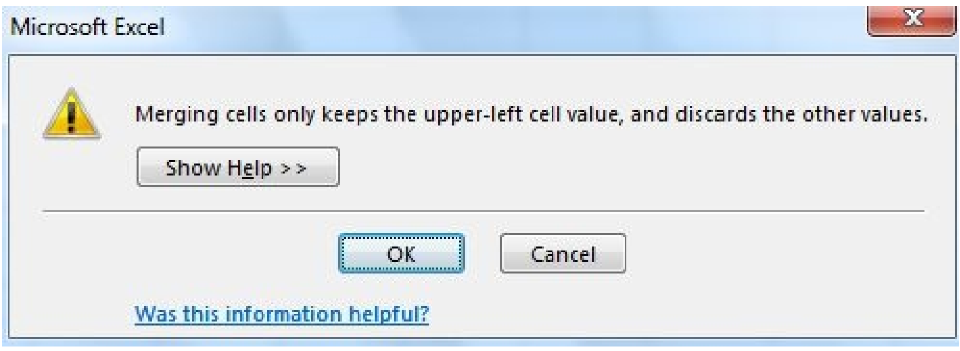


Figure 14.11 - Warning Window for Merging Filled Cells

If you click **OK**, Excel will delete the values in all the other cells. Click **Cancel** to stop the merging operation. If you have merged cells by mistake, click the **Undo** button in the Quick Access toolbar or press **Ctrl + Z** on your keyboard.

Using the 'Shrink to Fit' Feature

There are two more ways to fit large content in one cell; namely, *Wrap Text* and *Shrink to*

Fit.

These options are mostly used when the text value is too large to fit in the width of the merged cell.

The *Wrap Text* feature distributes the text in several lines in the same cell. It allows you to fit in large text in one cell without making the columns too wide or reducing the font size. You can find the Wrap Text command in the Alignment tab of Format Cells dialog box. It is also located in the Home tab right over the *Merge and Center* icon.

The *Shrink to Fit* feature decreases the font size of the text value so that it fits in the selected cell. This option can be found in the Alignment tab of Format Cells dialog box.

> You can use only one feature at a time, either Wrap Text or *Shrink to Fit*. If a cell is already formatted with the *Wrap Text* feature, you won't be able to apply the *Shrink to Fit* feature over it and vice versa.

Rotating the Direction of Text

This is another very interesting feature of Excel. At times you may want to rotate the text to make it more visually attractive or readable. Well, Excel allows you to do that. You can display the cell's content vertically, horizontally or at any other angle between 90 degrees up and 90 degrees down.

You can find the text rotation commands in the Home tab and the Alignment tab of Format Cells dialog box.

First, let's see how you can use the rotation commands in the Home tab.

Select the content you want to rotate. Then click over the Home tab. There you will find the **Orientation** drop down list in the Alignment group.

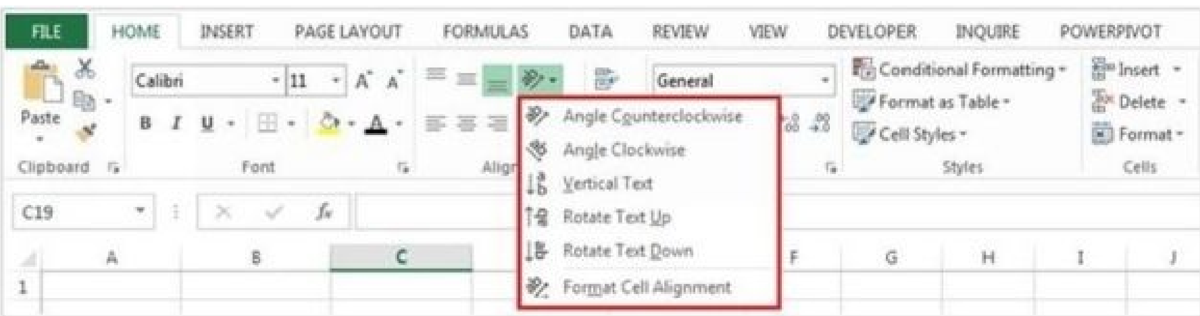


Figure 14.12 - The *Orientation* Drop Down List

As shown in Figure 14.12, the *Orientation* drop down list contains several options. You can rotate the selected text clockwise, counterclockwise, vertically and so on.

If you don't find the desired text rotating command in the Orientation drop down list, select **Format Cell Alignment** to open the Alignment tab in the Format Cells dialog box.

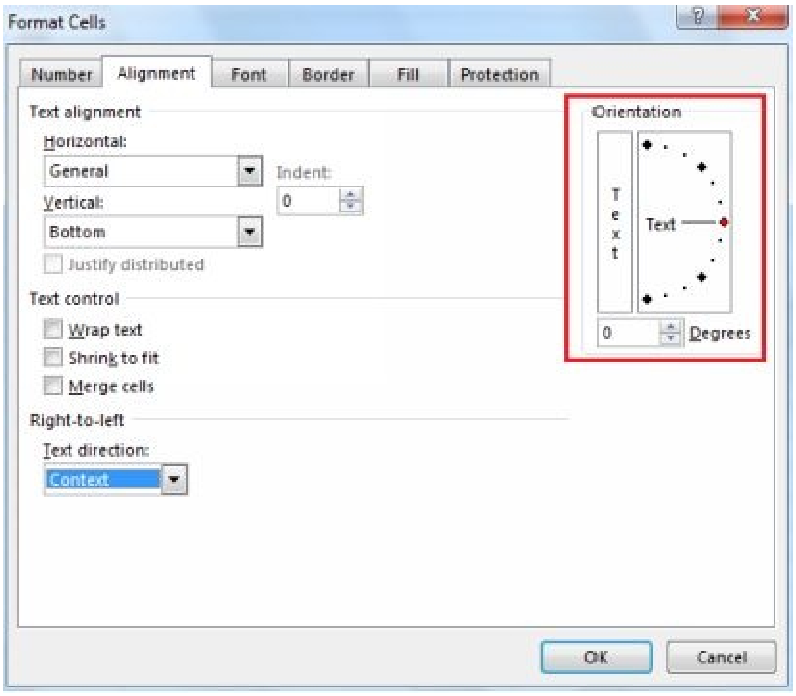


Figure 14.13 - Showing the *Degree Spinner* in the *Format Cells Dialog Box*

As shown in Figure 14.13, there is a degree spinner in the top right of the Alignment tab. Click and move the hand in the spinner to the desired angle, or you can also type the desired degrees in the *Degrees type text bo*x located below the spinner. Click **OK** to save the orientation and close the dialog box.

Beautify your Worksheet

Excel 2013 contains many colorful formatting tools that allow you to make your worksheets visually enthralling and more readable. You can change the color of the text, fill color in the entire cell(s), add borders, background images and much more.

The upcoming sections talks about all the colorful formatting tools of Excel.

How to Add a Background Image

At times, you may want to add a background image in the worksheet. It may be any online image, or your company's logo or any other personal picture. A background image in Excel gives the same effect as the wallpaper on your windows desktop.

To add a background image in Excel, select the **Page Layout** tab. Click **Background** located in the *Page Setup* group. This will open the *Insert Pictures* dialog box, as shown in Figure 14.14

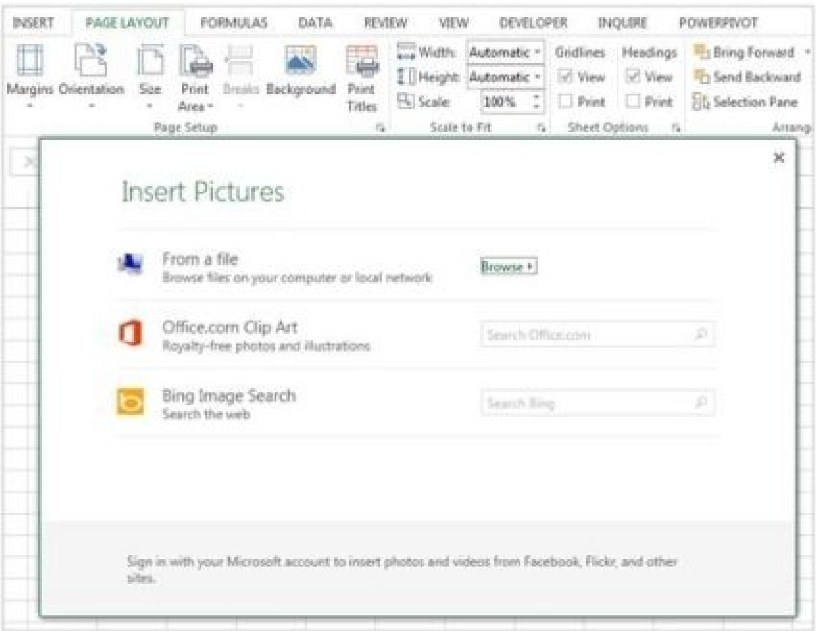


Figure 14.14 - The *Insert Pictures* Dialog Box

As you can see in Figure 14.14, you have got several options to choose the background image from. You can browse an image file from your computer or can get a royalty free image from Office.com Clip Art or you can also search and browse a picture from web. Excel also allows you to use any picture from your Facebook or any social media account. You just have to sign in with your Microsoft account to do that.

Click the option from where you want to export the image, then locate the image and insert it in your worksheet.

Excel supports all the common graphic file formats. It is just the animated GIFs that are displayed as still images.

Once you insert the image, Excel stretches it across the entire worksheet. Depending upon the type and size of image, Excel displays some images as tiles, as shown in Figure 14.15

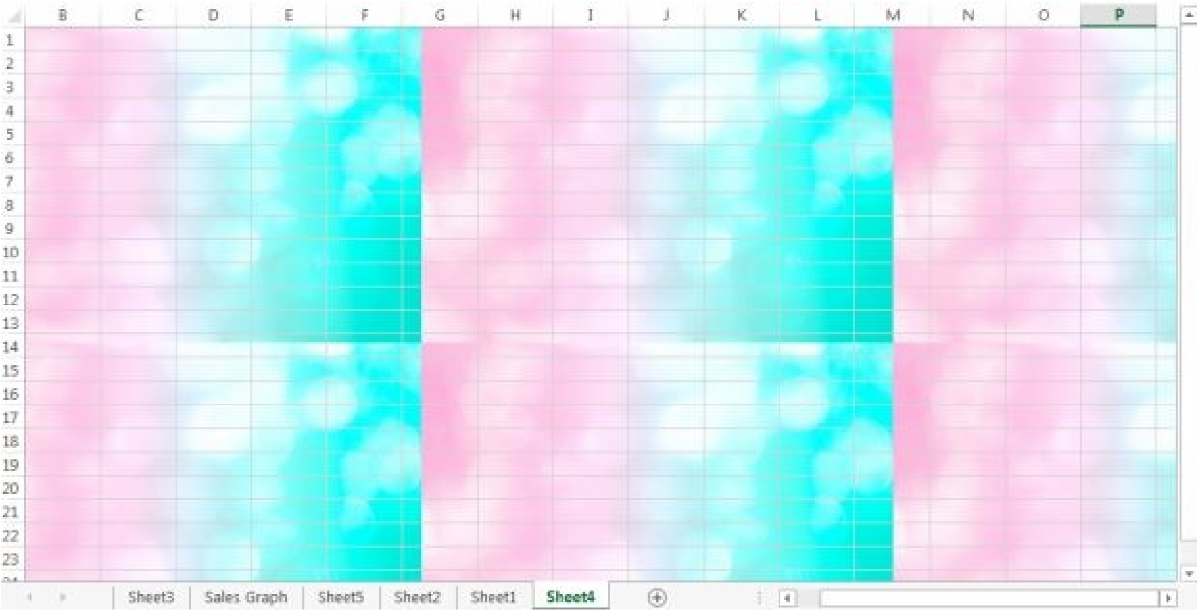


Figure 14.15 - Showing a Worksheet with Background Image Displayed As Tiles

When you add a background image in Excel, you may perhaps want to hide the gridlines to get a seamless background.

To turn off the gridlines, uncheck the **View** checkbox located under the heading *Gridlines* in the *Page Layout* tab.

Using Borders

Borders are a great way of making the values in adjacent columns and rows prominent and more readable. They are normally used to separate a range of cells or to demarcate rows and columns.

There are several ways to add borders in Excel.

The simplest way of adding borders and lines is the *Border drop down list* located in the *Font* group of the **Home** tab. But before you click the *Border drop down list*, make sure to select the cell(s) around or inside which you want to add borders.

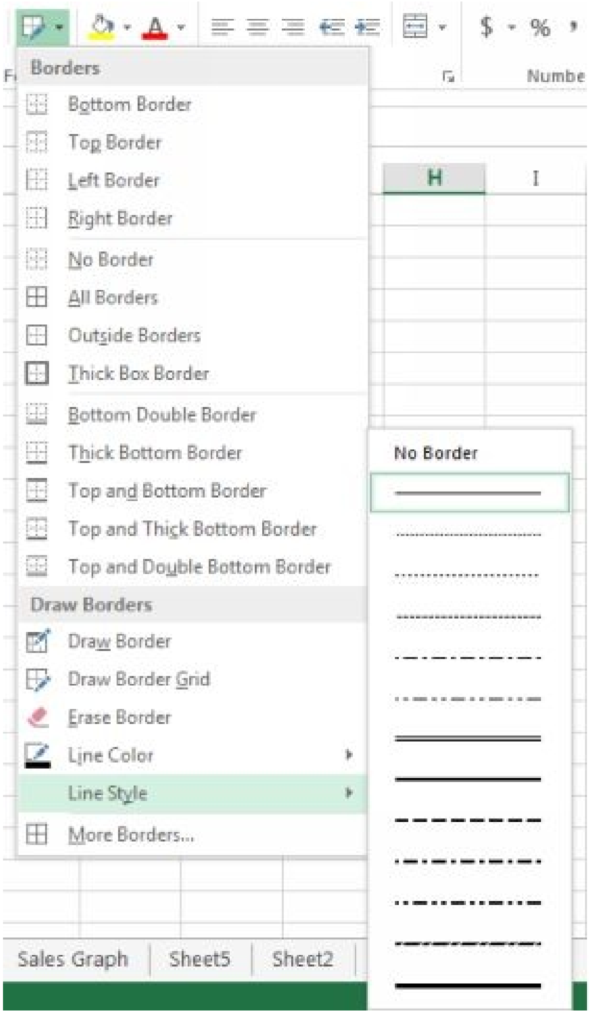


Figure 14.16 - Showing the Preset Border Styles in the Home Tab

As shown in Figure 14.16, there are 13 preset border styles all of which are quite self explanatory. For example, if you click **All Borders**, Excel will put a border around each cell in the selected range. Likewise, you can click **Thick Bottom Border** to put one thick border in the bottom of the selected cells.

If you don't find the required border setting in the 13 given preset styles, click **Draw Border**. This will change the mouse cursor into a small pencil. Click the pencil where you want to add border. Or click and drag the pencil to draw an outside border. Hit **Esc** once you are done using the border pencil.

Below the *Draw Border* option, there is the **Draw Border Grid** option. It performs the same function as the *Draw Border* feature. The only difference is that the *Draw Border* pencil when dragged draws the outside border only, whereas the *Draw Border Grid* pencil when dragged draws all borders, inside and outside the dragged cells.

If you have made any border by mistake, hit the **Erase Border** button and then click over the border that you want to erase.

> The *Erase Border* feature is very useful when you want to put *All Borders* within a large range except for a few cells. You can put *All Borders* using the preset style and then use the *Erase Border* command to remove the unwanted ones.

The **Line Color** command contains the color palette for borders.

The **Line Style** command allows you to use different types of borders, other than the simple single line borders, as shown in Figure 14.16

All these border settings can also be found in the **Border** tab of *the Format Cells dialog box*. You can open it by clicking the **More Borders** command in the *Borders drop down list*. Do not forget to select the cell(s) you want to add borders to before opening the *Format Cells dialog box*.

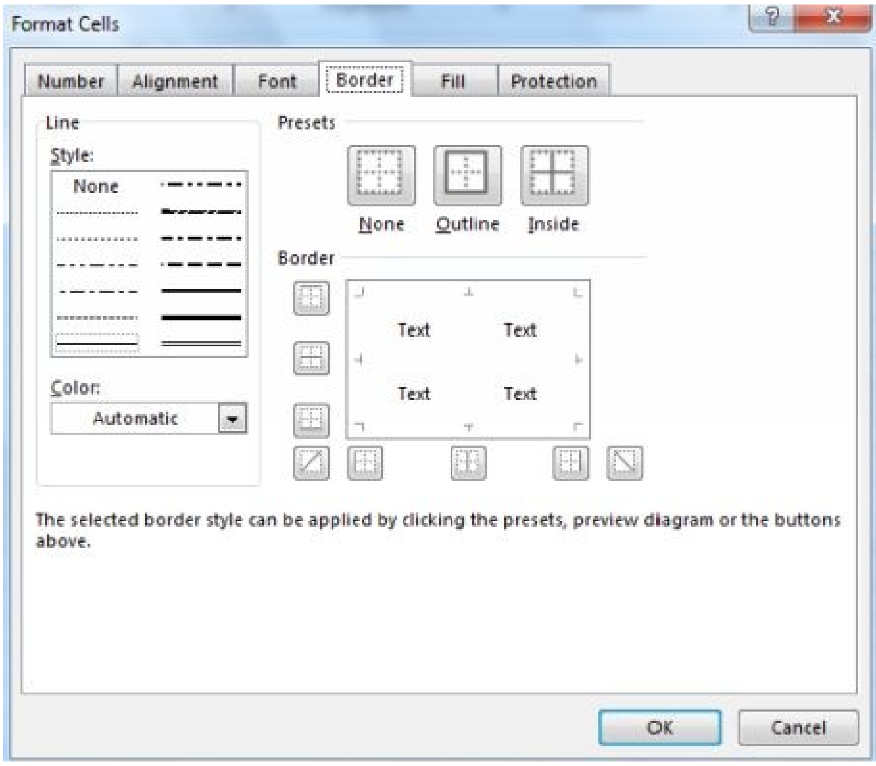


Figure 14.17 - Showing the Border Tab of the *Format Cells* Dialog Box

As you can see in Figure 14.17, the *Border* tab of the *Format Cells* dialog box contains all the pertinent options. You can select the style, color and position of the border. You can also select any of the three preset styles given at the top of the dialog box. To put an outside border, click **Outline**. To put inside borders, click **Inside** and to remove all the borders from the selected cells, click **None**.

The Border tab of the Format Cells dialog box contains all the commands given in the Border drop down list plus one more advanced feature and that is the option to put diagonal lines. You can put forward diagonal borders or backward or both within the selected range. The diagonal lines are normally used to show crossed out cells or values.

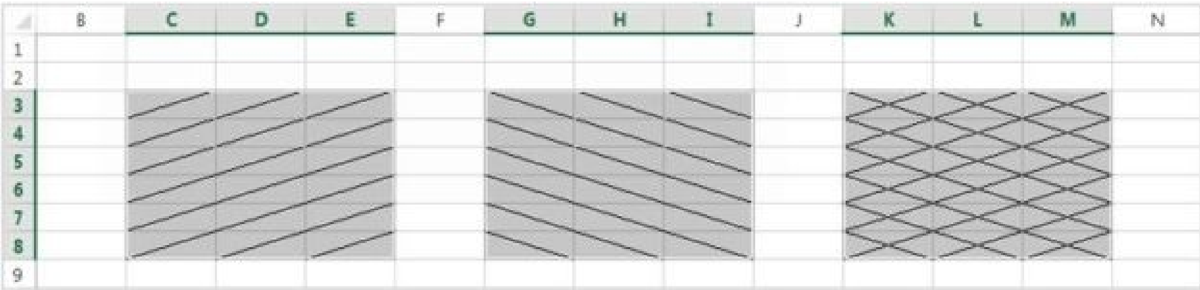


Figure 14.18 - Showing Examples of Diagonal Borders

In Figure 14.18, there are 3 different ranges. Starting from the left, the ranges contain forward diagonal borders, backward diagonal borders and both, respectively.

Making Your Worksheet Colorful

This is another very interesting way of enhancing the appearance and readability of the worksheet. You can change the color of the font as well fill colors in the entire cell(s).

To change the color of the font, select the cells the values of which you want to color, then go to **Home** tab and select the **Font Color drop down list**. Select the desired color and that's all it is required to make your cell content colorful.

To fill colors in cells, select the cells in which you want to fill colors, then go to **Home** tab and select **Fill Color drop down list**. Select the desired color and Excel will put that in the selected cell(s).

Both the drop down lists are also available in the *Mini Toolbar* that appears when you right click the selected cell(s).

Excel 2013 offers you virtually unlimited number of colors. So if you don't like the available colors in the *Font Color* or *Fill Color* palettes, click the **More Colors** command located at the bottom of both the color palettes. This will open the *Colors dialog box*. You can select any color from the *Standard tab* or make one of your own in *Custom tab*.

> If you want to hide the values of a cell, make the Font Color similar to the Fill Color. This will hide the cell's content; however it will still appear in the Formula bar when you select the corresponding cell.

Theme Formatting

If you want to apply same formats throughout the workbook, theme formatting is a way to do that. A theme is a set of formatting attributes including fonts, colors and effects. The best thing about using themes is that they save a whole lot of time that is spent on formatting. Just one click and your entire workbook will be formatted as per the applied theme.

> A theme is applied to the entire workbook. You cannot set different themes for different worksheets.

Excel 2013 contains a diverse variety of themes. The best way to explore them is to try a few.

To apply a theme, select **Page Layout** > **Themes**. This will open the Themes drop down menu containing the available Excel themes, as shown in Figure 14.19.

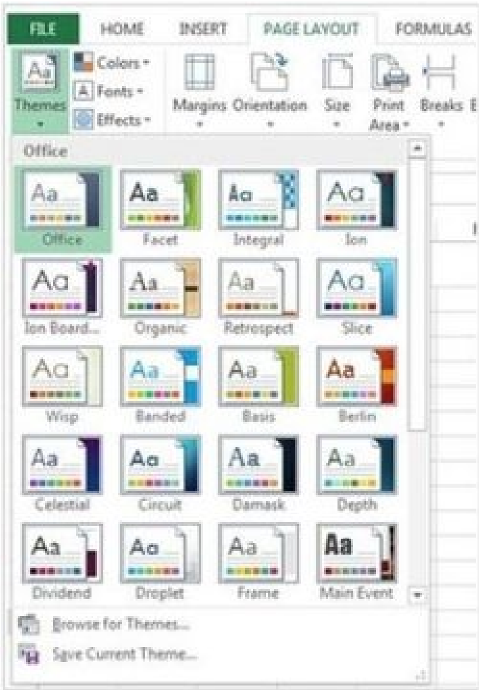


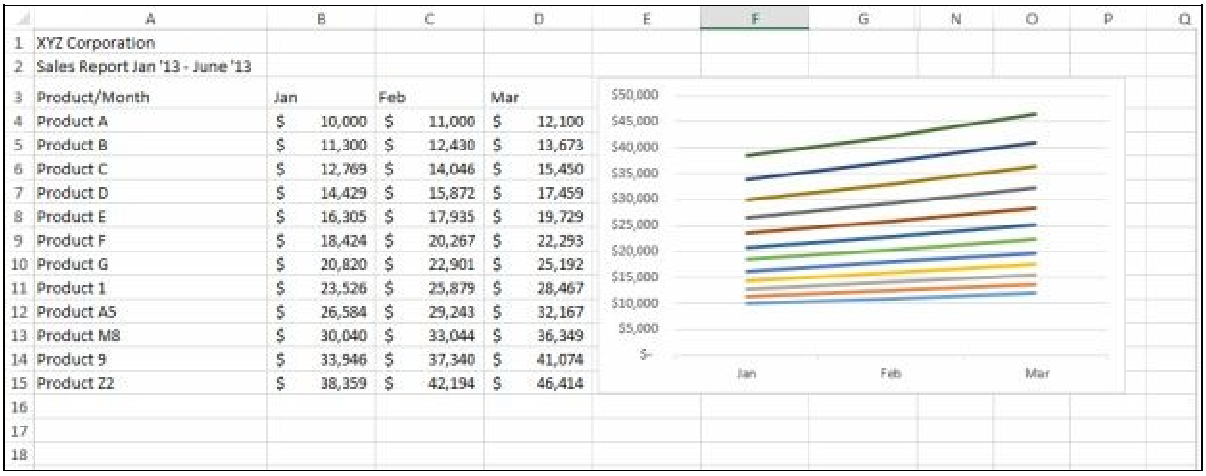
Figure 14.19 - Showing the *Themes Drop Down Menu* in the *Page Layout* Tab

The Themes drop down menu contains a live preview of all the themes. In other words, you won't have to apply a theme to check its attributes. Just move the mouse cursor to any theme and it will be displayed in the active sheet. So if you are unsure about which theme to choose, cycle your mouse cursor through all the themes and click the one that you like.

> Themes don't affect the originally applied font formats. Suppose you entered a value in red font color, then applied a theme over the

	workbook. Now if you reapply any other theme, it won't change the red font color. You will have to do it manually.

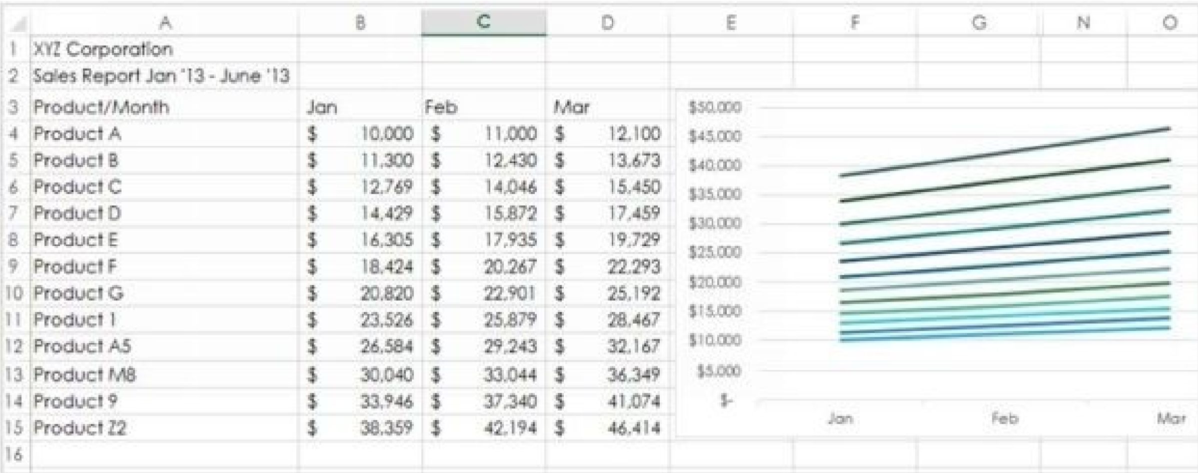
Figure 14.20 shows a workbook in default theme, without any specific formatting.



	A	B		C		D	
1	XYZ Corporation						
2	Sales Report Jan '13 - June '13						
3	Product/Month	Jan		Feb		Mar	
4	Product A	$	10,000	$	11,000	$	12,100
5	Product B	$	11,300	$	12,430	$	13,673
6	Product C	$	12,769	$	14,046	$	15,450
7	Product D	$	14,429	$	15,872	$	17,459
8	Product E	$	16,305	$	17,935	$	19,729
9	Product F	$	18,424	$	20,267	$	22,293
10	Product G	$	20,820	$	22,901	$	25,192
11	Product 1	$	23,526	$	25,879	$	28,467
12	Product A5	$	26,584	$	29,243	$	32,167
13	Product M8	$	30,040	$	33,044	$	36,349
14	Product 9	$	33,946	$	37,340	$	41,074
15	Product Z2	$	38,359	$	42,194	$	46,414

Figure 14.20 - Workbook in *Default* Theme

Figure 14.21 shows the same workbook after applying the Savon Theme.



	A	B		C		D	
1	XYZ Corporation						
2	Sales Report Jan '13 - June '13						
3	Product/Month	Jan		Feb		Mar	
4	Product A	$	10,000	$	11,000	$	12,100
5	Product B	$	11,300	$	12,430	$	13,673
6	Product C	$	12,769	$	14,046	$	15,450
7	Product D	$	14,429	$	15,872	$	17,459
8	Product E	$	16,305	$	17,935	$	19,729
9	Product F	$	18,424	$	20,267	$	22,293
10	Product G	$	20,820	$	22,901	$	25,192
11	Product 1	$	23,526	$	25,879	$	28,467
12	Product A5	$	26,584	$	29,243	$	32,167
13	Product M8	$	30,040	$	33,044	$	36,349
14	Product 9	$	33,946	$	37,340	$	41,074
15	Product Z2	$	38,359	$	42,194	$	46,414

Figure 14. 21 - The Same Workbook after Applying a Different Theme

As you can see in both images, the new theme changed the font type, size and color of the chart. The column width and row height are adjusted according to the new formats.

	Since every theme features a different font type and size, applying a theme may affect the original layout of your worksheet. For example, if the theme you applied features a larger font than the one previously applied, it may brim over the values contained in one printable page to another. So make sure to check the layout after applying a theme and make changes, if required.

Creating Your Own Themes

If you don't like any theme in the available themes, you can create one of your own.

As you can see in Figure 14.19, the Themes group in the Page Layout tab contains three more commands; namely, Colors, Fonts and Effects. You can use these commands to modify any or all of the corresponding formats.

Suppose you like the color and effects in the Savon theme but are not satisfied with the choice of font. You can change the font by clicking the **Font** command in the *Themes* group of the *Page Layout* tab. Select the desired font and it will be applied throughout the workbook.

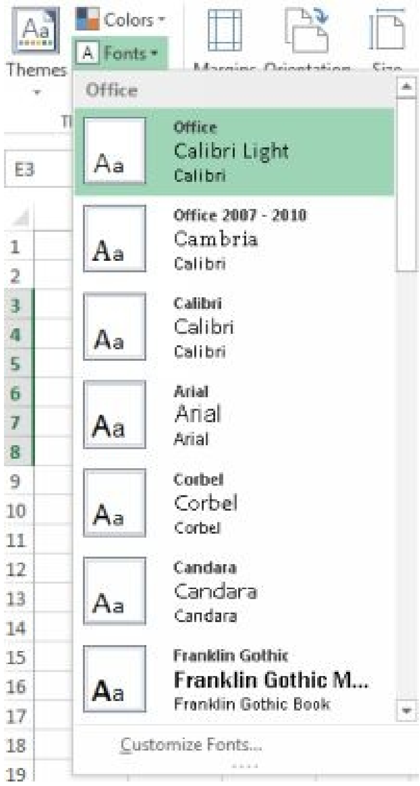


Figure 14. 22 - The Font Command Drop Down List

Every theme features two fonts, one for the heading and for the body. You can select a different font for both. As you can see in Figure 14.22, the Font command carries a drop down list containing all the font types. At the end of the list is the **Customize Fonts command**. Click this to open the C*reate New Theme Fonts dialog box*. Here you will find tee option to set different fonts for the heading and for the body.

Just like the Fonts command, you can change the effects and color code of a theme.

Every theme features a combination of 12 colors. If you do not want to apply the same color throughout the workbook, click **Customize Colors** located at the end of the *Colors* *drop down list*. This will open the *Create New Theme Colors dialog box*, as shown in Figure 14.23

Figure 14.23 - The *Create New Theme Colors* Dialog Box

Select the drop down list to open the color palette for the corresponding part of the theme. You can also give a personalized name to your new color code.

After you customize a theme using different fonts, colors and effects, you can save it as well. Saving a theme will make it available for use not only in other workbooks but also other Office applications such as Word, PowerPoint and so on.

To save your customized theme, select **Page Layout** > **Themes** > **Save Current Theme**. Enter a name for your new theme and click **Save**.

Style Formatting

Cell styles are quite similar to themes, as both save the users from making multiple clicks and opening several dialog boxes for formatting. As a matter of fact, cell styles are even more helpful and valuable than the themes. The latter is restricted to the entire workbook. You cannot apply different themes on different workbooks or ranges. On the contrary, cell styles can be applied to any number of cells. You can apply a different style to every cell and worksheet.

A cell style is made up of six different formatting attributes, namely, number format, font, text alignment, patterns, borders and cell protection.

The formatting features of a cell style are based on the current theme. If you change the theme, the cell style will update accordingly.

To apply a cell style, follow the steps below.

1. Select the cell(s) on which you want to apply the cell style. If you want to apply the same style on the entire worksheet, press **Ctrl + A**.
2. Choose the **Home** Tab.
3. Click **Cell Styles** located in the *Styles* group.
4. The *Cell Styles* command contains a drop down menu. Click the desired cell style and Excel will apply it on the selected cell(s).

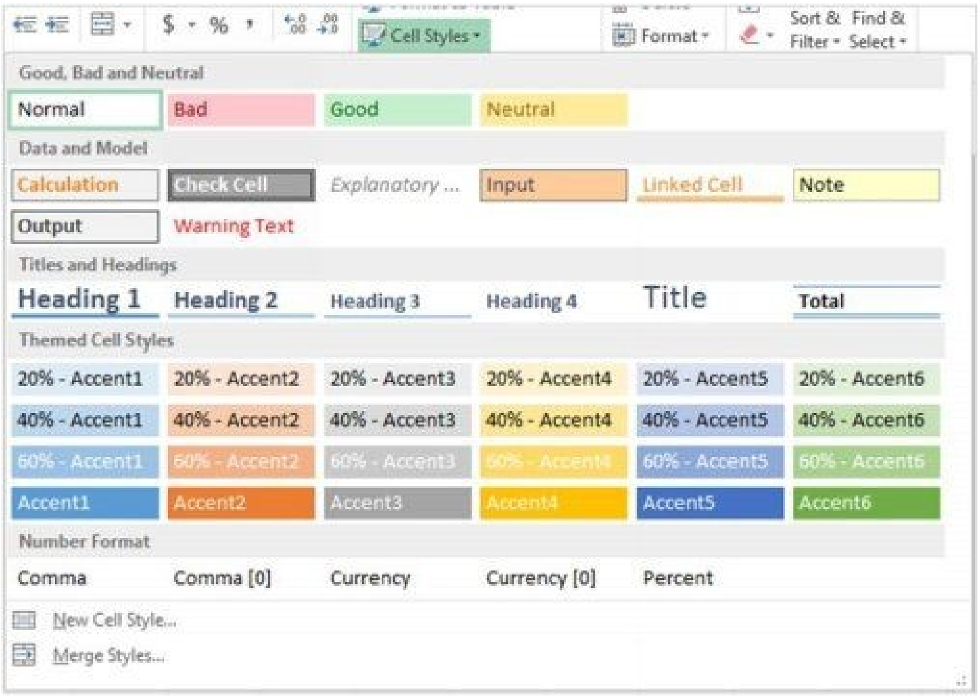


Figure 14.24 - The *Cell Styles* Drop Down Menu

Introducing the Cell Styles

As you can see in Figure 14.24, Excel offers several categories to filter the Cell Styles. The categories are explained as follows:

Good, Bad and Neutral: You can use these to highlight good, bad and general news respectively. For example, if you are making an income statement on Excel and the net income is negative, you can apply the *Bad* news style over it. The first cell in this category is *Normal*. Clicking this will reset the applied styles on the selected cell(s) to default formatting.

Data And Model: You can use these styles to delineate input and output cells. This category also contain styles for linked cells, warnings, note, check cell and calculations. For example, if a cell contains a hyperlink, you can format it with the *Hyperlink* style. Likewise, suppose a range contains three types of cells, one that accepts input values, other that reveals the results of a calculation and the third one contains the calculation part. You can format these cells with *Input*, *Output* and *Calculation* Cell Style respectively.

Titles And Headings: As the name suggests, these styles are used to delineate different levels of headings.

Themed Cell Styles: The styles in this category offer four graduated percentages of each Accent color for quartile comparisons. Here you need to remember that these styles are highly dependent upon the current theme. Changing the theme will also disturb the colors in the style.

Number Format: This category includes the basic number formats that are also located in the Number group of the Home Tab. However the one in Cell Styles allows you to make the particular number format a part of the selected style in conjunction with other formatting attributes.

Custom: You will not find this category in the Cell Styles drop down menu unless you create any custom style. Then it appears at the top of the Cell Styles gallery. *More about Custom Style coming up in this chapter.*

Just like the Themes drop down menu, the Cell Styles menu also contains a live preview of all the styles. In other words, you don’t need to apply a style just to check its attributes. Just move the mouse cursor to any style and it will be displayed in the selected cells. So if you are unsure about which style to choose, cycle your mouse cursor through all the styles and click the one that you like.

Modifying the Cell Styles

If you like a style partially, you can modify it to make it exactly the way you want. Suppose you like the color and font in the *Linked Cell Style* but are not satisfied with the choice of the bottom border. You can change the border and any other attributes that you want.

Here is how you can modify a cell style.

1. Select **Home** > **Cell Styles**
2. Right click the style you want to change and select **Modify**. This will open the *Style* dialog box with the current settings for the underlying style, as shown in Figure 14.25
3. Click the **Format** button to open the *Format Cells* dialog box.
4. Select the relevant tab in the *Format Cells* dialog box. For example, if you want to change the borders in the particular style, click the **Border** tab.
5. Make the required changes then click OK to return to the *Style* dialog box.
6. Click OK to close the *Style* dialog box.

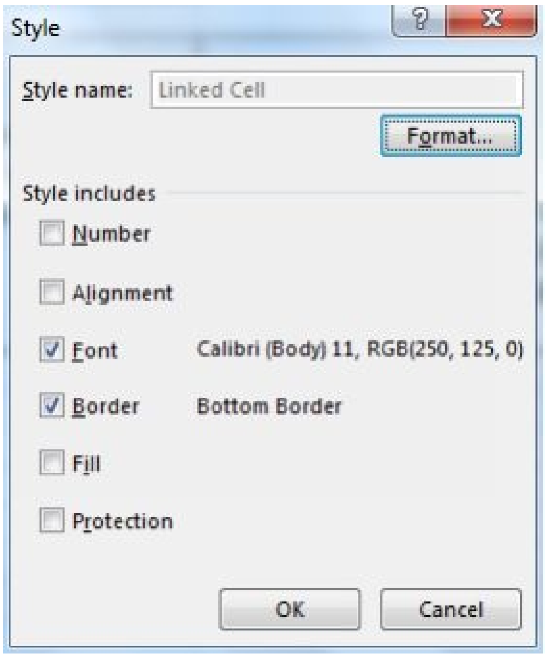


Figure 14.25 - The *Style* Dialog Box

> If you make changes in any existing style, it will override the original formatting attributes. So if you want to modify a cell style, at the same keep the original one, then right click the particular style and click **Duplicate** instead of *Modify*. Rest of the procedure is the same. The modified style will be saved in the Cell Styles dialog box, while the original one will also be there.

Creating your Own Style

If you don't like any Cell Style in the least, then it is recommended to create a Custom Style rather than modifying the existing one, as the latter would take far more time than the former.

To create a custom style in Excel,

1. Select any cell in a worksheet and apply the desired formats over it. Apply all the formatting that you want to include in your custom style.

2. Once you are done formatting the cell, select Home > Cell Styles > **New Cell Style**. This will open the *Style* dialog box containing your applied formats along with a suggested name for your new style.

3. If you want to change the name, type a new one in the *Style Name* text box and then click **OK**. Your custom style will now appear in the Cell Styles drop down menu.

As you can see in Figure 14.25, there are six check boxes in the Style dialog box, one for each formatting attribute. These checkboxes gives you an option to include one or more of the formats. Assume you want to apply the *Linked Cell* style but without borders. To do so, just uncheck the **Border** checkbox and then click **OK** to confirm to close the *Style* dialog box and apply the particular style.

The last checkbox in the Style dialog box is *Protection*. You can use this to allow or restrict other users from making changes in the particular style. However, this command is valid only if you have turned on the Protect Sheet feature in the Review tab. *Refer to chapter 16 to learn more about protection options in Excel.*

Copying Styles from Other Workbooks

By default, the Custom styles can only be used in the workbook in which they were created. However there is a way to copy them to other workbooks.

Here is how you can copy a cell style one workbook to another.

1. First, open the source workbook, the one in which the particular custom style was created.

2. Now open the destination workbook, the one in which you want to copy the custom style.

3. In the destination workbook, click Home > Cell Styles > Merge Styles. This will open the Merge Styles dialog box containing the names of all the open workbooks.

4. Select the source workbook and click **OK**.

Deleting Styles

> You can only delete the custom and duplicate styles. Excel does not allow deleting its built-in cell styles.

To delete a cell style, right click the particular style and select **Delete**.

> Deleting a style effect the formatting all the cells to which the particular style was applied to. All such cells are reverted to normal cell style.

Conditional Formatting

Conditional formatting is a very infamous feature of Excel. Though it is a bit advanced, it is widely used and applied in Excel based models. Conditional formatting allows you to format the cells in such a way that some particular values are highlighted automatically.

For example, you can apply conditional formatting to command Excel that if the values within the selected range are negative, it should fill the corresponding cells with red color. Then whenever you will change a positive value to negative, or if the resulting value of any formula comes to be negative, the respective cell will automatically be filled with red color.

The conditional formatting command can be found in the *Style* group on the **Home** tab.

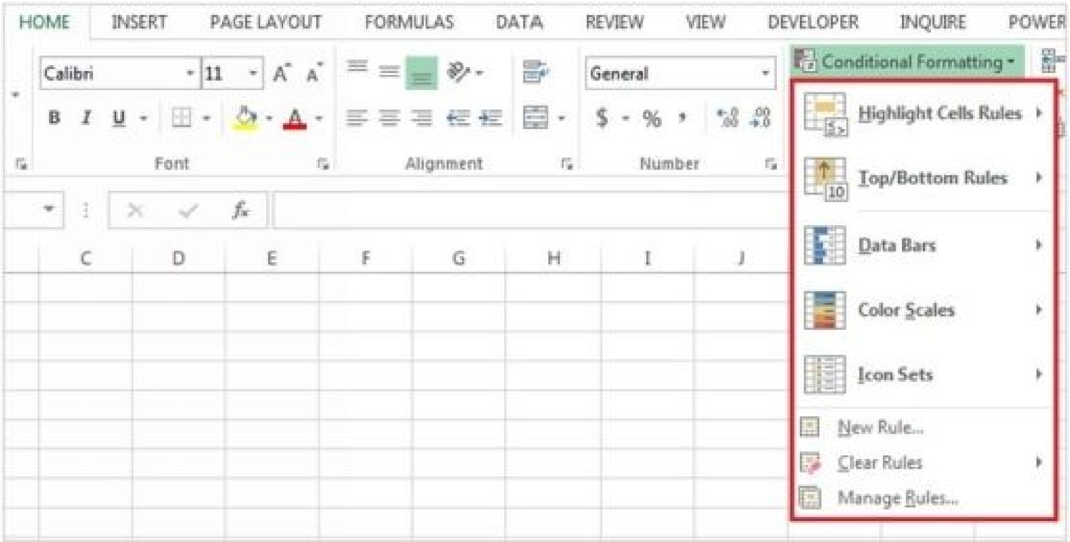


Figure 14.26 - Showing the Conditional Formatting Command in the Home Tab.

As shown in Figure 14.26, the Conditional Formatting button opens up a drop down list that carries the following options:

Highlight Cells Rules: This command opens a continuation menu containing several other formatting rules that highlight values that are greater than or less than a particular value, or that fall within a specified range of values.

Top/Bottom Rules: This option also opens up an extended menu containing rules such as highlight *Top 10 Items*, *Bottom 10 Items*, *Top 10%* and so on.

Data Bars: This command opens up a palette containing Gradient Fill and Solid Fill data bars. You can use these to indicate the relative magnitude of values within the selected range of cells. In other words, the Data Bars can help you highlight large and small values. The larger the value, the longer would be its data bar.

Color Scales: This one also opens up a palette containing multiple color scales. You can use these to highlight the relative magnitude of values within the selected range of cells. For example, you can apply the *Color Scales* formatting rules to analyze the data distribution and variation across large data. These are also widely used to indicate the investment over time. The selected cells are filled with different shades of one or two colors. The gradation in colors represents minimum, maximum and midpoint values.

Icon Sets: The Icon Sets command opens up a window containing numerous icons that you can use to represent different values and ranges. For example, you can set an icon for values above 55% and another icon for those between 54% - 60% and so on.

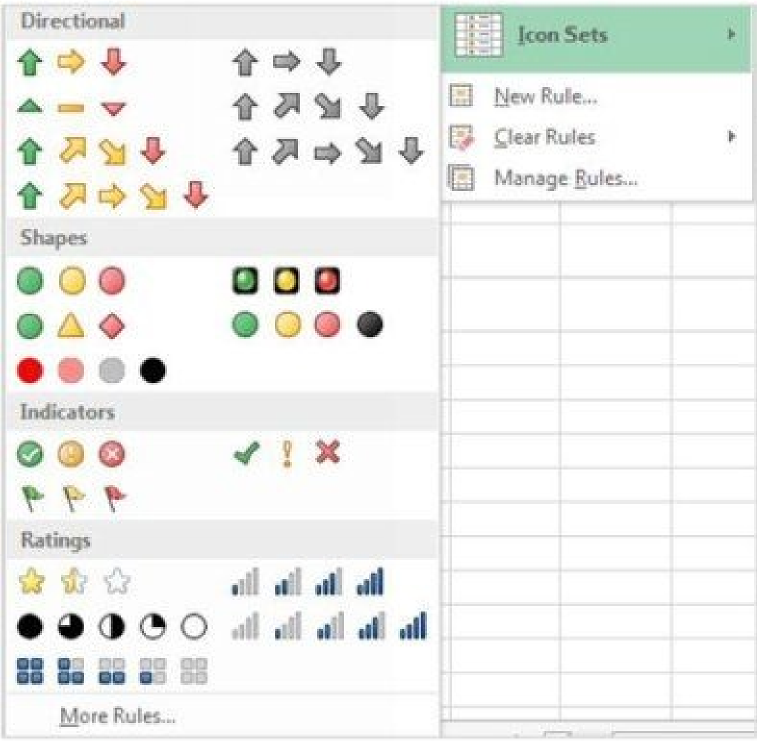


Figure 14.27 - The Icon Sets in Excel

New Rule: Clicking this will launch the *New Formatting Rule* dialog box where you can define a customized conditional formatting rule.

Clear Rules: As the name suggests, this option opens up a continuation menu containing options for removing the applied conditional formatting rules. You can clear rules from the entire worksheet, table, PivotTable and also from the selected cells.

Manage Rules: This command launches the *Conditional Formatting Rules Manager* dialog box, where you can modify the applied rules, delete them and can also arrange their precedence by shifting them up and down in the dialog box.

Now that you are introduced to the Conditional Formatting Commands, let's learn how you can actually use these options.

Using Graphical Markers for Conditional Formatting

The easiest and most interesting way of conditional formatting is through the graphical markers; namely Data Bars, Color Scales and Icon Sets. These are the middle three options located in the Conditional Formatting drop down list on the Home tab.

The previous section already contains a brief description about the three graphical markers. Let's talk about their application and mechanism.

Using Data Bars

Data bars are used to indicate the relative magnitude of values within the selected range of cells. The larger the value, the longer would be its data bar.

Following is an example on how you can use Data Bars in Excel.

Suppose you are working on a semiannual sales report containing sales value for the first 6 months. You can use Data Bars to indicate which month got the highest sale, which had the lowest sale and so on.

To apply the Data Bars conditional formatting, select the cells you want to format. Choose **Home** > **Conditional Formatting** > **Data Bars**. Then click any of the desired Data Bars option.

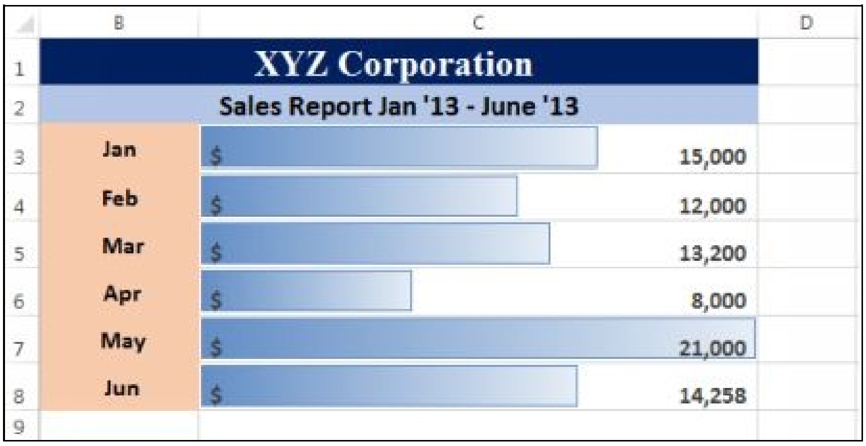


Figure 14.28 - Illustrating Example of Data Bars in Excel

Figure 14.28 shows an example of Data Bars.

As you can see, the data bars clearly signify which month has the highest sales, which one has the lowest and so on. You can gather this information even without the exact numeric values.

So if you want to hide the exact values and show Data Bars only, select the cells that contain the data bars, then select **Home** > **Conditional Formatting** > **Manage Rules**. This will open the *Conditional Formatting Rules Manager* dialog box. Select the particular Data Bars in the list of rules, then Click **Edit Rules**. This will open the *Edit Formatting Rule* dialog box. Click the checkbox labeled **Show Bar Only**, as shown in Figure 14.29

Click **OK** to save the settings and close the dialog box.

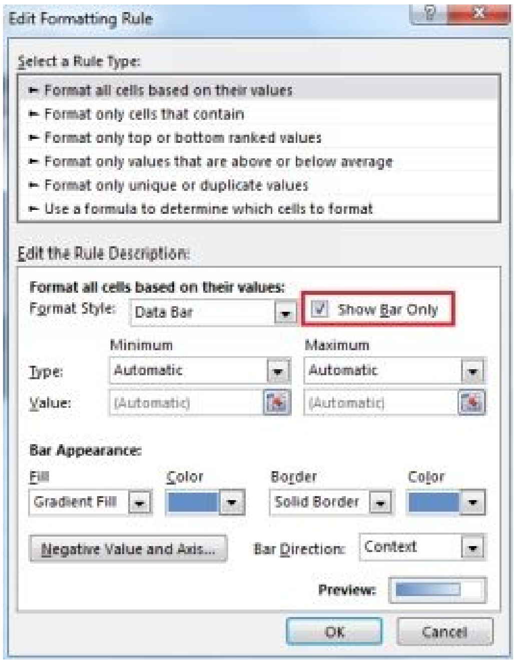


Figure 14.29 - Showing the *Show Bar Only* option in the *Edit Formatting Rule* dialog box

Using Color Scales

Color scales classify the values using color gradations. This feature of Conditional Formatting is very helpful for understanding the distribution and variation of values across a large range of data.

Continuing the example illustrated in Figure 14.28, here is how you can apply Color Scales conditional formatting.

1. Select the cells you want to format.
2. Choose **Home** > **Conditional Formatting** > **Color Scales**. Then click any of the desired Color Scales option.

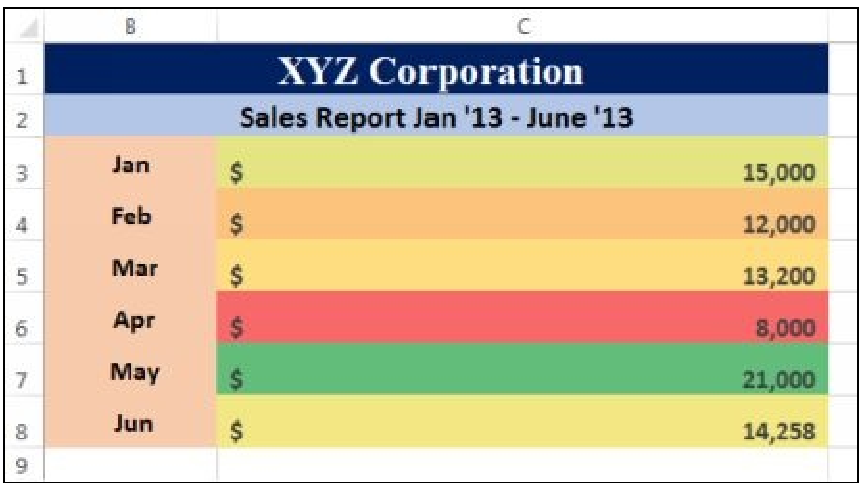


Figure 14.30 - Illustrating Example of Color Scales in Excel

In Figure 14.30, we have selected the last option in the second row of the Color Scales palette. As you can see in the above image, the highest value is highlighted with green and the lowest value with red color, and then there are color gradations of yellow to indicate other values.

If you want to change the current color, select the cells that contain the Color Scale formatting, then select **Home** > **Conditional Formatting** > **Manage Rules.** This will open the *Conditional Formatting Rules Manager* dialog box. Select the particular Data Bars in the list of rules, then Click **Edit Rules** to open the *Edit Formatting Rule* dialog box.

Figure 14.31 - Showing the *Color* Change Settings in the *Edit Formatting Rule* Dialog Box

Click **Color** to open the color palette for the *Minimum*, *Maximum* and *Midpoint* values. Excel will automatically adjust the gradation for midpoint value colors and will display the complete color theme in the *Preview* pane located at the bottom of the dialog box. Once you are satisfied with the new color code, click **OK** to confirm the changes and close the dialog box.

Using Icon Sets

The third and most interesting form of graphical markers is *Icon Sets*. You can apply this formatting to highlight different values and ranges.

Continuing the example illustrated in Figure 14.28; to apply *Icon Sets* conditional formatting, first select the cells you want to format. Choose **Home** > **Conditional Formatting** > **Icon Sets**. Then click over the desired set of icons.

	B	C	
1	XYZ Corporation		
2	Sales Report Jan '13 - June '13		
3	Jan	$	15,000
4	Feb	$	12,000
5	Mar	$	13,200
6	Apr	$	8,000
7	May	$	21,000
8	Jun	$	14,258

Figure 14.32 - Illustrating Example of Icon Sets in Excel

In Figure 14.32, we have selected the first set of icons in the *Directional* category. By default, Excel uses the following formula to calculate the threshold values.

67th percent = min + 0.67 * (max-min) = 2 + 0.67 * (95-2) = 64.31.

33th percent = min + 0.33 * (max-min) = 2 + 0.33 * (95-2) = 32.69.

Interrupting the above formula,

Excel will put a green icon arrow for values that are equal to or greater than 64.31.

Likewise, the yellow arrow is for values that are less than 64.31 and equal to or greater than 32.69.

A red arrow represents values that are less than 32.69.

To change the ranges, select the cells that contain the Icon Sets formatting, then select **Home** > **Conditional Formatting** > **Manage Rules.** This will open the *Conditional Formatting Rules Manager* dialog box. Select the particular Icon Sets in the list of rules, then Click **Edit Rules**. This will open the *Edit Formatting Rule* dialog box.

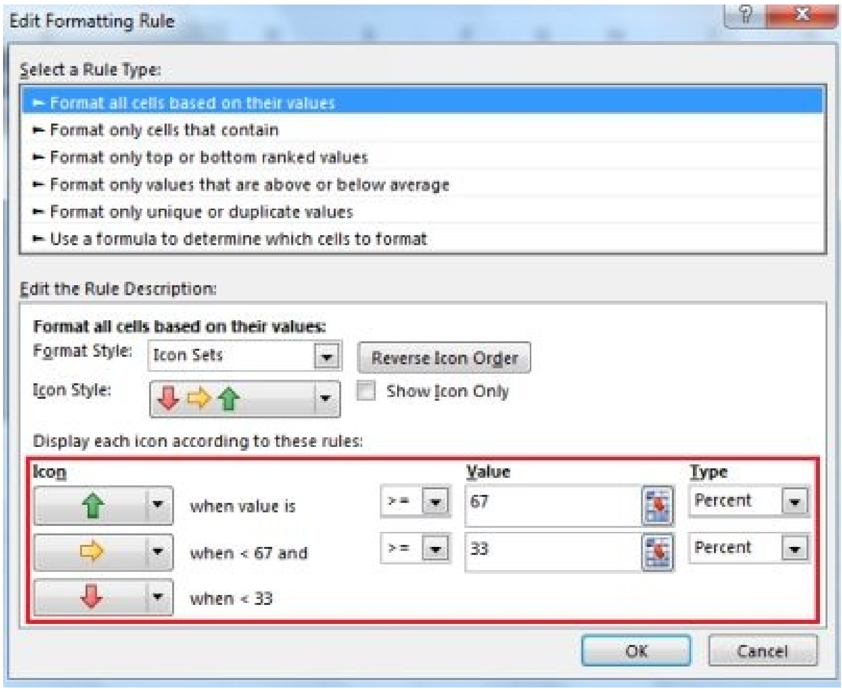


Figure 14.33 - Showing the *Icon Sets* Value Change Settings in the *Edit Formatting Rule* Dialog Box

Change the values, icons and other settings by clicking the pertinent drop down lists. Click **OK** to confirm the changes and close the *Edit Formatting Rule* dialog box.

Revealing the Duplicate Values

At times you may want to identify duplicate values within a worksheet or a range of cells. Well, you can do so by applying the Conditional formatting rules.

Here is how you can highlight the duplicate values within a selected range:

1. Select the range of cells in which you want to highlight the repeated values.
2. Select **Home** > **Conditional Formatting** > **Highlight Cell Rules** > **Duplicate Values.** This will open the *Duplicate Values* dialog box, as shown in Figure 14.34
3. As you can see in Figure 14.34, the *Duplicate Values* dialog box contains two drop down lists. Click the first one to select whether you want Excel to highlight *Duplicate* values or *Unique* values.
4. Next, click over the second drop down list to select the type of formatting you want Excel to apply over the identified (Duplicate or Unique) values.
5. Click **OK** to confirm the settings and close the *Duplicate Values* dialog box

Figure 14.34 - The *Duplicate Values* Dialog Box

Conditional Formatting via the Quick Analysis Tool

You can apply conditional formatting via the Quick Analysis Tool as well. This is something that wasn't there in the previous versions of Excel. The Quick Analysis tool in Excel 2013 contains several types of conditional formatting commands.

To reveal the Quick Analysis tool, select the range of cells on which you want to apply the formatting. As soon as you select the cells, the Quick Analysis button appears at the bottom right of the selection. Click the button to reveal the Quick Analysis Tool.

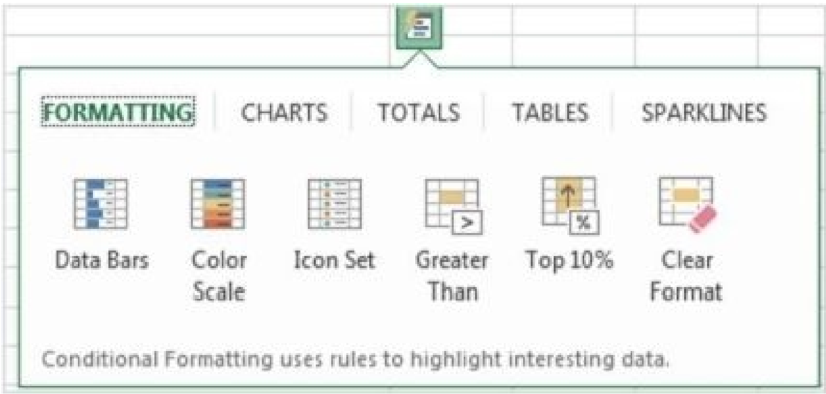


Figure 14.35 - Showing the *Conditional Formatting Commands*in the *Quick Analysis Tool*

As shown in Figure 14.35, the formatting tab in the Quick Analysis tool contains several conditional formatting commands including Data Bars, Color Scale, Icon Set, Greater Than, Top 10%, and Clear Format.

The best thing about the Quick Analysis tool is that it offers a live preview of how the selected cells would appear in different conditional formats. In other words, you don't need to apply a format just to check its attributes. Just move the mouse cursor to any conditional formatting command and it will be displayed in the selected cells. So if you are unsure about which formatting option to choose, cycle your mouse cursor through all the options and click the one that you like.

Create Your Own Formulas for Conditional Formatting

Excel 2013 contains innumerous conditional formatting rules, each of which is editable and can be modified as per the requirement. Yet at times, you may not find exactly what you need. In such cases, you can create your own conditional formatting rules.

To define your own formatting rules, select **Home** > **Conditional Formatting** > **New Rule**. This will open the *New Formatting Rule* dialog box, shown in Figure 14.36

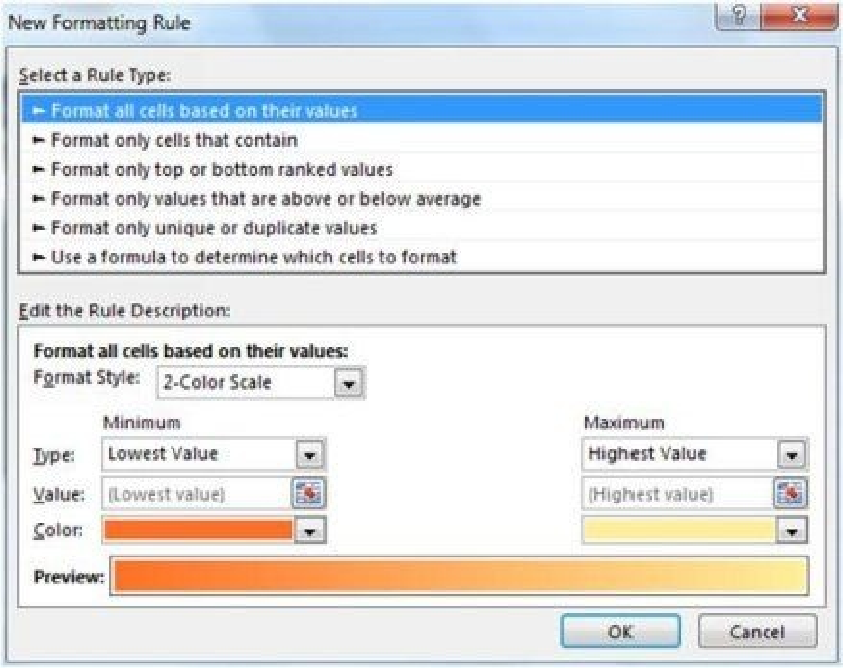


Figure 14.36 - The *New Formatting Rule* dialog box

First, select the type of rule you want to create in the '*Select a Rule Type'* list box. Then specify the corresponding settings in the in the '*Edit the Rule Description'* box. Remember that every rule has a different set of settings. Once you are done creating the rule, click **OK** to confirm the settings and close the dialog box.

Following are a few examples of creating customized conditional formatting rules.

