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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 various features of Microsoft Office and the Windows operating system.

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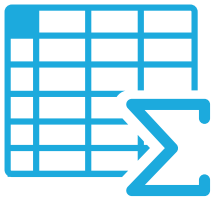
The Spreadsheet Concept



Spreadsheets, in the guise of the accountant's ledger sheet, have been in use for many, many years. They originally 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 (mark-up) and 10% growth might look like this:

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

Margin %	30					
Growth %	10					
		Profit Forecast				
		January	February	March	April	May
Cost of Goods		6,000	6,600	7,260	7986	8,785
Sales		7,800	8,580	9,438	10,382	11,420
Profit		1,800	1980	2,178	2,396	2,635
Total Profit		1,800	3,780	5958	8,354	10989

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:

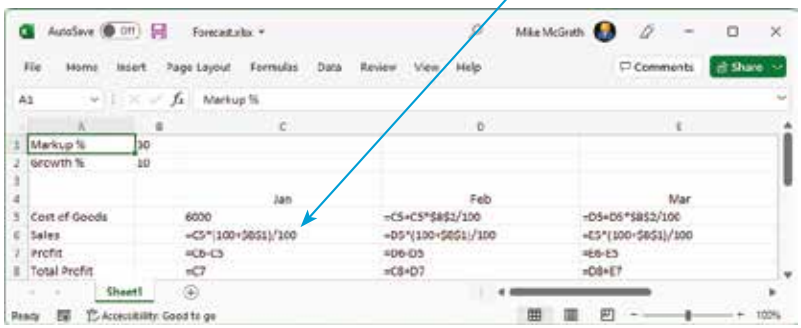
Margin %	20					
Growth %	60					
		Profit Forecast				
		January	February	March	April	May
Cost of Goods		6,000	9,600	15,360	24,576	39,322
Sales		7,200	11,520	18,432	29,491	47,186
Profit		1,200	1920	3,072	4915	7,864
Total Profit		1,200	3,120	6,192	11,107	18972

To make another change (for example, to show a 10% margin and 200% growth) would involve a completely new set of calculations and each time there would be the possibility of a calculation or transcription error creeping in.

The first spreadsheet application was VisiCorp's VisiCalc (visible calculator). Numerous competitive programs appeared, but market leadership was taken first by Lotus 1-2-3, and now by Microsoft Excel.

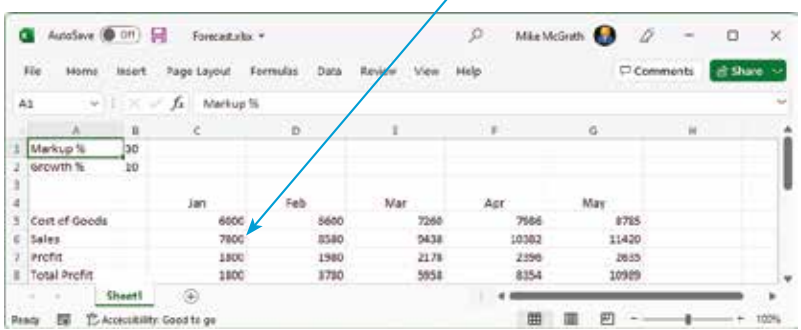
With the advent of the personal computer a new approach became possible. Applications were developed to simulate the operation of the financial ledger sheet, but the boxes (known as cells) that formed the rows and columns could store text, numbers, or a calculation formula based on the contents of other 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 cells whose values depended on that changed cell would be automatically recalculated.

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 like this:



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 the cells that the formulas refer to:



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.

When you want to see the effect of changes (for example, to show different values for margin and growth), 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, such as grading examination scores, interpreting experimental data, or keeping track of assets and inventories. In fact, the newest spreadsheet applications seem to support just about any possible requirement that can be imagined.

Microsoft Excel

Microsoft Excel

VisiCalc and Lotus 1-2-3 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, cell appearance, etc.). 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). Versions of Excel for Microsoft Windows and Office include:

Year	Version	Name
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
2018	**Excel 2019 (v16)**	Office 2019 / Office 365
2021	**Excel 2021 (v16)**	Office 2021/365
2022	**Excel 2021 (v16)**	Microsoft 365 Office

The newer versions of Excel provide many enhancements to the user interface, and incorporate connections with other Microsoft Office/365 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 are applicable to whichever version of Excel you may be using, or even if you are using a spreadsheet from another product – although the specifics of the instructions may need to be adjusted.

