ULTIMATE IT COURSES
a mile2® company

STUDENT MANUAL

Microsoft 365 Excel: Part 3

Microsoft 365 Training

Microsoft® 365 Excel®: Part 3

Microsoft® 365 Excel®: Part 3

Courseware Release Version 4.0

Notice of Rights

Trademark Notice

Notice of Liability

Disclaimer

Terms and conditions

Microsoft® 365 Excel®: Part 3

Contents

ABOUT THIS COURSE

Course Prerequisites

This manual assumes the user has completed, or has an understanding of the materials covered, in the first and second parts of the Microsoft Office Excel 365 courseware, including:

- Excel basics
- Working with data
- Modifying worksheets
- Printing workbook contents
- Managing large workbooks
- Customizing the Excel environment
- Creating advanced formulas
- Analyzing data with logical and lookup functions
- Organizing worksheets data with tables
- Visualizing data with charts
- Analyzing data with PivotTables, slicers, and PivotCharts
- Working with graphical objects
- Enhancing workbooks

Course Overview

Welcome to the third part of our Microsoft 365 Excel courseware. Excel is Microsoft's powerful and easy-to-use spreadsheet program. This new version of Excel incorporates some new features and connectivity to make collaboration and production as easy as possible.

This course is intended to help all users get up to speed quickly on the advanced features of Excel. We will cover:

- Using Excel Online
- Worksheet Automation
- Auditing and Error Checking
- Data Analysis and Presentation
- Working with Multiple Workbooks
- Exporting and Sorting Data

Note: This course is written for the desktop version of Microsoft 365 Excel.

Course Objectives

By the end of this course, users should be comfortable in both the online and desktop environments, using automating functions, analyzing and presenting data, auditing and error checking your work, working in multiple workbooks, and accessing and distributing data.

How to Use This Book

This course is divided into six lessons. Each lesson focuses on several key topics, each of which are broken down into easy-to-follow concepts. At the end of each topic, you will be given an activity to complete. At the end of each lesson, we will summarize what has been covered and provide a few review questions for you to answer. Supplemental learning for selected topics is provided in the form of Lesson Labs at the end of this book.

Before you begin, download the course's Exercise Files to a convenient location. They will be referenced throughout this course and are a key part of your learning experience.

LESSON 1:
EXCEL ONLINE

Lesson Objectives

In this lesson you will learn:

- How to access and use Excel Online
- Features that differ between Excel Online and the Excel desktop application

TOPIC A: Accessing and Using Excel Online

One of the benefits of your Microsoft 365 subscription is the ability to use the online version of Excel. While this version of Excel has some limitations in its functionality in comparison to the desktop application, it also provides some convenient features that can enhance your productivity and improve your data security and accessibility. In this topic, you will review the basics of using Excel Online, switching between versions, and saving your workbooks.

Topic Objectives

In this session, you will learn:

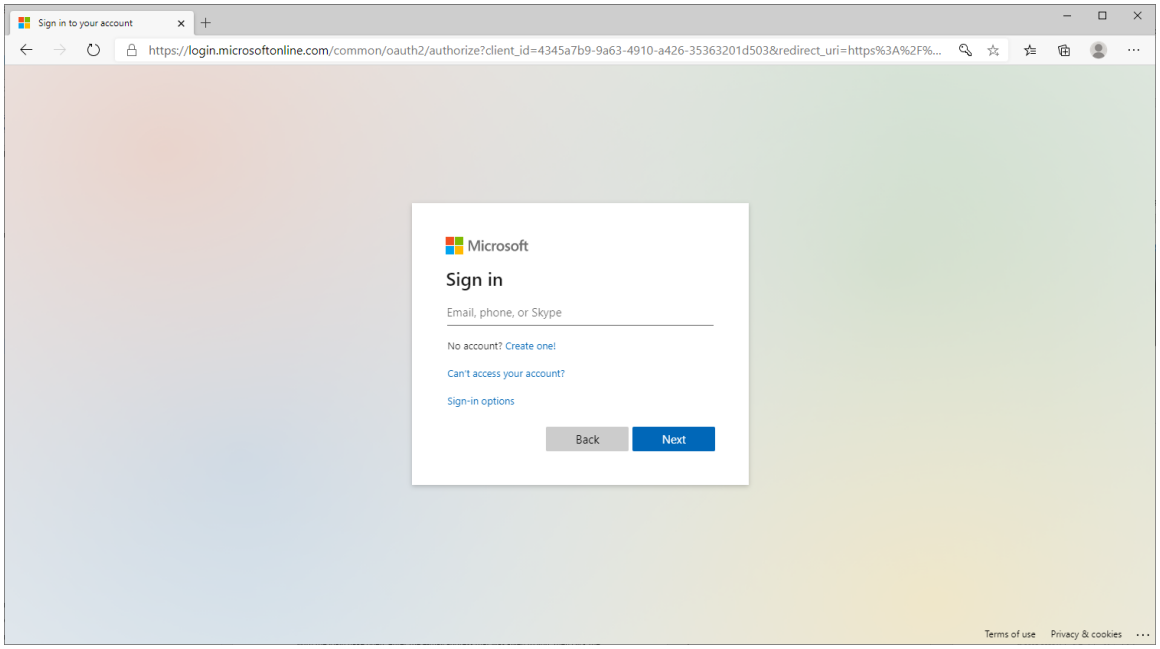
- About Excel Online
- How to log in to Microsoft 365
- How to identify where your workbook is saved
- How to save a copy of your workbook to your local machine
- How to copy a local workbook to OneDrive

About Excel Online

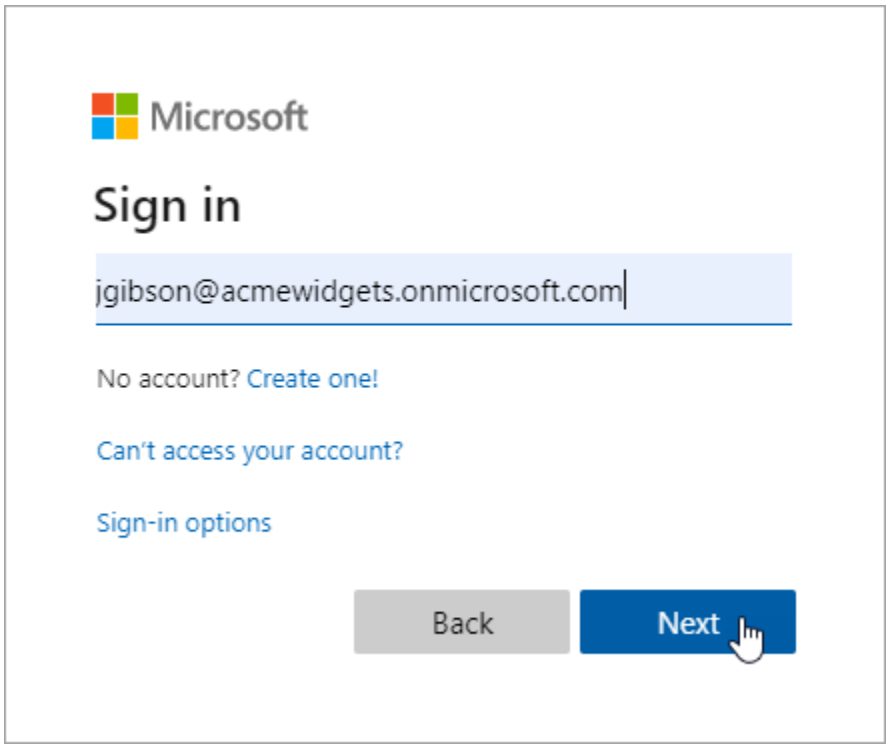
Excel Online is an online version of Excel that it is available to you through your Microsoft 365 subscription. It includes many of the basic functions available in the full Excel desktop application, and It works within your browser, so it can be accessed from any device with an internet connection, even if that device does not have the Excel desktop application installed. Using your Microsoft 365 account and OneDrive, you can store your files online, share them, and even collaborate with others in real time. Excel Online will also give you access to charting and survey tools that can help you gather and visualize data.

Logging into Microsoft 365

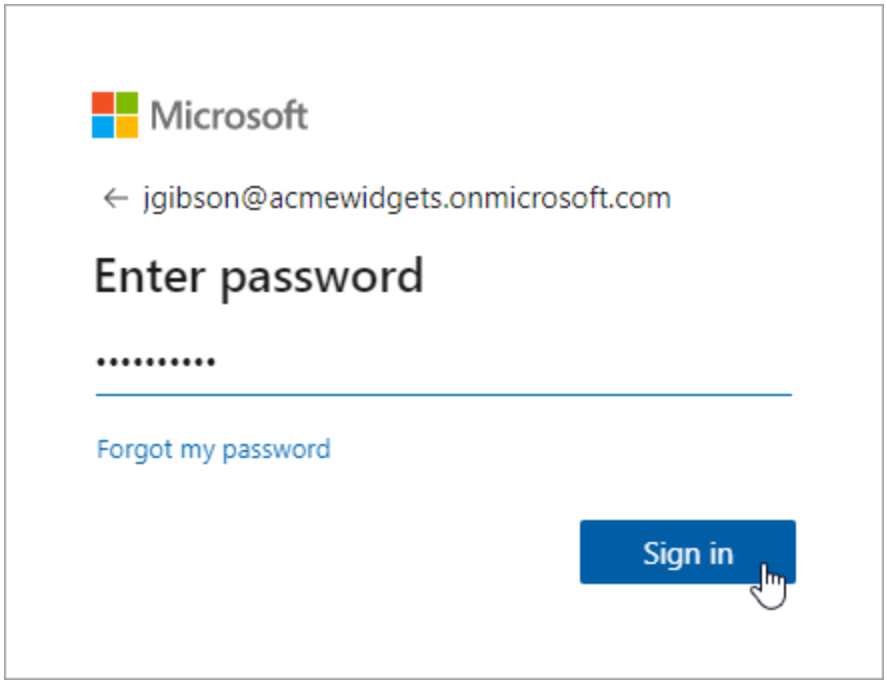
To use Microsoft 365, you will be given a username and password to access your online account. Once you have this information, open your browser (Edge, Firefox, Chrome, etc.) and then open the login page at https://login.microsoftonline.com:



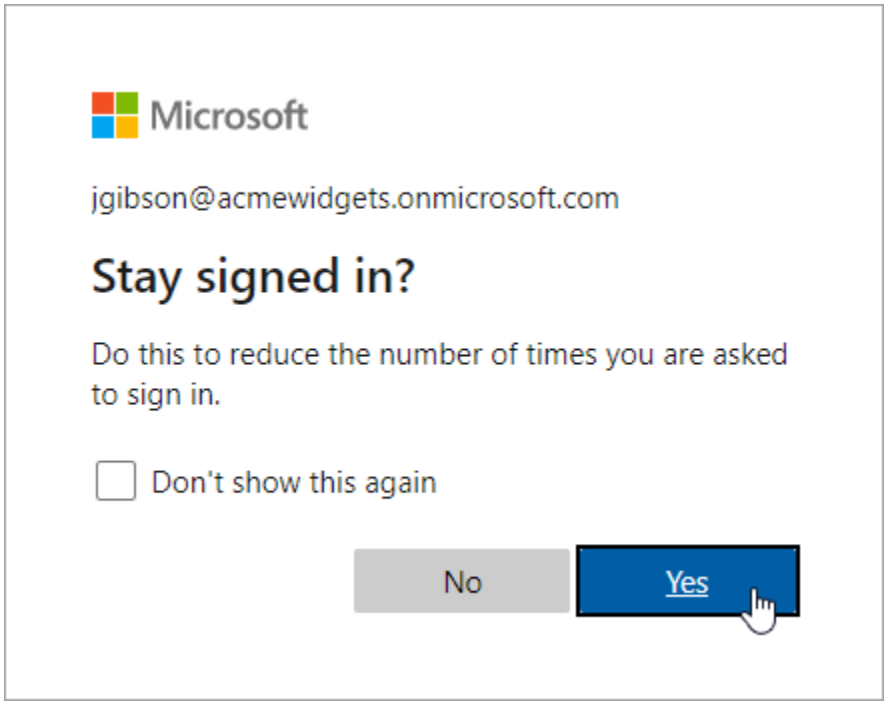
With the login page open, enter the e-mail address that was given to you, then click the **Next** button:



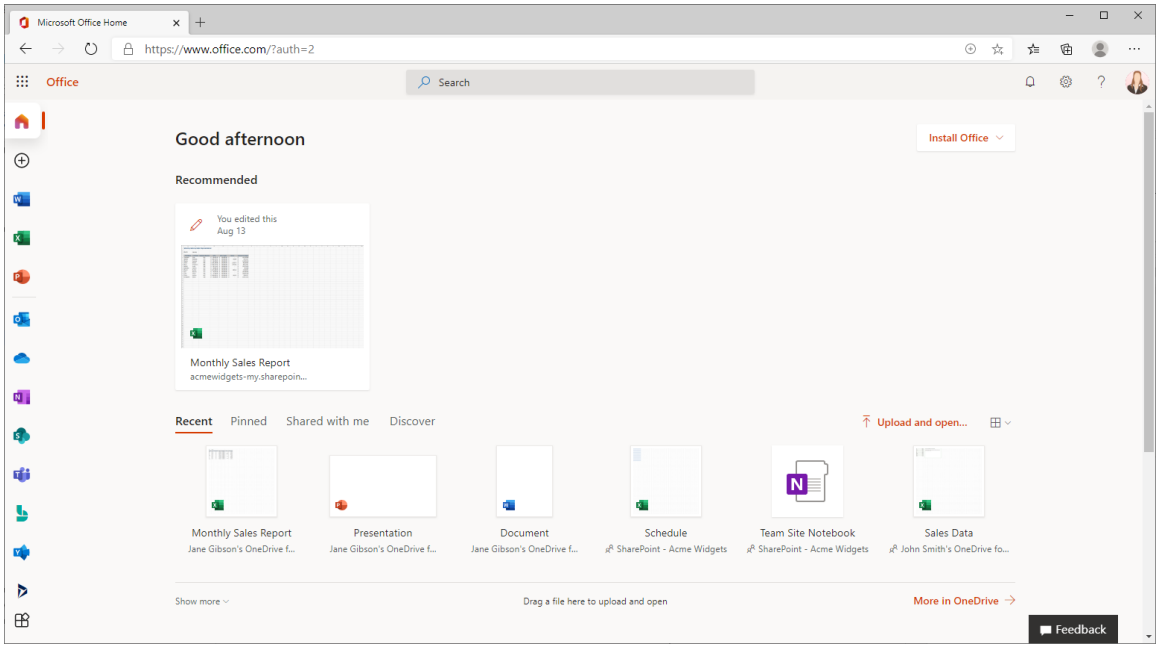
Type in your password, then click the **Sign in** button to complete the process:



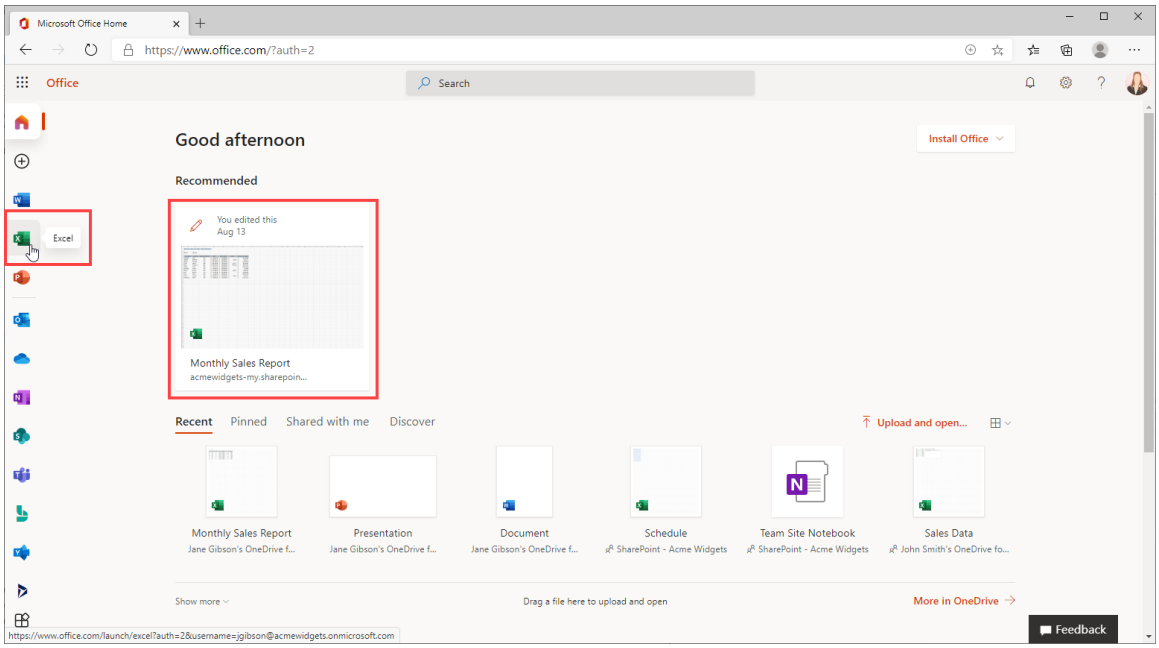
Keep in mind that you can choose to keep yourself signed into the account by clicking the **Yes** button. This can save you time as you do not have to log into your account every day, but you should not select this option when using public computers.



Once you are logged into your account, you will be greeted with the default **Office** landing page:

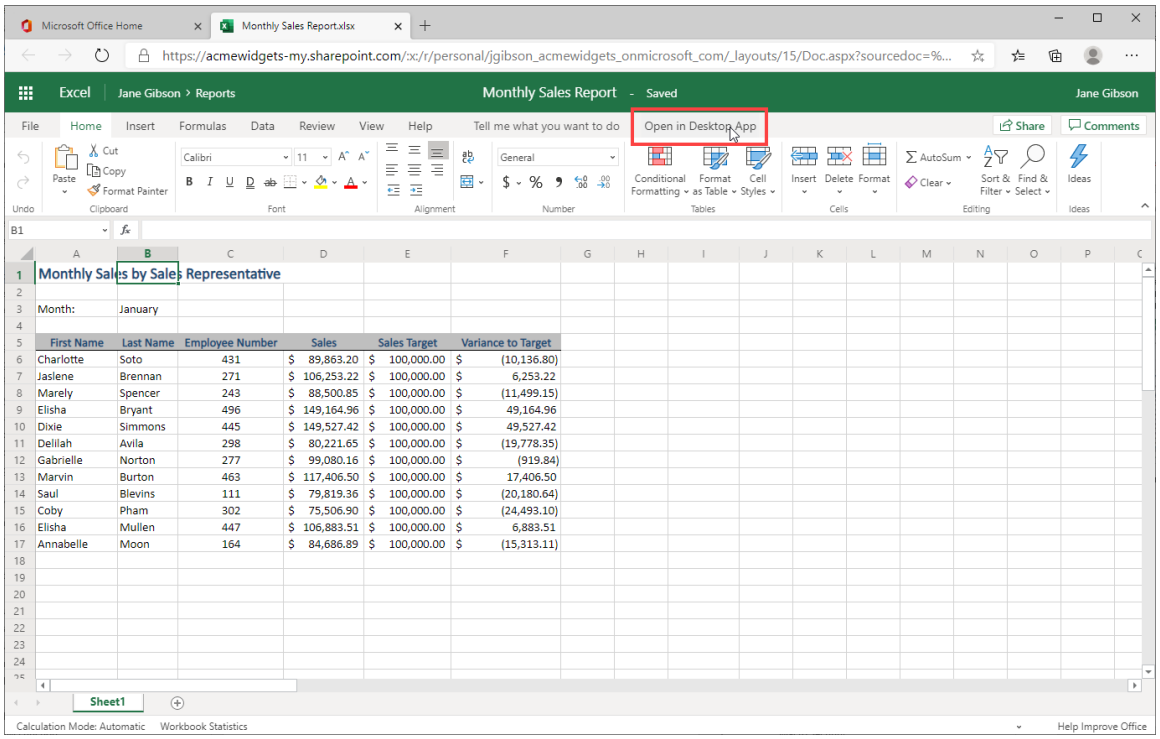


You can now open Excel Online by clicking on the Excel app, or by selecting an Excel file to open:

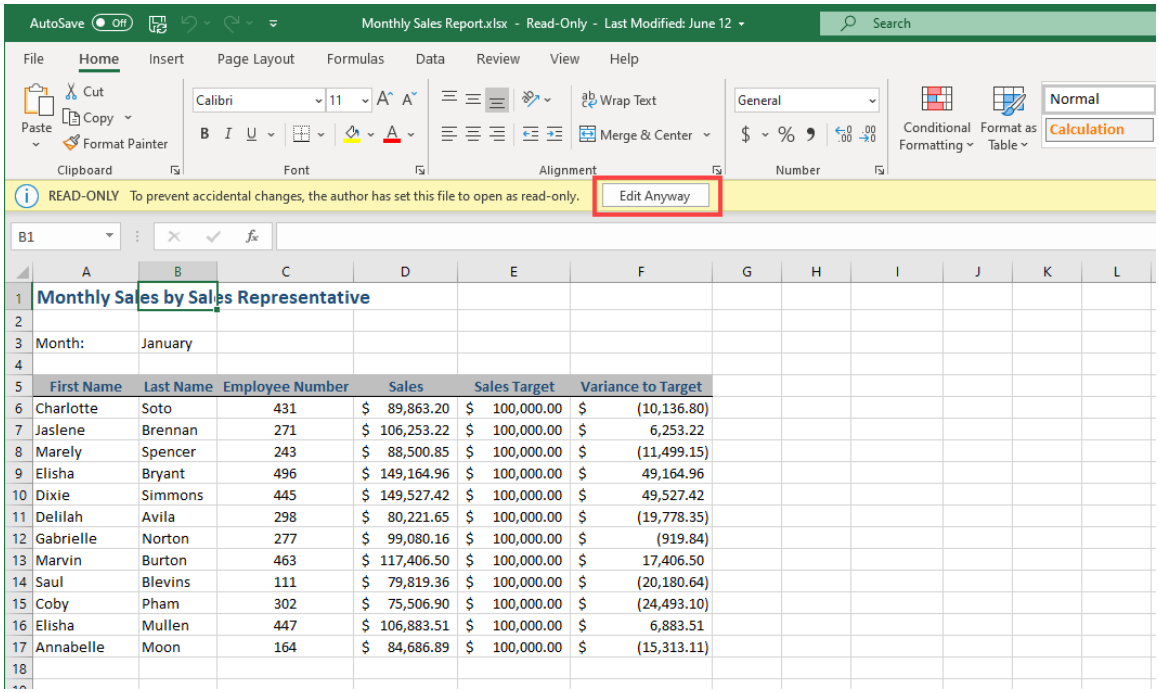


Edit Your File in the Excel Desktop Application

When you have a workbook open in Excel Online, you may want to access some of the more advanced features that are available in the Excel desktop application. To edit an open Excel Online workbook in the Excel desktop application, simply click **Open in Desktop App** on the ribbon list:



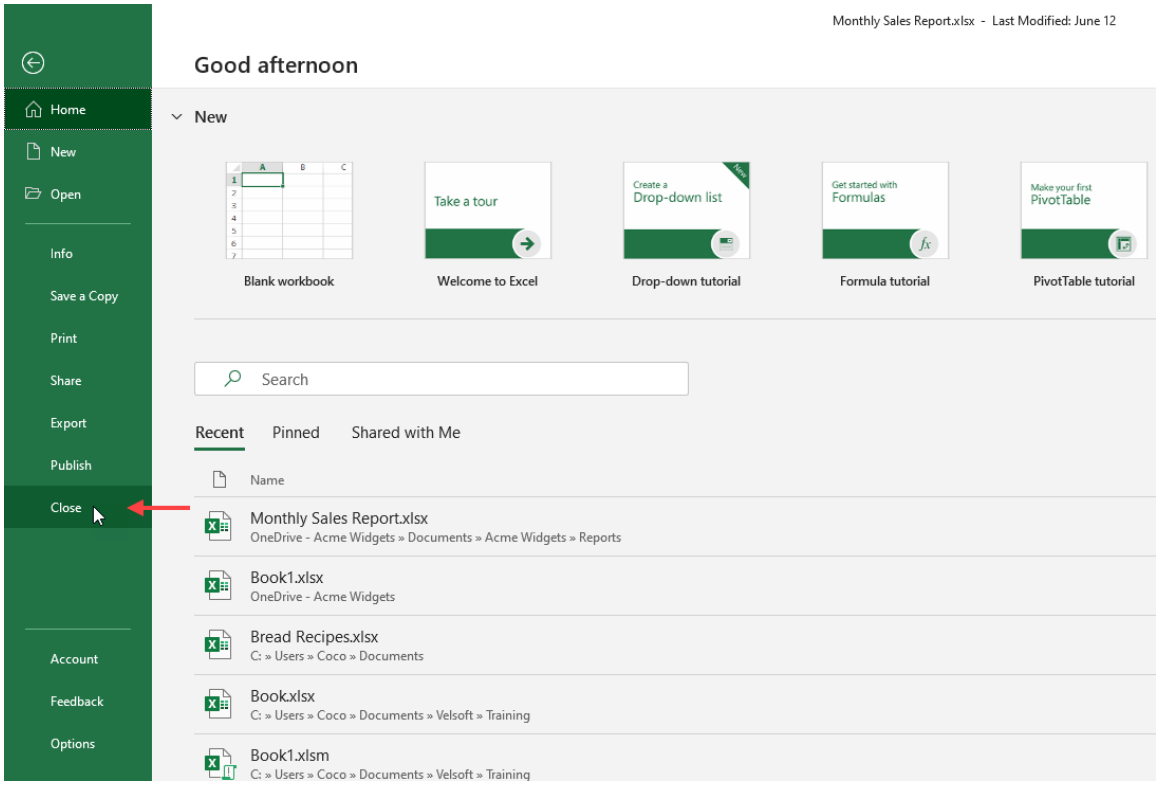
Excel will open on your desktop and display the current workbook on your screen:



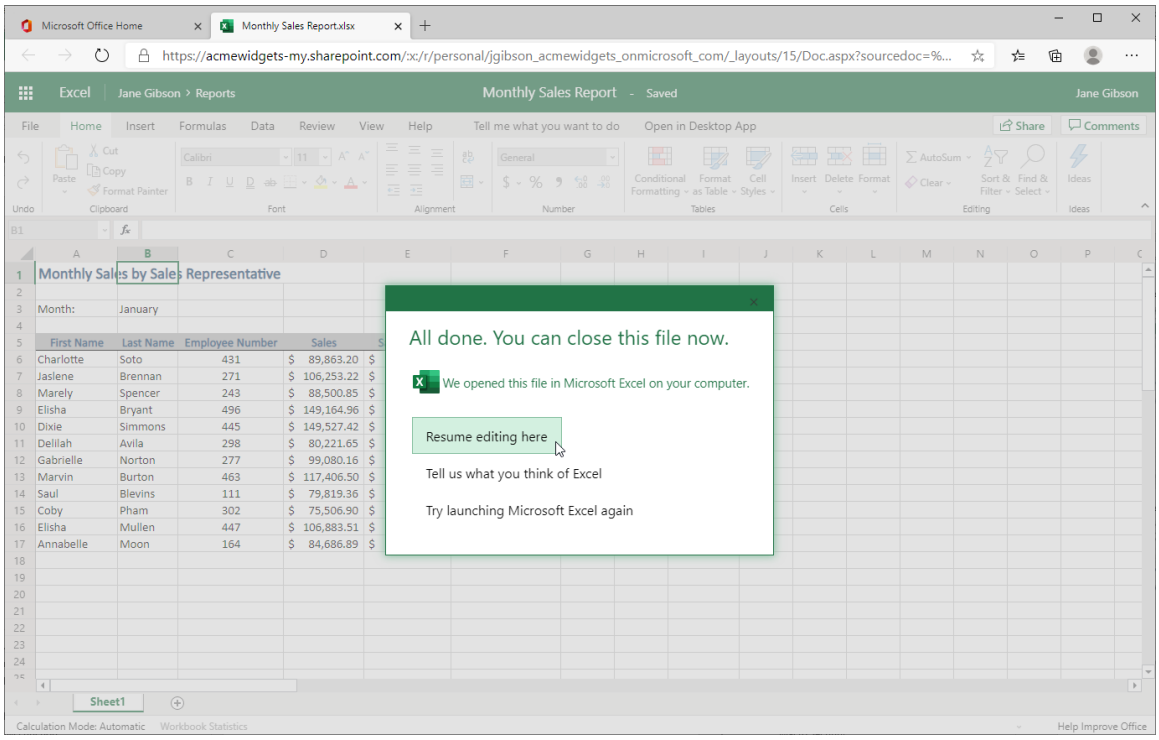
	A	B	C	D	E	F
1	Monthly Sales by Sales Representative					
2						
3	Month:	January				
4						
5	First Name	Last Name	Employee Number	Sales	Sales Target	Variance to Target
6	Charlotte	Soto	431	$ 89,863.20	$ 100,000.00	$ (10,136.80)
7	Jaslene	Brennan	271	$ 106,253.22	$ 100,000.00	$ 6,253.22
8	Marely	Spencer	243	$ 88,500.85	$ 100,000.00	$ (11,499.15)
9	Elisha	Bryant	496	$ 149,164.96	$ 100,000.00	$ 49,164.96
10	Dixie	Simmons	445	$ 149,527.42	$ 100,000.00	$ 49,527.42
11	Delilah	Avila	298	$ 80,221.65	$ 100,000.00	$ (19,778.35)
12	Gabrielle	Norton	277	$ 99,080.16	$ 100,000.00	$ (919.84)
13	Marvin	Burton	463	$ 117,406.50	$ 100,000.00	$ 17,406.50
14	Saul	Blevins	111	$ 79,819.36	$ 100,000.00	$ (20,180.64)
15	Coby	Pham	302	$ 75,506.90	$ 100,000.00	$ (24,493.10)
16	Elisha	Mullen	447	$ 106,883.51	$ 100,000.00	$ 6,883.51
17	Annabelle	Moon	164	$ 84,686.89	$ 100,000.00	$ (15,313.11)
18						

Note that you may need to click **Edit Anyway** to start working with the file.

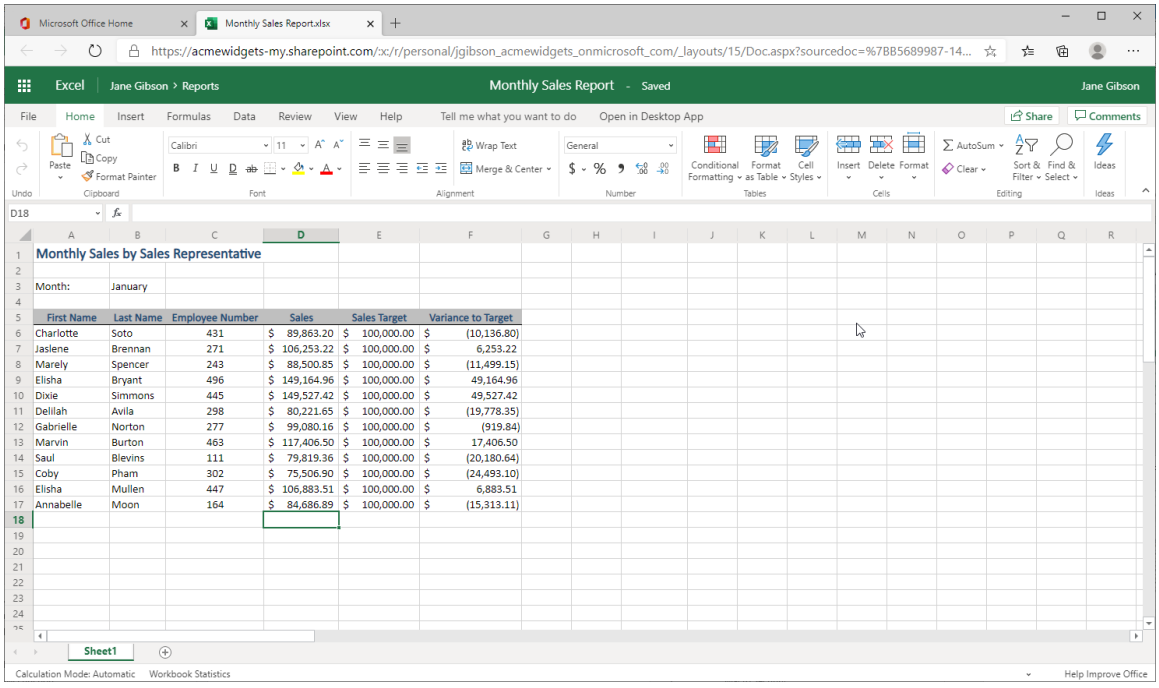
Even though you are working with the desktop version of Excel, any changes that you make will be automatically saved to the online file. This way you can have the full functionality of the Excel desktop application, combined with the versatility and portability of Excel Online, without having to worry about keeping track of multiple versions of the same file. When you are finished working with the desktop version of Excel you can simply close the program by clicking **File → Close**:



You can then return to your internet browser. If prompted, click **Resume editing here**:

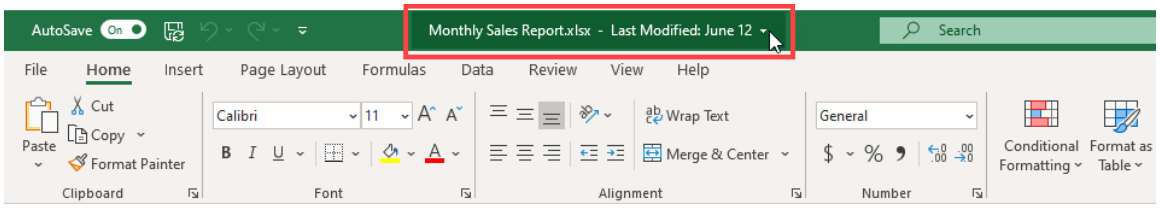


You will now be working with the updated version of your workbook:

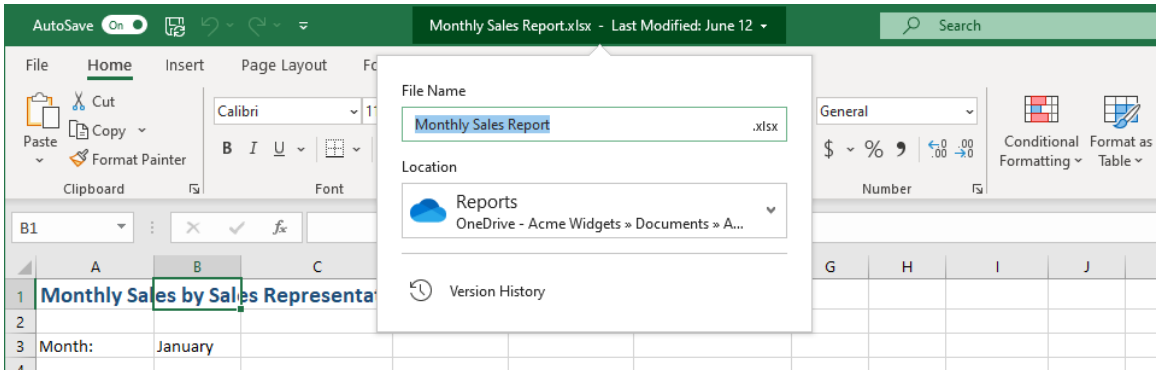


Identify Where Your Workbook is Saved

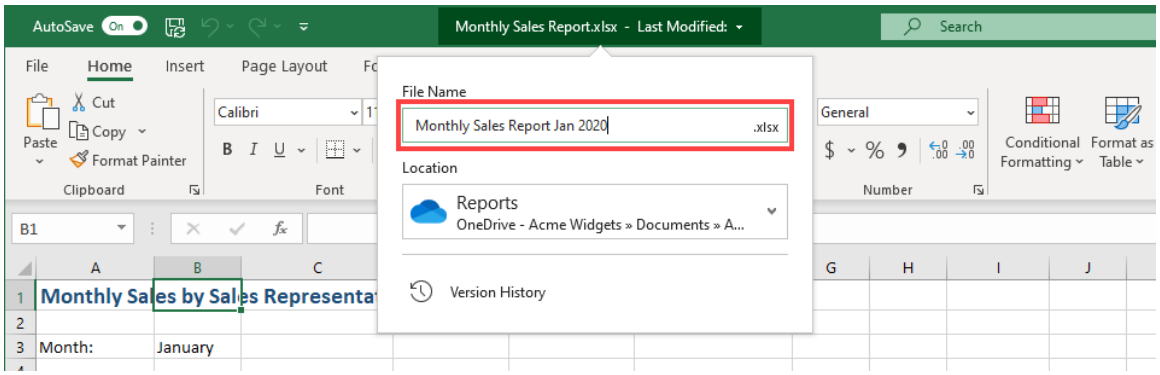
When working in Excel Online, all workbooks are stored either on OneDrive, OneDrive for Business, or a SharePoint site, and are saved automatically as you work. If you edit your file using the Excel desktop application, the file will continue to be automatically saved to the same location. You can confirm this in the desktop application by clicking on the file name at the top of the workbook window:



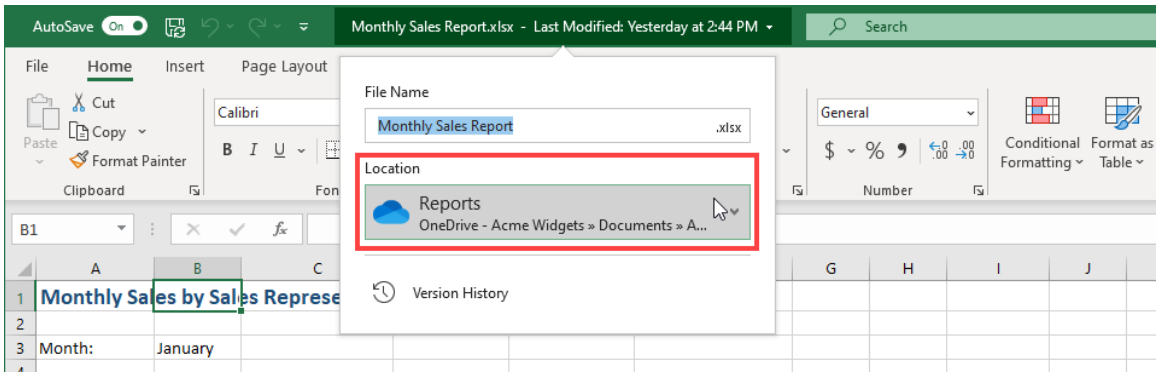
You will see a dialog box, indicating the **File Name** and the **Location**:



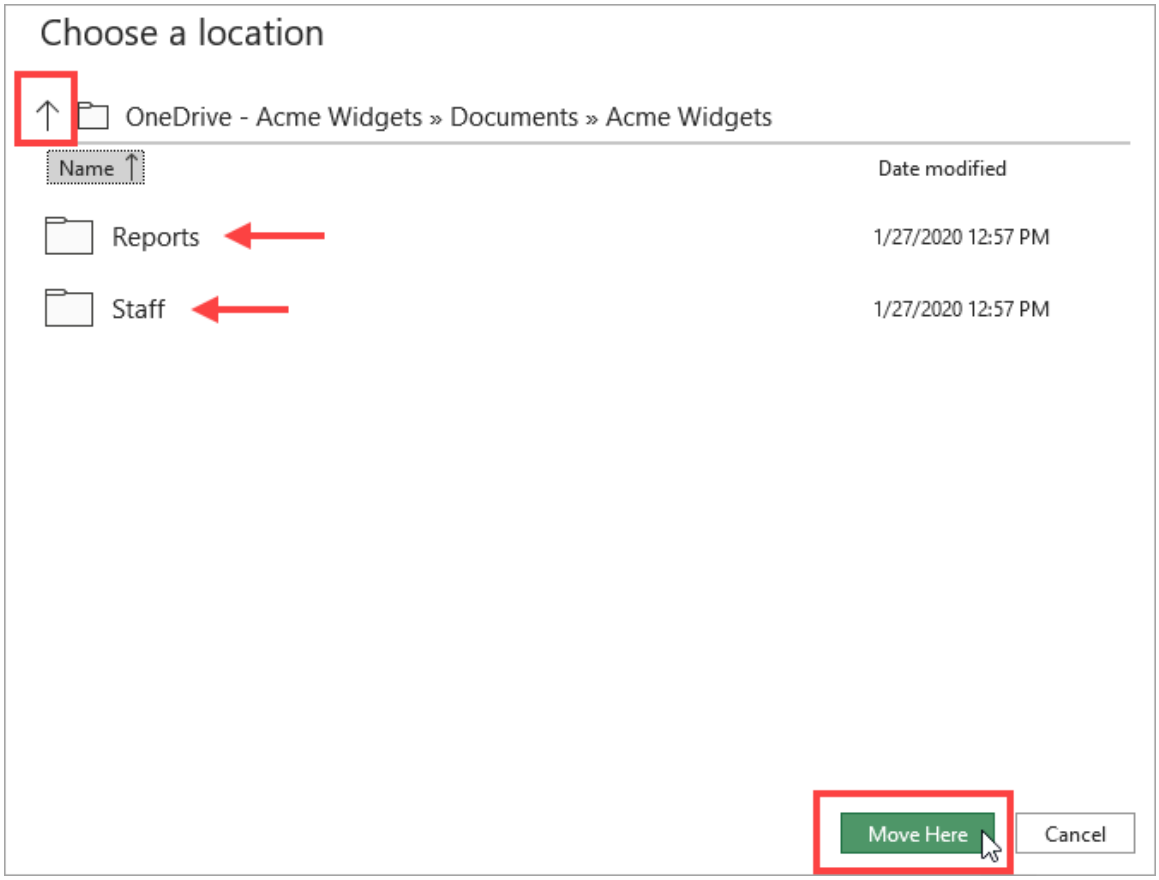
You can rename the file by editing the text in the **File Name** field:



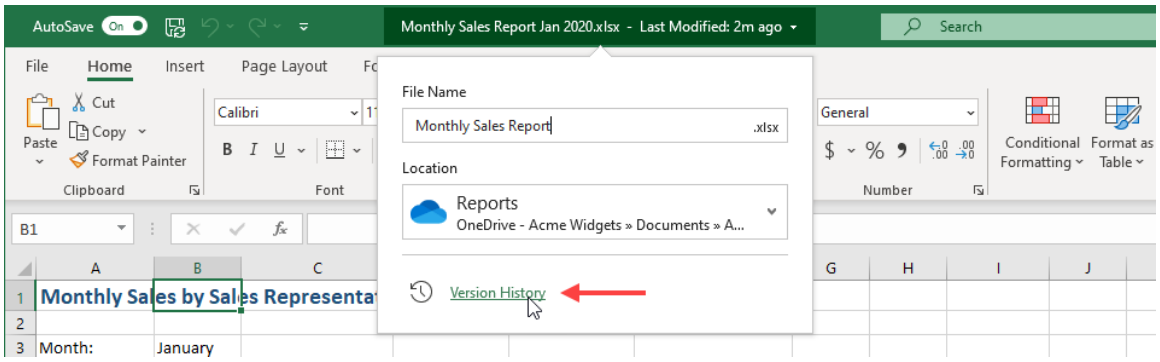
You can also move the file by clicking on the **Location** field:



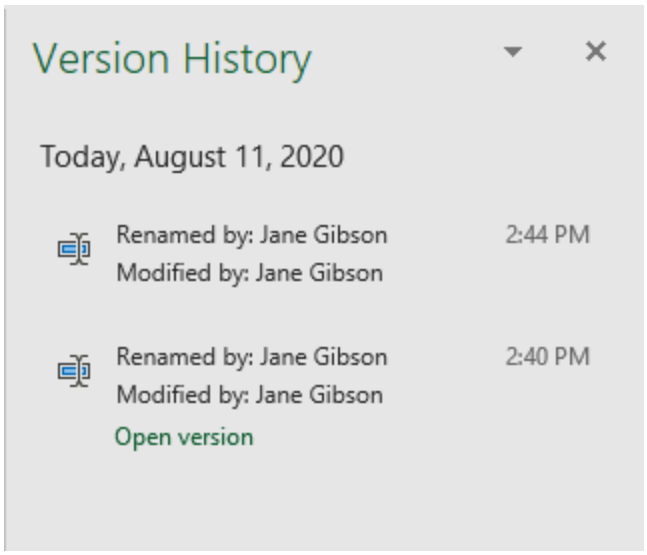
The **Choose a location** dialog box will open, asking you to choose a location. You can navigate through the folders on OneDrive by either clicking on the up arrow (to go up one level) or clicking on the folders in the window (to go down a level). Click **Move Here** to confirm the location to which you want to move the file:



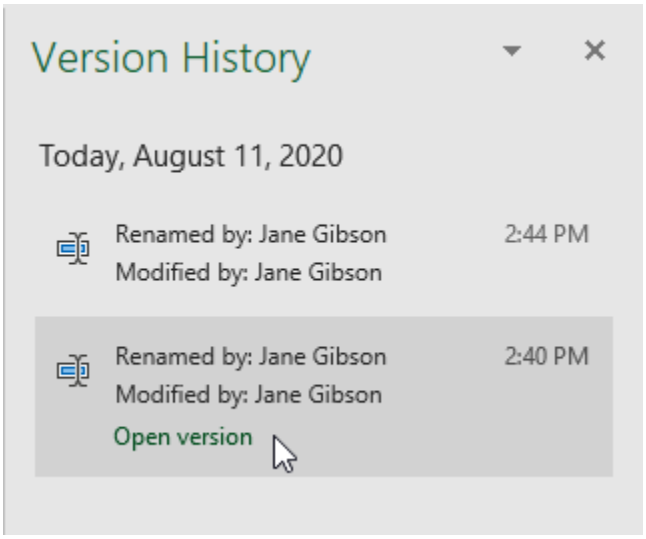
To see a history of your file versions, click **Version History**:



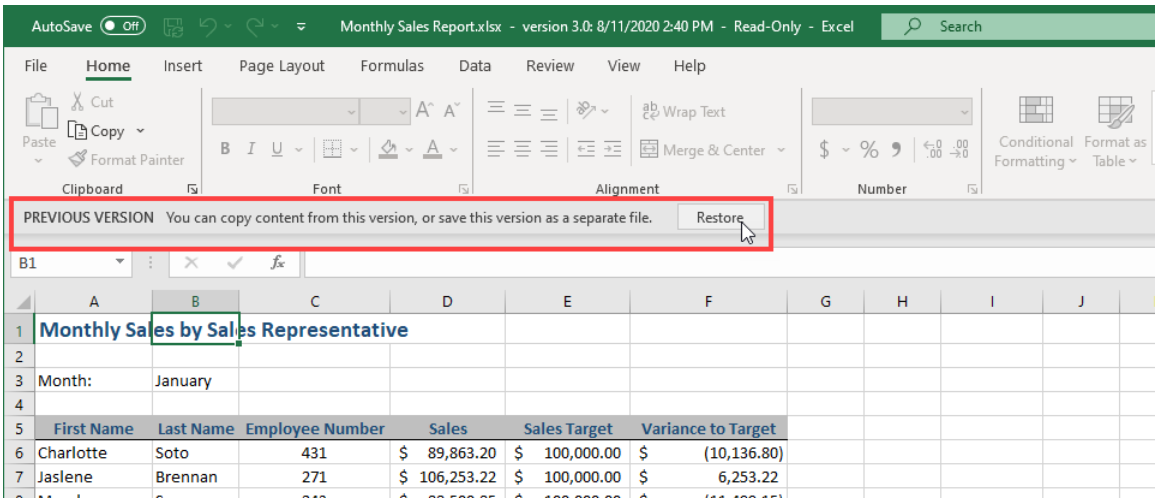
The **Version History** task pane will display on the right side of your window and will list the saved versions of the file, with a brief description of the activity, the name of the user who saved the changes, and the date and time:



If a version of the file has been saved, and is available, you can open it by clicking on **Open version,** beneath the version description. The version will then be opened as a separate file in the Excel desktop application.



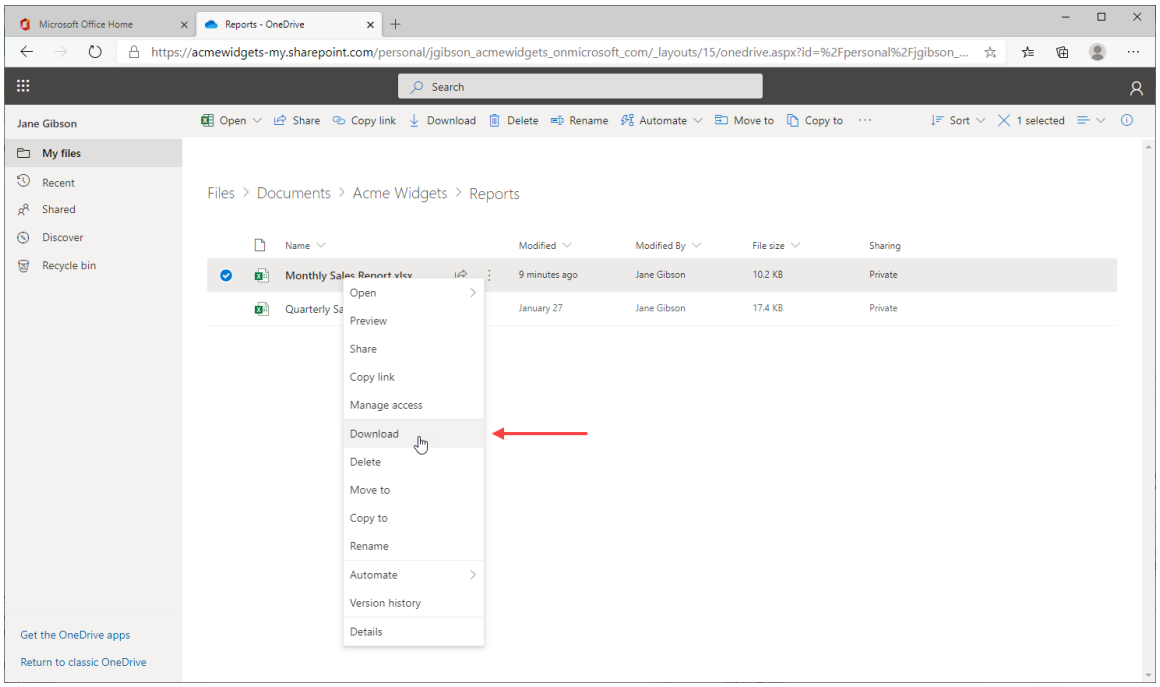
To restore the most recent document to the previous version, click **Restore** below the ribbon. The workbook will be restored to the previous version:



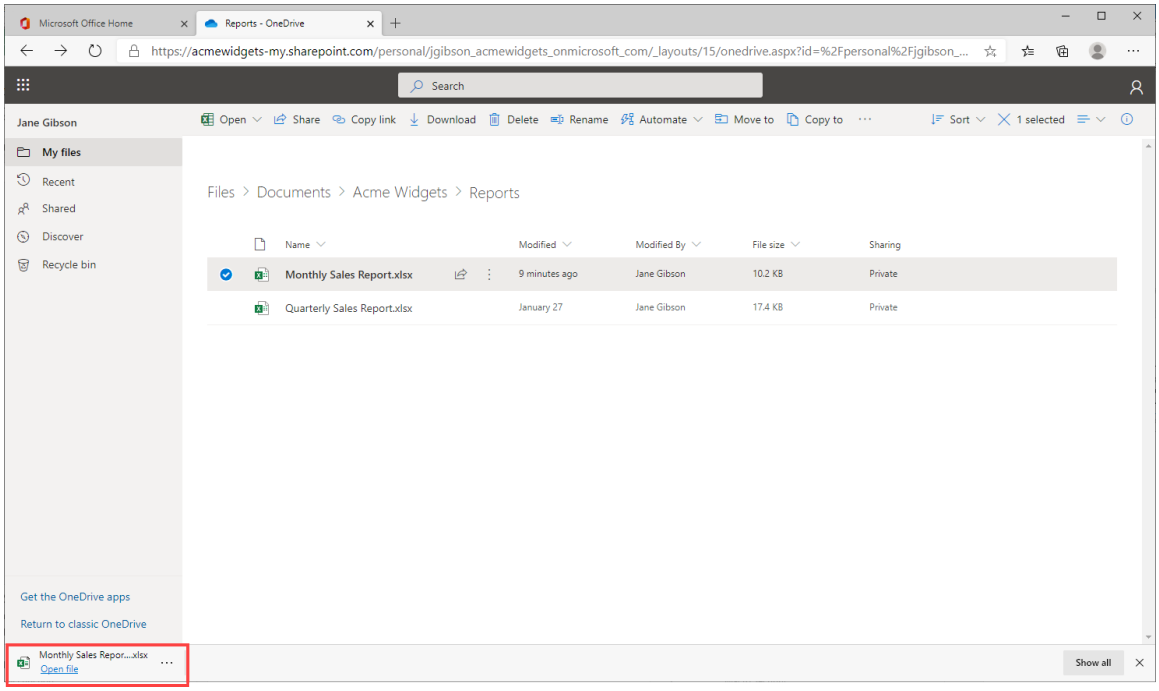
Save a Copy of Your Workbook to Your Local Machine

While using Microsoft OneDrive to store and manage your files provides for ease of access, version control, security, and data backup, there may be times that you will want to work on a file when you are offline.