1. ***To identify all the weekend dates in a range of cells containing date values:***

Select **Home** > **Conditional Formatting** > **New Rule**. Select the last option in the '*Select a Rule Type* list' box (*Use a Formula to determine which cells to format*). Then enter the following formula in the '*Format values where this formula is true'* type text box:

=OR(WEEKDAY(A1)=7,WEEKDAY(A1)=1)

Select the desired format by clicking the **Format** button. Click **OK** once done.

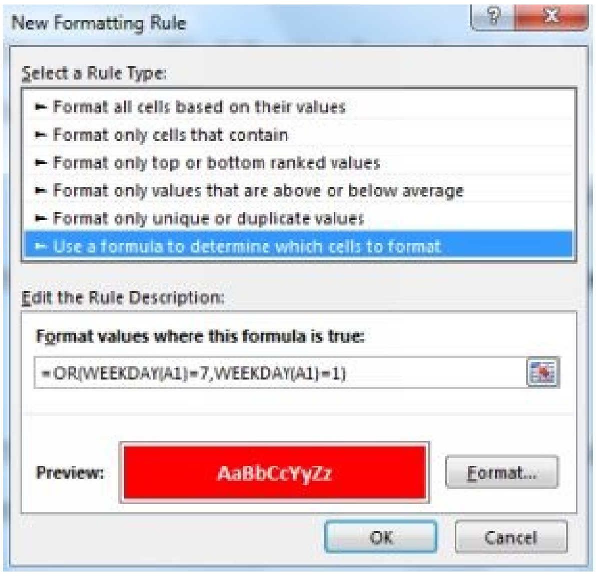


Figure 14.37 - Defining Conditional Formatting Rule to Highlight the Weekend Dates

> This formula assumes that a range of cells containing date values is selected and the active cell is A1. Make sure to replace A1 in this formula with the address of your active cell.

2. ***To highlight alternate columns in a particular range,***

Select the range in which you want apply the particular conditional formatting rules. Select **Home** > **Conditional Formatting** > **New Rule**. Select the last option in the '*Select a Rule Type*' list box (*Use a Formula to determine which cells to format*). Then enter the following formula in the '*Format values where this formula is true*' type text box:

=MOD(COLUMN(),2)=0

Select the desired format by clicking the **Format** button. Click **OK** once done.

> This procedure and formula can also be used to highlight alternate rows, just replace the word COLUMN with ROW in the formula.

3. ***To highlight alternative cells, like checkerboard shading:***

Select the range in which you want apply the particular conditional formatting rules. Select **Home** > **Conditional Formatting** > **New Rule**. Select the last option in the '*Select a Rule Type*' list box (*Use a Formula to determine which cells to format*). Then enter the following formula in the '*Format values where this formula is true*' type text box:

=MOD(ROW(),2)=MOD(COLUMN(),2)

Select the desired format by clicking the **Format** button. Click **OK** once done.

Figure 14.38 shows an example of checkerboard shading on a selected range of cells.

	A	B	C	D	E
1	1/1/2014	1/1/2014	1/1/2014	1/2/2014	1/3/2014
2	1/2/2014	1/2/2014	1/1/2014	1/2/2014	1/3/2014
3	1/3/2014	1/3/2014	1/1/2014	1/2/2014	1/3/2014
4	1/4/2014	1/4/2014	1/1/2014	1/2/2014	1/3/2014
5	1/5/2014	1/5/2014	1/1/2014	1/2/2014	1/3/2014
6	1/6/2014	1/6/2014	1/1/2014	1/2/2014	1/3/2014
7	1/7/2014	1/7/2014	1/1/2014	1/2/2014	1/3/2014
8	1/8/2014	1/8/2014	1/1/2014	1/2/2014	1/3/2014
9	1/9/2014	1/9/2014	1/1/2014	1/2/2014	1/3/2014
10	1/10/2014	1/10/2014	1/1/2014	1/2/2014	1/3/2014
11	1/11/2014	1/11/2014	1/1/2014	1/2/2014	1/3/2014
12	1/12/2014	1/12/2014	1/1/2014	1/2/2014	1/3/2014
13	1/13/2014	1/13/2014	1/1/2014	1/2/2014	1/3/2014
14	1/14/2014	1/14/2014	1/1/2014	1/2/2014	1/3/2014
15	1/15/2014	1/15/2014	1/1/2014	1/2/2014	1/3/2014
16					

Figure 14.38 - Showing an Example of Checkerboard Shading in Excel

Managing Conditional Formatting

The **Manage Rules** command in the *Conditional Formatting* drop down list on the Home tab opens the *Conditional Formatting Rules Manager* dialog box. It allows you to do the following:

New Rule: You can define new conditional format rules by clicking the **New Rule** button at the top left of the dialog box.

Edit Rule: You can edit an existing rule by selecting the particular rule in the Rule list box and then clicking the **Edit Rule** button.

Delete Rule: You can delete the existing rules by selecting the particular rule in the Rule list box and then clicking the **Delete Rule** button.

Align Rules: If any range of cells is formatted with multiple conditional formatting rules, you can define the order of precedence in which you want the particular rules to be applied. To do so, click over the rules, one at a time, and move them up and down by clicking the arrows located to the right of the 'Delete Rule' button.

When more than one rule is true and there is not conflict among them, Excel applies both over the selected range. In this case, the precedence of rules in the Rule list box does not matter. However when more than one rule is true and a conflict exists among them, then Excel gives more preference to the rule listed above. The rule that appears higher in the

Rule list box is applied first then the one after it and so on.

Filter Display: By default, Excel displays all the rules in the Rule list box show. If you want to see and change the alignment of a rule applied in a particular sheet, select its name from the "**Show formatting rules for**" drop down list located at the top left of the dialog box.

Stop Rule: By default, Excel applies the rules that are true. If you want to stop a particular rule from being applied even when it is true, put a tick mark in the '**Stop If True'** checkbox located in front of every rule in the Rule list box.

Chapter 15: Printing in Excel 2013

No matter how the world strives to create a paperless environment, the fact remains that a lot of reports and data lists needs to be printed in hard copy. You may need to get a hard copy of worksheets and tables that you make on Excel.

Being said that, it is a common misconception that printing in Excel is quite complicated. After going through this chapter, you will be freed of all such fallacies. Printing worksheets is a matter of just a few clicks. You can print the entire worksheets, or just the active region or even a few selected cells. This chapter covers all the basic and advanced printing features of Excel 2013.

Basic Printing Rules in Excel

We will start off with the basics of printing in Excel and then move on the advanced printing features. This section is a must for those who are printing their Excel files for the first time.

There are several ways of printing a worksheet, as listed below:

1. Select **File** > **Print**. Then click the **Print** button
2. Press **Ctrl + P** on your keyboard then hit **Enter**.
3. Click the *Quick Print* icon in the *Customize Quick Access Toolbar*. If it is not there, click the downward arrow located on the right of the Quick Access toolbar and select **Quick Print**.

Either ways, Excel uses the default print settings unless you change them.

You should go for the first method of printing if you want to change the print settings. If you don't change it, Excel uses the following default settings (also shown in Figure 15.1):

Prints one copy of the active region in the worksheet. It does not print the empty cells that lie outside of the active area, even if they were filled before.

Prints in collated and portrait form

Does not print the scaled output. In other words, the worksheets are printed at their actual size.

Does not print any headers, footers or comments, if any.

Does not print the gridlines.

If the worksheet contains large amount of data, Excel splits the data in pages, column wise.

Previewing Before Printing

If you are unsure about what area Excel will consider as active while printing, or if your worksheet contains large amount of data and you want to see how it is going to be divided in the print form, you can check the Print Preview before actual printing.

There are several ways of seeing the Print Preview of a worksheet, as listed below:

1. Hit **Ctrl + P** or **Ctrl + Shift + F12** on your keyboard.
2. Select **File** > **Print**.
3. Click the *"Print Preview and Print"* icon in the *Customize Quick Access Toolbar*. If it is not there, click the downward arrow located on the right of the Quick Access toolbar and select **Print Preview and Print**.

Either ways, you will land on the *Print* window in the *Backstage* view. As you can see in Figure 15.1, the left side of the *Print* window contains the print settings and on the right side is the print preview. If your active worksheet consists of multiple pages, spin the wheel on your mouse or click the page arrows located at the middle bottom of the *Print* window to see the print preview of all the pages.

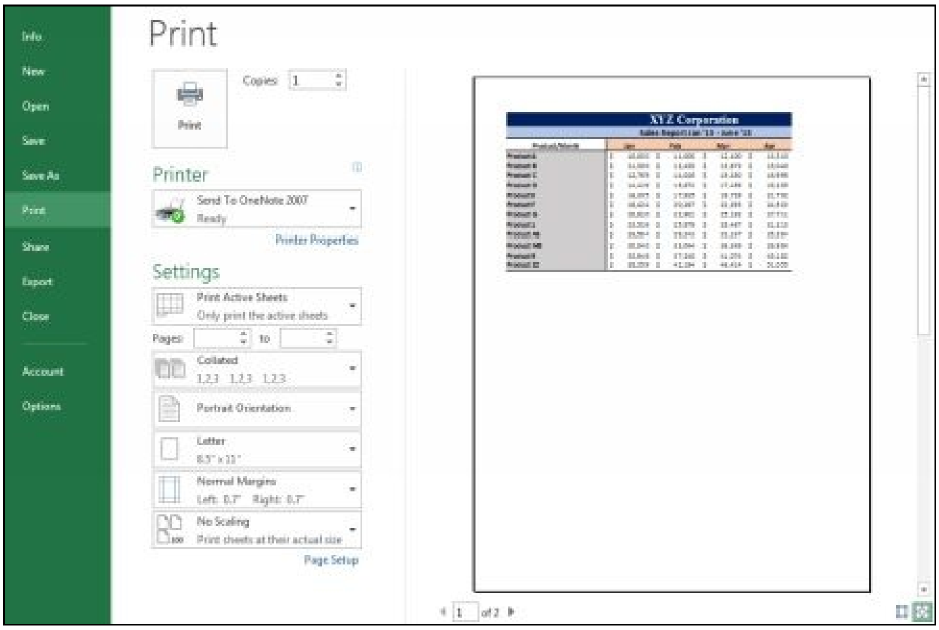


Figure 15.1 - Showing *Print Settings* and *Print Preview* in the *Print* Window of the Backstage View

Once you are satisfied with the Print Preview, click the **Print** button.

As you can see in Figure 15.1, there are two tiny icons located in the bottom right corner of the Print Window.

Starting from the left, the first button is to zoom in and zoom out the print preview. The second icon is a toggle to display the margins in print preview. You can click and drag the markers to increase or decrease any column’s width.

> Whatever changes you make in the column’s width in the print preview screen, the same will also be updated in the actual worksheet.

Types of Worksheet Views

You can view a worksheet in three different modes; namely, Normal view, Page Layout view and Page Break Preview. By default, a worksheet is displayed in Normal view. However you can switch between the different views by clicking any of the three page view icons located at the right side of the status bar in Excel.

The View tab on the Ribbon also contains these commands. You will find this in the left side on the View tab. Apart from the three mentioned commands, you can also magnify and shrink the display using the Zoom slider and Zoom commands in the View tab.

However this chapter is not about views, it is about the role of page views in printing. The upcoming sections explain how the different page views can help you in printing.

The Normal View Mode

When you open a worksheet, it is displayed in the Normal mode. The most prominent feature about Normal view is that it display page breaks on the worksheet. The page breaks are shown by dotted lines.

> You may not find the page breaks the first time you open a worksheet. To see the dotted lines, select the **Page Layout** tab > **Print Area** > **Set Print Area**.

It is these page breaks that assist in the printing process. Whenever you add any rows or columns, or increase the size of them or change the page orientation, the page breaks adjust automatically.

So if you see that the printed output is moving to another page just because of one row or column, you can make the required changes to fit the data within one page break. Likewise, if it is not possible to shrink the data in one page, you can make changes to divide the printed output appropriately between two page breaks. Just keep an eye on the page break dotted lines while you make such changes.

> Some people find the dotted lines annoying. So if you want to hide the page break's dotted lines, select **File** > **Options** > **Advanced**. Scroll down to the *Display Options for This Worksheet* section. There you will find the **Show Page Breaks** checkbox. Remove the checkmark from it.

Working in the Page Layout View

The best view for printing purpose is the *Page Layout* view. You can consider this as the editable version of the print preview that you see in the Backstage view. The latter is the just the view-only mode of the worksheet. However the *Page Layout* view allows you to make changes in the worksheet. It shows the headers and footers as well, if any.

In short, the Page Layout view gives you the editable and precise preview of the printed output.

Switching to the Page Break Preview

The third type is the Page Break Preview. As the name suggests, this one displays the page breaks in the worksheet. However unlike the normal mode, the page breaks shown in the Page Break Preview are not only dotted lines. They are indicated by thick and dark colored dotted lines.

When you will click the *Page Break Preview* command, Excel will zoom out the display to give you a bird's-eye view of your worksheet. You can zoom out to magnify the display. Figure 15.2 shows a worksheet in Page Break Preview mode.

Moreover, the *Page Break Preview* also displays the page numbers. As you can see in Figure 15.2, the page numbers are watermarked. However they do not appear in the hard copy.

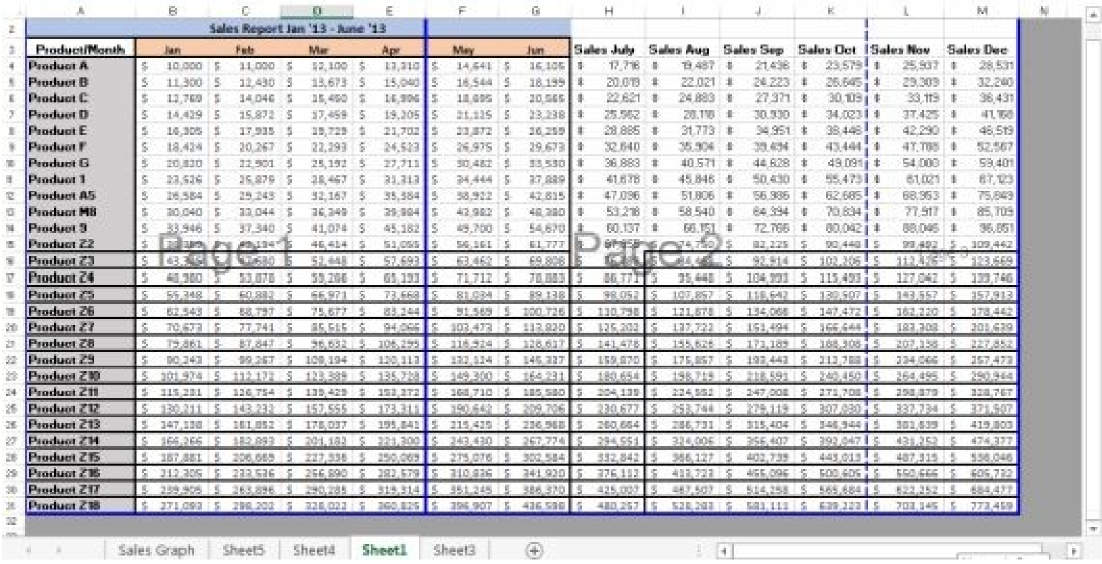


Figure 15.2 - Showing a Worksheet in *Page Break Preview* Mode

The most useful feature of the *Page Break Preview* is that it allows you to drag the page breaks. This option is not available in the Normal mode. When you click and drag the page breaks, Excel adjust the margins and scaling automatically so that it can fit information on the pages, as per your requirements.

Exploring the Page Setup Settings

The default print settings works fine most of the times. However, in some cases you may need to change them. There are three places in Excel where you can modify the print settings.

1. Select **File** > **Print**. You will find the Print settings on the right side of the Print window, as shown in Figure 15.1

2. The *Page Layout* tab on the ribbon also contains several print settings' commands.

3. Click the small downward diagonal arrow located at the bottom right corner of the *Page Setup* group in the Page Layout tab. This will open the *Page Setup* dialog box that contains the print settings.

> Not all these places contain all the print settings. For example, the command to specify where to print cell comments is not available in the *Backstage* view print window. You will find it in the *Page Setup* dialog box. The basic print settings are there in almost all the places. However if you don't find your required settings in one place, try the other two.

Following is a brief description of some important and commonly used print settings.

Copies: By default, Excel prints only one copy of the printed output. To make multiple copies, use the **Copies** control located at the top of the *Print* window in Backstage View. Enter the desired number of copies and then hit **Print**.

Printer: To select any other device for printing, select **File** > **Print**. Click the **Printer** drop down list and select the printer you want to use.

What To Print: The first option under the *Settings* section in the Backstage's Print window is 'what to print'. By default, it is set to *Print Active Sheets*. Click the corresponding drop down list to select any other option.

For example, you can print the entire workbook or just the current selection or the selected table and so on. This command is also available in the *Page Layout* tab on the ribbon. Select the cell(s) you want to print, click Print Area **> Set Print Area**. Each range prints on a separate page.

> If you have forgotten to add any range in the print area, select the range, then choose the **Page Layout** tab on the Ribbon. Click **Print Area** > **Add to Print Area**.

Collated: If you are printing more than one copy, make sure the **Collated** option is selected in the corresponding drop down list. Doing so will command Excel to print the pages in order for each set of output.

Page Orientation: By default, the page orientation is set to *Portrait*. You can change it by choosing the **Page Layout** tab on the ribbon. Then click the **Orientation** drop down list and select the desired option.

Page Size: To change the page size, choose the *Page Layout* tab on the ribbon. Click **Size** and then select the paper size you are using. This option is also available in the *Print* tab of the *Backstage* view as well as in the *Page Setup* dialog box.

Page Margins: Margins refer to the top and bottom of the printed page and the unprinted areas along the sides of the worksheet. You can select the desired margins from the quick margin settings or you can also specify the exact margin size you want.

Whatever margin size you specify, it will remain same for all the printed pages. You cannot set different margins for different pages.

If you want different margins in different pages, then print each page separately, while changing the page margin after each print.

There are several ways to modify the page margins, as listed below.

The first way of changing the page margins is to view the particular worksheet in the *Page Layout* mode. There you will see a horizontal ruler located above the first column and a vertical ruler located to the left of the first row. Click and drag the horizontal one to adjust the left and right margins, and the vertical one to set the top and bottom margins.

The Page Layout tab on the ribbon contains the quick margins option. Click the **Margins** drop down list and select the desired margin. If you don’t find the desired option in available ones, click **Custom Margins** located at the end of the **Margins** drop down list. This will open the **Margins** tab in the *Page Setup* dialog box. Here you can specify the exact margins you want.

The quick margins’ options along with the Custom Margin’s command are also located in the *Print* tab of the *Backstage* view.

Another way to adjust the margins is to open the Print tab in the *Backstage* view and click the *Show Margins* button located in the bottom right corner of the window. Doing so will reveal margins in the print preview. Drag the margins to the desired size.

Scale to Fit: Scaling allows you to control the printed output and fit it into the required number of pages. There are several ways of scaling the worksheets.

Choose the **Page Layout** tab. There you will find a **Scale** control command in the *Scale to Fit* group. Use it to enter the desired scaling factor. By default, the scaling is set to 100%. The minimum that you can scale down to is 10%. The maximum that you can scale up to is 400%.

For quick scaling options, select **File** > **Print**. Click the **No Scaling** drop down list and select the desired option.

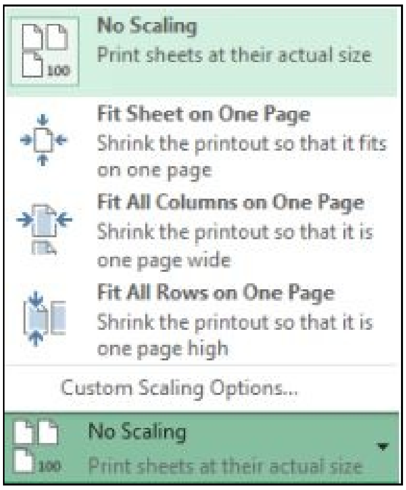


Figure 15.3 - The Scaling Commands Available in the *Print* Tab of the *Backstage* View

Figure 15.3 shows the quick scaling options available in the Print tab of the *Backstage* view. You can force the entire printed output to fit into one page, or you can shrink the columns in the printed output so that they all fit on one page and so on. The **Custom Scaling Options** command opens the **Page** tab in the *Page Setup* dialog box. Here you can specify the exact scaling factor you want.

	If you are scaling the printed output, make sure to check the print preview before printing it. Excel does not care how small the fonts have become due to scaling. It will oblige your scaling command even if it means making the font so small that that they are unreadable.

Handling Page Breaks

Page breaks are very important when it comes to printing the worksheets, especially the ones containing large amount of data. You would surely not want to a single column to print on a separate page by itself nor would you want the printed output to take up another page just because of one row or column.

The best way to control what prints where, is by managing the page breaks. Excel 2013 gives you complete authority to specify exact locations for entering page breaks.

Though Excel manages the page breaks automatically, you can manually enter page breaks if the ones entered by Excel do not seem appropriate to you.

To enter a horizontal page break, select the cell in Column A from where you want start the new page. Then choose the **Page Layout** tab. Click Breaks > **Insert Page** Break.

> In order to insert just a horizontal page break, it is important that you select the cell in Column A or else Excel will put the page break horizontally as well as vertically. So for example if you want to start a new page from Row 13, select Cell A13 and then insert the page break.

To enter a vertical page break, select the cell in Row 1 from where you want to start the new page. Then choose the **Page Layout** tab. Click **Breaks** > **Insert Page Break**. Make sure you select a cell in Row 1 in order to insert just a horizontal page break.

If you want to remove any of the manually inserted horizontal page breaks, select the cell beneath the first row of the particular page break. Then choose the **Page Layout** tab. Click **Breaks** > **Remove Page Break**.

Likewise, to remove any of the manually inserted vertical page breaks, select the cell located in first column to the right of the particular page break. Then choose the **Page Layout** tab. Click **Breaks** > **Remove Page Break**.

To remove all the manually inserted page breaks, choose the **Page Layout** tab. Click **Breaks** > **Reset All Page Breaks**.

Printing Tips

Following are a few more tips for advanced and selective printing.

Printing Gridlines

By default, Excel does not print the gridlines. However if you want to include the gridlines in the printed output, select the **Page Layout** tab. Put a tick mark in the **Print** checkbox located under the heading *Gridlines*.

Printing Headings

Just like gridlines, Excel does not print the row and column headers by default. However if you want to print the headers, select the **Page Layout** tab. Put a tick mark in the **Print** checkbox located under the option **Headings**.

Printing Row and Column Headings

If your worksheet is made in such a way that the first row or first column contains titles or any other headings and the rest of the cells contain data pertinent to those headings, it may be difficult to read data on pages that don't have these titles. Excel offers a way to resolve this issue, and that is by printing the particular column or row in every page.

It does not necessarily have to be the first row or column, it could be any. This is known as selective printing. You can command Excel to print a particular row or column on every page.

To print selective rows and columns on each page, select **Page Layout** > **Print Titles**. This will open the *Sheet* tab of the *Page Setup* dialog box, as shown in Figure 15.4

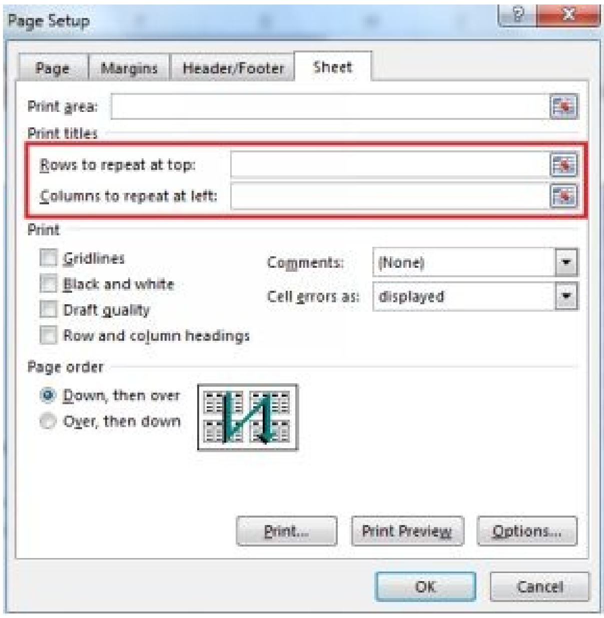


Figure 15.4 - Showing the Command to Print Selective Rows and Columns on Each Page

Select the rows or columns that you want to appear in every printed page, or you can also type in the references manually. For example, if you want Column A and Column B to print on every page, type **A:B** in the '**Columns to repeat at left'** type text box.

The repeated rows and columns will only appear in the printed output. These will now show in the worksheet unless you switch to the Page Layout view, and even there you will have to select the underlying cell to make any changes in the particular row or column's content.

Chapter 16: Take Care of Your Worksheets

When it comes to protection and security of data, Excel 2013 contains some exceptionally advanced and useful features. It allows you to protect the entire worksheets, as well as just a few cells, or a table, or a graph and so on. The security related options featured by Excel are very helpful. You can customize in any way to get the desired protection.

This chapter talks all the valuable data protection and privacy features of Excel. After going through this chapter, you will be able to set passwords to secure cells, control the extent to which your worksheets can be edited, add encryption and much more.

Securing Worksheets

All the cells and objects on a worksheet are locked and secured by default. However you need to activate the protection in order to apply it. Select **Review** > **Protect Sheet**. This will open the *Protect Sheet* dialog box, as shown in Figure 16.1. The **Format** button on the **Home** tab of the ribbon also opens same dialog box.

Figure 16.1 - *Protect Sheet* Dialog Box

As you can see in Figure 16.1, all the options are quite self explanatory. You can select what you want the users of the particular worksheet to be able to do. Once it is done, the locked items cannot be modified. In Figure 16.1, the users are just allowed to select the locked and unlocked cells. If anyone tries to perform any other operation over the locked cell(s), Excel displays an error message as shown in Figure 16.2

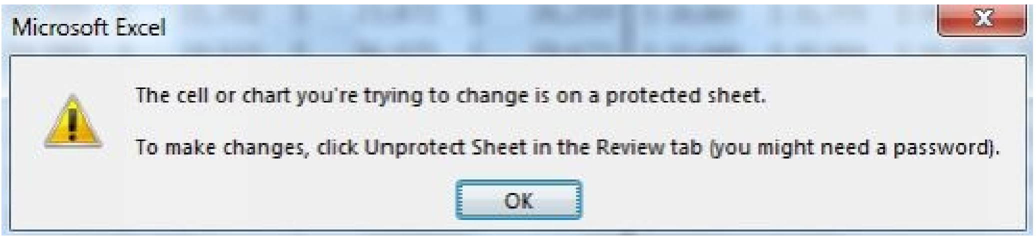


Figure 16.2 – Excel Displays an Error upon an Attempt to Edit a Protected Worksheet

As you can see in Figure 16.2, the error window also gives a suggestion on how the protected cells can be unprotected. Anyone can select the **Unprotect Sheet** command in the **Review** tab and then make the necessary changes in the locked cells. In order to prevent this from happening, set a password in the *Protect Sheet* dialog box. This will prevent other users from making any changes in the particular protection settings, except for those who know the password.

Protecting Individual Cells

The *Protect Sheet* option in the *Review* tab applies the particular settings on all the cells in the current worksheet. However at times you may not want to lock every cell. For example, you may want to lock the cells containing formulas and input values but leave some particular cells for comments and feedback.

Excel offers a way to keep particular cells unlocked while protecting the entire sheet. Here is how can do this.

1. Before you activate the *Protect Worksheet* feature, select the cells that you want to keep unlocked.

2. Select **Home** > **Format** > **Lock Cell**. The **Lock Cell** command is activated by default. Clicking it deactivates it, hence removes the protection settings from the selected cells.

3. Now select the **Review** tab and click **Protect Sheet**. The entire worksheet will be locked except for the few selected cells.

If you have kept multiple ranges unlocked and have gotten confused as to which cells are unlocked, just select the cell(s) you doubt is locked and choose **Home** > **Format**. Check the *Lock Icon* command. If it seems like it is already clicked, it means the particular cell is locked and vice versa.

You can also fill colors and apply borders in the unlocked cell(s) to keep them distinguished from locked cells.

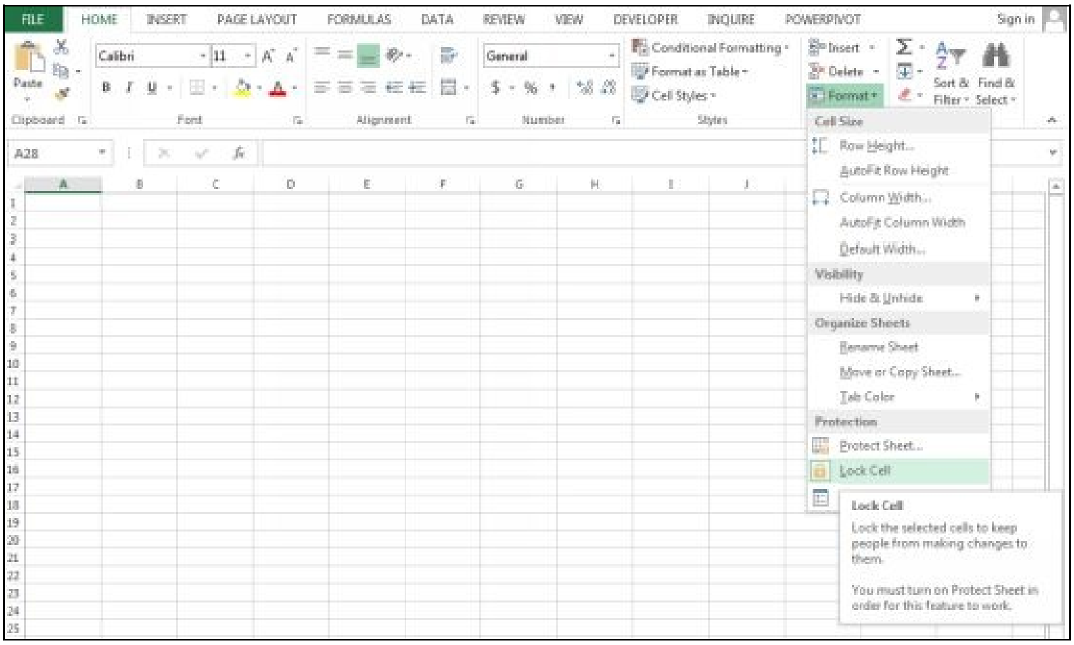


Figure 16.3 - Showing the *Lock Icon* Command in the Home Tab

Securing the Entire Workbook

If you want to protect the entire workbook's structure from editing, select the **Review** tab and then click **Protect Workbook.** This will open the *Protect Structure and Windows* dialog box, as shown in Figure 16.4

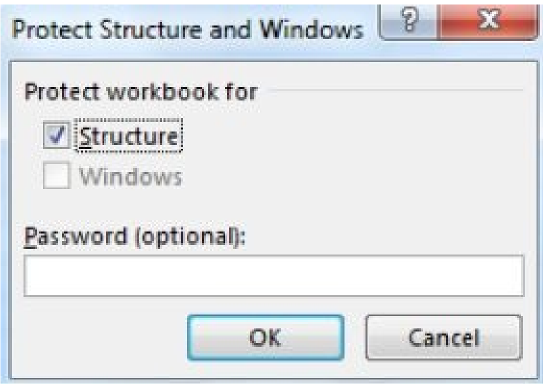


Figure 16.4 - The *Protect Structure and Windows* Dialog Box

Enter the password and click **OK** to lock the workbook's structure.

Permission to Edit

The protection features of Excel are not just limited to locking cells and worksheets. There are some advanced settings as well, the "*Allow Users to Edit Ranges*" being one of them.

Excel allows you to set password protection on ranges and specify exactly which users should be allowed to edit the particular ranges. To use this feature, make sure the *Protect Sheet* command is deactivated. Then select **Review** > **Allow Users to Edit Ranges**. This will open the "*Allow Users to Edit Ranges*" dialog box, as shown in Figure 16.5

Figure 16. 5 - Using the '*Allow Users to Edit Ranges*' command in Excel

This is the place where you can specify the editable ranges as well as the users who are permitted to make the edits.

Once the *"Allow Users to Edit Ranges"* dialog box is opened, click **New**. This will open another dialog box namely the *New Range* dialog box.

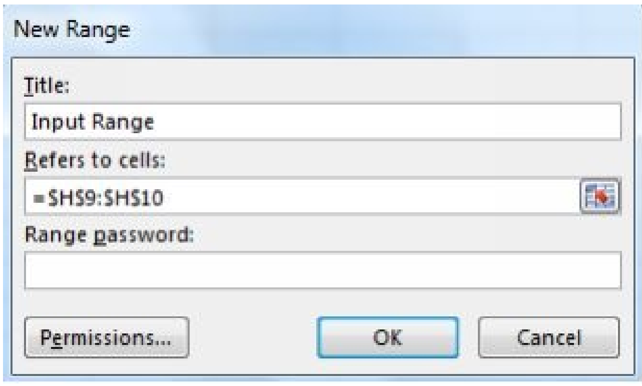


Figure 16. 6 - Selecting the Cell(s) to Protect in the *New Range* Dialog Box

First, enter a title for the range you want to protect. Next, enter the range reference in the '*Refers To Cells'* type text box; or you can also click the corresponding box and select the range in the worksheet. Type a password in the *Range Password* type text box (optional). Click **OK** to close the *New Range* dialog box and return to the "*Allow Users to Edit Ranges"* dialog box.

To edit the range or change the range selection or title, click the **Modify** button in the "*Allow Users to Edit Ranges"* dialog box. This will reopen the *Modify Range* dialog box for the particular range.

Now click **Permissions** to open the '*Permissions for Input Range'* dialog box, as shown in Figure 16.7

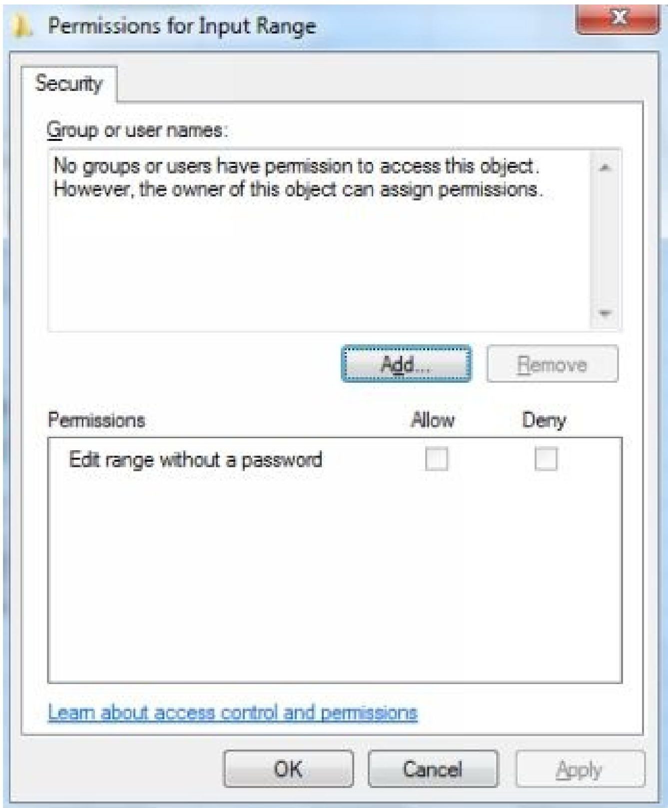


Figure 16.7 - The '*Permissions for Input Range*' Dialog Box

Click **Add** to open the '*Select Users or Groups'* dialog box, as shown in Figure 16.8

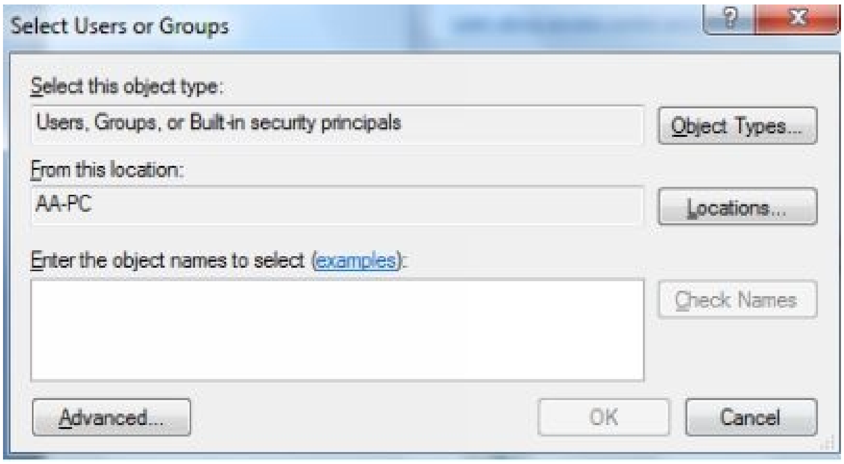


Figure 16.8 - The '*Select Users or Groups*' Dialog Box

Now click **Advanced** to open the extended version of the *Select Users or Groups* dialog box, as shown in Figure 16.9

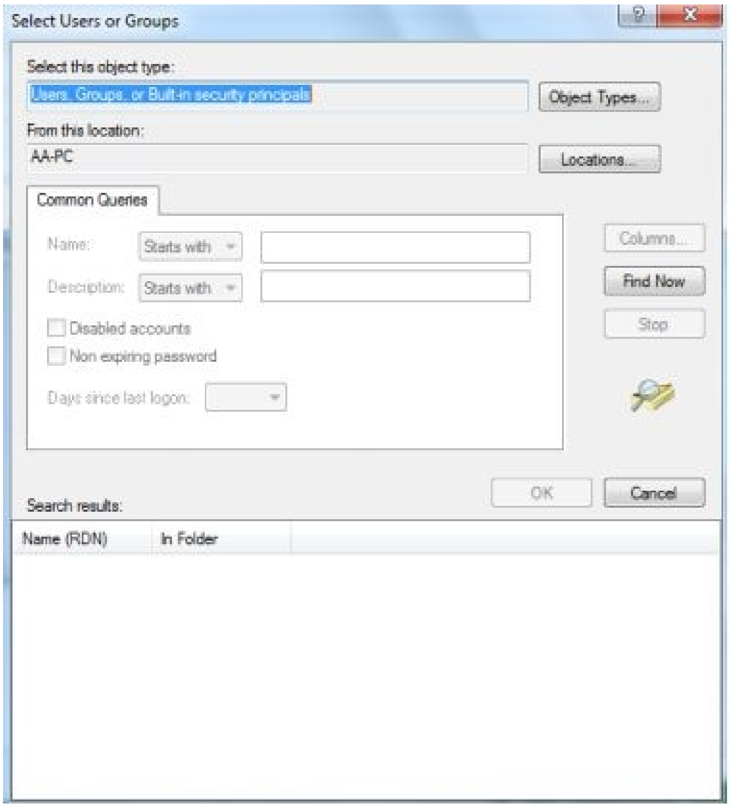


Figure 16.9 - Adding Users in the Extended Version of the '*Select Users or Groups*' Dialog Box

The simplest way of adding users is by clicking the **Find Now** button. It will display the list of all the users and groups available to your system. The **Locations** and **Object Types** commands are for filtered search.

Once you specify the individuals whom you want to allow editing of the particular range, click **OK** to return to the *Permissions* dialog box.

The *Permissions* dialog box lists the names of all the authorized users along with the *Allow* and *Deny* checkboxes. For each authorized users, you can specify whether they need a password to make the edits in the particular edits. In short, this feature applies double protection. You don't only specify the authorized users but also determine which users should enter password to access the editable form of ranges.

Once you have done all the settings and have added the users, the last step in the procedure is to activate the *Protect Sheet* command. You can do so by clicking the **Protect Sheet** button in the "*Allow Users to Edit Ranges*" dialog box or by selecting **Review** > **Protect Sheet**.

> If you want to keep track of who you have authorized and to what extent, put a tick mark in the **Paste Permissions Information Into A New Workbook** check box in the '*Allow Users To Edit Ranges'* dialog

	box.

Hiding/Unhiding a Worksheet

As already explained in Chapter 8, you can hide the values in a cell by applying the Null format over it. However, this will only hide the values in the cells. The entries will still be visible in formula bar.

To hide the selected cell(s), hit **Ctrl + Shift + F** to open the *Format Cells* dialog box. Select the P**rotection** tab and then click the **Hidden** checkbox. This will hide the formulas from view, though they will still be functional. The result of the formulas will stay visible on the worksheet.

Adding Encryption

Encryption is another way of securing your workbooks. It is a slightly complicated and advanced feature as it goes beyond the simple password protection. Encryption, in a way, obscures the data and renders it unreadable unless the user knows the decode key.

To apply Encryption, select **File** > **Info** > **Protect Workbook** > **Encrypt with Password**, as shown in Figure 16.9

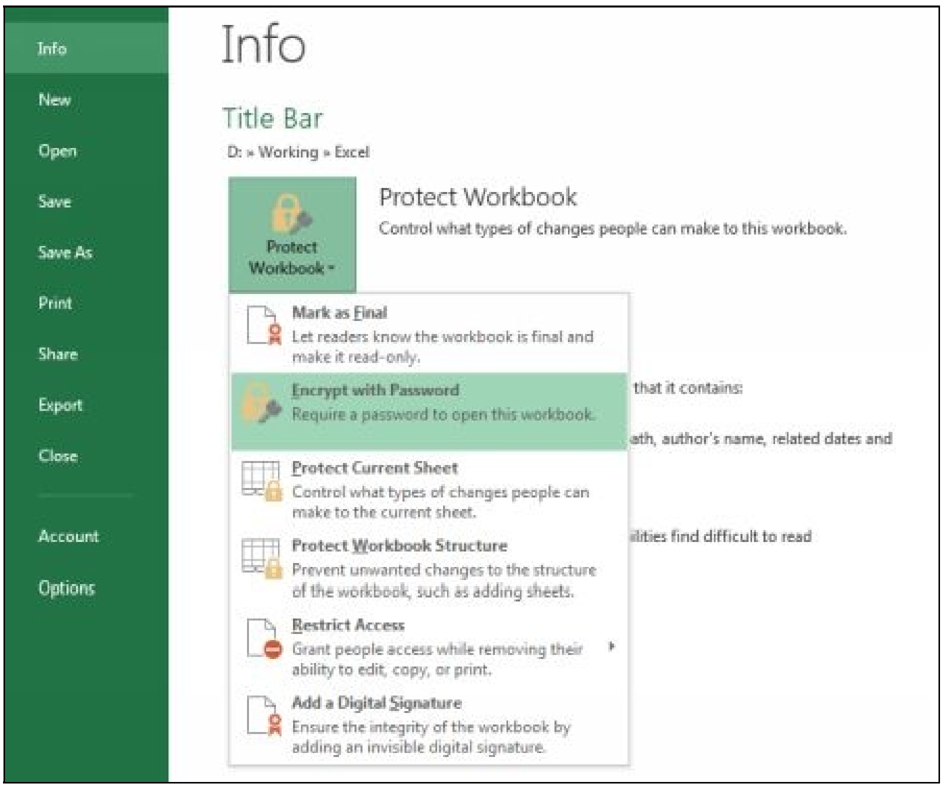


Figure 16.10 - Showing the Encryption Command in the Backstage View

This opens the *Encrypt Document* dialog box, as shown in Figure 16.11

Figure 16. 11 - The *Encrypt Document* Dialog Box

Enter a password, click **OK** and then re-enter the same password for confirmation purpose.

> Encrypting a workbook also activates the protection on the workbook structure.

Once you apply the Encryption, you are going to need the same password to reopen the workbook. Moreover, the *Protect Structure and Windows* dialog box (shown in 16.4) uses the same password.

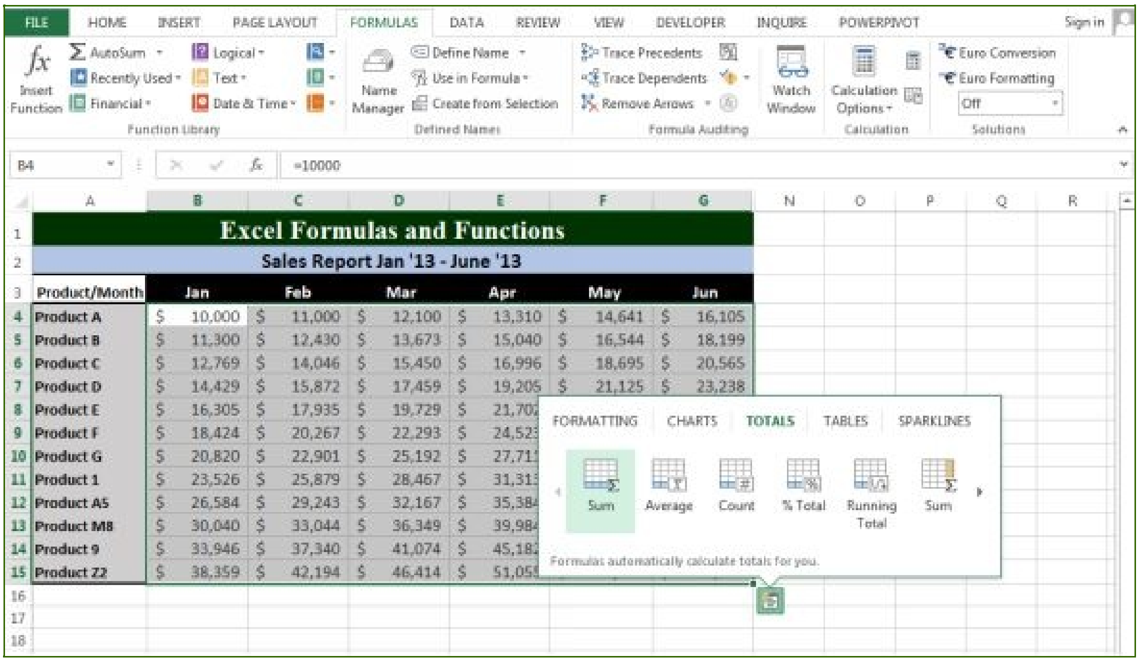
Encryption stays activated even after you turn off the *Protect Workbook* feature. To turn off the encryption, select **File** > **Info** > **Protect Workbook** > **Encrypt with Password.** Remove the password from the *Encrypt Document* dialog box and click **OK**.

Password Protection

Whether you activate the *Protect Sheet* feature, the *Protect Workbook* feature or any other security tool, it is imperative that you add a password or else anyone can easily unprotect the worksheets and turn off other security features. In short, the protection features are useless unless secured by a password.

> Password protection is a serious activity. Make sure you don’t forget your password as it is the key to unprotect the worksheet or workbook. Also remember, passwords are case sensitive.

PART III: FORMULAS AND FUNCTIONS



F ormulas and functions are the lifeblood of Excel. It is the formulas that is the identity of Excel. If there were no formulas in Excel, it would have been nothing but a simple word processing program with some extra tabular capabilities. A formula is a set of codes and characters that performs some type of calculation using data from the other cells.

This part of the book covers extensively the formulas and functions available in Excel. From the basics of entering formulas, to simple mathematical functions and advanced statistical formulas, this part of the book covers all you need to know to excel at Excel's formulas. You will also learn some very useful financial and lookup formulas. Moreover, this part also helps you in making the perfect error free worksheet in Excel 2013.

AT A GLANCE

Chapter 17: Learning the Basics

Excel 2013 features innumerable formulas and functions, but before we introduce you to those, it is important to understand the mechanism behind these formulas. This chapter covers all such basics including the operators used in building formulas, different ways of entering and modifying formulas, array formulas and numerous handy tips that will make the usage of formulas easier and interesting.

Know the Different Type of Operators

An operator is a symbol that determines the type of operation you want the formula to perform. In other words, operators specify the type of computation that is to take place between the cells and the linked values.

Most of the basic formulas in Excel require nothing but the sole use of operators. Excel recognizes four types of operators; namely, Arithmetic, Reference, Comparison and Single Text.

Table 17.1 lists the operators along with their function and examples.

Type	Operator	Description	Function	Example
Arithmetic	+	Plus Sign	Adds the values	=A5+B5+D5
	-	Minus Sign	Performs subtraction	=A5-B5
	/	Forward Slash	Performs Division	=A5/D7
	*	Asterisk	Multiplies the values	=B5*D8
	%	Percentage	Divides the value by 100	=D9%
	^	Exponent symbol	Exponentiation	=B5^5
Reference	, (comma)	Union operator	It combines multiple references into one reference	=SUM(A5,B8:C11,D15)
	: (colon)	Range operator	Defines the selected range	
	space	Intersection operator	Evaluates cells that are common in two references	=SUM(A5:A8 A5:D8)
Comparison	>	Greater than		=A5>B5
	<	Less than		=A5<B6
	=	Equals to	Equates the values and create links between cells	=A5=B7
	>=	Greater than or equal to		=A5>=B5
	<=	Less than or equal to		=A5<=B6
	<>	Angle Brackets	Not equal to	=A5<>B7
Single Text	&	Ampersand	Connects different entries to produce one continuous entry	=B4&" "&C6t

Table 17. 1 - Excel Operators Along With Their Function and Examples

Determining the Order of Operator Precedence

When you create formula using operators, it is interpreted in a certain order of operator precedence by Excel. There are certain rules that Excel follow to determine the order in which the different parts of the formula are calculated.

If a formula contains more than one operator having the same level of precedence, Excel follows the left-to-right order of precedence while performing the required calculation.

Table 17.2 lists down the operators with their level of precedence.

Operator	Description	Precedence
-	Negation	1
%	Percentage	2
^	Exponentiation	3
* and /	Multiplication and Division	4
+ and -	Addition and Subtraction	5
&	Ampersand/ Concatenation operator	6
=, <, >, <=, >=, <>	Comparison Operators	7

Table 17.2 - Order of Operator Precedence in Excel

Here is an example to make you understand better the order of operator precedence in Excel.

Suppose you entered the following formula in a cell in Excel:

=A5+B6*C7

As you can see in Table 17.2, multiplication has a higher precedence than addition. Therefore, while executing this formula, Excel will first multiply B6 to C7, and then the resulting value will be added to A5. Suppose A5 contains 5, B6 contains 10 and C7 contains 2. The resulting value would be 25 (**5+10*20**).

If you want Excel to perform the addition first, then put it in closed parentheses, as shown below:

=(A5+B6)*C7

If you enter this formula, Excel will first perform the calculation within the brackets. Considering the same values as assumed above, the resulting value in this case would be 300 (**(5+10)*20**).

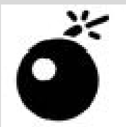
Now let's extend this formula for further understanding. Suppose you entered the following formula in a cell in Excel:

=A5+(B6–C7)/D9

In this formula, Excel will first perform the calculation within the parentheses. After that, it will follow the standard order of precedence, thereby performing division and then addition. So if you want Excel to ignore the order of precedence and perform the calculation otherwise, then you need to put double parentheses. Have a look at the following formula as an example:

=(A5+(B6–C7))/D9

Here we have entered double parentheses. It implies that Excel will first perform the calculation in the inner brackets, then the outer brackets and finally the division.



Be very careful while you use double parentheses. Make sure you put them in the right places and don't forget to balance the pair of brackets you use. There must be right parenthesis for every left parenthesis, or else Excel will display an Alert dialog box, notifying an error in the particular formula.

Ways of Entering Formulas

Now that you know how to use operators in building formulas, let's see how actually you can enter formulas in Excel 2013.

Type and Enter

The most basic way of entering a formula is to type it manually in the active cell. Just enter an equal sign (=) or a plus sign (+) followed by the formula.

Point and Enter

Though you can manually type as large a formula you want, this method of entering formula gets very difficult especially when working on large spreadsheets and uncountable cells of data.

A comparatively easier way of entering formula is by pointing to the cell references.

Suppose you want to enter the following formula in a cell **A9**:

=A5+B6*C7

You can either enter it manually, or use the following method to point and enter.

1. Select the cell A9.
2. Type an equal sign (=) in it.
3. While the equal sign (=) is still there, move the cell pointer to Cell A5. You can use the arrow keys on your keyboard to go to Cell A5 or can also directly click over it using the mouse. Just move the cell pointer to Cell A5. Do not double click it.
4. Now type a plus sign (+). Here you will see that while the cell pointer is at Cell A5, the plus sign will appear in Cell A9.
5. Now move the cell pointer to Cell B6.
6. Type a plus sign (+), then move the cell pointer to Cell B6.
7. Type an asterisk (*) and then move the cell pointer to Cell C7.
8. Finally, press **Enter** on your keyboard to confirm and close the formula mode.

> From the time you put an equal to (=) sign in a cell till you press **Enter**, the underlying cell is in the *Formula Edit* mode. Stay conscious of your mouse clicks. Make sure you select only the required cells, because any cells you click will be referenced to the underlying formula. In short, any extra clicks cell while the underlying cell is in the *Formula Edit* mode, may disturb the corresponding formula.

How to Insert Functions into Formulas

While operators can be used to build a lot of formulas, they cannot replace the need of functions. It is the functions that help you create and manage complex calculations and analysis models in Excel.

There are several ways of inserting functions in Excel, as explained below.

Using the Formulas Tab on the Ribbon

If you don't remember or are unsure about which function to use, the best way to find the right function is through the categories available in the *Function Library* group in the *Formulas* tab on the Ribbon, as shown in Figure 17.1

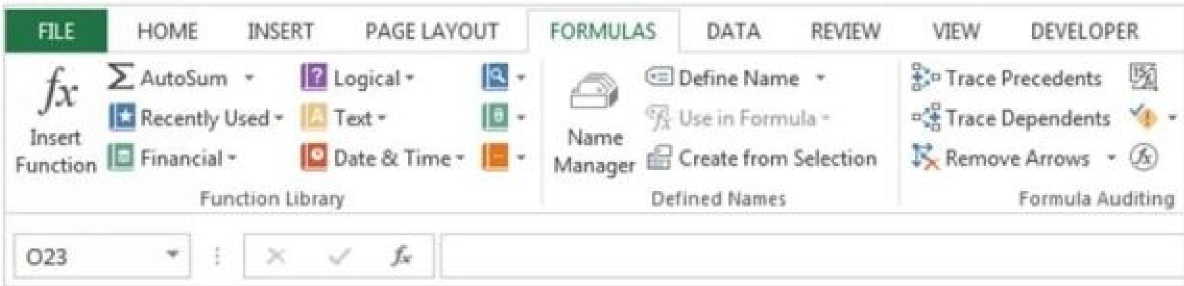


Figure 17.1 - Showing the Functions in the Formulas Tab on the Ribbon

All you have to do is to select cell the where you want to enter the function, then choose the **Formulas** tab and click the function category to open up the list of functions in the corresponding category.

As you see in Figure 17.1, there categories for financial, Logical, Text, Math and numerous other type of functions. Once the function's list is opened, click the one that you intend to insert in the active cell. Doing so will open the *Function Arguments* dialog box, as shown in Figure 17.2

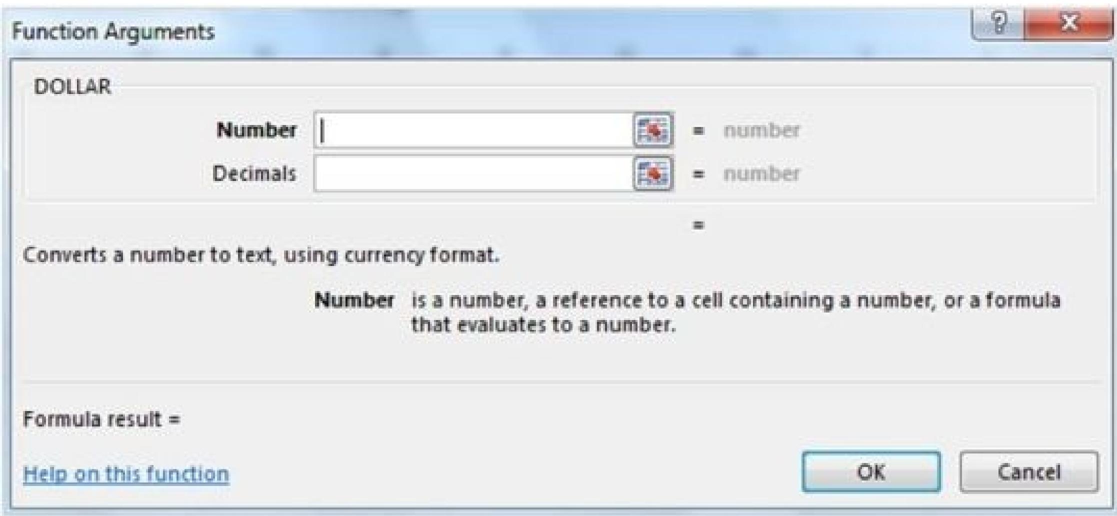


Figure 17.2 - The *Function Arguments* Dialog Box

Enter the function’s argument and click **OK** to insert it in the active cell.

As you can see in Figure 17.2, there is a small description written about the particular function. If this description is not enough and you are still unable to learn the usage of the function, click **Help on this function** link located at the bottom left of the *Function Arguments* dialog box.

Using the Insert Function dialog box

Another way to insert a function in Excel is by using the *Insert Function* dialog box, as shown in Figure 17.3

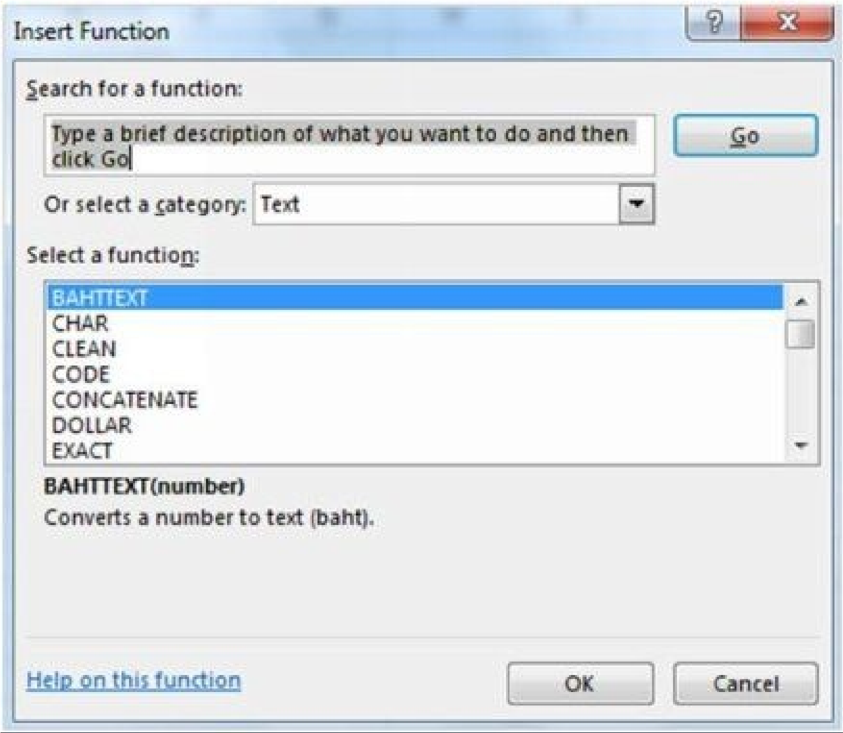


Figure 17.3 - Inserting Functions Using the *Insert Function* Dialog Box

Following is the procedure on how to use the *Insert Function* dialog box.

Choose **Formulas** tab and click the **Insert Function** button on the left of the tab. This will open the *Insert Function* dialog box. It can also be opened by clicking the ***fx*** icon located on the immediate left of the formula bar.

For keyboard users, hit **Shift + F3** to open the *Insert Function* Dialog box.

The *Insert Function* dialog box contains a drop down list of all the function categories. Just select a category and all the pertinent functions will be listed in the list box.

If you are unable to find the required function this way, you can also search for it by using the ***Search for a Function*** type text box located at the top of the dialog box.

Once you find the required function, click over it to open the *Function Arguments* dialog box. Enter the argument and click **OK**.

Using the Miraculous AutoComplete Formula Feature

The AutoComplete Formula tool is yet another advanced and valuable feature of Excel 2013. It offers the easiest way of entering a function in a formula. Here is how you can use it.

1. Move the cell pointer to the cell where you want to insert the function.

2. Type an equal sign (=) followed by the first letter of the function you want to insert. Suppose you want to insert the **SUMIF** function. To do that, type **S** and all the functions starting from **S** will appear below the selected cell, as shown in Figure 17.4

3. Using the arrow keys on the keyboard, move the selection to the function you want to insert.

4. Once the appropriate function is highlighted, press the **Tab** key on your keyboard.

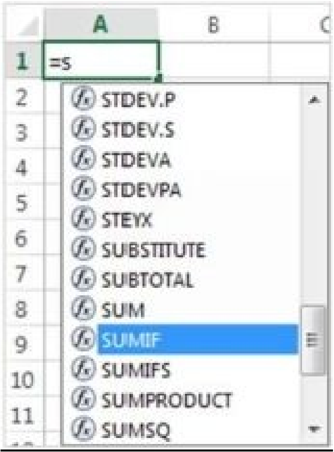


Figure 17.4 - Entering the SUMIF Function Using the AutoComplete Formula Feature

5. The selected function will appear in the active cell. Enter the argument in the cell, use commas to separate the arguments and finally, don't forget to close the parentheses, if any.

6. Hit **Enter** to complete the formula.

How to Use Range Names in Building Formulas

You do not necessarily need to put the cell address in the formulas. You can put names of the cells and ranges as well, if there are any.

There are three ways of using named cells and ranges in a formula, as listed below:

1. Type the name of the particular cell or range, where you want to place it in the formula.
2. Enter the first letter or character of the name and the select it from the *Name* drop down list.
3. Hit **F3** on your keyboard. This will open the *Paste Name* dialog box. Select the appropriate name and click **OK**. The selected name will appear in the formula.

Referencing Cells in Formulas

Most of the formulas that you create in Excel contain references to other cells and ranges. The references are what make the formulas interactive and valuable. You just change the value in the referenced cell and all the referenced formulas and resulting values are updated accordingly.

For example, if you refer to Cell B7 in a formula, the moment you change the value in cell B7, the formula's result will be updated accordingly. On the other hand, if you don't refer the cell, you would have to edit the formula manually every time you make a change in any input value.

There are three types of references that you can use in Excel.

Using Relative References

By default, Excel creates relative cell references when you copy and drag formulas to other cells. This type of referencing applies to the corresponding rows and columns.

The relative row and column references are actually offsets from the current row and column, hence they change when you copy a formula to other cells.

Using Absolute References

The second type of reference is the absolute reference. In this case, the row and column referred values does not change even when you copy the formula. This is because the reference is actually made to one cell address and that needs to remain constant in all the formulas. An absolute reference contains two dollar signs ($) in its cell address; one sign is to lock the column address and other for the row address. For example, **$B$7** represents an absolute reference. When entered in a formula, it will remain same no matter how far you copy and drag the formula. A change in cell B7 will affect all the formula's results containing this absolute reference.