There are also versions of Excel designed specifically for Apple Macintosh ("Mac") computers – starting from Excel 1.0! Excel is also available in versions for mobile devices that use iOS, such as the iPad and the iPhone. Plus, there are versions for cell phones and tablets that are Android- or Windows-based.

Microsoft 365

Later versions of Excel were shipped as part of the bundled stand-alone Microsoft Office suite of applications, which included programs like Microsoft Word and Microsoft PowerPoint.

Microsoft Office

Subsequently, Microsoft released a subscription version of the Office suite of applications, named Office 365. This was available as an alternative to the stand-alone version. One great advantage of Office 365 was that apps got updated automatically via Windows Update to ensure you always had the latest features. After the release of Office 365, the Excel version remains 16.0.

Microsoft Office 2021 was the final version of the stand-alone Microsoft Office suite of applications. Its components are thereafter available in the Microsoft 365 subscription version, which replaces the Office 365 subscription version.

Microsoft 365 is available in these individual user editions:

- **Microsoft 365 Personal** (formerly Office 365 Personal)
- **Microsoft 365 Family** (formerly Office 365 Home)

Microsoft 365

There are also several editions for larger organizations, including:

- **Microsoft 365 Business Standard**
- **Microsoft 365 Enterprise Apps**
- **Microsoft 365 Education**

All these editions include the fully-featured Microsoft Excel app, which uses a result-oriented interface with Ribbon, File tab, Backstage, Galleries, and Live Preview.

Excel uses the OpenXML file format by default. This is based on XML and uses ZIP compression to create files up to 75% smaller than those in the older Microsoft Office file formats. Shared features include Document Theme, which defines colors, fonts, and graphic effects, and collaboration services for sharing spreadsheets and documents with other users.

Excel Online

Microsoft offers free web-based versions of Excel, Word, and more. These online apps have interfaces similar to the desktop products, and allow access to Excel spreadsheets and documents via your browser. They make it easy to share documents with users who may not have a Microsoft 365 subscription, but the online apps may not support the full feature-set of the desktop products.

The Microsoft 365 Online apps work in conjunction with OneDrive, the online storage associated with your Microsoft account.

System Requirements

To install and run Microsoft 365 with Excel, your computer should match or better these minimum hardware and operating system requirements:

Computer and processor

- Windows OS: 1.6GHz, 2-core.
- macOS: Intel processor.

Memory

- Windows OS: 4GB RAM; 2GB RAM (32-bit).
- macOS: 4GB RAM.

Hard disk

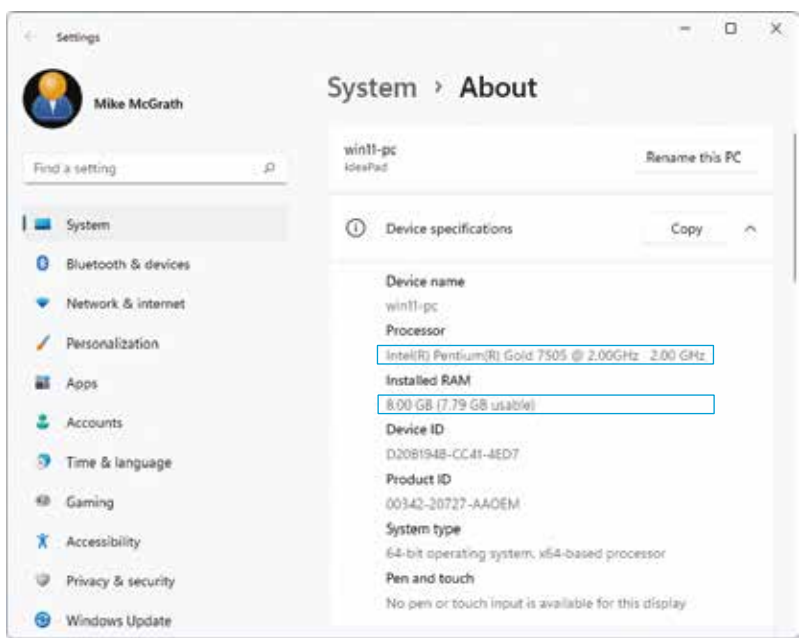
- Windows OS: 4GB of available space.
- macOS: 10GB available space, Extended Format (HFS+).