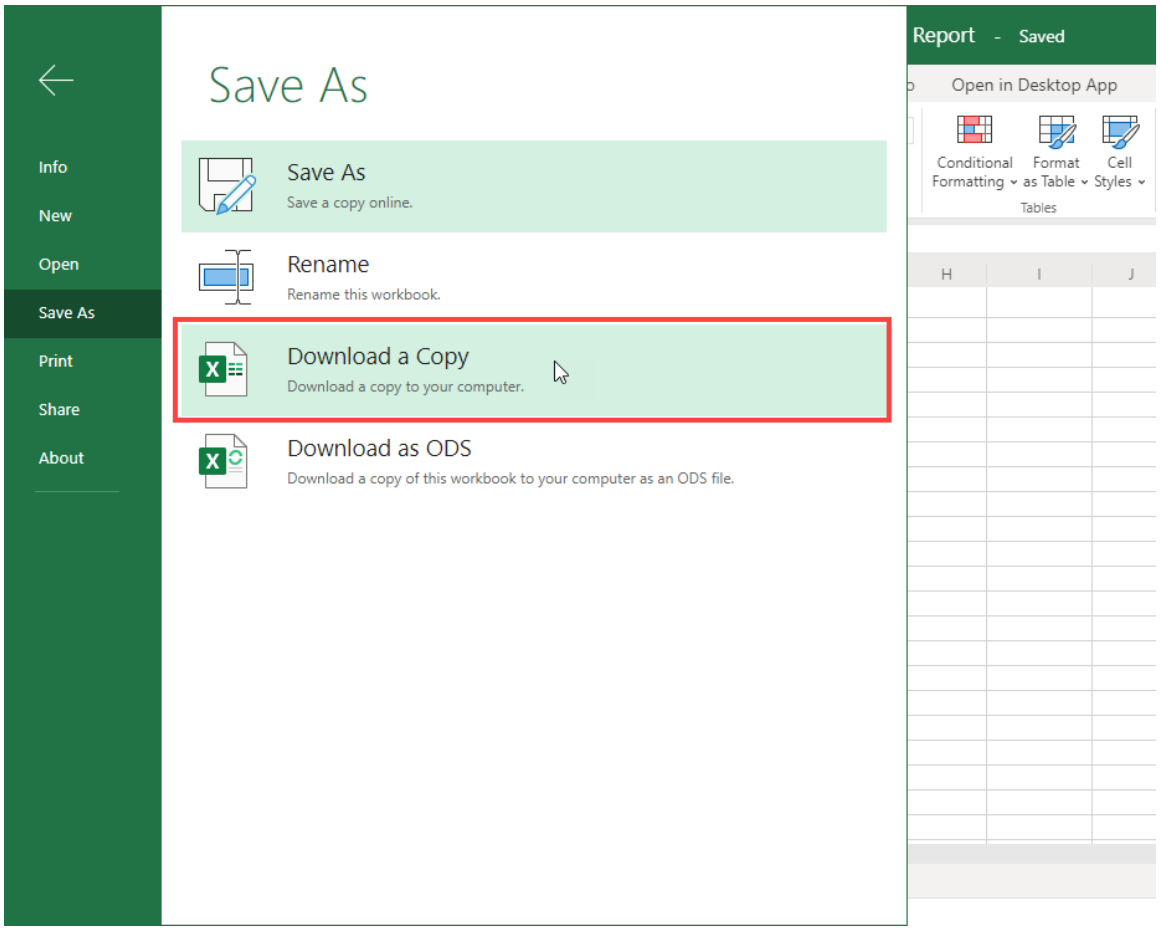
One simple way to copy a file to your local computer is to open OneDrive in your browser, navigate to the file you want to copy, right-click on the file and select **Download** from the option list:



Your file will be saved to the folder you have configured to receive downloaded files (typically the Downloads folder in Windows 10). To open the file from your browser, click **Open file** under the file name in the list of downloaded files at the bottom of the window:



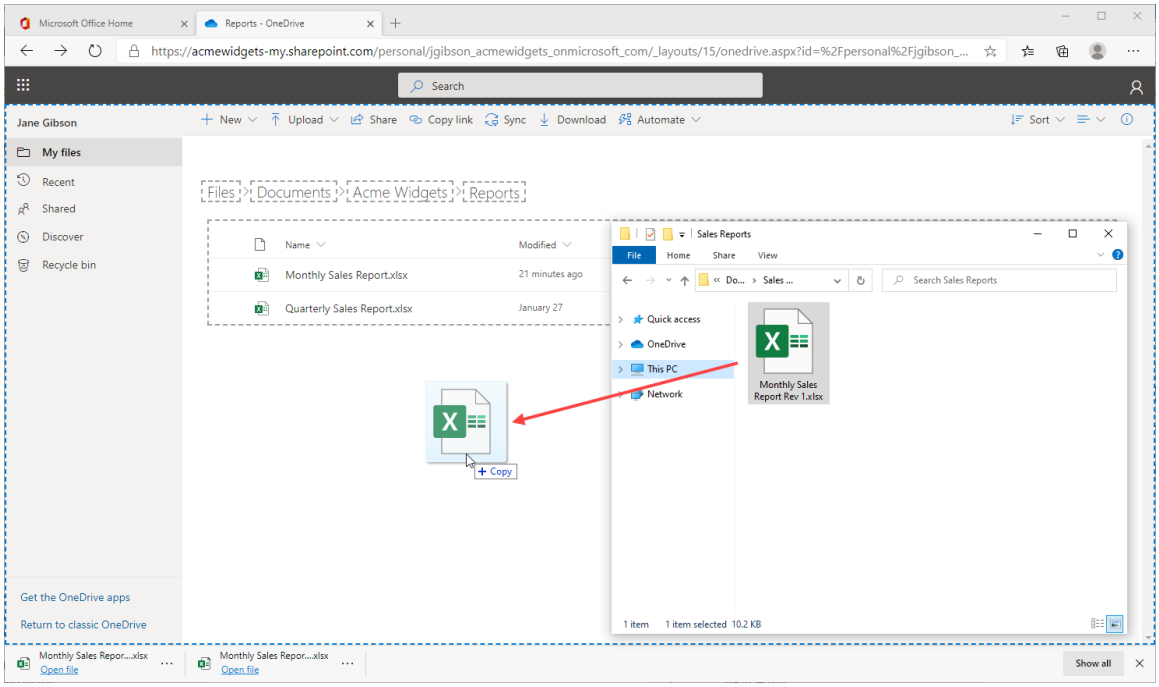
If your workbook is already open in Excel Online, you can also click **File → Save As → Download a Copy**, with the same result:



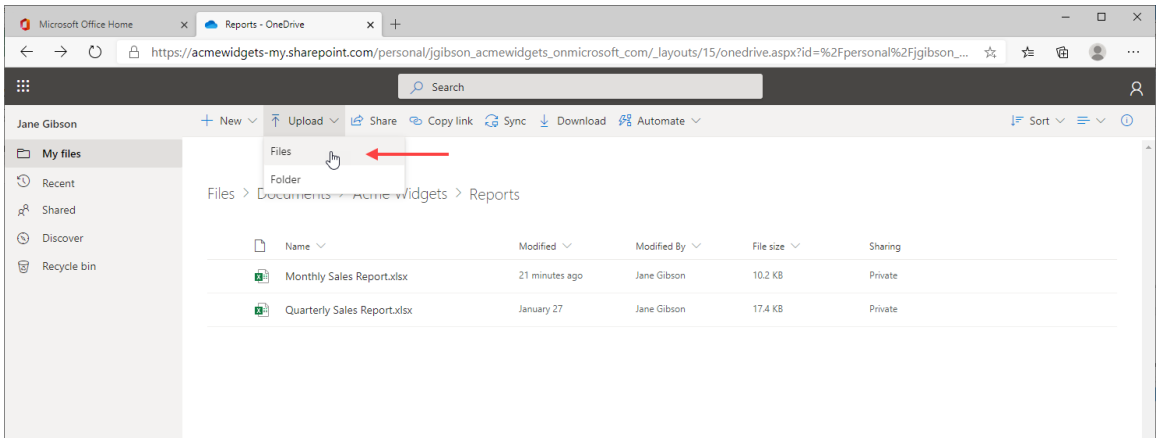
Copy a Local Workbook to OneDrive

It is important to note that if you have copied a workbook from OneDrive to work offline, the original workbook that you copied has not been updated to reflect any changes that you have made. If you want to ensure that the latest workbook is stored in OneDrive, you can copy the file from your local computer and either replace the original or use your own naming strategy to track the versions of your files.

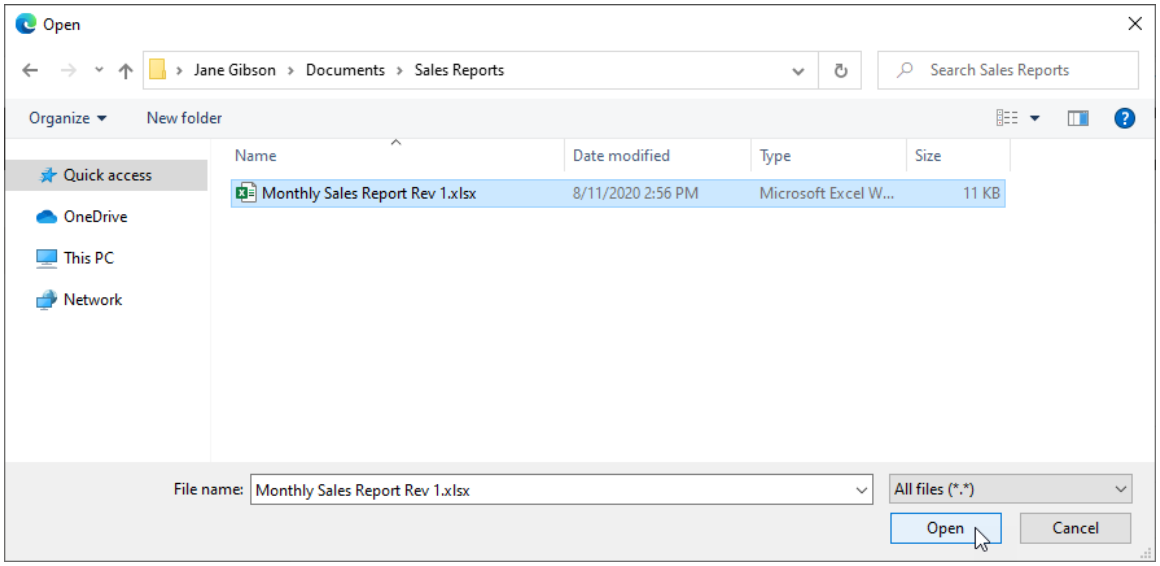
There are two ways to upload a workbook to OneDrive. The simplest method is to **drag and drop the file** from File Explorer or your desktop to the **OneDrive** window:



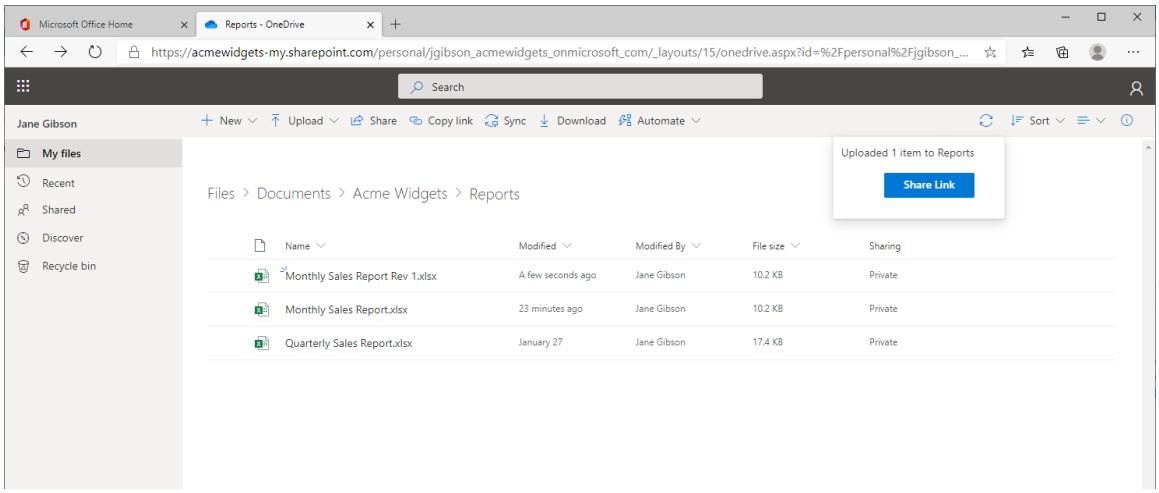
You can also click on the **Upload** button in the OneDrive window and click **Files**:



This will launch the **Open** dialog box, where you can locate and select the workbook(s) you would like to upload. To complete the process, click **Open**:



The workbook(s) will be uploaded and will now be available in the OneDrive window:

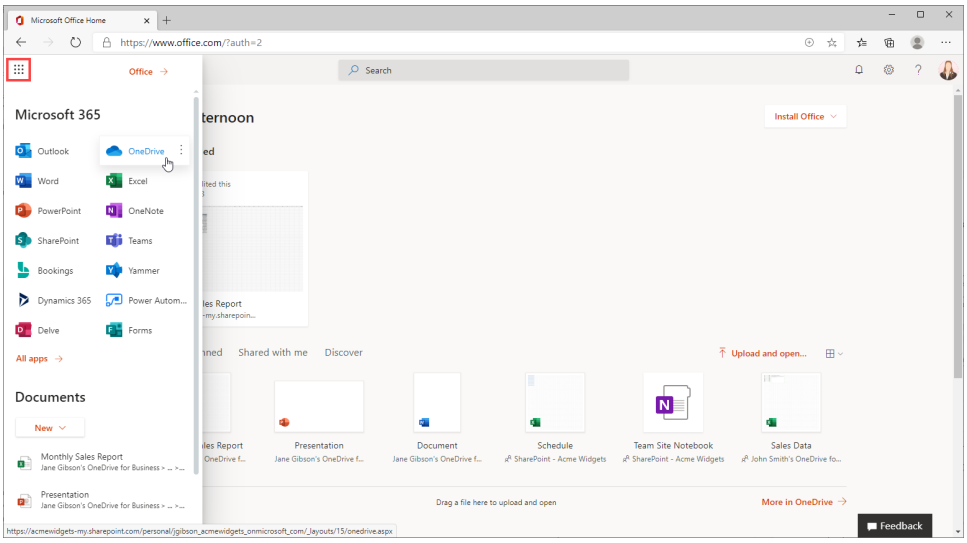


Activity 1-1: Managing Workbooks Between Excel Online and the Excel Desktop Application

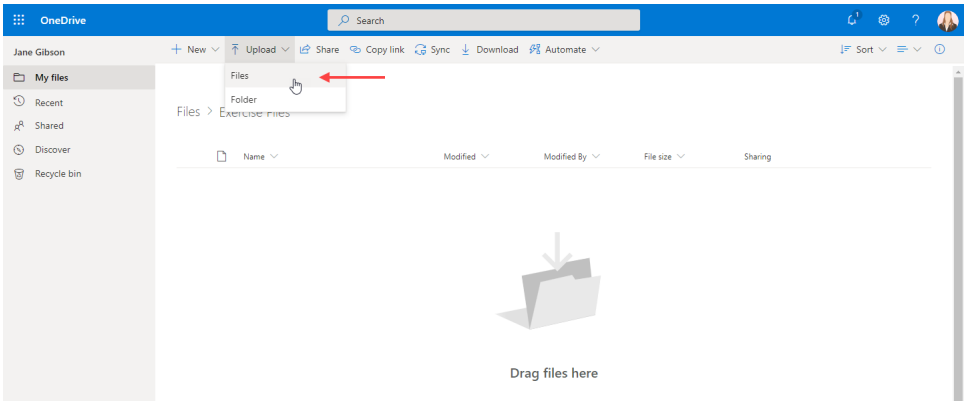
In this activity, you will open a workbook in Excel Online and then edit the file in the Excel desktop application.

1. To begin, open your internet browser and log into Microsoft 365.

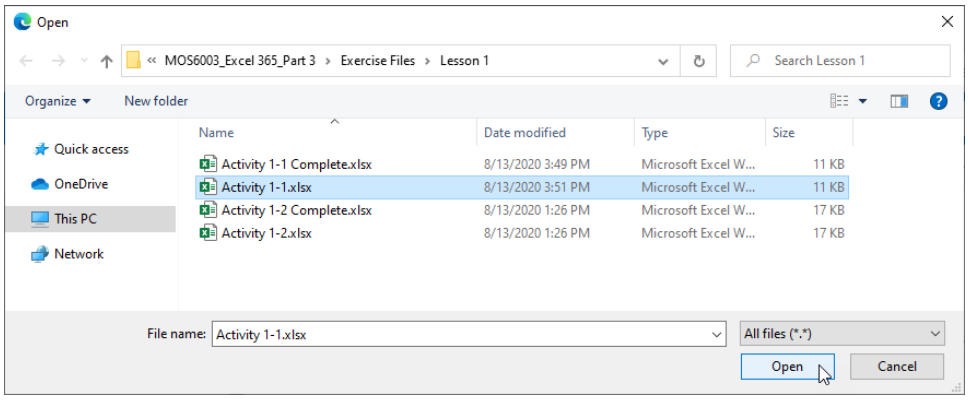
2. Once you are logged in, navigate to your OneDrive location by clicking the **App launcher Icon**, then clicking the **OneDrive** icon:



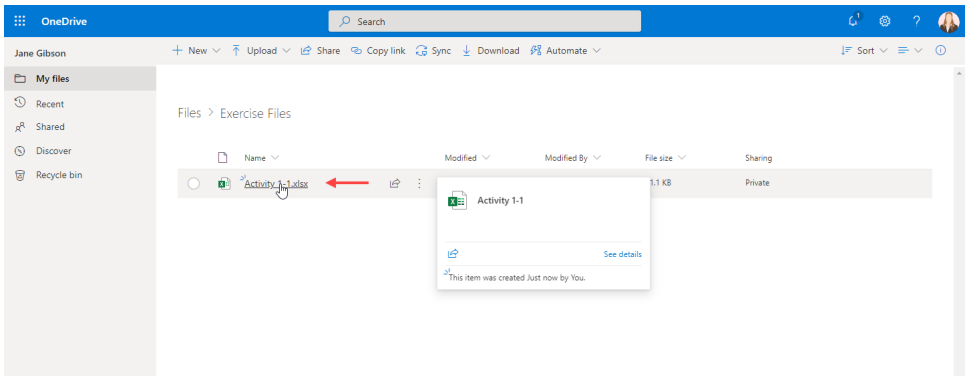
3. Now click **Upload → Files**:



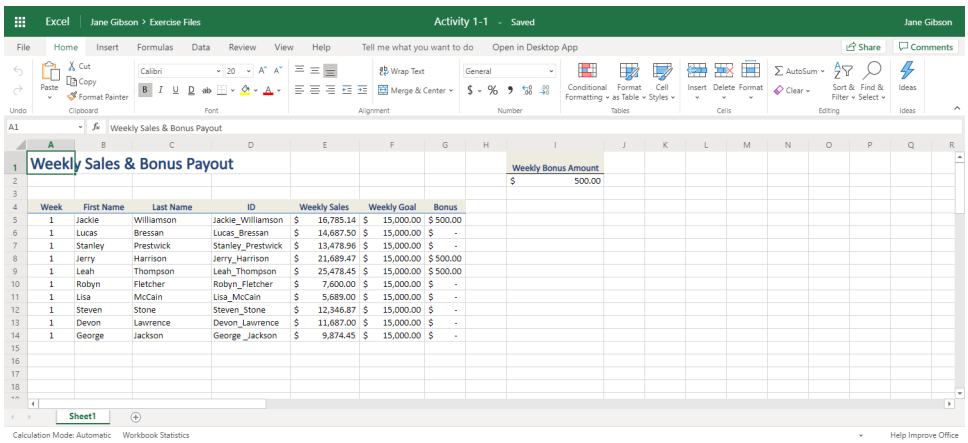
4. Navigate to the folder where you have stored your exercise files and select the file **Activity 1-1**, then click **OK**:



5. You can now click on the **Activity 1-1** file in your OneDrive location to open it:

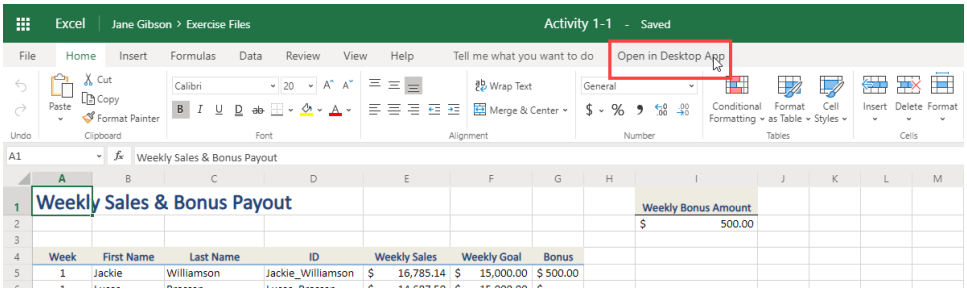


6. The workbook will now open:

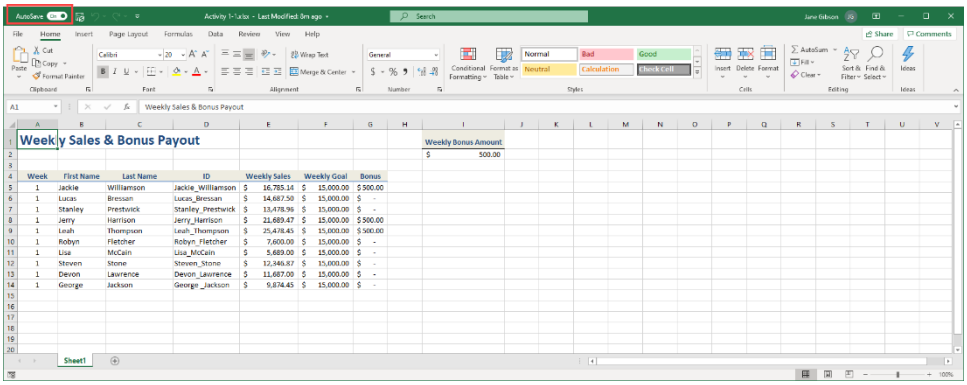


(If the workbook opens as Read-only click **Edit Anyway**.)

7. Click **Open in Desktop App** on the ribbon list:

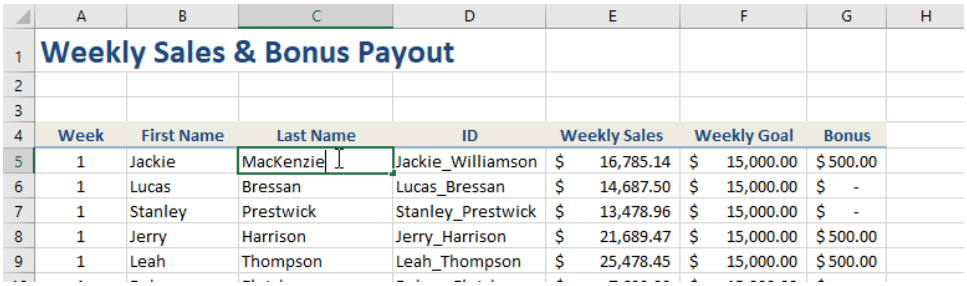


8. Your workbook will now be open in the Excel desktop application. Note that the AutoSave radio switch is set to On, indicating that the file is being saved automatically to the OneDrive location:

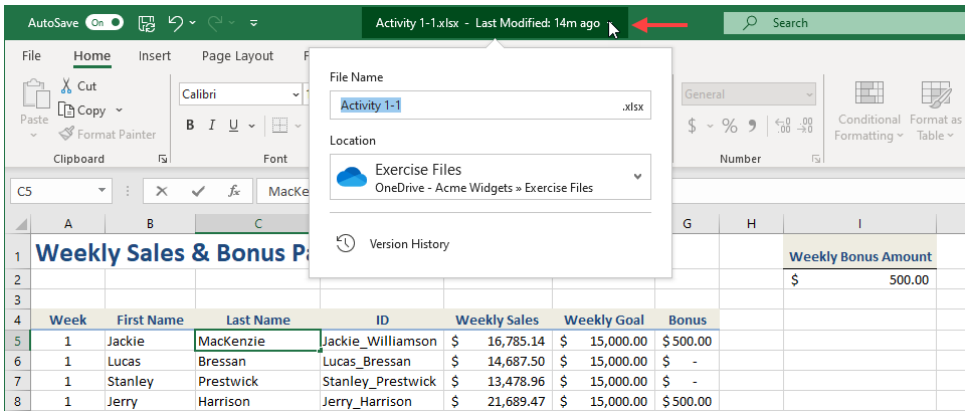


(If the workbook opens as Read-only click **Edit Anyway**.)