Using Mixed References

A mixed reference is a combination of absolute and relative reference. It contains only one dollar sign, either with the column address or with the row address. The one containing the dollar sign stays constant in all the copied formulas, while the other referred value stays relative. $B7 and B$7 are examples of mixed reference.

Figure 17.5 shows an example of all three types of references.

	A	B	C	D	E	F	G	H
1			FORECASTED SALES					
2			Relative Reference		Absolute Reference		Mixed Reference	
3		Current Sales	Formula	Resulting Value	Formula	Resulting Value	Formula	Resulting Value
4	Jan-13	1500	=B3*1.2	1800	=$B$4*1.2	1800	=$B4*1.2	1800
5	Feb-13	1650	=B4*1.2	1980	=$B$4*1.2	1800	=$B4*1.2	1980
6	Mar-13	1815	=B5*1.2	2178	=$B$4*1.2	1800	=$B4*1.2	2178
7	Apr-13	1997	=B6*1.2	2396	=$B$4*1.2	1800	=$B4*1.2	2396
8	May-13	2196	=B7*1.2	2635	=$B$4*1.2	1800	=$B4*1.2	2635
9	Jun-13	2416	=B8*1.2	2899	=$B$4*1.2	1800	=$B4*1.2	2899

Figure 17.5 - Example of Relative, Absolute and Mixed Cell Referencing

The F4 Trick for Referencing Cells

Here is a handy exclusive tip for referencing cells.

Hit **F4** once to change the relative cell reference to absolute (For example: B7 to $B$7)

Hit **F4** twice to change the absolute cell reference to mixed, in which the column reference is relative and the row reference is absolute and fixed (For example: $B$7 to B$7)

Hit **F4** thrice to change the structure of the mixed reference. This time, in which the column reference is absolute and the row reference is relative (For example: B$7 to $B7)

Hit **F4** four times to change the mixed reference back to the relative reference (For example, B$7 to B7)

How to Edit Formulas

Just like you can edit values in a cell, you can edit the formulas as well. At times you may need to change the references in a formula or add any other argument. Or the formula returns an error value and you may need to edit the formula to make it right.

> To convert a formula into text, simply remove the equal (=) sign from the beginning of the formula. To reconvert the text into formula, replace the equal sign (=).

Editing formula is a very common activity in Excel and there are several ways to perform it.

- Move the cell pointer to the cell you want to edit and then change the corresponding formula in the formula bar.
- Double click the cell to put the corresponding formula in the edit mode.
- Hit **F2** on your keyboard to modify the formula directly in the cell.
- If you have entered an erroneous formula in a cell, you will see that the corresponding cell will display small green triangle in the upper left corner of the cell. Select the cell and you will see a warning icon attached to the cell, as shown in Figure 17.6 Click the icon to open the suggestions for correcting the formula.

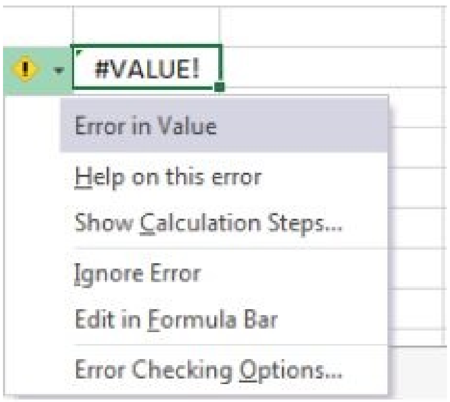


Figure 17.6 - Showing the Warning Icon for Erroneous Formula

> If you find the warning icon annoying and wants to turn it off, select **File** > **Options**. Find and unmark the checkbox labeled **Enable Background Error Checking**.

Chapter 18: Working with Text Formulas

Excel is definitely the best number cruncher software. However it is pretty versatile and can perform numerous other functions as well, text manipulation being one of them. There are countless formulas in Excel that allows you to play with text values in any way you want.

This chapter contains examples of some of the most useful and popular text formulas in Excel. After going through this chapter, you will be able to combine the text values of two cells into one cell, you will learn the magical text formula to change the font case, then there is a function to replace text in a cell and so on.

Formula to Combine Two Cells

Ampersand is the most commonly used operator when it comes to creating text formulas. It is widely used to combine the first and last name originally written in different cells, into one cell.

Suppose cell A1 contains “United” and cell B1 contains “States”. To combine both the words in Cell C1, type the following formula in Cell C1.

= A1&B1

The resulting value would be “UnitedStates”. To put space between the two text values, modify the above formula in the following way:

= A1”&”B1

This will produce “United States” in cell C1.

The DOLLAR Function

If you want to convert a numeric value to text in the currency format, create a formula using the DOLLAR function.

The DOLLAR function uses two arguments; the first one is the number you want to convert and the second one specifies the number of decimal places to display in the value.

Suppose cell A1 contains 2400.7632 and you want to covert this into “**Amount: $2400.763**”

Move the cell pointer to the destination cell and enter the following formula into it.

=”Amount: “&DOLLAR(2400.7632, 2)

The "2" written at the end of the formula signifies that you want to display 2 decimal places in the resultant value.

Formula to Remove Extra Spaces

Many times you may need to import data into Excel from other sources, such as web pages. The imported data may contain several extra spaces and unprintable characters.

There are two functions that can help you in this regard.

1. The **CLEAN** function deletes all the unprintable characters from the text value.
2. The **TRIM** function deletes all the spaces and puts a single space in the appropriate places.

Suppose cell A1 contains a value "Sales   Revenue for   Third   Quarter". The quoted text is copied from a web version of a company's sales report, hence contains many spaces.

To save yourself from manually removing the extra spaces, enter the following formula in any other cell.

=TRIM(A1)

Or if you want to rectify the value in the same cell, hit **F2** to put the cell in edit mode and then type the following before the value:

=TRIM("

Close the quotation and parentheses when the value ends.

So the complete formula will be like:

=TRIM("Sales Revenue for   Third   Quarter")

Formula to Repeat Characters

If you want to repeat a text value or any characters in it, you can apply the REPT function to do that. It repeats the values as many times as specified in the formula.

Suppose you want to fill a cell with hyphens (-). To do so, enter the following formula in the destination cell.

=REPT("-",30)

The character inside the quotations can also be replaced with a cell address. However if you are referencing a cell address, remove the quotation marks as well. **'30'** represent the number of times you want the character to be repeated.

Using REPT to Create Histogram

A very interesting application of the REPT function is that it can be used to create a histogram. Following is an example of how you can do this.

	A	B	C
1	Production Report 2013		
2	Month	Units	Graphical Representation
3	January	500	■■■■■
4	February	492	■■■■
5	March	566	■■■■■
6	April	651	■■■■■■
7	May	748	■■■■■■■
8	June	861	■■■■■■■■
9	July	990	■■■■■■■■■
10	August	1138	■■■■■■■■■■■
11	September	648	■■■■■■
12	October	900	■■■■■■■■■
13	November	898	■■■■■■■■
14	December	750	■■■■■■■
15			

Figure 18.1 - Creating Histogram Using the REPT Function

As you can see in Figure 18.1, column B contains the units produced in the corresponding month. The following formula is entered in Cell C3:

=REPT(CHAR(162),B3/100)

The formula is then dragged down to the cover the entire range. "162" represents the character that made up the histogram. It is the 162 character in the Wingdings 2 font.

Formula to Change Case

Excel features three functions that allow you to change the case of text without having to do it manually.

UPPER

The UPPER function converts the text to ALL UPPERCASE. Suppose Cell B2 contains “united states”. Entering the following formula in the destination cell would result in UNITED STATES.

=UPPER(B2)

LOWER

The LOWER function converts the text to all lowercase.

Continuing the same example, the following formula would result in united states”, as shown in Figure 18.2

=LOWER(C4)

PROPER

The PROPER function converts the text to Proper Case, in which the first letter of every word is capitalized.

Continuing the same example, the following formula would result in “United States”, as shown in Figure 18.2

=PROPER(C5)

	A	B	C	D
1		**Formula to Change Case**		
2	**Original Text**	united states		
3	**Funtion**	**Formula Applied**	**Resulting Value**	
4	UPPER	=UPPER(B2)	UNITED STATES	
5	LOWER	=LOWER(C4)	united states	
6	PROPER	=PROPER(C5)	United States	
7				

Figure 18.2 - Illustrating the Use of Different Functions to Change Case

Substituting Text

At times, you may need to replace a part of the text value or a few characters in it. Suppose you copied data from some external source and after pasting it into Excel, the data shows hyphens. You want to replace the hyphens with space. There are two ways to do that:

1. Select **Home** > **Find & Select** > **Replace**. This will open the *Find and Replace*

dialog box. Enter the new and old values to make the replacement.

2. You can also replace text and characters by using functions. Excel provides two functions to substitute values in cells; namely SUBSTITUTE and REPLACE.

SUBSTITUTE

The SUBSTITUTE functions can be used to replace a specific part of text. This function comes in handy when you know which characters needs to be replaced but are unsure about their position.

Suppose a cell contains **January 2013** and you want to replace **2013** with **2014**. Entering the following formula in the destination cell will cause the resulting value to be **January 2014.**

=SUBSTITUTE("January 2013","2013","2014")

As you can see in the above formula, the first argument contains the underlying text, the second argument contains the value that needs to be changed and the third argument contains the new value.

REPLACE

The REPLACE function can be used to replace text that occurs in a specific location within the entire underlying value. This function comes in handy when you know the position of the text or characters that needs to be replaced but are unsure about what the actual values are.

Suppose a cell contains January 2014 and you want to replace the space with a hyphen. Entering the following formula in the destination cell will cause the resulting value to be **January-2014.**

=REPLACE("January 2014",8,1,"-")

As you can see in the above formula, the first argument contains the underlying text, the second argument contains the position of the character that needs to be replaced, the third argument contains the number of characters that needs to be changed after the specified position and finally the fourth argument is the new character enclosed in quotation marks.

Formula to Separate First, Middle And Last Name

One of the most popular and common applications of Excel is that it is used to maintain list of names. If the names are imported from any other source, most of the times the full names are pasted in one single row.

Excel provides a way to divide the first, middle and last name into three different columns respectively.

Suppose the names are listed in Column A, with the first name in Cell A2, as shown in Figure 18.3

	A	B	C	D	E
1	**Full Name**	**First Name**	**Middle Name**	**Last Name**	
2	Davy J Jones	Davy	J	Jones	
3	Julie Taft Rider	Julie	Taft	Rider	
4	Steven John Paul	Steven	John	Paul	
5	Marcus Welby	Marcus		Welby	
6	James R. Rachel	James	R.	Rachel	
7	Eric S. Kurjan	Eric	S.	Kurjan	
8	Anthony Lazy Denosso	Anthony	Lazy	Denosso	
9	Paula Barreto Mattos	Paula	Barreto	Mattos	
10	Janaina B. Bueno	Janaina	B.	Bueno	
11	Janis Joplin	Janis		Joplin	
12	Mark T Seager	Mark	T	Seager	
13	James van Eaton	James	van	Eaton	
14	Mary Jean Post	Mary	Jean	Post	
15					

Figure 18.3 - Separating the First, Middle and Last Name in Excel

Enter the following formula in Cell B2 to return the first name.

=LEFT(A2,FIND(” “,A2)-1)

Enter the following formula in Cell C2 to return the middle name.

=IF(ISERR(FIND(” “,A2,1+FIND(” “,A2))),””,MID(A2,FIND(” “,A2)+1,FIND(” “,A2,1+FIND(” “,A2))-FIND(” “,A2)-1))

Enter the following formula in Cell D2 to return the first name.

=IF(ISERR(FIND(” “,A2,1+FIND(” “,A2))),MID(A2,FIND(” “,A2)+1,LEN(A2)),MID(A2,1+FIND(” “,A2,1+FIND(” “,A2)),LEN(A2)))

All the above formulas assume that the first name is in Cell A2. If you have used any other row and column, then just copy the same formula but change the reference cell. Since the reference is relative, dragging it down will apply the same formula to all the other corresponding rows and columns.

Formula to Remove Titles from Names

Suppose cell A2 contains Mr. Paul Emmanuel. You want to remove Mr. and just put Paul Emmanuel in a cell. Enter the following formula in the destination cell to return the name without the title.

First enter the following formula in Cell B2. This would return the title only.

=IF(ISERROR(FIND(“Mr.”,A2))=FALSE,“Mr.”,IF(ISERROR(FIND(“Mrs.”,A2))=FALSE
A2))=FALSE,“Dr.”,””)))

Now enter the following formula in Cell C2. This would return the name only.

=IF(B2=””,A2,MID(A2,FIND(“.”,B2)+2,LEN(A2)-FIND(“.”,B2)))

You can drag this formula down the column to remove titles from all the names in the corresponding column and row. If you don’t want to see the title and just the name, hide the row containing titles.

The LEN Function

You can use the LEN function to count the number of words in a text value. However, the LEN function alone is not capable of counting the accurate number. You need to combine it with a few more functions.

Suppose Cell A1 contains “United States of America”. In order to count the number of words in this value, enter the following formula in any other cell.

=IF(LEN(TRIM(A1))=0,0,LEN(TRIM(A1))-LEN(SUBSTITUTE(A1,” “,””))+1)

In the above formula, first the TRIM function removes the extra spaces. The SUBSTITUTE function then creates a new value with all the spaces removed. Finally the LEN function subtracts the substituted value from the trimmed value to calculate the number of spaces. This value is then incremented by 1 to count the total number of words.

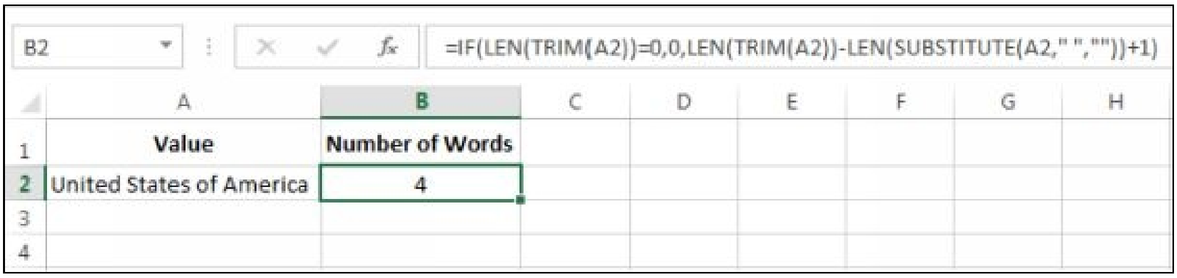


Figure 18.4 - Counting the Number of Words in a Cell

As you can see in Figure 18.4, entering a formula in Cell A2 results in 4. It implies that the value in Cell A1 contains 4 words. The Formula bar shows the formula entered in cell B2.

This was just an example. One does not count the number of words in such a small value. This formula is normally used to count the words in range of cells. To do so, just replace the cell reference with the range address.

Chapter 19: Understanding the Date and Time Formulas

Working with Date and Time formulas in Excel can be a bit confusing, especially for beginners. In order to use the date and time formulas correctly, it is highly essential that you first understand how Excel interprets Date and Time. Once you will understand the mechanism, it will be easy for you to make effectual use of the valuable date and time functions.

This chapter gives you all the information you need to know in order to create date and time formulas in Excel. The chapter starts with how Excel treats such formulas and then goes on to different examples and applications of how you can create formulas in Excel to manipulate date and time.

How Does Excel Read Date and Time

Excel does not treat dates and times as simple numeric or text values. For Excel, every date and time is a serial number. Any value, the format of which slightly resembles a date or time format, is automatically read as a serial number by Excel.

The first date that Excel recognizes is January 1, 1900.

In case of a date, a serial number signifies the number of days that passed since January 1, 1900. This date carries a serial number 1. Likewise, January 2, 1900 carries a serial number 2, and so on. The last date in Excel's date system is December 31, 9999 (serial number: 2,958,465).

*The time cycle of Excel starts with midnight (serial number = **0.00000000**).*

In the case of times, the serial numbers are extended to include decimals. The fractional value represents the number of hours, minutes and seconds that have passed since midnight. 12:00:00 AM (midnight) carries a serial number 0.00000000 and 12:00:00 PM (noon) carries a serial number 0.50000000.

The serial number equivalent of one minute is approximately 0.00069444. Hence, the serial number for 1:30:00 PM is 0.56250000 and for 4:30:00 PM is 0.68750000.

> Don't worry! You don't need to learn all these serial numbers. This is just to give you an idea about how helps Excel interpret date and time

in formulas and calculate the elapsed time accordingly.

Creating Formulas to Calculate the Elapsed Date

One of the most common applications of Date formulas is that they are used to calculate the number of days passed between two dates. The best part is that this is the easiest formula to create when it comes to manipulating date and time. You just need to enter a subtraction operator and that is all it is required to calculate the elapsed dates.

Suppose cell A1 contains **1/1/2013** and cell B1 contains **1/2/2012.** To calculate the number of days between the elapsed dates, enter the following formula in the destination cell.

=A1-B1

Make sure the cells that you refer in the formula are all formatted with the Date format, or else they will be considered as simple numeric values by Excel.

To find the number of years passed between two dates, apply the same formula and then divide the resulting value by 365.

Creating Formulas to Calculate the Elapsed Time

Most of the time formulas are created to calculate the time elapsed between two time periods. Suppose you maintain a worksheet for recording the entry and exit times of your employees. Now you want to include in the worksheet the time each employee spends in the office. You can do so by calculate the time difference between the entry and exit time.

For example, if cell A1 contains 9:15 AM and cell B1 contains 4:30 PM. To calculate the number of hours and minutes between the two times, enter the following formula in the destination cell.

=B1-A1

This will yield 7:15 AM in the destination cell. To convert this value into number of hours, format the destination cell with General format and then multiply it by 24.

The final answer will be 7.25. It implies that the particular worker spent 7 hours and 25 minutes in the office.

Exploring Common Time Functions

First let's talk about the valuable and commonly used Time functions in Excel 2013 and then we will move on to the Date functions.

HOUR, MINUTE, and SECOND

The HOUR, MINUTE, and SECOND functions allow you to separate a time value into hours, minutes and seconds respectively. Suppose cell A1 contains **2:45:30 PM**.

Entering the following formula in the destination cell (B2 in this example) would result in 14.

=HOUR(A1)

> The HOUR function follows the 24-hour time period and calculate the number in hours accordingly.

Continuing the same example, to extract the number of minutes from the original value, enter the following formula in the destination cell (B3 in this example). It would return the value 45 in B3.

=MINUTE(A1)

Continuing the same example, to extract the number of seconds from the original value, enter the following formula in the destination cell (B4 in this example). It would return the value 30 in B4.

=SECOND(A1)

Figure 19.1 illustrates the example explained above.

	A	B	C	D
1	**2:45:30 PM**	**Resulting Value**	**Formula Applied**	
2	**Hours**	14	=HOUR(A1)	
3	**Minutes**	45	=MINUTE(A1)	
4	**Seconds**	30	=SECOND(A1)	
5				

Figure 19.1 - Illustrating the use of HOUR, MINUTE, and SECOND Functions

NOW

The NOW function is used to put the current date and time in a cell. This function is very useful when you are recording any observation or results of an experiment and need to record the exact time anything happens.

The date and time are based on the computer's internal clock. This function is the easiest to use. All you have to do is enter the following formula in the destination cell and Excel will put the current date and time in it.

=NOW()

	By default, the NOW function uses the "**d/mm/yyyy hh:mm"** format, that is it puts the date before the time. You can change this format by creating a desired custom format and then applying it over the cell containing the NOW function.

TIME and TIMEVALUE

The TIME function in Excel yields a decimal number that represents the serial number of the underlying time value. The serial number ranges from 0 (zero) which represents the time 0:00:00 and goes up to 0.99999999 representing time 23:59:59.

The TIME function is used to combine the hour, minutes and seconds into one value. You can say this as the opposite of HOUR, MINUTE, and SECOND functions that separate a time value into the corresponding component.

To use the TIME function, enter the following argument in the destination cell:

=TIME(hour,minute,second)

Remember the following while using the TIME function.

- When entering the hour value, use a number between 0 and 23. If you type a number greater than 23, Excel divides it by 24 and then puts the resulting value in the ‘*hour*’ part of the TIME formula.
- Likewise when entering the minute value, type a number between 0 and 59. If you enter a number greater than 59, Excel will convert into hours and minutes. The hour value will be added to the hour part of the TIME formula.
- The above rule applies to seconds also. That is when you enter the minute value, type a number between 0 and 59. If you enter a number greater than 59, Excel will convert into minutes and seconds. The minute value will be added to the minute part of the TIME formula.

Have a look at figure 19.2, as an example.

	A	B
1	**Hour Value**	15
2	**Minute Value**	45
3	**Second Value**	30
4	**Resulting Value**	**3:45 PM**
5	**Serial Number**	0.656597222
6	**Formatted Value**	3:45:30 PM
7		

Figure 19.2- Example of the TIME Function

In this example, it is assumed that cell B1 contains 15, cell B2 contains 45 and cell B3 contains 30. The following formula is entered in cell B4.

=TIME(B1,B2,B3)

The resulting value combined all the three input values and returned one time value. In cell B5, we have applied general number format to the resulting value. This is the serial number for 3:45 PM. In cell B6, we have changed the formatting of the resulting value to include the seconds as well.

Exploring Common Date Functions

The following section explains the important and useful Date functions in Excel. You can insert these functions manually as well as from the *Date and Time* drop down list in the *Formulas* tab on the Ribbon.

DATE and DATEVALUE

Just like the TIME function, the DATE function combines different values into one date. To use the DATE function, enter the following argument in the destination cell:

=DATE(year,month,day)

Example

=DATE(2009,10,6)

Entering the above formula would return the following value: **6-10-2009**

This function comes in handy when you are working on large set of data containing different parts of the date in different cells. You can combine these cells to get the full date at one place.

TODAY

This function is just like the NOW function. You can use it to put the current date in a cell. It is also very easy to use. All you have to do is enter the following formula in the destination cell and Excel will put the current it.

=TODAY()

The TODAY function uses the “d/mm/yyyy” format. However, you can change this format by creating a desired custom format and then applying it over the cell containing the TODAY function.

> Do not use the TODAY function to record historical data. The date returned from the TODAY function is not fixed. In other words, it changes whenever you open the worksheet containing it. For example, if you use this function today, the resulting value will display today’s date. When you will open the same worksheet tomorrow, the resulting value will then display tomorrow’s value and so on.

WEEKNUM

You can use the WEEKNUM function to find out where the week in a particular date falls within the year.

To use the WEEKNUM function, enter the following argument in the destination cell:

=WEEKNUM(serial_number,[return_type])

In this function, the first argument implies the serial number of the date whose week you want to find out. The second argument (return_type) is an optional argument. It can be either **1** or **2**. If you enter 1, it means that you want Excel to consider Sunday as the first day of the week. If you enter 2, it means that Excel should count Monday as the first day of the week and then perform the calculation accordingly.

> If you don't enter either 1 or 2, it is considered as 1 by Excel.

For example, entering the following formula in a cell would return the value **26**.

=WEEKNUM(DATE(2013,6,25))

In the above formula, the serial number argument was replaced with the DATE function. The resulting value is 26, it means that this particular date lies in the 26th week of year 2013.

NETWORKDAYS

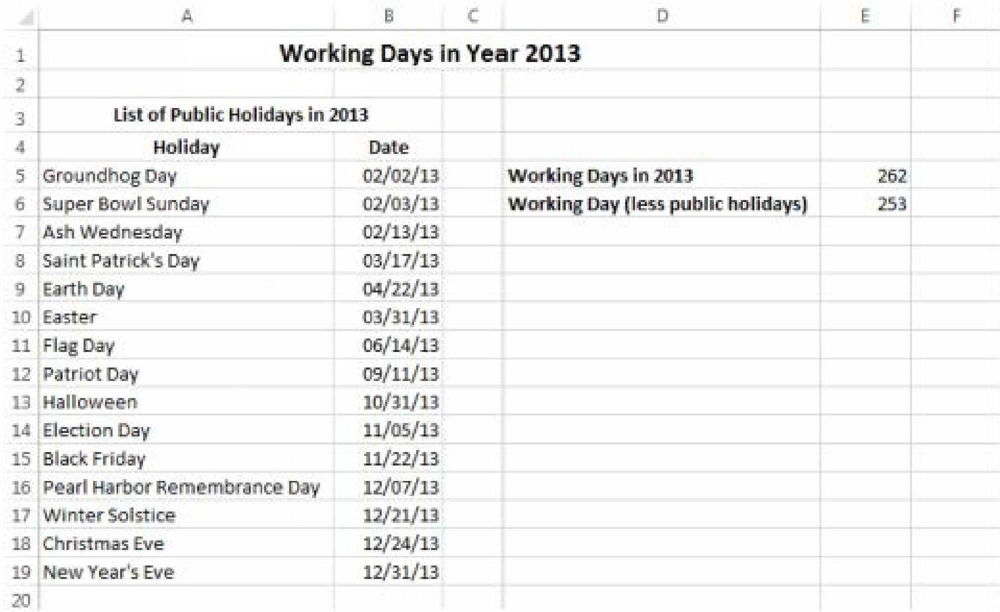
The NETWORKDAYS is used to calculate the number of working days between two dates.

To use the NETWORKDAYS function, enter the following argument in the destination cell:

= NETWORKDAYS(start_date,end_date,[holidays])

The third argument (holidays) is optional. You can put the number of holidays observed by your company. Doing so will command Excel to subtract the holidays from the total number of working days.

Figure 19.3 shows an example of this function.



	A	B	C	D	E	F
1	Working Days in Year 2013					
2						
3	List of Public Holidays in 2013					
4	Holiday	Date				
5	Groundhog Day	02/02/13		Working Days in 2013	262	
6	Super Bowl Sunday	02/03/13		Working Day (less public holidays)	253	
7	Ash Wednesday	02/13/13				
8	Saint Patrick's Day	03/17/13				
9	Earth Day	04/22/13				
10	Easter	03/31/13				
11	Flag Day	06/14/13				
12	Patriot Day	09/11/13				
13	Halloween	10/31/13				
14	Election Day	11/05/13				
15	Black Friday	11/22/13				
16	Pearl Harbor Remembrance Day	12/07/13				
17	Winter Solstice	12/21/13				
18	Christmas Eve	12/24/13				
19	New Year's Eve	12/31/13				
20						

Figure 19.3 - Using the NETWORKDAYS Function to Calculate the Number of Working Days in 2013

As you see in Figure 19.3, column B (range B5:B19) contains the dates of all the public holidays in 2013.

The following formula is entered in cell E5 to calculate the working days including the mentioned holidays:

=NETWORKDAYS(DATE(2012,12,31),DATE(2013,12,31))

The following formula is entered in cell E6 to calculate the working days less the mentioned holidays:

=NETWORKDAYS(DATE(2012,12,31),DATE(2013,12,31),B5:B19)

DAYS360

The DAYS360 function can be used to calculate the number of days passed between two dates.

> The DAYS360 function is based on a 360-day year. It assumes 12 equal months of 30 days each in a year.

To use the DAYS360 function, enter the following argument in the destination cell:

= DAYS360(start_date,end_date,[method])

The first two arguments are the serial numbers representing the particular dates.

	To convert a date into serial number, format the particular cell with General Number format.

The third argument (method) in the DAYS360 function is optional. It could be either TRUE or FALSE.

If you enter TRUE, Excel will use the U.S. calculation method. In this method, the starting date is same as the 31^{st} of the month, it is considered as equivalent to the 30^{th} of the same month. Likewise, if the ending date is equal to the 31^{st} of a month and the starting date is before than the 30^{th} of the month, then the ending becomes the first day of the next month.

If you enter FALSE in the *method* argument, Excel uses the European calculation method. According to this method, the starting and ending dates that lies on the 31^{st} of a month are equal to the 30^{th} of the same month.

Example

Suppose Cell A1 contains Start Date (5-15-2006) and Cell A2 contains End Date (5-15-2006)

=DAYS360(A1,A2,1)

Entering the above formula in a blank cell will return **1221**; that is, the number of days passed between the two mentioned dates.

Chapter 20: Some Commonly Used Formulas

While Excel contains a function for almost every type of formula you want to create, the summing and counting functions are the ones highly used. Most of the operations and activities done in Excel involves SUM or COUNT function or a subset of either.

This chapter explains some of the most commonly used functions of Excel. The basic SUM and COUNT functions are quite easy to used, however this is not what the basic mathematical functions are all about. There are several advanced summing and counting functions that are not easy to perform initially but once you get proficient in these, you will find them very useful and valuable.

Coming forward, this chapter presents description and examples of the valuable and most handy summing and counting functions.

The Simple SUM Formula

The first and most basic mathematical function in Excel is SUM. As the name suggests, it totals the values or references specified in the formula.

To use the SUM function, enter the following argument in the destination cell:

=SUM(number1, number2, …)

The number arguments can either be simple numeric values or cell references or you can also select a range.

> The SUM function only considers numeric values and cells that contain these. It ignores the text and logical values, as well as the blank cells.

SUM is such a popular and highly used function that Microsoft has placed it several places in Excel. Apart from being present in the Formula tab and *Insert Function* dialog box, you will find it in the Editing group on the Home tab, as shown in Figure 20.1.

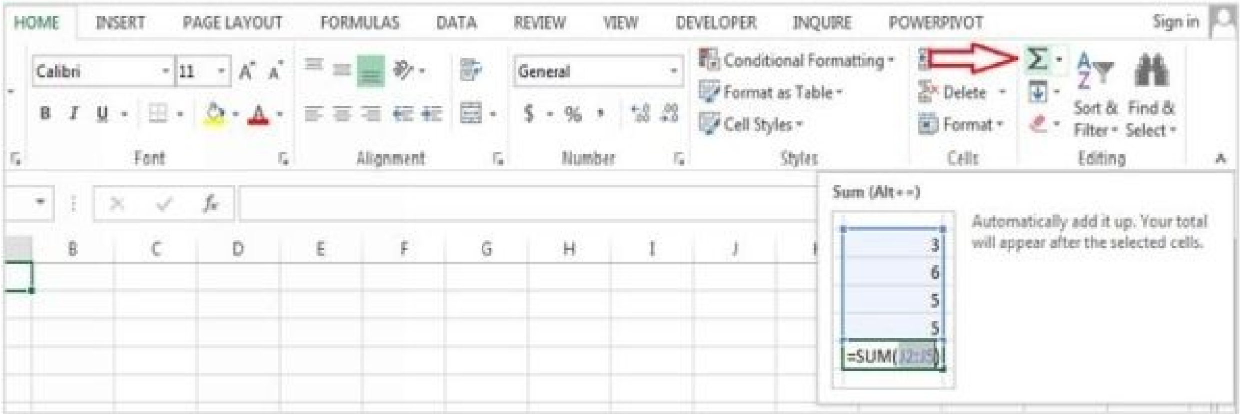


Figure 20.1 - Showing the SUM Function on the Home Tab

Just select the cells/values that you want to sum, then click then click the SUM icon on the Home tab.

	For Keyboard users, press **Alt + =** to enter the SUM function.

Formula to Count the Blank

Excel provides a way to count the number of blank cells in a range. It can be done via the COUNTBLANK function.

To use the COUNTBLANK function, enter the following argument in the destination cell:

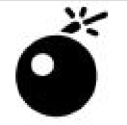
= COUNTBLANK(range)

	The COUNTBLANK function works only with an adjacent range of cells. If you select a noncontiguous range in the range argument, it shows a #VALUE! error.

This function comes in handy when you need to find the number of empty cells in the entire worksheet. Suppose you want to find the number of blank cells in Sheet4. To do so, enter the following formula in a cell in any sheet other then Sheet 4.

=COUNTBLANK(Sheet4!1:1048576)

The **1:1048576** selects the entire sheet. This value will remain the same as every sheet has the name number of total cells.

	Make sure the destination cell lies in any other worksheet then the one entered in the formula, or else Excel will display a circular reference error.

Formula to Count Filled Cells

Just like Excel provides a way to count blank cells, there is a function to count the filled cells. The COUNTA function returns the number of filled cells in the specified range.

To use the COUNTA function, enter the following argument in the destination cell:

=COUNTA(value1,[value2],…)

You don't have to enter the cell references. Just enter the function, select the particular range, close the parentheses and hit **Enter**.

=COUNTA(A1:B5)

For example, entering the above formula will return the number of filled cells in the specified range (A1:B5).

Value Based Counting Formulas

The COUNTA function counts cells that contain any types of values. It could be numeric, text, or logical values. Moreover, if a cell contains a formula whose resulting value is a blank cell or zero, it is also counted by COUNTA.

But what if you need to count the cells containing numeric values only? Or just the text values? Well, Excel also provides a way to count a specific type of value.

How to Count Cells Containing Numeric Value

Enter the following argument in the destination cell to count the numeric cells in a particular range.

=COUNT(value1,[value2],…)

You don’t have to enter each value. Just enter the function, select the particular range in which you want to count the number of numeric values, close the parentheses and hit **Enter**.

Example

=COUNTA(A1:B5)

Entering the above formula will return the number of filled cells containing numeric values in the specified range (A1:B5).

> Date and Time values are also considered as numeric values by the COUNT function. Hence if your selected range contains any of these, the number of Date and Time cells will be counted and returned to the destination cell.

How to Count Cells Containing Text Value

If you want to count the number of cells containing text values, enter the following array argument in the destination cell:

=SUM(IF(ISTEXT(range),1))

While entering the above formula, select the particular range in the *range* argument and the rest of the formula remains the same.

Example

=SUM(IF(ISTEXT(A1:B6),1))

Entering the above formula and then pressing press **Ctrl + Shift + Enter** will return the number of filled cells containing text values in the specified range (A1:B6).

	The above formula must be entered as an array formula, or else it won’t work correctly. To do so, press **Ctrl + Shift + Enter** instead of **Enter** after you close the last parentheses in the formula.

Refer to Chapter 24 to learn more about Array formulas.

How to Count Cells Containing Non-Text Values

If you want to count the number of cells containing non-text values, enter the following array argument in the destination cell:

=SUM(IF(ISNONTEXT(range),1))

While entering the above formula, select the particular range in the *range* argument and the rest of the formula remains the same.

This formula also needs to be entered as an array formula. You need to press **Ctrl + Shift + Enter** instead of **Enter** after putting up the complete formula.

Example

=SUM(IF(ISNONTEXT(A1:B6),1))

Entering the above formula and then pressing press **Ctrl + Shift + Enter** will return the number of filled cells containing non-text values in the specified range (A1:B6).

In Excel, the array formulas are represented by curly parentheses {}. For example, the above array formula when entered in Excel will display as following in the formula bar.

{=SUM(IF(ISNONTEXT(range),1))}.

How to Count Cells Containing Logical Values

To count the number of cells containing logical values, enter the following array argument in the destination cell:

=SUM(IF(ISLOGICAL(range),1))

This one is also an array formula, hence needs to be entered accordingly.

Example

=SUM(IF(ISLOGICAL(A1:B6),1))

Entering the above formula and then pressing press **Ctrl + Shift + Enter** will return the number of filled cells containing logical values (True/False) in the specified range

(A1:B6).

The COUNTIF Function

The COUNTIF function is the conditional counting function. It counts the cells within a range that meets a certain specified criteria.

To use the COUNTIF function, enter the following argument in the destination cell:

=COUNTIF(range,criteria)

As you can see in the above formula, there are two arguments in the COUNTIF function. The *range* argument refers to the range of cells in which you want to count the particular values.

The *criteria* argument includes the criteria for the inclusion of the cells in counting. For example, the criteria could be entered as “25, “<45”, “pass” and so on. Suppose the criteria is “<45”. Following this argument, Excel will count cells that contain numeric value less than 45. Likewise, if the criterion is “pass”, Excel will return the number of cells containing the text value “pass”.

The COUNTIF function works only with an adjacent range of cells. If you select a noncontiguous range in the range argument, it shows a #VALUE! error.

AND and OR

At times you may want to enter two or more criteria in the COUNTIF formula. The AND and OR arguments allow you to do that.

Applying the AND Principle

If you use an AND condition in a COUNTIF formula, Excel will count the cells if all the specified criteria are met.

To use the AND condition, enter the following argument in the destination cell:

=COUNTIFS(criteria_range1,criteria1, criteria_range1,criteria1”)

The first argument requires you to enter or select the range in which you want Excel to count the cells. The second argument is the criterion for the corresponding range. You can enter as many ranges and criteria you want. Once the formula is complete and you hit

Enter, Excel returns the number of cells containing values that fit into all the criteria.

Following is an example formula using the AND condition.

=COUNTIFS(B4:G15,”>20000”,B4:G15,”<40000”)

The above formula commands Excel to count the number of cells containing value above 20,000 and below 40,000, within the specified range.

The following formula is the alternative for the above formula. Both return the same answer. You can use whichever you feel is easier.

=SUM((B4:G15>20000)*(B4:G15<40000))

The SUM formula is an array formula. So make sure to press **Ctrl + Shift + Enter** instead of **Enter** after putting up the complete formula.

Applying the OR Principle

If you use an OR condition in a COUNTIF formula, Excel will count the cells if any of the mentioned criteria is met.

Following is an example of the OR condition.

=COUNTIF(B4:G15,”>20000”)+COUNTIF(B4:G15,”<20000”)

Following this argument, Excel counts the cells that fall in either of the two specified criteria.

Formula to Count the Number of Unique Values

Following is an example of a formula that would calculate the number of unique values in the specified range.

=SUM(1/COUNTIF(A1:G15,B4:G15))

Remember it is an array formula, hence need to be treated as one.

There is one limitation in the above formula. That is, if the specified range consists of any blank cells, it returns an error.

Following is the alternative to the above formula. You can use it when the range includes blank cells as well.

=SUM(IF(COUNTIF(A1:G15,B4:G15)=0,””,1/COUNTIF(A1:G15,B4:G15)))

This one is also an array formula.

Applications of the SUMIF Function

Just like the COUNTIF is the conditional counting function, the SUMIF is the conditional summing function. This function commands Excel to total the values that fit in the mentioned criteria.

To use the SUMIF function, enter the following argument in the destination cell:

=SUMIF(range,criteria,[sum_range])

As you can see in the above formula, there are three arguments in the SUMIF function. The *range* argument contains values that indicate whether to include a particular cell’s value in the sum.

The *criteria* argument includes the criteria for the inclusion of the cells in the totaled value. For example, the criteria could be entered as “<200, “<850” and so on. Suppose the criteria is “<200”. Following this argument, Excel will total cells that contain numeric value less than 200.

The third argument (*sum_range*) is an optional argument. It refers to the range of cells that you want to sum. If you don’t enter this argument, then by default Excel considers the range selected in the first argument. In other words, you need to enter the third argument only if the *range* and *sum_range* are different.

Suppose you want to total all the negative values in a range named “integers”. To do so, enter the following formula in the destination cell.

=SUMIF(integers,”<0”)

The SUMIF also comes in handy when you need to sum the total value that lies before or after a particular date. For example, the following formula would return the sum of values, the corresponding due date of which is after February 1, 2012:

=SUMIF(B4:G15,”>=”&DATE(2012,2,1))

Chapter 21: Creating Formulas for Financial Analysis

Excel provides the most diverse and widest range of financial functions that helps you make almost any kind of money-related decision. Whether it is a simple assessment of whether you should buy a new cell phone or a decision as large as starting up your own business, you will find a function and formula for it in Excel.

The list of financial functions provided by Excel is endless. While they are all briefed in the appendix section of this book, this chapter discusses some of the most handy and commonly used financial functions.

Formulas to Calculate Depreciation

Depreciation refers to the value of an asset at a certain point of time. The value is estimated on the basis of the original value of the asset and its lifetime.

Excel provides five functions to calculate the depreciation of an asset over time; namely, SLN, VBD, DDB, DB and SYD. Each function represents a different type of depreciation method.

While there is a different formula for every depreciation function, following are the common arguments used in almost every function.

Cost: Underlying cost of the asset.

Start_Period: Starting period for the calculation.

End_Period: Ending period for the calculation.

Salvage: The cost of the asset after it has been completely depreciated.

Life: Time period over which the asset will depreciate.

Period: Time period in the life of the asset for which the depreciation value is to be calculated.

No_switch: It could be either 1 (TRUE) or 0 (FALSE). It indicates whether to toggle to straight line depreciation method in case the SL depreciation is greater than the declining balance depreciation value.

Factor: Rate at which value of the asset declines.

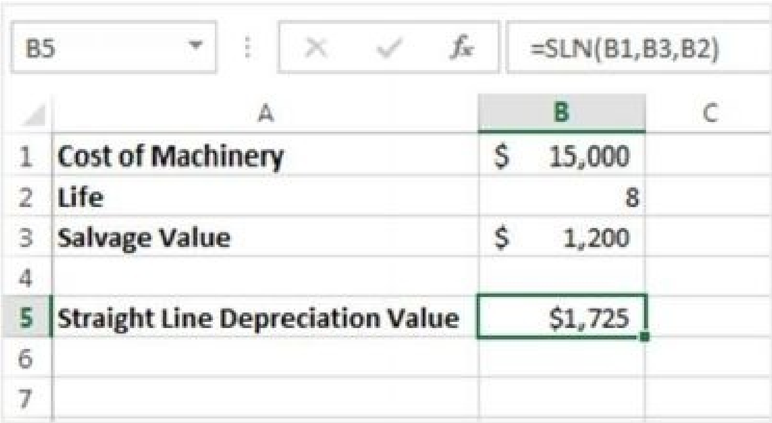
SLN

The SLN function uses the straight line depreciation method for calculating the value of an asset over a single period. This method assumes that the asset depreciates by an equal amount every period till it is fully depreciated.

To use the SLN function, enter the following argument in the destination cell:

=SLN(cost,salvage,life)

Figure 21.1 shows an example of using the SLN function.


B5 =SLN(B1,B3,B2)

	A	B	C
1	Cost of Machinery	$ 15,000	
2	Life	8	
3	Salvage Value	$ 1,200	
4			
5	Straight Line Depreciation Value	$1,725	
6			
7			

Figure 21.1 - Example of Calculating the Straight Line Depreciation Value in Excel

In this example, the asset is a heavy duty printing machine that is originally bought for $15,000. It has a life of 8 years and a salvage value of $1,200. The following formula is applied in the destination cell (Cell B5):

=SLN(B1,B3,B2)

The resulting value implies that the asset is depreciated each year by $1,725

VDB

The VDB function uses the Variable Declining Balance depreciation method. It calculates the depreciation value of an asset for a specific period of time (it could be the complete life of the asset or a partial period). The VDB method uses the double declining balance or another accelerated depreciation method that you specify.

To use the VDB function, enter the following argument in the destination cell:

=VDB(cost,salvage,life,start_period,end_period,[factor],[no_switch)

The *start_period* and *end_period* argument specifies the time period for which the depreciation is to be calculated. It could be any length of time during the life of the asset.

While all the arguments are necessary, the *factor* and *no_switch* arguments are optional. If you don’t enter the *factor*, it is assumed as 2 by Excel which represents the double declining balance method. In other words, skipping the *factor* argument implies that you want Excel to use double declining balance method to calculate depreciation.

Likewise, the *no_switch* argument is optional. If you skip this one, by default Excel assumes it as FALSE, hence toggles to the straight line depreciation method.

DDB

The DDB function uses the Double Declining Balance depreciation method. It calculates the depreciation value of an asset at an accelerated rate. As per the DDB method, the depreciation value of an asset is at its peak in the first period of its life, then declines gradually in the subsequent periods.

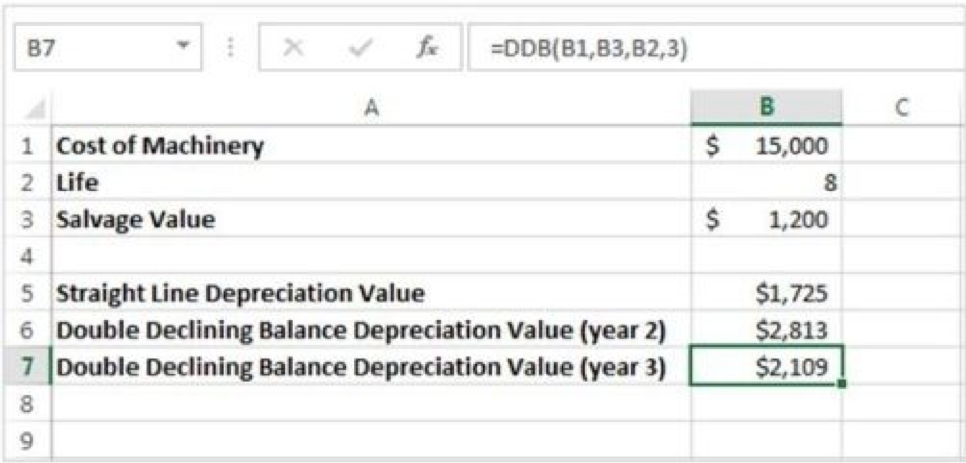
To use the DDB function, enter the following argument in the destination cell:

=DDB(cost,salvage,life,period,[factor])

> Make sure you use the same units for life and period. For example, if the life of the asset is expressed in years, period must also be in years.

The *factor* argument is optional. If omitted, it is assumed as 2 by Excel, hence the double declining balance method is used. If you enter 3 in the factor argument, Excel applies the triple declining balance method to calculate the depreciation.

Continuing the same example as discussed in the straight line depreciation, Figure 21.2 shows the DDB depreciation of the printing machine.



B7 =DDB(B1,B3,B2,3)

	A	B	C
1	Cost of Machinery	$ 15,000	
2	Life	8	
3	Salvage Value	$ 1,200	
4			
5	Straight Line Depreciation Value	$1,725	
6	Double Declining Balance Depreciation Value (year 2)	$2,813	
7	Double Declining Balance Depreciation Value (year 3)	$2,109	
8			
9			

Figure 21.2 - Example of Using the DDB Function in Excel

The following formula is entered in cell B6 to find the DDB depreciation value.

=DDB(B1,B3,B2,2)

The ‘2’ in the above formula represents the period. It means that double declining balance depreciation for the second year is $2,813.

As you see in Figure 21.2, the DDB value for third year is less than the second year. This is because in DDB method, the depreciation value declines as time passes.

DB

The DB function uses the Declining Balance depreciation method. It works the same way as the DDB method except for one difference; and that is, the DB method uses the fixed declining balance method to compute the depreciation value. In other words, the DB method calculates the depreciation at a fixed rate.

To use the DB function, enter the following argument in the destination cell:

=DB(cost,salvage,life,period,[month])

While all the other arguments in the DB function are same, except for the month argument. It is an optional one that specifies the number of months depreciated in the first year. It omitted, Excel assumes it as 12 months.

Figure 21.3 extends the same printing machinery example to include the DB value of depreciation.

	A	B	C
1	Cost of Machinery	$ 15,000	
2	Life	8	
3	Salvage Value	$ 1,200	
4			
5	Straight Line Depreciation Value	$1,725	
6	Double Declining Balance Depreciation Value (year 2)	$2,813	
7	Double Declining Balance Depreciation Value (year 3)	$2,109	
8			
9	Declining Balance Depreciation Value (year 2)	$2,963	
10	Declining Balance Depreciation Value (year 3)	$2,160	
11			

Figure 21.3 - Extending the Printing Machinery Example to Calculate the DB Value of Depreciation.

SYD

The SYD function uses *“Sum of the Years’ Digits”* depreciation method which distributes a large percentage of the depreciation value in the initial years of the asset’s life.

To use the SYD function, enter the following argument in the destination cell:

=SYD(cost,salvage,life,period)

Make sure you use the same units for life and period.

Formulas to Analyze Investment

This section discusses the functions that help you analyze cash flows and investments.

Following are the common arguments used in the investment related financial functions.

Rate: Interest rate per period.

Future value (fv): Value of an investment at the end of the period.

Reinvestment rate: The rate at which the underlying investment money is reinvested.

value1, value2,…: Cash inflows and periodic payments.

Type: Period when the payment is to be made. This argument can either be 0 (end of period) or 1 (beginning of period).

Present value (pv): Value of the asset/investment today.

Guess: Initial discount rate for iterative calculations.

Period: Number of periodic payments.

Finance rate: The rate at which the investment amount is borrowed.

PV

PV is the function used to calculate the present value of an investment. It is also used as an argument in some other financial functions.

Present Value is the one of the most widely used methods to evaluate the feasibility of a business venture. Simply put, PV is the underlying principal value of the investment. It is calculated by discounting the cash inflows, that is the payments received from the investment, back to the present time. If the PV value is above the initial investment, it means the underlying investment is profitable.

In Excel, you need to enter the following argument to calculate PV:

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

nper: Number of payment periods for a loan.

pmt: Payment amount per period.

fv: It is optional argument. If omitted, Excel assumes it to be 0 (zero).

type: This one is also an optional argument. If omitted, Excel considers it as zero (that is, the end of the period).

Figure 21.4 shows an example of the PV function.

B5 =PV(B1/12,B2,-B3)

	A	B	C	D
1	Rate	8%		
2	Number of payment periods	36		
3	Payment amount per period	$ 121.80		
4				
5	PV	$3,886.86		
6				
7				

Figure 21.4 - Example of Using the PV Function in Excel.

In this example, the investment amount is borrowed for a 36-month period at an annual interest rate of 8%. The expected monthly payment on this amount is $121.8.

The following formula is entered in the destination cell (B5) to calculate the PV.

=PV(B1/12,B2,-B3)

NPV

The NPV function is used to calculate the Net Present Value of an investment. If the NPV is greater than zero, it means the investment is profitable.

To calculate NPV of an investment in Excel, enter the following argument:

=NPV(rate,value1,[value2],…)

FV

The FV investment evaluation method is the exact opposite of the PV method. It calculates the future value of an investment at some future period in time.

To calculate FV of an investment in Excel, enter the following argument:

=FV(rate,nper,pmt,[pv],[type])

IRR

The IRR function is used to calculate the internal rate of return of an investment. IRR is the discount rate at which the NPV is equal to zero. In other words, it is the rate that equates the PV of the inflows to the initial cost of the investment.

If the IRR is greater than the underlying rate, it means the investment is profitable and vice versa.

To calculate IRR of an investment in Excel, enter the following argument:

=IRR(values,[guess])

The IRR method assumes that the payments are made at the end of a period. *Guess* is an optional argument. If you don't enter it, Excel assumes it to be 10%.

Figure 21.5 illustrates an example of calculating IRR in Excel.

B13 | =IRR(B1:B11)

	A	B	C	D
1	**Initial Investment**	$ (300,000)		
2	**Year 1**	$ 42,000		
3	**Year 2**	$ 42,900		
4	**Year 3**	$ 43,800		
5	**Year 4**	$ 44,700		
6	**Year 5**	$ 45,600		
7	**Year 6**	$ 46,500		
8	**Year 7**	$ 47,400		
9	**Year 8**	$ 48,300		
10	**Year 9**	$ 49,200		
11	**Year 10**	$ 50,100		
12				
13	**IRR**	8%		
14				

Figure 21.5 - Illustrating an Example of Calculating IRR in Excel

In this example, it is assumed that a person wants to buy a townhouse worth $300,000. He then plans to rent the townhouse for the next 10 years. The first year's rent is expected to be $42,000, increasing by $900 every year over the remaining 9 years. To calculate the IRR of this investment, the following formula is entered in the destination cell (B13):

=IRR(B1:B11)

The first value in the selected range is the initial investment and it must be entered as a negative value, or else Excel returns a #NUM! error.

As you can see in Figure 21.5, the IRR of the particular investment is calculated to be 8%. If the cost of investment (hurdle rate) is less than 8%, it means that it's a profitable investment.

MIRR

The MIRR function computes the Modified Internal Rate of Return of an investment.

The MIRR method comes in handy when you intend to reinvest the profit generated from the underlying investment.

To calculate MIRR of an investment in Excel, enter the following argument:

=MIRR(values,finance_rate,reinvest_rate)

This formula assumes that all the transactions take place at the end of a period.

The first value in the selected range is the initial investment and it must be entered as a negative value, or else Excel returns a #NUM! error.

Formulas to Valuate Stocks and Securities

Stocks and securities are also a kind of investment. While there are numerous financial functions that you can use to valuate equity and stock, the ones discussed in this section are meant specifically for analyzing different types of securities. Following are the common arguments used in such functions.

Investment: Investment amount.

Coupon: Annual coupon rate of the security

Basis: Specifies the type of day count basis of the security. By default or if not entered, Excel assumes it to be **0** (zero). It means a US (NASD) 30/360 day count basis. The basis values could also be **1** = day count basis is actual/actual; **2** = actual/360; **3** = actual/365; **4** = European 30/360.

Redemption: The value of security at the time of redemption.

Frequency: Number of coupon payments per year. If frequency is **1**, it means annual payments (one payment made per year). Likewise, **2** specify semiannual payments and **4** means quarterly payments.

Par: Par value (face value) of the security. By default or if omitted, Excel assumes it to be $1,000.

Price/Pr: Current price of the security

Issue: Specifies the issue date of the security (the date the security is issued)

Settlement: Specifies the settlement date of the security (the date on which you are supposed to pay for it. This date must be higher than the issue date.

Maturity: Specifies the maturity date of the security (the date on which the security matures). This date must be ahead than the settlement date.

Rate: The interest rate of the security at the issue date. This rate must be equal to or higher than zero.

First_interest: The first interest date of the security.

Yield: Specifies the annual yield of the security. This rate must be equal to or higher than zero.

DOLLARDE and DOLLARFR

The DOLLARDE function converts the fractional price of a currency and security into a decimal value.

To use the DOLLARDE function in Excel, enter the following argument:

=DOLLARDE(fractional_dollar, fraction)

=DOLLARDE(1.5,8)

In the above example, Excel will convert 1.5 to a decimal number (answer: 1.625). The fraction value is 10 signifies that the resulting price value has a precision of 1/8 of a dollar.

The DOLLARFR performs the opposite of the DOLLARDE function. It converts the value of a security initially expressed in decimals into a fractional value.

To use the DOLLARFR function in Excel, enter the following argument:

=DOLLARDE(decimal_dollar, fraction)

=DOLLARFR(1.625,8)

Entering the above formula in Excel will return the dollar in fractional value (answer: 1.5).

The arguments used in the DOLLARDE and DOLLARFR functions are briefed as follows:

Fractional dollar: The fractional value separated by a decimal symbol.

Fraction: Specifies the value that is to be used in the denominator of the fraction.

Decimal_dollar: The underlying value of the security expressed in decimal number.

ACCRINT and ACCRINTM

The ACCRINT function in Excel calculates the interest accrued by a security that pays periodic interest.

To use the ACCRINT function in Excel, enter the following argument:

= ACCRINT(issue,first_interest,settlement,rate,par, frequency,[basis],[calc_method])

All the arguments are explained in the beginning of this section, except for the *calc_method* one.

The *calc_method* argument contains a logical value that indicates the way of calculating the total accrued interest. This argument is required when the settlement date is later than the *first_interest* date.

The *calc_method* argument could either be 1 (TRUE) or 0 (FALSE). The former value calculates the total accrued interest from the issue date to the settlement date, whereas the latter calculates the total accrued interest from the *first_interest* date to the settlement date.

Bu default or if omitted, it is assumed as TRUE by excel.

Example

=ACCRINT(A1,A2,A3,A4,A5,A6)

Assuming,

A1 = 29500 (serial number of issue date)

A2 = 29656 (serial number of the first interest date)

A3 = 29568 (serial number of the settlement date)

A4 = 10% (Coupon rate)

A5 = 1000 (par value)

A6 = 4 (frequency - quarterly)

The resulting answer; that is 18.6, shows the accrued interest of a security with the specified conditions.

DISC

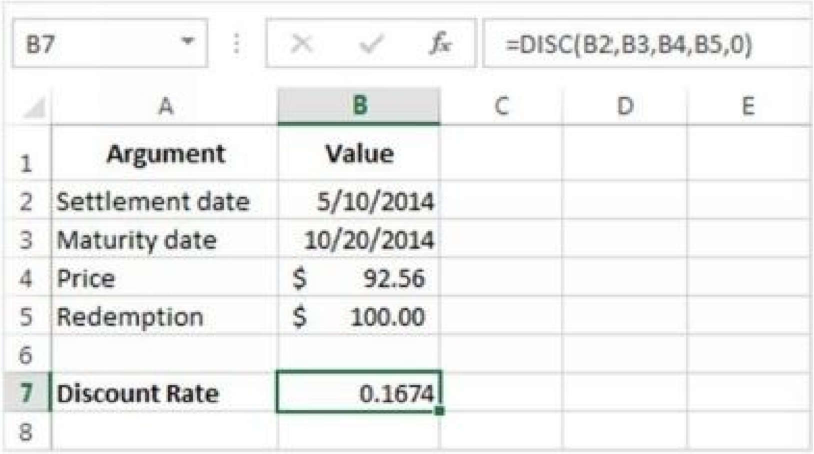
The DISC function computes the discount rate for a security.

To use the DISC function in Excel, enter the following argument:

=DISC(settlement, maturity, pr, redemption, [basis])

All the arguments are explained in the beginning of this section.

Figure 21.6 illustrates an example of using the DISC function in Excel.



B7 =DISC(B2,B3,B4,B5,0)

	A	B	C	D	E
1	Argument	Value			
2	Settlement date	5/10/2014			
3	Maturity date	10/20/2014			
4	Price	$ 92.56			
5	Redemption	$ 100.00			
6					
7	Discount Rate	0.1674			
8					

Figure 21.6 - Calculating Discount Rate Using the DISC Function in Excel

As shown in the formula bar in Figure 21.6, the following formula is entered in the destination cell (B7) to calculate the discount rate:

=DISC(B2,B3,B4,B5,0)

The discount rate is 0.1674 or 16.74%.

INTRATE

The INTRATE function in Excel computes the interest rate for a fully invested security.

To use the INTRATE function in Excel, enter the following argument:

=INTRATE(settlement, maturity, investment, redemption, [basis])

RECEIVED

The RECEIVED function computes the amount received at maturity for a fully invested security.

To use the RECEIVED function in Excel, enter the following argument:

=INTRATE(settlement, maturity, investment, discount, [basis])

Figure 21.7 shows the example of INTRATE and RECEIVED functions.

	A	B	C
1	**Description**	**Value**	
2	Settlement date	5/10/2014	
3	Maturity date	10/20/2014	
4	Initial Investment	$ 750,000	
5	Redemption	$ 768,253	
6	Discount Rate	6%	
7	Basis (30/360)	0	
8			
9	**Interest Rate (INTRATE)**	5.48%	
10	**Amount Received at maturity**	$ 770,547.95	
11			

Figure 21.7 - Example of Using the INTRATE and RECEIVED Functions in Excel

The following formulas were entered to calculate the interest rate and received amount, respectively.

=INTRATE(B2,B3,B4,B5,0)

=RECEIVED(B2,B3,B4,B6,0)

Formulas to Analyze Loans

This section explains the functions that can help you analyze and evaluate the different components of a loan. Most of these functions also serve as arguments in the investment related functions.

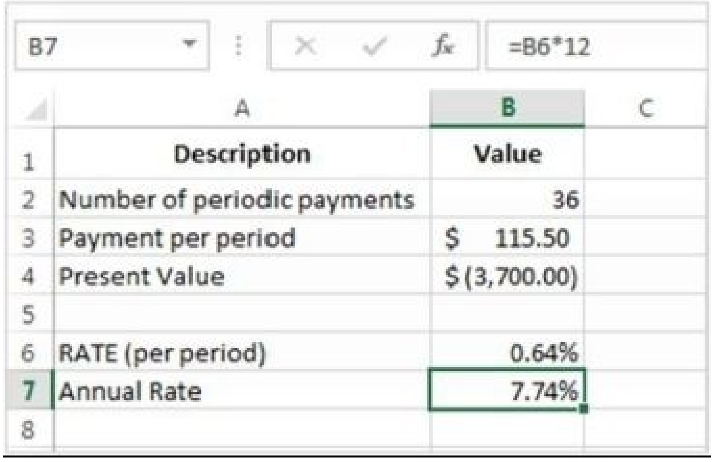
RATE

The RATE function computes the periodic interest rate of a loan. It uses the following argument:

=RATE(nper,pmt,pv,[fv],[type],[guess])

All the arguments are explained in the "*Formulas to Analyze Investment*" section of this chapter. The first three arguments are mandatory while the last three are optional. If not entered, Excel assumes the default values for the optional arguments.

Figure 21.8 shows an example of how you can use the RATE function in Excel.



	A	B	C
1	Description	Value	
2	Number of periodic payments	36	
3	Payment per period	$ 115.50	
4	Present Value	$ (3,700.00)	
5			
6	RATE (per period)	0.64%	
7	Annual Rate	7.74%	
8			

Figure 21.8 - Using the RATE Function in Excel

The following formula is entered in the destination cell (B6) to calculate the interest rate per period:

=RATE(B2,B3,B4)

The resulting value is then multiplied by 12 to calculate the annual interest rate.

In the above example, PV is a negative value hence represents the money owed.

NPER

The NPER function calculates the number of payment periods for a loan.

To use the NPER function in Excel, enter the following argument:

=NPER(rate,pmt,pv,[fv],[type])

Other then *fv* and *type*, all the other arguments are necessary.

Continuing the same example as illustrated in Figure 21.8, the following formula needs to be entered in a new destination cell in order to calculate the number of payment periods.

=NPER(B6,B3,B4)

This formula returns 36 (means 36 months).

> The *rate* argument in the NPER function uses the rate per period. If you enter annual interest rate, Excel may return a #NUM! error. So make sure you enter the periodic interest rate.

PMT

The PMT function in Excel is used to calculate the loan payment per period. Loan payment includes the principal plus the interest amount.

To use the PMT function in Excel, enter the following argument:

=PMT(rate,nper,pv,[fv],[type])

The last two arguments (fv and type) are optional.

Example

=PMT(A1,A2,A3)

Assuming the following values:

A1 = 10% (rate)

A2 = 36 (nper)

A3 = - 100,000 (pv)

The resulting answer; that is $10,334, shows the loan payment per period.

IPMT

As explained in the previous heading, the PMT function calculates the principal plus interest payment per period. If you want to calculate only the interest payment, you can do so by using the IPMT function.

