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1

Introduction

This chapter shows how the spreadsheet, the electronic counterpart of the paper ledger, has evolved in Excel, taking advantage of the features of the different versions of Microsoft Office, and the Windows operating system.

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Ledger sheets pre-date computers and handheld calculators, and have been in use for literally hundreds of years.



The first spreadsheet application was VisiCorp's VisiCalc (visible calculator). Numerous competitive programs appeared, but market leadership was taken first by Lotus 123, and now by Microsoft Excel.

The Spreadsheet Concept

Spreadsheets, in the guise of the accountant's ledger sheet, have been in use for many, many years. They consisted of paper forms with a two-dimensional grid of rows and columns, often on extra-large paper, forming two pages of a ledger book, for example (hence the term "spread sheet"). They were typically used by accountants to prepare budget or financial statements. Each row would represent a different item, with each column showing the value or amount for that item over a given time period. For example, a forecast for a 30% margin and 10% growth might show:

Margin %	30	Profit Forecast				
Growth %	10	January	February	March	April	May
Cost of Goods		6,000	6,600	7,260	7,986	8,785
Sales		7,800	8,580	9,438	10,382	11,420
Profit		1,800	1,980	2,178	2,396	2,635
Total Profit		1,800	3,780	5,958	8,354	10,989

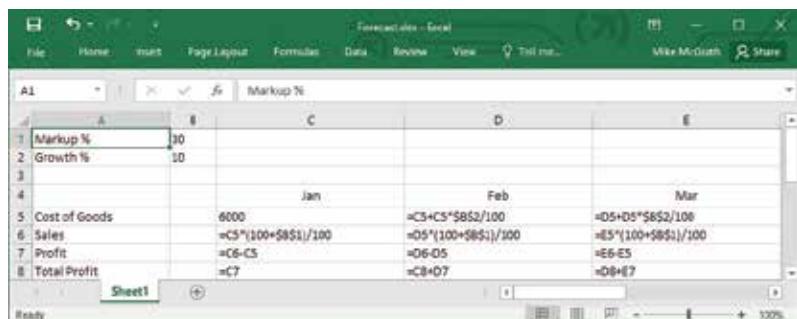
Any changes to the basic figures would mean that all the values would have to be recalculated and transcribed to another ledger sheet to show the effect, e.g. for a 20% margin and 60% growth:

Margin %	20	Profit Forecast				
Growth %	60	January	February	March	April	May
Cost of Goods		6,000	9,600	15,360	24,576	39,322
Sales		7,200	11,520	18,432	29,491	47,186
Profit		1,200	1,920	3,072	4,915	7,864
Total Profit		1,200	3,120	6,192	11,107	18,972

To make another change, to show 10% margin and 200% growth, for example, would involve a completely new set of calculations. And, each time, there would be the possibility of a calculation or transcription error creeping in. With the advent of the personal computer, a new approach became possible. Applications were developed to simulate the operation of the financial ledger sheet, but the boxes (known as cells) that formed the rows and columns could store text, numbers, or a calculation formula based on the contents of other cells. The spreadsheet looked the same, since it was the results that were displayed, rather than the formulas themselves. However, when the contents of a cell were changed in the spreadsheet, all the cells whose values depended on that changed cell were automatically recalculated.

...cont'd

This new approach allowed a vast improvement in productivity for various activities, such as forecasting. In the second example shown on the previous page, you'd set up the initial spreadsheet using formulas, rather than calculating the individual cell values. A spreadsheet might contain these values and formulas, for example:

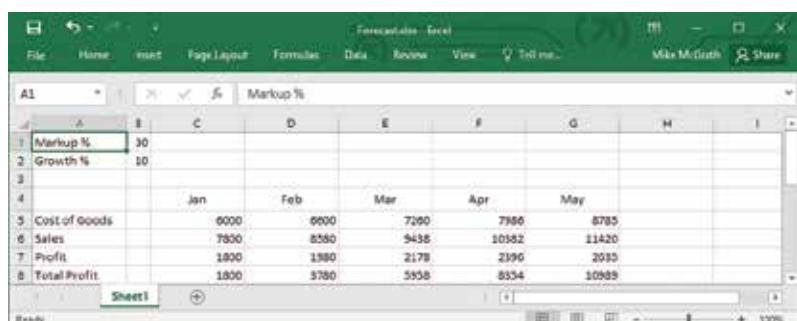


A screenshot of Microsoft Excel showing a spreadsheet titled "Forecast.xlsx - Excel". The spreadsheet has columns A through E and rows 1 through 8. Row 1 contains "Markup %" and "30". Row 2 contains "Growth %" and "10". Row 3 is blank. Row 4 contains "Jan", "Feb", and "Mar". Rows 5 through 8 contain formulas: Row 5: "Cost of Goods" = 6000, "Sales" = C5*(100+\$B\$1)/100, "Profit" = C6-C5, "Total Profit" = C7. Row 6: "Cost of Goods" = 6000, "Sales" = D5*(100+\$B\$1)/100, "Profit" = D6-D5, "Total Profit" = D7. Row 7: "Cost of Goods" = 6000, "Sales" = E5*(100+\$B\$1)/100, "Profit" = E6-E5, "Total Profit" = E7. Row 8: "Cost of Goods" = 6000, "Sales" = F5*(100+\$B\$1)/100, "Profit" = F6-F5, "Total Profit" = F7. The status bar at the bottom right shows "Ready".



The = sign signals to Excel that what follows is a formula and must be calculated.

However, what will be displayed in the cells are the actual values that the formulas compute, based on the contents of other cells:



A screenshot of Microsoft Excel showing the same spreadsheet after calculations have been performed. The values in the "Sales" column are now 6600, 7260, 7880, and 8520 respectively. The "Profit" column values are 1800, 1980, 2178, and 2396. The "Total Profit" column values are 1800, 3780, 5554, and 10989. The status bar at the bottom right shows "Ready".



When you want to see the effect of changes, such as different values for margin and growth, for example, you change just those items and instantly see the effect, as the values calculated by the formulas are adjusted and redisplayed. The capabilities of the spreadsheet applications have evolved, and the use of spreadsheets has extended far beyond the original use for financial planning and reporting. They can now handle any activity that involves arrays of values interrelated by formulas, grading examination scores, interpreting experimental data, or keeping track of assets and inventories, for example. In fact, the newest spreadsheet applications seem to support just about any possible requirement.

Sets of predefined functions were added, plus support for writing small programs, or macros, to manipulate the data. Further developments incorporated graphs, images, and audio.



There are also versions of Excel designed specifically for the Apple Macintosh ("Mac") computers – starting from Excel 1.0!



In this book, the New icon pictured above is used to highlight new or enhanced features in Excel 2016.

Microsoft Excel

VisiCalc and Lotus 123 were MS-DOS programs, subject to its command-line interface, but Microsoft Excel was developed for Windows. It was the first spreadsheet program to allow users to control the visual aspects of the spreadsheet (fonts, character attributes, and cell appearance). It introduced intelligent cell recomputation, where only cells dependent on the cell being modified are updated (previous spreadsheet programs recomputed everything all the time, or waited for a specific Recalc command). Later versions of Excel were shipped as part of the bundled Microsoft Office suite of applications, which included programs like Microsoft Word and Microsoft PowerPoint. Versions of Excel for Microsoft Windows and Office include:

1987	Excel 2.0	Windows
1990	Excel 3.0	Windows
1992	Excel 4.0	Windows
1993	Excel 5.0	Windows
1995	Excel 95 (v7.0)	Office 95
1997	Excel 97 (v8.0)	Office 97
1999	Excel 2000 (v9.0)	Office 2000
2001	Excel 2002 (v10)	Office XP
2003	Excel 2003 (v11)	Office 2003
2007	Excel 2007 (v12)	Office 2007
2010	Excel 2010 (v14)	Office 2010
2013	Excel 2013 (v15)	Office 2013 / Office 365
2015	Excel 2016 (v16)	Office 2016 / Office 365