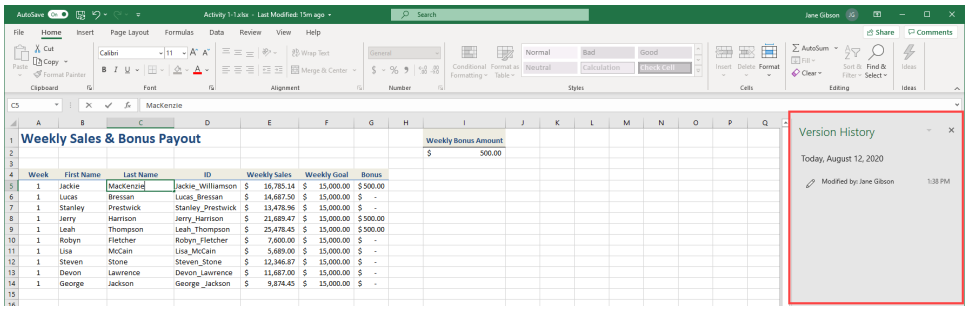
9. Now select cell **C5** and replace the current text by typing **MacKenzie**:



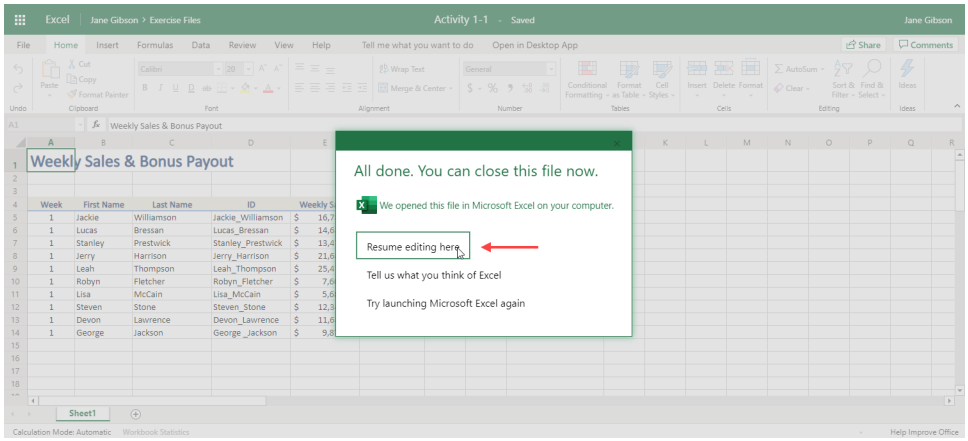
10. Confirm the file location by clicking on the **file name** at the top of the workbook window:



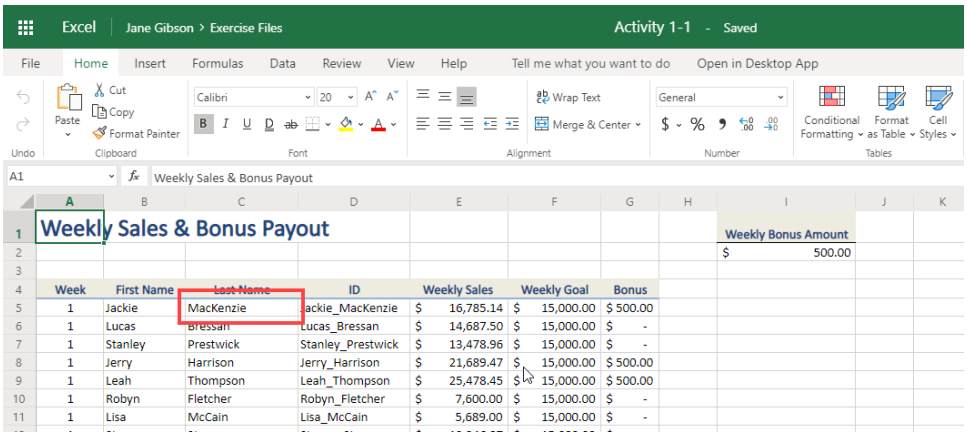
11. Now click on **Version History.** The Version History task pane will appear on the right-hand side of the workbook window:



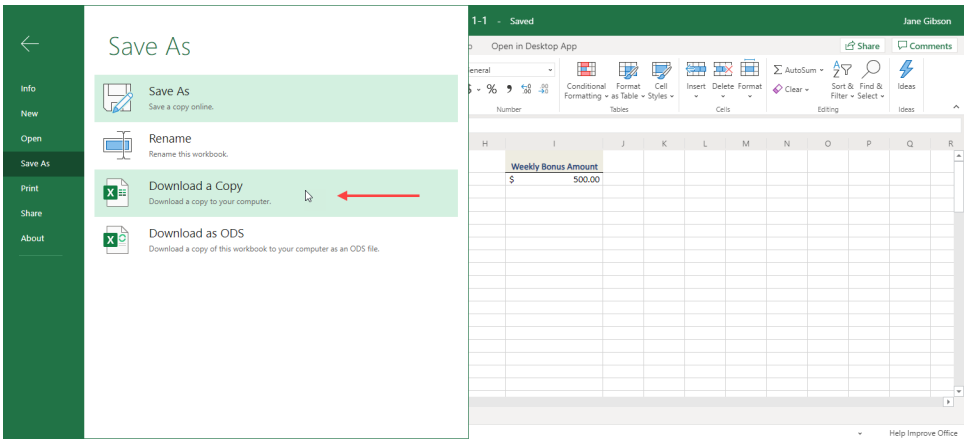
12. You can now close the file in the Excel desktop application and return to your browser window. In the open dialog box, click **Resume editing here**:



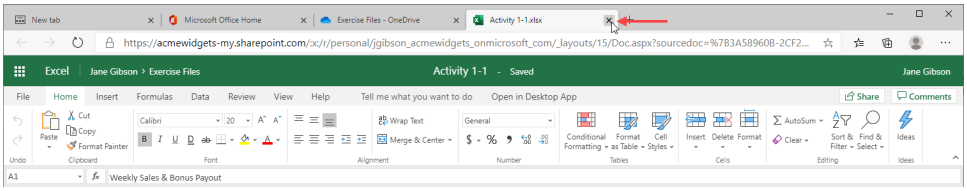
13. You will see that workbook shows the edit you made in the Excel desktop application:



14. Now click **File → Save As → Download a Copy**:



15. You can now **close** the browser tab to close the Excel Online App. Navigate to your download folder, rename the downloaded file to **Activity 1-1 Complete**, and move it to your **Exercise folder**, to complete the activity:



TOPIC B: Features that Differ Between Excel Online and the Excel Desktop Application

Now that you have been introduced to Excel Online and the advantages and conveniences it can offer, it is important to understand how it differs from the Excel desktop application, and how those differences may impact how and when you choose to use it. While this topic is not meant to be a detailed review of all the differences you will find, it should provide you with a good understanding of the limitations you may face when using Excel Online.

Topic Objectives

In this session, you will learn about:

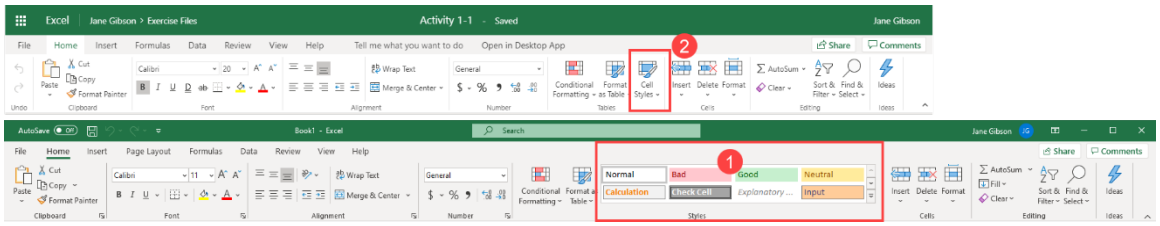
- Features in the Excel desktop application that are not available in Excel Online
- Differences in features available in both versions of Excel

Features Not Available in Excel Online

At first glance it may seem that Excel Online and the Excel desktop application are the same, but when we take a closer look through the tabs in the ribbon interface, the differences in functionality become clearer.

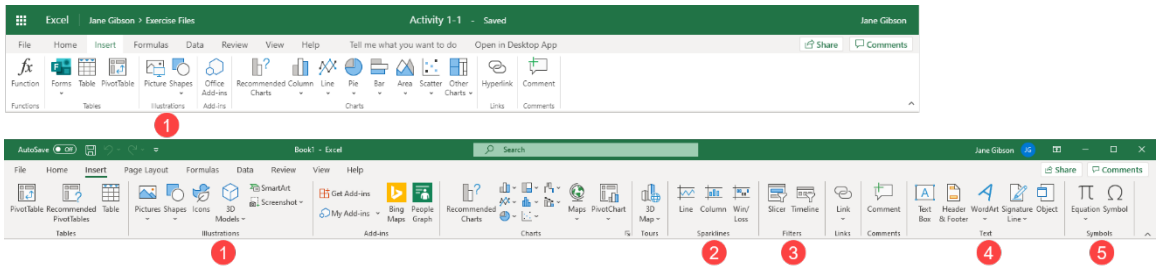
To show these differences, we will compare the different tabs in the ribbon interface of each application. In the images that follow in this topic, the interface for Excel Online is illustrated above the interface for the Excel desktop application.

The Home tab:



In the Home tab, the available commands and functions are very similar. The primary difference is that the **(1) Quick Styles** options in the Styles group of the Home tab are available using the **(2) Cell Styles** command drop-down in the Tables group in Excel Online.

The Insert tab:

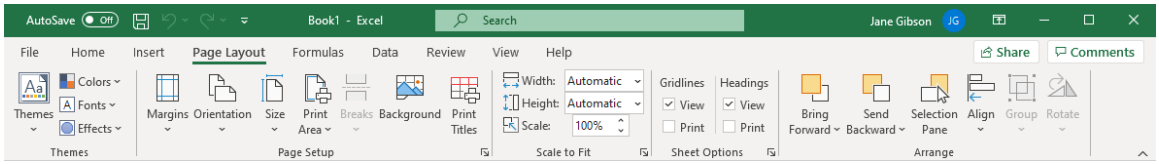


Here there are some significant differences.

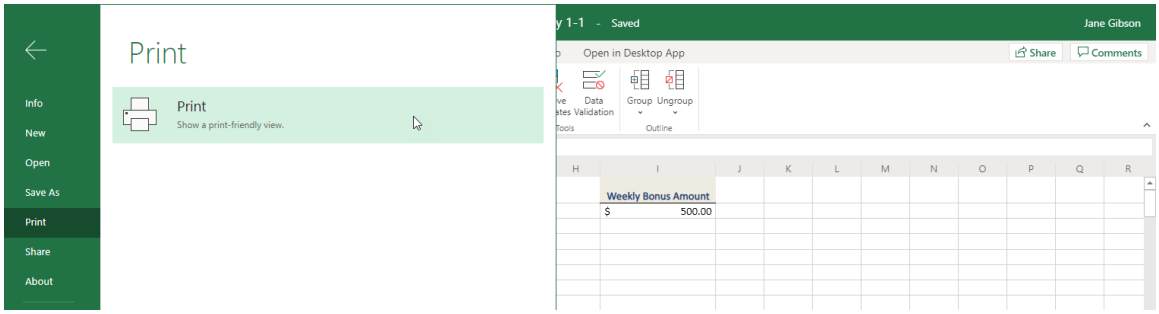
1. In the **Illustrations** group you will see that you can only add pictures and shapes in Excel Online, whereas in the Excel desktop application, you can add pictures, icons, 3D Models, SmartArt and screenshots.
2. **Sparklines** can only be added in the Excel desktop application, though they will display if opened in Excel Online.
3. **Slicer and Timeline filters** are not available in Excel Online.

4. Advanced controls for **some text elements**, such as Text Boxes, are not available in Excel Online.
5. **Symbol** and **Equation** options are not available in Excel Online.

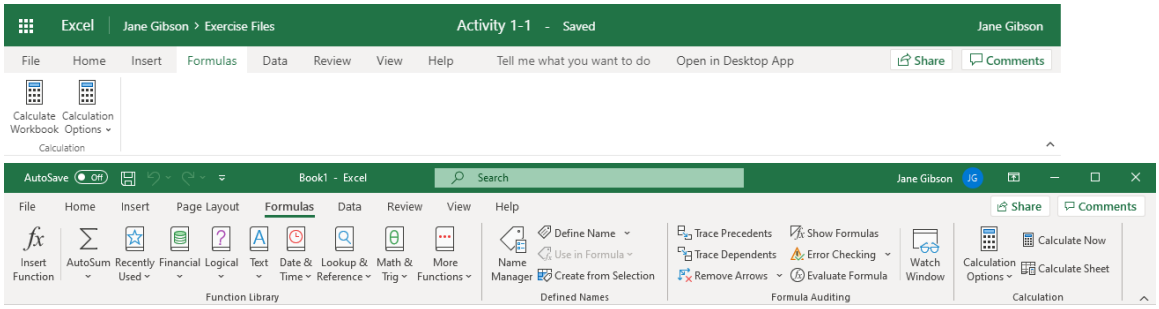
The Page Layout tab:



The Page Layout tab is only available in the Excel desktop application. Layout and print features in Excel Online are limited to the options available by clicking **File → Print**:

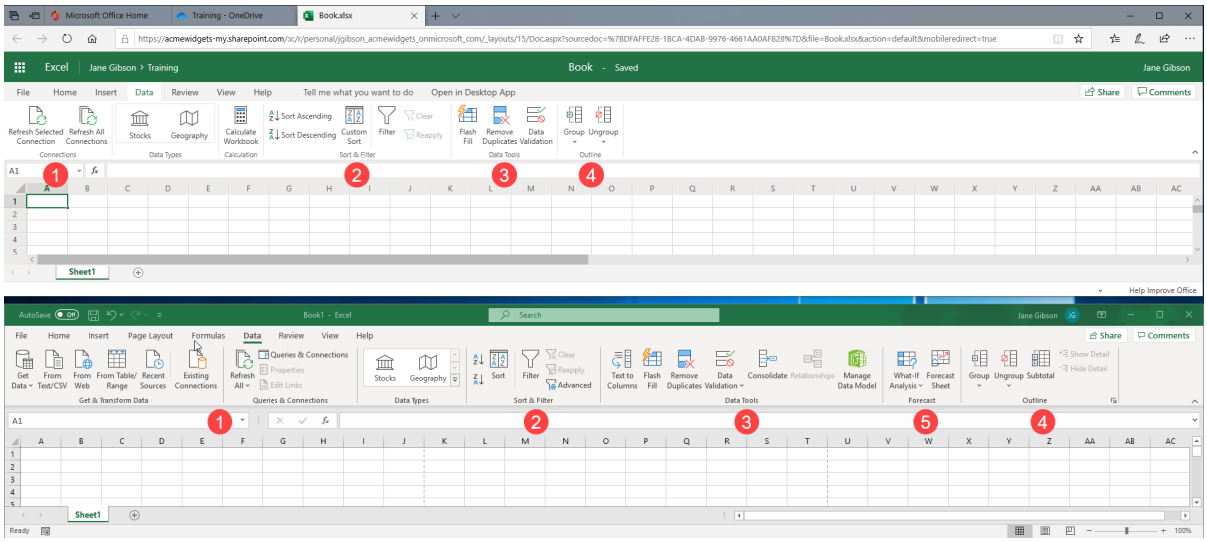


The Formulas tab:



The Formulas tab in Excel Online is limited to the **Calculate Workbook** and **Calculation Options** commands. You can insert functions by using the Function command in the Functions group of the Insert tab, or by clicking the Functions button in the formula bar, but many of the formula tools with which you are familiar are not available in Excel Online.

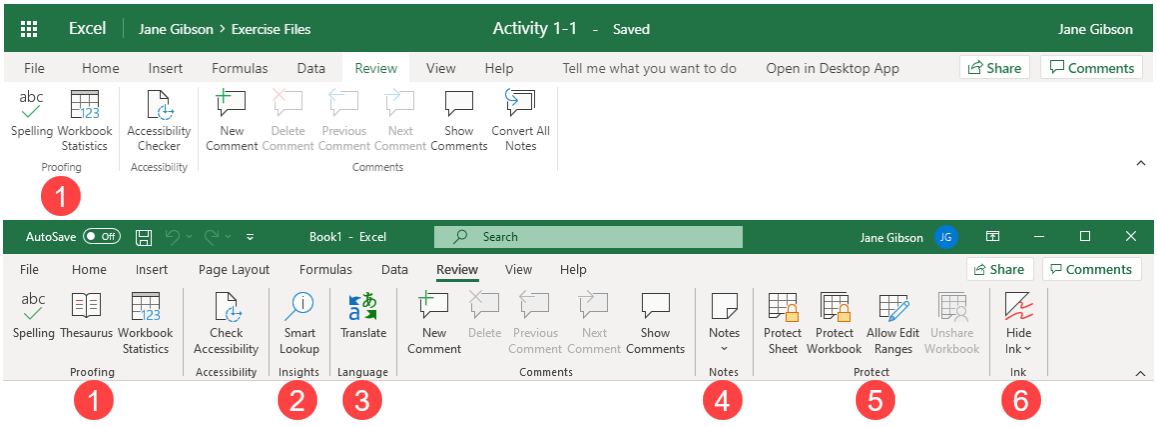
The Data tab:



Let's review the differences.

1. In the **Connections** group, the Excel desktop application provides many options to source and transform data while Excel Online is limited to refreshing connections.
2. Features in the **Sort & Filter** group are similar, except the **Advanced** filter is not available in Excel Online.
3. The **Data Tools** group in Excel Online only provides a limited set of the options available in the Excel desktop application. Notably, the Text to Columns option is not available in Excel Online.
4. The **Forecast** group is not available in Excel Online.
5. **Subtotals** are not available in the **Outline** group of Excel Online.

The Review tab:

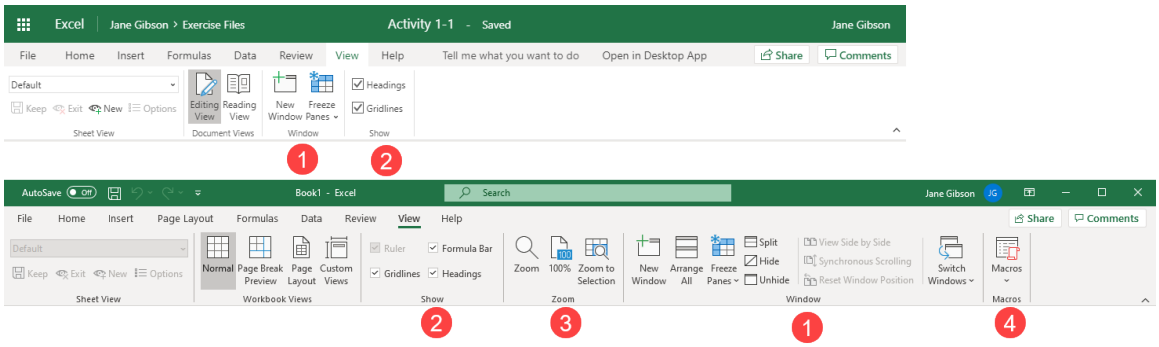


Again, let's examine the differences.

1: Proofing in Excel Online is limited to the **Spelling** option, where the Excel desktop application also provides options for using a thesaurus.

2, 3, 4, 5, 6: The **Insights**, **Language**, **Notes**, **Protect**, and **Ink** groups are not available in Excel Online.

The View tab:



Finally, we will look at the differences in the View tab.

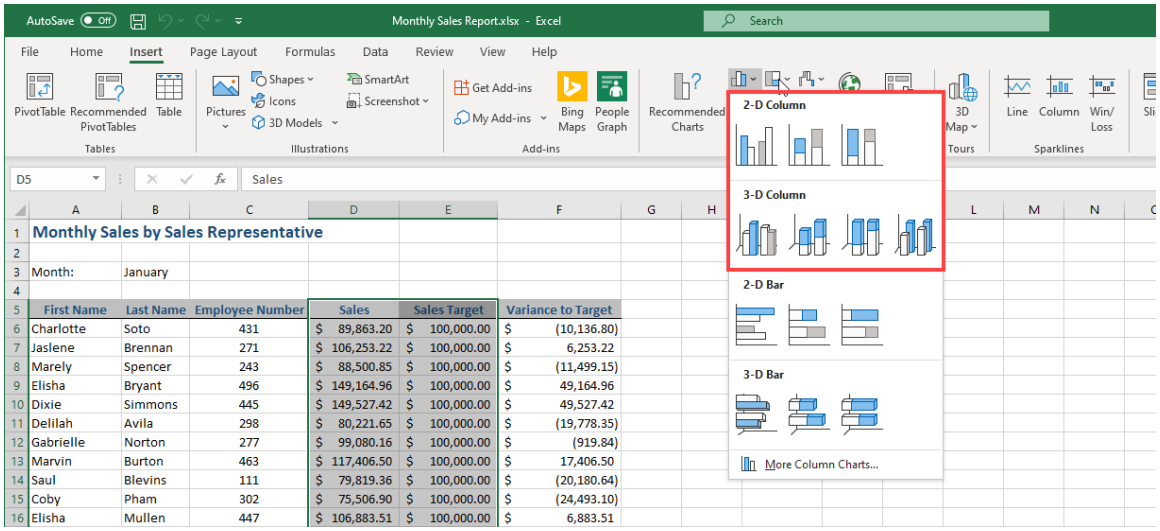
1. Excel Online is limited to only the **Freeze Panes** and **New Window** commands in the Window group, while there are many more options in the Excel desktop application.
2. You cannot hide the **Formula** bar in Excel Online
3. The **Zoom** group is not available in Excel Online.
4. The **Macros** group is not available in Excel Online.

Differences in Features Available in Both Excel Online and The Excel Desktop Application

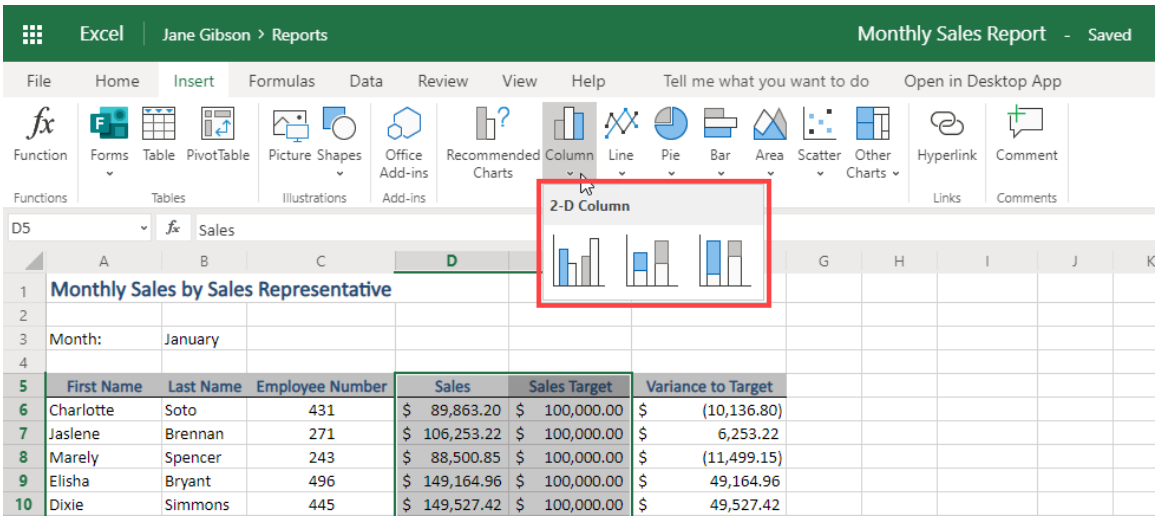
It is also important to understand that while some features are available in both Excel Online and the Excel desktop application, they do not necessarily perform in the same way, or have all the same options.

For instance, both Excel Online and the Excel desktop application provide tools for creating charts to help you illustrate and analyze your data, and while the available types are similar, there are more types available in the desktop application, and options to edit and customize your charts in Excel Online can be limited in comparison.