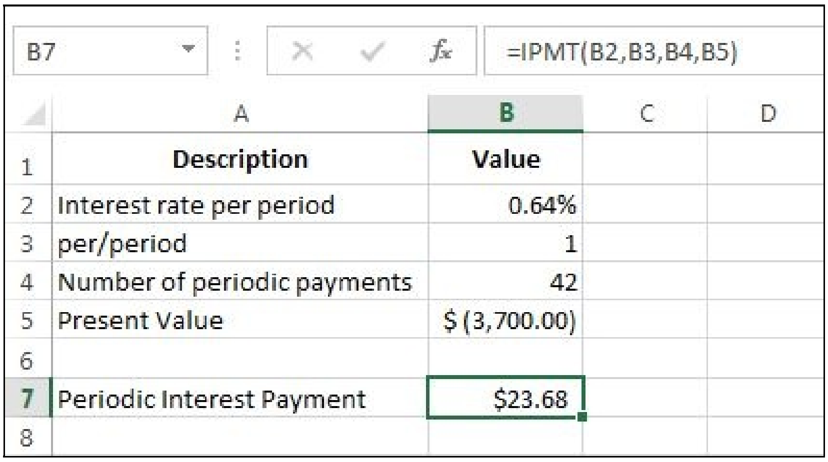
> The IPMT function assumes fixed payment amounts and a constant interest rate.

To use the IPMT function in Excel, enter the following argument:

=IPMT(rate,per,nper,pv,[fv],[type])

The last two arguments, *fv* and *type* are optional. If omitted, Excel assumes the default values.

Figure 21.9 illustrates an example of using the IPMT function in Excel.



B7 =IPMT(B2,B3,B4,B5)

	A	B	C	D
1	**Description**	**Value**		
2	Interest rate per period	0.64%		
3	per/period	1		
4	Number of periodic payments	42		
5	Present Value	$ (3,700.00)		
6				
7	Periodic Interest Payment	$23.68		
8				

Figure 21.9 - Example of Using the IPMT Function in Excel

The following formula is entered in the destination cell (B7) to calculate the interest payment per period:

=IPMT(B2,B3,B4,B5)

The formula returns an interest amount of $23.68.

The amount calculated through the IPMT function pertains to a single period only. However, there is a way to compute the cumulative interest paid between two payment periods as well. You can so by using the CUMIPMT function.

The CUMIPMT function uses the following argument:

= CUMIPMT (rate,nper,pv,start_period,end_period,type)

There are a few major differences when it comes to the arguments in the IPMT and CUMIPMT function. Firstly, the *per* argument is replaced by the *start_period* and *end_period* argument. This specifies the time period of which you want to calculate the cumulative interest.

Secondly, unlike the IMPT function, all the arguments in the CUMIPMT function are mandatory. None is optional. You need to enter the timing of the payment in the *type* argument.

Type **0** = payment at the end of the period

Type **1** = payment at the beginning of the period

While using the CUMIPMT function, make sure you use the same units for *nper*, *start period* and *end period*. For example, if the nper is expressed in months, then the other two arguments must also be

	entered as months.

PPMT

Just like the IMPT function calculates the interest part of the total periodic loan payment, the PPMT function computes the principal payment part.

	The PPMT function assumes fixed payment amounts and a constant interest rate.

To use the PPMT function in Excel, enter the following argument:

=PPMT(rate,per,nper,pv,[fv],[type])

The last two arguments, *fv* and *type* are optional. If omitted, Excel assumes the default values.

Just like the IPMT function, the principal payment amount calculated through the PPMT function pertains to a single period only. To compute the cumulative principal payment paid between two payment periods, you need to use the CUMPRINC function.

The CUMPRINC function uses the following argument:

= CUMPRINC (rate,nper,pv,start_period,end_period,type)

While using the CUMPRINC function, make sure you use the same units for *nper*, *start period* and *end period*. For example, if the nper is expressed in quarterly periods, then the other two arguments must also be entered as quarters.

Chapter 22: Working with Statistical Formulas

Excel provides innumerous functions that can help you do the statistical analysis of your data. From the basic statistical functions such as AVERAGE, MEDIAN, MODE to advanced functions like PERCENTILE, VAR and so on, the list of statistical functions built in Excel 2013 is endless.

While all the statistical functions are briefed in the appendix section of this book, this chapter discusses the most popular and valuable ones.

> To insert statistical function from the *Formula* tab on the Ribbon, click the **More Functions** drop down menu and then select **Statistical**. This will open the *Statistical* category of the Excel functions. For keyboard users: hit **Alt + MQS**.

The Basic Average Functions

The most basic and commonly used statistical operation is average and Excel provides four functions to perform this operation. There are four ways to calculate the average of the values in a range of cells; namely, AVERAGE, AVERAGEA, AVERAGEIF and AVERAGEIFS.

The first and most basic function is AVERAGE. It calculates the arithmetic mean of the numeric values in the selected range of cells.

This function uses the following argument:

=AVERAGE(number1, [number2],…)

Now you don’t have to refer each cell separately. Just enter the function, select the range containing the values you want to find the average of, close the parentheses and hit **Enter**. You can enter up to 255 *number* arguments at a time in the AVERAGE function.

AVERAGEA is another handy statistical function in Excel. It uses the following argument:

=AVERAGE(value1, [value2],…)

As you must have noticed, the arguments for AVERAGE and AVERAGEA are exactly the same.

Well, the arguments are definitely the same, difference lies in the mechanism of both the functions. The AVERAGE function calculates the arithmetic mean of numeric values only. It ignores the blank cells, text and logical values, if there are any in the selected range. On the other hand, the AVERAGEA uses all types of values in the calculation.

The Conditional Average Function

This section discusses the remaining two average functions of Excel, namely AVERAGEIF and AVERAGEIFS. These are the conditional average functions. In other words, they allow you to specify criteria for the inclusion of cells in the average calculation.

To use the AVERAGEIF function, enter the following argument in the destination cell:

=AVERAGEIF(range,criteria,[average_range])

Here is the brief description of the arguments used in the AVERAGEIF function:

range: Cell(s) and value(s) to average.

criteria: The criteria for the inclusion of cells in the average computation. The criteria could be a numeral, a text or logical value or any cell reference. Suppose the criteria is **“>25”**. It means that Excel computes the average of values that are greater than 25 in the selected range.

average_range: It is an optional argument. It refers to the actual range of cells that you want to compute the average of. If you don’t enter this argument, then by default Excel considers the range selected in the first argument. In other words, you need to enter the third argument only if the *range* and *average_range* are different.

The *average_range* criterion comes in handy when you want to select cell(s) on the basis of the content in the row(s) and column(s) but the actual calculation is to be performed in the values carried by the adjacent row(s) and column(s), respectively.

The AVERAGEIFS function is almost the same as the AVERAGEIF function, except for one difference; and that is the allowance to add more than one criterion.

To use the AVERAGEIFS function, enter the following argument in the destination cell:

=AVERAGEIF(average_range,criteria_range1,criteria1, [criteria_range2,criteria2],…)

You can select multiple ranges and specify a different criterion for each range. The *average_range* argument refers to range of cells that contain the values you want to average. The *criteria_range* argument specifies the values you want to compare and the *criteria* argument contains the criterion for the corresponding range.

You can enter up to 127 *criteria ranges and criteria* arguments at a time in the AVERAGEIFS function.

MIN and MAX

The MIN and MAX functions returns the largest and smallest value, respectively in the selected range.

To find the highest value in a range of cells, enter the following argument.

=MAX(number1,[number2],…)

To find the lowest value in a range of cells, enter the following argument.

=MIN(number1,[number2],…)

=MIN(B3:C10)

Entering the above formula will return the lowest value in the cell range B3:C10

MEDIAN

The MEDIAN function, as the name suggests, computes the median of the values in a range of cells. In other words, it returns the middle number in the selected values; that is, a number that lies exactly in the center of the equal number of high and low values.

If the selected range includes even number of cells, the median would be the average of two values that lies in the middle of data set.

The MEDIAN function uses the following syntax:

=MEDIAN(number1,[number2],…)

You don't have to enter the values individually in the *number* arguments. Just select the particular range and hit **Enter**.

Example

=MEDIAN(B3:C10)

The above formula will return the middle number in the cell range B3:C10

MODE.MULT

The MODE.MULT function yields a vertical array of the repetitive and most recurrently occurring values in the selected range of cells.

> The MODE.MULT function only considers numerical values. Text and logical values, if any are ignored. Moreover, if there are not repetitive values in the selected range, Excel returns #N/A error value.

To use the MODE.MULT function, enter the following argument in Excel:

= MODE.MULT(number1,[number2],…)

> To return the repetitive values in a horizontal array, use the following argument:
>
> =TRANSPOSE(MODE.MULT(number1,number2,…)).

MODE.SNGL

The MODE.SNGL identifies and returns the most repetitive value in the selected range of cells. If there are no duplicate values, it displays a #N/A error.

The MODE.SNGL function uses the following syntax:

= MODE.SNGL(number1,[number2],…)

=MODE.SNGL(B3:E14)

Entering the above formula in Excel returns the most repetitive value in the cell range B3:E14.

PERCENTRANK

The PERCENTANK functions determine the ranking of the values in the selected range. The ranking is returned in terms of percentage of the selected values.

There are two types of PERCENTANK functions; namely, PERCENTRANK.INC and PERCENTRANK.EXC.

Following is the brief description on the arguments used in the PERCENTRANK functions.

array: The range of cells containing data to be ranked.

X: Specifies the value whose rank you want to determine

significance: Specifies the level of precision in the rank; that is, how many decimal digits you want in the percentage. This argument is optional and if omitted, Excel assumes three decimal digits.

The **PERCENTRANK.INC** uses the following syntax:

= PERCENTRANK.INC(array,x,[significance])

You can use this function to analyze the relative standing of a value in a set of data. This function includes all the values in the selected range, unlike the PERCENTRANK.EXC, explained as follows.

The **PERCENTRANK.EXC** uses the following syntax:

= PERCENTRANK.EXC(array,x,[significance])

As you can see, both the functions hold the same syntax and arguments. The only difference between them is that in the PERCENTRANK.INC function includes all the values in the selected range, whereas the PERCENTRANK.EXC excludes the rankings of 0% and 100% (0..1,) from the data set.

Figure 22.1 shows an example where the PERCENTRANK functions are used to evaluate the relative performance of employees.

C3 | =PERCENTRANK.INC($B$3:$B$13,B3)

	A	B	C	D
1	Name of Employee	Performance Score	PERCENTRANK	
2			PERCENTRANK.INC	PERCENTRANK.EXC
3	Davy J Jones	150	30.00%	33.30%
4	Julie Taft Rider	165	40.00%	41.60%
5	Steven John Paul	181.5	70.00%	66.60%
6	Marcus Welby	199.65	90.00%	83.30%
7	James R. Rachel	188	80.00%	75.00%
8	Eric S. Kurjan	125	20.00%	25.00%
9	Anthony Lazy Denosso	205	100.00%	91.60%
10	Paula Barreto Mattos	165	40.00%	41.60%
11	Janaina B. Bueno	115	10.00%	16.60%
12	Janis Joplin	98	0.00%	8.30%
13	Mark T Seager	175	60.00%	58.30%

Figure 22.1 - Using the PERCENTRANK Functions in Excel to Analyze the Comparative Performance of Employees

In the example shown in Figure 22.1, the following formulas are entered in cell D3 and D4 respectively.

=PERCENTRANK.INC($B$3:$B$13,B3)

=PERCENTRANK.EXC($B$3:$B$13,B3)

The same formula is dragged down to cover the entire range. The *array* argument contains an absolute reference; therefore it did not change upon dragging.

Using the PERCENTILE Functions

The PERCENTILE function works the other way round the PERCENTRANK functions. They determine the value in the selected data that stands at a specified rank.

Just like the PERCENTANK function, the PERCENTILE function is of two types; namely, PERCENTILE.INC and PERCENTILE.EXC. The former type includes all the values in the selected range whereas the latter eliminates the rankings of 0% and 100% (0..1,) from the data set.

Following are syntax of the PERCENTILE functions:

=PERCENTILE.INC(array,k)

=PERCENTILE.EXC(array,k)

array: The range of cells containing the relative data

K: it is the percentile value whose corresponding value you want to determine. This argument needs to be entered in the decimal form. For example, to determine which value represents the 52nd percentile in the example shown in Figure 22.1, you need to enter the following formula in the destination cell.

=PERCENTILE.INC($B$3:$B$13,0.52)

Functions to Calculate Population Statistics

Variance and standard deviation are the most common and preferred ways of measuring dispersion in population or any other set of data.

The VAR and STDEV functions in Excel return the variance and standard deviation of the selected data set, respectively.

There are different forms of the VAR and STDEV functions. However before you apply any of them, you need to specify whether the underlying values represent the total population or just a sample of it. This would determine the form of function you are going to use.

If you use the VAR.S and STDEV.S functions, Excel assumes that the selected data set represent the sample of the total population. On the other hand, the VAR.P and STDEV.P functions assume that the values represent the total population.

To use the VAR and STDEV functions, enter the appropriate following argument in the destination cell.

= VAR.S(number1,[number]2,…)

= VAR.P(number1,[number]2,…)

=STDEV.S(number1,[number]2,…)

= STDEV.P(number1,[number]2,…)

As you can see, all functions use the same arguments. The difference lies in the assumptions and mechanism of the function.

> The VAR.S, VAR.P, STDEV.S and STDEV.P consider numerical values only. If the selected range contains any text or logical value, these are ignored by the four abovementioned functions.

If you want to include the text and logical values in the variance and standard deviation calculation, you need to use STDEVA and VARA OR STDEVPA and VARPA functions.

Following is a brief explanation of these functions. The arguments and way of using these is the same as in case of the non-text forms of VAR and STDEV functions.

> In all the below explained functions, Text values and FALSE logical values are evaluated as 0 (zero). A TRUE Logical value is evaluated as 1.

STDEVA: Calculates the standard deviation of the entire data, including text and logical values. This function assumes that the data set represents sample population.

VARA: Computes the variance of the selected data, including text and logical values. It assumes that the data set represents sample population.

STDEVPA: Calculates the standard deviation of the entire data, including text and logical values. This function assumes that the data set represents the entire population.

VARPA: It is similar to the VARA function, except that it assumes that the selected data set represents the entire population.

Chapter 23: Introducing the Lookup Formulas

Excel provides several handy and amazing lookup functions that can help you find a value in Excel without having to skim through all the cells. The best example of a lookup function is a telephone directory maintained in Excel. You can create a lookup formula to locate a particular name and contact number in the blink of an eye.

This chapter explains in detail the different lookup functions and their application in Excel. You will learn to use the three most popular and handy lookup functions along with several other formulas to lookup an exact value in Excel and the technique to work with the MATCH and INDEX functions and so on.

Get To Know the Lookup Functions

The three basic lookup functions in Excel 2013 include LOOKUP, VLOOKUP and HLOOKUP. These are normally used to search a row or column for a lookup value in order to find the related value.

LOOKUP

The LOOKUP function in Excel searches the lookup value in a range consisting of a single row or column (lookup vector), and then returns the value from the same position in the other single row or column (result vector).

To use the LOOKUP function in Excel, enter the following argument:

=LOOKUP(lookup_value,lookup_vector,[result_vector])

Here is a brief description of the arguments used in the LOOKUP function.

lookup_value: It is the value that you want to lookup in the first selected range; that is the lookup vector. The *lookup_value* can be a numeric, text or logical value. It can also be a name or cell reference.

lookup_vector: It is the row or column containing the lookup value.

result_vector: This argument is optional. It specifies the other row or column containing the value to be returned. Make sure the *result_vector* contains the same number of cells as the *lookup_vector.*

	Make sure the values in the *lookup-vector* range are placed in

ascending order or else Excel may return an incorrect value.

If the lookup value is lower than the lowest value in the lookup-vector, Excel returns #N/A error.

Figure 23.1 shows an example of a LOOKUP function in Excel 2013.

D3 =LOOKUP(D2,B3:B14,A3:A14)

	A	B	C	D	E
1	**Name of Employee**	**Performance Score**			
2			Standard Score	150	
3	Davy J Jones	98	LOOKUP (150)	Marcus Welby	
4	Julie Taft Rider	115			
5	Steven John Paul	125			
6	Marcus Welby	150			
7	James R. Rachel	165			
8	Eric S. Kurjan	162.5			
9	Anthony Lazy Denosso	175			
10	Paula Barreto Mattos	192.5			
11	Janaina B. Bueno	188			
12	Janis Joplin	206.8			
13	James van Eaton	105			
14	Mary Jean Post	118.56			
15					

Figure 23.1 - Example of Using the LOOKUP Function in Excel

The example illustrated in Figure 23.1 shows a performance score sheet of employees. The standard score of performance is 150. To find out which employee has achieved the exact or closest standard score, the following formula is entered in the destination cell (D3):

=LOOKUP(D2,B3:B14,A3:A14)

The first argument in the above formula refers to the cell containing the lookup value, which is the standard score of performance. The second argument specifies the range in which all the scores are located. The third argument contains the resulting values. As you can see in Figure 23.1, Excel returns "*Marcus Welby*" in the destination cell. It implies the Marcus Welby has secured the standard score among all the mentioned employees.

VLOOKUP

The VLOOKUP function searches the lookup value in the left most column of the selected table and returns the corresponding value from the specified column.

The VLOOKUP table uses the following syntax:

=VLOOKUP(lookup_value,table_array,col_index_num, [range_lookup])

Here is a brief description of the arguments used in the VLOOKUP function.

lookup_value: It is the value that you want to lookup in the left most column of the selected table. The *lookup_value* can be a numeric, text or logical value. It can also be a name or cell reference.

table_array: It is the range that contains the lookup data.

col_index_num: It specifies the column number in the *table_array* range from which the relative value is to be returned. For example, a *col_index_num* argument of **1** returns a value from the first column of selected table range; a *col_index_num* argument of **2** returns a value from the second column of selected table range and so on.

> If the *col_index_num* argument is less than 1, Excel returns a #VALUE! error.
>
> If the *col_index_num* argument is greater than the number of columns in the selected table range, Excel returns a #REF! error..

range_lookup: It contains a logical argument that specifies whether the VLOOKUP function should find an exact match of the lookup value or just an approximate match. If the *range_lookup* argument is TRUE, Excel returns an exact or an approximate match. It first looks for an exact match, if not found, it then returns an approximate match of the lookup value.

If the *range_lookup* argument is FALSE, it returns an exact match. If Excel is unable to find the precise match, it returns #N/A error.

> *range_lookup* is an optional argument. If not entered, Excel assumes it

to be TRUE, hence returns an exact or approximate match.

If the *range_lookup* argument is TRUE or omitted, it is imperative that the first column of the lookup table is aligned in ascending order (alphabetical order in case of text values) or else Excel may return an incorrect value.

If the lookup value is lower than the lowest value in the left most column of the lookup-table, Excel returns #N/A error.

Figure 23.2 continues the same example (shown in Figure 23.1) to include the VLOOKUP value.

D3 =VLOOKUP(D2,A3:B14,2)

	A	B	C	D	E
1	**Name of Employee**	**Performance Score**			
2			Lookup value	James van Eaton	
3	Anthony Lazy Denosso	98	VLOOKUP	165	
4	Davy J Jones	115			
5	Eric S. Kurjan	125			
6	James R. Rachel	150			
7	James van Eaton	165			
8	Janaina B. Bueno	162.5			
9	Janis Joplin	175			
10	Julie Taft Rider	192.5			
11	Marcus Welby	188			
12	Mary Jean Post	206.8			
13	Paula Barreto Mattos	105			
14	Steven John Paul	118.56			
15					

Figure 23.2 - Example of Using the VLOOKUP Function in Excel

In this example, firstly the values in the first column are sorted alphabetically. Then the following formula is entered in the destination cell (D3)

=VLOOKUP(D2,A3:B14,2)

Interpreting the above formula, it searches the value in cell D2 (that is, James van Eaton) in the first column of the *table_array* (A3:B14) and returns the corresponding value from the second column in the *table_array*.

HLOOKUP

The HLOOKUP is similar to the VLOOKUP function, with only one difference; that is, the lookup table in case of HLOOKUP is arranged horizontally instead of vertically. In other words, the HLOOKUP function searches the lookup value in the top row of the selected table and returns the corresponding value from the specified row in the table.

The HLOOKUP table uses the following syntax:

=HLOOKUP(lookup_value,table_array,row_index_num, [range_lookup])

Here is a brief description of the arguments used in the HLOOKUP function.

lookup_value: It is the value that you want to lookup in the top most row of the selected table. The *lookup_value* can be a numeric, text or logical value. It can also be a name or cell reference.

table_array: It specifies the range that contains the lookup data.

row_index_num: It specifies the row number in the *table_array* range from which the relative value is to be returned. For example, a *row_index_num* argument of **1** returns a value from the first row in the selected table range; a row*_index_num* argument of **2** returns a value from the second row in the selected table range and so on.

range_lookup: It contains a logical argument that specifies whether the HLOOKUP function should find an exact match of the lookup value or just an approximate match. If the *range_lookup* argument is TRUE, Excel returns an exact or an approximate match. It first looks for an exact match, if not found, it then returns an approximate match of the lookup value.

If the *range_lookup* argument is FALSE, it returns an exact match. If Excel is unable to find the exact match, it returns #N/A error.

> *range_lookup* is an optional argument. If not entered, Excel assumes it to be TRUE, hence returns an exact or approximate match.

In short, the HLOOKUP works exactly the same as the VLOOKUP function. The only difference is that the column part in the latter is replaced by row in the former.

Tip To Replace the #N/A Error

As already explained in the above section, VLOOKUP and HLOOKUP functions, by default returns the exact or approximate value. In other words, if the exact match of the lookup value is not found in the specified range, it returns the next closest value.

If you want to find the exact match, enter FALSE in the *range_lookup* argument. But remember that if Excel is unable to find the exact match, it returns a #N/A error.

At times, you may want to use another word or phrase for the #N/A error. Suppose you are maintaining an inventory worksheet in which you want to enter a lookup formula to determine if a particular item is listed in the column containing names of available inventory. Needless to say that you would have to enter the VLOOKUP or HLOOKUP formula with a false argument, so as to find the availability of the particular item (which is going to be your lookup value).

If the specified item is not found in the selected range, Excel returns the #N/A error. You may want to replace the #N/A error with the term "Not Available".

Suppose the underlying VLOOKUP formula is:

=VLOOKUP(D2,A3:B14,2,FALSE)

To replace the #N/A error value with any other term, replace the above formula with the following one:

=IFERROR(VLOOKUP(D2, A3:B14,2,FALSE),"Not Available")

Lookup with Match and INDEX Functions

The MATCH and INDEX functions in Excel are often used together in the lookup formulas.

First, let's talk about the MATCH function. It finds the relative position of a cell in a range or array that matches the specified lookup value in a specified order.

The MATCH function has the following syntax:

=MATCH(lookup_value,lookup_array,[match_type])

Following is a brief description of the arguments used in the MATCH function.

lookup_value: It is the value that you want to lookup in the *lookup_array* (second argument in the MATCH function). The *lookup_value* can be a numeral, text or logical value. It can also be a name or cell reference.

lookup_array: It specifies the range of cells that contains the lookup data.

match_type: This argument specifies how Excel matches the lookup value in the selected range. It can be 0, 1 or -1.

If *match_type* is 1, Excel returns the largest value that is less than or equal to the *lookup_value*. In this case, it is essential that the *lookup_array* is aligned in ascending order (alphabetical order i.e. A – Z, in case of text values) or else Excel may return an incorrect value.

If *match_type* is 0, Excel returns the value that is exactly equal to the *lookup_value.*

If *match_type* is -1, Excel returns the smallest value that is greater than or equal to the *lookup_value*. In this case, it is essential that the *lookup_array* is aligned in descending order (inverse alphabetical order i.e. Z – A, in case of text values) or else Excel may return an incorrect value.

> *match_type* is an optional argument. If not entered, Excel assumes it to be **1**, hence returns the largest value that is less than or equal to the *lookup_value*.

Now let's discuss the INDEX function. It returns a value or cell reference at the intersection point of a particular column and row, in the specified range.

The INDEX function has the following syntax:

=INDEX(array,row_num,[column_num])

Here is a brief description of the arguments used in the INDEX function.

array: The range of cells

row_num: Specifies the row number in the array from which the resulting value is to be returned.

col_num: Specifies the column number in the array from which the resulting value is to be returned.

Keep in mind the following while you work with the INDEX function.

- If the selected array contains only one row or column, the corresponding *row_num* or *column_num* argument is optional.
- If the selected array contains more than one row and column, and you have entered

either *row_num* or *column_num* argument, then Excel returns an array of the entire row or column, respectively.

- If both the *row_num* and *column_num* arguments are used, Excel returns the value in the cell at the intersection point of the specified row and column number.

Figure 23.3 illustrates an example of INDEX function.

	A	B	C	D
1	**Course**	**Weightage**		
2	Literature	10%	**Formula**	**Resulting Value**
3	Poetry	10%	=INDEX(A1:B8,2,1)	Literature
4	Mathematics	15%	=INDEX(A1:B8,4,2)	15%
5	Geography	10%	=INDEX(A1:A8,4)	Mathematics
6	Business Communications	20%		
7	International Relations	20%		
8	Political Science	15%		
9				

Figure 23.3 - Illustrating the Use of INDEX Function in Excel 2013

In the above example, three different INDEX formulas are applied. All the formulas contain the array argument, the *row_num* and *column_num* arguments are different.

For example, in the first formula, the *row_num* argument is 2 and *column_num argument* is 1. Hence Excel returned the value located in intersecting cell at second row and first column in the selected array. As you can see in Figure 23.3, **Literature** lies in specified position.

Now that you know the individual usage of the MATCH and INDEX functions, following are a few applications of how you can use these two functions together in the lookup formulas.

Formula to Lookup A Case Sensitive Value

Suppose your lookup value is PAUL. Whether you use LOOKUP, VLOOKUP or HLOOKUP function, Excel returns Paul, paul, PAUL and all the same values. In other words, the lookup formulas are not case sensitive. At times you may want to lookup the exact (case sensitive) text value.

Suppose the underlying LOOKUP formula is:

=LOOKUP(D2,B3:B14,A3:A14)

In the above formula, D2 is the cell containing the lookup value, B3:B14 is the range containing the lookup data and A3:A14 is the range containing the corresponding resulting values.

If you want the above lookup formula to be case sensitive, replace it with the following array formula:

=INDEX(A3:A14,MATCH(TRUE,EXACT(B4,B3:B14),0))

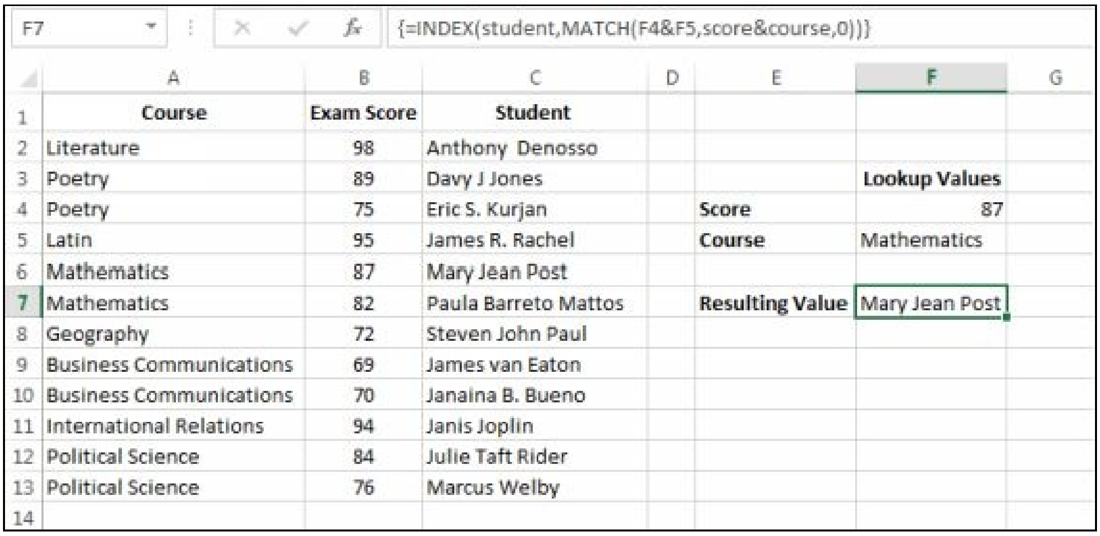
	The above formula must be entered as an array formula, or else it won’t work correctly. To do so, press **Ctrl + Shift + Enter** instead of **Enter** after you close the last parentheses in the formula.

Refer to Chapter 24 to learn more about Array formulas.

Learning the Two-Column Lookup

At times you may need to search a value based on values in two columns.

Figure 23.4 illustrates one such example.



F7 | {=INDEX(student,MATCH(F4&F5,score&course,0))}

	A	B	C	D	E	F	G
1	Course	Exam Score	Student				
2	Literature	98	Anthony Denosso				
3	Poetry	89	Davy J Jones			Lookup Values	
4	Poetry	75	Eric S. Kurjan		Score	87	
5	Latin	95	James R. Rachel		Course	Mathematics	
6	Mathematics	87	Mary Jean Post				
7	Mathematics	82	Paula Barreto Mattos		Resulting Value	Mary Jean Post	
8	Geography	72	Steven John Paul				
9	Business Communications	69	James van Eaton				
10	Business Communications	70	Janaina B. Bueno				
11	International Relations	94	Janis Joplin				
12	Political Science	84	Julie Taft Rider				
13	Political Science	76	Marcus Welby				
14							

Figure 23.4 - Determining a Value Based On Two Lookup Values

The above image of worksheet contains a lookup table made up of three columns. The first one carries the name of the course, second contains the exam score and the third carries the name of the students.

For the sake of understanding, we have named the ranges as follows:

A2:A13 = **course** (This range contains the lookup data of one lookup value)

B2:B13 = **score** (This range contains the lookup data of the other lookup value)

C2:C13 = **student** (This range contains the resulting values)

Suppose you want find the name of the student who scored 87 in mathematics. This implies two lookup values (87 and mathematics).

As you can see in Figure 23.4, the lookup values are entered in cell F4 and F5. Entering the following array formula in the destination returns the required answer:

=INDEX(student,MATCH(F4&F5,score&course,0))

The above formula returns the value “Mary Jean Post”. Interpreting this answer, Mary Jean Post is the student who scored 87 in mathematics.

This formula must be entered as an array formula, or else it won’t work correctly. To do so, press **Ctrl + Shift + Enter** instead of Enter after you close the last parentheses in the formula.

Chapter 24: Learn to Work with Array Formulas

Array formulas are mentioned a many times in this book. A couple of times in the previous chapters, the shortcut key for entering array formulas has also been stated. But array formulas are a lot more than what's explained so far.

Well, this chapter talks in detail about the valuable array formulas and their handy features. Starting with the basic concept to the types of array formulas and different dimensions, this chapter tells you all you need to know about using the array formulas in Excel.

Defining Array Formulas

Simply put, array is an assortment of items operated on individually or collectively. In Excel, an array formula is a special kind of formula that works on a range of values. If the array formula is dependent on a range of cells, the corresponding range is known as an *array range*. On the other hand, if the formula contains to a list of values, they are called *array constant*.

> It is not necessary to store the arrays in cells. You can work with arrays that are stored in Excel's memory only.

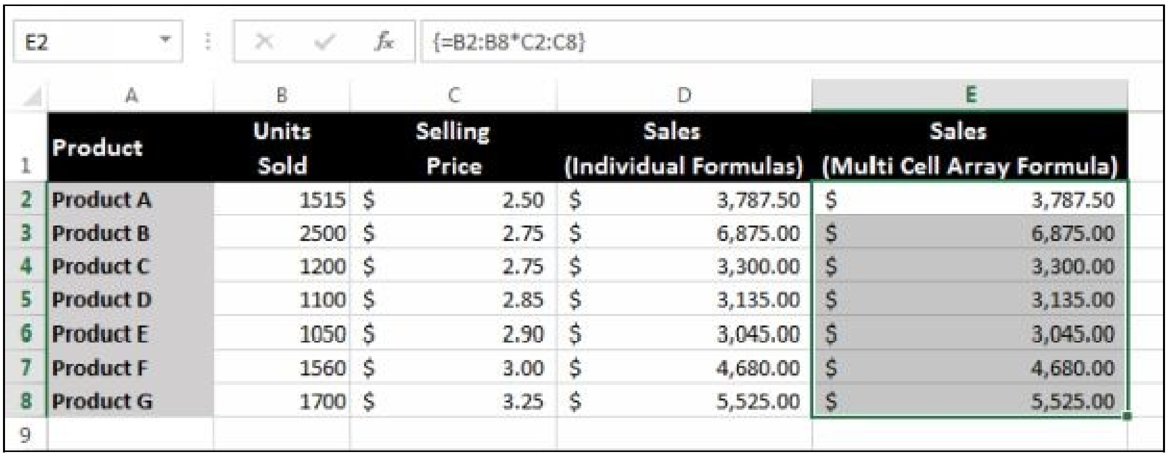
There are two types of array formulas; namely, Single cell array formulas and Multi array cell formulas. The former operates on arrays that display the results in a single cell, whereas the latter displays the result in a range of cells. Moreover, a Multi array cell formula is also entered into an array, as against the Single cell array formula which is entered into a single cell.

Apart from the types, arrays are also categorized in terms of dimensions. An array can be one-dimensional or two-dimensional. The array dimensions pertain to the number of rows and columns. A one dimensional array is the one that can be stored in a range consisting of a single row or column, whereas a two dimensional array can be stored in a range of cells consisting multiple rows and columns.

The types and dimensions are explained in detail with examples in the upcoming chapters.

Applying the Multi-Cell Array Formula

First, let’s talk about the multi cell array formula. Have a look at Figure 24.1.



E2 | {=B2:B8*C2:C8}

	A	B	C	D	E
1	Product	Units Sold	Selling Price	Sales (Individual Formulas)	Sales (Multi Cell Array Formula)
2	Product A	1515	$ 2.50	$ 3,787.50	$ 3,787.50
3	Product B	2500	$ 2.75	$ 6,875.00	$ 6,875.00
4	Product C	1200	$ 2.75	$ 3,300.00	$ 3,300.00
5	Product D	1100	$ 2.85	$ 3,135.00	$ 3,135.00
6	Product E	1050	$ 2.90	$ 3,045.00	$ 3,045.00
7	Product F	1560	$ 3.00	$ 4,680.00	$ 4,680.00
8	Product G	1700	$ 3.25	$ 5,525.00	$ 5,525.00
9					

Figure 24.1 - Creating One Multi-Cell Array Formula to Calculate Sales for Different Products

The worksheet shown in Figure 24.1 contains a worksheet holding sales data for different products.

The following formula is entered in Cell D2 to calculate the total sales for Product A.

=B2*C2

Normally, you’d drag this formula down to calculate the sales of other products as well. Upon dragging down, column D contains seven formulas, one for each product.

An alternative way of performing this calculation is by creating one multi-cell array formula. The one multi-cell array formula will dwell in all the seven cells and return an array of seven resulting values.

Here is how you can create a multi cell formula:

Select the range of cells that is to hold the resulting values. In Figure 24.1, it is E2:E8

Enter the following formula

=B2:B8*C2:C8

Press **Ctrl + Shift + Enter** on your keyboard to enter the formula. Normally, we hit **Enter** to enter a formal, but when entering an array formula, you need to press **Ctrl + Shift + Enter.**

As you can see in Figure 24.1, the entire range in Column E consists of a single formula. Since the result is displayed in a range of cells, it is known as a multi cell array formula.

	The curly brackets shown in the formula bar are a symbol of array

formulas. It signifies that the corresponding cells contain an array formula. However you don't have to enter these brackets, neither will they show when the cell is in the edit mode. These are just an indication or you can say a reminder of the presence of an array formula in the pertaining cells.

Excel does not allow multi cell array formulas in range of cells that are formatted as a table. Likewise, if a range already contains a multi cell array formula, it cannot be converted into a table.

As you can see in Figure 24.1, the resulting values in Column D and Column E are the same. In Column D, we have entered a single formula and then dragged it down the range. In Column E, we have selected the entire range and entered one multi-cell array formula.

Entering a multi cell array formula produces the same answers as individual formulas. As a matter of fact, the former provides the following advantages against the latter:

- A multi cell formula eliminates the probability of over writing a formula mistakenly, as you can't modify or delete just one cell in the array formula. If you do so, Excel displays an error message.
- The error message, as explained in the previous point, prevents the novice and unauthorized users to tamper with your formulas.
- When working on a large range of cells, a multi cell formula ensures that all the formulas are identical hence produce the correct results.

Though a multi cell array formula has several pros, it has some cons as well.

- û You cannot insert a new row into the array range. This drawback serves as an advantage when you don't want other users to modify your worksheet or array formula.
- û If you add any new data or row to the bottom of the range, you need to select the entire range and modify the formula accordingly. You cannot just copy or drag the formula down.

Applying the Single-Cell Array Formula

Figure 24.2 continues the same sales report example (shown in Figure 24.1) to explain single cell array formulas.

C10 {=SUM(B2:B8*C2:C8)}

	A	B	C	D	E
1	Product	Units Sold	Selling Price	Sales (Individual Formulas)	Sales (Multi Cell Array Formula)
2	Product A	1515	$ 2.50	$ 3,787.50	$ 3,787.50
3	Product B	2500	$ 2.75	$ 6,875.00	$ 6,875.00
4	Product C	1200	$ 2.75	$ 3,300.00	$ 3,300.00
5	Product D	1100	$ 2.85	$ 3,135.00	$ 3,135.00
6	Product E	1050	$ 2.90	$ 3,045.00	$ 3,045.00
7	Product F	1560	$ 3.00	$ 4,680.00	$ 4,680.00
8	Product G	1700	$ 3.25	$ 5,525.00	$ 5,525.00
9					
10	TOTAL SALES		$ 30,347.50	$ 30,347.50	$ 30,347.50
11					

Figure 24.2 - Creating a Single-Cell Array Formula to Calculate the Cumulative Sales of All Products

In the above Figure, the user wants to calculate the cumulative sales of all the products. One way is to sum the values in Column D or Column E. However, this would take up a lot of time if you don’t need to calculate the individual sales of each product and directly compute the total sales of all the products.

To enter a single cell array formula, enter the following formula in the destination cell (C10):

=SUM(B2:B8*C2:C8)

This formula must be entered as an array formula; hence you need to press **Ctrl + Shift + Enter** instead of Enter after completing the formula.

As you can see in Figure 24.2, Cell C10, D10 and E10 all contains the same resulting value. The difference is in the calculation procedure and mechanism. The value in Cell C10 is calculated directly, without any intermediate computations. This method is therefore preferable and time saving if you don’t need the individual product-wise sales values.

An alternate way of calculating total sales in the above example is by entering the following formula in the destination cell:

=SUMPRODUCT(B2:B8,C2:C8)

This will yield the same answer as the single cell array formula.

How to Create an Array Constant

As already mentioned, an array does not need to be stored in worksheet ranges. You can work with arrays saved in Excel’s memory also. These are known as *array constant*.

The examples in the previous sections used arrays stored in a range of cells. This one talks about the ones stored in Excel’s memory.

Following is an example of a formula containing an array constant:

=SUM({2,5,2,7,9})

The above formula uses an array however it is not an array formula itself. Therefore you do not need to press **Ctrl + Shift + Enter** to enter the formula.

This is just an example of a simple array constant. The formula will produce the same result, even if you’d have entered the simple SUM formula.

The array constant’s formula comes in handy when you need to use two array constants at a time.

For example, the following formula contains two array constants:

=SUM({2,5,2,9}*{3,5,9,4})

> While entering an array formula, you need to press **Ctrl + Shift + Enter** to enter the formula. However if you are using array constants, then you need to type in the curly brackets at the appropriate positions in the formula.

Following is the array-less alternative to the above formula.

=SUM(2*3,5*5,2*9,9*4)

The following formula is a combination of array constants and array stored in range:

=SUM((A7:D7*{2,4,6,8}))

In short, ‘*arrays stored in ranges*’ means ‘*cell references*’ and ‘*array constants*’ means ‘*values*’.

If your formula use arrays stored in cells (that is cell references), it must be entered as array formulas (by pressing by **Ctrl + Shift + Enter**). On the other hand, if your formula contains direct values (that is array constants), you must manually put curly brackets in appropriate places.

You need to remember the following while working with array constants:

- An array constant can contain numerals, text and logical values, and even error values.
- The text values must be enclosed in double quotation marks.
- The numeral can be an integer, a decimal value or a scientific notation.
- Array constant does not recognize, hence cannot contain dollar sign, parentheses, commas and percentage signs.
- An array constant cannot contain functions and functions, and links to other arrays.

Exploring the Dimensions of an Array

As mentioned before, an array can be one dimensional or two dimensional. The understanding of dimensions is as important as the study of the types and array constants. This section explains the different orientations of an array along with relevant examples.

First, let's talk about one dimension arrays. A one dimensional array is the one that can be stored in a range consisting of a single row or column. This dimension further contains two orientations; vertical and horizontal.

One Dimensional Vertical Arrays

One Dimensional Vertical Array corresponds to a single row. The array is displayed in a column of cells and the items in it are separated by semicolons.

Following is an example of a five-element vertical array constant:

{2;4;6;8;10}

To display the above array constant in a column, first select a range consisting of 5 cells in one column. Then enter the following formula:

={2;4;6;8;10}

Press **Ctrl + Shift + Enter**. All the numeric values will be displayed in a contiguous range in a single column.

The above explained process of creating one dimensional vertical array comes in handy when the array constant contains text values. Consider the following six-element vertical array constant, as an example:

{“Paul”;”Mary”;”Wilson”;”David”;”Cole”;”Lisa”}

To display these names in a vertical array, select a range consisting of 6 cells in one column. Then enter the following formula:

={“Paul”;”Mary”;”Wilson”;”David”;”Cole”;”Lisa”}

Press **Ctrl + Shift + Enter**. All the name values will be displayed in the selected cells, as shown in Figure 24.3

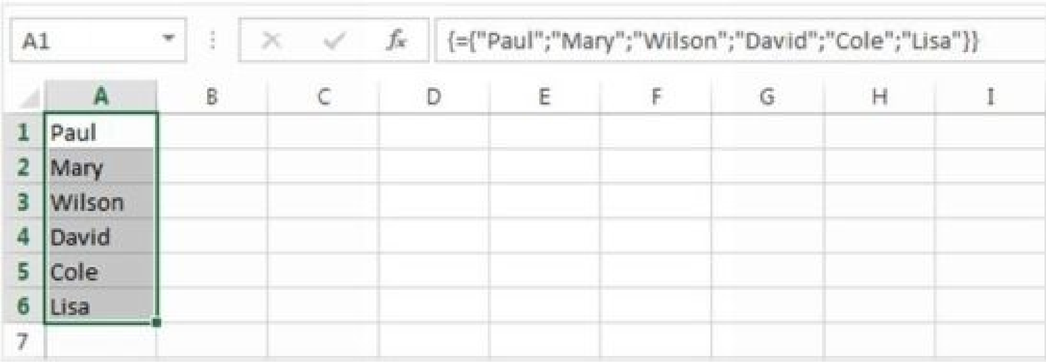


Figure 24.3 - Displaying Text Values in a Vertical Array

One Dimensional Horizontal Arrays

The *one dimensional horizontal array* is different from the *one dimensional vertical array* in two aspects, as listed below:

1. The array is displayed in a row of cells
2. The items in a *one dimensional horizontal array* are separated by commas.

Following is an example of a five-item horizontal array constant:

{2,4,6,8,10}

To display the above array constant in a row, first select a range consisting of 5 consecutive cells in a row. Then enter the following formula:

={2,4,6,8,10}

Press **Ctrl + Shift + Enter**. All the numeric values will be displayed in a contiguous range in a single row.

	If the selected range contains more cells than the number of array

items, the extra cells display #N/A error value. If you select a vertical range of cells and enter a horizontal array constant formula in it, all the selected cells will display the first item.

Two Dimensional Arrays

A two dimensional array allows you to combine the vertical and horizontal array constants. The rules remain the same; that is, you need to put commas to separate the horizontal elements and semicolons to separate the vertical elements in a two dimensional array formula.

Following is an example of a 3 x 4 two-dimensional array constant:

{2,2,4,4;6,6,8,8;10,10,12,12}

In the above array constant, there are four items for the first row, then a semicolon which implies the starting of the next row, again there are four items in the second row and then the third row.

To display this in an array of 12 cells, first select a range of empty cells that contains four columns and three rows. Then type the following formula:

={2,2,4,4;6,6,8,8;10,10,12,12}

Press **Ctrl + Shift + Enter**.

Figure 24.4 illustrates how the array constant will be displayed in the selected cells.

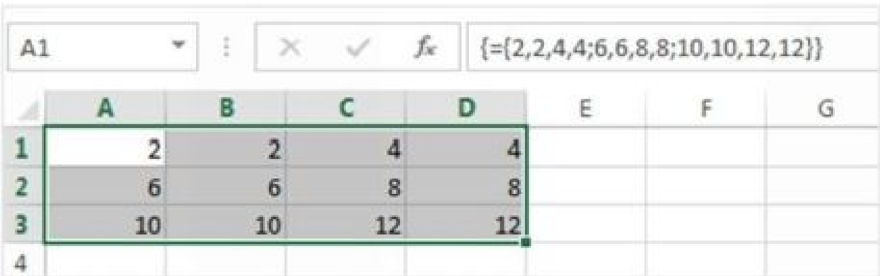


Figure 24.4 - Illustrating a Two Dimensional Array

It is essential that each row in a two dimensional array constant contains the same number of items or values. For example, the below array is invalid as there are only three items in the second row, whereas the other two have four items each.

{2,2,4,4;6,8,8;10,10,12,12}

	Excel does not support nor even allow a formula with an invalid array.

Chapter 25: Making an Error Free Worksheet

By now you must have gotten a fair idea on how formulas are created and references are linked. While working with these, you need to be careful as one error or misplacement of an argument can produce errors in the entire worksheet. Surely you would not want to make the entire worksheet again just because of one wrong entry or any other mistaken clicks.

This chapter tells you how you can locate the source of error and rectify it, in order to save your efforts from going down the drain. Just like one incorrect entry or referencing can affect all the resulting cells, the reversal of the misdoing can rectify all of it at once.

Starting from the types of formula errors, auditing tools and error trapping techniques, this chapter helps you make a perfect and completely error free worksheet.

Fixing the Formula Errors

While working on spreadsheets containing complex and interlinked formulas, one minor change may produce a massive ripple effect and produce errors in all the referenced cells and other linked formulas. And this is not something that you can prevent from happening! Formula errors are very common in Excel and you are bound to encounter one while working on interrelated and lengthy formulas.

Types of Formula Errors

The trickiest thing when it comes to formula errors is that if the underlying formula is interlinked to other formulas in the workbook, then you need to identify the source of error and then deal accordingly. Changing the resulting value manually won't be enough; on the contrary it may complicate the error in other referenced formulas.

Being said that, the rectification process depends upon the type of error you encounter. Following is a brief description about the general categories of formula errors that you may encounter while working in Excel.

Syntax Errors: As the name suggest, syntax error occurs when there is a problem in the syntax of the underlying formula. In other words, you may encounter this error when you fail to follow the syntax and argument structure of a function.

The most common type of syntax error is *mismatched parentheses*. It occurs when the number of right parentheses is not equal to the number of left parentheses in the formula. The next common syntax error occurs when you enter incorrect or incomplete arguments.

Syntax errors are the easiest to identify. In case of mismatched parentheses, Excel does not let you enter a formula.

Incomplete Calculation Errors: This error occurs when the formulas are not calculated completely.

> To make sure that your formulas are completely calculated, press **Ctrl + Alt + Shift + F9** on your keyboard.

Semantic Errors: This error normally occurs when you spell a function incorrectly. Excel attempts to interpret it as a name and displays the #NAME? error.

Logical Errors: Logical errors are difficult to identify as they are not displayed overtly. They occur when a formula contains a logical error which in turn causes it to produce incorrect or imprecise result.

Array Formula Entry Errors: This error occurs when you press **Enter** instead of **Ctrl + Shift + Enter** while entering an array formula. Depending upon the function and structure of formula, Excel may display an error alert or it may produce incorrect result.

Incorrect Reference Errors: This error occurs when you enter incorrect cell reference in a formula.

Circular References: A circular reference occurs when a formula refers to its own value, or when a cell reference(s) is dependent upon the underlying formula’s resulting value.

Get To Know the Common Error Values

Error values mostly occur when you enter any invalid or incorrect formula thus rendering Excel unable to perform the specified calculation.

Error values are of many types, each corresponding to a different source of error. Following is a brief description of all the error values including their meaning and possible causes.

> Every error value spurs from a different cause and the only way to rectify the error is to identify the source of it and then edit the formula accordingly to make it right.

#DIV/0!

Mathematically, you cannot divide any number with zero. It is an invalid operation. When you try to perform this in Excel, it displays the #DIV/0! error. This error occurs when you perform a division operation containing 0 (zero) or a blank cell reference.

#N/A

This error occurs when a lookup formula is unable to return the required value. Many users type this error value manually in a cell to indicate unavailable data.

#NULL!

As explained previously in this book, the intersection operator in Excel is a space. The #NULL! error occurs when you put an intersection operator in a formula where it is actually not available in the worksheet. In other words, when you refer an intersection of two cell ranges in a formula that actually don't intersect, Excel displays a #NULL! error.

This error also occurs when you mistakenly enter a space instead of a comma in a formula, as latter is the argument separator. So when you put a union separator instead of an argument separator, Excel displays the #NULL! error.

#NAME?

The #NAME? error occurs when Excel is unable to recognize a cell or range name. This could be due to any of the following reasons:

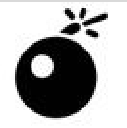
û The formula contains a text value that is not enclosed in double quotation marks.

û The formula contains a misspelled function name. *This also falls under the category of semantic errors.*

û The formula refers to range of cells but the range address does not contain a colon between the cell addresses.

û The formula contains a deleted name range.

û The formula contains an advanced or add-in function that is not installed in the current version of Excel.

	Excel is comparatively less advanced and smart when it comes to using name ranges in formulas. If you use a name range or a named cell reference in a formula and then delete the name later on, Excel displays the #NAME? error. It does not automatically replace the cell address with the corresponding range or cell.

#REF!

The #REF! error occurs when a formula contains an invalid cell reference. This could be due to any of the following reasons:

û When the row, column or the cell containing the cell reference is deleted. Suppose you entered the following formula in a cell:

=SUM(C5,D4,B1)

Now if you delete Column C, D or B or any of the rows containing the mentioned cell references, Excel will display the #REF! error.

û When worksheet containing the cell reference is deleted.

û When copying a formula to any other location invalidates the cell references in it.

û When you cut and paste a cell to a cell already containing a cell reference.

#VALUE!

This error occurs when a function contains a wrong or invalid argument, or a wrong operator is used in it. This could be due to any of the following reasons:

û When an argument in a formula contains invalid or incorrect data type.

û When the argument refers to a cell range, whereas it should refer to a single value or cell only.

û When you press **Enter** instead of **Ctrl + Shift + Enter** while entering an array formula. *This is also known as Array Formula Entry Error*.

û When a customized function does not perform the calculation. You can hit **Ctrl + Alt + F9** to force a recalculation.

#NUM!

The #NUM! error occurs when there is some issue with the numerical value or number format in the formula. For example, this error occurs when an argument contains a text or logical value whereas it is supposed to be a numeral, or when the resulting value is too large or too small to fit in the corresponding cell.

> When a referenced cell in a formula returns an error value or when a cell containing error value is referred in a formula, the formula returns the particular error value as well. When this happens, the error value spreads like wildfire throughout the workbook and all the cells that are in anyway linked to the underlying formula. In such cases, it becomes very difficult to identify the cell from where the error value originated so as you can rectify it.

The Phantom Link Error

The Phantom link error occurs when the links contained in a workbook are outdated.

Figure 25.1 shows the Excel phantom error alert window.

Figure 25.1 - Phantom Error Notification Giving You the Option to Update the Links

The phantom links are mostly created when a worksheet containing names is copied to any other workbook.

If you want, you can update the links however there are two other methods that you can try to resolve this issue.

First, select **File** > **Info** > **Edit Links to Files** to display the *Edit Links* dialog box. Now one by one select each link and click **Break Link**. If the phantom links issue still persists, try the second method, explained as follows.

Select **Formulas** tab > **Defined Names** > **Name Manager**. This will open the *Name Manager* dialog box. Scroll through all the names and if you see any name that says #REF!, delete it.

If your *Name Manager* dialog box contains numerous names and scrolling through all of them would take up a lot of time, you can use the filter option located at the top right corner of the dialog box. To do so, Click **Filter** and then select Click **Names with Errors**.

Using Conditional Formatting to Hide Errors

At times the error values won't be much of a concern to you and you may just want to hide them, you can do so using Conditional Formatting. You can set a conditional formatting rule that can render all the error values invisible.

Following is the step by step process on how you can do that:

1. Select the cell(s) containing error values that you want to hide.
2. Select **Home** tab > **Conditional Formatting** > **New Rule**. This will open the *New Formatting Rule* dialog box.
3. In the *Select a Rule Type* box, click **Select the Format Only Cells That Contain**
4. Click the *Cell Value* drop down list and select **Errors**.
5. Click the **Format** button to open the *Format Cells* dialog box.
6. Click the *Color* drop down menu to open the *color palette*. Select *White* color and click **OK**. *If the selected cells are shaded, then choose the same color in the color palette.*
7. Click OK to close the *New Formatting Rule* dialog box and return to the worksheet. All the error values in the selected cells would have disappeared from the

worksheet.

Formula Auditing Tools

If you are unable to trap the contagious errors that seem to have spread throughout the worksheet, you may have to check all the linked cells to find the source of error. At times the errors become so viral that you may have to recreate the entire worksheet; even in this case there is no such guarantee that the previous errors won't occur again.

So the best solution out of it is to find the origin of error and rectify it once and for all. Fortunately, Excel 2013 contains some very advanced and smart formula auditing tools that can help you track down the cause of error.

The Formula Auditing tools are located in the *Formula Auditing* group on the Formulas tab of the Ribbon, as shown in Figure 25.2.

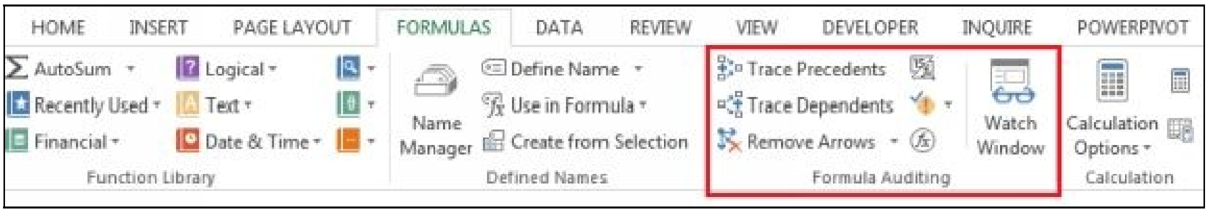


Figure 25.2 - The Formula Auditing Tools in Excel 2013

Before we explain the applications of the formula auditing tools, you need to understand two terms pertaining to them. First is *Direct Precedents*, which refer to cells that directly feed the formulas. The second term is *Dependents* which implies the cells that depend on the results of the formulas.

Following is a brief description about the formula auditing tools available in Excel.

Trace Precedents

When you click the *Trace Precedents* command once, Excel puts arrows to the direct precedents; that is, the cells that are referred to in the formula in the cell. Clicking the *Trace Precedents* command again cause Excel to add a tracer to the arrows that identifies the cells that are referred to in the formulas in the direct precedents.

Choosing the Error Checking Option

The Error Checking tool performs a complete error-check and tells you the nature of the error in the selected cell. It also offers help on the particular error and allows you to trace its precedents.

When you will click the *Error Checking* drop down list, you will see that there is another option by the name of *Trace Error*. Clicking it will cause Excel to find the cell that holds the underlying formula containing the error.

The third option in the *Error Checking* drop down list is *Circular References*. It carries a continuation menu that tells you the cells addresses of all the cells having circular references in the current worksheet.

Trace Dependents

The Trace Dependents tool traces all the cells that currently are or have been directly or indirectly linked to the underlying formula. When you click the Trace Dependents command once, Excel puts arrows from the selected cell to the direct precedents; that is, the cells that are referred to in the formula in the cell. Clicking this Trace Dependents command again will cause Excel to add a tracer to the arrows that identifies the cells that are referred to in the formulas in the direct precedents.

Evaluating the Formula

The Evaluate Formula tool evaluates each part and item of the selected cell. Select the cell that you want to analyze and click the **Evaluate Formula** command in the Formulas tab. This will open the *Evaluate Formula* dialog box. Here you will see the complete evaluation of the selected cell.

Removing Arrows

If you don't have time or want to rectify the errors and just want to remove the errors from the view, you can do so by clicking the *Remove Arrows* button in the Formulas tab.

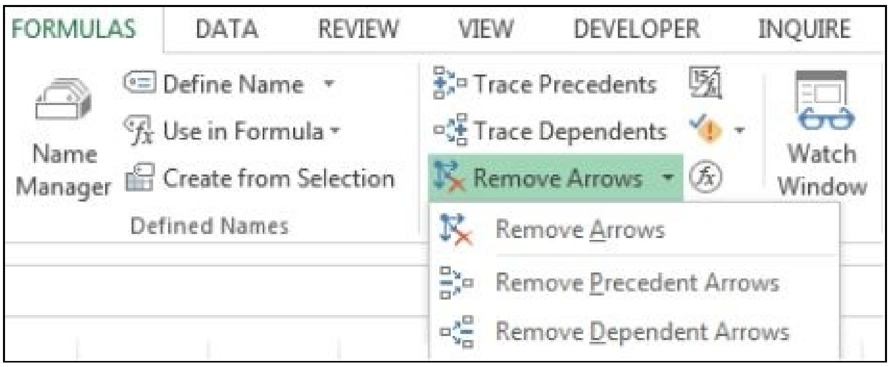


Figure 25.3 - The *Remove Arrows* Commands in Excel

As you can see in Figure 25.3, the *Remove Arrows* command contains a drop down list with three options, briefed as follows:

1. The *Remove Arrows* command removes all the arrows on the current worksheet

2. The *Remove Precedent Arrows* command removes all arrows that were put up after you clicked the *Trace Precedents* button

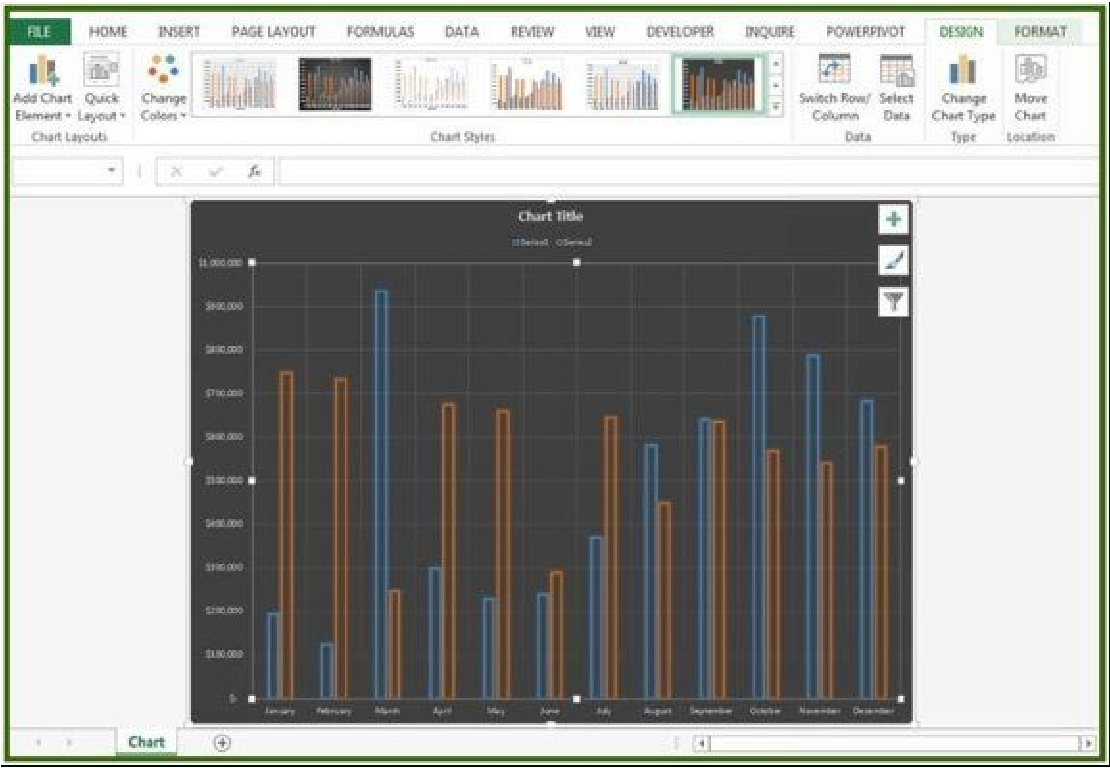
3. The *Remove Dependent Arrows* command removes all the arrows that were put up when you clicked the *Trace Dependents* button.

Window Watching Tool

The *Watch Window* command opens the *Watch Window* dialog box, which shows the current workbook, worksheet, cell address, range name, value in the underlying cell and formula in the cells that are added in the watch list.

If you want to add a cell to the watch list, select the particular cell in the worksheet, click **Watch Window** to open the *Watch Window* dialog box and then click **Add Watch** in it.

PART IV: INTRODUCING CHARTS



Numbers, formulas, calculations and so on…these are normally the words that comes into our mind when we think of "Excel". Excel has a general impression of being a number cruncher but this is not what it is all about. If you think of it this way, then you are not aware of the most colorful and exciting feature of Excel; that is, the charts and graphics.

Excel has the ability to create some advanced graphical and enthralling pictorial representations of the data. The best part is that these charts are linked to the corresponding cells. In other words, the pictorial representations in Excel are live, hence are updated as soon as the input data is changed.

The four chapters in this part of the book talks about the colorful charting and other pictorial features of Excel. You will learn some unique tricks to use Excel's graphical abilities, drawing tools and Sparkline graphics.

AT A GLANCE

Chapter 26: Creating Charts

This chapter discusses the basics of the charting capabilities of Excel. It introduces you to the different chart types and their applications. Moreover, you will learn how to create a chart in Excel, how to resize it and several other chart management techniques.

Understanding the Basics

Starting from the basic definition, a chart is a pictorial representation of numeric values. Also known as graphs, charts have been an integral part of Excel since its early days; needless to say that they have improved and advanced over time.

Excel 2013 offers some of the most advanced and high tech charting capabilities. You can create chart from numeric values within the same worksheet as well as with data from other worksheets. Then you can also change the chart type, size, input values and formatting as many times as you want even after creating a chart.

A chart in Excel can either be embedded in a worksheet or can be displayed in a separate chart sheet. An embedded chart is the one that floats on top; that is, on the drawing layer of the worksheet.

By default, every chart is created as an embedded chart. You can then later on move it to the chart sheet.

> To create a chart directly on a separate chart sheet, select the data and hit **F11**.