The newer versions of Excel provide many enhancements to the user interface, and incorporate connections with Microsoft Office and other applications. The basis of the program, however, remains the same. It still consists of a large array of cells, organized into rows and columns, containing data values or formulas with relative or absolute references to other cells. This means that many of the techniques included in this book will be applicable to whichever version of Excel you may be using, or even if you are using a spreadsheet from another family of products, though, of course, the specifics of the instructions may need to be adjusted.

Microsoft Office 2016

Microsoft Office 2016 is the latest version of Microsoft Office, and it is available in a variety of editions, including:

- **Office Home & Student 2016 (PC & Mac)**
- **Office Home & Business 2016 (PC & Mac)**
- **Office Professional 2016**

There are volume licensing versions for larger organizations:

- **Office Standard 2016 (PC & Mac)**
- **Office Professional Plus 2016**

There is also a subscription version of Microsoft Office known as Office 365, and this is also available in a number of editions:

- **Office 365 Home (PC & Mac)**
- **Office 365 Personal (PC & Mac)**
- **Office 365 University**
- **Office 365 Business**
- **Office 365 Enterprise**

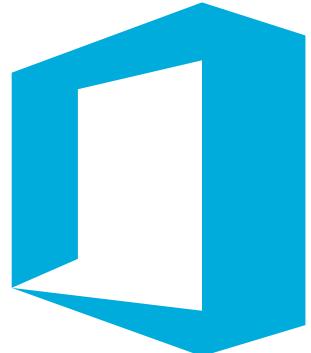
All of these editions include Microsoft Excel 2016. Whichever edition you obtain, your copy of Excel 2016 incorporates all the features and uses the Office result-oriented user interface, with the Ribbon, File tab, BackStage, Galleries, and Live Preview, etc.

Excel 2016 also uses the Microsoft Office file format, OpenXML, as the default file format. This is based on XML and uses ZIP compression, so the files will be up to 75% smaller than those in the older Microsoft Office file formats.

Other shared Office features include the Document Theme, which defines colors, fonts, and graphic effects for a spreadsheet or other Office document, and collaboration services for sharing spreadsheets and documents with other users.

Office Online Apps

Microsoft offers a free, web-based version of Office; this includes online versions of Word, Excel, PowerPoint, and OneNote. These online apps feature user interfaces similar to the full desktop products, and allow you to access Office documents, including Excel spreadsheets, via your browser. They also make it easier for you to share documents with users who may not have Office 2016 on their systems. However, the Office Online apps do not support the full feature set of the desktop products.



The Office Online apps work in conjunction with OneDrive, the online storage associated with your Microsoft account (or your Office 365 account, if you have a subscription).

System Requirements

To install and run Excel 2016, your computer should match or better the minimum hardware and operating system requirements for Office 2016. If you are upgrading to Office 2016, from Office 2010 or Office 2013, the hardware should already meet the requirements – though you may need to upgrade your operating system. For an upgrade from earlier versions of Office you will need to check that both hardware and operating system meet the minimum specifications for Office 2016. This includes:



These are minimum requirements. You may need other components (e.g. a sound card) for some Excel features.