Monitor

- Windows OS: 1278 x 768 screen resolution.
- macOS: 1280 x 800 screen resolution.

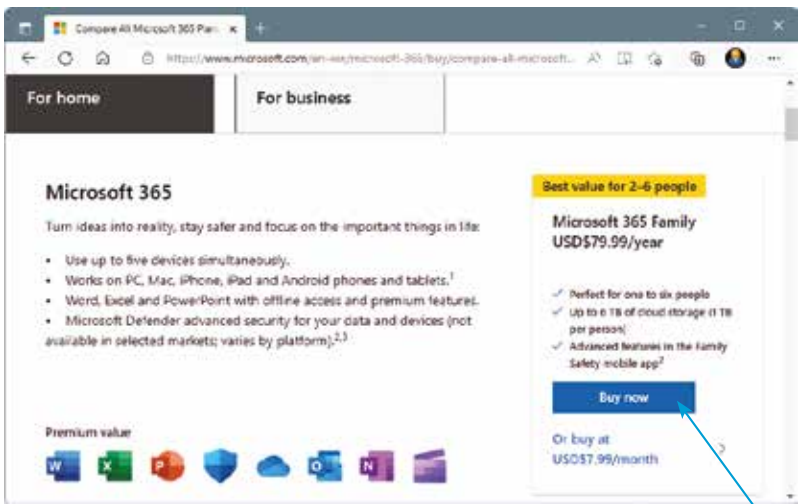
The 64-bit version of Microsoft 365 will be automatically installed unless you explicitly select the 32-bit version.

A broadband internet connection is recommended for download, product activation, and for OneDrive online storage.



Getting Excel

Excel is a part of the Microsoft 365 suite of Office applications. Microsoft 365 is available only as a subscription model that provides regular updates as new features are introduced. There are several versions of Microsoft 365 for Home and Business users. You can decide which version is best for you by visiting the comparison website at **microsoft.com/en-ww/microsoft-365/buy/compare-all-microsoft-365-products**



You may also find a tile on your Start menu that you can click to get started with a Microsoft 365 subscription.

Click the **Buy now** button beside your preferred version to begin completion of the Microsoft 365 subscription process.

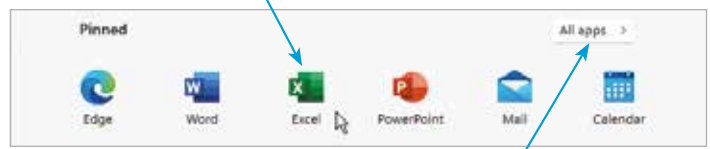
At the time of writing, the popular available versions of Microsoft 365 subscriptions are those listed in the table below:

Version	Features
Microsoft 365 Personal	For 1 person, 1TB of cloud storage
Microsoft 365 Family	For 1-6 people, 1TB of cloud storage per person
Microsoft 365 Business Basic	Each user, web & mobile Office apps only, 1TB of cloud storage per user
Microsoft 365 Apps for business	Each user, desktop Office apps, 1TB of cloud storage per user
Microsoft 365 Business Standard	For 5 mobile, tablet, and PC devices, 1TB of cloud storage per user
Microsoft 365 Business Premium	For 5 mobile, tablet, and PC devices, 1TB of cloud storage per user, Advanced security

Excel and Windows

With Microsoft 365 installed under Windows, you have a number of ways to launch Excel:

1. You may find tiles for the Office applications on the **Start** screen. Click the Excel tile



2. If a tile isn't shown, select the **All apps** list then scroll to the **E** category and click the **Excel** entry

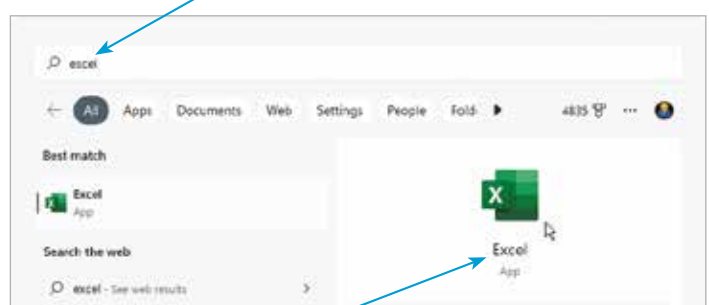
Hot tip

You can right-click Excel on the **All apps** list and select **Pin to Start** to add an Excel tile to the Start screen.