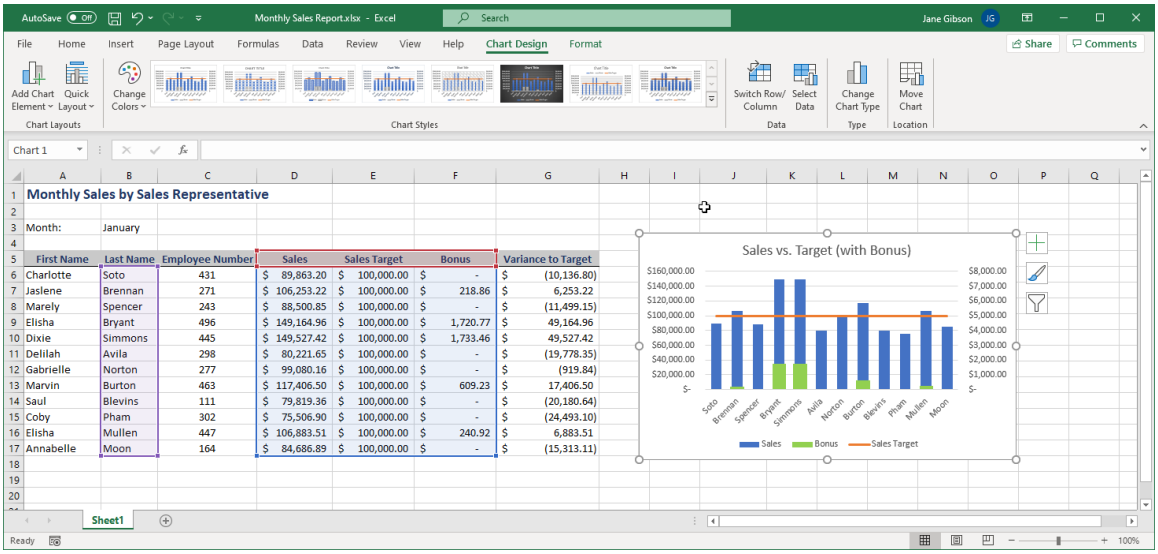
As an example, when creating a column chart in the Excel desktop application, you have options for both two-dimensional and three-dimensional column charts:



In comparison, Excel Online only provides options for two-dimensional column charts:

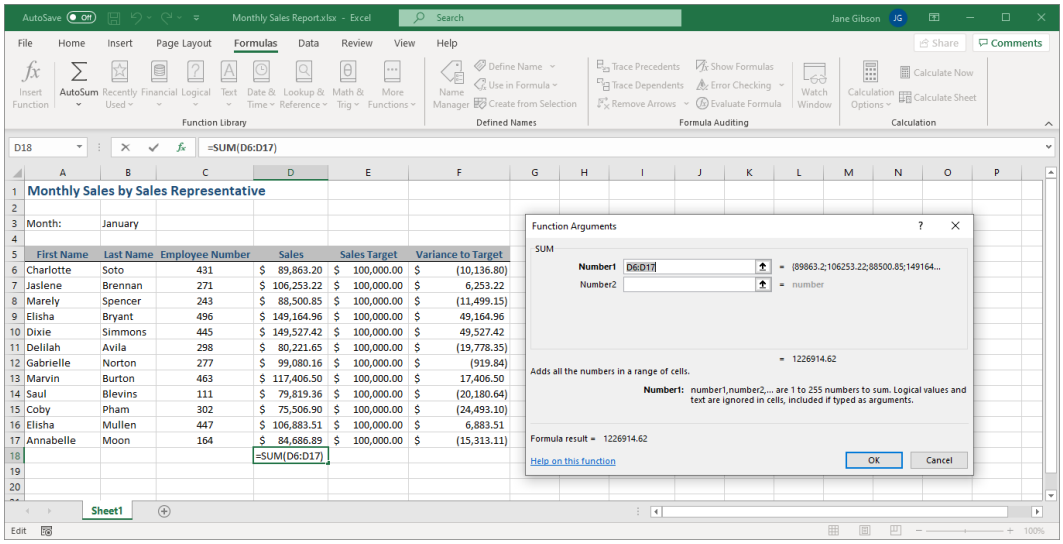


Another difference when creating charts is the ability to create **Combo** charts. In the Excel desktop application, you can use two different chart types in the same chart to display related data series. You can also create a secondary axis, to better align the two chart types:

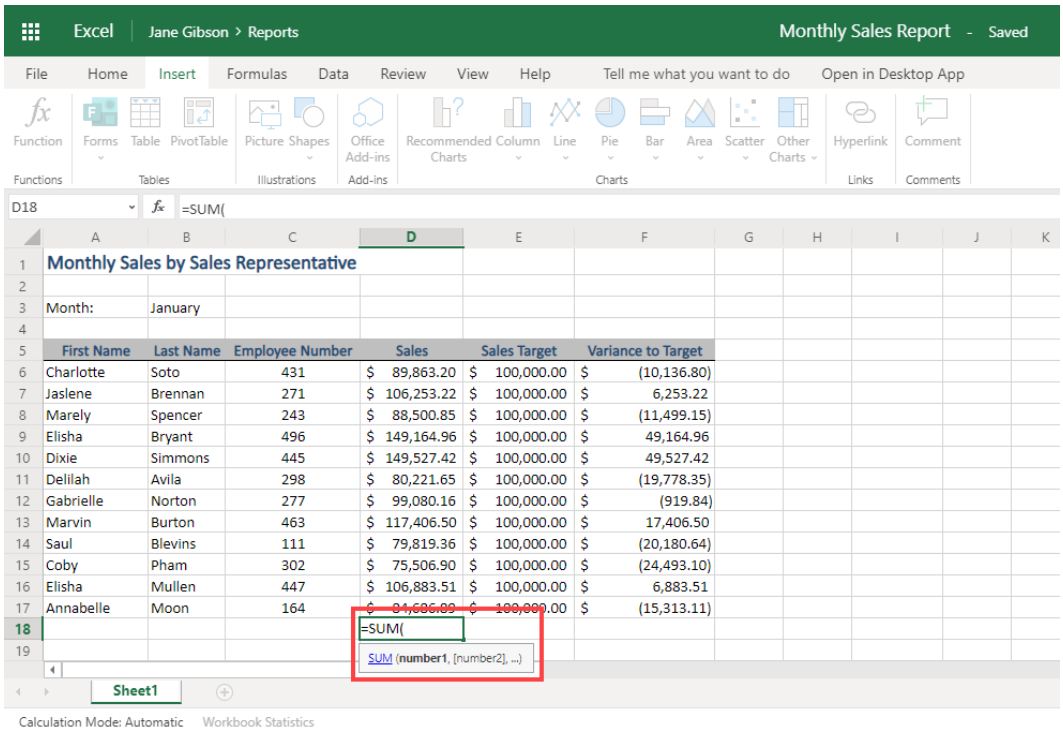


In Excel Online, these options are currently not available.

When entering functions, you will also notice differences between the platforms. In the Excel desktop application, using the insert function command to select a function will lead you to the Function Arguments dialog box, where you can use the argument by argument references to assist you in building your function:

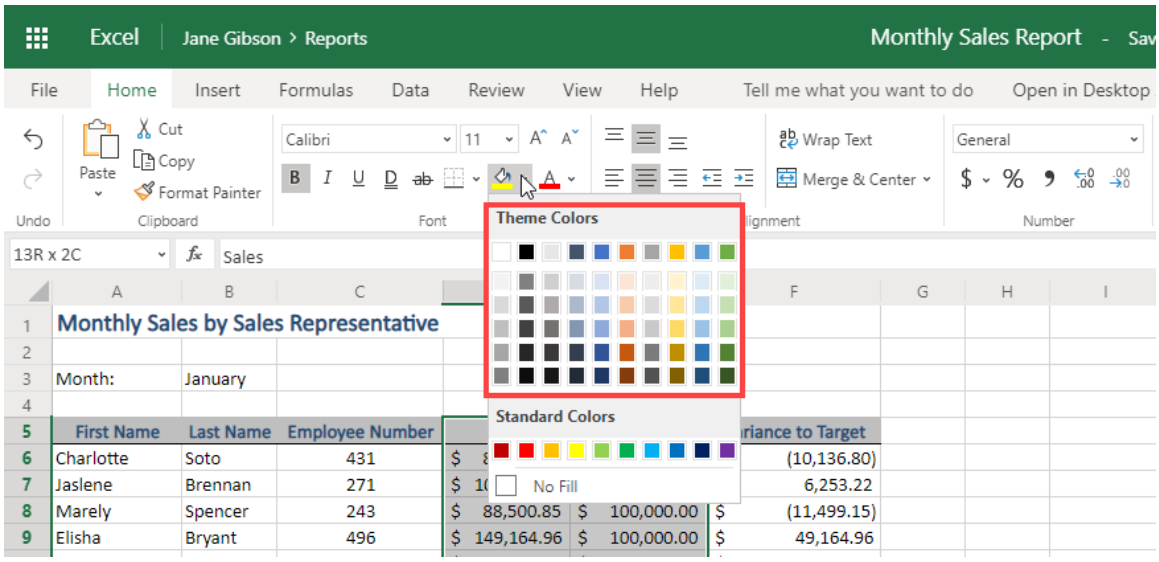


In contrast, inserting a function in Excel Online will simply enter the function and an opening bracket in the selected cell:

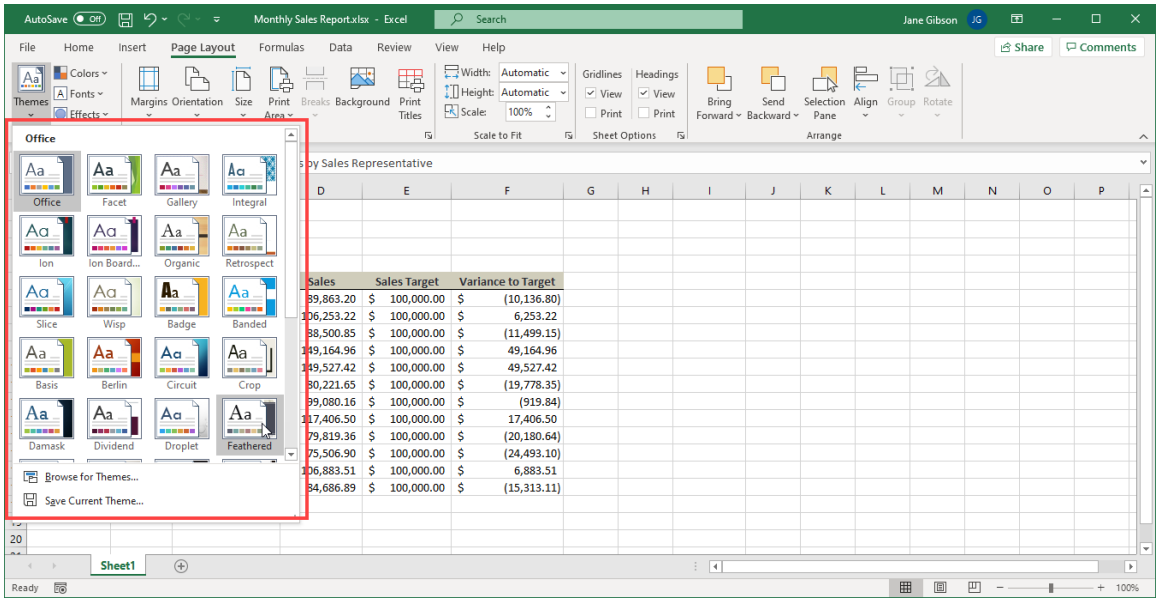


First Name	Last Name	Employee Number	Sales	Sales Target	Variance to Target
Charlotte	Soto	431	$ 89,863.20	$ 100,000.00	$ (10,136.80)
Jaslene	Brennan	271	$ 106,253.22	$ 100,000.00	$ 6,253.22
Marely	Spencer	243	$ 88,500.85	$ 100,000.00	$ (11,499.15)
Elisha	Bryant	496	$ 149,164.96	$ 100,000.00	$ 49,164.96
Dixie	Simmons	445	$ 149,527.42	$ 100,000.00	$ 49,527.42
Delilah	Avila	298	$ 80,221.65	$ 100,000.00	$ (19,778.35)
Gabrielle	Norton	277	$ 99,080.16	$ 100,000.00	$ (919.84)
Marvin	Burton	463	$ 117,406.50	$ 100,000.00	$ 17,406.50
Saul	Blevins	111	$ 79,819.36	$ 100,000.00	$ (20,180.64)
Coby	Pham	302	$ 75,506.90	$ 100,000.00	$ (24,493.10)
Elisha	Mullen	447	$ 106,883.51	$ 100,000.00	$ 6,883.51
Annabelle	Moon	164	$ 84,686.89	$ 100,000.00	$ (15,313.11)

Another difference between the platforms is the range and control of available colors. In Excel Online you are limited to using a very narrow color palette:



The Excel desktop application, however, allows you to select from a range of color, font, and effects themes by clicking the Page Layout tab, then clicking Themes, which can immediately change all of the color, font, and effects elements of your worksheet:



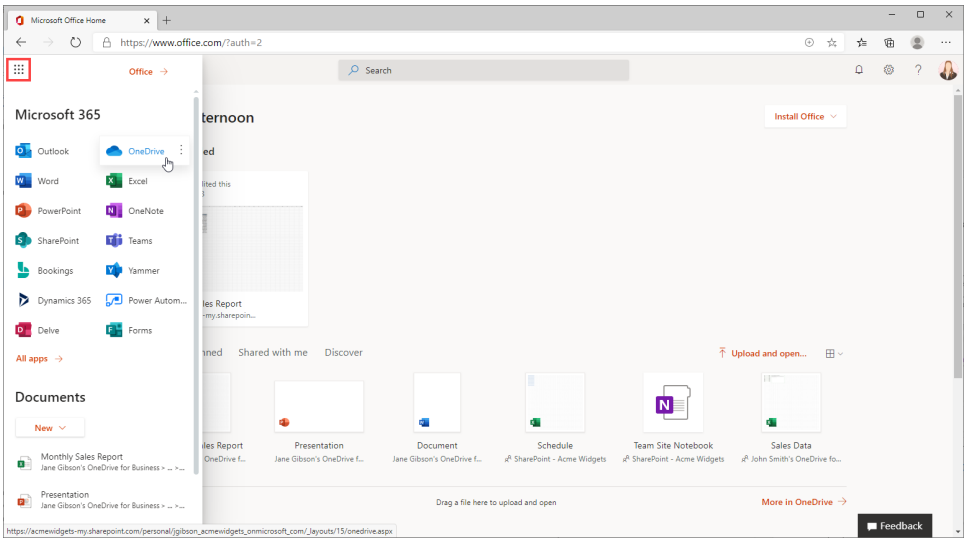
These are only a few examples of some of the differences in the features of Excel Online and the Excel desktop application, and, because both platforms continue to evolve over time, they may change in the future. Rather than knowing all of the distinct differences between each Excel platform, it is more important that you be aware of the potential limitations and benefits of each, as you decide how to best approach your projects.

Activity 1-2: Features that Differ Between Excel Online and the Excel Desktop Application

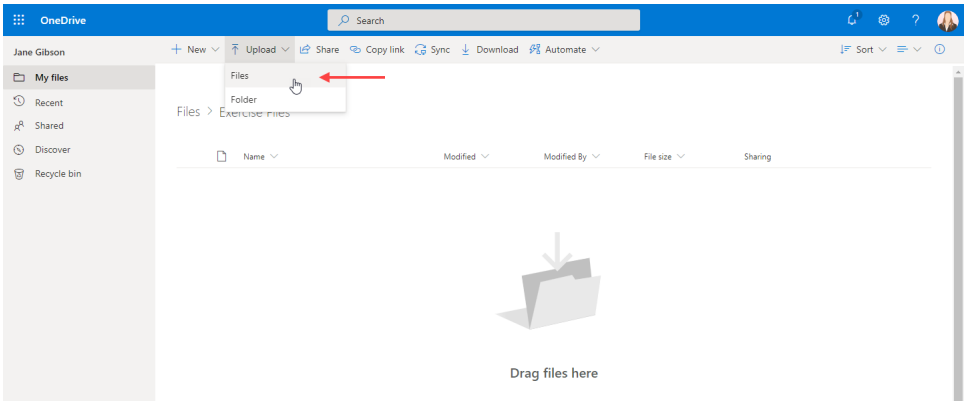
You would like to explore the capabilities of Excel Online in comparison to the Excel desktop application.

1. To begin, open your internet browser and log into Microsoft 365.

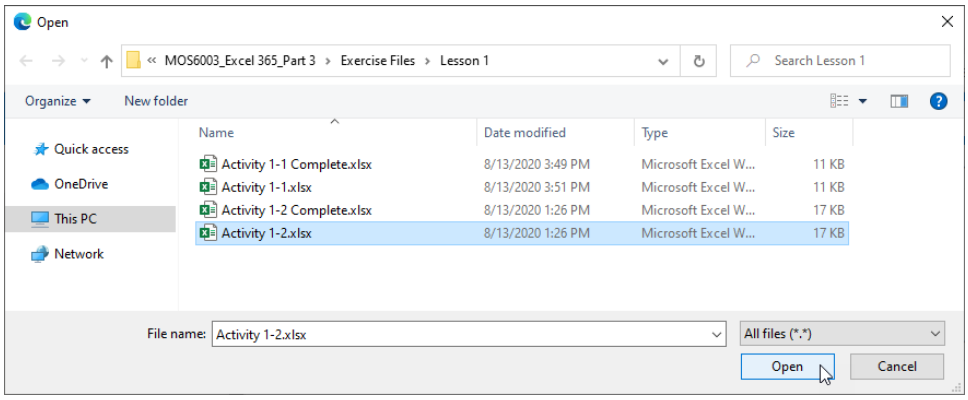
2. Once you are logged in, navigate to your OneDrive location by clicking the App launcher Icon, then clicking the **OneDrive** icon:



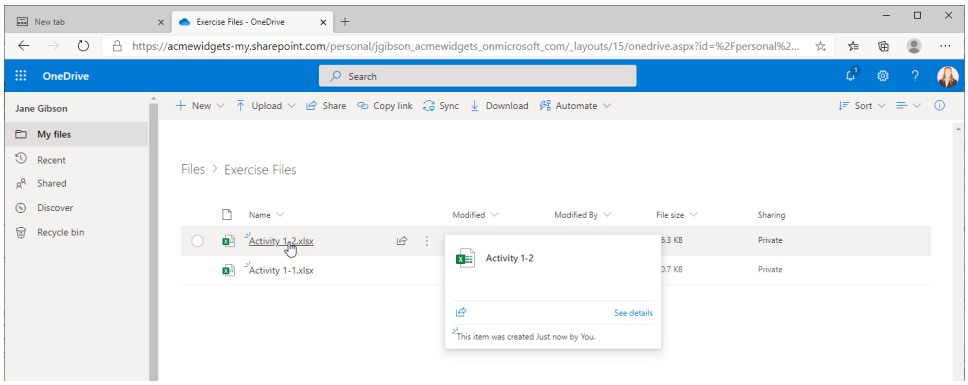
3. Now click **Upload → Files**:



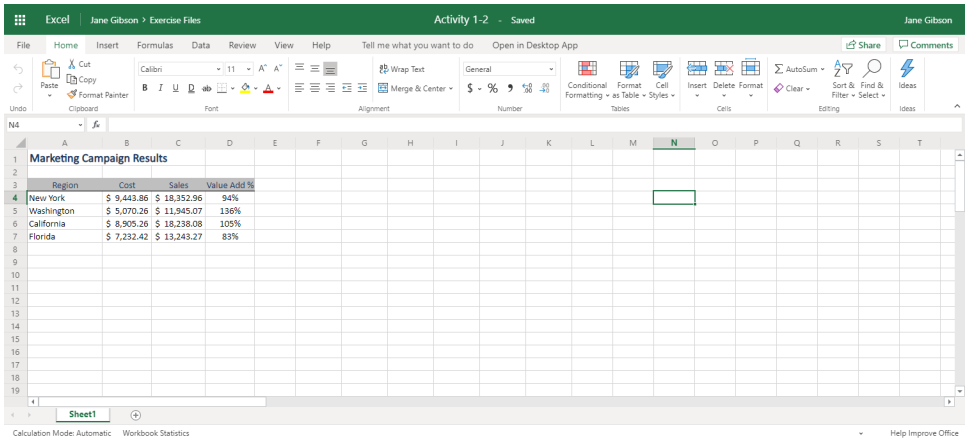
4. Navigate to the folder where you have stored your exercise files and select the file **Activity 1-2**, then click **OK**:



5. You can now click on the **Activity 1-2** file in your OneDrive location to open it:

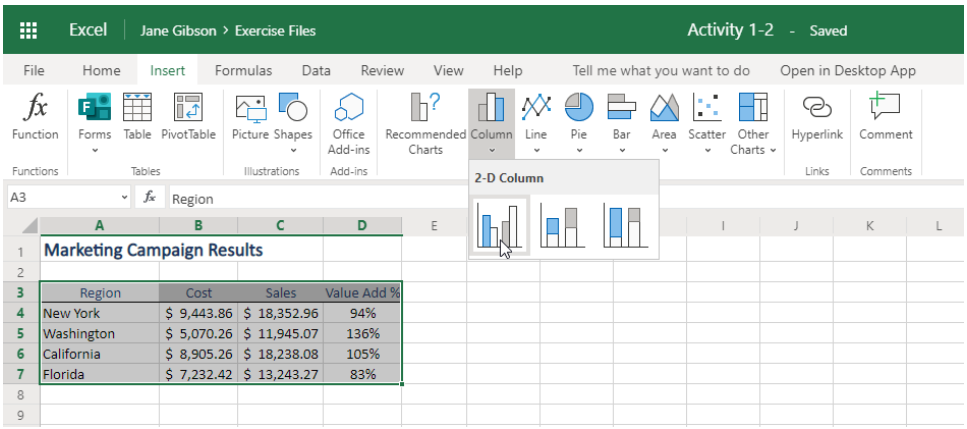


6. The workbook will now open:

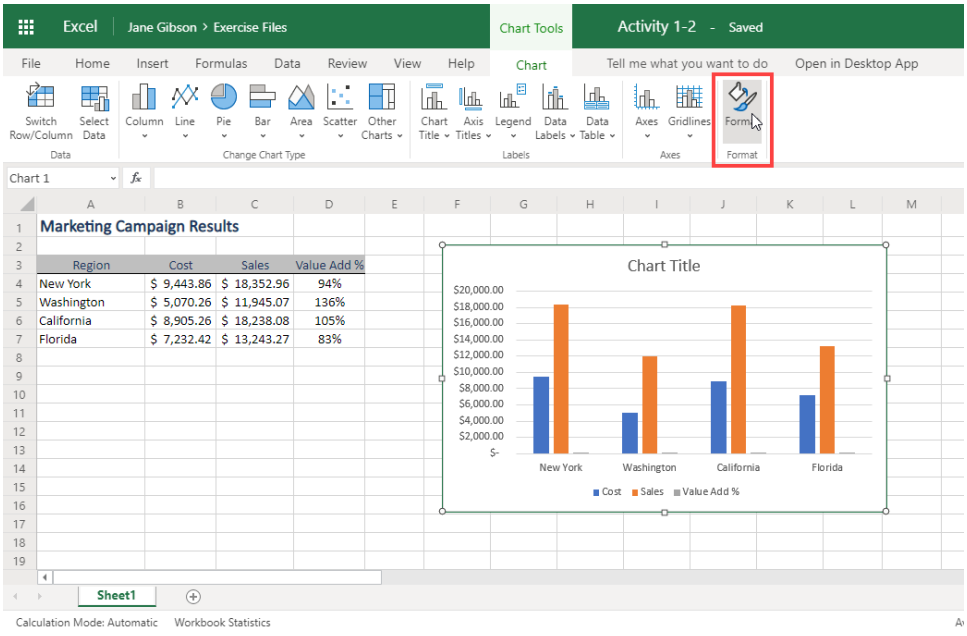


(If the workbook opens as Read-only click **Edit Anyway**.)