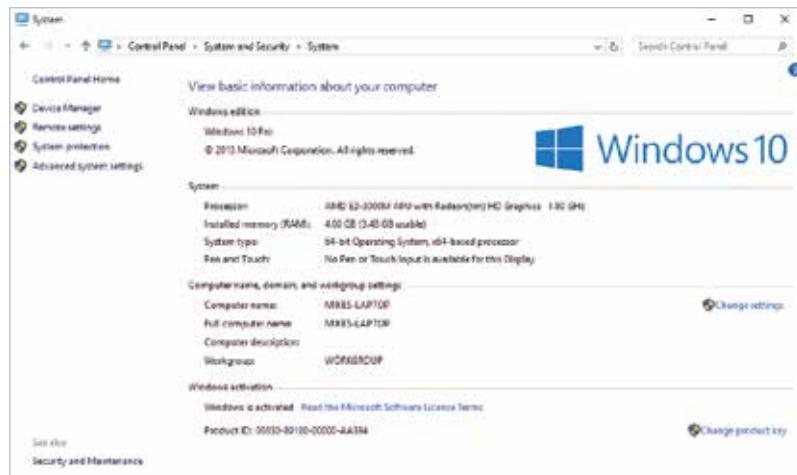


Office 2016 (32-bit) runs on both 32-bit and 64-bit systems. Microsoft recommends this, rather than the 64-bit version, for add-in compatibility.



Your computer must also meet the hardware requirements for your chosen operating system. These may exceed the minimum specifications for Office 2016, especially with advanced systems, such as Windows 10 with Multitouch function.

Operating system	Windows 7, Windows RT, Windows 8/8.1, Windows 10 (32-bit or 64-bit) or Windows Server 2008/R2 or later (64-bit)
Processor	1GHz or higher (32-bit or 64-bit)
Memory	2GB (PC) or 4GB (Mac)
Hard disk	3GB (PC) or 6GB (Mac)
Monitor	1280 x 800 resolution or higher
Internet	Broadband connection recommended for download, product activation and OneDrive



Additional Software Requirements

If you have another computer running an earlier version of Office, and you need to work with Excel files in the Office 2016 format, you can download the Microsoft Office Compatibility Pack, from microsoft.com/downloads. This will allow older versions of Excel to read the new file format.

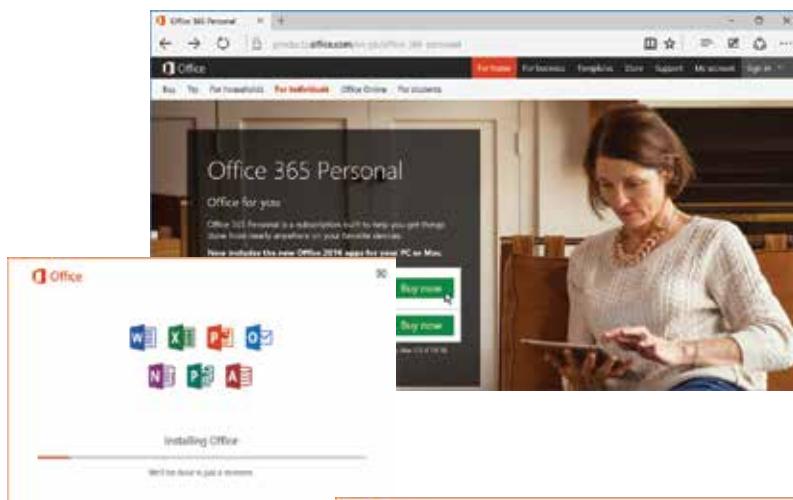
Getting Office 2016

You can buy your preferred version of Microsoft Office 2016 in disk format from a retail source, or download it from Microsoft. Windows 10 provides a default “Get Office” item on the Start menu that launches your web browser at the Office download page products.office.com. Here, you can select one of the Office 365 subscription-based versions of Microsoft Office 2016. These provide fully installed Office apps that work across multiple devices and are continuously upgraded – so are always up to date. For example, you might choose the Office 365 Personal version, which lets you use Office on one PC, one tablet, and one phone. This also gives you a massive 1TB of storage for one user.