An embedded chart can easily be moved to a chart sheet and vice versa. To do so, select the chart, click **Chart Tools** > **Design** > **Location** > **Move Chart**. This will open the *Move Chart* dialog box. Click the **New Sheet** check circle and enter a name for the chart sheet. If you don't want to give any particular name to the chart sheet, you can use the one proposed by Excel in *New Sheet* type text box.

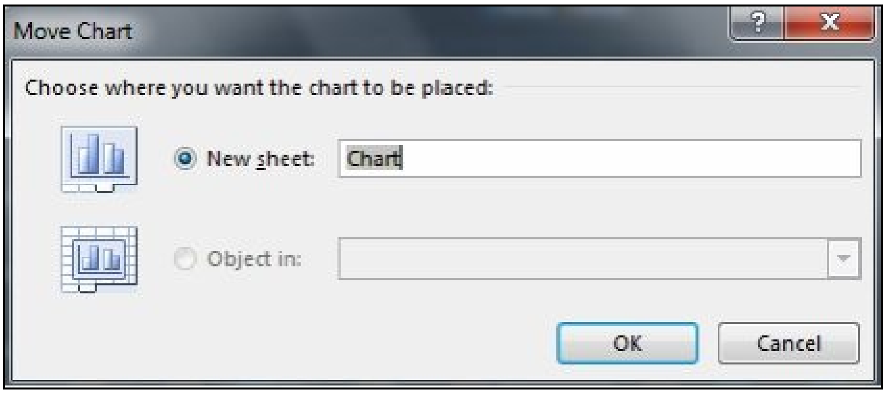


Figure 26.1 - Moving an Embedded Chart to a Chart Sheet

In Figure 26.1, the proposed name is Chart.

Now that you know the basic features of a chart, let's see how you can actually create a chart in Excel.

Selection of Data

The first step in creating a chart is to select the data for the chart. Your selection should contain rows and column headings to serve as labels and series indicators in the chart. You can select a contiguous range or separate rows and columns.

The data range for the chart does not need to be contiguous. If you want to create a chart of data lying in different and nonadjacent rows and columns, press and hold **Ctrl** while you select all the data.

You don't have to select the entire data in every case. If you want to create a chart of all data in a table or a range of cells that is separated from other filled cells, just select any one cell in the table or range and create the chart. Excel 2013 is quite smart and will almost guess the data range for chart accurately. This technique comes in handy when the data for chart is a contiguous range.

While Excel allows you to create a chart using data located in different worksheets, the initial data must be from the same worksheet. You can then later on add more data from different worksheets to the already created chart.

Pick a Chart Type

Once you are done selecting the data, the next step is to select the chart type. To do so, choose the **Insert** tab. There in the *Charts* group, you will the different chart categories. Each category command is a drop down list containing the types of charts available in the particular category. Select the chart type you want to create and it will be displayed on the active worksheet.

If you are unable to choose a chart type, you can let Excel do that for you. In the *Charts* group on the *Insert* tab, you will find the **Recommenced Charts** button. Select the data you want to create the chart of then click the **Recommenced Charts** button. This will open the *Insert Chart* dialog box, as shown in Figure 26.2

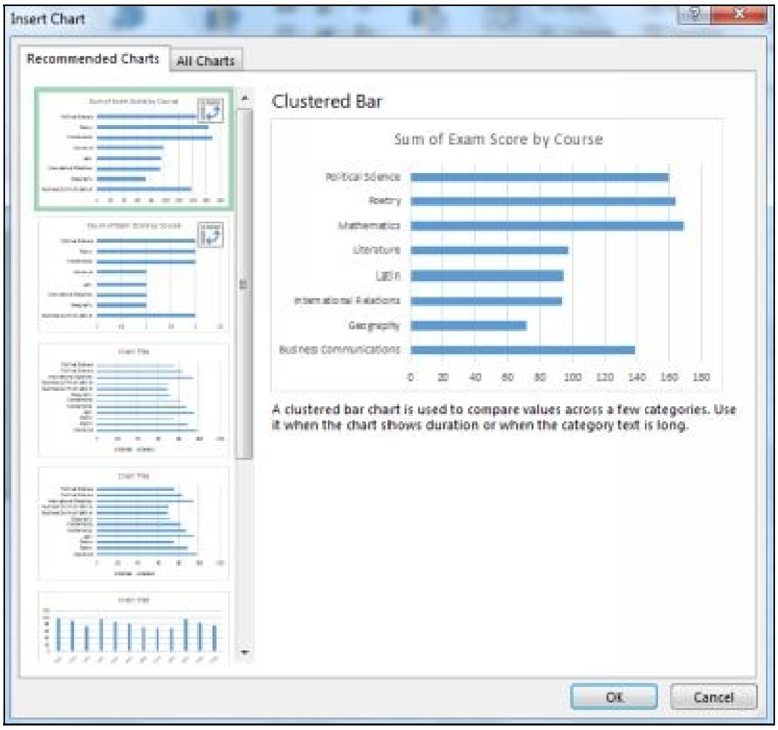


Figure 26.2 - Creating a Chart by Using the Recommended Chart Feature in Excel

The chart at the top is the one highly recommended by Excel. You can also scroll down for other recommendations. If you like any of the recommended charts, select it and then click **OK**.

Play With Different Styles and Layouts

After creating a chart, you may want to try different colors and layouts with the same data to check which graph gives the best and intended pictorial representation.

Well, you don't have to recreate or modify a chart to check different styles. Just select the chart, then click **Design** tab in the *Chart Tools* contextual tabs. There in the *Chart Styles* group, you will see the same chart type in different colors. Just hover your mouse cursor over to any of the style and check its preview in your chart on the worksheet. Don't worry the changes will not be applied just by hovering over the style. If you like any chart style, click it to apply.

Just like styles and colors, you can experiment with different layouts as well. A layout contains supplementary chart elements, such as a title, axes, data labels, and more. You can add or delete the individual elements manually as well, but using a built-in layout saves a lot of time. Even if you don't find the exact layout you want, you can select a one that is closely similar to what you want and then make a few adjustments in it.

To check how a predefined layout would look, select the chart, then click **Design** tab in the *Chart Tools* contextual tabs. There in the *Chart Layouts* group, click the **Quick Layout** button drop down list to explore the different layouts available. Just hover your mouse cursor over to any of the layout and check its preview in your chart on the worksheet.

If you want to manually add or remove any chart elements, click the *Chart Elements* icon represented by a plus sign at the top right of the chart.

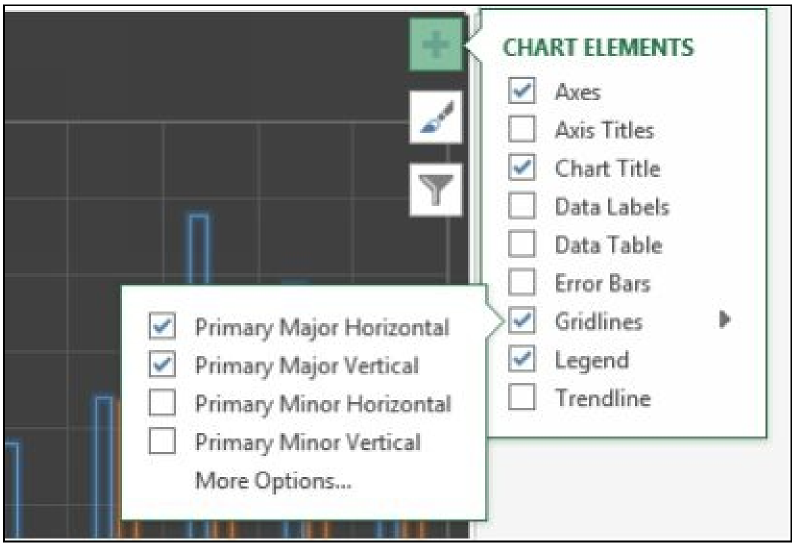


Figure 26.3 - Adding Chart Elements

As shown in Figure 26.3, the Chart Elements option contains a checkbox list of all the elements. Moreover, each item contains a continuation menu containing more options for the particular option. Put a tick mark next to the elements that you want to add to your graph. Uncheck ones that you want to remove.

Exploring the Different Chart Types in Excel

If you don't like any of the charts recommended by Excel, you can select from the ones located in the *Charts* group on the *Insert* tab. Following is a brief description of the all charts categories in Excel.

> Each category contains several types of charts. While this section talks about the general category only, you can experiment any chart by hovering your mouse cursor over it. Doing so will also reveal a ScreenTip for the particular chart.

Column Charts

The most commonly used chart type is the column chart. It portrays each data point in the form of a vertical column. The height of the column corresponds to and signifies the size of the value.

In column charts, the value scale is plotted on the vertical axis. You can entail any large or small data series. The corresponding values from each series are stacked on top of each other. Normally, each column and data series is shown in a different color, which you can change in the *Chart Styles* group in the *Design* tab.

Column charts are of many types. It could be 2-D, 3-D, cone, cylindrical and much more. Click the **Column** command in the *Insert* tab on the Ribbon to explore the different column charts.

Bar Chart

A bar chart is nothing but a 90-degrees clockwise rotated version of a column chart. However, it holds one distinct advantage over a column chart. A bar chart can accommodate lengthier category labels, hence make them more readable.

If your data range consists of lengthy labels and headings, then it is recommended to go for bar chart as it would be difficult to adjust the labels in the column chart.

Figure 26.4 shows different type of column and bar charts plotted using the same set of data.

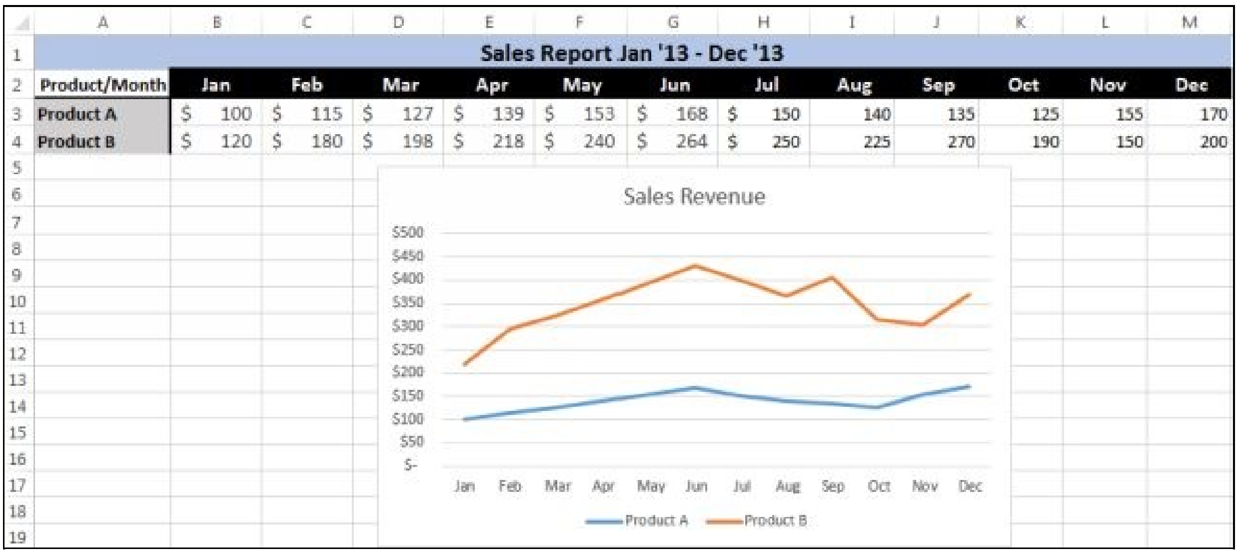
Figure 26.4 - Showing Two Different Types of Column and Bar Chart

Line Charts

Line Charts are normally used to plot continuous data and to identify trends. The category axis in a line chart normally displays equal intervals.

Figure 26.5 shows an example of line chart.

In the example shown in Figure 26.5, the annual sales data of two products is plotted on a line chart. From the shape of the line, the sales trend, fluctuations, peak and lowest points on sales can easily be identified.



Product/Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Product A	$ 100	$ 115	$ 127	$ 139	$ 153	$ 168	$ 150	140	135	125	155	170
Product B	$ 120	$ 180	$ 198	$ 218	$ 240	$ 264	$ 250	225	270	190	150	200

Figure 26.5 - Creating Line Chart to Analyze the Sales Trend over the Year

You can add any number of data series in a line chart and the lines can be distinguished by using different colors. For example, you can plot the annual sales trend of different products on the same line graph, and then use different colors to differentiate the sales trend of each product, just like it is shown in Figure 26.5.

You can also add squares, triangles or any other markers to differentiate the lines from each other. The markers come in very handy when you need to print a non-color version of the chart. In such cases, since that chart is printed in grayscale, markers are the only way to distinguish between different lines.

Area Charts

Area charts are quite similar to line charts but with one major difference; that is, the area below the line is filled. The colorful area makes it easier to evaluate the size of values. The data series with smaller values are plotted in the back of the chart.

Figure 26.6 shows an example of an area chart.

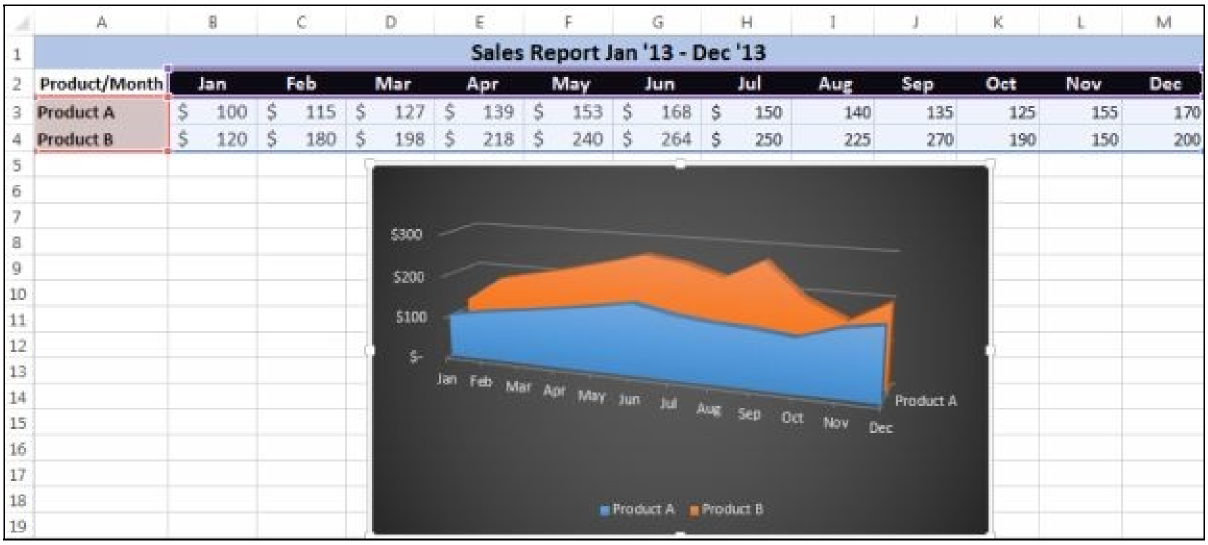


Figure 26.6 - Creating an Area Chart to Analyze the Sales Trend over the Year

Surface Charts

Surface charts are used to display multiple data series on a surface.

> You cannot create a surface chart with one data series. It must contain at least two data series, or else Excel displays an error.

Following are a few distinct features of surface charts:

- Unlike line chart that uses colors to distinguish data series, a surface chart uses colors to differentiate values and not series.

- The number of colors used depends upon the major unit scale setting for the value axis.
- Each color pertains to one major unit.
- You cannot plot 3-D data points on a surface chart. The series axis for a surface chart is not a value axis, it is a category axis. In other words, if your data contains three coordinates (x, y and z), you cannot plot it accurately unless the first two coordinates are equally spaced.

Radar Charts

A radar chart is a special type of chart that has a separate axis for each category. One another very distinct feature that makes the Radar charts stand apart from other charts in Excel is that the axes in it stretches outward from the middle of the chart with each data point plotted on the corresponding axis.

Figure 26.7 illustrates an example of a radar chart.

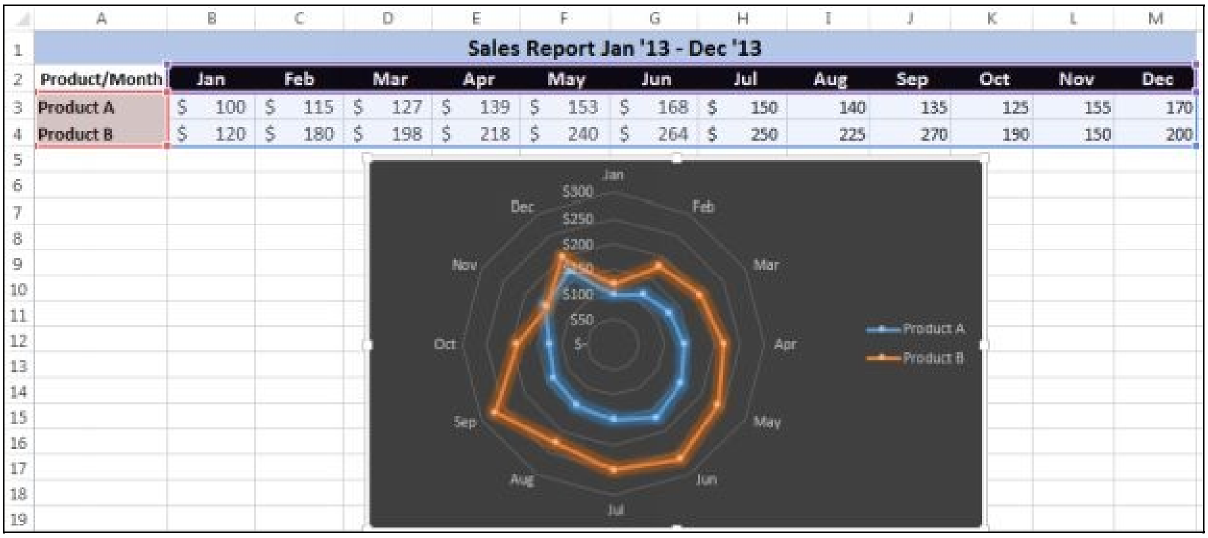


Figure 26.7 - Example of a Radar Chart

Pie Charts

Pie charts are normally used to show relative proportions to a whole. For example, you can create a pie chart to show the contribution of each product in the total revenue, or the proportion of each course in the total credit hours for the academic degree and so on.

Pie charts are useful when created with a small number of data points, preferably five to six points. A pie chart with too many data points and values becomes very cramped and difficult to read.

> Use pie charts only when the values in your data are all positive integers. Pie charts do not recognize negative values, and if you add one, it will be automatically converted to a positive value.

The most distinct and popular feature of a pie chart is its ability to explode. You can separate one or more slices of a pie chart to emphasize the particular data series. And it is very simple! All you have to do it select the chart, click over any pie slice to active the entire pie, the click the slice that you want to emphasize and drag it outwards from the center.

Figure 26.8 shows an example of such a pie chart.

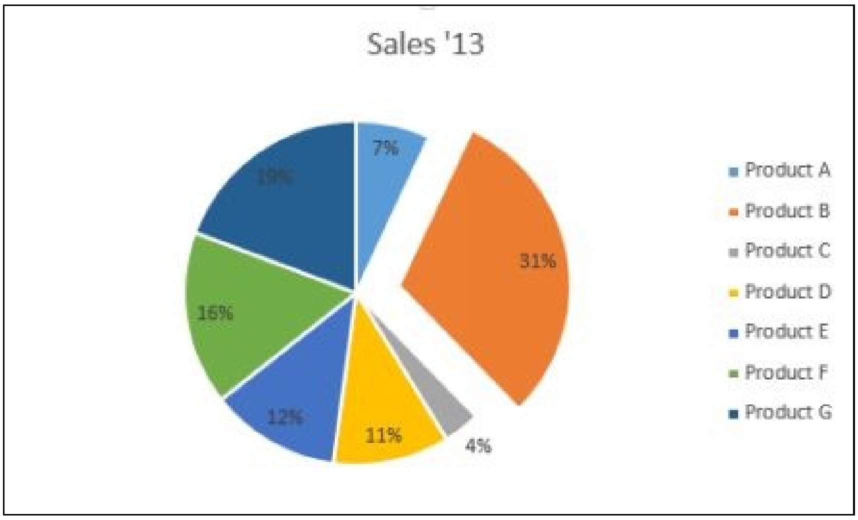
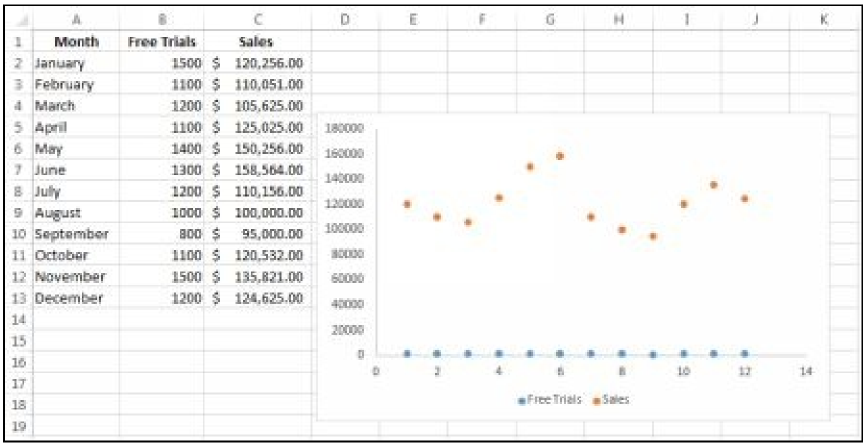


Figure 26.8 - Pie Chart with an Exploded Slice to Emphasize the Sales of Product B

Scatter Charts

Scatter charts (also known as XY chart, scattergrams and scatter plots) have no category axis. They are normally used to display relationship between two variables.

Figure 26.9 shows an example of a scatter chart.



Month	Free Trials	Sales
January	1500	$ 120,256.00
February	1100	$ 110,051.00
March	1200	$ 105,625.00
April	1100	$ 125,025.00
May	1400	$ 150,256.00
June	1300	$ 158,564.00
July	1200	$ 110,156.00
August	1000	$ 100,000.00
September	800	$ 95,000.00
October	1100	$ 120,532.00
November	1500	$ 135,821.00
December	1200	$ 124,625.00

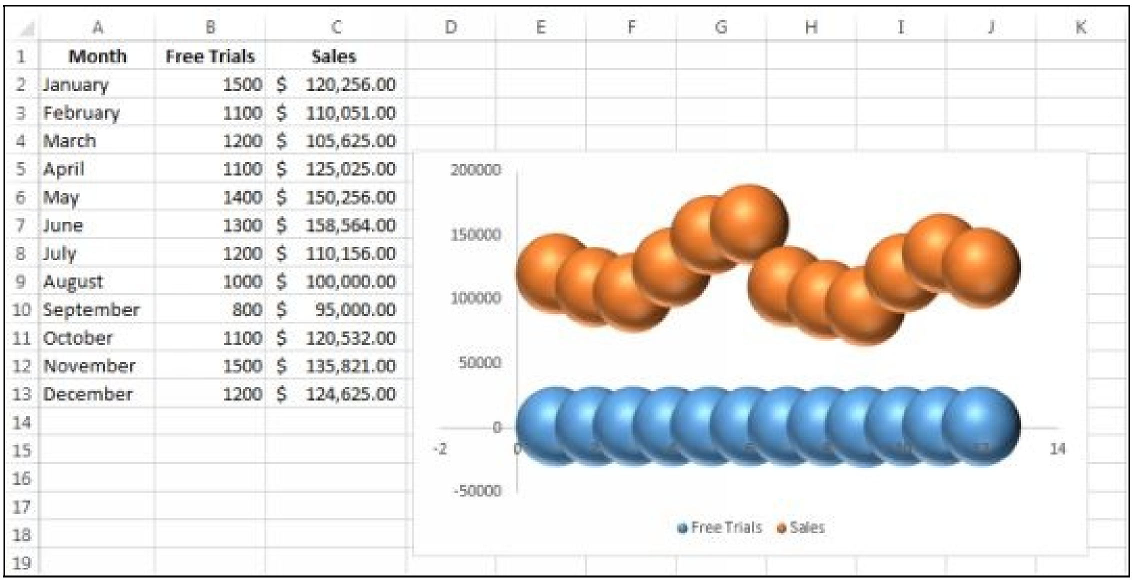
Figure 26.9 - Showing the Relationship between Two Elements Using a Scatter Chart

In the example illustrated in Figure 26.9, the scatter chart shows the relationship between free trials of a product and sales. It indicates the effect of giving free giveaways on the sales of the particular over the year.

Bubbles Charts

A bubble chart is quite similar to a scatter chart but with one major difference; that is, a bubble chart allows you to add an additional data series that is shown by the size of the bubbles.

Figure 26.10 shows an example of a bubble chart. The same set of data that was used to create a scatter chart is taken in the below image to create a bubble chart.



Month	Free Trials	Sales
January	1500	$ 120,256.00
February	1100	$ 110,051.00
March	1200	$ 105,625.00
April	1100	$ 125,025.00
May	1400	$ 150,256.00
June	1300	$ 158,564.00
July	1200	$ 110,156.00
August	1000	$ 100,000.00
September	800	$ 95,000.00
October	1100	$ 120,532.00
November	1500	$ 135,821.00
December	1200	$ 124,625.00

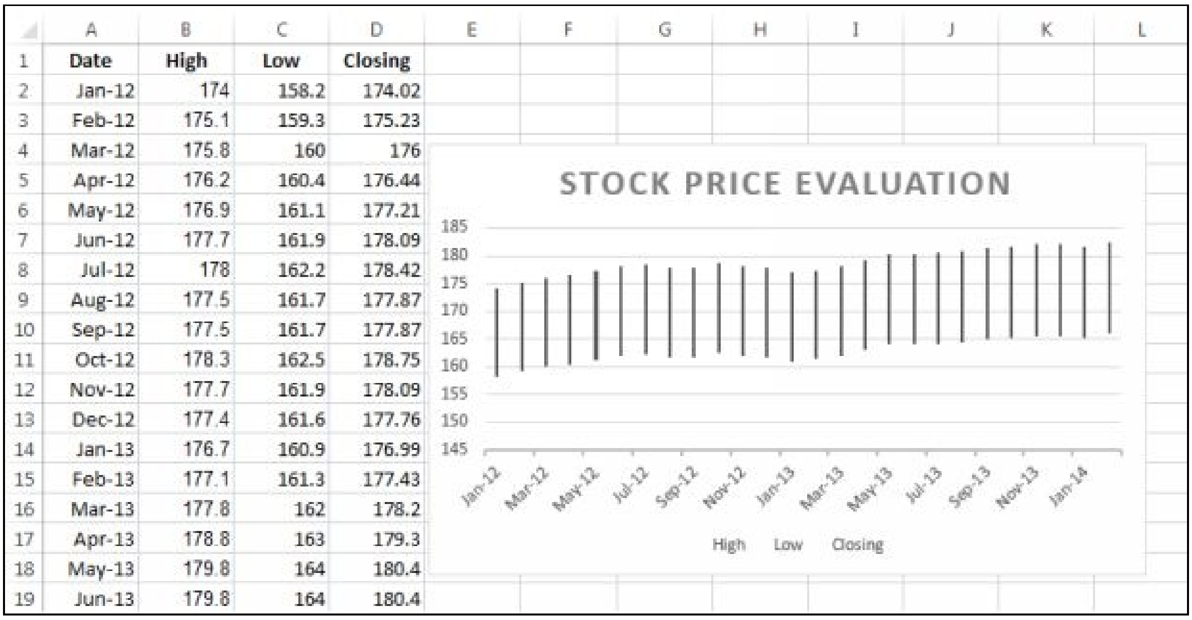
Figure 26.10 - Example of a Bubble Chart in Excel 2013

Stock Charts

Stock charts, as the name suggests, are mostly used to display data related to stock market. For example, market index, NASDAQ performance, technical analysis of a company's stock price and so on.

There are several subtypes of stock charts. Depending upon the subtype, a stock chart can contain three to five data series.

Figure 26.11 shows an example of a stock chart.



Date	High	Low	Closing
Jan-12	174	158.2	174.02
Feb-12	175.1	159.3	175.23
Mar-12	175.8	160	176
Apr-12	176.2	160.4	176.44
May-12	176.9	161.1	177.21
Jun-12	177.7	161.9	178.09
Jul-12	178	162.2	178.42
Aug-12	177.5	161.7	177.87
Sep-12	177.5	161.7	177.87
Oct-12	178.3	162.5	178.75
Nov-12	177.7	161.9	178.09
Dec-12	177.4	161.6	177.76
Jan-13	176.7	160.9	176.99
Feb-13	177.1	161.3	177.43
Mar-13	177.8	162	178.2
Apr-13	178.8	163	179.3
May-13	179.8	164	180.4
Jun-13	179.8	164	180.4

Figure 26.11 - Example OF A Stock Chart

Adjusting the Chart Size

> By default, every chart in Excel is an embedded chart unless created on or moved to a chart sheet. So every time the term chart in used in this book, it refers to an embedded chart.

To resize a chart, click the outer edge or corner of the chart. You will see that square handles appears on the corners of the chart and then within a second, the mouse pointer will turn into a double arrow. Click the double arrow and drag it inwards or outwards to achieve the desired size.

You can also resize a chart by selecting **Format** in the *Chart Tools* contextual tabs. There in the *Size* group you will find two controls; one to adjust the height and other to adjust the width of the selected chart.

Moving a Chart

To move a chart from one place to another on a worksheet, simply click the chart, place the cursor on any of the chart's border and then drag it to the desired location.

You can also use the traditional cut and paste technique to move a chart. Select the chart you want to move, right click and select **Cut** (or hit **Ctrl + X**). Then select the cell near the new desired location, right click and select **Paste** (or hit **Ctrl + V**).

> You can a move a chart to a different location in the same worksheet or to a new worksheet. In case of the latter, the chart will still be linked to the original values.

Removing a Chart

To get rid of an embedded chart, click the particular chart and hit **Delete** on your keyboard. To delete multiple charts at the same time, press and hold **Ctrl** on your keyboard and then click all the charts that you want to get rid of. Hit **Delete** on your keyboard

To delete a chart sheet, right click the corresponding sheet tab and select **Delete**. To delete multiple chart sheets at the same time, press and hold **Ctrl** on your keyboard while you click all the chart sheets that you want to get rid of. Then right click and select **Delete**.

Chapter 27: Advanced Charting Techniques

Select your data, choose a chart type and that's all it is required to create a graph in Excel. However, at times a simple default chart won't be just enough. You may need to customize a chart to make it more effective.

Customizing a chart in Excel includes changing the colors, appearance, background, legends, titles and much more. You may not get your desired layout and chart style built in Excel every time. You may have to modify, add and remove some chart elements to make your chart perfect.

This previous chapter talked about basic charting techniques in Excel. This chapter extends charting to a more advanced level. Here you will discover how to modify your chart to make it look exactly the way you want. You will also learn some handy tricks on adding titles and legends, working with data series, charting elements and much more.

Choosing the Chart Elements

Just like every operation you do in Excel, the first step in modifying a chart is to select the chart element that you want to modify and then apply the required command.

> You can modify as many elements as you want but one at a time. You cannot customize multiple elements at a time. For example, if you want to change the font of two legends or axes titles, you must select and modify one title at a time.

There are three ways of selecting a chart element; mouse, keyboard and chart element controls. Let's discuss each one by one.

The simplest way to select a chart element is by clicking it using your mouse. The selected chart element displays small circles at the corners.

At times you may get confused as to whether you selected the right element. This mostly happens when the chart is cramped with lots of elements in it.

To check it you made right selection, select **Format** in the *Chart Tools* contextual tabs. There in the *Current Selection* group you will find the name of the selected element, as shown in Figure 27.1

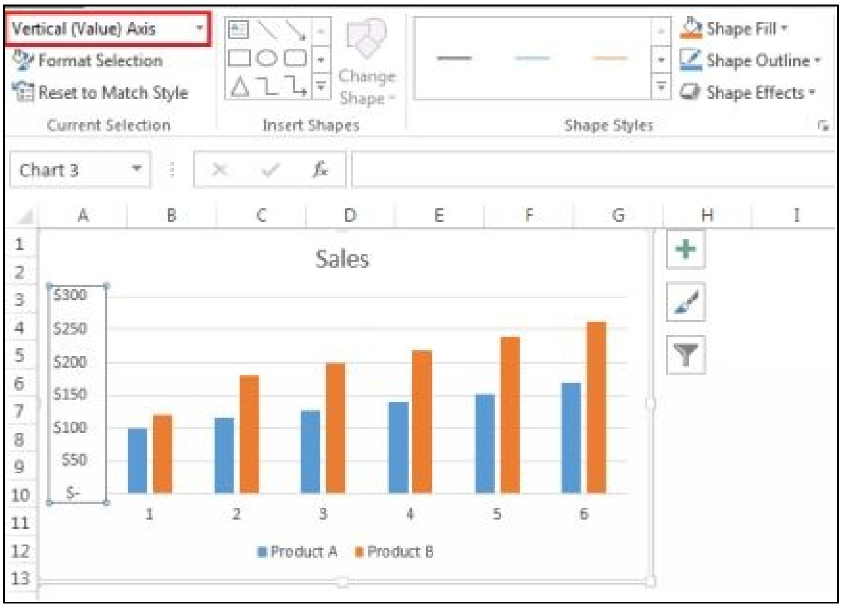


Figure 27.1 - Showing the Name of the Selected Element in the Format Tab

In Figure 27.1, the numerical values located on the vertical axis are selected. In the Current Selection group, it says "Vertical (Value) Axis".

Some chart elements are too minute or tricky to be selected with a mouse. Don't worry! There are other ways of selection too.

If you are unable to select the required element with a mouse, try it with a keyboard. Just select the chart to make it active then use the arrow keys to cycle through the chart elements.

Remember the following points while selecting chart elements with a keyboard:

- To select individual items within a chart series, first select the entire series and then use left and right arrows on the keyboard.
- To select specific elements within a legend, first select the entire legend and then cycle through the elements using the left and right arrow keys.
- To select a particular data label, first select the entire set of data labels and then use left and right arrows on the keyboard to move to the appropriate data label.

If you are unable to select the right element with a mouse or keyboard, then select it manually in the *Chart Selection* group. To do so, select **Format** in the *Chart Tools* contextual tabs. There in the *Current Selection* group you will find a drop down list containing names of the elements in the selected chart.

	If you need to do a lot of work with charts, it is recommended to add

the *Chart Elements* drop down list to the Quick Access toolbar. Just right click the mentioned drop down list and click **Add to Quick Access Toolbar**.

Working with Chart Element

Now that you know how to select the required element, let's see how you can actually modify it. There are several ways of customizing the selected chart element, explained as follows.

Ribbon Commands

The Ribbon contains some commonly used chart formatting commands. For example, to change the color of the chart (bars, lines, pie slices and so on), select the chart then select **Chart Tools** > **Format** > *Shape Styles* group.

Not all the chart formatting commands can be found in the *Chart Tools* contextual tabs. For example, to change the font of the title or legend, select the text then change the font through the Font type and size commands in the Home tab on the Ribbon.

Format Task Pane

If you are unable to find the required formatting option in the Ribbon, look for it the Format task pane. It contains a lot of other chart customization tools.

You can access the Format task pane by using any of the following methods:

1. Right click the chart element that you want to modify, then select Format *nnn* (*nnn* is the name of the selection).
2. Double click the chart element.
3. Select the chart element that you want to modify, then select **Chart Tools** > **Format**. There in the *Current Selection* group, click **Format Selection.**

For keyboard users, select the chart element and press **Ctrl + 1** on your keyboard.

Using Mini Toolbar to Modify the Chart Elements

The Mini Toolbar also contains a few chart formatting tools. It appears when you right click an element in a chart, as shown in Figure 27.2

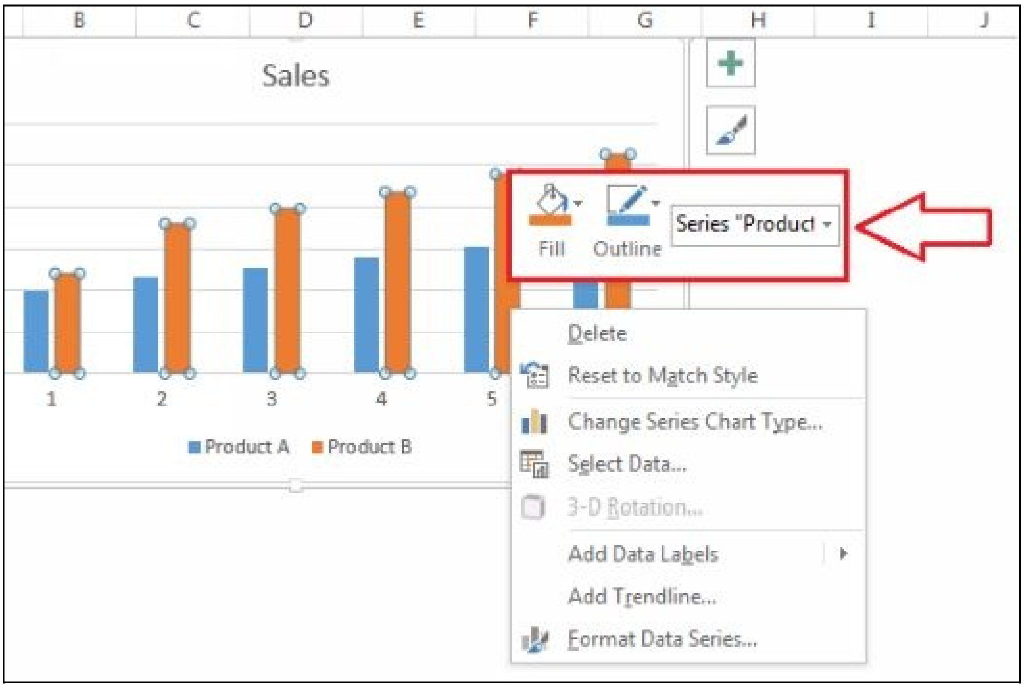


Figure 27.2 - Showing the Chart Element Mini Toolbar

Formatting the Plot Area

At times, you may want to format or beautify the plot area as well. The *Plot Area* is the area that actually contains the chart and the chart series.

Following are a few tips to format the plot area,

- To move the Plot Area, select the border of the chart and drag it to the desired location.
- To resize the Plot Area, click any of the corner handles and drag it inwards or outwards to the desired size.
- To make the Plot Area transparent, set the *Shape Fill* property to *No Fill*. This will then make the color in the chart area show through.

In some cases, the size of the plot area adjusts automatically in response to the other changes. For example, adding a legend or an additional title to a chart automatically increases the plot area.

Naming Charts

A chart is incomplete without titles. It is very difficult to read and analyze a chart unless you know which axis represents what. This section talks about different types of titles that you can add to your chart.

Inserting a Chart Title

A chart can have several titles, such as the Chart title, Category axis title, Secondary category axis title, Value axis title and Depth axis title.

How many and which titles you should use depends upon the type of your chart. For example, a pie chart can only contain a chart title. You cannot add any axis titles as the pie chart itself does not have any axes. Likewise, the Depth axis title is only compatible with 3-D charts.

To add a chart title, first select the chart, click the *Chart Elements* button (a plus sign located to the right of the chart) and then put a tick mark next to *Chart Title*.

If you want to change the location of the Chart title in the plot area, simply move the mouse cursor over to the Chart Title item and select the arrow, then specify the desired location. For advanced settings related to Chart titles, click **More Options**. This will open the *Format Chart Title* task pane

The same procedure applies to all other types of titles. Just remember one thing: You cannot resize the box containing the title. The only way to increase or decrease the size of a title is by changing its font size.

You can link the chart title or axis title to a cell. Suppose, cell A1 contains the text value “January”. If you link the axis title or chart title to cell A1, the corresponding text will appear in the title’s location in the Plot Area. Every time you change the text value in cell A1, the same will be updated in the linked title.

To link a title to a cell, select the title, type an equal sign (=), then select the cell reference and hit **Enter**.

Adding Legends

A *Legend* contains text and some other keys that indicate the data series in a chart. A *Key* refers to a small graphical object that pertains to chart's series, one key for each series.

Adding a legend to a chart is quite simple. First, select the chart to activate it, then click the *Chart Elements* button (a plus sign located to the right of the chart) and enable the *Legend* item.

If you want to specify a position for the legend, click the small arrow located right next to the Legend item then select the desired location. You can also move a legend manually within the Plot area. To do so, simply click and drag it to wherever you like.

To get rid of a legend, just click it and hit **Delete** on your keyboard.

Just like you can customize the chart elements, you can modify the legend elements as well. For example, you can bold or underline the text in a legend to emphasize a particular data series.

If you did not add legends at the time of creating the chart, by default Excel displays Series 1, Series 2, and so on as legends. To rename the default series name, select the **Design** tab in the *Chart Tools* Contextual tabs. There in the *Data* group, you will find a command named **Select Data**. Click this command to open the *Select Data Source* dialog box, as shown in Figure

Select the series you want to rename and click the **Edit** button. This will open the *Edit Series* dialog box. Enter the desired name and click **OK**. Repeat the same to rename other series.

Working with Axes

The number of axes depends upon the type of chart you use. For example, pie charts have no axes. All other 2-D charts have two axes but you can add one more, that is the secondary value axis. Likewise, all 3-D charts have three axes.

You can manage the axes in your charts through the *Format Axis* Task pane.

To modify the value axis, right click the axis and select **Format Axis** from the shortcut menu. This will open the *Format Axis* task pane, as shown in Figure 27.3

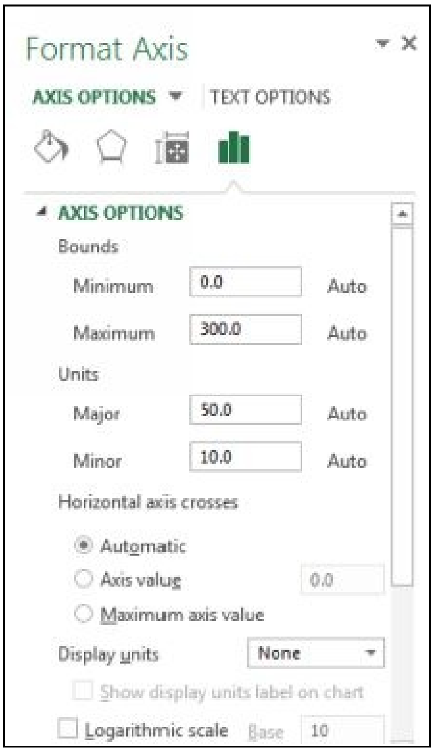


Figure 27.3 - Showing the *Format Axis* Task Pane

The Bounds section located at the top of the task pane indicates the minimum and maximum values for the axis. Based on the lowest and highest numerical value in your data, Excel determines the minimum and maximum value automatically. However, you can also specify any other values. Likewise, the Major and Minor units are also set by default but you can of course change them.

Once you change any of the default values, the *Auto* icon located right next to the value changes to "*Reset*". Clicking it resets the default Excel settings pertaining to the corresponding command.

Another very interesting option in the *Format Axis* Task pane is the "*Values in Reverse Order*". It reverses the scale's direction. For example, if it is a column chart, then activating the "*Values in Reverse Order*" option would put the columns upside down.

If you are creating several charts using the same nature of data, it is highly recommended to keep the Minimum and Maximum Bounds values same for the all charts. Suppose you have created five column charts to evaluate the monthly sales of five products; one chart for one product. Keeping the Bounds values same would help you make effective comparison among the products.

Understanding the Data Series

Every chart is made up of one or more data series. It is the data series that translates itself in the form a chart's bar, column, pie, bubbles and so on.

Suppose you are working on a column chart that displays the sales revenue generated every month. Now rather than creating a new chart every month, don't you think it would be better and more effective if you just add the monthly data to the already created column chart. This will also make the monthly comparison easier.

This section talks about all such operations. You will learn to add, modify, delete and do much more to your data series.

Managing the Data Series

Following are a few techniques for managing your data series.

- To delete any data series and its corresponding representation in the chart, simply select the referenced data and hit **Delete** on your keyboard.

- To modify the values in a data series, first select the chart element representing it. This will automatically select the corresponding data on the worksheet. Now drag the range to include more data points.

- Another way to edit data series is via the *Edit Series* dialog box. Here is what you need to do. First, right click the data series in the chart and then click **Select Data** from the shortcut menu. This will open the *Select Source Data* dialog box, as shown in Figure 27.4. Select the series that you want to modify and then click the **Edit** button located over the *Series* section. This will then open *Edit Series* dialog box. Select the new series and click **OK**.

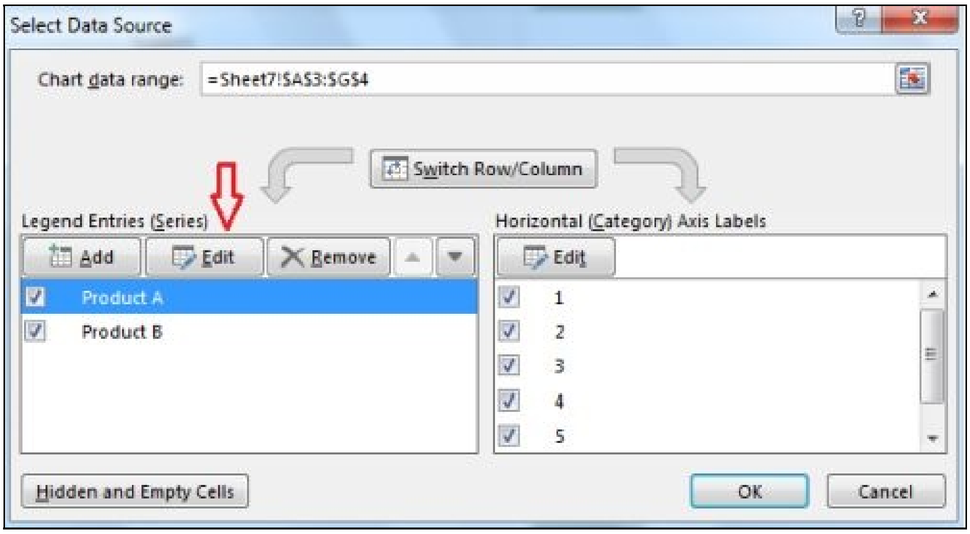


Figure 27.4 - Editing the Data Series via the *Select Source Data* Dialog Box

Adding New Series

At times you may want to add an entire new data series to a chart rather than just modifying the existing one. One way is to recreate the chart with new data series.

However this approach may take up a lot of time if the chart is perfectly created and formatted and you just need to add one or more series.

In such cases, it is highly recommended that you follow any of the following methods to add the new data series to the already created and formatted chart.

- If the new data series is attached to the one already used in the chart, you can drag it to include the new data points in it. This method works for embedded charts only.
- To add a non-contiguous data series, select the chart to activate it, then select the **Design** tab in the *Chart Tools* contextual tabs. There in the *Data* group, click the **Select Data** command. This will open the *Select Source Data* dialog box. Click the **Add** button located over the *Series* section. This will then open *Edit Series* dialog box. Specify the new series and click **OK**.
- You can add new data series by the typical *Copy and Paste* method. Select the data that you want to add, hit **Ctrl + C** on your keyboard to copy, then click the chart to activate it and hit **Ctrl + V** to paste the data into the chart.

> If a chart is initially created from a table, any data you add in the table is automatically added to the corresponding chart. Therefore, it is recommended to format the particular range of cells as table and then create a chart from it.

How to Insert Trendline

A *trendline* highlights the general trends in the data. It is mostly needed in case time based charts. Trendline is also often used to forecast the future of any data.

Here is how you can display a trendline in your chart:

1. Select the data series.
2. Click the *Chart Elements* icon represented by a plus sign at the top right of the chart.
3. Put a tick mark next to *Trendline*.

There are several types of trendlines that you can enter. To specify your preferred type, click the arrow to the right of the *Trendline* item. This will open the continuation menu containing the types of trendlines provided by Excel. Select the one you want to add to the chart.

Figure 27.5 - Showing a Trendline in a Column Chart

Figure 27.5 shows a trendline in a column chart. For more formatting and other options regarding trendlines, open the *Format Trendline* task pane. You can access the *Format Trendline* task pane by double clicking the trendline or by right clicking and selecting **Format Trendline**.

How to Insert Error Bars

When you are plotting a data that contains negative and positive values, you may want to add *Error Bars* to indicate the nature of the data points. Error bars are not compatible with all chart types. These can be used in area, column, bar, line and scatter charts only.

Error bars display the positive and negative nature of the values which in turn indicates the uncertainty in data.

Here is how you can display Error Bars in your chart:

1. Select the data series.
2. Click the *Chart Elements* icon represented by a plus sign at the top right of the chart.
3. Put a tick mark next to *Error Bars*.

There are several types of error bars that you can put in your chart. To specify your preferred type, click the arrow to the right of the *Error Bars* item. This will open the continuation menu containing the types of error bars provided by Excel. Select the one you want to add to your chart.

Following is a brief explanation of the types of error bars:

Standard Error: This type of error bars represents one standard error unit, where the standard error of the data series is automatically calculated by Excel.

Percentage: These errors represent the percent value of each data point.

Standard Deviation: This type of error bars represents the standard deviation of the specified units.

Custom: As the name suggests, this option allows you to specify units for the upper and lower error bars. You can enter the value manually or specify the range of cells containing the error values.

For more formatting and other options regarding Error Bars, open the *Format Error Bars* task pane. You can access the *Format Error Bars* task pane by double clicking the error bars in the chart or by right clicking and selecting **Format Error Bars**.

Chapter 28: Working With Sparkline Graphics

Sparkline is yet another very exciting and highly popular feature of Excel. It is a miniature chart contained within a single cell. A single sparkline represents one series of data only.

Sparkline allow quick analysis of time-based and fluctuating data. These miniature charts are ideal when you have less space on the worksheet and need to display individual data series.

This chapter talks in detail about the Sparklines features in Excel. You will discover the different types of Sparklines, how to create one and most interestingly, how to customize your Sparklines.

Exploring the Types of Sparklines

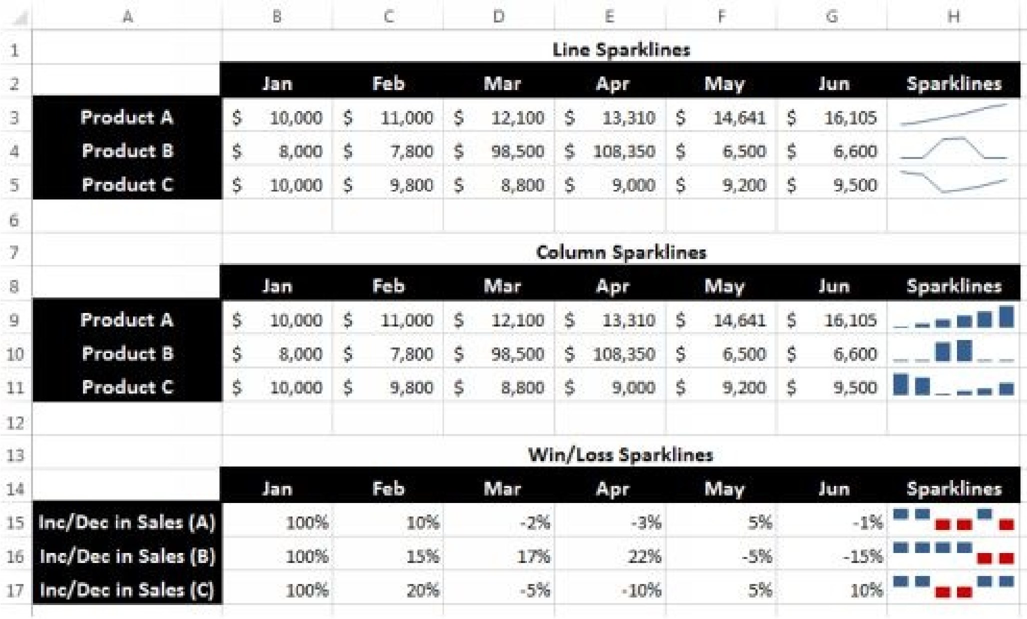
There are three types of Sparklines that you can create in Excel; namely, Line, Column and Win/Loss. Following is a brief explanation of each.

Line Sparklines: As the name suggests, a line sparkline is quite similar to a line chart. It represents a single data series with a marker for each data point. The provision to add markers is optional.

Column Sparklines: A column sparkline is similar to a column chart, except that it can display a single series of data only.

Win/Loss Sparklines: A Win/Loss sparkline represents the negative and positive values in the data. It contains blocks of two colors, one representing negative numbers and the other showing positive values. The Win/Loss sparklines ignore zero values.

Figure 28.1 shows a worksheet containing all three types of sparklines.



	A	B	C	D	E	F	G	H
1				Line Sparklines				
2		Jan	Feb	Mar	Apr	May	Jun	Sparklines
3	Product A	$ 10,000	$ 11,000	$ 12,100	$ 13,310	$ 14,641	$ 16,105	
4	Product B	$ 8,000	$ 7,800	$ 98,500	$ 108,350	$ 6,500	$ 6,600	
5	Product C	$ 10,000	$ 9,800	$ 8,800	$ 9,000	$ 9,200	$ 9,500	
6								
7				Column Sparklines				
8		Jan	Feb	Mar	Apr	May	Jun	Sparklines
9	Product A	$ 10,000	$ 11,000	$ 12,100	$ 13,310	$ 14,641	$ 16,105	
10	Product B	$ 8,000	$ 7,800	$ 98,500	$ 108,350	$ 6,500	$ 6,600	
11	Product C	$ 10,000	$ 9,800	$ 8,800	$ 9,000	$ 9,200	$ 9,500	
12								
13				Win/Loss Sparklines				
14		Jan	Feb	Mar	Apr	May	Jun	Sparklines
15	Inc/Dec in Sales (A)	100%	10%	-2%	-3%	5%	-1%	
16	Inc/Dec in Sales (B)	100%	15%	17%	22%	-5%	-15%	
17	Inc/Dec in Sales (C)	100%	20%	-5%	-10%	5%	10%	

Figure 28. 1 - Showing the Three Types of Sparklines

As you can see in the above image, the line and column sparklines represents the sales trend of the three products over the period of 6 months. One can easily identify from the sparklines that Product A has a consistent sales growth rate, Product B is comparatively a riskier product and has fluctuating sales trend. Likewise, Product C secured the lowest sales in March.

In the Win/Loss sparklines, there are red and blue blocks. The red blocks signify that the current month's sale is lower than the base month (which is January in this example). Likewise, the blue block in the sparkline indicates a positive growth in current month.

How to Create Sparklines

Now that you have an understanding of the different types of sparklines, here is how you can create sparklines in Excel.

1. Select the cell in which you want to create a sparkline
2. Choose the **Insert** tab
3. There in the *Sparklines* group, you will find three commands, one for each type of sparkline. Click the one you want to create. In either case, the *Create Sparklines* dialog box will open up, as shown in Figure 28.2

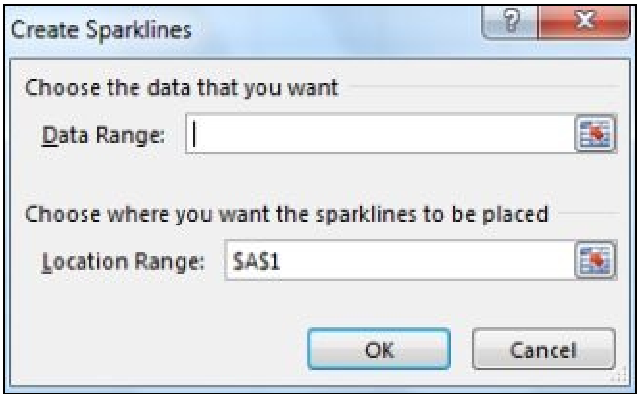


Figure 28.2 - The *Create Sparklines* Dialog Box

4. In the *Data Range* field, enter the range address of the data series or select it on the worksheet. The *Location Range* field contains the address of the cell that you selected in the first step. If you want to specify any other location for the sparkline, type or point it in the *Location Range* field.

How to Create Customized Sparklines

Just like charts, you can tailor sparklines to make them exactly the way you want. Customizing sparklines include changing colors, formatting, managing markers and much more.

When you select cell(s) containing sparkline(s), a new tab is added to the Ribbon. The new tab, namely *Design*, contains all the sparkline related options.

Making the Sparklines Colorful

To change the color of your sparklines, select the cells containing it and then click the **Design** tab. There in the *Style* group, you will find several color options.   If you don't like any style from the ones already provided by Excel, click **Sparkline Color** to open the color palette and select your own color for the selected sparkline.

The *Sparkline Color* palette also contains the *Weight* option, which allows you to increase or decrease the thickness of your sparkline.

Figure 28.3 shows the commands in the Design tab.

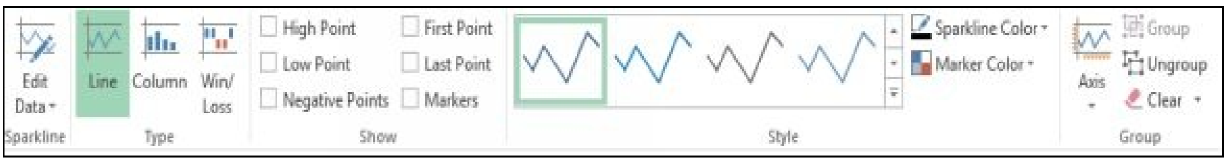


Figure 28.3 - The *Design* Tab Containing Sparkline Customization Options

As you can see in the above image, the *Style* group contains another command by the name of **Marker Color**. It allows you to specify a different color for each marker in your sparklines. For example, you can specify a different color for markers representing negative values, then a different one for those indicating high data points and so on.

Highlighting Data Points

The *Show* group in the **Design** tab contains checkboxes for data points. You can toggle the markers and other given options. For example, putting a tick mark in the *Low Point* checkbox will place a market at the lowest data point in the selected sparkline.

By default, the Line sparklines do now show negative data points. However, if you activate the **Negative Points** checkbox in the *Show* group, Excel will put a marker in the line sparkline to indicate the negative values. You can change the color of this marker by selecting the **Negative Points** command in the **Marker Color** drop down list in the *Style* group.

Displaying Axes

By default, the sparklines does not display any axes. However if you want, you can add horizontal axis.

To display a horizontal axis in your sparklines, select the cell containing the particular sparklines, then select **Design** tab > *Group* group > **Axis** > **Show Axis**.

Deleting Sparkline

Sparklines cannot be removed via normal deleting procedures. It won't go away just by hitting Delete or Backspace on your keyboard. To delete a sparkline, select the cell(s) containing sparkline(s), then select **Design** tab > *Group* group > **Clear**, as shown in Figure 28.4

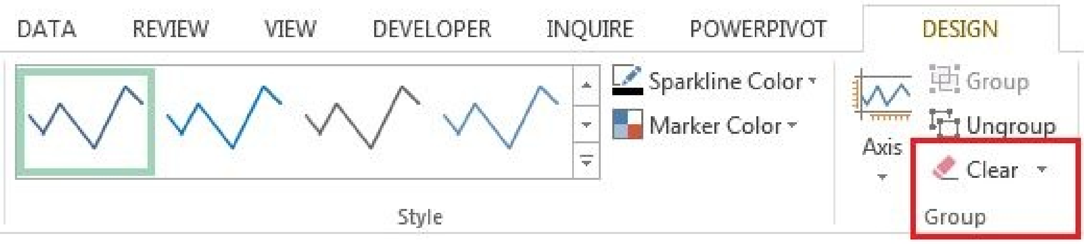


Figure 28.4 - Deleting a Sparkline

Chapter 29: Beautifying Your Work with Pictures and Graphics

When talking about graphics and pictorial representation, Excel offers a lot more than just charts and sparklines. There is a wide and diverse variety of graphical objects that you can insert on your worksheets.

This chapter talks about all such colorful tools. It introduces you to the non-chart artistic side of Excel. Here you will learn to use the wide variety of shapes, interactive SmartArt, picturesque WordArt and much more. This chapter also contains a high tech exclusive trick on saving your graphical items.

Working with Shapes

Shapes constitute a very integral part of Microsoft Office apps. Whether it is Word, Excel or any other software of MS Office any, shapes are one of the most commonly used tools.

Excel contains a variety of shapes including several kinds of circles, rectangles, arrows, flowchart shapes and much more. This section discloses some handy tricks on using shapes in Excel.

> Shapes are inserted for many purposes, the most common one being to draw attention to certain cells. If you are using them for the same intent, make sure not to overcrowd your worksheet with shapes or else they may lose their impact.

Adding Shapes

To insert a shape on your worksheet, select **Insert** tab > *Illustrations* group> **Shapes**.

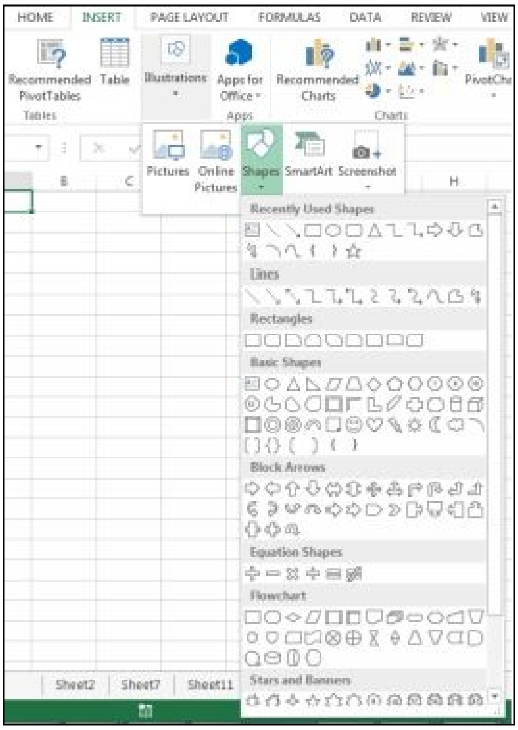


Figure 29.1 - Shapes Gallery in Excel

As you can see in Figure 29.1, the *Shapes* command in the *Insert* tab is a large drop down menu containing the innumerous types of shapes sorted into categories. Look for the desired shape and then follow any of the below stated methods to add it to the worksheet.

Click the desired shape in the *Shapes* drop down menu and then click anywhere on the worksheet. The selected shape in its default size will be added.

Click the desired shape in the *Shapes* drop down menu and then drag the mouse pointer on the worksheet to draw the shape in the required size.

Either ways, once the shape is inserted, you can resize it, drag it to any location, fill colors in it, put borders around it, add text in it and much more. All the shape related formatting options can be found in *Format* tab that appears in the Ribbon after you select a shape.