You can also look for applications by name, using Windows' **Search** feature:

1. Click the **Search** button on the Windows desktop taskbar

2. Type "excel" in the **Search** box to find matching items



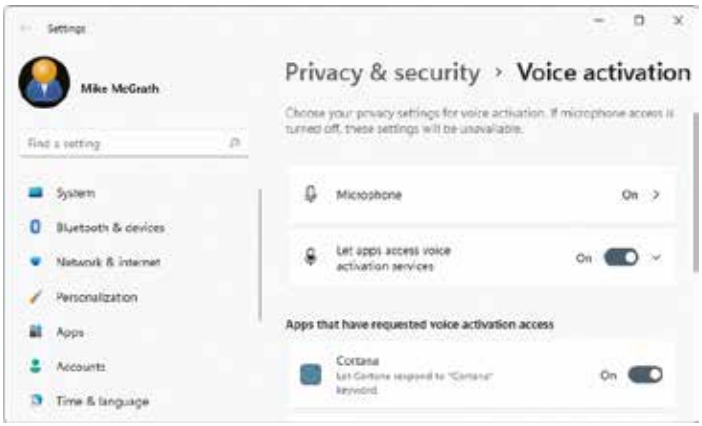
3. Select the **Excel** app entry in the search results to launch the application

Hot tip

You can right-click Excel on the **All apps** list, click **More** and click **Pin to taskbar** to add an Excel icon to the taskbar.

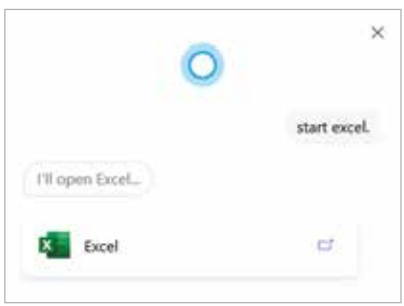
If you have a microphone on your system, you can use **Cortana** to simply ask to start applications:

1. Go to **Settings**, **Privacy & security**, **Voice activation** and ensure that **Cortana** is set to respond to voice commands



2. Select **Cortana** on the **All apps** list, or say "Hey Cortana" into your system microphone, to wake up **Cortana**

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



Whichever technique you use, the Excel app will be loaded and made ready to deal with your requirements.

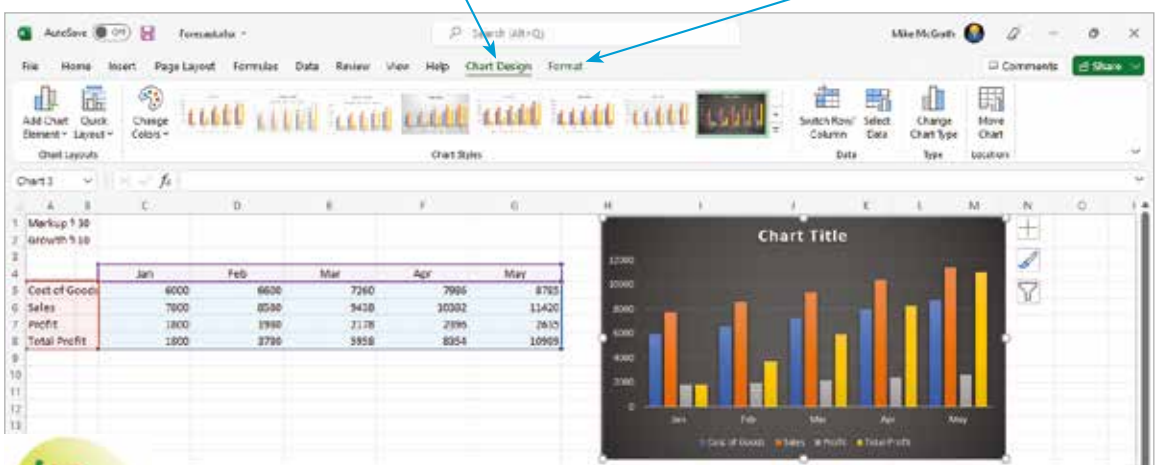
If Cortana can't hear you, go to **Settings**, **Privacy & security**, **Microphone** and turn **On** the **Let apps access your microphone**, **Cortana** option.