- 1 Click the **Get Office** tile or Start menu item – to launch your web browser



- 2 Select your version then enter the purchase details – to begin installation



- 3 Take a break until the Office completion dialog appears



To compare the various versions of Office 365 visit [products.office.com/en-us/buy/compare-microsoft-office-products](http://office.com/en-us/buy/compare-microsoft-office-products)



Microsoft is eager to encourage adoption of the subscription versions – Office 365 Personal edition also includes 60 minutes per month of Skype calls to cellphones and landlines.

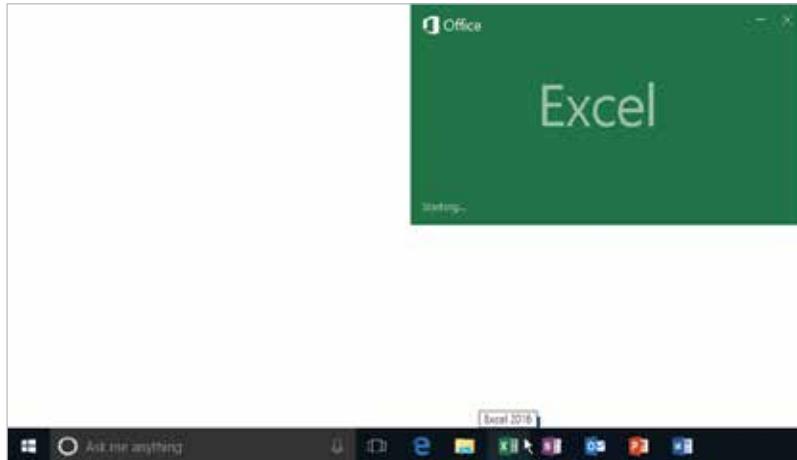
Excel 2016 and Windows 10

With Microsoft Office 2016 installed under Windows 10, you have a number of ways to launch Excel 2016:



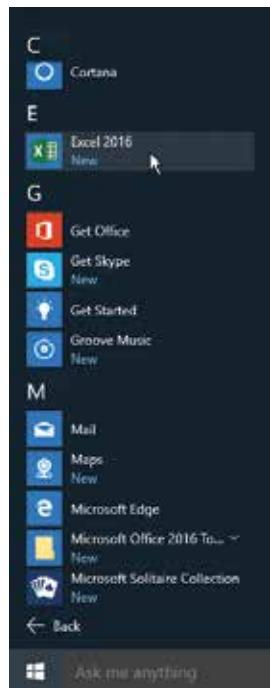
These options are available for the Windows 10 operating system.

- 1 The installation of Office should have added colored icons for various Office apps on the Windows Desktop taskbar. Click the green icon 'X' to launch the Excel 2016 app



You can right-click the Excel 2016 item on the **All apps** list and select **Pin to taskbar** if the Excel icon isn't already visible on the taskbar.

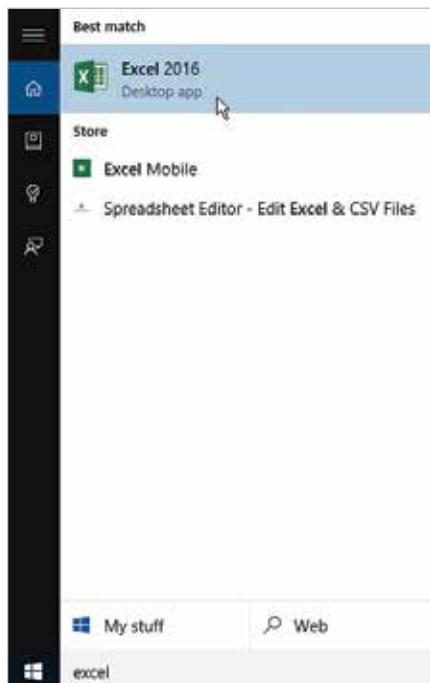
- 2 In either Desktop or Tablet mode, click or tap the Start button, then choose **All apps**
- 3 Now, scroll down the A-Z list to the **E** category heading
- 4 Choose the **Excel 2016** item to launch the Excel 2016 app