Following are a few more tips with regards to shape formatting:

- To move a shape to any other location in the worksheet, simply click, hold and drag it to the desired place.
- To resize a shape, activate it first by selecting it. Then either use the height and width controls in the *Size* group on the *Format* tab, or click and drag any of the square handles that appears on the borders of the particular shape.
- To rotate a shape, activate it first by selecting it. Then either use the *Rotate Objects* command in the *Size* group on the *Format* tab, or click and spin the small circular arrow that appears on top of the selected shape.

- To insert a shape into a chart, first select a chart and then select a shape in the *Shapes* drop down menu. Rest of the procedure remains the same.

	When you insert a shape into a chart, it is embedded into it and therefore moves along. In other words, moving a chart would move the shape in it too. Likewise, if you change the size of the chart, the size of the embedded shape also adjusts accordingly.	
	If you want to keep the aspect ratio same while resizing a shape, press and hold the **Ctrl** key while you drag the shape's square handles.	

Arranging Shapes in Stacks

All the graphical objects that reside on the drawing layer on the worksheet, which includes shapes too, are arranged in a stack. The lastly added shape is placed on top of the stack, which is then overtopped by another shape and so on.

A larger shape when inserted on top of a smaller shape can put the smaller ones out of view. However, you can rearrange the stack as per your requirement.

To do so, select the shape to make it active. Then click the **Selection Pane** button located in the *Arrange* group on the **Format** tab that appears in the Ribbon after you select a shape. This will open the Selection pane which contains the list of all the graphical objects on the drawing layer of the current worksheet. The items are listed in order of their appearance; that is, the top object on the stack is listed first and so on.

The easiest way to rearrange the position of objects in a stack is by moving the corresponding item up and down in the *Selection* pane list.

To change the position of a single shape in the stack, right click and select any of the following commands:

Bring to Front > **Bring to Front.** This command puts the selected shape on top of the stack.

Bring to Front > **Bring Forward**: This command moves the selected shape one level higher from its current position in the stack.

Send to Back > **Send to Back**: This command puts the selected shape at the bottom of the stack.

Send to Back > **Send Backward**: This command moves the selected shape one level down from its current position in the stack.

All the above mentioned commands can also be found in the *Arrange* group on the *Format* tab.

Reshaping Shapes

Another advanced and exciting quality of Excel is that it allows you to create customized shapes. So if you don't find the required shape in the ones provided by Excel, create one of your own.

Following are a few handy tricks on customizing shapes:

- To rotate a shape, click and turn the circular arrow that appears on top of the shape.
- Combine two or more shapes to make a new one. Refer to the next heading "*Grouping Shapes*" to learn more about the combining technique.
- You can create an entirely new shape by using the freeform shapes in the Lines category in the Shapes gallery.
- You can customize a shape by editing its points. To do so, select the shape, then choose the **Format** tab. There in the *Insert Shapes* group, click the **Edit Shape** icon > **Edit Points**. This will put some new square handles in the selected shape's border. Click and drag these handles to reconfigure the new shape.
- Some shapes contain one or more small yellow square handles. Click and drag these handles to increase or decrease the size of the shape's outline. Yellow handles can change the entire look of the shape. It can transform a triangle into a line, a square into a plus sign and much more.

Grouping Shapes

You can merge two or more shapes to create a single graphical object. This technique is known as *Grouping*.

The process to group shapes is very simple.

1. Make sure all the needed shapes are on the same worksheet. Add, if any is missing.

2. Keep the **Ctrl** key pressed down and then select all the images that you want to combine.

3. Right click any of the selected image, then choose **Group** > **Group**.

All the shapes that are grouped moves together. Whatever formatting you apply is applied to the entire group and all the objects in it.

> Excel allows you to combine a chart with a shape. The process is the same. Just make sure the graphical objects that are to be grouped are on the same worksheet.

To break the group back into its original components, right click then select **Group** > **Ungroup**.

Using WordArt

Figure 29.2 shows a worksheet containing different examples of WordArt.

Figure 29.2 - Showing Different Examples of WordArt

In Figure 29.2, different forms of WordArt are applied on the same phrase. As you can see, WordArt is nothing but a colorful way to put some beautiful graphical effects in your text.

To use WordArt, select **Insert** tab > **Text** > **WordArt**.

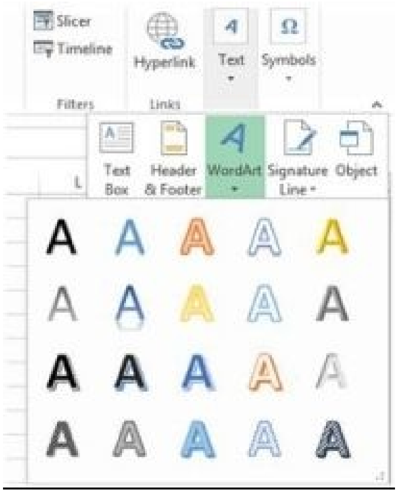


Figure 29.3 - WordArt Styles Provided by Excel

As shown in Figure 29.3, the WordArt command on the Insert tab contains a gallery of WordArt styles. Click the one you want to use. This will put an object on the current worksheet with the placeholder text “Your Text Here”. Type your text in place of this placeholder, then resize, change the color and format it as you like.

Just like all other graphical objects, selecting a WordArt object adds a contextual tab in the Ribbon. The contextual tab, namely *Format*, contains all the WordArt formatting commands. Or you can also the formatting commands in the task pane by right clicking the WordArt and selecting **Format Shape** or **Format Text Effects**.

Learning SmartArt

If Excel’s Shapes are amazing, its SmartArt feature is absolutely incredible. SmartArt are editable images that are made up of a variety of shapes. Using these, you can create a variety of diagrams, graphs, flowcharts and much more.

How to Insert SmartArt

To insert a SmartArt into a worksheet, select **Insert** > **Illustrations** > **SmartArt**. This will open the *Choose a SmartArt Graphic* dialog box, as shown in Figure 29.4

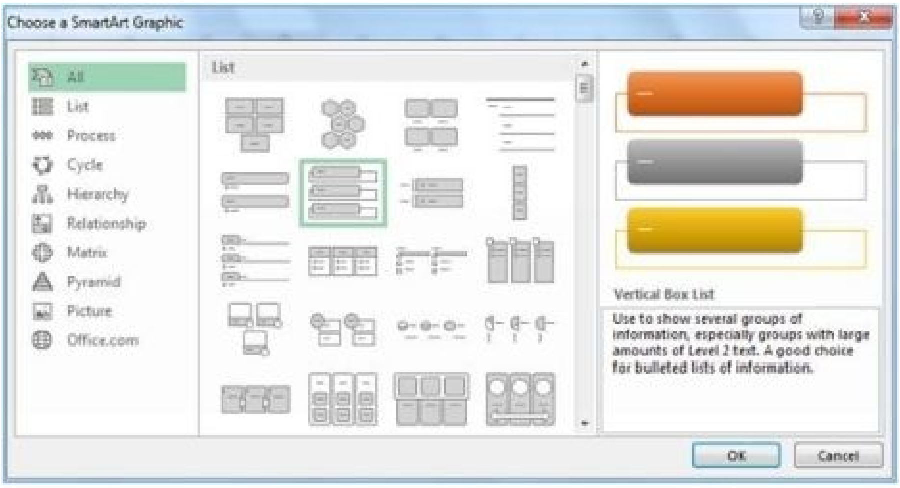


Figure 29.4 - Exploring the *Choose a SmartArt Graphic* Dialog Box

On the left side of the dialog box are the categories of SmartArt in Excel. Select any category to see its subtypes in the middle section of the dialog box. The right side displays the default sample of the selected SmartArt followed by a brief description about its applications.

Select the one you want to insert and click **OK**.

Don't worry if you cannot find the perfect SmartArt. Select the one that is closest to your requirements and then customize it as desired. The following section entails some tips and tricks for customizing SmartArt.

How to Customize SmartArt

Customizing SmartArt includes changing layouts and styles, filling colors in SmartArt's components, converting into shapes, adding more shapes and much more. Here are a few valuable tips in this regard.

Inserting Additional Elements: Suppose you inserted the *Vertical Box List* SmartArt that contains three rectangles by default. To add another rectangle, select any one rectangle in the SmartArt, then choose the **Design** tab > *Create Graphic* group > **Add Shape**.

Basic Formatting: The process to move and resize any elements in the SmartArt, and all the other basic formatting techniques are same as in case of other graphical objects. For example, drag the square handles to resize, drag the edges to relocate, select an element and hit **Enter** to put the selected item in the editable mode and so on.

Changing the Style and Layout: You can change the layout of your SmartArt by selecting **Design** tab > **Layouts**.

If you are unsure about which layout would look best, experiment a few before finalizing any one. To check how a predefined layout would look, select the SmartArt, then click **Design** tab. There in the *Layouts* group, just hover your mouse cursor over to any of the layout and check its preview in your SmartArt on the worksheet.

Just like layout, you can check the preview of different styles. The *Styles* gallery is located right next to the *Layouts* group in the **Design** tab.

> Changing the theme of the workbook also changes the layout and style of SmartArt. As a matter of fact, some themes give an incredibly dramatic and attractive appearance to the SmartArt. To explore different themes, select **Page Layout** > **Themes**.

Capturing Screenshots

Another very high tech and popular feature of Excel is its ability to insert screenshots of any other windows currently running on your computer. It saves the hassles of taking the Print Screen, saving it and then inserting it as image file in Excel. You can directly insert a screenshot to your worksheet without even having to hit the *Print Screen* button on your keyboard.

To use Excel's screenshot feature, make sure the Window you want to insert the screenshot of is opened but minimized on your system. Select **Insert** tab > **Illustrations** group > **Screenshot**. The Screenshot command drops down to display all the windows that are currently open on your computer. Select the window and Excel will insert its screenshot on the current worksheet.

Saving Graphics Separately

At times, you may want to save the charts and shapes as a separate file other than the one in Excel. Well, there is not any direct way, let alone a shortcut key to save the graphical objects as a separate image file. However, there is a secret recipe for this too. But first you need to add some tools to your Quick Access Toolbar, explained as follows.

1. Right click the *Quick Access toolbar* and select **Customize the Quick Access Toolbar.** This will open the Excel Options dialog box.

2. Select **Commands Not in the Ribbon** in the top left drop down list.

3. Scroll down the list on the left and select **Web Options**. Click **Add**.

4. Next, select **Web Page Preview** in the same list. Click **Add**.

5. Click **OK** to close the Excel Options dialog box and return to the worksheet. There will be two new buttons in your Quick Access toolbar.

You have to perform the above steps just once. Once the *Web Options* and *Web Page Preview* buttons are added to your Quick Access toolbar, follow the process listed below save the Excel's graphical objects as separate files on your computer.

1. Open the workbook that contains the image you want to save.

2. Click the **Web Options** button in your Quick Access toolbar. This will open the *Web Options* dialog box.

3. In the Browsers tab, put a tick mark in the *"Allow PNG as a Graphics Format"* checkbox, if it is not already marked. Next, make sure the "*Rely on VML for displaying graphics in browser*" is unchecked.

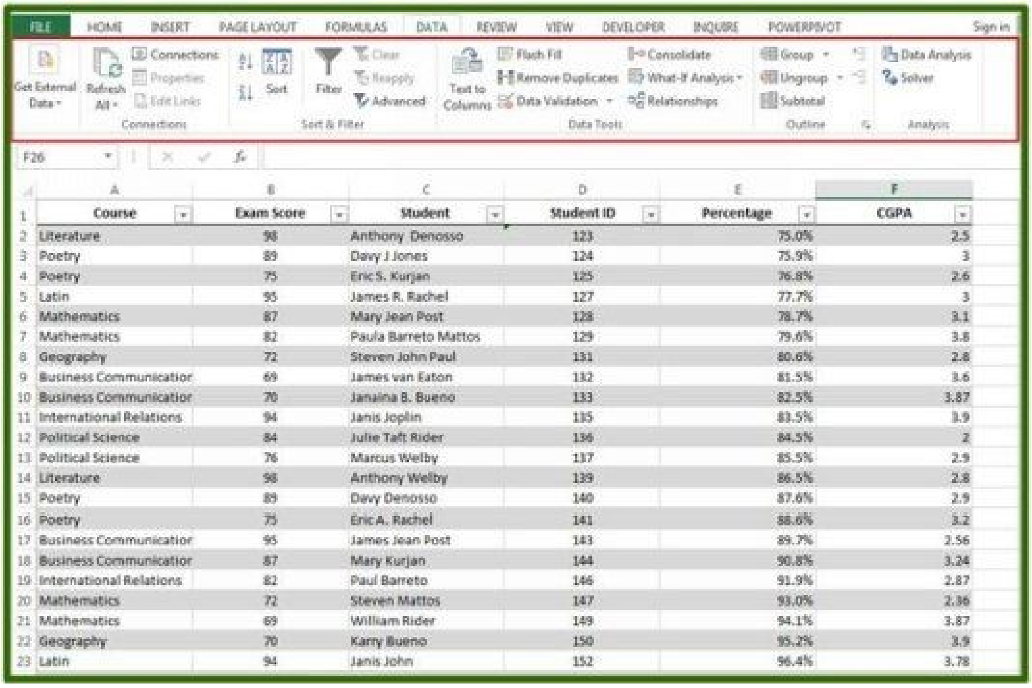
4. Now select the **Pictures** tab. In the "*Pixels Per Inch"* drop down list, select **120**. Click **OK** to save the settings and close the *Web Options* dialog box.

5. Click the **Web Page Preview** button in the Quick Access toolbar. This will convert a copy of the workbook into HTML and will display it in your default browser.

6. In the browser, right click the graphical object and select **Save Image As**.

7. This will open the typical *Save As* dialog box. Select a location and file type for the image, enter a name for your image if you want to and then click **Save**.

PART V: DATA MANAGEMENT AND ANALYSIS



	Course	Exam Score	Student	Student ID	Percentage	CGPA
2	Literature	98	Anthony Denosso	123	75.0%	2.5
3	Poetry	89	Davy J Jones	124	75.9%	3
4	Poetry	75	Eric S. Kurjan	125	76.8%	2.6
5	Latin	95	James R. Rachel	127	77.7%	3
6	Mathematics	87	Mary Jean Post	128	78.7%	3.1
7	Mathematics	82	Paula Barreto Mattos	129	79.6%	3.8
8	Geography	72	Steven John Paul	131	80.6%	2.8
9	Business Communicatior	69	James van Eaton	132	81.5%	3.6
10	Business Communicatior	70	Janaina B. Bueno	133	82.5%	3.87
11	International Relations	94	Janis Joplin	135	83.5%	3.9
12	Political Science	84	Julie Taft Rider	136	84.5%	2
13	Political Science	76	Marcus Welby	137	85.5%	2.9
14	Literature	98	Anthony Welby	139	86.5%	2.8
15	Poetry	89	Davy Denosso	140	87.6%	2.9
16	Poetry	75	Eric A. Rachel	141	88.6%	3.2
17	Business Communicatior	95	James Jean Post	143	89.7%	2.56
18	Business Communicatior	87	Mary Kurjan	144	90.8%	3.24
19	International Relations	82	Paul Barreto	146	91.9%	2.87
20	Mathematics	72	Steven Mattos	147	93.0%	2.36
21	Mathematics	69	William Rider	149	94.1%	3.87
22	Geography	70	Karry Bueno	150	95.2%	3.9
23	Latin	94	Janis John	152	96.4%	3.78

Crunching numbers, performing calculations, complex formulas, colorful graphs and interactive charts…and there is still more to Excel! This part of the book introduces you to yet another exciting and handy capability of Excel; that is Data Analysis.

Excel is a surprisingly amazing and high tech data analysis tool. Apart from its considerable data analysis competencies, Excel is also pretty good at managing vast database tables and unending data lists. The *What-If Analysis* feature of Excel allows you to do much more than simple data analysis. And then there are the highly popular and useful Pivot Tables that gives a completely new definition to data management.

All these things are covered in this part of the book. As you will discover in the upcoming sections, the data management and analysis capabilities of Excel are not only incredibly powerful but also quite easy to use.

AT A GLANCE

Chapter 30: Managing and Sorting Data Lists

This chapter talks all about data lists. You will learn the basic procedure of creating data lists along with some handy tricks on maintaining, filtering and sorting data lists. The chapter concludes with a very important and useful topic that explains the process of retrieving external data into Excel.

Defining Data Lists

A data list, also known as a database is nothing but a table in Excel that follows a special structure. Data lists in some aspects, differs from the other kind of tables in Excel.

Some main features of Data Lists are listed as follows:

- Data lists contain column headings only. Known as *field names* in technical terms, the column headings represent items contained in the corresponding columns.
- Each row in the data list contains complete information about each entity (technically known as *record*) that you track in the data list.
- Each column in the data list holds information about each item in the database. The item in columns is technically known as *field* of the data list.

Creating a Basic Data List

Follow the steps briefed below to create a new data list in a worksheet:

1. Select an empty cell from where you want to start the new data list.
2. Start putting field names (column headings) that represent items you want to add in the particular data list. Once you are done adding the field names, you are now all set to enter the first row of data.
3. Start making entries in the corresponding columns of the row, directly beneath the one containing the field names.
4. Now select the **Home** tab on the ribbon. There in the *Styles* group, click the **Format as Table** command. This will open the continuation menu, as show in Figure 30.1
5. Select the desired style, then click **OK** in the *Format As Table* dialog box that appears after you click over any style in the *Format as Table* drop down gallery.

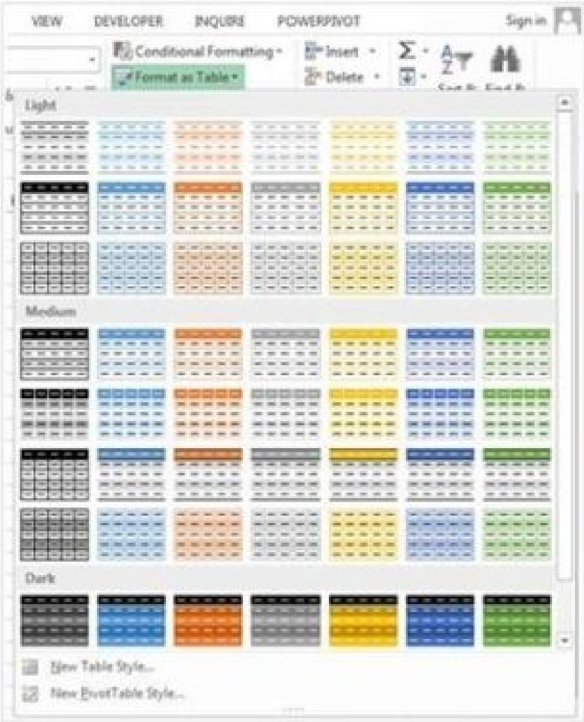


Figure 30.1 - Table Formatting Styles in Excel

Adding a Data Form

Data Form is another way of managing lengthy lists and ranges in Excel. You can add a Data Form to a normal range of cells, as well as to one that has been formatted as a table.

To work with a data form, first you need to add its command to your Quick Access toolbar or to the Ribbon.

Here is how you can add the data form command to your Quick Access toolbar:

1. Right click the *Quick Access toolbar* and select **Customize the Quick Access Toolbar.** This will open the Excel Options dialog box.
2. Select **Commands Not in the Ribbon** in the top left drop down list.
3. Scroll down the list on the left and select **Form**. Click **Add**.
4. Click **OK** to close the Excel Options dialog box and return to the worksheet. There will be a new button in your Quick Access toolbar.

You have to perform the above steps just once. Once the *Form* command is added to your Quick Access toolbar, follow the process listed below to add a Data Entry Form:

1. Arrange your data in such a way so that Excel may recognize it as a table. Make sure there are column headings in the first row of the particular data range.
2. Now select any cell in the table and hit the **Form** command in the Quick Access

toolbar. This will open up a Dialog box, customized as per your data. Each heading in the dialog box represents a field name in your data range or table, as shown in Figure 30.2

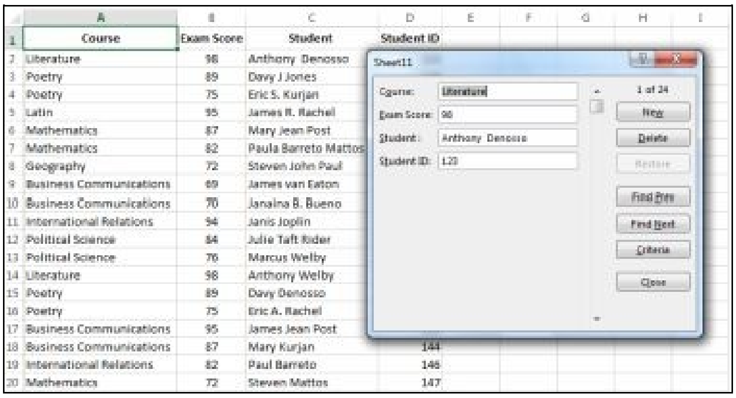


Figure 30.2 - Creating a Data Entry Form in Excel

3. Fill in the information in the dialog box.

4. When you are done entering data, click **New**. Excel will add this data into a row in the worksheet and will clear up the dialog box for the next row of data. Enter the data for the next row and click **New**. Likewise, perform the same step for other rows.

	If a cell in a particular table or range contains a formula, the result of the formula appears as uneditable. In other words, you cannot edit a formula while creating a data form.

	To modify the data entered in any of the previous rows, scroll up in the dialog box till you find the row you want to edit.

Sorting Data Lists

The *Sort & Filter Data* command on the Ribbon's Home tab allows you to sort the data in your data list. You can sort the values from the largest to smallest and vice versa. Then you can also sort the fields by sorting the corresponding columns. Likewise, you can sort the records by sorting the appropriate rows.

> While the *Sort & Filter* command is mostly used to arrange and maintain data lists, you can sort the data in normal ranges and other data that has not been arranged or formatted as a table.

How to Sort Data on One Field

To sort the data in one field (or column), select any cell in the corresponding column then click the appropriate command from the *Sort & Filter* drop down list:

Sort A to Z or **Sort Z to A** to sort text values.

Sort Oldest to Newest or **Sort Newest to Oldest** to sort Date values.

Sort Smallest to Largest or **Sort Largest to Smallest** to sort numeric values.

When you select a cell, Excel recognizes the type of value in it and put the sorting commands accordingly in the *Sort & Filter* drop down list.

Figure 30.3 shows the *Sort & Filter* commands for Text fields.

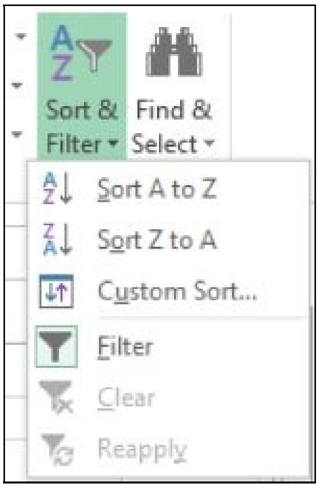


Figure 30.3 - Showing the *Sort & Filter* Commands for Text fields

How to Sort Data on Multiple Fields

To sort the data in more than one column, follow the steps listed below:

1. Select any cell in the data list table.
2. Select **Data** tab > *Sort & Filter* group > **Sort**. This will open the *Sort* dialog box, as shown in Figure 30.4. You can also open the *Sort* dialog box by selecting **Home** > **Sort & Filter** > **Custom Sort**.

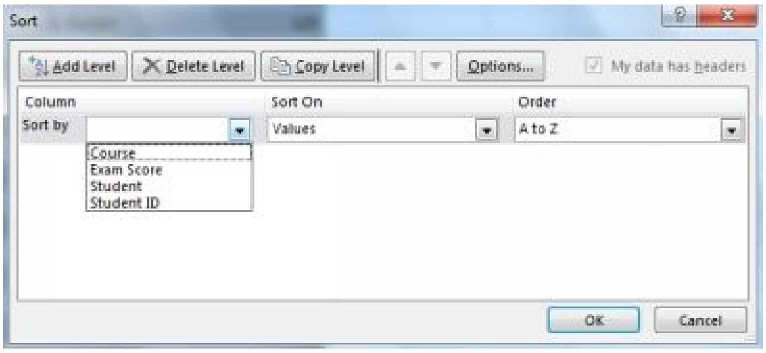


Figure 30.4 - Showing the *Sort* Dialog Box

3. The *Sort By* drop down list contains all the field names in the particular data list table. Select the name of the field you want to sort first. Then select the sorting option in the *Order* drop down list.

4. Repeat the same process for all the fields, by selecting them one by one in the *Sort By* drop down list.

5. Once you are done, click **OK** to close the *Sort* dialog box.

6. (Optional) The *Sort* dialog box also contains an **Options** button. Click this to open the *Sort Options* dialog box that allows you to change the orientation of the sorting operation from top-to-bottom (default settings) to left-to-right.

If a selected field contains any duplicate values, click the **Add Level** button to insert another sort level in the *Sort* dialog box. This will allow you to specify how the records in the particular field should be sorted. You can add as many sort levels as you want.

How to Sort the Columns

Excel provides you a way to change the placement of the fields in a data list without having to cut and paste the individual columns.

When you sort the fields in a data list, Excel adds a row at the top of the list. This row is the primary sorting level. It contains numbers, starting from 1 to the number of the last field in your data list. The numbers represent the new order of the fields (columns).

Following is how you can change the orientation of the fields in a data list table:

1. Select any cell in the data list table.

2. Select the **Design** tab in the *Table Tools* contextual tab. There in the *Tools* group, click the **Covert to Range** button.

3. Excel will ask you to confirm the conversion. Click **Yes** in the dialog box that appears after you click the **Covert to Range** button.

4. Select all the records in the data list table including the top row containing the numbers on which the fields are to be sorted.

5. Select **Data** tab > *Sort & Filter* group > **Sort** button. This will open the *Sort* dialog box, as already shown in Figure 30.4. You can also open the *Sort* dialog box by selecting **Home** > **Sort & Filter** > **Custom Sort**.

6. Hit the **Options** button in the *Sort* dialog box. This will open the *Sort Options* dialog box.

7. Select the **Sort Left to Right** check-circle. Click **OK**.

7. The *Sort By* drop down list contains the Row numbers. Select **Row 1** and then select the sorting option in the *Order* drop down list. Make sure the *Sort On* drop down list box read **Values**. Click **OK**. Excel will sort the fields according to the order of the entries in the top row.

8. (*Optional*) If you want to remove the top row from a particular range, select the top row and hit **Delete** in the **Home** tab.

9. To reconvert the range to table format, hit the **Format as Table** button on the **Home** tab. This will open the *Format as Table* dialog box. Click **OK**, but before that make sure the *My Table Has Headers* checkbox is checked.

> While you sort the columns in a data list, make sure the **Sort Left to Right** option in the *Sort Options* dialog box is checked. If it is not, Excel sorts records instead of fields, and in doing so, it sorts the row of the field names with the other data records in the data list.

Filtering Data Lists

Filtering in Excel is the process to pick out the relevant and useful data in the data list. It allows you to leave behind only the required information in the data list, while hiding from display the unnecessary data.

This section introduces you to the Excel's very popular *AutoFilter* tool that allows you to filter your data lists as per your current needs.

Meet the Excel's AutoFilter

AutoFilter is another way to manage your data lists. It enables you to filter out the unwanted data out of the data list. The AutoFilter button is attached to each cell containing the field name. All you have to do is to click the AutoFilter button and then select the desired filtering criteria from the drop down menu.

If you don't find the AutoFilter buttons attached to the field names in your data list table, select any cell in the particular table, then click the **Filter** button on the **Data** tab. Or you can also select **Home** tab > **Sort & Filter** > **Filter**.

	For keyboard users, press **Ctrl + Shift + L** or **Alt + AT** to reveal the AutoFilter buttons.

When you click the AutoFilter button, Excel recognizes the type of value in the corresponding column and put the filter commands accordingly in the AutoFilter drop down menu. If the column contains numeric values only, the AutoFilter drop down menu displays Number Filter options. Likewise if a column contains text values or a combination of text, number and dates, the AutoFilter drop down menu contains Text Filter options.

Figure 30.5 shows the *AutoFilter* commands for a column containing text fields.

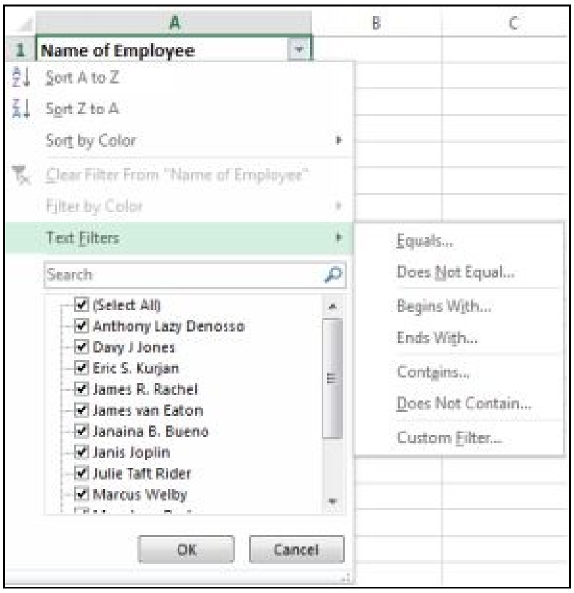


Figure 30.5 - Showing the AutoFilter Commands for a Column Containing Text Values

Date Filtering

Table 30.1 contains brief description about the filter options in the AutoFilter drop down menu, in case the corresponding column contains date values.

Filter Option	Description
Equals	Launches the *Custom AutoFilter* dialog box with the option *Equals* selected in the first criteria.
Before	Launches the *Custom AutoFilter* dialog box with the option *Is Before* selected in the first criteria.
After	Launches the *Custom AutoFilter* dialog box with the option *Is After* selected in the first criteria.
Between	Launches the *Custom AutoFilter* dialog box with the option Is After or *Equal To* selected in the first criteria and the *Is Before* or *Equal To* options selected in the second AND criteria.
Tomorrow	Filters out all the records leaving behind the ones with tomorrow’s date only.
Today	Filters out all the records leaving behind the ones with current date only.
Yesterday	Filters out all the records leaving behind the ones with yesterday’s date only.
Next Week	Filters out all the records leaving behind the ones with date entries in the week ahead.
This Week	Filters out all the records leaving behind the ones with date entries in the current week.
Last Week	Filters out all the records leaving behind the ones with date entries in the previous week.

Next Month	Filters out all the records leaving behind the ones with date entries in the month ahead.
This Month	Filters out all the records leaving behind the ones with date entries in the current month.
Last Month	Filters out all the records leaving behind the ones with date entries in the previous month.
Next Quarter	Filters out all the records leaving behind the ones with date entries in the 3-month quarterly period ahead.
This Quarter	Filters out all the records leaving behind the ones with date entries in the current 3-month quarterly period.
Last Quarter	Filters out all the records leaving behind the ones with date entries in the previous 3-month quarterly period.
Next Year	Filters out all the records leaving behind the ones with date entries in the calendar year ahead.
This Year	Filters out all the records leaving behind the ones with date entries in the current calendar year.
Last Year	Filters out all the records leaving behind the ones with date entries in the previous calendar year.
Year to Date	Filters out all the records leaving behind the ones with date entries in the current year up to the current date in this field.
All Dates in the Period	Filters out all the records leaving behind the ones with date entries in the quarter (Quarter 1 through Quarter 4) or month (January through December) that you select from its submenu.
Custom Filter	Launches the *Custom AutoFilter* dialog box where you can specify your own criteria for more AND or OR conditions.

Table 30.1 - Date Filter Options in the AutoFilter Drop Down Menu

Text Filtering

Table 30.2 contains brief description about the filter options in the AutoFilter drop down menu, in case the corresponding column contains text values.

Filter Option	Description
Equals	Launches the *Custom AutoFilter* dialog box with the option *Equals* selected in the first criteria.
	Launches the *Custom AutoFilter* dialog box with the option *Does Not Equal*

Does Not Equal	selected in the first criteria.
Begins With	Launches the *Custom AutoFilter* dialog box with the option *Begins With* selected in the first criteria.
Ends With	Launches the *Custom AutoFilter* dialog box with the option *Ends With* selected in the first criteria.
Contains	Launches the *Custom AutoFilter* dialog box with the option *Contains* selected in the first criteria
Does Not Contain	Launches the *Custom AutoFilter* dialog box with the option *Does Not Contain* selected in the first criteria.
Custom Filter	Launches the *Custom AutoFilter* dialog box where you can specify your own criteria for more AND or OR conditions.

Table 30.2 - Text Filter Options in the AutoFilter Drop Down Menu

Number Filtering

Table 30.3 contains brief description about the filter options in the AutoFilter drop down menu, in case the corresponding column contains numeric values.

Filter Option	Description
Equals	Launches the *Custom AutoFilter* dialog box with the option *Equals* selected in the first criteria.
Does Not Equal	Launches the *Custom AutoFilter* dialog box with the option *Does Not Equal* selected in the first criteria.
Greater Than	Launches the *Custom AutoFilter* dialog box with the option *Greater Than* selected in the first criteria.
Greater Than or Equal To	Launches the *Custom AutoFilter* dialog box with the option *Greater Than or Equal To* selected in the first criteria.
Less Than	Launches the *Custom AutoFilter* dialog box with the option *Less Than* selected in the first criteria.
Less Than or Equal To	Launches the *Custom AutoFilter* dialog box with the option *Less Than or Equal To* selected in the first criteria.
Between	Launches the *Custom AutoFilter* dialog box with the option *Is Greater Than or Equal To* selected in the first criteria and the *Is Less Than or Equal To* options selected in the second AND criteria.
Top 10	Launches the *Top 10 AutoFilter* dialog box where you can specify the top 10 fields and filter out all leaving behind just the specified top 10 fields.
Above Average	Filters out all the records leaving behind the ones where the values in the selected field are greater than the average of the values in the same field.
Below Average	Filters out all the records leaving behind the ones where the values in the selected field are less than the average of the values in the same field
Custom Filter	Launches the *Custom AutoFilter* dialog box where you can specify your own criteria for more AND or OR conditions.

Table 30.3 - Numeric Filter Options in the AutoFilter Drop Down Menu

Extracting External Data

Many a times you may need to copy data from external databases to Excel. Well, you can simply type it in Excel, however, this is not such a good idea if the data you want is huge.

Excel offers you several ways to acquire data from a number of external sources, including web pages, text documents, files on Microsoft Access, SQL server, Analysis Services, Microsoft Azure Marketplace and so on. All the external sources and their respective data importing wizards can be found in the *Get External Data* drop down list located in the *Data* tab on the Ribbon. This section explains the process of extracting data from some common external sources.

How to Retrieve Data from the Web

To extract data from Web, first the select **Data** tab. Click **Get External Data** > **From Web**. This will open the *New Web Query* dialog box, as shown in Figure 30.6

Figure 30.6 - Using the *New Web Query Dialog* Box to Import Data from the Web

As you can see in Figure 30.6, there is an address bar at the top of the *New Web Query* dialog box. In the address bar, enter the URL address of web page from where you want to extract the data and hit the **Go** button. If you have visited the web page recently, you can find its address by clicking the drop down button attached to the address bar. Once you do that, Excel will display the user interface of the particular web page in the center of the *New Web Query* dialog box.

You can also explore the website further in the *New Web Query* dialog box. For example, suppose you want to extract data from the Sports page of Yahoo. You can either directly enter the URL address of the sports page or you can click the Sports tab on the main Yahoo page in the *New Web Query* dialog box.

Once you are on the right page, look for the small right-side pointing arrows. These arrows indicate the possibility of importing the particular table on Excel. To import any table from the webpage, click the arrow accompanying it. You can select multiple arrows at a time.

Once you are done checking the arrows, click the **Import** button. Doing so will close the *New Web Query* dialog box and open the *Import Data* dialog box, as shown in Figure 30.7

Figure 30.7 - The *Import Data* Dialog Box

In the *Import Data* dialog box, specify the cell where you want the selected data to be imported. You can also indicate your preference of whether you want to add the data in the current worksheet or a new worksheet. Click **OK** once done.

How to Retrieve Data from Text Files

The typical *Copy and Paste* method is not the only way to extract data from text files into Excel. Though you can do it this way, a far easier way is to extract it directly via the Text Import Wizard. Here is how you can do this:

1. Select **Data** tab > **Get External Data** > **From Text**. This will open the *Import Text* File dialog box.

2. Click the **Open** button and specify the folder where the particular text file is located.

3. Select the file and click **Import**. Doing so will open the *Text Import Wizard*.

4. The Text Import Wizard displays all the default settings. Make any changes you want. If you are importing a CSV file, make sure the **Delimited** option is check marked.

5. Click the **Finish** button. The *Import Data* dialog box will appear.

6. Hit the **Properties** button. This will open the *External Data Range Properties* dialog box

7. Remove the checkmark from the **Save Query Definition** check box. Then click

OK to close this dialog box and return to the *Import Data* dialog box.

8. In the *Import Data* dialog box, specify the cell where you want the data from the selected text file to be imported. You can also indicate your preference of whether you want to add the data in the current worksheet or a new worksheet. Click **OK** once done.

Using Microsoft Query to Retrieve Data

The Microsoft Query Wizard in Excel allows you to import data from unlisted databases.

To extract data using Microsoft Query, follow these steps:

1. Select **Data** tab > **Get External Data** > **From Other Sources** > **From Microsoft Query**. This will open the *Choose Data Source* dialog box, as shown in Figure 30.8

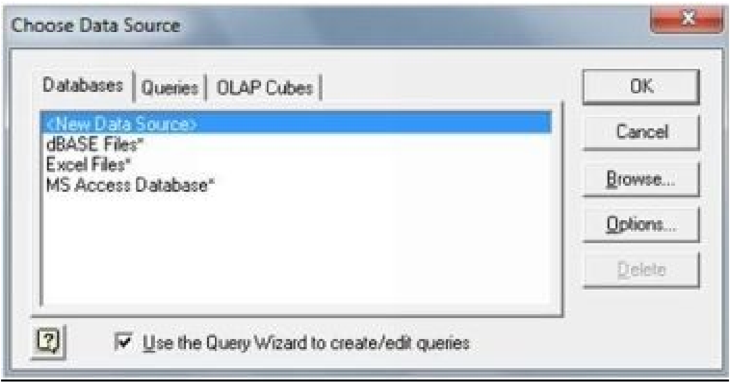


Figure 30.8 - Showing the *Choose Data Source* Dialog Box

2. As you can see in Figure 30.8, by default, the **<New Data Source>** item is listed at the top in the *Database* tab. Let the settings stay this way and click **OK**.

3. The *Create New Data Source* dialog box appears, where you are required to specify the name for your new database query as well as the driver to be used in accessing the external database. Naming the database allows you to reuse the same database without having to define it every time you need to access it.

4. Once you are done entering the name and specifying the driver, click the **Connect** button. Doing so opens up a dialog box in accordance to your selected driver. Suppose you selected **Driver do Microsoft Access (*.mdb)** as the driver in the *Create New Data Source* dialog box, Excel opens up an *ODBC Access Setup* dialog box.

5. Hit the **Select** button. This action opens the *Select Database* dialog box.

6. Locate the folder that contains the file you want to import. Click **OK**.

7. Click **OK** in the Setup dialog box. This action takes you back to *the Create New Data Source* dialog box. It now contains the name of database that you specified in the previous steps.

8. (*Optional*) Select a default table to use in your database and specify a name for your table.

9. Click **OK** to save the settings and return to the *Choose Data Source* dialog box.

10. The *Choose Data Source* dialog box now contains the name of your newly created database. Select your database and then specify your database query to complete the data extraction procedure.

Chapter 31: Working With Pivot Tables

A Pivot Table is a special type of table that allows you to summarize your data lists for effective analysis. It makes it easy for you to identify the correlation between elements in a data list.

Some of the most handy and interesting features of Pivot Table are as follows:

- Pivot Table allows you to summarize large values in a data list.
- Not only is the Pivot Table capable of summarizing the data but it does so by using a variety of summary functions.
- Pivot Table is very interactive. You can rearrange the data in any way you want, even after creating it.
- The data used in a Pivot table is linked to its original source. However unlike other cell references, Pivot table does not update automatically when you change values in the source data. You will have to click the Refresh button to update the Pivot Table every time you make changes in the referenced data.

Now that you have an idea about what Pivot table is, let's explore its applications and functionality. This chapter talks about all the basic mechanism of creating, managing and formatting Pivot tables. You will also learn about Pivot Charts and the powerful add-in Power Pivots.

Different Ways of Creating Pivot Tables

You can create a Pivot Table automatically as well as manually. While the former way is easier, the latter is more popular and lets you generate a customized Pivot Table.

We will start off with the easier method; that is, the automatic way of generating a Pivot Table and then move on to the manual procedure.

Generating Pivot Table Automatically

Introduced in Excel 2013, the Recommended Pivot Tables tool was not there in the previous versions of Excel. It is one of the most handy and popular feature in Excel 2013.

The Recommended Pivot Tables feature provides the easiest way to generate Pivot Tables. All you have to do is to select any cell in the data range, click **Insert** tab > **Recommended**

PivotTables. This action will open the *Recommended PivotTables* dialog box, as shown in Figure 31.1

The *Recommended PivotTables* dialog box contains thumbnails pertaining to the selected data. Select any thumbnail and click **OK** to generate its corresponding Pivot table. By default, Excel inserts a Pivot Table on a new worksheet.

Clicking any cell in a Pivot Table opens the PivotTable Fields task pane. You can use this task pane to rearrange, format, filter and do much more to your Pivot Table.

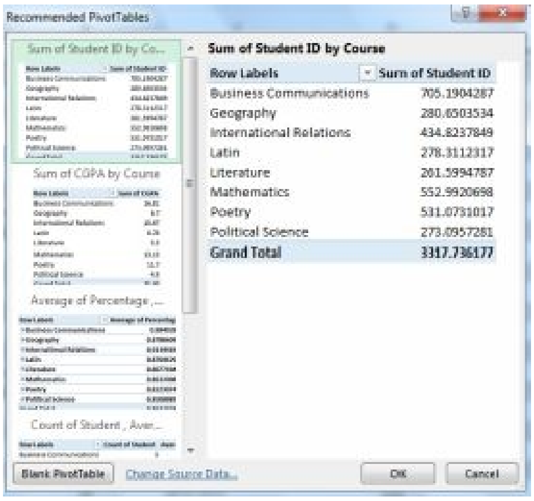


Figure 31.1 - Creating a Pivot Table Using the *Recommended PivotTables* dialog box

Generating Pivot Table from External Data Sources

The procedure explained in the previous section can be used to create Pivot Table from data lists in Excel. However, if you want to use the data from External databases, Excel provides you a way to do that as well.

Here is how you can generate Pivot Tables by directly using the data from external data sources without having to import it first.

1. Select any blank cell in a worksheet.
2. Click **Insert** tab > **Recommended PivotTables**. This action will open the *Choose Data Source* dialog box, as shown in Figure 31.2
3. Hit the **Choose Connection** button to specify the external data source. This will open the *Existing Connections* dialog box, containing the list of the recommended pivot tables
4. Click the one you want to insert.

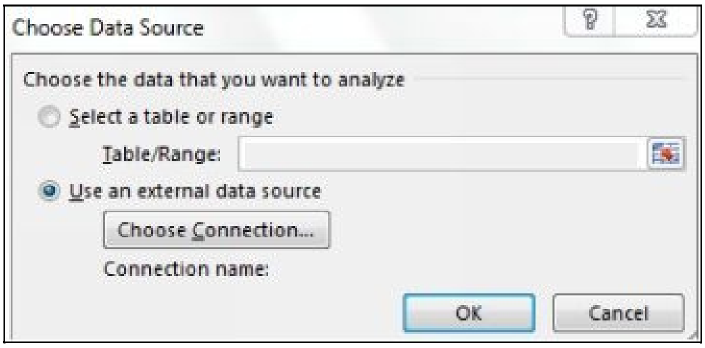


Figure 31.2 - Creating Pivot Table from External Data Sources

If you do not like any of the Recommended PivotTables, hit the **Blank PivotTable button** located at the bottom left of the *Recommended PivotTables* dialog box (shown in Figure 31.1), then create a Pivot Table manually.

Generating Pivot Table Manually

Following is the basic process of creating a Pivot Table manually. First you need to create a basic version, then you can experiment with different layouts and formats till you are satisfied with the final results.

The first step in creating a Pivot Table manually is to specify the data of which the table is to be created. If your data is in a worksheet, select any cell in that data range and then click **Insert** > **PivotTable**. Doing so will open the *Create PivotTable* dialog box, as shown in Figure 31.3

In the *Create PivotTable* dialog box, Excel attempts to guess the data range in the *Table/Range* type text bar. If the estimate is not correct, select the data range in your worksheet.

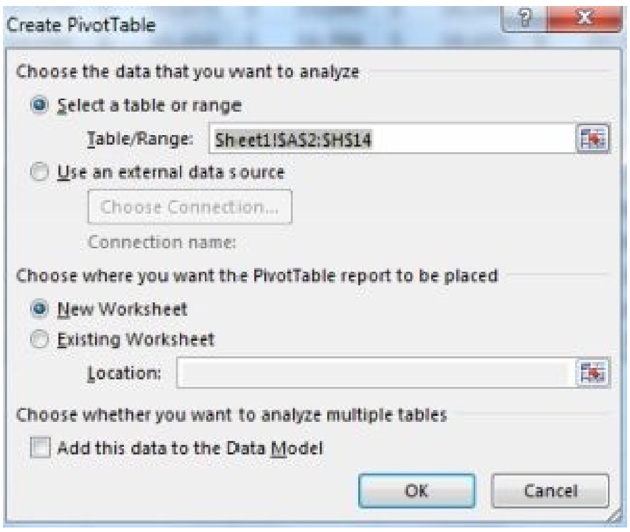


Figure 31.3 - Showing the *Create PivotTable* Dialog Box

By default, the "*Select a table or range*" option is check-marked in the *Create PivotTable* dialog box. If you want to use data from any external source, click the **Choose Connection** button and specify the data source.

Next in the *Create PivotTable* dialog box is the “*Choose where you want the PivotTable report to be placed*” option. By default, this option is set to *New Worksheet*. However, if you want to create a Pivot Table on the current worksheet, click the **Existing Worksheet** option and then select the location of the Pivot table in the current worksheet. Click **OK** once done.

Excel generates an empty Pivot Table, as shown in Figure 31.4

The *PivotTable Fields* task pane is docked on the right side of the worksheet. The column heads in the selected data range are listed as fields in the *PivotTable Fields* task pane. Click the checkboxes of the fields that you want to add to your Pivot table.

Figure 31.4 - Creating a Pivot Table Manually

You can also add fields to the Pivot table by dragging them from the top of the task pane to the four areas located at the bottom of the *PivotTable Fields* task pane; or you can right click a field a select the appropriate option from the shortcut menu.

Keep playing with the fields by moving them between the four boxes or checking/unchecking the checkboxes till you reach the desired result.

How to Format a Pivot Table

By default, the data in a Pivot table uses General number formatting. To change the number format, right click any value in the Pivot table and select Number Format from the shortcut menu. This will open the *Format Cells* dialog box where you can apply the desired number format on the selected value(s).

Changing the Style of a Pivot Table

When it comes to formatting the Pivot Table, you can change the style of the table. To check how a built-in style would look, select any cell in the Pivot table, then click **Design** tab. There in the *PivotTable Styles* group, click the downward pointing arrow to open the Styles gallery. Just hover your mouse cursor over to any style and check its preview in your Pivot Table on the worksheet. Click the one that you want to apply.

Even if you don't find the exact style you want, you can select a one that is closely similar to what you want and then make a few adjustments in it. You can also create your own style by clicking the **New PivotTable Style** command located in the bottom of the Styles gallery.

Changing the Layout of a Pivot Table

Layout is another aspect of Pivot Table formatting. The *Layout* group in the **Design** contextual tab contains various formatting commands, explained as follows:

Subtotals: The *Subtotals* drop down list contains commands to control the placement of subtotals in the Pivot Table. You can also hide the subtotals by selecting the **Do Not Show Subtotals** command in the **Subtotals** drop down list.

Grand Totals: The Grand Totals drop down list allows you to select the types, if any, you want to display.

Report Layout: The *Report Layout* command gives you three layouts to choose from; namely, compact, outline and tabular. You can also specify if you want to display or hide the repeating items.

Blank Row: The Blank Row command gives you options to insert or remove blank lines after each item in the Pivot Table.

Advanced Formatting Options

When you click any cell in a Pivot Table, two contextual tabs appears in the ribbon; namely *Analyze* and *Design*. The Design tab contains the style and layout pertaining formatting commands. These are already discussed in the previous sections.

The Analyze tab contains some advanced formatting options that can affect the entire appearance of your Pivot Table. For example, the **Show** command in the *Analyze* tab contains three buttons that allows you to toggle the display of Field List, +/- Buttons and

Field Headers.

For more formatting options regarding the layout, filters, display and so on, select any cell in the Pivot table. Then choose **Analyze** tab > **Pivot Table** > **Options** > **Options**. This will open the *PivotTable Options* dialog box, as shown in Figure 31.5

You can also open the *PivotTable Options* dialog box by right clicking any cell in the Pivot table and selecting **PivotTable Options** from the shortcut menu.

There are not any hard and fast rules as to what type of formatting should you apply. The best way to get familiar with the formatting elements is to try them all at least once and then settle on the one that seems most appropriate to you.

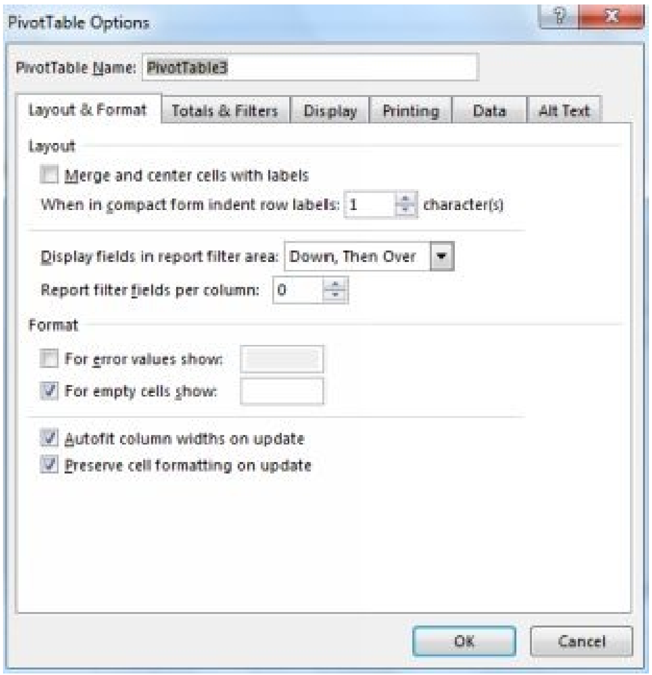


Figure 31.5 - Showing the Layout and Formatting Commands in the *PivotTable Options* Dialog Box

Generating Pivot Charts

A Pivot Chart is a more attractive and interactive form a Pivot table. Simply put, it is a data analysis tool that can help you interpret the data in the Pivot table.

Creating a pivot chart is very easy. Here is how you can do that:

1. A pivot chart is always created from a Pivot table. So the first step is to generate a Pivot table.

2. Select any cell in the Pivot table, then choose **Analyze** tab > **PivotChart**. This will open the *Insert Chart* dialog box, as shown in Figure 31.6. The *Insert Chart* dialog box displays a thumbnail of all the chart types that you can create from the selected Pivot table.

3. Select the thumbnail of the chart that you want to create and then click **OK**.

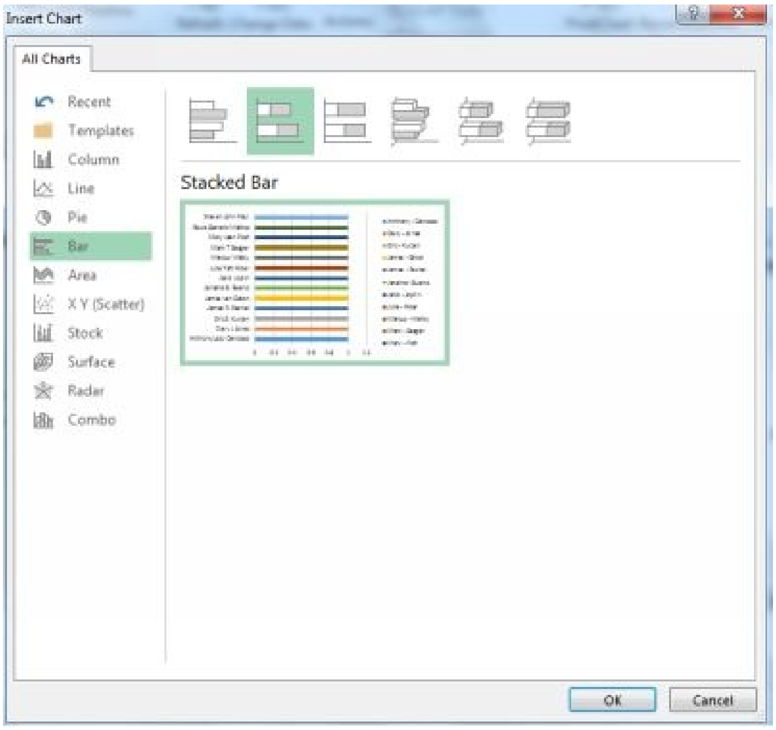


Figure 31.6 - Creating a Pivot Chart Using the *Insert Chart* Dialog Box

Once you click **OK**, Excel inserts an embedded pivot chart on the same worksheet as the Pivot table.

Just like normal chart formatting, you can format a Pivot chart as well. You can experiment with different styles, layouts, chart titles, legends and so on. When you click a Pivot chart, three tools (Analyze, Design and Format) are added to the Ribbon. While these tabs contain all the Pivot chart formatting commands, the style and color options can also be accessed by clicking the small paint brush icon located at the top right of the Pivot chart.

Above the paint brush icon is a plus sign that contains the buttons to toggle the display of different chart elements.

Moving a Pivot Chart

By default, a Pivot Chart is inserted into the same worksheet that contains the underlying pivot table. Follow these steps to move a Pivot Chart to a new worksheet:

1. Select the Pivot Chart that you want to move.

2. Choose **Analyze** tab > **Move Chart**. This will open the *Move Chart* dialog box, as shown in Figure 31.7

Figure 31.7 - Moving a Pivot Chart to a New Worksheet

3. Excel suggests a generic name for the selected chart. If you want to rename it, click the **New sheet** check circle and then enter your chart name in the corresponding text type bar.

4. Select the **Object in** drop down list and click the name of the sheet to which you want to the particular chart.

5. Click **OK** once done.

Activating PowerPivot

PowerPivot is a high tech add-in that was introduced in Excel 2010. This advanced tool that is capable of summarizing infinitely large databases, containing thousands and millions of records, was made even more powerful and integral in Excel 2013.

The PowerPivot has been made a part of Excel 2013 in the form of its Data Model feature. This implies that you don't need to install the PowerPivot add-in. It is already integrated in Excel 2013; you need to activate it though.

Follow these steps to start using PowerPivot in Excel:

1. Select **File** > **Options** > **Add-Ins**. This will open the *Add-Ins* tab in the *Excel Options* dialog box.

2. At the bottom left in the *Add-Ins* tab, you will find the **Manage** drop down list. Click it and then select **COM Add-Ins** from the drop down list.

3. Hit the **Go** button. This will open the *COM Add-Ins* dialog box, as shown in Figure 31.8

4. Click the checkbox labeled **Microsoft Office PowerPivot for Excel 2013**.

5. Click **OK** to close the *COM Add-Ins* dialog box and return to Excel.

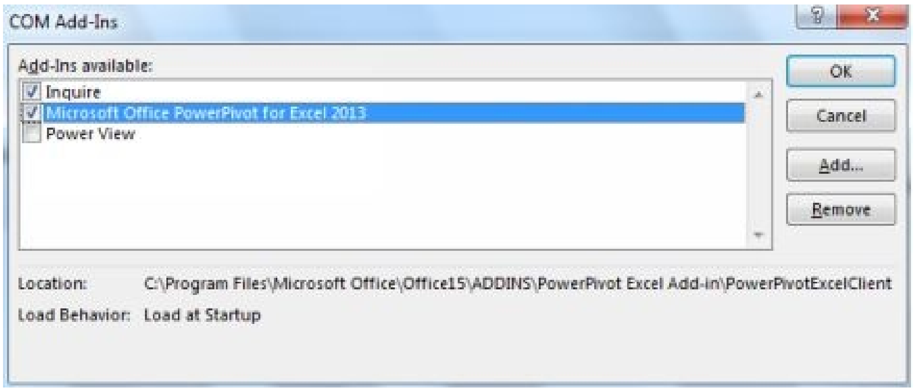


Figure 31.8 - The *COM Add-Ins* Dialog Box

You will see that a new tab by the name of *PowerPivot* is added to the Ribbon. This new tab contains all the commands pertaining to the application and management of PowerPivot.

> The Excel PowerPivot add-in is compatible with Office 2013 Professional Plus edition as well as all the versions of Office 365, except for one; that is, Small Business. Moreover, it is not available in Excel 2013 that is installed on the RT edition of the Microsoft Surface tablet. If you are using Excel on a Microsoft Surface tablet, it has to have Windows 8 Pro or else the Excel 2013 in it will not support the PowerPivot add-in.

Chapter 32: Performing What-if Analysis

What if the cost of production increases by 10%? What if we increase the per unit retail price by $0.5? These are few examples of the What-If situations. Excel is pretty much capable of answering such questions without even the need to remake the entire model.

It is Excel's one of the most advanced and appealing feature that it can create and manage interactively dynamic models; models that instantly updates as soon as you change the input values. The What-If capability of Excel allows you to check the effect of different assumptions on the final result by just changing a few variables.

Excel provides several useful tools that can help you analyze a situation under different scenarios. This chapter talks about the three most commonly used What-If tools in Excel; namely Scenario Manager, Goal Seeker and Data Tables.

At the end of this chapter, we introduce to the Excel's very popular and valuable add-in, Solver. It is powerful utility add-in that can help you manage data models and complex problems having multiple variables.

Analyzing Different Scenarios

The Scenario Manager enables you to create different scenarios and set different values for each scenario. For example, you can create a worst-case scenario in which your company made no profit in the current month, then you make a best-case scenario in which the profits rose by 30% and so on. Likewise, you can create several cases and sets of input values to analyze the effect of changing variables on the final result.

After saving different scenarios, you can also generate a summary report showing the result of the three scenarios. But first, let's see how you can create scenarios in Excel.

Follow these steps to create new scenarios in Excel:

1. The first step is to indicate the changing cells. *Changing cells* are cells containing input values that changes in each scenario.

	To make it easier to identify the changing cells in your data range, it is highly recommended that you give names to the changing cells. It will make it easier for you to keep track of the input values.

> The Changing Cells must contain constant values and not formulas. If there are any formulas in the Changing Cells, they will be replaced by constant values (that will be the result of the formulas) when you show the Scenario.

2. Select the *changing cells* in the worksheet. If the changing cells are not in a contiguous range, press and hold **Ctrl** while you select all the cells.

3. Select **Data** tab > *Data Tools* group > **What-If Analysis** > **Scenario Manager**. This will open the *Scenario Manager* dialog box, as shown in Figure 32.1

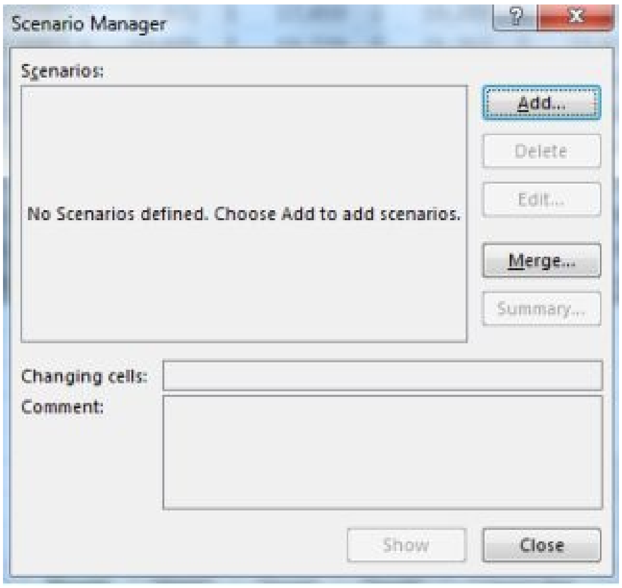


Figure 32.1 - Showing the *Scenario Manager* Dialog Box

4. Hit the Add button in the *Scenario Manager* dialog box. This will open the *Add Scenario* dialog box, as shown in Figure 32.2

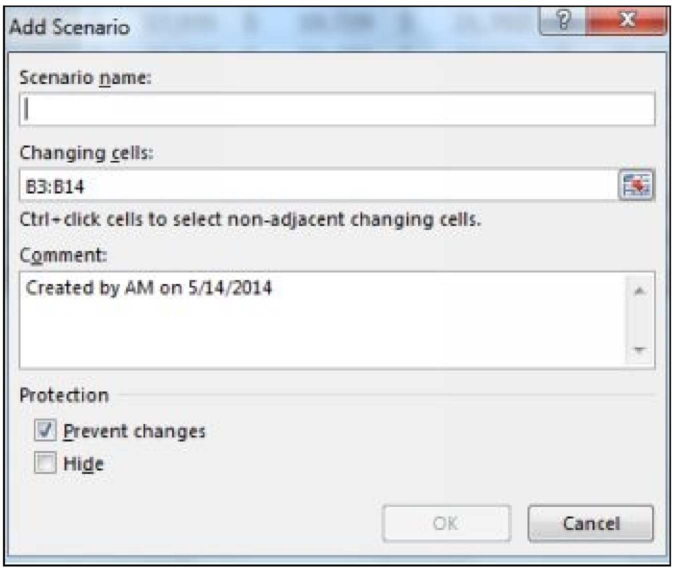


Figure 32.2 - Adding Scenarios Using the *Add Scenario* Dialog Box

5. In the *Scenario Name* text box, enter a name for your scenario. It could be any name pertaining to the particular scenario. The most commonly used names are generic names such best case, worst case, most likely, least likely and so on.

6. After the *Scenario Name* text box is the *Changing Cells* text box which contains the address range of the cells that you selected in the second step. If you missed the second step or want to change the changing cells, you can do so in this text box.

7. Next is the Comment box that displays your name and the time the particular scenario is created. You can add other comment or note, if you want.

8. After the Comment box, there are two checkboxes, *Prevent changes* and *Hide*. Keep the *Prevent changes* option checked if you want to prevent other users from making changes in the particular scenario. Keep the *Hide* option checked if you want to hide the particular scenario when the worksheet is protected.