Cortana's 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**, **Language & region**.

The Excel Ribbon

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

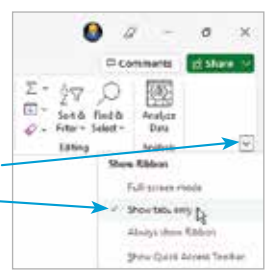
The Ribbon may also include contextual command tabs, which appear when you perform a specific task. For example, if you select some data and then click **Insert Column or Bar Chart**, **2D-Column** in the **Charts** group, chart tool tabs **Format** and **Chart Design** are displayed.

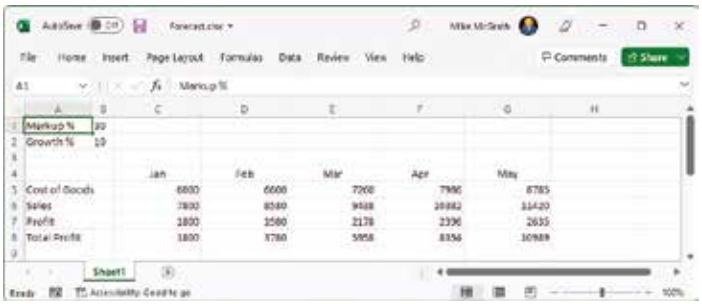


You can also choose **Full-screen mode** to run Excel full-screen, with no tabs or commands visible. Click the top of the app to display the Ribbon.

You can minimize the Ribbon, to use more of the space on the screen for the actual content of the spreadsheet:

1. Click the **Ribbon Display Options** button and select **Show tabs only** – the tabs will still be displayed but the commands will be hidden





2 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)

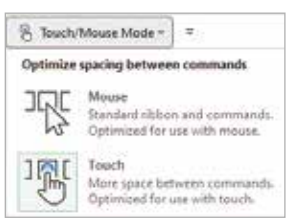
Touch/Mouse Mode

Excel offers two interfaces – Mouse or Touch, where the latter is optimized for touch-enabled devices. To enable Touch Mode:

1 Click the **Ribbon Display Options** button and select **Show Quick Access Toolbar** – a toolbar containing a drop-down arrow button now appears below the Ribbon

2 Click the drop-down arrow button on the Quick Access Toolbar, then choose the **Touch/Mouse Mode** option to add that item to the Quick Access Toolbar

3 Click the **Touch/Mouse Mode** item on the Quick Access Toolbar – see the Ribbon now display with extra spacing



Other Microsoft 365 apps such as Word, Access and PowerPoint also have a Ribbon – displaying tabs appropriate to those particular apps.

The **File** tab displays the Backstage view, which provides general document file functions and options. For example, **Options**, **Quick Access Toolbar** can be used to add items you regularly use to the Quick Access Toolbar so that they are readily available.

Exploring Excel

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:

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

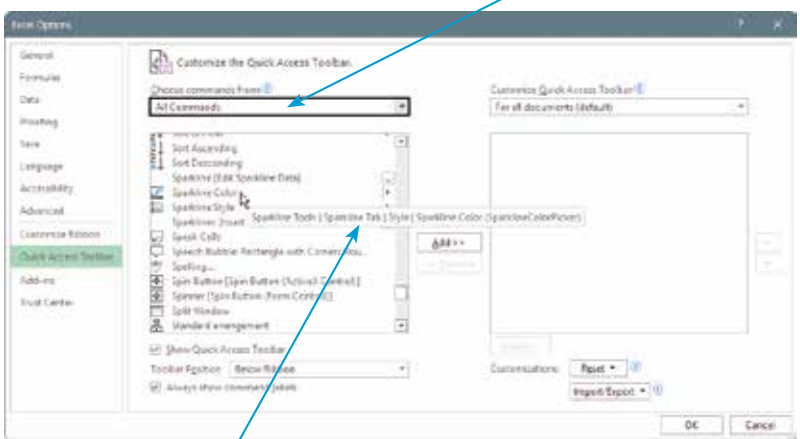
Explore the Ribbon tabs and command groups in Excel to find the features that you need to carry out activities on your worksheets.