...cont'd

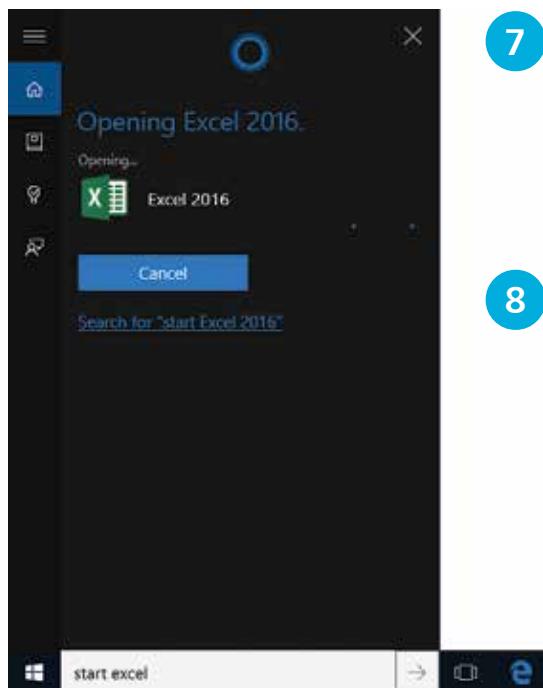
5

In the taskbar Search box, type "excel" to search for the Excel app on your system



6

Now, click or tap the **Excel 2016** item from the search results to launch the Excel 2016 app



7

Say "Hey Cortana" into your system microphone to wake up your Personal Digital Assistant

8

Now, say "start Excel" into the microphone to launch the Excel 2016 app



You can right-click the Excel 2016 item on the **All apps** list and select **Pin to Start** to add a tile to the Tablet mode Start screen and Desktop mode Start group.

15



Cortana is new in Windows 10 but performance may vary by region. If Cortana is not working or enabled in your country try setting your region to "United States" in **Settings > Time & language > Region & language**.

The Office 2016 Ribbon

The menus and toolbars used in earlier versions of Excel have been replaced by the Ribbon. With this, commands are organized in logical groups, under command tabs – **Home**, **Insert**, **Page Layout**, **Formulas**, **Data**, **Review** and **View** tabs – arranged in the order in which tasks are normally performed. When you click any of these tabs, the corresponding commands display in the Ribbon.



Other Office 2016 apps (Word, Access, Outlook, and PowerPoint) also have a Ribbon, which displays tabs appropriate to that particular app.



The **File** tab displays the BackStage view, which provides general document file functions, plus **Share**, **Export** and the **Excel Options**.



The Ribbon may also include contextual command tabs, which appear when you perform a specific task. For example, if you select some data and then click **Insert Column Chart** in the **Charts** group, chart tool tabs **Design**, **Layout**, and **Format** are displayed.

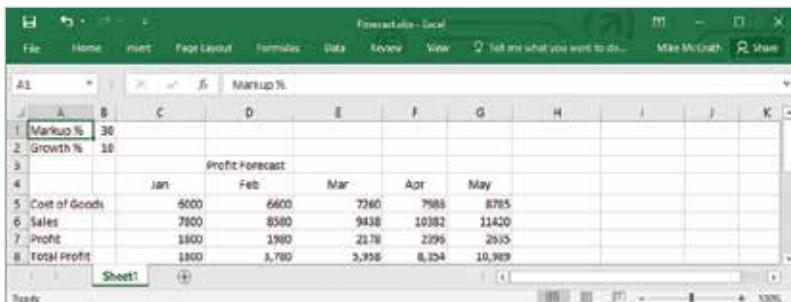


You can minimize the Ribbon, to make more room on the screen:

- 1 Click the **Ribbon Display Options** button and select **Show Tabs**
- 2 The tabs will still be displayed but the commands will be hidden



...cont'd



A screenshot of Microsoft Excel showing a spreadsheet titled 'Forecast.xlsx - Local'. The ribbon is visible at the top, displaying tabs like File, Home, Insert, Page Layout, Formulas, Data, Review, View, and Tell me what you want to do... The main area shows a profit forecast for January through May. The first row contains 'Markup %' and 'Profit Forecast' labels. Rows 5-8 show data for Cost of Goods, Sales, Profit, and Total Profit respectively. The 'Total Profit' row has a formula =B5+B6+B7+B8.