9. Click **OK** once done. This will close the *Add Scenario* dialog box and opens the *Scenario Values* dialog box, as shown in Figure 32.3.

10. The *Scenario Values* dialog box displays the address range or name of the selected cells along with their respective values. Change the values, if you want any, then hit the **Add** button. This will close the *Scenario Values* dialog box and returns you to the *Add Scenario* dialog box.

11. Repeat steps 5 - 10 to create as any scenarios as you want.

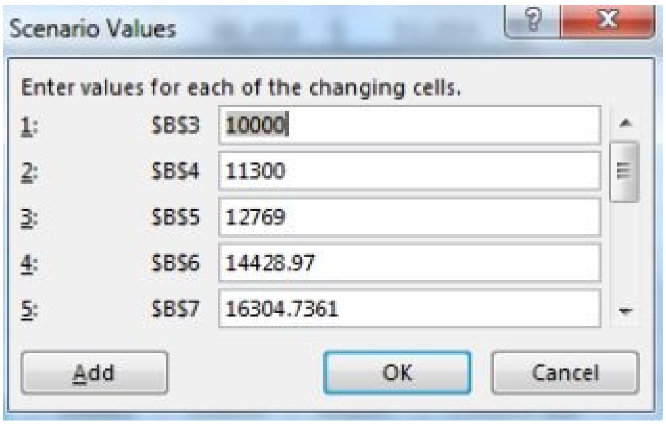


Figure 32.3 - Entering Input Values in the *Scenario Values* Dialog Box

Once you are done creating scenarios, all these will appear in the *Scenario Manager* dialog box.

To show a particular set of values in the worksheet, simply double click the corresponding scenario in the *Scenario Manager* dialog box or select the scenario and click the **Show** button.

Managing Scenarios

- If after creating a scenario, you want to delete it, click the **Delete** button in the *Scenario Manager* dialog box.
- If after creating a scenario, you want make some changes in it, click the **Edit** button in the *Scenario Manager* dialog box. You can modify the changing cells range address, and change the input values, and change the name of the scenario and you can also make changes in the Protection settings.

Merging Scenarios

Just below the **Edit** button is the **Merge** button, which allows you to merge scenarios from other worksheets as well from other workbooks. To do so, first hit the **Merge** button. This will open the *Merge Scenarios* dialog box.

First, select the workbook that contains the scenarios you want to merge, next select the worksheet containing the prospective scenarios. Click **OK** once done.

Once you click OK, Excel copies the scenarios from the specified worksheet and the merges them with the one already created on the current worksheet.

> If you want to merge scenarios from any other workbook, make sure it is opened on your system or else Excel will not display its name in the *Merge Scenarios* dialog box.

Generating a Summary Report

Double clicking a scenario in the *Scenario Manager* dialog box shows it on the worksheet. This implies that at a time you can view only one scenario, unless you enter each scenario separately on a worksheet. However, Excel provides a way to view all the three scenarios at the same time on the same worksheet without any extra efforts.

A *Scenario Summary* report shows the changing values in all the scenarios. Moreover, it gives you an option to display the resulting values as well.

Generating a summary report in Excel is pretty easy. All you have to do is to click the **Summary** button in the *Scenario Manager* dialog box. This will open the *Scenario Summary* dialog box.

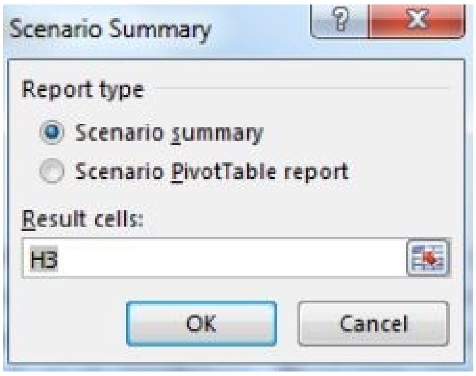


Figure 32.4 - The *Scenario Summary* Dialog Box

First, specify if you want to generate a simple *Scenario summary* report or a *Scenario PivotTable* report. Next, specify the address of cells containing the results that you want to show in your summary report. Click **OK** once done.

If you have named your changing and result cells, the summary report shows the cell names instead of their address. This is why we previously recommended you to give names to the changing and result cells. This makes the report more readable.

To save your scenario summary report, hit **Ctrl + S** or you can also click the **Save** command on the Quick Access toolbar. To print your scenario summary report, hit **Ctrl + P** or you can also click the **Quick Print** command button on the Quick Access toolbar.

Using the Goal Seek Feature

How much markup should you charge to make a $10 million profit this year?

How many sales calls you need to make to achieve your $50,000 monthly target?

The Goal Seek tool in Excel answers all such questions. It helps you determine a particular value that you need in order to reach your objective. You can access the *Goal Seek* tool by clicking the **Goal Seek** command in the **What-If Analysis** drop down list on the **Data** tab.

Let's take a simple example to learn the application of Goal Seek. Suppose you want to find out the maximum 20-year mortgage value if the interest rate is 4.5% and you pay fixed monthly payments of $1,500.

One way to find the required value is the ‘trial and error’ method. You keep experimenting with different trial values till you achieve the correct answer. However, doing so may take up a whole lot of your time, needless to say that it would change the underlying values as well. By using Goal Seek, you can find out the required value and it won’t in the least effect the original values.

You can use the Goal Seek tool to solve this problem, however for that, first you need to determine a trial value. Let’s assume a trial mortgage amount of $350,000.

Here is how you can use Goal Seek in this particular example. The same example and goal seek process is illustrated in Figure 32.5.

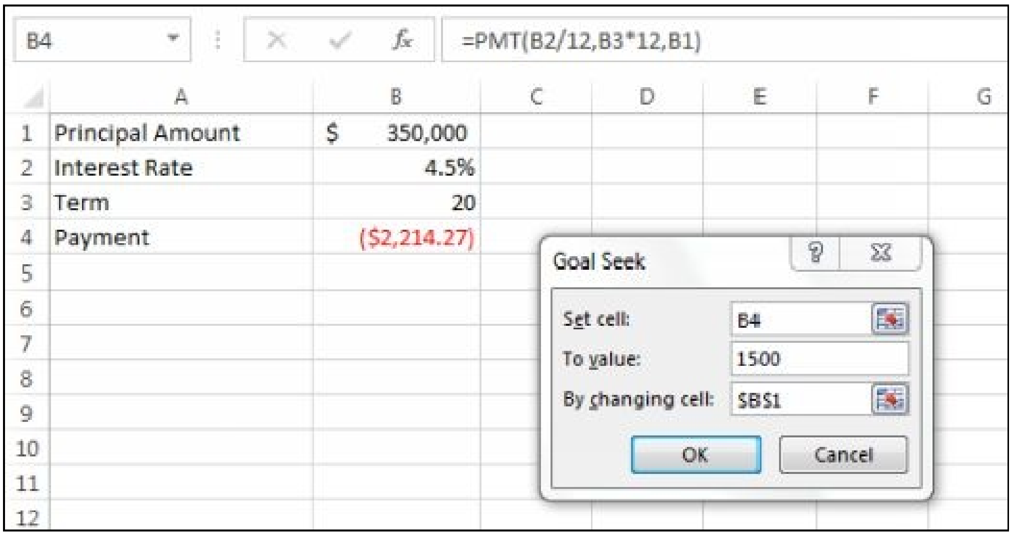


Figure 32.5 - Solving the Mortgage Problem Using the *Goal Seek* Dialog Box

1. Select the cell containing the formula that returns the resulting value. In this case, it is Cell B4, as shown in Figure 32.5

2. On the **Data** tab, click **What-If Analysis** > **Goal Seek**. This will open the *Goal Seek* dialog box, shown in Figure 32.5

3. The *Set cell* text box contains the cell address that you selected in step 1. Make sure it is the cell that contains the formula.

4. In the *To value* text box, type the value you want as the result of the formula. In this example, it is **-1500**. Since it is going to be a cash outflow, therefore we have put a minus sign with it.

5. In the *By changing cell* text box, specify the cell address containing the unknown value; that is the trial value. In this case, it is Cell B1. If you have named any cell, you can enter the name instead of the cell address.

6. Recheck all the entries and click **OK**.

Once you hit **OK**, the *Goal Seek* dialog box will be replaced by the *Goal Seek Status* dialog box stating the target value as well as the current value. The value that you want to find out is stated in the corresponding cell (Cell B1 in this case), as shown in Figure 32.6. If you want to save the new values in the worksheet, hit the **OK** button in the *Goal Seek Status* dialog box. To restore the original values, click **Cancel**.

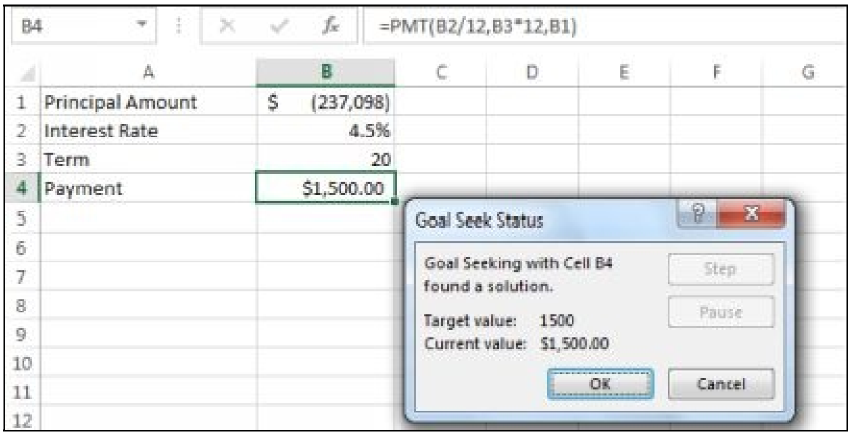


Figure 32.6 - The Goal Seek Tool Providing Solution of the Mortgage Problem

The mortgage problem as illustrated above is a very simple example of using Goal Seek. While using the Goal Seek tool on complex problems, Excel may take a little longer in performing the goal seeking calculations. In such cases, you can click the **Pause** button in the *Goal Seek Status* dialog box to hold the calculation, and then hit the **Step** button to the see the result at each iteration.

	To move back and forth between the original and goal seek values even after closing the *Goal Seek Status* dialog box, use the typical Undo and Redo commands on the Quick access toolbar. Press **Ctrl+Z** to display the original values, provided you clicked **OK** in the *Goal Seek Status* dialog box. Press Ctrl+Y to display the values applied after performing the goal seek operation.

A Handy Tip to Increase Precision

By default, Excel stops the Goal Seek operation after it performs 100 iterations or after it finds an answer that is at least 0.001 precise of your specified target value. If you want a greater precision than 0.001, select **File** > **Options** > **Formulas**. Put a tick mark in the **Enable iterative calculation** checkbox, then increase the value in the **Maximum Iterations** text box or decrease the value in the **Maximum Change** text box, or both.

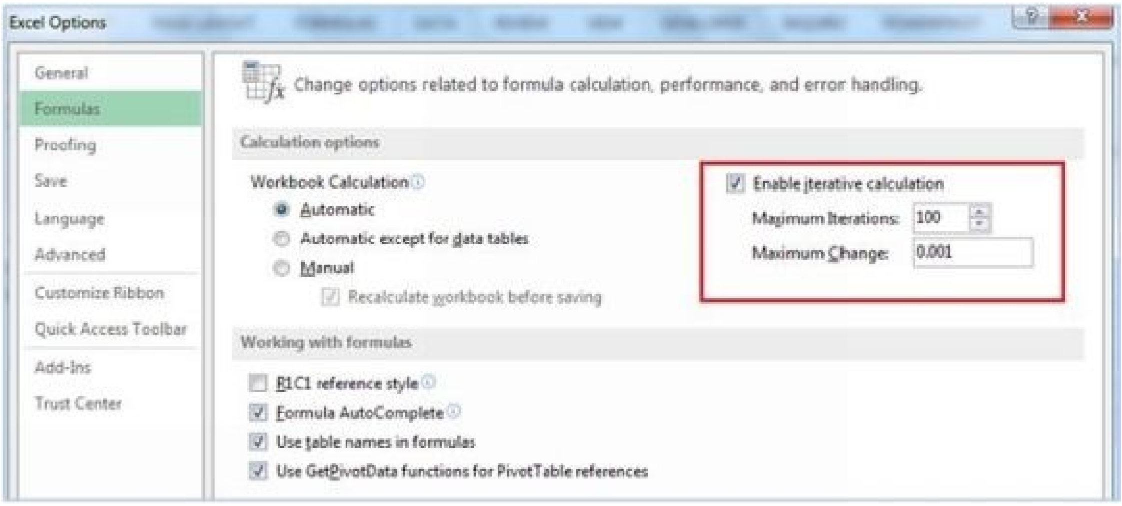


Figure 32.7 - Changing the Settings to Increase the Precision in Goal Seek Results

How to Use Data Tables

What will be the effect on the net profit if the capital gain tax increases by 2%? This is just one example of what type of problems can be solved with the use of Data Tables.

A Data Table allows you to analyze the effect of one or two variable on the final result. For example, you may want to see how changing the tax rate affects the net income, or the effect of increased discount rate on the total operating expenses and so on.

> A data table is useful only when you need to see the effect of one or two variables on the bottom line. In other words, a data table can work with maximum two input values at a time.

There two types of data tables that you can create in Excel, one-variable and two-variable. Let's talk about each in detail.

Generating a One-Variable Data Table

As the name suggests, a *one-variable data table* can deal with a single input cell only. You can change the input value but the input cell remains the same. In other words, you can see the effect of only one variable on the bottom line.

Creating a one-variable data table in Excel is not a one-click automatic procedure. You need to set up the table manually. You can place the table anywhere on a worksheet. Remember the following points while setting up your table:

- The top left cell in the table is to be kept blank.

- The left column in the table is to contain the different values for a single input cell.
- The top row in the table is to contain the references to the formulas that may be located anywhere in the worksheet.

Figure 32.8 shows a skeleton structure of a data table. Follow this figure to set up your data table.

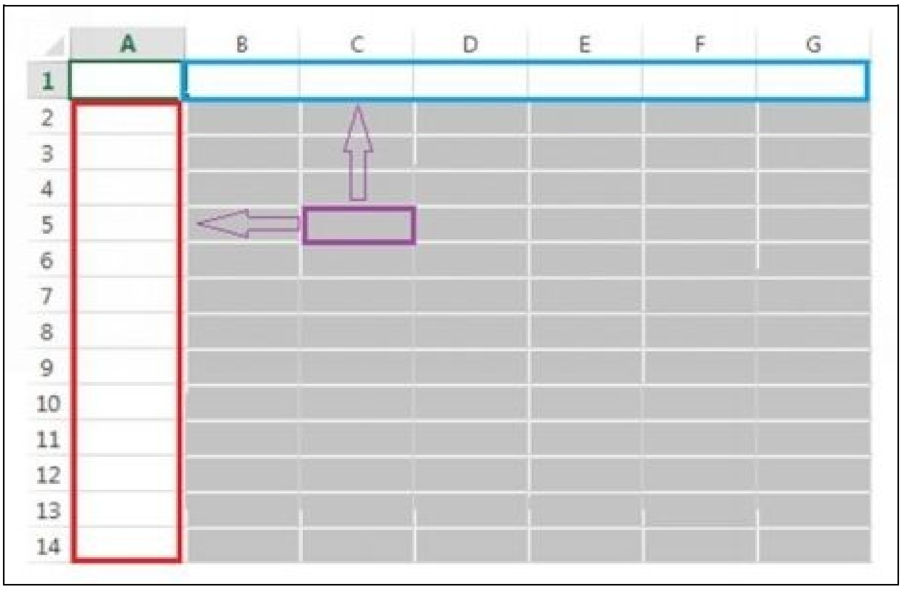


Figure 32.8 - Structure of a Table for Creating a One-Variable Data Table

In Figure 32.8, the cells enclosed in red border are to carry the various values for a single input cell. The top row enclosed in blue border should contain the references to the formulas. The top left cell must be kept blank.

The cells in between the top row and left column (grey shaded) are where Excel returns the resulting values for different input values. For example, when calculating the resulting value in Cell C5 (enclosed in purple box), Excel takes the formula in the top cell in column C and uses the input value in the first cell in Row 5 (as indicated by purple arrows in Figure 32.8). Likewise, Excel calculates all the values using the corresponding formulas and input values.

After setting up your table on the worksheet, follow these steps to create a one-variable data table:

1. Select the data table range.
2. Click **Data** tab > **What-If Analysis** > **Data Table**. This will open the *Data Table* dialog box.
3. Do not enter anything in the *Row Input Cell* text box. Keep it blank. In the *Column Input Cell* text box, specify the cell containing the underlying input value.

4. Click **OK** once done.

One you click **OK**, Excel calculates the resulting values, each with a different input value and returns the answer under the respective formula reference.

> The above process creates a vertical data table. To create a horizontal data table, switch the values between the top row and the left column. Enter the input values in the top row and the formula references in the column. When creating a horizontal data table, leave the *Column Input Cell* text box blank in the *Data Table* dialog box. Specify the input cell address in the *Row Input Cell* text box.

Generating a Two-Variable Data Table

A two-variable data table enables you to see the effect of two variables on the bottom line. In other words, this table is capable of dealing with two input cells at the same time. However, unlike a one-variable data table, a two-variable data table shows the results of one formula only.

When creating a two-variable data table, you need to first set up the table manually. You can place the table anywhere on a worksheet. Remember the following points while setting up your table:

- The top left cell in the table is to contain the formula reference.
- The left column in the table is to contain the different values for the first input cell.
- The top row in the table is to contain the different values for the second input cell.

Figure 32.9 shows a skeleton structure of a data table. Follow this figure to set up your data table.

In Figure 32.9, the cells enclosed in red border are to home the various values for the first input cell. The top row enclosed in blue border are to contain the different values for the second input cell. The top left cell is to contain the formula reference.

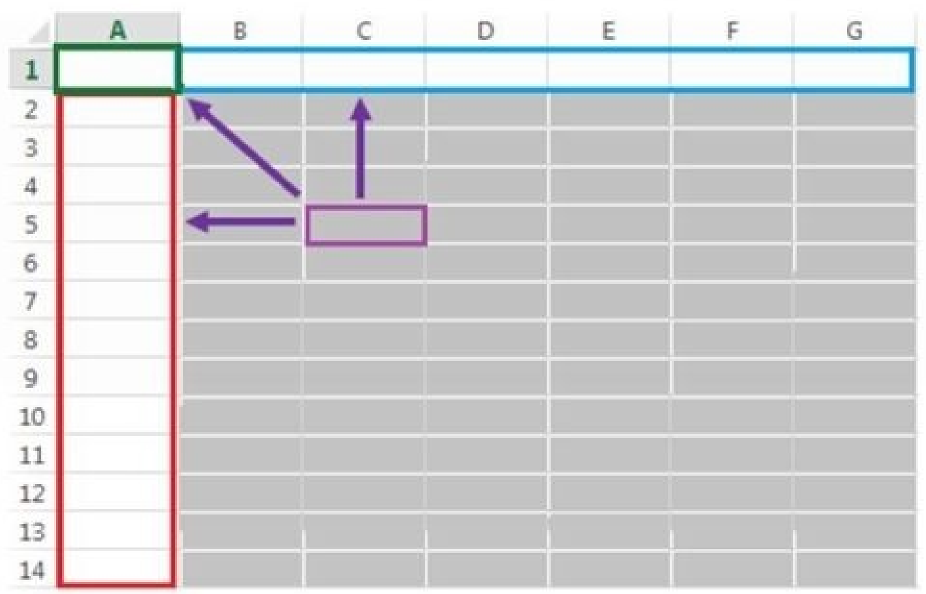


Figure 32. 9 Structure of the Data Table for Creating a Two-Variable Data Table

The cells in between the top row and left column (grey shaded) are where Excel returns the resulting values for the different input values. For example, when calculating the resulting value in Cell C5 (enclosed in purple box), Excel takes the formula in the top left cell and uses the input value in the first cell in Row 5 and the second input value in the top cell in Column C (as indicated by purple arrows in Figure 32.8). Likewise, Excel calculates all the values using the corresponding formulas and two input values.

After setting up your table on the worksheet, follow these steps to create a two-variable data table:

1. Select the data table range.
2. Click **Data** tab > **What-If Analysis** > **Data Table**. This will open the *Data Table* dialog box.
3. In the *Column Input Cell* text box, specify the first input cell (the values of which are entered in the column in the table). In the *Row Input Cell* text box, specify the second input cell (the values of which are entered in the row in the table)
4. Click **OK** once done.

One you click **OK**, Excel calculates the resulting values, each with a different combination of two input values and returns the answer under the intersecting cell in the table.

Get To Know the Excel Solver

Although the Goal Seek and Data Table tools help you to solve almost every kind of problems, both have their own limitations. These are quite an effective data analysis features yet at times you may need something more advanced and powerful, something that enables you to work with multiple input values, formulas, constraints and assumptions.

The Solver add-in in Excel is what you probably need to solve complex data analysis problems. It is capable of performing the following operations in Excel:

- Enables you to specify several changing cells and constraints.
- Applies iterative methods to calculate the most precise solution, given the input values, formulas, constraints and assumptions.
- Keeps on performing iterations (trial and error) till it reaches an answer that is closest to the optimum result.
- Returns multiple solutions, at times, to a problem.
- Returns a solution that optimizes the value in the specified result cell.

The Solver feature is very powerful and handy, however it is a bit complicated to use. You need to put in a little more efforts to learn its usage and mechanism. Make sure you read this section very carefully and then practice all that is mentioned here with a few of your own data analysis problems, if any, or create a few for practice purpose.

Adding the Solver Add-In

The Solver command is located in the *Analysis* group on the Data tab. However, since it is an add-in program, you may not find it in your Ribbon the first time you use Excel.

So if you are unable to find the *Solver* button in the *Data* tab, it means you need to load it first in order to use it. Here is how you can do this:

1. Select **File** > **Options** > **Add-Ins**. This will open the Add-Ins category in the *Excel Options* dialog box.
2. At the bottom of this window is a *Manage* drop-down list. The Excel Add-Ins is selected by default. Let it stay default and click **Go**.
3. This will open the *Add-Ins* dialog box.
4. Click the checkbox labeled **Solver Add-In**, then click **OK**.

Excel adds the Solver add-in in the Data tab on the Ribbon.

Learn to Use Solver

	Remember that at times Solver returns more than one solution, especially when dealing with complex problems. Though it recommends one optimum solution as well, it is not often the only possible outcome, needless to say that it may not be the best solution for you. To make sure you get the best solution, it is highly recommended that you run Solver more than once, every time with different initial underlying value(s).

Before you start using Solver, you need to define the problem for which you actually want to use the Solver. To do so, you need to create a worksheet model that contains the target cell, the changing cells and the constraint cells.

Target Cell: Also known as the *Objective Cell*, it contains the value that is to be optimized. It is the value that you may want to minimize, maximize or set it equal to some other value.

Changing Cells: Also known as *Variable Cells*, these cells contain values that are to be adjusted to reach the target value.

Constraint Cells: These cells contain the limitations that the Solver must take into account while adjusting the changing values.

Once you define the Target, Changing and Constraint cells in your worksheet, follow these steps to solve the problem with the Solver:

1. Click the **Solver** button located at the extreme right in the **Data** tab. This will open the *Solver Parameters* dialog box, as shown in Figure 32.10

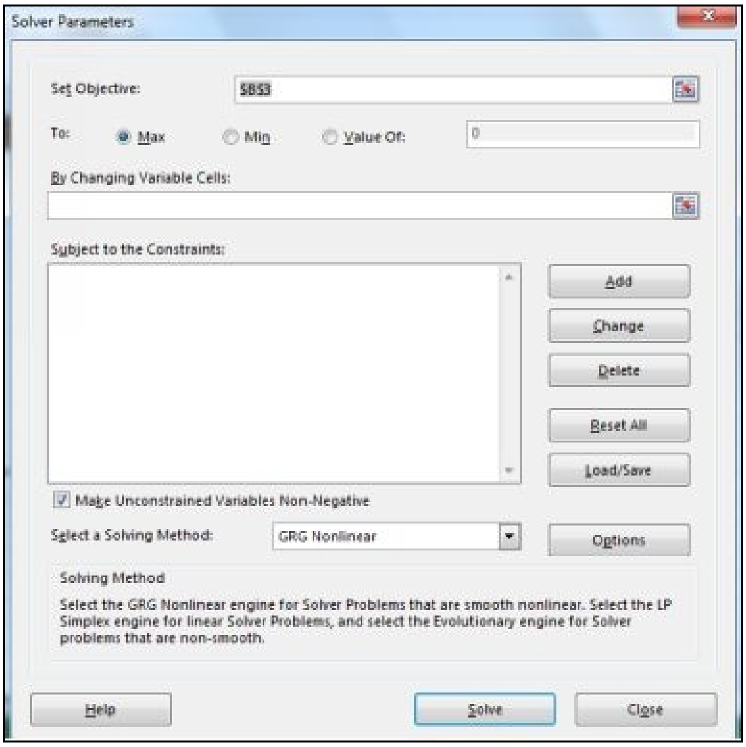


Figure 32.10 - Exploring the *Solver Parameters* Dialog Box

2. In the *Set Objective* text box, specify the target cell by clicking it in the worksheet or by typing it manually in the *Set Objective* text box.

3. Just below the *Set Objective* text box are three check circles; namely, *Max*, *Min* and *Value of*. Click the **Max** check circle if you want to maximize the value in the target cell; or click the **Min** check circle if you want to minimize the value in the target cell; or click the **Value of** check circle if you want the target value to reach any other value. If you are checking the **Value of** option, enter the prospective target value in the accompanying text box.

4. In the *By Changing Variable Cells* text box, specify the cell range containing the changing values. You can do so by clicking the particular cell range in the worksheet or by typing the range address manually in the *By Changing Variable Cells* text box. If the *Changing Cells* are spread apart non-adjacently, press and hold **Ctrl** while clicking the cells in the worksheet.

5. The *Subject to the Constraints* text box displays the constraints that you want the Solver to follow while performing the iterations. To add any constraint, click the **Add** button. This will open the *Add Constraint* dialog box, as shown in Figure 32.11

6. In the *Cell Reference* text box, specify the cell upon whose value you want to apply

the constraint. Next to the *Cell Reference* text box is a drop down list containing several limitations (<=, +, >=, int, bin, dif). Select the required limitation from this drop down list, and then enter the appropriate corresponding value or cell reference in the *Constraint* text box.

> You don't need to enter a value in the *Constraint* text box if you are choosing *int* (integer) or *bin* (binary) in the drop down list.

Figure 32.11 - Adding Constraints

7. You can add many constraints as you want. Click the **Add** button to save the current constraint and clear the text boxes for the next one. After entering details for the last constraint, click **OK** to close the *Add Constraint* dialog box and return to the *Solver Parameters* dialog box. All the constraints will now be displayed in the *Subject to the Constraints* text box.

8. Just below the *Subject to the Constraints* text box is a checkbox labeled **Make Unconstrained Variables Non-Negative**. This option is check marked by default. You can deselect it if you want to allow the negative values, provided the changing cells are not subject to any limitations. This step is optional.

9. Next in line is the **Select a Solving Method** option accompanied by a drop down list. By default, the *GRG Nonlinear method* is selected. Other than the GRG method, this drop down list contains two more options; namely *Simplex LP* and *Evolutionary*.

    Select the *GRG (Generalized Reduced Gradient) Nonlinear method* if the underlying problem is smooth and non-linear.

    Select the *Simplex LP (Linear Programming) method* if the underlying problem is linear.

    Select the *Evolutionary method* if the underlying problem is non-smooth.

10. Finally, recheck all the entries and hit the **Solve** button.

Managing the Solver's Solution

After you click the Solve button, the *Solver Parameters* dialog box disappears. The status bar in Excel keeps you informed of the Solver's progress. It shows you the number of iterations being performed by Excel. If at any time during this process you want to stop the Solver, hit the **Esc** key on your keyboard.

After you stop the solver, the *Show Trial Solution* dialog box appears alerting you that the operation has been halted. To continue from it left off, hit the **Continue** button. To terminate the solver's operation entirely, click the **Stop** button.

If the Solver is not interrupted in between, it completes the process and shows the results in the *Solver Results* dialog box.

First, the *Solver Results* dialog box informs you if the solver was able to find a solution. If not, it poses an error as shown in Figure 32.12. Next, it gives you two options regarding whether you want to keep the solver solution or restore the original values. Put a check mark in the appropriate check circle.

If you currently want to restore the original values on the worksheet but need to save the solution as well for later use, you can do so by clicking the **Save Scenario** button. This will open the Save Scenario dialog box, where you need to enter a name for the scenario. Click **OK** to save the scenario and return to the *Solver Results* dialog box.

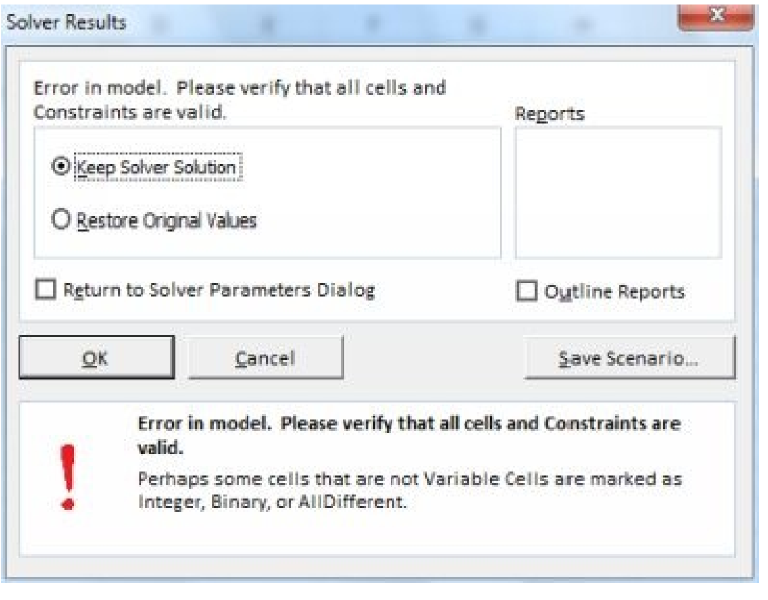


Figure 32.12 - Showing the Error in the *Solver Results* Dialog Box

> Unlike the provision of Redo and Undo in goal seeking operation, you cannot move back and forth between the original values and the ones suggested by the Solver. If you select the **Keep Solver Solution** option in the *Solver Results* dialog box and click **OK**, these changes will be made permanent. You won't be able to view the original values by pressing **Ctrl + Z** and vice versa. The only way of saving both, the original and the new values, is by saving the scenario (by clicking the **Save Scenario** button) and then selecting the **Restore Original Values** option in the *Solver Results* dialog box

Modifying the Solver Settings

Normally, the default solver settings work just fine. You won't really need to make any changes in them, most of the times. However, in some cases, you may need to modify the settings a bit.

To change the Solver settings, open the *Solver Parameters* dialog box and click the **Options** button. This will open the *Options* dialog box, as shown in Figure 32.13.

Once you are done making changes, click **OK** to return to the *Solver Parameters* dialog box and then hit the **Solve** button to start the solver's operation with the modified settings.

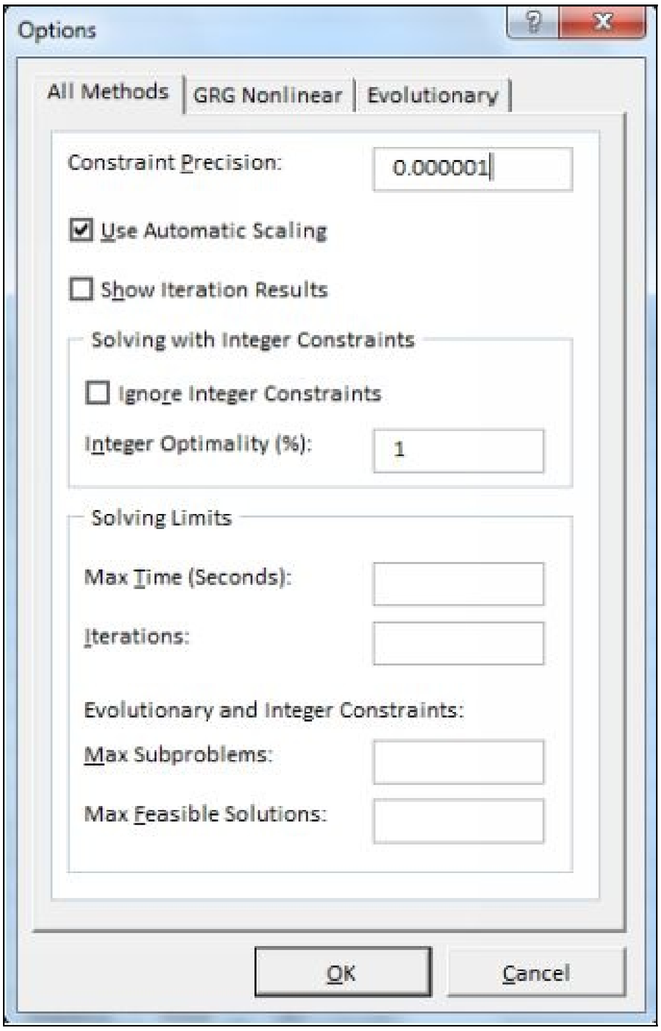


Figure 32.13 - Solver Settings in the *Options* Dialog Box

Following is a brief description about each option in the *Options* dialog box.

Constraint Precision: As the name implies, this option allows you to specify the precision level of the constraints. The value in the *Constraint Precision* text box specifies how close you want the Cell Reference and the Constraint formulas to satisfy the specified limitations.

	The lower the precision, the lesser time is taken by the Solver to return the results. So if there are no constraints in your problem or constraint precision does not matter much in the particular problem, it is recommended to keep the precision as low as possible.

Use Automatic Scaling: Click this checkbox if you want the Solver to automatically scale the resulting values while performing the operation.

Show Iteration Results: Clicking this checkbox will instruct Solver to halt and show the results after each successive iteration.

Ignore Integer Constraints: Clicking this checkbox will instruct the Solver to ignore any constraints that requires a particular cell to be an integer.

Integer Optimality: The value in this text box indicates the percentage of integer optimality criteria that you want the Solver to follow while performing the operation.

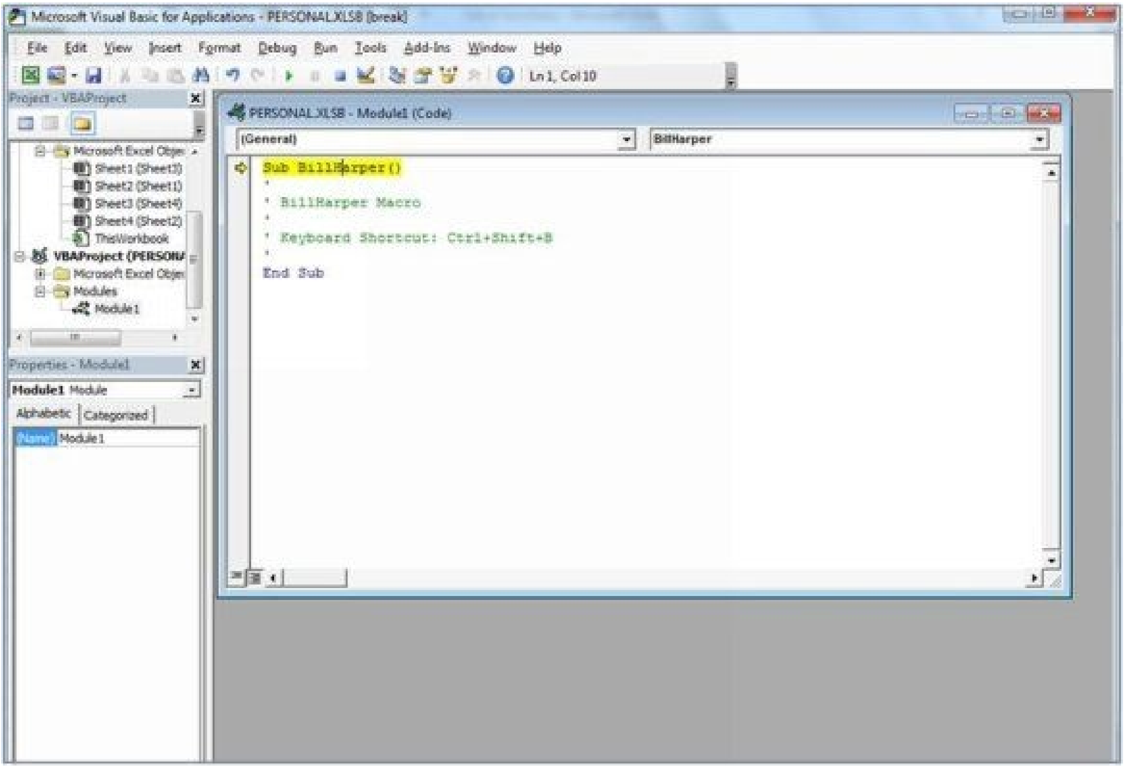
Max Time (Seconds): As the name suggests, the value in this text box specifies the maximum number of seconds that you want the Solver to spend in solving the problem.

Iterations: The value in this text box specifies the maximum number of iterations that you want the Solver to perform while finding the solution.

Max Subproblems: When using the *Evolutionary* method to solve the problem, you can specify the maximum number of subproblems that you want the Solver to take on.

Max Feasible Solutions: When using the *Evolutionary* method to solve the problem, you can specify the maximum number of feasible solutions that you want the Solver to explore while solving the problem.

PART VI: WORKING WITH MACROS



If you are bored or tired of performing the same tasks repetitively and manually, or by using the same boring tools, this part and next one is a must read for you. Talking about this part, here you will get to know about Excel's one of the two most advanced features; that is, Macros. The other advanced thing is talked about in the next part.

A macro is like a program in Excel that enables you to automate boring or repetitive tasks. By using the macro recorder in Excel, you can record the activities that you perform frequently in Excel. This not only saves times that you would have otherwise spent on performing the entire task all over again, it ensures that the particular task is carried out the same way every time.

This part introduces you to the Macro recording tool of Excel, along with its mechanism and applications. You will also learn some macro assigning techniques that will make the use of Macro easier.

AT A GLANCE

Chapter 33: Learning the Basics

In this chapter, you will learn how to record macros in Excel, and then run back the macros to use the recorded procedure to perform repetitive tasks. But first let's see what *macro* actually is.

A *macro* is a set of instructions that you can record to reapply repetitively. After a macro is saved, you just need to hit a single macro button to perform all the tasks that are recorded in the particular macro.

A macro is recorded in a programming language called Visual Basic for Applications (VBA). It is a special type of programming language that can be used with all the Microsoft Office applications. While the next part talks more about VBA, for now you need to know that it is the Excel's Visual Basic Editor that enables you to view and edit the recorded macros.

There are two ways of recording macros; you can use the Excel's macro recorder to record the entire procedure while you perform it on a worksheet, or you can enter the macro VBA code in the Visual Basic Editor.

The first way of recording macros is comparatively easier; also it is the macro recorder process that we have explained in the next section.

How to Record Macros

Before you set on to record macros, make sure you have the *Developer* tab revealed on your Ribbon in Excel. The *Developer* tab, that contains several Macro related commands, is hidden by default. Here is you can make it visible on the Ribbon.

1. Select **File** > **Options** > **Customize Ribbon.**
2. Click the **Developer** check box located in the right side *Main tabs* list.
3. Click **OK** once done.

The Developer tab is added to your Ribbon.

Now that you have revealed the Developer tab, let's see how you can actually create a macro in Excel.

For the sake of understanding, suppose the repetitive task is entering "Bill Harper LLB" in 14 Times Roman, bold, italic and centralized. Follow these steps to record a macro for this process.

1. First you need to open the *Record Macro* dialog box. There are three ways to do that:

    1. Select **View** tab > **Macros** drop down list > **Record Macros.**

    2. Select **Developer** tab > **Record Macro**.

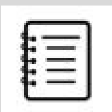
    3. Click the *Record Macro* button in the status bar.

Either ways, the *Record Macro* dialog box opens up, as shown in figure 33.1.

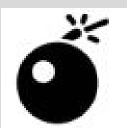
2. In the *Macro name* text box, enter a name for your macro.

Figure 33.1 - Entering Details in the *Record Macro* Dialog Box

3. Just below the *Macro name* text box is the *Shortcut key* option, where you need to specify a shortcut key to run the particular macro. The Ctrl key is already there, you are to complete the shortcut combination by entering a letter in the accompanying text box.



While assigning a shortcut key, you can specify any letter from A to Z, or you can also enter “Shift+ (any letter from A to Z)”. You cannot, however, assign a number or any other punctuation key. **Ctrl+4** and **Ctrl+!** are examples of invalid macro shortcut key combinations.



While assigning a keyboard shortcut to your macro, make sure you assign an unused shortcut. For example, **Ctrl+C** is already a

	shortcut used to copy cells in Excels. If you assign the same shortcut to any macro, the latter will override the former, hence you won't be able to use the same shortcut for copying cells and data in the particular workbook.

4. Next in line is the **Store macro in** drop down list, containing the following three options.

    1. Click **Personal Macro Workbook** to be able to use the particular macro in any Excel workbook.

    2. Click **This Workbook** if you plan to use to this macro in the current workbook only.

    3. Click **New Workbook** if you want to open a new workbook to record and save this macro.

5. In the *Description* text box, enter a description about the macro. This step is optional; however it is recommended that you enter a brief description to keep record of what the particular macro entails, especially when working with quite a number of macros.

6. Click **OK** once done.

7. As soon as you click the OK button, the *Record Macro* dialog box disappears. In the status bar, the Record Macro button is replaced with a solid square. This icon indicates that a macro is currently recording; and that you can stop the recording by clicking this square icon.

8. Select **View** tab > **Macros** drop down list > **Use Relative References**; or click **Developer** tab > **Use Relative References.** This step is optional however it is highly recommended that you keep the relative references command activated as this would enable you to run the macros anywhere on the worksheet.

9. Start entering data and do whatever you want the macro the record. In this example, select a cell, enter "Bill Harper LLB", then in the Font group on the Home tab, set the font to 14 size Times Roman. Make it bold, italic and centralized.

10. Once you are done entering all that you want to record in the macro, hit the Stop Recording button on the status bar. After you stop a macro, the *Stop Recording* icon is replaced by the Record Macro icon, indicating that the recording has been

stopped.

How to Run Macros

There are several ways of running a macro, as stated below:

1. Select **View** tab > **Macros** drop down list > **View Macros**.
2. Select **Developer** tab > **Macros**.

Either ways, Excel opens the *Macro* dialog box, as shown in Figure 33.2. Select the name of the macro you want to run and hit the **Run** button.

For keyboard users, hit **Alt + F8** to open the *Macro* dialog box.

If you have assigned any shortcut key to a macro, then you don't need to follow the above steps. Just hit the shortcut combination and it will run the particular macro.

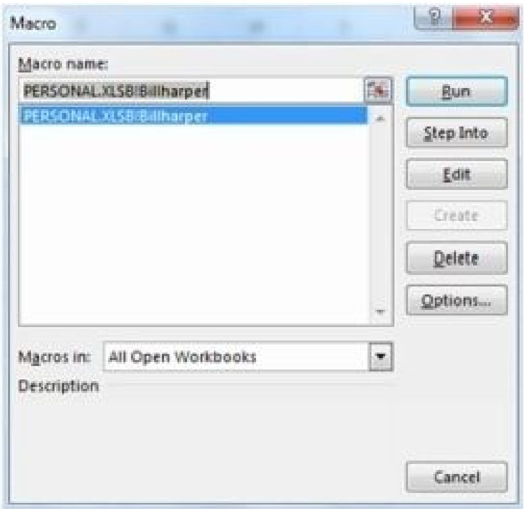


Figure 33.2 - The *Macro* Dialog Box

Before running a macro, make sure to select a blank cell where you want the macro to perform the recorded task, or else the macro may override the existing data. To revert a macro's actions, hit the **Undo** button on the Quick Access toolbar. If a particular macro performs series of tasks, you may have to Undo several times in order to nullify the macro's effects.

How to Save Workbooks Containing Macros?

The first time you record a macro in a workbook, you may need to change the file type in order to save it. Clicking **Ctrl + S** or the simple **Save** button in the quick access toolbar may not store a macro, in fact, it may make you lose your macro if you ignore Excel's warning and close the file without saving it in the right format.

By default, an Excel file is saved *.xlsx* file format. When storing macros in a workbook, you need to save it as *.xlsm* (Excel Macro-Enabled Workbook).

> You can also save the workbook as *.xls* (Excel 97–2003 format) or the *.xlbs* (Excel binary format), both of these file types can contain macros.

Modifying the Macro Security Settings

Figure 33.3 shows *Macro Settings* tab in the *Trust Center* dialog box. There are two ways to open it:

1. Click **Macro Security** in *Code* group on the **Developer** tab.
2. Select **File** > **Options** > **Trust Center**. Hit the **Trust Center Settings** button.

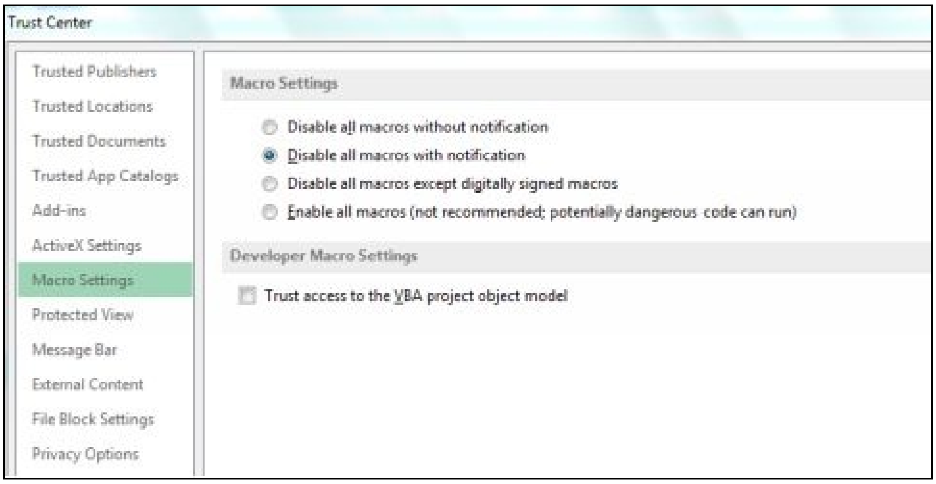


Figure 33.3 - The Macro Security Settings in the *Trust Center* Dialog Box

Following is a brief description about the options in the *Macro Settings* tab of the *Trust Center* dialog box.

Disable all macros without notification: Clicking this option deactivates all the macros that are not saved in your computer's trusted locations. This option prevents all the users including you, to run any macros in the current worksheet. You can activate this security setting when your computer is shared by other users whom you don't want to run a macro, as some macros may carry harmful computer virus.

Disable all macros with notification: This option is selected by default. It is the opposite of the previous security setting; that is, it gives you control over the deactivation of macros that are not saved in your computer. This security option is most recommended as it gives you control over the running of potentially harmful macros.

Disable all macros except digitally signed macros: Excel allows you to specify publishers that can be trusted. Selecting this option automatically enables the digitally signed macros from trusted publishers, and disallows the ones that are not digitally signed. If after activating this security option, you try to a run a macro that is digitally signed but not from a trusted publisher, Excel displays an alert window that contains a **Trust All Documents from this Publisher** button. Clicking this button will add the particular publisher to your trusted list.

Enable all macros (not recommended; potentially dangerous code can run): As already mentioned, this is the least recommended option as it opens doors to all publishers and macros. This option can cause real damage to your system as anyone at anytime can run a macro in any of the opened worksheet. This even includes the macros containing deadly computer viruses and malware.

Apart from the above explained four options, the **Trusted Locations** tab in the *Trust Center* dialog box contains some options that you should know about, with regards to Macro security.

Add New Location: Clicking this button opens up the M*icrosoft Office Trusted Location* dialog box where you can specify any folder on your computer as a trusted location. You can either type in the folder's directory path or can hit the **Browse** button and then explore it in your computer. If you want to designate the subfolders of the selected folder as trusted locations, click the **Subfolders of This Location Are Also Trusted** check box. Click **OK** once done.

Allow Trusted Locations on My Network (Not Recommended): The locations that you add by clicking the *Add New Location* button will only be considered as trusted after you select this checkbox.

Disable All Trusted Locations: Selecting this option disables all the locations that you add by clicking the *Add New Location* button, only the macros from trusted publishers will be allowed to run in excel.

Chapter 34: Assigning Macros

Macros are so handy that you may get addicted to them once you learn to use them properly; and when that happens, it is recommended that you add the frequently needed macros to your quick access toolbar or to a customized tab in your ribbon. This would make the use of macro quicker and easier.

This chapter talks about the macro assigning techniques. The first section entails a step by step process of adding macros to the quick access toolbar. The second section explains the process of assigning macros to your ribbon.

How to Add Macros to the Quick Access Toolbar

Follows these steps to add a macro button to your quick access toolbar:

1. Click the **Customize Quick Access Toolbar** button > **More Commands**. This will open the *Quick Access Toolbar* tab in the *Excel Options* dialog box.

2. Click the **Choose Commands From** drop-down list and select **Macros**. All the macros that are saved in the current workbook as well as those saved as *Personal Macro Workbook* will be listed in the box located below the **Choose Commands From** drop-down list.

3. Select the macro that you want to add to your Quick Access toolbar and hit the **Add** button. Likewise, you can select and add any number of macros you want.

4. After adding all the desired macros, click the **OK** button to close the *Excel Options* dialog box.

Once you are back to the worksheet, you will notice that a new button is added to your Quick Access toolbar. The macro button resembles a typical flowchart icon, which should not be a problem unless you add more than one macro to your Quick Access toolbar, in which case it would be difficult for you to distinguish between different macro buttons, all having the same flowchart icon.

One way to find out the required macro button is by taking the mouse cursor over to each macro icon and seeing the name of the corresponding macro in the form of a ScreenTip. This method however, may take up a lot of time, and is not at all recommended when you have quite a number of macro icons on the quick access toolbar.

A better approach of telling apart between different macro icons is to put a customized button for each one of them on a worksheet. You can assign different images, clip arts and shapes to the macro icons.

To assign any graphical object to a macro, first you need to insert the particular graphical object on a worksheet; then right click the image and select **Assign Macro** from the shortcut menu, as shown in Figure 34.1

This will open the Assign Macro dialog box. Enter a name for your macro button and click **OK**. You can place this image anywhere on the worksheet. It is now the *Run* button for the corresponding macro. Just click the image to run the particular macro.

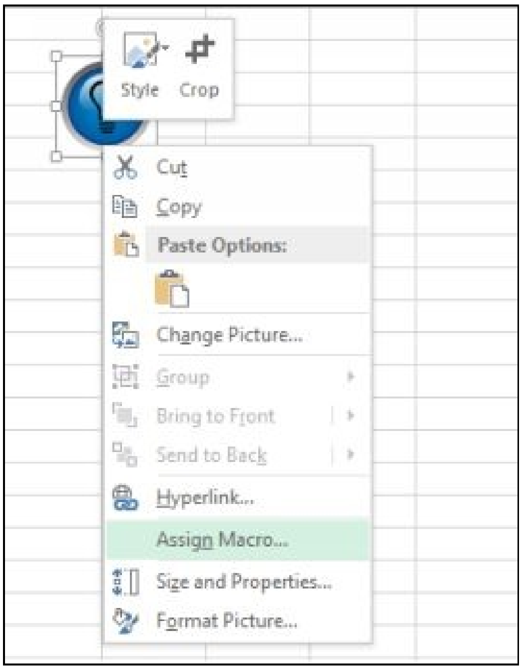


Figure 34.1 - Assigning Macro to a Graphical Object

How to Add Macros to the Ribbon

If you don't like to cramp your Quick Access toolbar with extra buttons, you can add macros to a custom tab on the Ribbon. Here is how you can do that:

1. Select **File** > **Options** > **Customize Ribbon**. This will open the *Customize the Ribbon* tab in the *Excel Options* dialog box.

2. On the left side, you will find the **Choose Commands From** drop-down list. Click this drop down list and select **Macros**. All the macros that are saved in the current workbook as well as those saved as *Personal Macro Workbook* will be listed in the box located below the **Choose Commands From** drop-down list.

3. In the *Main Tabs* list box on the right, select the name of the custom tab to which

you want to add the macro buttons. If you have not yet created a custom tab, follow these steps to do so:

1. Hit the New Tab button located just below the *Main Tabs* list box. This will add a **New Tab (Custom)** and a **New Group (Custom)** to the *Main Tabs* list.

2. Click **New Tab (Custom)** and hit the **Rename** button.

3. Specify a name for your new tab; you can name it *Macro* if you are planning to dedicate this tab solely to the macros. Click **OK** to close the *Rename* dialog box.

4. Now select **New Group (Custom)** and hit the **Rename** button. Specify a name for the new group and click **OK**.

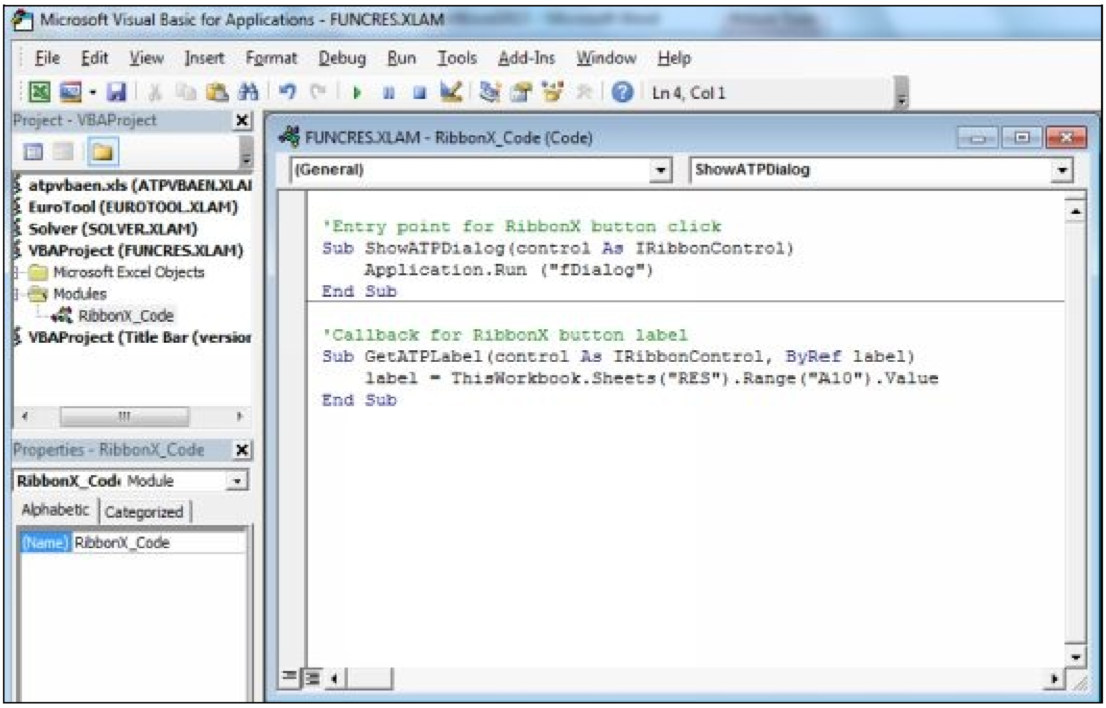
> You can segregate the groups on the basis of the nature of Macros. For example, if you have named the New Tab (Custom) as *Macro*, you can create different groups and name them as Finance Macros, Depreciation Macros and so on.

4. After selecting the name of the custom tab and group in the *Main Tabs* list box, select the macro that you want to add to this particular tab and then hit the **Add** button. Likewise, you can select and add any number of macros you want.

5. After adding all the desired macros, click the **OK** button to close the *Excel Options* dialog box.

Once you are back to the worksheet, you will find the newly added macros in the custom tab. Just click the macro command button on the Ribbon to run the particular macro.

PART VII: LEARNING VBA PROGRAMMING



Visual Basic for Applications, commonly known as VBA, is the official programming language of Excel. You can use it to create and edit macros, define custom functions and much more.

VBA is an entire new subject in itself, the study of which is well beyond the scope of this book. However, this part does tell you the basic and common applications of the Visual Basic language.

This part of the book entails the process and tips to create macros using VBA. It introduces you to the Visual Basic editor and its different components. You will also learn how to use the VB editor to edit your macros.

The second chapter in this part contains a detailed explanation on how you can use the VB language to create user defined functions in Excel.

AT A GLANCE

Chapter 35: Working With the VB Editor

This chapter starts with an introduction of the Visual Basic editor in Excel. Then it entails the step by step process of editing and creating macros using the VBA language. You will also discover some handy tips regarding the use of Excel's VB editor.

Introducing the VB Editor

Figure 35.1 shows a Visual Basic Editor in Excel. You can open the VB editor by clicking the **Visual Basic** button in the **Developer** tab.

	For keyboard users, press Alt + F11 to open the Visual Basic Editor

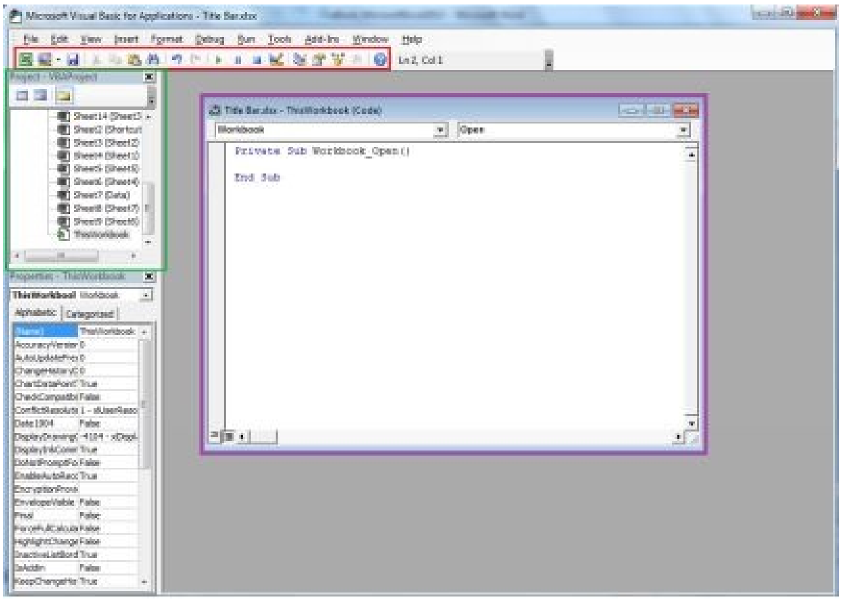


Figure 35.1 - Exploring the Visual Basic Editor in Excel

In Figure 35.1, different areas have been highlighted. The buttons enclosed in the red box make up the *Visual Basic Editor Standard toolbar*. It contains several commands that you may need to use while creating and editing VBA codes. Just hover your mouse cursor over a button to reveal the name of the corresponding command.

Just below the Standard toolbar, there are three tiled windows. The one enclosed in green borders is the *Project Explorer* window. It contains all the sheets and projects opened in the Visual Basic Editor. You can click a project in this window to explore and work on its components and user forms.

In VBA terminology, a *Project* consists of all the worksheets, codes and user forms, that are part of a particular workbook.

The second window in the VB editor is the *Code* window (*highlighted in purple in Figure 35.1*). When you select any project or module in the *Project Explorer* window, the *Code* window displays the VBA programming code for the macro stored in the selected project.

Just beneath the *Project Explorer* window is another tiled window that shows the properties of the project or module selected in the *Project Explorer* window.

When you first open the Visual Basic Editor, it shows three tiled windows; one containing the list of open projects and modules, the other displaying the properties of the selected project and the third one showing the VBA programming code of the selected module.

Apart from these, you can open as many *Code* windows as you want. Just double click a module in the *Project Explorer* window to open its corresponding *Code* window, or you can right click the module you want to view the code of and then click **View Code** in the shortcut menu.

Renaming Items in the VB Editor

Sheet1, *Sheet2*, *Module1*, *Module2*, and so on…this is how, by default, the names of sheets and modules appear in the VB Editor. You may want to give a more descriptive name to your projects, especially when there are lots of them or when you need to present them to other users.

Naming a module or worksheet in the VB Editor makes it easier to remember what it contains. And it is very simple! Suppose you want to rename *Module1*. All you have to do is click Module1 in the *Project Explorer* window, then specify a name for it in the text box attached to the **(Name)** tab in the *Properties* window.

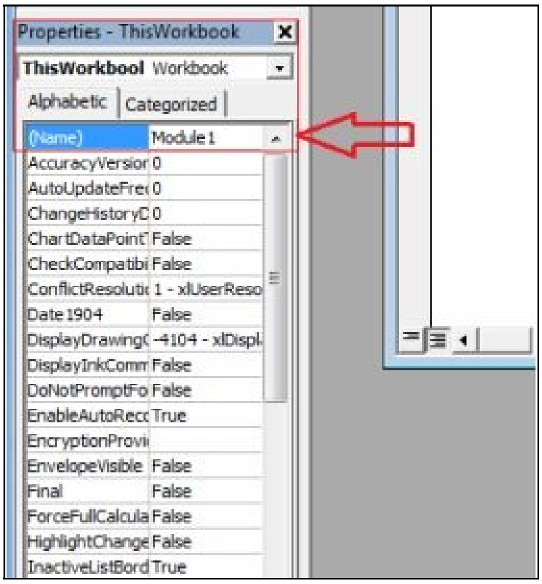


Figure 35.2 - Renaming *Module1* in the Properties Window in the VB Editor

	When specifying a name for a module or sheet in the VB editor, it is mandatory that you start the name with a letter. Moreover, make sure the name does not contain any spaces between words; instead you can put underscore.

How to Edit Macros Using VBA?

In Part VI of this book, you learned how to create macros using the Excel's macro recorder. What if you mistakenly skipped something while recording a macro or you need to add/delete any activity from a recorded macro. Well, you can definitely recreate the entire macro, however, this may take up a lot of your time especially when a macro contains a lengthy task. In such cases, it is more convenient and recommended to edit the macro rather than recreating it from scratch. This section tells you how to do that.

	If the macro you want to edit is stored in a *Personal Macro Workbook*, than you would have to unhide this workbook first before making any changes in it. To unhide a Personal Macro Workbook, click the **Unhide** button in the **View** tab on the Ribbon. This will open the *Unhide* dialog box. Select the name of the personal workbook in the *Unhide Workbook* list box and click **OK**.