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

If you want to locate a particular command, you can search a list of all the commands that are available in Excel:

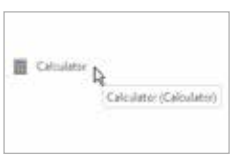
1. Click the drop-down arrow button on the Quick Access Toolbar, then choose the **More Commands** option to open the "Customize the Quick Access Toolbar" menu

2. Click the drop-down arrow button in the **Choose commands from** box, then select **All Commands**

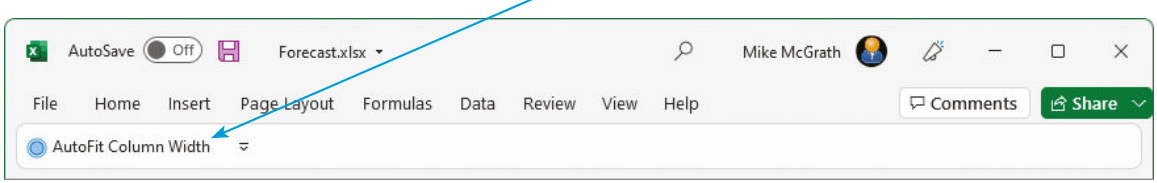


3. A **ScreenTip** will indicate the tab and group containing that command as you scroll down the list and move the mouse pointer over a command name

4. Some commands may not currently be included in any group, and so will be shown with just their name – for example, the **Calculator** command



5. Click **Add**, **OK** to add a selected command to the Quick Access Toolbar – for example, **AutoFit Column Width**



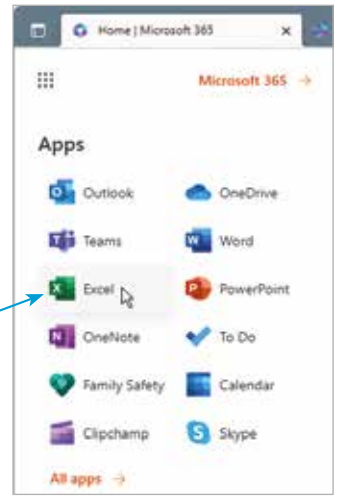
You can alternatively click **File**, **Options**, **Quick Access Toolbar** to open the "Customize the Quick Access Toolbar" menu.

To list commands that may not be currently in any group, you can select **Commands Not in the Ribbon**.

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

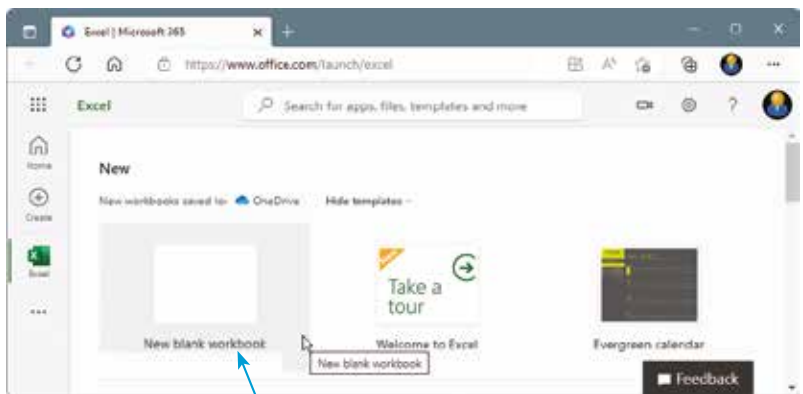
Excel Online App

1 To use the free Microsoft 365 Online apps, open your web browser and visit **microsoft.com/en-us/microsoft-365/free-office-online-for-the-web**, then sign in with your Microsoft account



2 Select **Excel** from the choice of Microsoft 365 Online apps

Microsoft 365 Online apps are touch-friendly web applications that let you create, edit and share Excel, Word, PowerPoint and OneNote files from any browser. They are free to use and can share your OneDrive storage. However, the web page and the steps for accessing the free apps may vary.



3 Select the **New blank workbook** option – to begin working on a new spreadsheet