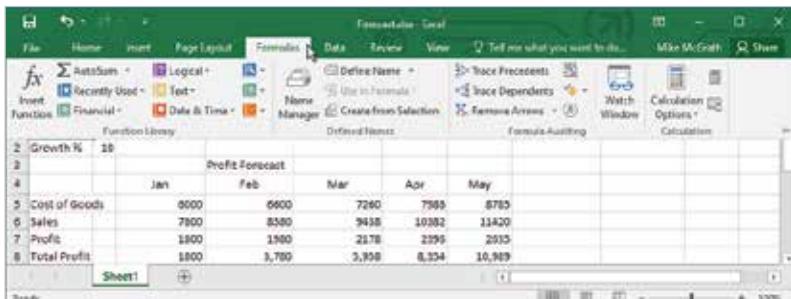


You can also choose **Auto-hide Ribbon**. Excel runs full-screen with no tabs or commands visible. Click the top of the application to display the Ribbon when it's hidden.



3

The Ribbon and the commands are redisplayed as a temporary overlay whenever you click a tab, or when you use the **Alt** key shortcuts (see page 118)



A screenshot of Microsoft Excel showing the same profit forecast spreadsheet. In this view, the ribbon is displayed as a temporary overlay when the 'Formulas' tab is selected. The ribbon tabs are visible above the spreadsheet area, while the rest of the interface remains the same.



Office 2016 applications offer two interfaces – Mouse or Touch, where the latter is optimized for operation with touch-enabled devices. To add this option to the Quick Access Toolbar, click the down arrow and select **Touch/Mouse Mode**.

Touch/Mouse Mode

To enable Touch Mode:

1

Click the down arrow on the Quick Access Toolbar, then choose the **Touch** option



2

The Ribbon displays with extra spacing between buttons



A screenshot of Microsoft Excel showing the same profit forecast spreadsheet. The ribbon is displayed with extra spacing between buttons, as indicated by the previous step. The 'View' tab is selected, and the 'Touch' mode is active.





Explore the Ribbon tabs and command groups in Excel 2016 to find the features that you need to carry out activities on your worksheets.



There is a **Tell Me** text box on the Excel 2016 Ribbon where you can enter words and phrases, to quickly locate features or get help on what you want to do.

Tell me what you want to do...

Exploring Excel 2016

If you are used to a previous version of Excel, you may not always know where to find the features you need. The following table lists some of the actions that you may want to carry out, and indicates the Ribbon tabs and groups where the associated commands for these actions may be found in Excel 2016:

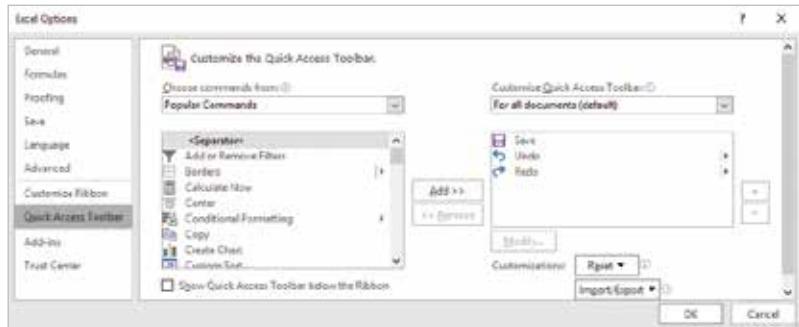
Action	Tab	Groups
Create, open, save, print, share, or export files, or change options	File	Backstage Commands – Info, New, Open, Save, Save As, Print, Share, Export, Close, Account, Options, and Feedback
Format, insert, delete, edit or find data in cells, columns, and rows	Home	Number, Styles, Cells, and Editing groups
Create tables, charts, sparklines, reports, slicers, and hyperlinks	Insert	Tables, Charts, Sparklines, Filters, and Links groups
Set page margins, page breaks, print areas, or sheet options	Page Layout	Page Setup, Scale to Fit, and Sheet Options groups
Find functions, define names, or troubleshoot formulas	Formulas	Function Library, Defined Names, and Formula Auditing groups
Import or connect to data, sort and filter data, validate data, flash fill values, or perform a what-if analysis	Data	Get External Data, Connections, Sort & Filter, and Data Tools groups
Check spelling, review and revise, and protect a sheet or workbook	Review	Proofing, Comments, and Changes groups
Change workbook views, arrange windows, freeze panes, and record macros	View	Workbook Views, Window, and Macros groups

If you want to locate a particular command, you can search the list of all of the commands that are available in Excel 2016 (see next page).

...cont'd

To display the list of available commands:

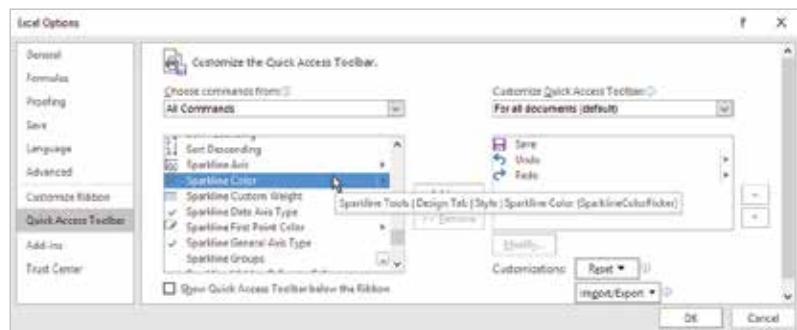
- 1 Click the down arrow on the Quick Access Toolbar to display the **Customize** menu (see page 17) and select the option for **More Commands**



You can also right-click the Ribbon and select **Customize the Ribbon** to display the list of commands and view the associated tool tips.



- 2 Click the box **Choose commands from**, and select **All Commands**



- 3 Scroll the list and move the Mouse pointer over a command name, and the Tool Tip will indicate the tab and group containing that command – for example:



Some of the commands may not currently be included in any group and so are shown as **Commands not in the Ribbon**. You can use Customize to **Add** any of these commands to the Quick Access Toolbar or to the Ribbon.

Excel Online App

To use the Excel and other Office Online apps:

- 1 Launch your web browser and visit **office.com**, then sign into Office Online with your Microsoft Account

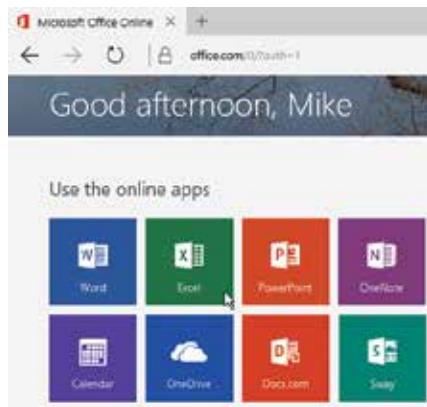


Office Online apps are touch-friendly web applications that let you create, edit and share your Excel, Word, PowerPoint and OneNote files from any browser. They can be used with your OneDrive storage.



- 2 Select the Office Online app you want to use, such as the Online Excel app

- 3 Open a blank workbook to begin working on a new spreadsheet



The functions provided in the Excel Online app are limited and you'll be offered a reduced set of tabs and commands.