Follow these steps to edit the contents of a macro in the Visual Basic Editor:

1. Select **View** tab > **Macros** drop down list > **View Macros**, or hit **Alt + F8** on your keyboard. This will open the *Macro* dialog box, displaying names of all the macros created in the book as well as those saved in your *Personal Macro Workbook*.

2. Select the name of the macro that you want to edit and then click the **Edit** button. This will open the Visual Basic Editor with the Code window displaying the VBA code for the selected macro.

3. Edit the VBA code in the VB editor as desired.

While editing a macro’s code in the VB editor, you can use the Excel’s traditional **Ctrl + Z** and **Ctrl + Y** to undo or redo any action, respectively. These commands are also located in the Visual Basic Editor Standard Toolbar.

4. Once you are done editing the macro, you can return to the worksheet and run your modified macro. To do so, click the **View Microsoft Excel** command, it is the first button on the Standard toolbar, or you can also **Alt + F11**. Either ways, Excel minimizes the VB editor and shows the corresponding worksheet.

5. Once you are on the worksheet, select any blank unneeded cell and test-run your modified macro. If it does not run as it should, go back to the VB editor and rectify the mistakes in the VBA code.

6. Once the modified macro is correctly edited; that is, it runs the intended task, hit the **Save** command on the Quick Access toolbar to the save the changes in the particular macro.

It is highly recommended that you test a modified macro by running it immediately after editing it. This is to ensure that you have not added any invalid code or made any incorrect changes in the VBA code; if yes, go back to the VB editor and undo your last actions. If you close a worksheet without testing the modified macro and later on if it poses any error while running, you would not be able to undo the edits just by hitting **Ctrl + Z**.

If you edit a macro that is stored in your Personal Macro Workbook, you need to unhide it first, this has already been mentioned. Once you make the changes to this particular macro, save it and then exit Excel, it will be automatically hidden. You won't have to click the **Hide** command on the **View** tab. So next when you need to edit the same macro, you would have to unhide the workbook again before making any changes in it.

How to Record New Macros Using VBA?

As already mentioned in the previous chapters, there are two ways of creating a macro in Excel; you can record it using the Excel's macro recorder or you can create it using the Visual Basic Editor. You have already learned the former; following entails the step by step process to perform the latter.

Here is how you can create a macro in the VB Editor:

1. Open the VB editor by clicking the **Visual Basic** button in the **Developer** tab, or by pressing **Alt + F11** on your keyboard.

2. In the *Project Explorer* window, select the name of the project in which you want to create the new macro.

3. Select **Insert** > **Module**. This will open a blank code window in the VB Editor. Also, you will see that a new module icon is added in the *Project Explorer* window, under the name the particular VBA Project.

4. In the blank *Code* window, type **sub** and then hit the *space bar*.

5. Type a name for your new macro, then hit the **Enter** key. As soon as you specify the name and hit **Enter**, a closed pair of parentheses is added after the macro's name, followed by a blank line and then the *End Sub* statement. The insertion point rests on the blank line.

While naming your new macro, make sure the name does not contain any spaces between words, instead you can put underscore. Moreover, the name should start with a letter.

6. Start typing the VBA code for your macro. The code must start from the blank line that is inserted by Excel in between the macro name and the *End Sub* statement.

7. Once you are done entering the code, click **File** > **Save** or hit **Ctrl + S** to save your new macro.

8. Now click the **View Microsoft Excel** command on the Standard toolbar, or you can also **Alt + F11**. Either ways, Excel minimizes the VB editor and shows the appropriate worksheet.

9. Once you are on the worksheet, select **View** tab > **Macros** or hit **Alt + F8** to open the *Macro* dialog box. Select the macro that you just created and click the **Run** button. If the macro runs correctly and yields the intended results, your work is done then.

10. If, however, Excel faces any error while running your new macro, it takes you back to the Visual Basic Editor. There you will see an *Alert Microsoft Visual Basic* dialog box specifying the nature of the particular error. If you are still unable to figure out the error yourself, click the **Debug** button in the *Alert Microsoft Visual Basic* dialog box. This will have Excel highlight the line of code that contains any invalid entry.

11. Once you are done rectifying the incorrect line of code, click the **Continue** button which replaces the *Run* button on the standard toolbar while the VB Editor is the debug mode.

Chapter 36: Creating User Defined Functions in Excel

This chapter talks about yet another exciting feature of VBA; that is, it allows you to create your own functions in Excel.

User Defined Functions, shortly read as *UDFs*, works just like any other functions. You can enter them into worksheets just like you do any other built-in Excel function. However, UDFs are customized functions; that is, you can create them as per your requirements.

How to Create a User Defined Function in Excel

Following is the simple generic process to create a user defined function in Excel:

1. Open the VB editor by clicking the **Visual Basic** button on the **Developer** tab, or by pressing **Alt + F11** on your keyboard.

2. In the *Project Explorer* window, select the name of the project for which you want to create the particular user defined function.

> If you want to use a user defined function in any worksheet of Excel, select **VBAProject (personal.xlsb)** in the *Project Explorer* window.

3. Select **Insert** > **Module**. This will open a blank Code window in the VB Editor. Also, you will see that a new module icon is added in the *Project Explorer* window, under the name the particular VBA Project.

4. In the first line of the blank Code window, specify a name for your custom function, then enter the names of the arguments that you want to include in this particular function.

> While specifying a name for your custom function, you cannot use the name of any built-in function. You must come up with a unique name. Moreover, the arguments that you enter must be listed in order in which they are to be applied and enclosed in parentheses.

5. Now, using the arguments listed in the first line of code, enter the formula(s) that you want this particular user defined function to perform. You can use arithmetic operators and other built-in functions to make up the formula that is to be performed by your user defined function to return the required result.

6. Once you are done defining the user defined function, type the **End** command on the last line in the *Code* window.

How to Use a User Defined Function in Your Worksheet

As already mentioned, you can work with a user defined function just like you work with any other built-in function in Excel. First, select the cell where you want to enter the particular user defined function, then open the *Insert Function* dialog box by clicking the ***fx*** icon on the formula bar. The *Insert Function* dialog box is shown in Figure 36.1

1. Click the '**Or Select a Category'** drop down list, scroll down and select **User defined**. Doing so will display all your user defined functions in the '**Select a function'** list box.

2. Select the function you want to enter and click **OK**.

3. Now enter the appropriate arguments to complete the operation.

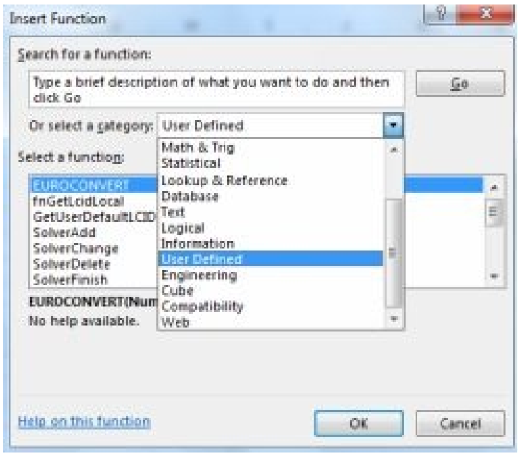


Figure 36.1 - Browsing the User Defined Functions in the *Insert Function* Dialog Box

How To Add Description With A User Defined Function?

As you can see in Figure 36.1, the area below the '*Select a function*' list shows "**No help available**". Normally, this part of the *Insert Function* dialog box contains a brief description about the selected function, but in case of a user defined function, there is no such thing.

This is because a user defined function is created by you and therefore you are the only one who can add a description to your creation.

Follow these steps to add description about your user defined function in the *Insert Function* dialog box:

1. Click the **Visual Basic** button on the **Developer** tab or hit **Alt + F11** on your keyboard, to open the Visual Basic Editor.

2. Select **View** > **Object Browser**. This will open the *Object Browser* dialog box, as shown in 36.2

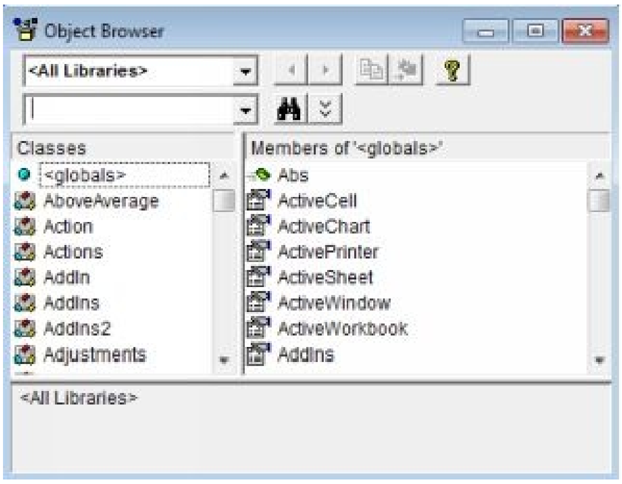


Figure 36.2 - The *Object Browser* Dialog Box

	For keyboard users, open the Visual Basic Editor and then hit the **F2** key on your keyboard to launch the *Object Browser* dialog box.

3. In the *Object Browser* dialog box, click the value **<All Libraries>** and then select **VBAProject**. This will list all your user defined functions in one of the classes in the left pane of the *Object Browser* dialog box.
4. Right click the user defined function, for which you want to add the description and select **Properties** in the shortcut menu. This action opens the *Member Options* dialog box where you can enter your description of the selected user defined function.

5. Type in the description and click **OK** to save the description and close the *Member Options* dialog box.

6. Close the *Object Browser* dialog box to return to the VB Editor.

7. In the VB Editor, select **File** > **Save** or hit **Ctrl + S** on your keyboard.

The added description will now appear in the *Insert Function* dialog box, upon selecting the particular user defined function in it.

Entering a User Defined Function Directly Into a Cell

In the previous section, we narrated the process of entering a user defined function via the *Insert Function* Dialog Box. But as you already know, you can enter a function directly into a cell too; that is, by preceding it with an equal to (=) sign. Unfortunately, the direct method of entering a function is not the same for a user defined function as it is for other built-in functions.

Suppose you created a user defined function by the name of RATIO. If it was a normal built-in function, you could have entered it as follows:

=RATIO (E1/E2)

where E1 and E2 are cell references pertaining to the function's arguments.

However, since RATIO is a user defined function, you cannot just enter it as shown just now. If you do so, Excel would return the #NAME? error value in the cell.

To enter a user defined function directly into a cell, you must enter the name of the appropriate workbook along with the function. For example, if the RATIO function is created in a *Personal Macro Workbook*, you need to enter this function as follows:

=PERSONAL.XLSB!RATIO(E1/E2)

Entering the workbook's name may get annoying and time consuming as well, especially if the particular workbook's name is lengthy. Well, there is a way to enter a user defined function directly into a cell, without having to enter the appropriate workbook's name. To do so, you need to save the workbook containing the user defined functions, as an add-in file.

Follow these steps to save a file containing user defined functions as an add-in file, so that you can enter these functions directly into the cells without the need to enter their respective filenames:

1. First you need to unhide the Personal Macro Workbook that you want to save as a special add-in file. Here is how you can do that:

    1. Click the **Unhide** button in the **View** tab on the Ribbon. This will open the

Unhide dialog box.

2. Select the name of the personal workbook in the *Unhide Workbook* list box and click **OK**.

2. Now click the **Visual Basic** button on the **Developer** tab or hit **Alt + F11** on your keyboard, to open the Visual Basic Editor. You will see that the workbook containing the user defined functions is selected in the *Project Explorer* window.

3. Now select the **Tools** > **VBAProject Propertie**s. This will open the *VBAProject - Project Properties* dialog box, as shown in Figure 36.3. This dialog box contains two tabs, General and Protection.

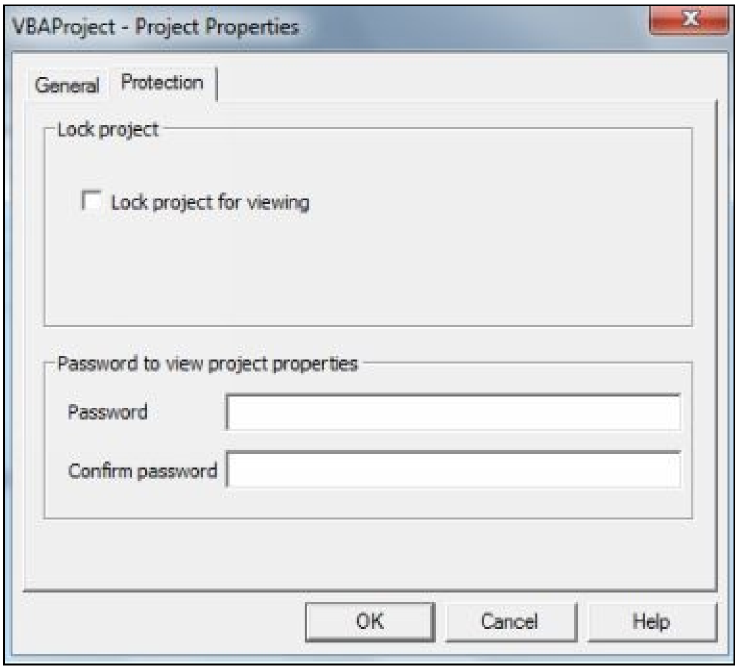


Figure 36.3 - The *VBAProject - Project Properties* Dialog Box

4. Click the **Protection** tab. There, put a tick mark in the **Lock Project for Viewing** check box. Doing so will prevent others from viewing your user defined functions. Needless to say that if they won't be able to view it, they won't be able to modify it as well.

5. Next, enter a password in the *Password* text box. Renter the same password in the *Confirm Password* text box and then click **OK**. This action will prevent others from un-checking the **Lock Project for Viewing** check box.

6. Now click the **View Microsoft Excel** in the VB Editor's Standard toolbar. This will take you back to the worksheet.

7. Before saving this workbook as an add-in file, you need to give it a title. To do so,

select **File** > **Info**. This will take you to the *Info* tab in the *Backstage* view. Enter a name for the add-in file in the *Title* field. If you want, you can also add a brief description about the user defined functions that would be there in the particular add-in file.

8. After entering the title and description, click the **Save As** command. This will open the *Save As* screen in the *Backstage* view.
9. Click **XLSTART** located under the *Current Folder* heading on the right hand side of the *Save As* screen. This will open the *Save As* dialog box.
10. Specify a filename for the particular add-in file and select **Excel Add-In (*.xlam)** in the *Save as type* drop down list.
11. After entering the filename and changing the file type to ***.xlam***, hit the **Save** button.
12. Now it is time to activate your user defined functions contained in the add-in file. To do so, click **File** > **Options** > **Add-Ins**. This will open the *Add-Ins* tab in *the Excel Options* dialog box.
13. At the bottom of this window is a *Manage* drop-down list with the *Excel Add-Ins* selected in it. Hit the **Go** button located right next to the *Manage* drop-down list. This will open the *Add-Ins* dialog box, containing the names of all the available add-ins.
14. To activate your user defined functions, you need to include the name of the add-in file in the *Add-Ins available* list in the *Add-Ins* dialog box. To do so, click the **Browse** button and then select the name of your add-in file in the *Browse* dialog box. Click **OK** once done.
15. The last step closes the *Browse* dialog box and brings you back to the *Add-Ins* dialog box. You will see that the name of your new add-in is now listed in the *Add-Ins* dialog box. Make sure the check box carrying the name of your add-in is check-marked. Click **OK** once done.
16. Once you click OK, Excel closes the *Add-Ins* dialog box and brings you back to the Visual Basic Editor. Hit the **Save** button on the Standard toolbar or click **Ctrl + S** on your keyboard.
17. Click the **View Microsoft Excel** button, or hit **Alt + F11** on your keyboard, to return to the workbook.

18. Hide back the personal macro workbook by clicking the **hide** button in the **View** tab on the Ribbon.

Now you can enter the user defined functions directly into a cell, without having to enter the respective workbook's name.

APPENDIX

List of Keyboard Shortcuts

Shortcuts for Using Microsoft Excel Help

Keyboard Shortcut	Description
F1	Open the Microsoft Excel Help Dialog Box
Tab	Select the next help topic or hyperlink
Shift + Tab	Select the previous help topic or hyperlink
Enter	Open the selected help topic or hyperlink
Alt + F4	Close the Microsoft Excel Help Dialog Box
Alt + Left Arrow	Go to the previous Help topic
Alt + Right Arrow	Go to the next Help topic
Ctrl + P	Print the currently opened Help topic
Ctrl + A	Select the entire Help topic
Ctrl + C	Copy the selected items to the Clipboard
Up Arrow	Scroll to the beginning of a Help topic
Down Arrow	Scroll to the end of a Help topic
Page Up	Scroll toward the top of the current page of a Help topic
Page Down	Scroll toward the bottom of the current page of a Help topic
Home	Go to the beginning of a Help topic
End	Go to the end of a Help topic

Shortcuts for Navigating Worksheet

Keyboard Shortcut	Description
Arrow keys (↑, ↓, ←, →)	Move one cell up, down, left or right respectively

Arrow keys* (↑, ↓)	Scroll one row up or down respectively
Arrow keys* (←, →)	Scroll one column left or right respectively
Home	Move to the first cell of the current row
Home*	Move to the top left cell of the current display of the worksheet
End*	Move to the bottom right cell of the current display of the worksheet
Page Up	Move up one screen
Page Down	Move down one screen
Ctrl + Page Up	Move to the previous sheet in the workbook
Ctrl + Page Down	Move to the next sheet in the workbook
Alt + Page Up	Move one screen to the left
Alt + Page Down	Move one screen to the right
Ctrl + Home	Move to cell A1 (the first cell of the worksheet)
Ctrl + End	Move to the last blank cell of the active region of the worksheet
Ctrl + Arrows keys	Move to the edge of the active region . If the current cell is blank, move to the last blank cell in the corresponding direction
Ctrl + Backspace	Scroll to the active cell
End + Home	Move to the last cell of the active data block
Ctrl + Tab	Go to next window
Ctrl + Shift + Tab	Go to the previous window
Ctrl + F6	Move to the next open workbook
Ctrl + Shift + F6	Move to previous open window
* With Scroll Lock on	

Shortcuts for Selecting Cell(s)

Keyboard Shortcut	Description
Home	Select the first cell in the row.

F8	Switch On/Off the Extend Selection mode. In this mode is On, you can select cells just moving the navigation keys
Shift + Spacebar	Select the entire row(s)
Ctrl + Spacebar	Select the entire column(s)
Shift + F8	Turn On/Off the “Add to Selection” mode. If this mode is on, it eliminates the need of holding Ctrl while selecting a range of cells. Just click on the cell(s) you want to select. Turn off this mode once you are done selecting.
Shift + Navigation key	Extend the selection by one cell in the corresponding direction
Ctrl + Shift + Spacebar	Hit this combination once to select the active table without the header row; Hit it twice to select the entire table; Hit it thrice to select the entire worksheet
Ctrl + Shift + Navigation key	Extend the selection up to the last nonblank cell in the corresponding row or column
Ctrl + A	Select the entire worksheet
Shift + Home	Extend the selection to the beginning of the active row
Scroll Lock + Shift + Home	Extend the selection to the cell in the top left corner of the current window
Ctrl + Shift + Home	Extend the selection to the beginning of the active worksheet
Ctrl + *	Select the range of cells surrounding the active cell
Ctrl + Shift + End	Extend the selection to the last nonblank cell on the worksheet
End + Shift + Home	Extend the selection to the last blank/nonblank cell on the worksheet
Shift + Page Up	Extend the selection up one screen in the active row
Shift + Page Down	Extend the selection down one screen in the active row
F5 or Ctrl + G	Open the Go To dialog box for selecting cells by name
Shift + Backspace	Cancel the current range selection and select the active cell
End + Shift + arrow key	Extend the selection in the direction of the navigation key to the last nonblank cell in the current region
Ctrl + Home	Select the first cell in the current window or pane
Ctrl + Down Arrow	Select the last cell down in the region
Scroll Lock + Shift + End	Extend the selection to the cell in the bottom right corner of the current window

Ctrl + 6	Toggle the visibility of objects
Shift + Alt + Page Down	Extend the selection one page to the right
Shift + Ctrl + Page Up	Extend the selection one worksheet up
Shift + Alt + Page Up	Extend the selection one page to the left
Shift + Ctrl + Page Down	Extend the selection one worksheet down

Shortcuts for "Go To Special" Commands

Keyboard Shortcut	Description
Ctrl + Shift + O	Select the Comments command
Ctrl + Shift + *	Select the current region command
Ctrl + /	Select the current array command
**Ctrl + **	Select Row Differences
Ctrl + Shift + |	Select Column Differences
Ctrl + [	Select precedents (Direct)
Ctrl + Shift + {	Select precedents (All)
Ctrl +]	Select dependents (Direct)
Ctrl + Shift + }	Select dependents (All)
Alt + ;	Select visible cells only

Shortcuts for Data Entry

Keyboard Shortcut	Description
Enter	Accept the cell entry and moves below
Alt + Enter	Start a new line in the selected cell
Ctrl + Enter	Copy the current entry in all the cells in the selected range
Shift + Enter	Accept the cell entry and moves up one cell

Tab	Accept the cell entry and moves one cell to the right
Shift + Tab	Accept the cell entry and moves one cell to the left
Esc	Cancel an entry or any changes made in the cell while it is still in the edit mode
F4	Repeat the last command or activity
Ctrl + D	Fill down the cells in the selected range
Ctrl + Shift + :	Enters the current time
Ctrl + ;	Enters the current date

Shortcuts for Number Formatting

Keyboard Shortcut	Description
Ctrl + Shift + ~	Apply the General number format
Ctrl + Shift + $	Apply the Currency format with two decimal places (put negative numbers in parentheses)
Ctrl + Shift + %	Apply the Percentage format with no decimal places
Ctrl + Shift + ^	Apply the Scientific (Exponential) number format with two decimal places
Ctrl + Shift + #	Apply the Date format (Day-Month-Year)
Ctrl + Shift + @	Apply the Time format (Hour:Minute AM/PM)
Ctrl + Shift + !	Add two decimal places, thousands separator, and hyphen (-) for negative values

Shortcuts for Text Formatting and Editing Worksheets

Keyboard Shortcut	Description
Alt + ’ (apostrophe)	Display the Style dialog box
Ctrl + 1*	Display the Format Cells dialog box
Ctrl + B or Ctrl + 2*	Apply or remove bold formatting
Ctrl + I or Ctrl + 3*	Apply or remove italic formatting
Ctrl + U or Ctrl + 4*	Apply or remove underline

Ctrl + 5*	Apply or remove strikethrough
Ctrl + 9*	Hide the selected rows
Ctrl + 0*	Hide the selected columns
Ctrl + Shift + (	Unhide the hidden rows within the selection
Ctrl + Shift + &	Apply the outside border to the selection
Ctrl + Shift +_ (underscore)	Remove the outside border from the selection
* Use the numeric key on the keyboard, not on the keypad	

Shortcuts for Working with Charts and Borders

Keyboard Shortcut	Description
F11	Create a chart of the selected data on a new worksheet.
Alt + F1	Create an embedded chart of the selected data on the current worksheet.
Down Arrow	Select the previous group of elements in the selected chart.
Up Arrow	Select the next group of elements in the selected chart.
Right Arrow	Select the next element within the selected group in a chart.
Left Arrow	Select the previous element within the selected group in a chart.
Alt + T	Draw or erase the top border.
Alt + B	Draw or erase the bottom border.
Alt + L	Draw or erase the left border.
Alt + R	Draw or erase the right border.
Alt + U	Draw or erase the upward diagonal border.
Alt + D	Draw or erase the downward diagonal border.
Alt + H	Apply or delete the horizontal divider, if cells in multiple rows are selected.
Alt + V	Apply or delete the vertical divider, if cells in multiple rows are selected.

Shortcuts for Working with Formulas

Keyboard Shortcut	Description
= (equals to)	Start a formula.
Enter	Complete a cell entry in the cell or formula bar and move one cell down.
F2	When a cell is not in the editing mode, this key moves the insertion point into the formula bar.
Backspace	Delete one character to the left of the cursor, in the formula bar.
Delete	Delete one character to the right of the cursor, in the formula bar.
Home	Move the insertion point to the beginning of the line, in the formula bar.
End	Move the insertion point to the end of the line, in the formula bar.
Ctrl + Delete	Delete all characters from the insertion point to the end of the line.
Alt + = (equal sign)	Insert an AutoSum formula.
Ctrl + Shift + “	Copy the displayed value from the cell located above the active cell and then select it for editing.
Ctrl + Shift + Enter	Enter a formula as an array formula.
Ctrl + ’ (apostrophe)	Copy the underlying value from the cell located above the active cell into the active cell.
Ctrl + A	Open the *Function Arguments* dialog box, when the insertion point is to the right of a function name in a formula.
Ctrl + Shift + A	Insert the argument names and parentheses, when the insertion point is to the right of a function name in a formula.
Esc	Cancel an entry in the cell or formula bar, or take the selected cell out of the editing mode.
F3	Open the *Paste Name* dialog box.
Shift + F9	Calculate the active worksheet.
Ctrl + ` (accent grave)	Toggle between displaying cell values and formulas.
Shift + F3	Open the *Insert Function* dialog box.
F9	When a part of a formula is selected, calculate the selected part; or else calculate all worksheets in all open workbooks.
	Calculate all worksheets in all the open workbooks, regardless of whether

Ctrl + Alt + F9	and how much have they been modified since the last calculation.

Some More Keyboard Shortcuts

Keyboard Shortcut	Description
Alt + F8	Open the *Macro* dialog box.
Alt + F11	Open the Visual Basic Editor; if the editor is already opened, this shortcut key acts as a toggle between displaying the main Excel window and the editor.
Ctrl + F11	Insert a Microsoft Excel 4 macro worksheet.
Ctrl + 6	Cycles among different ways of displaying objects on a worksheet
Ctrl + P or Ctrl + Shift + F12	Open the *Print* dialog box.
Shift + F10	Open the shortcut menu for the selected item.
Alt + Spacebar	Open the control menu for Excel window.
Ctrl + Shift + L	Toggle the AutoFilter controls in a table
Ctrl + Alt + V	Open the Paste Special dialog box.
Alt + F, then press P	Open the *Print/Print Preview* screen in the *Backstage* view.
Ctrl + 8	Act a as a toggle to display the outline symbols.
Ctrl + F	Open the *Find* tab in the *Find and Replace* dialog box.
Ctrl + H	Open the *Replace* tab in the *Find and Replace* dialog box.
Ctrl + F1	Act a as a toggle to display and hide the Ribbon.
Alt + Backspace	Undo the last action.
Ctrl + K	Open the *Insert Hyperlink* dialog box.
Ctrl + R	Fill Right
Ctrl + N	Open a new workbook.
Ctrl + O	Open the *Open* screen in the *Backstage* view.
Ctrl + T	Open the *Create Table* dialog box.
Ctrl + Shift + T	Toggle the Total row in a table

List of the Functions in Alphabetical Order

Function	Description
ABS	Returns the absolute value of a number; that is a number without it sign.
ACCRINT	Returns the interest accrued by a security that pays periodic interest.
ACCRINTM	Returns the interest accrued by a security that pays interest at maturity.
ACOS	Returns the arccosine (inverse cosine) of a number.
ACOSH	Returns the inverse hyperbolic cosine of a number.
ACOT	Returns the arccotangent (inverse cotangent) of a number
ACOTH	Returns the inverse hyperbolic arccotangent of a number
ADDRESS	Creates the cell reference as text, given the specified row and column numbers
AGGREGATE	Returns an aggregate of a range of array, in a list or database.
AMORDEGRC	Returns the prorated linear depreciation for each accounting period
AMORLINC	Returns the prorated linear depreciation for each accounting period (The coefficient of depreciation depends upon the life of the asset)
AND	Tests whether the specified arguments are true; Returns TRUE if all the arguments are TRUE
ARABIC	Converts a Roman numeral to an Arabic numeral
AREAS	Returns the number of areas in a reference, where Area is an adjacent range or a single cell
ASIN	Returns the arcsine of a number in radians
ASINH	Returns the inverse hyperbolic sine of a number
ATAN	Returns the arctangent of a number in radians
ATAN2	Returns the arctangent of the specified x and y coordinates, in radians
ATANH	Returns the inverse hyperbolic tangent of a number
AVEDEV	Returns the average of the absolute deviations of data points from their mean

AVERAGE	Returns the arithmetic of the numbers specified in the arguments
AVERAGEA	Computes the average of the values specified in the arguments, where values include text and logical values as well
AVERAGEIF	Returns the average of the values in the specified range, that meets the given criterion
AVERAGEIFS	Computes the average for the cells specified by multiple criteria
BAHTTEXT	Converts a number to Thai (Baht) text
BASE	Converts a number into a text representation with the given radix (base)
BESSELI	Returns the modified Bessel function In(x)
BESSELJ	Returns the Bessel function Jn(x)
BESSELK	Returns the modified Bessel function Kn(x)
BESSELY	Returns the Bessel function Yn(x)
BETA.DIST	Calculates the beta cumulative distribution function
BETA.INV	Returns the inverse of the beta cumulative distribution function (BETA.DIST)
BETADIST*	Calculates the beta cumulative distribution function. This function is the compatibility version of BETA.DIST function.
BETAINV*	Returns the inverse of the cumulative beta probability density function. This function is the compatibility version of BETA.INV function.
BIN2DEC	Converts a binary number to a decimal number
BIN2HEX	Converts a binary number to hexadecimal
BIN2OCT	Converts a binary number to octal.
BINOM.DIST	Returns the individual term binomial distribution probability.
BINOM.DIST. RANGE	Returns the probability of a trial result using a binomial distribution.
BINOM.INV	Returns the smallest value for which the cumulative binomial distribution is greater than or equal to a criterion value.
BINOMDIST*	Returns the individual term binomial distribution probability. This function is the compatibility version of BINOM.DIST function.
BITAND	Compares two numbers in binary form, and then returns the one indicating the bit positions that do not match. In other words, it returns a bitwise ‘AND’ of two numbers.

BITLSHIFT	Returns a number that has been shifted to the left by *shift_amount* bits, by adding zeros to the right of the number.
BITOR	Compares two numbers in binary form, and then returns the one indicating the bit positions that match. In other words, it returns a bitwise ‘OR’ of two numbers.
BITRSHIFT	Returns a number that has been shifted to the right by *shift_amount* bits, by removing digits to the right of the number
BITXOR	Compares the two numbers and then returns the one that indicates the result of an ‘Exclusive OR’ of its arguments. In other words, it returns a bitwise Exclusive OR of two numbers.
CEILING*	Rounds a number to the nearest integer or to the nearest multiple of significance.
CEILING.MATH	Rounds a number up, to the nearest multiple of significance.
CELL	Returns information about the formatting, location and contents of a cell.
CHAR	Returns the character specified by the code number from the character set for your computer. It mostly corresponds to the ASCII code
CHIDIST*	Returns the right-tailed probability of the chi-squared distribution. This function is the compatibility version of CHISQ.DIST.RT function.
CHIINV*	Returns the inverse of the right tailed probability of the chi-squared distribution. This function is the compatibility version of CHISQ.INV.RT function.
CHISQ.DIST	Returns the chi-square distribution.
CHISQ.DIST.RT	Returns the right-tailed probability of the chi-squared distribution.
CHISQ.INV	Returns the inverse of the left-tailed probability of the chi-squared distribution.
CHISQ.INV.RT	Returns the inverse of the right-tailed probability of the chi-squared distribution.
CHISQ.TEST	Returns the test for independence: the value from the chi-squared distribution for the statistic appropriate degrees of freedom.
CHITEST*	Returns the test for independence. This function is the compatibility version of CHISQ.TEST function.
CHOOSE	Chooses a value or action from a list of values.
CLEAN	Deletes all the nonprintable characters from text.
CODE	Returns a numeric code for the first character in a text string, according to the character set installed in your computer

COLUMN	Returns the column number of a reference.
COLUMNS	Returns the number of columns in a reference or array
COMBIN	Returns the number of combinations for a given number of objects
COMBINA	Returns the number of combinations for a given number of items.
COMPLEX	Converts real and imaginary coefficients into a complex number.
CONCATENATE	Combines multiple text values into one text value.
CONFIDENCE*	Computes the confidence interval for a population mean, assuming a normal distribution. This function is the compatibility version of CONFIDENCE.NORM function.
CONFIDENCE.NORM	Computes the confidence interval for a population mean, assuming a normal distribution
CONFIDENCE.T	Returns the confidence interval for a population mean. This function uses the Student's T-distribution.
CONVERT	Converts a numeric value from one measurement system to another.
CORREL	Computes the correlation coefficient between the two given data sets.
COS	Returns the cosine of a number. It is the complement of the SIN function.
COSH	Returns the hyperbolic cosine of a number.
COT	Returns the cotangent of an angle in radians.
COTH	Returns the hyperbolic cotangent of an angle in radians.
COUNT	Returns the number of numerical values in a given range.
COUNTA	Returns the number of values in a given range, including the text and logical values.
COUNTBLANK	Returns the number blank cells in the given range.
COUNTIF	Counts and returns the number of cells that meet the specified criteria.
COUNTIFS	Counts and returns the number of cells that meet multiple criteria.
COUPDAYBS	Computes the number of days from the beginning of the coupon period to the settlement date.
COUPDAYS	Computes the number of days in the coupon period that contains the settlement date.

COUPDAYSNC	Computes the number of days from the settlement date to the next coupon date.
COUPNCD	Returns the next coupon date after the settlement date.
COUPNUM	Computes the number of coupons payable between the settlement date and the maturity date.
COUPPCD	Returns the coupon date previous to the settlement date.
COVAR*	Computes the covariance, the average of the products of deviations for each data point pair in two data sets. This function is the compatibility version of COVARIANCE.P function.
COVARIANCE.P	Computes the covariance, the average of the products of deviations for each data point pair in two data sets.
COVARIANCE.S	Computes the sample covariance, the average of the products deviations for each data point pair in two data sets.
CRITBINOM*	Returns the smallest value for which the cumulative binomial distribution is less than or equal to a criterion value. This function is the compatibility version of BINOM.INV function.
CSC	Returns the cosecant of an angle.
CSCH	Returns the hyperbolic cosecant of an angle.
CUBEKPIMEMBER	Returns a key performance indicator name (KPI) property and displays the name and property in the cell.
CUBEMEMBER	Returns a member or tuple in a cube hierarchy.
CUBEMEMBERPROPERTY	Returns the value of a member property in the cube.
CUBERANKEDMEMBER	Returns the nth or ranked member in a set.
CUBESET	Returns a calculated set of members or tuples by sending a set expression to the cube on the server’s database.
CUBESETCOUNT	Returns the number of items in a set.
CUBEVALUE	Returns an aggregated value from a cube.
CUMIPMT	Returns the cumulative interest paid between two periods, the *start_period* and the *end_period*.
CUMPRINC	Returns the cumulative principal paid on a loan between two periods, the *start_period* and the *end_period*.
DATE	Returns the serial number of a particular date.
DATEVALUE	Returns the serial number of a date that is originally entered in the form

	of text.
DAVERAGE	Returns the average of the values in a column of a list or database that match the specified conditions.
DAY	Converts a serial number to day of the month, a number between 1 and 31.
DAYS	Counts and returns the number of days between the two dates specified in the arguments.
DAYS360	Counts and returns the number of days between two dates, based on a 360-day year.
DB	Calculates the depreciation of an asset for a given period, using the fixed declining-balance method.
DCOUNT	Counts and returns the cells that contain numerical values in a column of a list or database that match the specified conditions.
DCOUNTA	Counts and returns the cells that contain values (including text and logical values) in a column of a list or database that match the specified conditions.
DDB	Calculates the depreciation of an asset for a specified period, using the double declining-balance method or any other specified method.
DEC2BIN	Converts a decimal number into binary.
DEC2HEX	Converts a decimal number to hexadecimal.
DEC2OCT	Converts a decimal number to octal.
DECIMAL	Converts a text representation of a number in a given base into a decimal number.
DEGREES	Converts radians to degrees.
DELTA	Performs a test to check whether two values are equal.
DEVSQ	Returns the sum of squares of deviations of data points from their sample mean.
DGET	Extracts a single value from a column in a table or database that matches the specified conditions.
DISC	Computes and returns the discount rate for a security.
DMAX	Returns the largest numeric value in a column in a table or database that matches the specified conditions.
DMIN	Returns the smallest numeric value in a column in a table or database that matches the specified conditions.

DOLLAR	Converts a numeric value to text, using the currency format, with the specified number of decimal places.
DOLLARDE	Converts a dollar price that was originally displayed in fraction form into a dollar price displayed in decimal form.
DOLLARFR	Converts a dollar price expressed as a decimal number into a dollar price expressed as a fraction.
DPRODUCT	Multiplies the values in a column in a table or database that matches the specified conditions.
DSTDEV	Returns the estimated standard deviation based on a sample population from the selected table or database.
DSTDEVP	Returns the estimated standard deviation based on the entire population from the selected table or database.
DSUM	This function performs Conditional Summation. It totals the numeric values in a column in a table or database that matches the specified conditions.
DURATION	Calculates the annual duration of a security with periodic interest payments.
DVAR	Returns the estimated variance based on a sample population from the selected table or database.
DVARP	Returns the estimated variance based on the entire population from the selected table or database.
EDATE	Returns the serial number of the date that is the indicated number of months before or after a given date.
EFFECT	Computes the effective annual interest rate.
ENCODEURL	Returns a URL encoded string; that is, a Universal Resource Locator encoded string for web use.
EOMONTH	Returns the serial number of the last day of the month before or after a specified number of months.
ERF	Returns the error function integrated between *lower_limit* and *upper_limit*.
ERF.PRECISE	Returns the error function.
ERFC	Returns the complementary error function integrated between *x* and *infinity.*
ERFC.PRECISE	Returns the precise complementary error function integrated between *x* and *infinity.*
ERROR.TYPE	Returns a number matching an error value.

EVEN	Rounds a number up to the nearest even integer.
EXACT	Performs a case sensitive test to see whether two text values are identical.
EXP	Computes the value of the constant *e* raised to the power of a given number.
EXPON.DIST	Returns the exponential distribution.
EXPONDIST*	Returns the exponential distribution. This function is the compatibility version of EXPON.DIST function.
F.DIST	Returns the left tailed F probability distribution for two data sets.
F.DIST.RT	Returns the right-tailed F probability distribution for two data sets.
F.INV	Returns the inverse of the left-tailed F probability distribution.
F.INV.RT	Returns the inverse of the right-tailed F probability distribution.
F.TEST	Returns the result of an F-test, the two-tailed probability that the variances in Array1 and Array2 are significantly different.
FACT	Returns the factorial of a number.
FACTDOUBLE	Returns the double factorial of a number.
FALSE	Returns the logical value FALSE.
FDIST*	Returns the right-tailed F probability distribution for two data sets. This function is the compatibility version of F.DIST.RT function.
FILTERXML	Returns specific data from the XML content by using the specified Xpath.
FIND	Returns the starting position of one text string within another text string. This function performs a case sensitive operation.
FINV*	Returns the inverse of the right-tailed F probability distribution. This function is the compatibility version of F.INV.RT function.
FISHER	Returns the Fisher transformation.
FISHERINV	Returns the inverse of the Fisher transformation.
FIXED	Rounds a number to the specified number of decimals and returns the result as text, with or without commas.
FLOOR*	Rounds a number down, to the nearest multiple of significance.
FLOOR.MATH	Rounds a number down, to the nearest integer or to the nearest multiple

	of significance.
FORECAST	Calculates, or predicts a future value based on the existing values. This function uses the linear regression method to perform the calculation.
FORMULATEXT	Returns the formula in the formula bar, as a text value.
FREQUENCY	Calculates the number of times the values occur within a specified range and then returns a vertical array of numbers.
FTEST*	Returns the result of an F-test, the two-tailed probability that the variances in Array1 and Array2 are significantly different. This function is the compatibility version of F.TEST function.
FV	Calculates the future value of an investment, based on a constant interest rate and constant periodic payments.
FVSCHEDULE	Returns the future value of an initial principal after applying a series of compound interest rates.
GAMMA	Returns the Gamma function value
GAMMA.DIST	Returns the gamma distribution
GAMMA.INV	Returns the inverse of the gamma cumulative distribution
GAMMADIST*	Returns the gamma distribution. This function is the compatibility version of GAMMA.DIST function.
GAMMAINV*	Returns the inverse of the gamma cumulative distribution. This function is the compatibility version of GAMMA.INV function.
GAMMALN	Returns the natural logarithm of the gamma function, G(x).
GAMMALN.PRECISE	Returns the natural logarithm of the gamma function, G(x).
GAUSS	Returns 0.5 less than the standard normal cumulative distribution.
GCD	Returns the greatest common divisor.
GEOMEAN	Computes the geometric mean of an array, or a range of cells containing positive numeric data.
GESTEP	Performs a test to check whether a number is greater than a threshold value.
GETPIVOTDATA	Returns data stored in a Pivot Table.
GROWTH	Returns values in an exponential growth trend matching known data points.
HARMEAN	Returns the harmonic mean of a data containing positive numbers.

HEX2BIN	Converts a hexadecimal number to binary.
HEX2DEC	Converts a hexadecimal number to decimal.
HEX2OCT	Converts a hexadecimal number to octal.
HLOOKUP	Searches for a value in the top row of a table and then returns a value in the same column from a row you specify in the table.
HOUR	Returns the hour part of a serial number as a number between 0 - 23.
HYPERLINK	Creates a shortcut that opens a document saved on a hard drive, network server or the Internet.
HYPGEOM.DIST	Returns the hypergeometric distribution.
HYPGEOMDIST*	Returns the hypergeometric distribution. This function is the compatibility version of HYPGEOM.DIST function.
IF	Performs a logical test to check if the specified conditions are met, then returns one specified value if TRUE, returns another value if FALSE.
IFERROR	Returns a different value if the first argument evaluates to an error, otherwise returns the value of the expression itself.
IFNA	Returns the specified value if the expression evaluates to #N/A error, otherwise returns the value of the expression itself.
IMABS	Returns the absolute value (modulus) of a complex number.
IMAGINARY	Returns the imaginary coefficient of a complex number.
IMARGUMENT	Returns the argument theta, an angle that is expressed in radians.
IMCONJUGATE	Returns the complex conjugate of a complex number.
IMCOS	Returns the cosine of a complex number.
IMCOSH	Returns the hyperbolic cosine of a complex number.
IMCOT	Computes and returns the cotangent of a complex number.
IMCSC	Computes and returns the cosecant of a complex number.
IMDIV	Computes and returns the quotient of two complex numbers.
IMEXP	Returns the exponential of a complex number.
IMLN	Returns the natural logarithm of a complex number.
IMLOG10	Returns the base-10 logarithm of a complex number.

IMLOG2	Returns the base-2 logarithm of a complex number.
IMPOWER	Returns a complex number raised to an integer power.
IMPRODUCT	Computes and returns the product of complex numbers.
IMREAL	Returns the real coefficient of a complex number.
IMSEC	Returns the secant of a complex number
IMSECH	Returns the hyperbolic secant of a complex number
IMSIN	Returns the sine of a complex number.
IMSINH	Returns the hyperbolic sine of a complex number.
IMSQRT	Computes the square root of a complex number.
IMSUB	Computes the difference of two complex numbers.
IMSUM	Computes the sum of complex numbers.
IMTAN	Returns the tangent of a complex number.
INDEX	Returns a value(s) or cell reference(s) at the intersecting point of a particular row and column in the specified range.
INDIRECT	Returns a reference indicated by a text string.
INFO	Returns information about the current operating environment.
INT	Rounds a number down to the nearest integer.
INTERCEPT	Returns point at which a line intersects the y axis by using existing x values and y values.
INTRATE	Returns the interest rate for a fully invested security.
IPMT	Returns the interest payment for an investment for a given period, assuming constant and periodic payments and constant interest rate
IRR	Computes the internal rate of return for a series of cash flows.
ISBLANK	Performs a test to check whether the referenced cell is empty; and returns TRUE if the cell is blank, otherwise FALSE.
ISERR	Returns TRUE if the value is any error value except #N/A.
ISERROR	Performs a test to check whether the referenced cell contains any error value; and returns TRUE if the value is any error value.
ISEVEN	Returns TRUE if the number is even, otherwise FALSE.

ISFORMULA	Returns TRUE if the referenced cell contains a formula, otherwise FALSE.
ISLOGICAL	Returns TRUE if the value in the referenced cell is a logical value, otherwise FALSE.
ISNA	Returns TRUE if the referenced cell contains #N/A error value, otherwise FALSE.
ISNONTEXT	Performs a test to check whether the referenced value is a text value; and returns TRUE if the value is not text, otherwise FALSE.
ISNUMBER	Performs a test to check whether the referenced value is a numeric value; and returns TRUE if the value is a number, otherwise FALSE.
ISODD	Returns TRUE if the referenced value is an odd number, otherwise FALSE.
ISOWEEKNUM	Returns the number of the European ISO week number of the year for a given date
ISPMT	Computes and returns the amount of interest paid during a specific period of an investment.
ISREF	Returns TRUE if the value is a reference, otherwise FALSE.
ISTEXT	This function performs the opposite of the ISNONTEXT function. It returns TRUE if the value is text, otherwise FALSE.
KURT	Returns the kurtosis of a data set.
LARGE	Returns the kth largest value in a data set, where *k* is the position from the largest value in the data range you want to find.
LCM	Returns the least common multiple.
LEFT	Returns the leftmost characters from a text value.
LEN	Returns the number of characters in a text value
LINEST	Calculates the statistics that defines a linear trend matching known data points. This function follows the least squares method to perform the operation.
LN	Returns the natural logarithm of a number.
LOG	Returns the logarithm of a number to the base you specify in the argument.
LOG10	Returns the base-10 logarithm of a number.
LOGEST	Calculates the statistics that defines an exponential curve matching known data points.

LOGINV*	Returns the inverse of the lognormal cumulative distribution function of x, where *ln(x)* is normally distributed with arguments *mean* and *standard_dev*. This function is the compatibility version of LOGNORM.INV function.
LOGNORM.DIST	Returns the lognormal cumulative distribution function of x, where *ln(x)* is normally distributed with arguments *mean* and *standard_dev*.
LOGNORM.INV	This function performs the opposite of LOGNORM.DIST function; that is, it returns the inverse of the lognormal cumulative distribution function of x, where *ln(x)* is normally distributed with arguments *mean* and *standard_dev*.
LOGNORMDIST*	Returns the lognormal cumulative distribution function of x, where *ln(x)* is normally distributed with arguments *mean* and *standard_dev*. This function is the compatibility version of LOGNORM.DIST function.
LOOKUP	Lookup a value from either a one-row or one-column range or from an array.
LOWER	Converts all letters in the specified text value to lowercase.
MATCH	Returns the relative position of an item in an array, that matches the specified lookup value.
MAX	Returns the largest value in the specified data range. This function does not take into account the logical values and text.
MAXA	Returns the largest value in the specified data range. This function does not ignore the logical values and text.
MDETERM	Returns the matrix determinant of an array.
MDURATION	Returns the Macauley modified duration for a security with an assumed par value of $ 100.
MEDIAN	Computes the median, or the middle number in a set of given numbers.
MID	Returns a specific number of characters from a text string, starting at the position you specify.
MIN	Returns the smallest numeric value in the specified set of data. This function does not take into account the logical and text values.
MINA	Returns the smallest value in the specified set of data, including the logical and text values.
MINUTE	Converts the minute part in a date/time serial number and returns the minute value (0 - 59)
MINVERSE	Returns the inverse matrix for the matrix stored in an array.
MIRR	Returns the Modified Internal Rate of Return of an investment; that is, the internal rate of return for a series of periodic cash flows, taking into

	account both cost of investment and interest on reinvestment on cash.
MMULT	Returns the matrix product of two arrays, an array with the same number of rows as array1 and as columns in array2.
MOD	Returns the remainder after the specified value is divided by a specified divisor.
MODE*	Returns the most common value in a data set. This function is the compatibility version of MODE.SNGL function.
MODE.MULT	Returns a vertical array of the most frequently occurring or repetitive values in an array or range of data.
MODE.SNGL	Returns the most frequently occurring or repetitive value in the specified array or range of data.
MONTH	Converts the month part in a date serial number and returns the corresponding month value (1 - 12)
MROUND	Returns a numeric value rounded to the specified multiple.
MULTINOMIAL	Returns the multinomial of a set of numbers.
MUNIT	Returns the unit matrix for the desired specified dimension.
N	Converts a non-numeric value to a numeric value, dates to serial numbers, TRUE value to 1 and any other value or error to 0 (zero).
NA	Returns the error value #N/A (value unavailable).
NEGBINOM.DIST	Returns the negative binomial distribution, the probability that there will *be number_f* failures before the *number_s-th* success, with the specified *probability_s* probability of success.
NEGBINOMDIST*	Returns the negative binomial distribution, the probability that there will be *number_f* failures before the *number_s-th* success, with the specified *probability_s* probability of success. This function is the compatibility version of NEGBINOM.DIST function.
NETWORKDAYS	Returns the number of whole workdays between the two specified dates.
NETWORKDAYS.INTL	Returns the number of whole workdays between two dates, with the desired specified weekend parameters.
NOMINAL	Returns the annual nominal interest rate.
NORM.DIST	Returns the normal cumulative distribution, for the specified mean and standard deviation.
NORM.INV	This function performs the inverse of the NORM.DIST function; that is, it returns the inverse of the normal cumulative distribution, for the specified mean and standard deviation.

NORM.S.DIST	Returns the standard normal cumulative distribution, that assumes a mean of 0 (zero) and standard deviation of 1.
NORM.S.INV	This function performs the inverse of the NORM.S.DIST function; that is, returns the inverse of the standard normal cumulative distribution, that assumes a mean of 0 (zero) and standard deviation of 1.
NORMDIST*	Returns the normal cumulative distribution, for the specified mean and standard deviation. This function is the compatibility version of NORM.DIST function.
NORMINV*	This function performs the inverse of the NORM.DIST function; that is, it returns the inverse of the normal cumulative distribution, for the specified mean and standard deviation. This function is the compatibility version of NORM.INV function.
NORMSDIST*	Returns the standard normal cumulative distribution, that assumes a mean of 0 (zero) and standard deviation of 1. This function is the compatibility version of NORM.S.DIST function.
NORMSINV*	Returns the inverse of the standard normal cumulative distribution, that assumes a mean of 0 (zero) and standard deviation of 1. This function is the compatibility version of NORM.S.INV function.
NOT	Reverses the logic of the specified argument; that is, changes TRUE to FALSE and vice versa.
NOW	Returns the current date and time formatted as date and time respectively.
NPER	Returns the number of periods for an investment assuming constant periodic payments and a constant interest rate.
NPV	Returns the net present value of an investment based on the specified discount rate and a series of future cash flows, both negative (cost) and positive (income) cash flows.
NUMBERVALUE	Converts text to number in a locale-independent manner.
OCT2BIN	Converts an octal numeric value to binary.
OCT2DEC	Converts an octal numeric value to decimal.
OCT2HEX	Converts an octal numeric value to hexadecimal.
ODD	Rounds up a positive number to the nearest odd integer; if the specified value is a negative number, it rounds down to the nearest odd integer.
ODDFPRICE	Computes the price per $ 100 face value of a security with an odd first period.
ODDFYIELD	Computes the yield of a security with an odd first period.

ODDLPRICE	Computes the price per $ 100 face value of a security with an odd last period.
ODDLYIELD	Computes the yield of a security with an odd last period.
OFFSET	Returns a reference to a range that is a specified number of rows and columns from a particular cell reference.
OR	Performs a test to check if any of the arguments are TRUE; returns FALSE only is all the arguments are false.
PDURATION	Returns the number of periods required by an investment to reach a specified value.
PEARSON	Returns the Pearson product moment correlation coefficient.
PERCENTILE*	Returns the kth percentile of values in a range. This function is the compatibility version of PERCENTILE.INC function.
PERCENTILE.EXC	Returns the kth percentile of values in a range, where k is in the range (0 - 1, exclusive).
PERCENTILE.INC	Returns the kth percentile of values in a range, where k is in the range (0 - 1, inclusive
PERCENTRANK*	Returns the percentage rank of a value in a data set. This function is the compatibility version of PERCENTRANK.INC function.
PERCENTRANK.EXC	Returns the rank of a value in a data set as a percentage (0..1 exclusive) of the data set.
PERCENTRANK.INC	Returns the rank of a value in a data set as a percentage (0..1 inclusive) of the data set.
PERMUT	Returns the number of permutations for a given number of items that can be selected from the total number of items.
PERMUTATIONA	Returns the number of permutations for a specified number of items (with repetitions) that can be selected from the total items
PHI	Returns the value of the density function for a standard normal distribution.
PI	Returns the value of pi, precise up to 15 digits.
PMT	Returns the periodic constant payment for loan, assuming a constant interest rate.
POISSON*	Returns the Poisson distribution. This function is the compatibility version of POISSON.DIST function.
POISSON.DIST	Returns the Poisson distribution.
POWER	Returns the result of a number raised to a power.

PPMT	Returns the payment on the principal for the specified investment, assuming constant periodic payments and a constant interest rate.
PRICE	Returns the price per $100 face value of a security that pays interest on periodic basis.
PRICEDISC	Returns the price per $100 face value of a discounted security.
PRICEMAT	Returns the price per $100 face value of a security that pays interest at maturity.
PROB	Returns the probability that values in a range are between two limits or equal to the specified lower limit.
PRODUCT	Multiplies all the values specified in the arguments.
PROPER	Coverts a text string to Proper case; that is, capitalizes the first letter in each word of a text value.
PV	Computes the present value of an investment; that is, the present worth of a series of future cash flows.
QUARTILE*	Returns the quartile of a data set. This function is the compatibility version of QUARTILE.INC function.
QUARTILE.EXC	Returns the quartile of the data set, based on percentile values from 0 ..1, exclusive.
QUARTILE.INC	Returns the quartile of a data set, based on percentile values from 0 ..1, inclusive.
QUOTIENT	Returns the integer portion after a division operation.
RADIANS	Converts degrees to radians.
RAND	Returns a random number between 0 and 1, evenly distributed.
RANDBETWEEN	Returns a random number between the specified numbers.
RANK*	Returns the rank of a number in a list of numbers, its size relative to other values in the specified list.
RANK.AVG	Returns the rank of a number in a list of numbers, its size relative to other values in the specified list; if more than one value in the list has the same rank, the function returns average rank.
RANK.EQ	Returns the rank of a number in a list of numbers, its size relative to other values in the specified list; if more than one value in the list has the same rank, it returns the top rank.
RATE	Computes the interest rate per period of an investment.
RECEIVED	Computes the amount received at maturity for a fully invested security.

REPLACE	Replaces a specified string of characters in a text value with another string.
REPT	Repeats a specified text value a given number of times.
RIGHT	Returns the specified number of characters from the right end of text string.
ROMAN	Converts an Arabic numeral to Roman, as text.
ROUND	Rounds a numeric value to a specified number of digits.
ROUNDDOWN	Rounds down a numeric value, toward zero.
ROUNDUP	Rounds up a numeric value, away from zero.
ROW	Returns the row number of a reference.
ROWS	Counts and returns the number of rows in the specified reference.
RRI	Returns an equivalent interest rate for the growth of an investment.
RSQ	Returns the square of the Pearson product moment correlation coefficient, through the given data points.
RTD	Returns real-time data from a program that supports COM automation.
SEARCH	Returns the position of a character within a text string, it starts reading from left to right and is not case sensitive.
SEC	Returns the secant of an angle.
SECH	Returns the hyperbolic secant of an angle.
SECOND	Converts the second part in a date/time serial number and returns the corresponding second value (0 - 59)
SERIESSUM	Returns the sum of a power series based on the formula.
SHEET	Returns the sheet number of the referenced sheet.
SHEETS	Returns the number of sheets in a reference.
SIGN	Returns the sign of the number in the argument: 1 if the number is positive, zero (0) if the number is 0, and –1 if the number is negative.
SIN	Returns the sine of the given angle.
SINH	Returns the hyperbolic sine of the number specified in the argument.
SKEW	Returns the skewness of a distribution: a characterization of the degree

	of asymmetry of a distribution around its mean.
SKEW.P	Returns the skewness of a distribution based on a population: a characterization of the degree of asymmetry of a distribution around its mean.
SLN	Computes the straight-line depreciation of an asset for one period.
SLOPE	Computes the slope of the linear regression line through the given data points.
SMALL	Returns the kth smallest value in a data set, where k is the position from the smallest value in the data range you want to find.
SQRT	Calculates the positive square root of the number specified in the argument.
SQRTPI	Returns the square root of (Number * pi).
STANDARDIZE	Returns a normalized value from a distribution characterized by *mean* and *standard_dev*.
STDEV*	Estimates the standard deviation based on a sample population, ignoring the text and logical values in the specified data range. This function is the compatibility version of STDEV.S function.
STDEV.P	Calculates standard deviation based on the entire population specified in the arguments, ignoring the text and logical values
STDEV.S	Estimates the standard deviation based on a sample population, ignoring the text and logical values in the specified data range.
STDEVA	Returns the standard deviation based on a sample population, including text and logical values in the specified data range.
STDEVP*	Calculates standard deviation based on the entire population specified in the argument, ignoring the text and logical values. This function is the compatibility version of STDEV.P function.
STDEVPA	Returns the standard deviation based on the entire population specified in the argument, including text and logical values.
STEYX	Returns the standard error of the predicted y-value for each x in the regression.
SUBSTITUTE	Replaces the existing text value with the new specified text in a text string.
SUBTOTAL	Returns a subtotal in a list or database.
SUM	Returns the sum of all the numeric values in its arguments.
SUMIF	This function commands Excel to total the values that fit in the

	specified criteria.
SUMIFS	This function commands Excel to total the values that fit in the specified multiple criteria.
SUMPRODUCT	Returns the sum of the products of the corresponding array or data ranges.
SUMSQ	Returns the sum of the squares of the arguments.
SUMX2MY2	Computes the sum of the difference between the squares of corresponding data ranges or arrays.
SUMX2PY2	Computes the sum total of sum of squares of values in two corresponding data ranges or arrays.
SUMXMY2	Computes the sum of squares of differences in two corresponding data ranges or arrays.
SYD	Returns the depreciation of an asset for a specified period, using the sum-of-years' digits depreciation method.
T	Performs a test to check whether the given value is text; returns the text if it is, or returns double quotes if it is not.
T.DIST	Returns the left-tailed student's T-distribution.
T.DIST.2T	Returns the two-tailed student's T-distribution.
T.DIST.RT	Returns the right-tailed student's T-distribution.
T.INV	Returns the left-tailed inverse of the student's T-distribution.
T.INV.2T	Returns the two-tailed inverse of the student's T-distribution.
T.TEST	Returns the probability associated with a student's T-test.
TAN	Returns the tangent of the given angle.
TANH	Returns the hyperbolic tangent of the number specified in the argument.
TBILLEQ	Returns the bond-equivalent yield for a Treasury bill.
TBILLPRICE	Calculates the price per $ 100 face value for a Treasury bill.
TBILLYIELD	Calculates the yield for a Treasury bill.
TDIST*	Returns the left-tailed student's T-distribution. This function is the compatibility version of T.DIST function.
TEXT	Converts a value to text using the specified format.
TIME	Converts a time value to its corresponding serial number.

TIMEVALUE	Converts a time originally entered as text to a serial number, and then formats it with the time format.
TINV*	Returns the left-tailed inverse of the student's T-distribution. This function is the compatibility version of T.INV function.
TODAY	Returns the serial number of current date, formatted as date.
TRANSPOSE	Transposes a vertical array of cells to horizontal, and vice versa.
TREND	Return numeric values in a linear trend matching known data points, using the least squares method.
TRIM	Removes all spaces from a text string, leaving just single spaces between words.
TRIMMEAN	Returns the mean of the interior position of the specified data set.
TRUE	Returns the logical value TRUE.
TRUNC	Shortens a number, following the specified precision; that is, truncates a numeric value by removing the decimal or fractional part of it.
TTEST*	Returns the probability associated with a Student's t-Test. This function is the compatibility version of T.TEST function.
TYPE	Specifies the type of value contained in the cell reference; returns 1 for a numeric value, 2 for a text value, 4 for a logical value, 16 for error value and 64 for array.
UNICHAR	Returns the Unicode character referenced by the given numeric value.
UNICODE	Returns the number (code point) corresponding to the first character in the given text string.
UPPER	Converts text in a text string to uppercase; that is, capitalizes all the letters.
VALUE	Converts a text argument that represents a number to a number.
VAR*	Estimates the variance based on sample population, this function does not take into account the logical and text values, if there are any in the data range. This function is the compatibility version of VAR.S function.
VAR.P	Returns the variance based on entire population, this function does not take into account the logical and text values, if there are any in the data range.
VAR.S	Estimates the variance based on sample population, this function does not take into account the logical and text values, if there are any in the data range.

VARA	Computes the variance of the selected data, including text and logical values. It assumes that the data set represents sample population
VARP*	Computes the variance based on entire population, this function does not take into account the logical and text values, if there are any in the data range. This function is the compatibility version of VAR.S function.
VARPA	It is similar to the VARA function, except that it assumes that the selected data set represents the entire population
VDB	Calculates the depreciation of an asset for a specified period (which can include partial periods as well), this function uses the double declining-balance method or any other method you specify to calculate the depreciation.
VLOOKUP	Searches the lookup value in the left most column of the selected table and returns the corresponding value from the specified column
WEBSERVICE	Returns data from a web service.
WEEKDAY	Converts a serial number to a day of the week.
WEEKNUM	Returns the week number (1 - 7) in a date.
WEIBULL*	Returns the Weibull distribution. This function is the compatibility version of WEIBULL.DIST function.
WEIBULL.DIST	Returns the Weibull distribution.
WORKDAY	Returns the serial number of a date before or after a specified number of workdays.
WORKDAY.INTL	Returns the serial number of a date before or after a specified number of workdays, with the desired specified weekend parameters.
XIRR	Returns the internal rate of return for a schedule of cash flows, that does not necessarily have to be periodic.
XNPV	Returns the net present value for a schedule of cash flows, that does not necessarily have to be periodic.
XOR	Returns a logical ‘Exclusive OR’ of all arguments.
YEAR	Converts the year part in a date/time serial number and returns the corresponding year value (1900 - 9999)
YEARFRAC	Returns the year fraction representing the number of whole days between the two specified dates (*start_date* and *end_date*).
YIELD	Computes the yield on a security that pays periodic interest.
YIELDDISC	Computes the annual yield for a discounted security, a Treasury bill, for example.

YIELDMAT	Computes the annual yield of a security that pays interest at maturity.
Z.TEST	Returns the one-tailed P-value of a Z-test.
ZTEST*	Returns the one-tailed P-value of a Z-test. This function is the compatibility version of Z.TEST function.