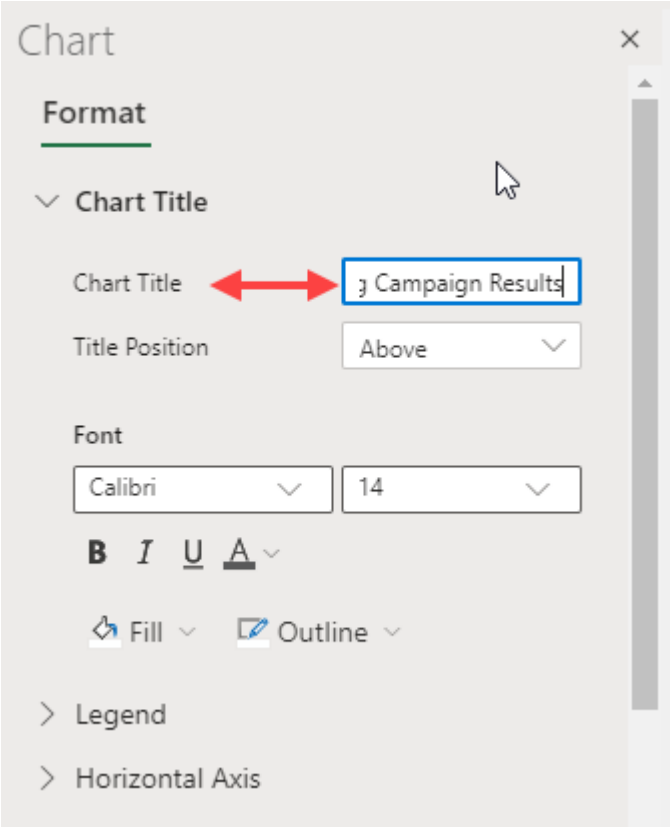
7. Now Create a clustered column chart with the data. Select the range **A3:D7**, then click **Insert → Column → Clustered Column**:



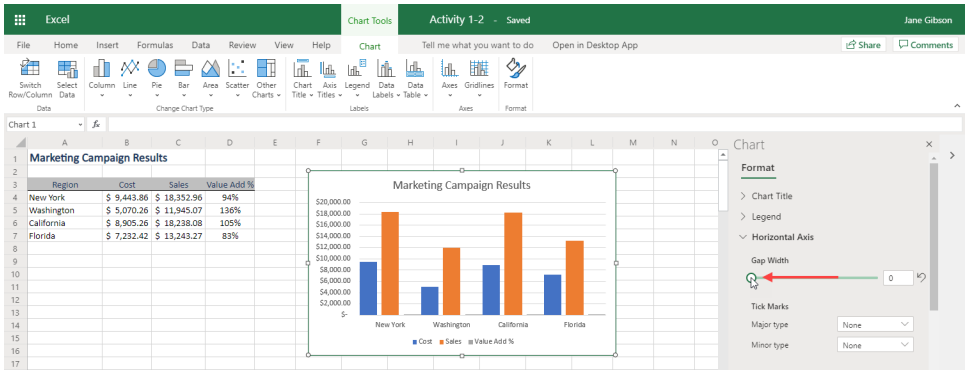
8. With the new chart selected, click **Chart Tools Chart → Format**:



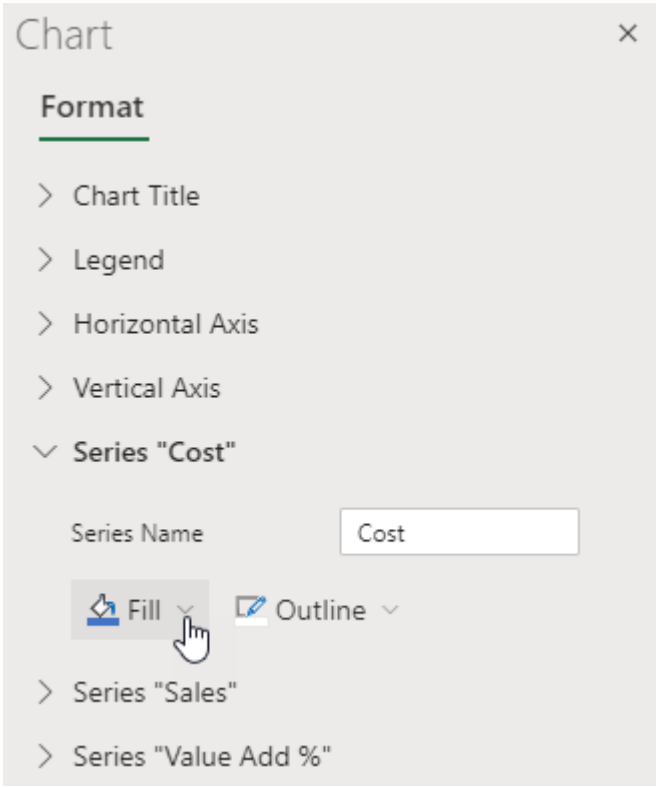
9. The Chart task pane will open. Click **Format → Chart Title** to expand the group, then type "**Marketing Campaign Results**" in the Chart Title field:



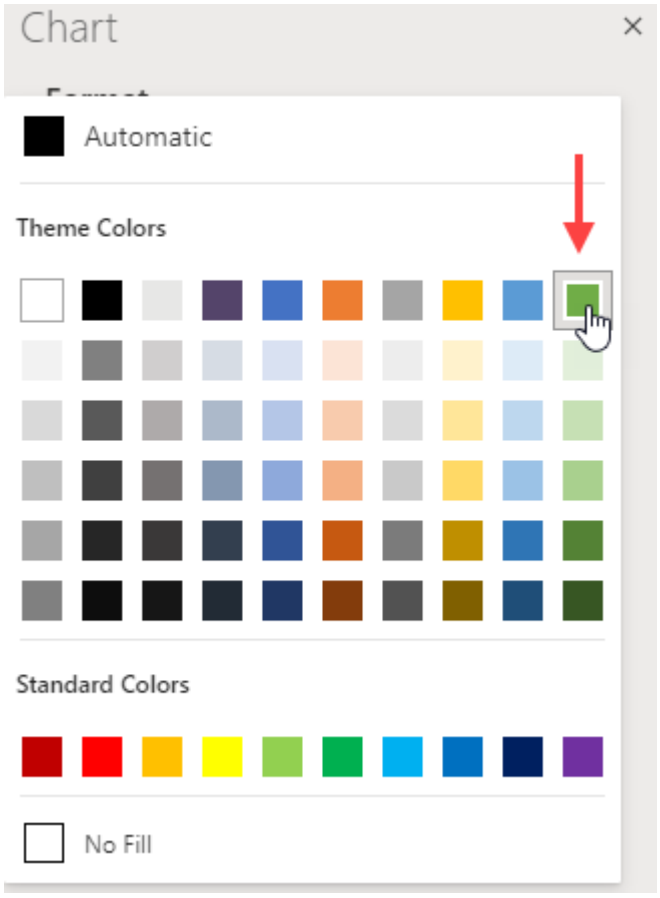
10. Now, click on the **Horizontal Axis** group to expand it, then click and drag the **Gap Width slider** button fully to the left:



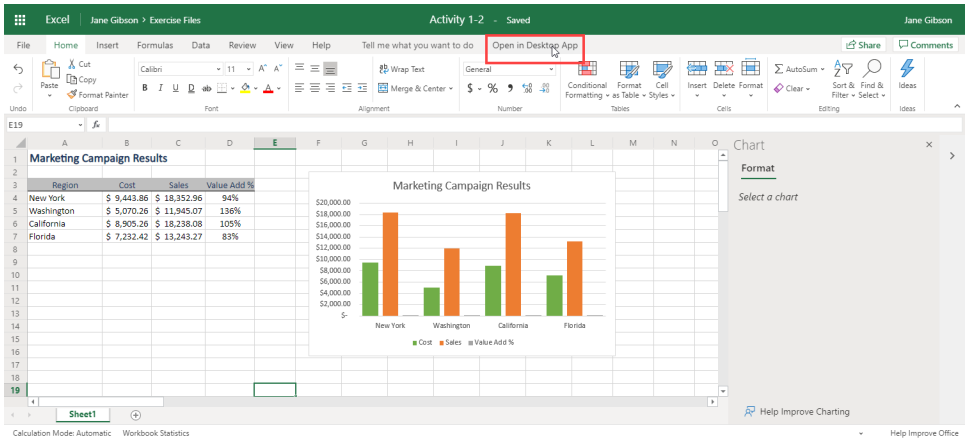
11. Now change the color of the Cost data series by clicking on the **Series "Cost"** group to expand it, then click on the **Fill** drop-down button:



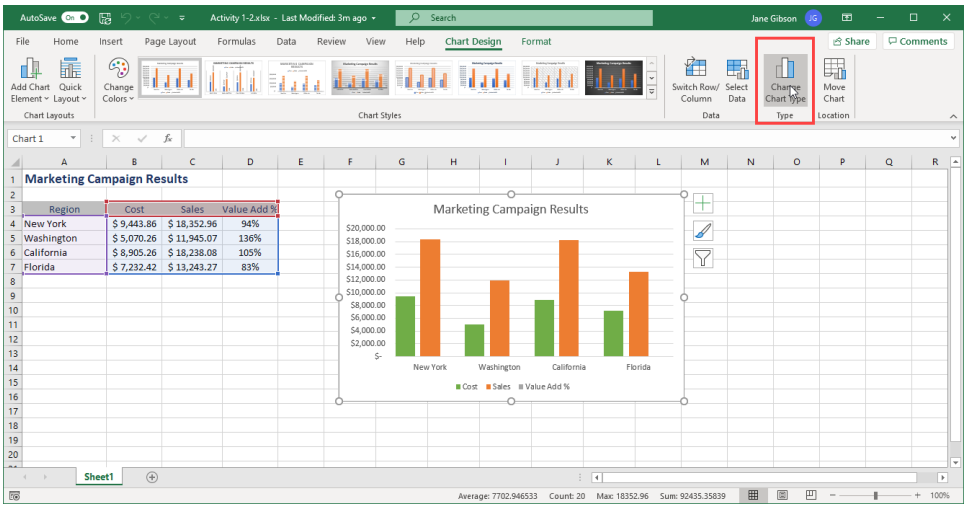
12. Click on the **Green, Accent 6** color icon:



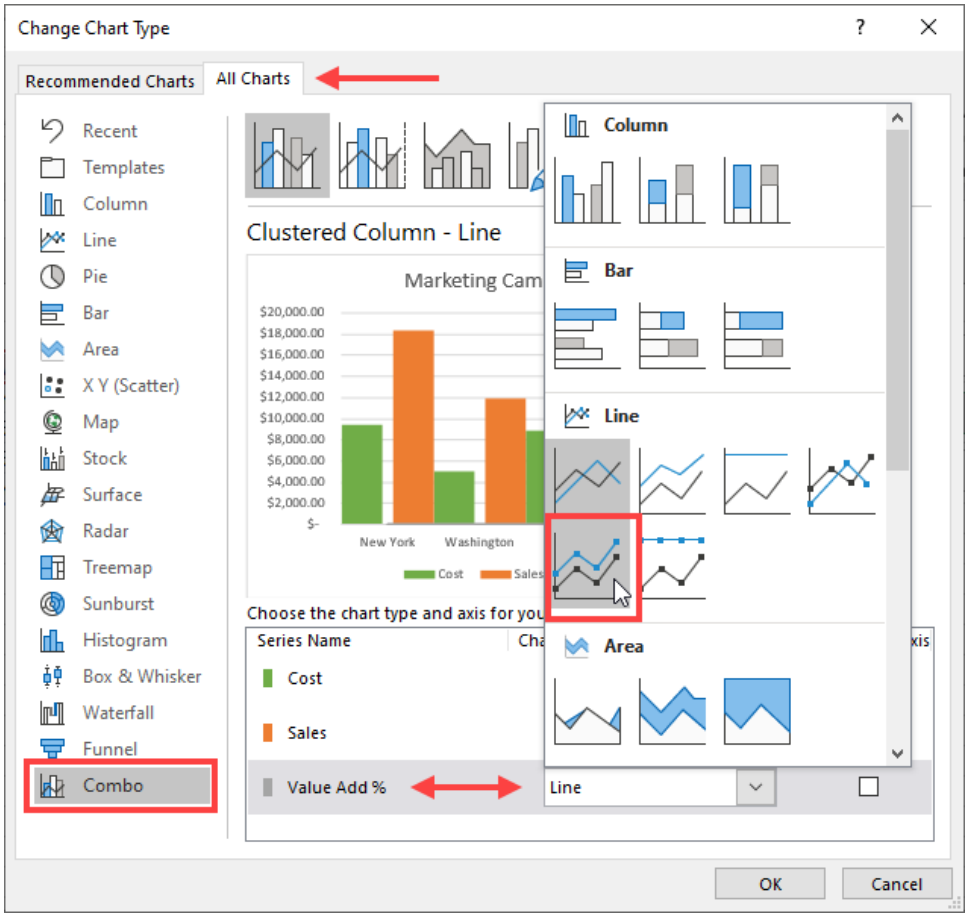
13. Now click **Open in Desktop App** on the ribbon:



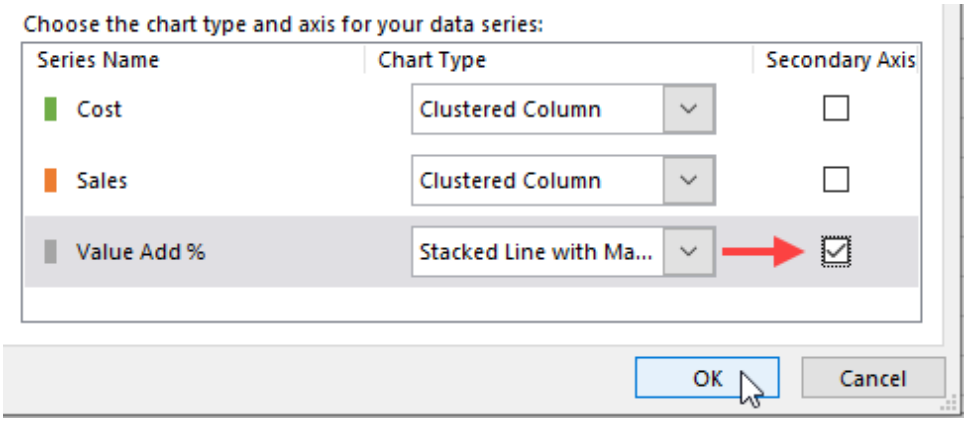
14. Now, in the Excel desktop application, select the chart and click **Chart Design → Change Chart Type**:



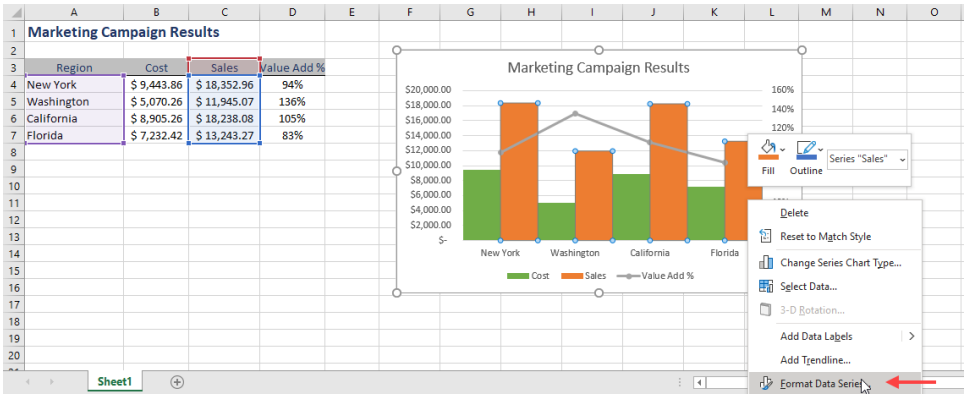
15. The Change Chart Type dialog box will open. Select the **Combo** category on the All Charts tab, then click the Chart Type drop-down of the **Value Add %** series name in the Choose the chart type and axis for your data series section and select **Stacked Line with Markers**:



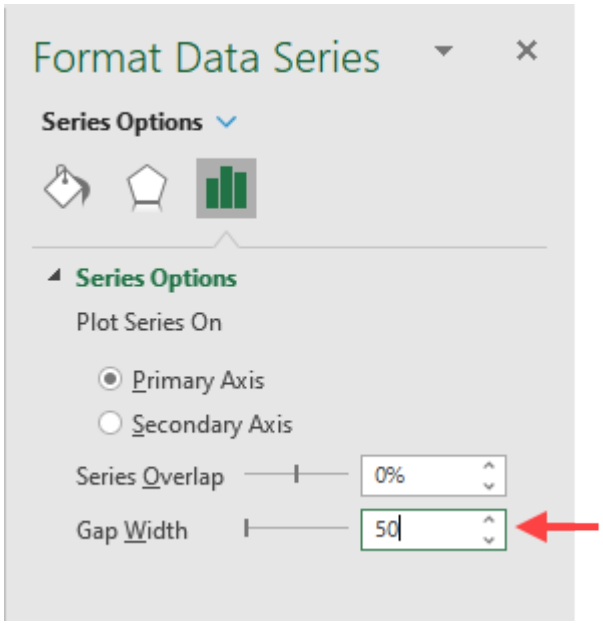
16. Then click to enable the **Secondary Axis** checkbox next to the Value Add % series and click **OK**:



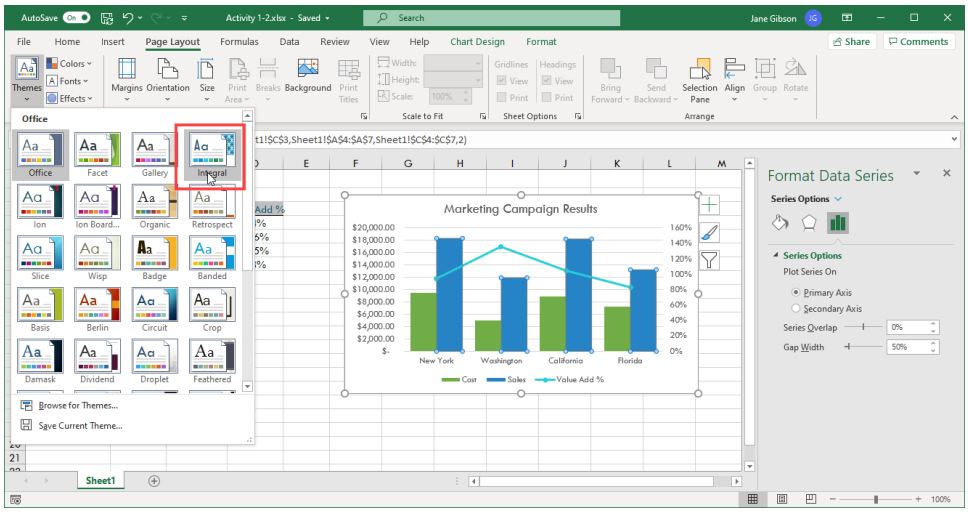
17. Right-click on one of the columns in your chart and then select **Format Data Series** from the menu:



18. Type "**50**" in the **Gap Width** field to adjust the width of the columns:

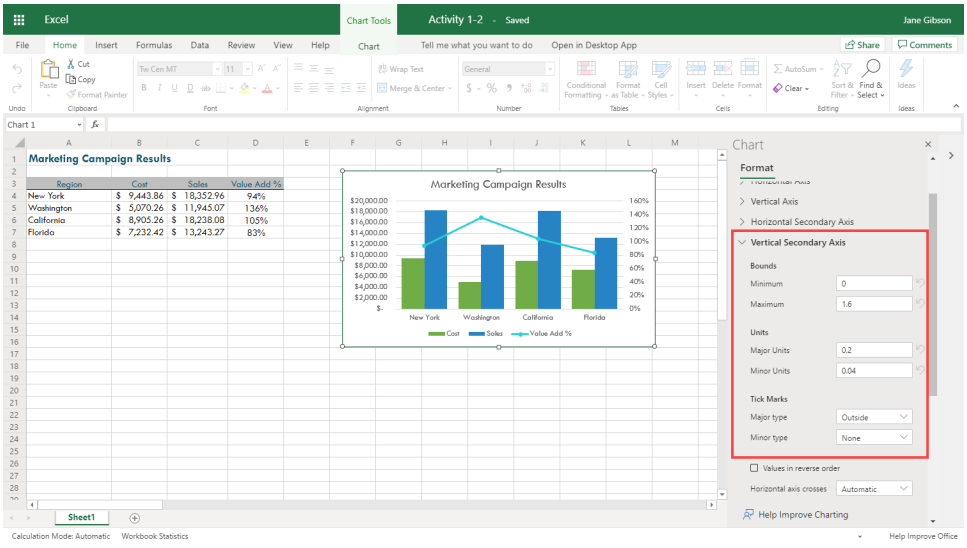


19. Now click **Page Layout → Themes → Integral** to change the color theme of your workbook:

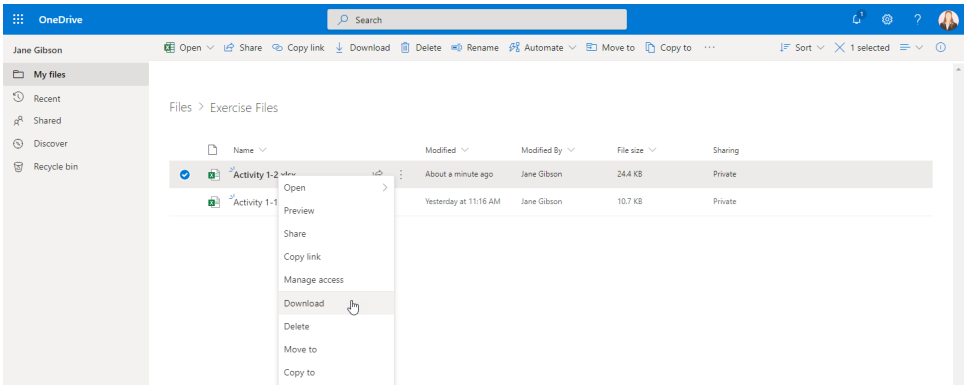


Note that as you move your cursor over the different themes, the color of the Cost data series does not change, as it was customized in Excel Online.

20. You can now close the workbook and return to the browser tab to review the results in Excel Online. Select the chart, then click **Chart Tools Chart → Format.** You will see in the Vertical Secondary Axis group that you can make changes to the bounds, units, and tick marks, even though you could not create a secondary axis using Excel Online:



21. Now you can close the Activity 1-2 tab in your browser, then right click the file in your OneDrive folder and select **Download**:



22. Now navigate to your download folder, rename the downloaded file to **Activity 1-2 Complete**, and move it to your Exercise folder, to complete the activity:

Summary

In this lesson you learned about using both Excel Online and the Excel desktop application, and the differences between them. You should now be comfortable managing your workbooks in OneDrive, opening and editing them in both applications, and understanding the benefits and obstacles that can be presented by each.

Review Questions

1. **How do you open a workbook in the Excel desktop application from Excel Online?**

2. **How can you check where your workbook is saved in the Excel desktop application?**

3. **What is the one ribbon tab that is not available in Excel Online?**

4. **Can you add Sparklines to a workbook in Excel Online?**

5. **Which Excel application, Excel Online or the Excel desktop application, has access to Color themes?**

LESSON 2:
WORKSHEET AUTOMATION

Lesson Objectives

In this lesson you will learn how to:

- Manage workbook properties
- Record, create and edit a macro
- Create and use a template
- Use data validation in a workbook

TOPIC A: Managing Workbook Properties

Workbook properties are details that are stored within an Excel workbook to provide information about the workbook author, the creation and modification dates, and more. This type of information is referred to as metadata and can be useful in managing multiple workbooks, especially in an online or shared environment. During this topic you will learn how to view, add, and edit workbook properties.

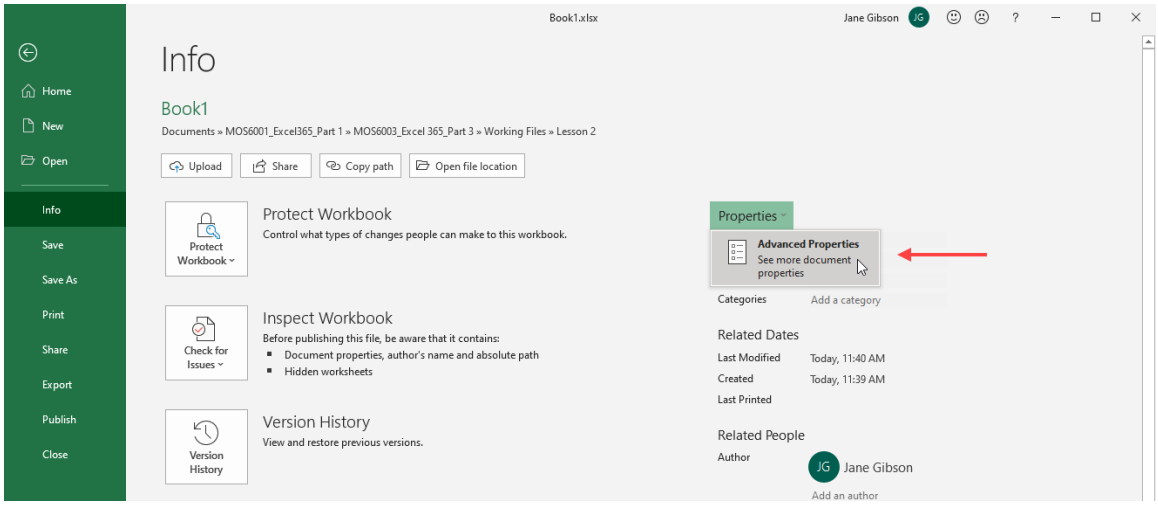
Topic Objectives

In this session, you will learn how to:

- View, add and edit workbook properties
- Use the Document Inspector

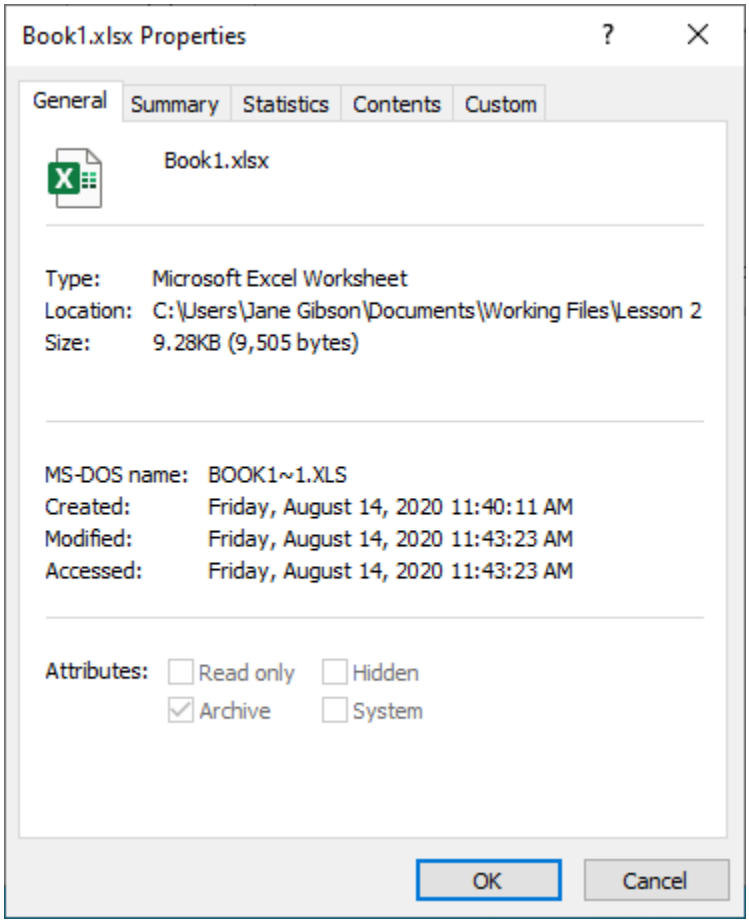
View Workbook Properties

You can view your workbook properties by clicking **File → Info → Properties → Advanced Properties**:

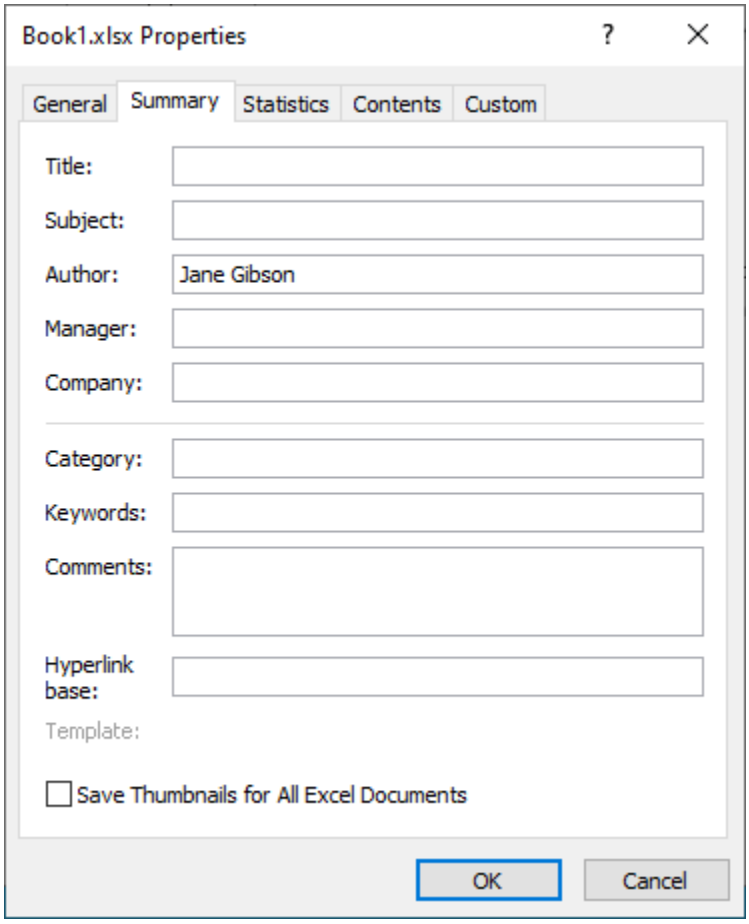


When the Workbook Properties dialog box opens, you will see that there are five tabs: **General**, **Summary**, **Statistics**, **Contents**, and **Custom**:

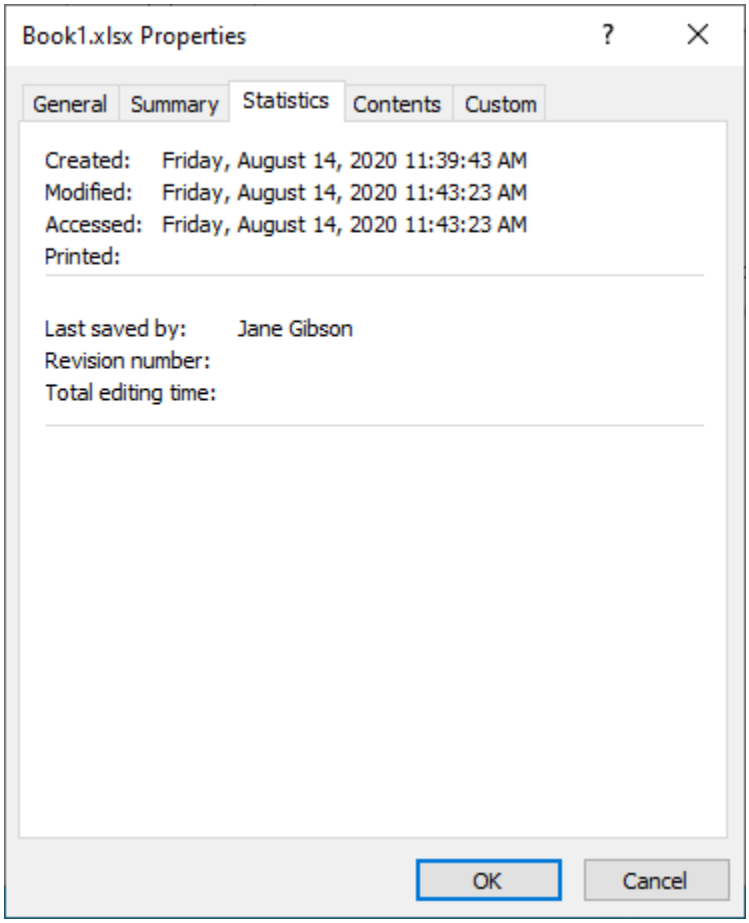
The **General** tab contains basic information about your workbook. This includes the file name, type, location, and size. It also displays the dates the file was created, last modified, and last accessed:



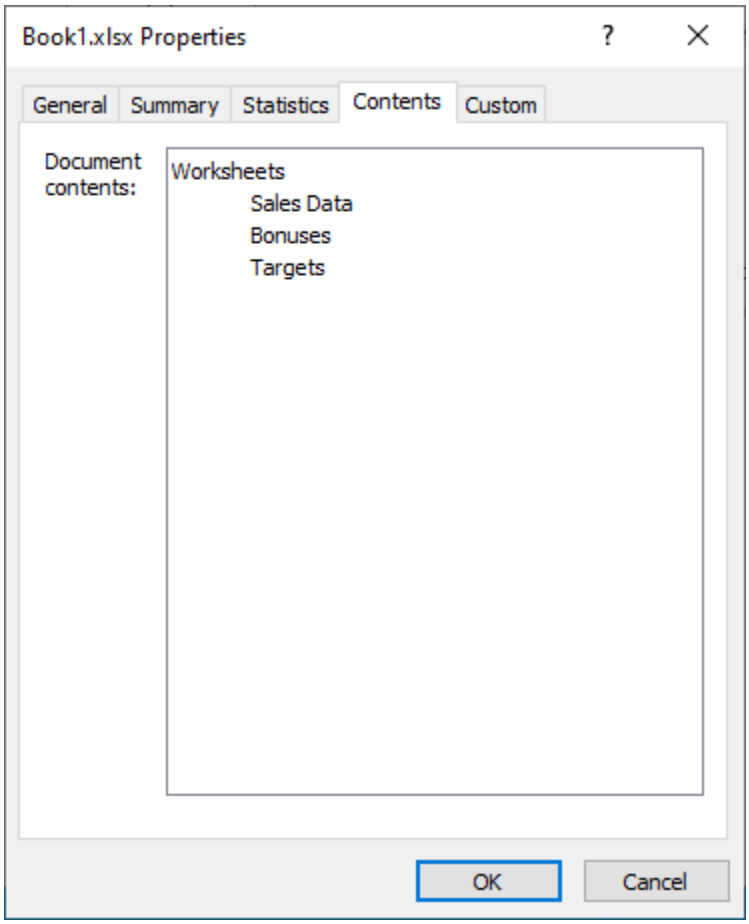
The **Summary** tab allows you to add information about the workbook to help you and other users understand the origin and purpose of the document. The fields available are Title, Subject, Author, Manager, Company, Category, Keywords, Comments, and Hyperlink base:



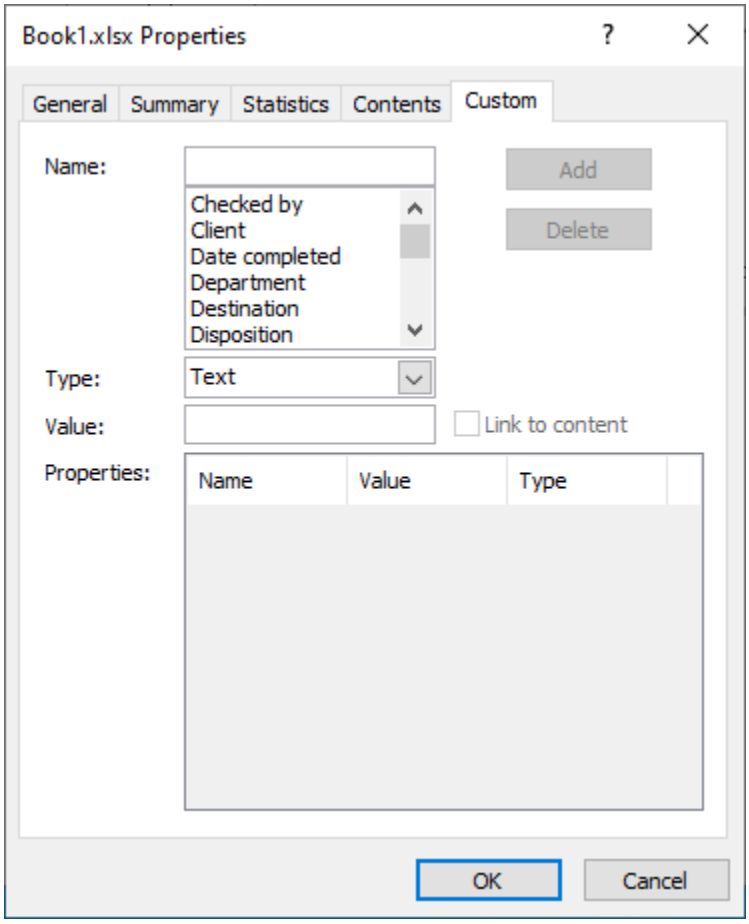
Like the General tab, the **Statistics** tab will display the date the workbook was created, last modified, last accessed, and last printed. It may also display the last user to have saved the file, the revision number (if available), and the total editing time. Like the General tab, this information is not editable:



The **Contents** tab lists the worksheets contained in the workbook, including hidden worksheets:



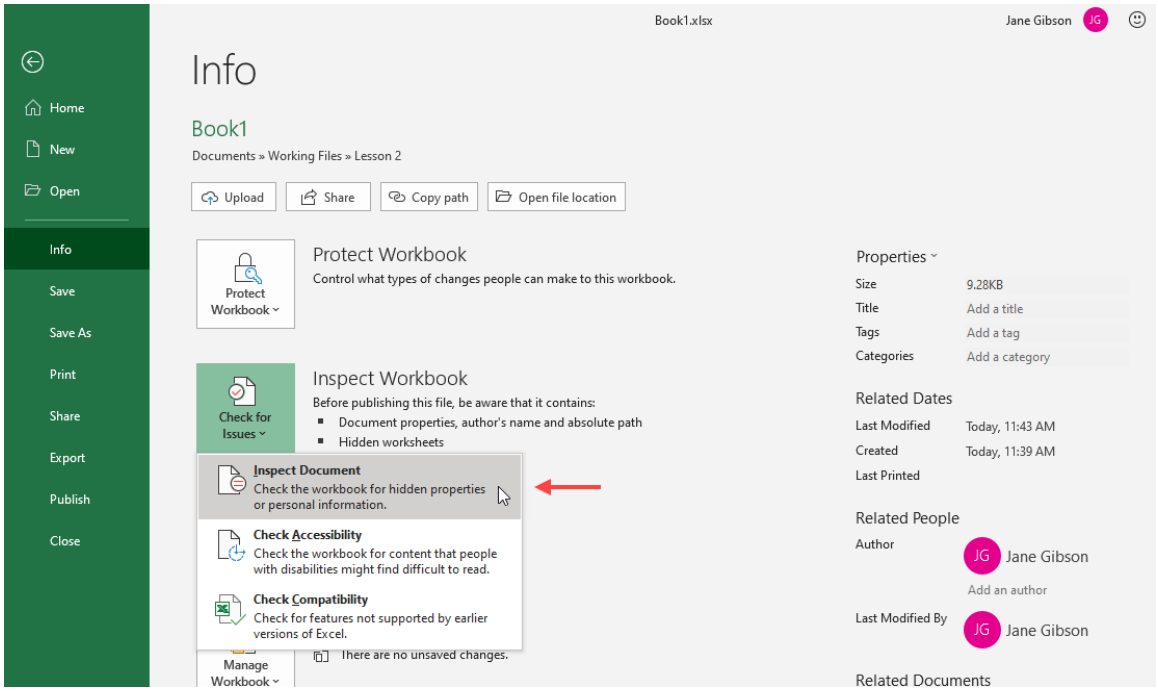
The **Custom** tab allows the user to add custom information about the workbook, based on more than 25 available options. The information can be added as Text, Date, Number, or Yes or no:



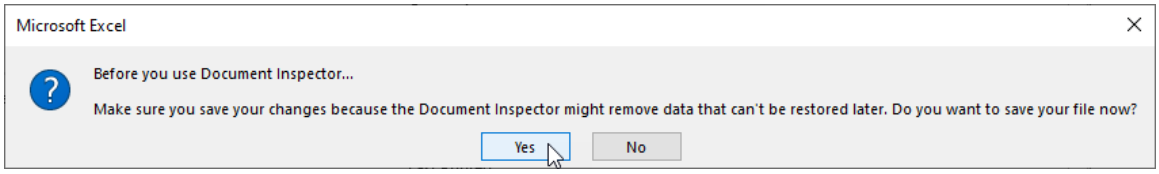
Using the Document Inspector

The **Document Inspector** is a tool you can use to easily examine your workbook for personal or sensitive information that you may not want to include when sharing your workbook with other users. This information could include comments, document properties, personal information, hidden worksheets, hidden rows and columns, or external links. The Document Inspector also provides you with the ability to quickly delete this information.

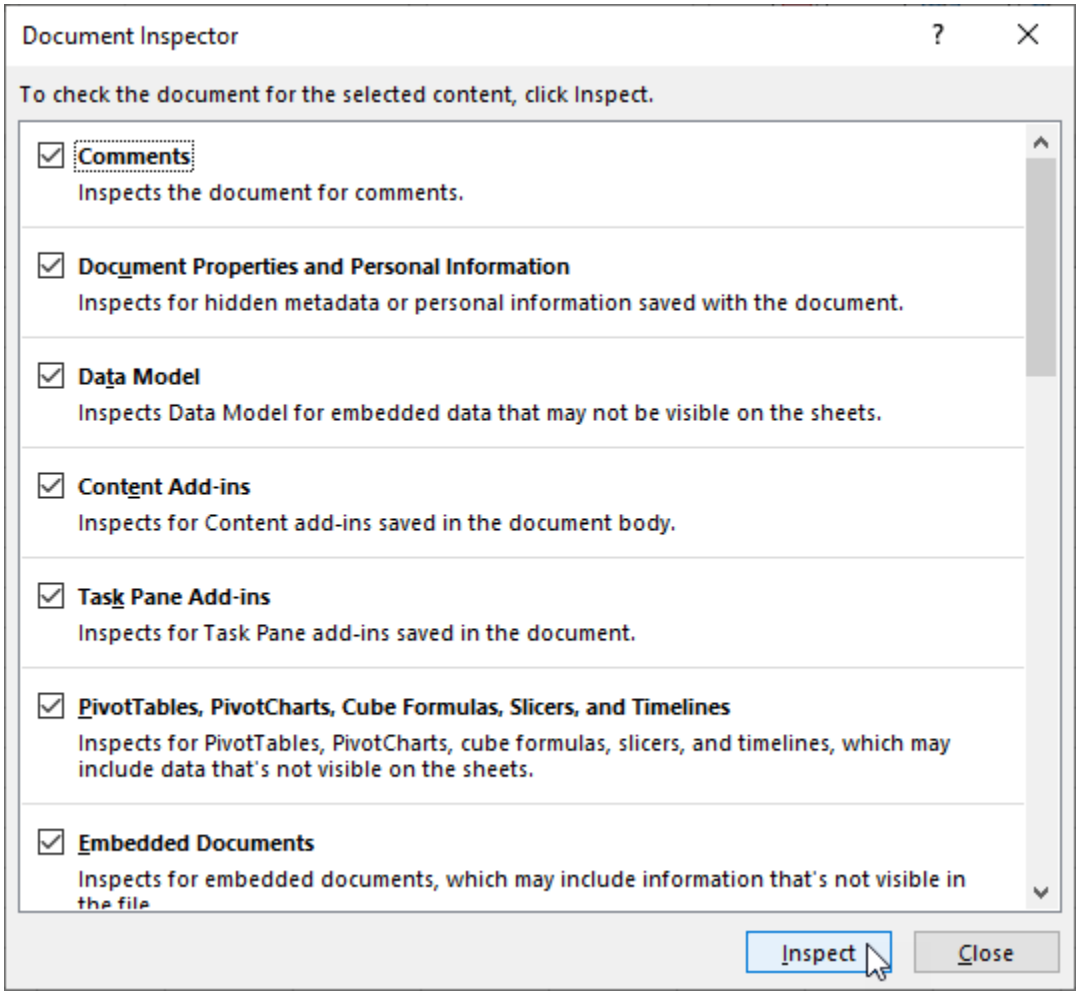
To access the Document Inspector, click **File → Info → Check for Issues → Inspect Document**:



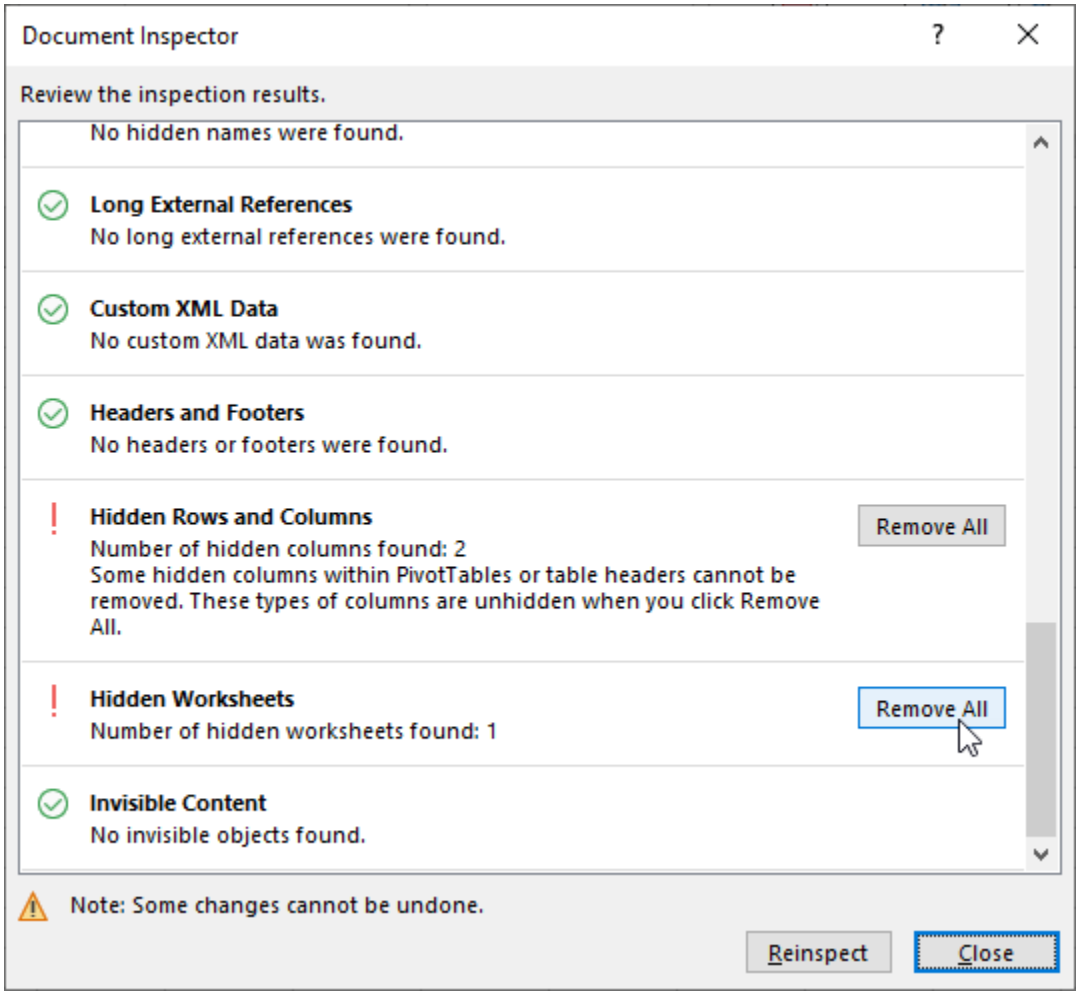
Because the Document Inspector can remove data that cannot be restored later, you will be encouraged to save your workbook prior to using it. This will allow you to restore to a previous version if you remove data that you did not intend. Click **Yes** to proceed:



The Document Inspector will open and allow you to choose the elements the Document Inspector should check for. By default, all the content will be inspected. To proceed click **Inspect**:



Once the inspection is complete, the Document Inspector will display details on any data it has found, as well as the option to remove it. To remove the data, click the **Remove All** button beside the data category you wish to remove.

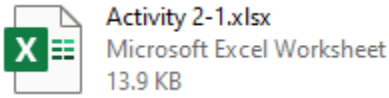


If you have chosen to remove any data, it is recommended that you click the Reinspect button to rerun the inspection and confirm that the data has been removed. You can also click the close button to return to the workbook to investigate any identified data that you are unsure of, such as hidden columns or rows, before returning to the inspector to once again inspect your workbook.

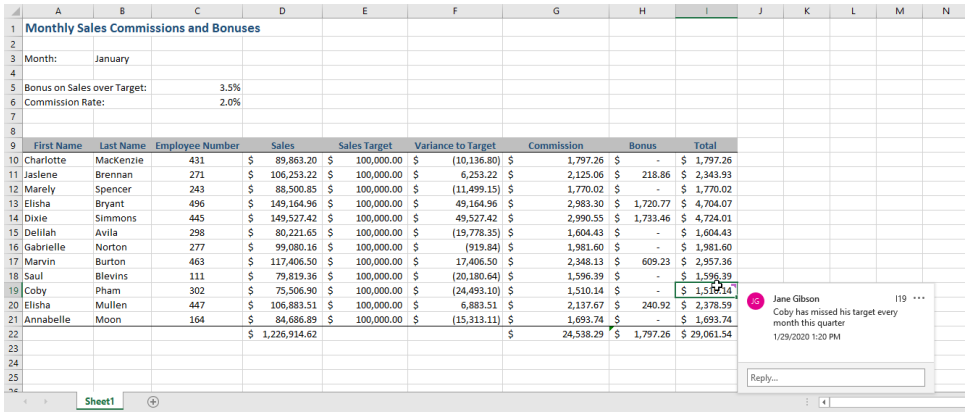
Activity 2-1: Managing Workbook Properties

You need to send the commissions report to the accounting department for payment. The department requires that the properties information is completed for their record keeping. You also need to inspect the document to remove any comments that may have been added.

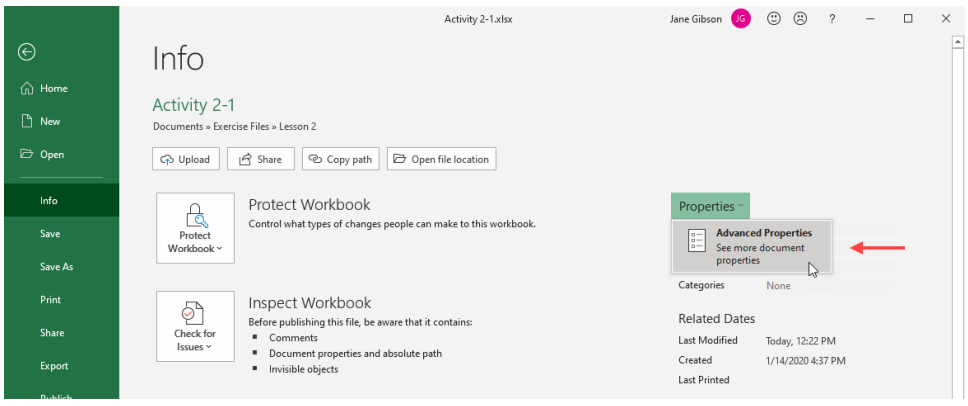
1. To begin, open **Activity 2-1** from your Exercise Files folder:



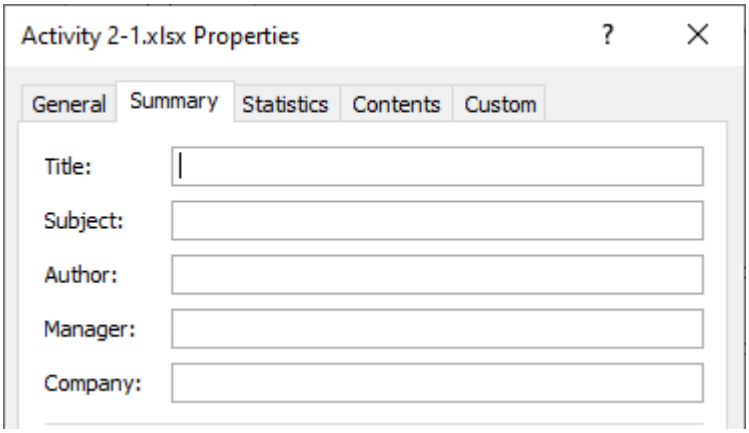
2. Hover your mouse over cell **I19** and note the comment:



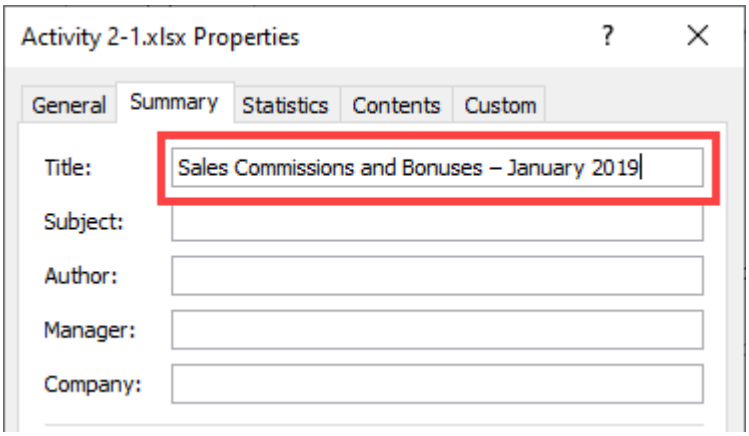
3. To open the Properties dialog box, click on **File → Info → Properties → Advanced Properties**:



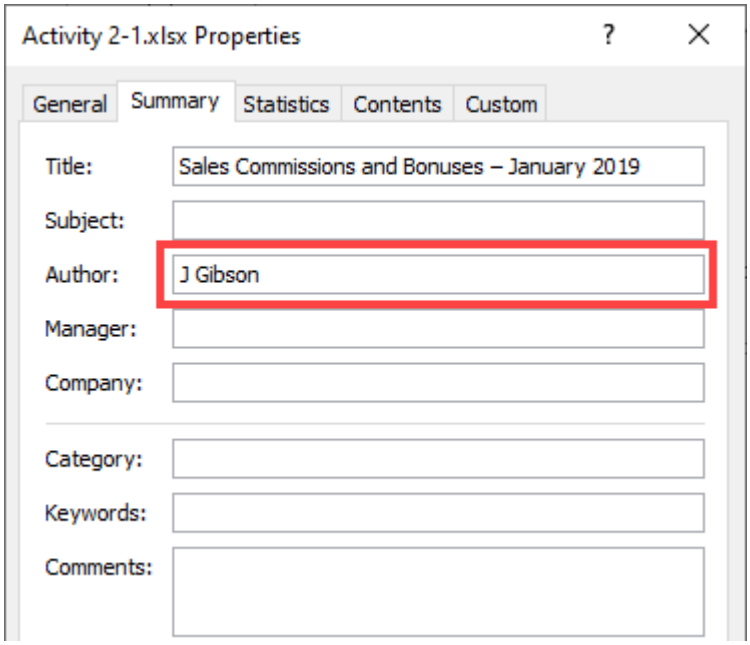
4. The Properties dialog box will be opened. Click to select the **Summary** tab:



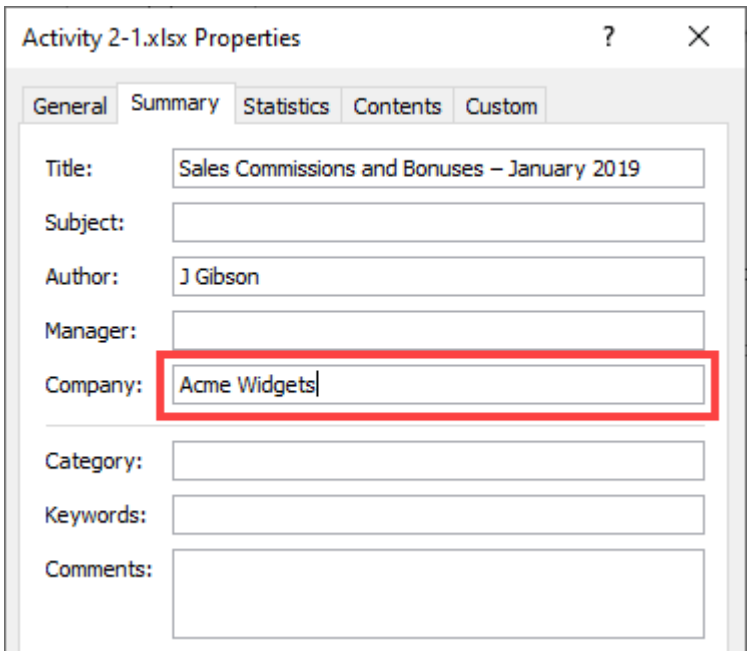
5. Type "**Sales Commissions and Bonuses – January 2019**" inside the **Title** field:



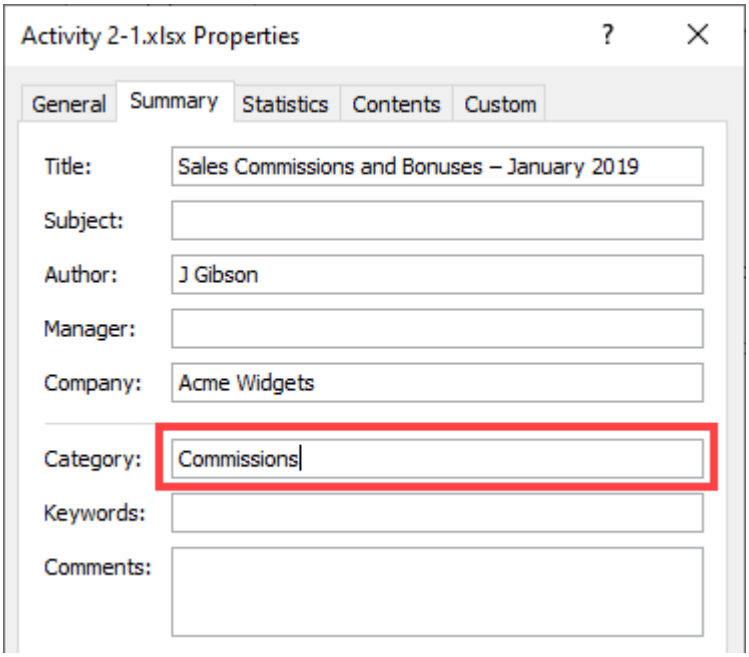
6. Type **your name** in the **Author** field:



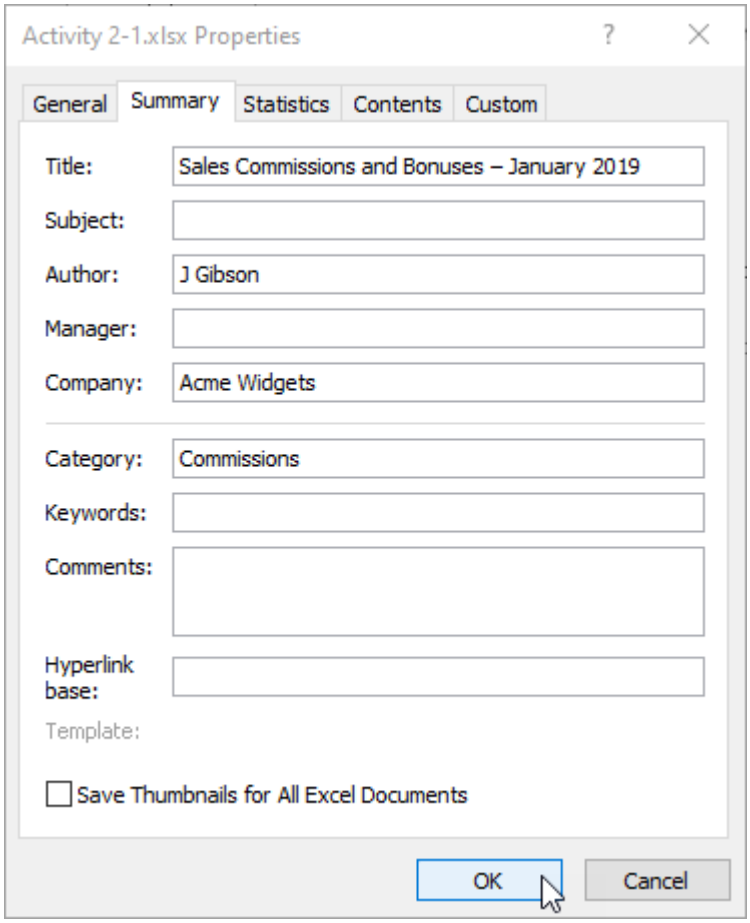
7. Type "**Acme Widgets**" in the **Company** field:



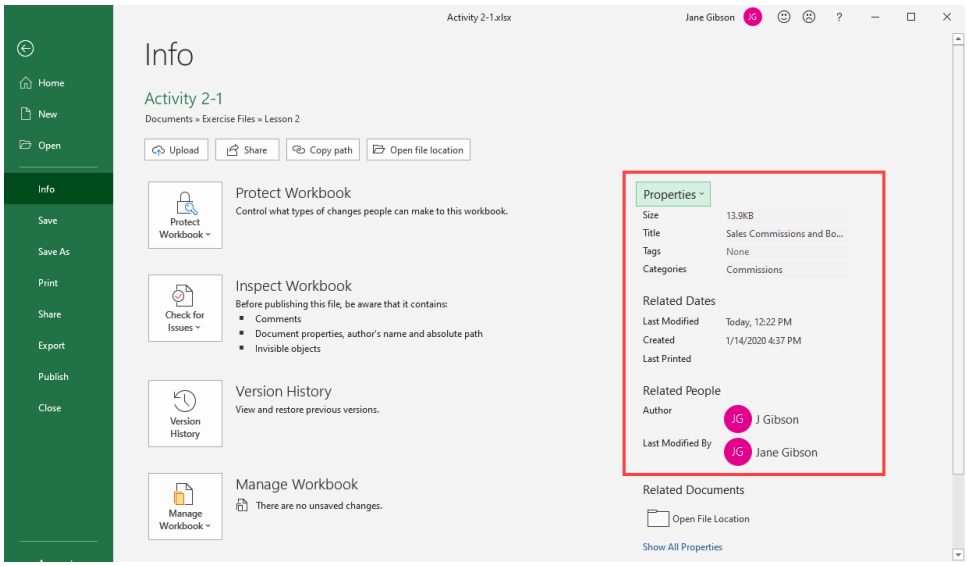
8. Inside the **Category** field, type "**Commissions**:"



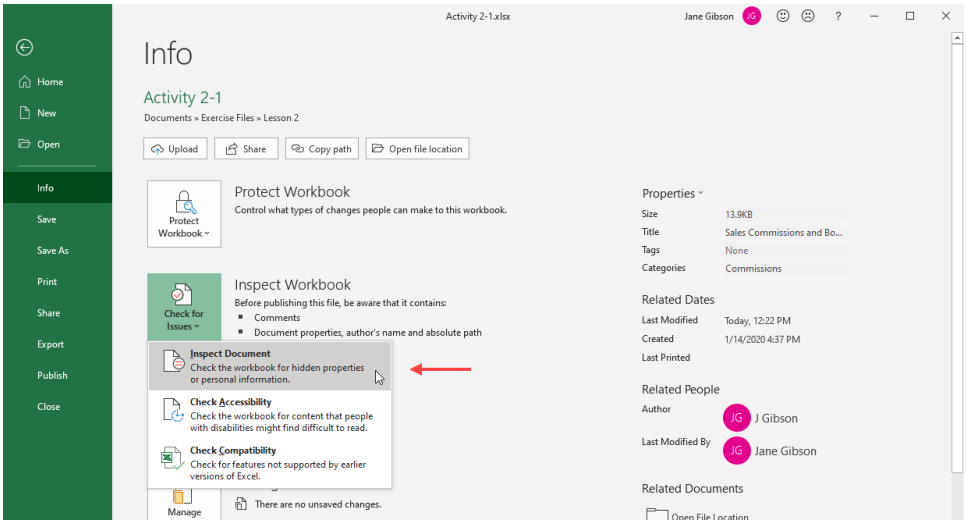
9. Click **OK** to update the properties:



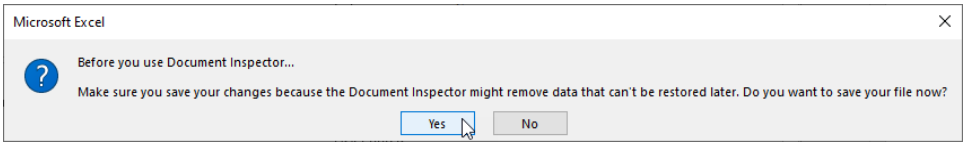
10. You will now see the updated properties on the right side of the Info category:



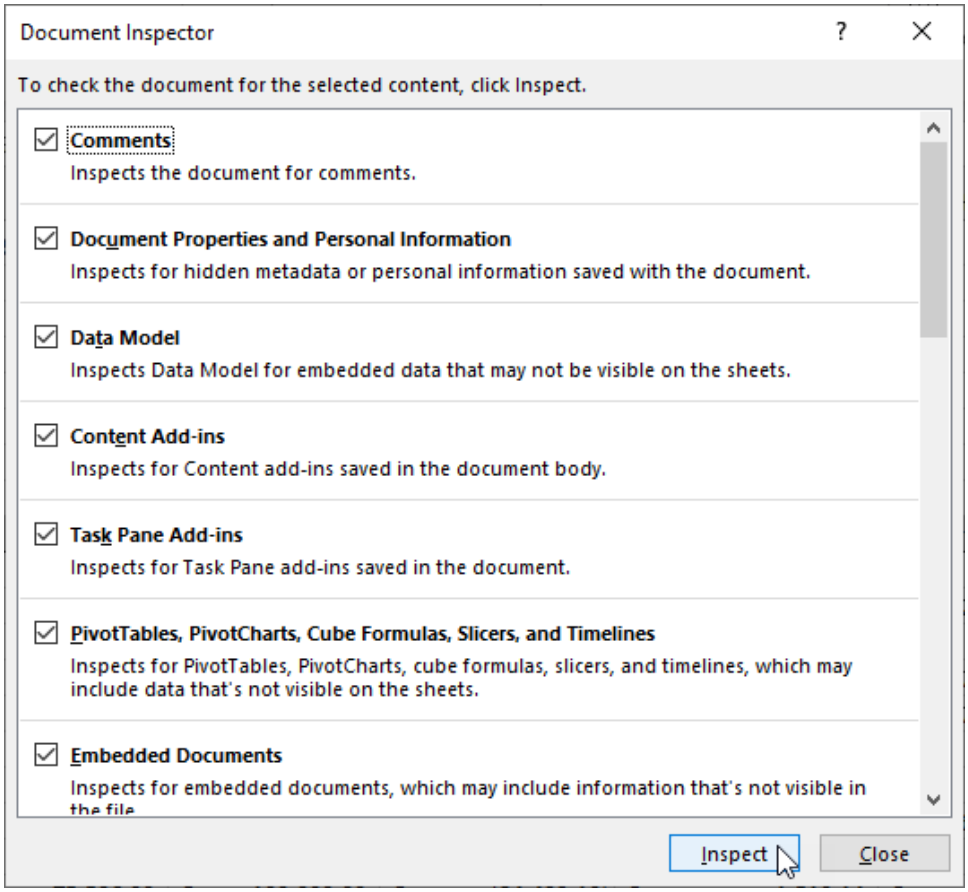
11. Now click on **Check for Issues → Inspect Document**:



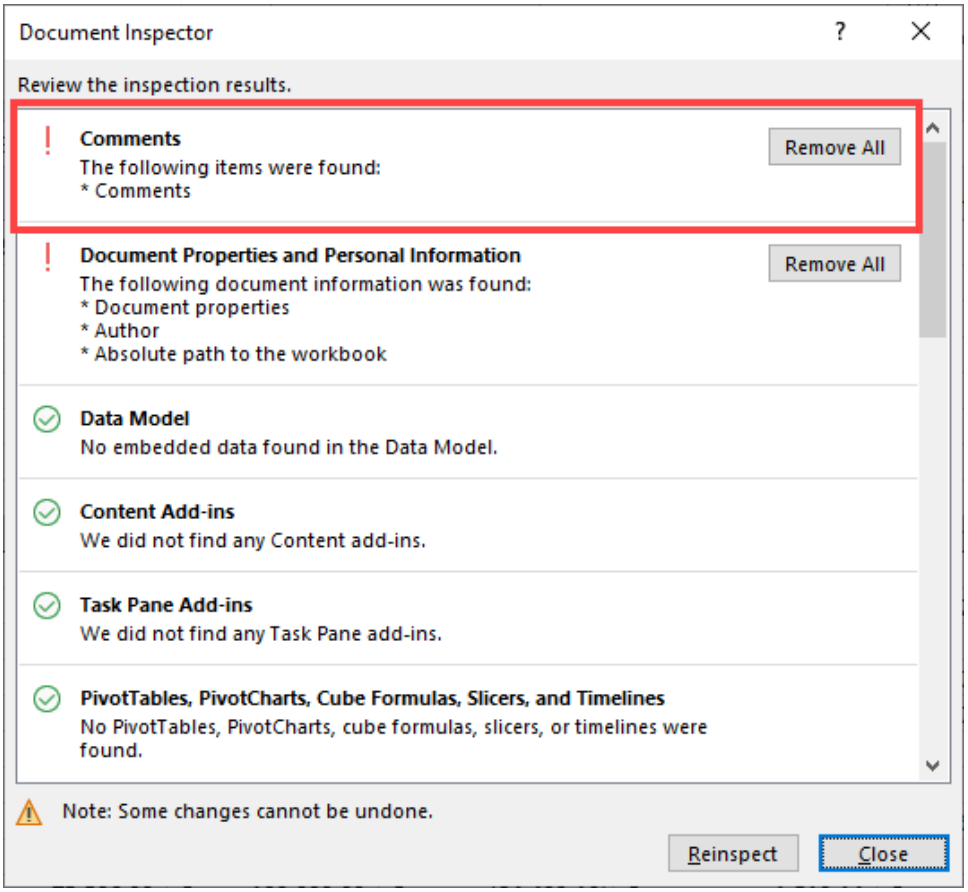
12. Click **Yes** to save the document:



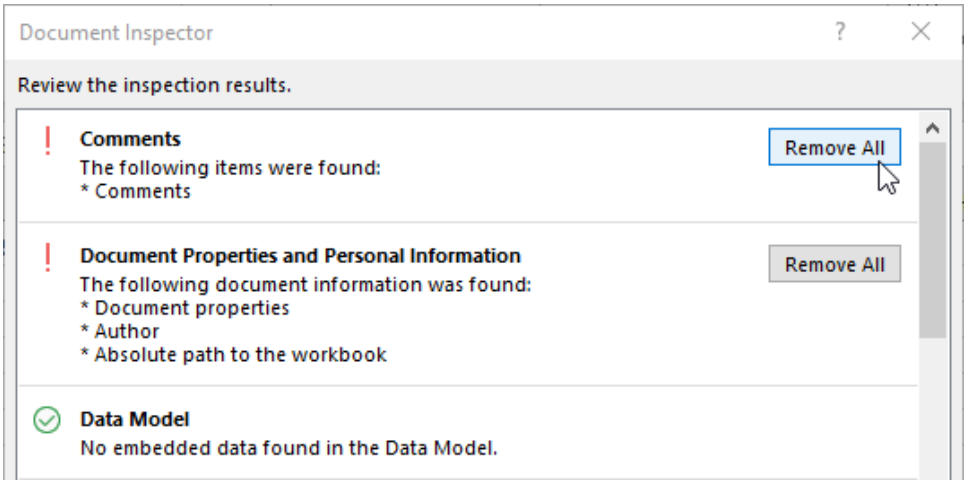
13. Click **Inspect** to start the inspection:



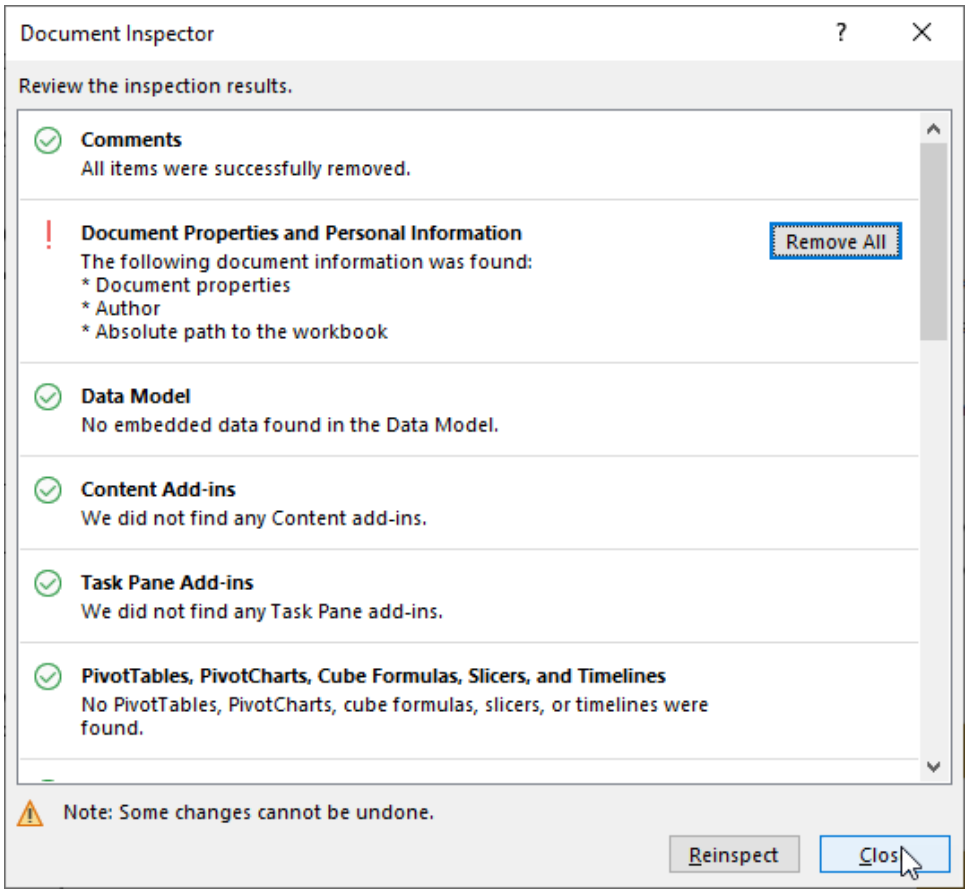
14. Once complete you will note that there were comments found:



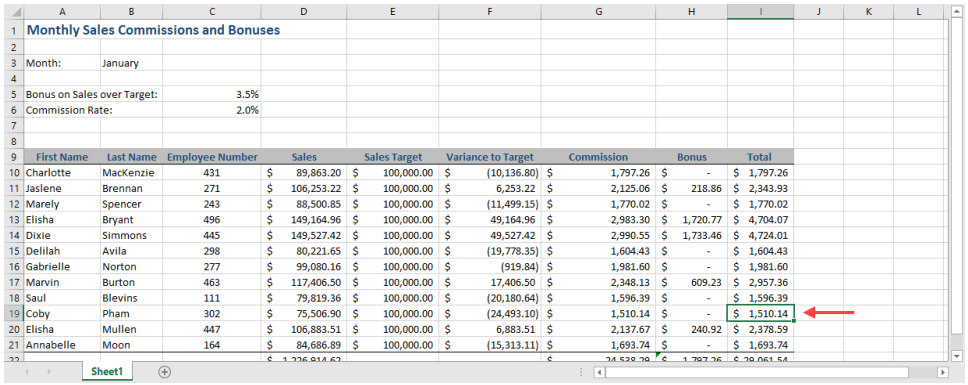
15. There were also document properties found, but you want to keep them. Click the **Remove All** button in the comments field to remove the comments:



16. You can now click **Close** to return to the workbook:



17. Note that the comment in cell I19 has been removed:



	A	B	C	D	E	F	G	H	I	J	K	L
1	Monthly Sales Commissions and Bonuses											
2												
3	Month:	January										
4												
5	Bonus on Sales over Target:		3.5%									
6	Commission Rate:		2.0%									
7												
8												
9	First Name	Last Name	Employee Number	Sales	Sales Target	Variance to Target	Commission	Bonus	Total			
10	Charlotte	MacKenzie	431	$ 89,863.20	$ 100,000.00	$ (10,136.80)	$ 1,797.26	$ -	$ 1,797.26			
11	Jaslene	Brennan	271	$ 106,253.22	$ 100,000.00	$ 6,253.22	$ 2,125.06	$ 218.86	$ 2,343.93			
12	Marely	Spencer	243	$ 88,500.85	$ 100,000.00	$ (11,499.15)	$ 1,770.02	$ -	$ 1,770.02			
13	Elisha	Bryant	496	$ 149,164.96	$ 100,000.00	$ 49,164.96	$ 2,983.30	$ 1,720.77	$ 4,704.07			
14	Dixie	Simmons	445	$ 149,527.42	$ 100,000.00	$ 49,527.42	$ 2,990.55	$ 1,733.46	$ 4,724.01			
15	Delilah	Avila	298	$ 80,221.65	$ 100,000.00	$ (19,778.35)	$ 1,604.43	$ -	$ 1,604.43			
16	Gabrielle	Norton	277	$ 99,080.16	$ 100,000.00	$ (919.84)	$ 1,981.60	$ -	$ 1,981.60			
17	Marvin	Burton	463	$ 117,406.50	$ 100,000.00	$ 17,406.50	$ 2,348.13	$ 609.23	$ 2,957.36			
18	Saul	Blevins	111	$ 79,819.36	$ 100,000.00	$ (20,180.64)	$ 1,596.39	$ -	$ 1,596.39			
19	Coby	Pham	302	$ 75,506.90	$ 100,000.00	$ (24,493.10)	$ 1,510.14	$ -	$ 1,510.14			
20	Elisha	Mullen	447	$ 106,883.51	$ 100,000.00	$ 6,883.51	$ 2,137.67	$ 240.92	$ 2,378.59			
21	Annabelle	Moon	164	$ 84,686.89	$ 100,000.00	$ (15,313.11)	$ 1,693.74	$ -	$ 1,693.74			

Sheet1

18. Save the current workbook as **Activity 2-1 Complete** and then close Microsoft Excel 365 to complete the activity.

TOPIC B: Working with Macros

One of the more powerful automation features of Excel is the ability to record and run Macros to streamline and execute repetitive tasks and procedures that you may encounter in your day-to-day use of the program. Not only can they save you time, but they can also help you reduce mistakes by reducing manual steps.

Topic Objectives

In this session, you will learn:

- About macros
- How to record a macro
- About options for saving your macros
- How to inspect your macro using the Visual Basic for Applications (VBA) editor
- How to configure macro security

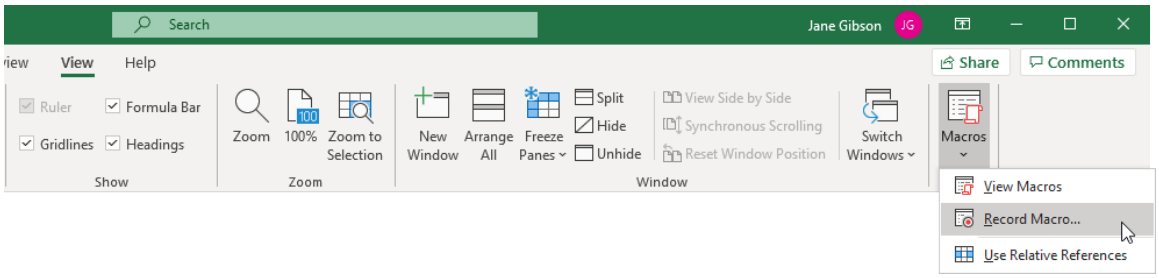
What is a Macro?

A **macro** is a sequence of instructions, or code, written in the Visual Basics for Applications (VBA) language, that can be executed by a user to complete a task or set of tasks in Excel. You can create them by writing code in the VBA editor, which is built into Excel, or you can record your steps as you complete activities in Excel so you can run them in the future.

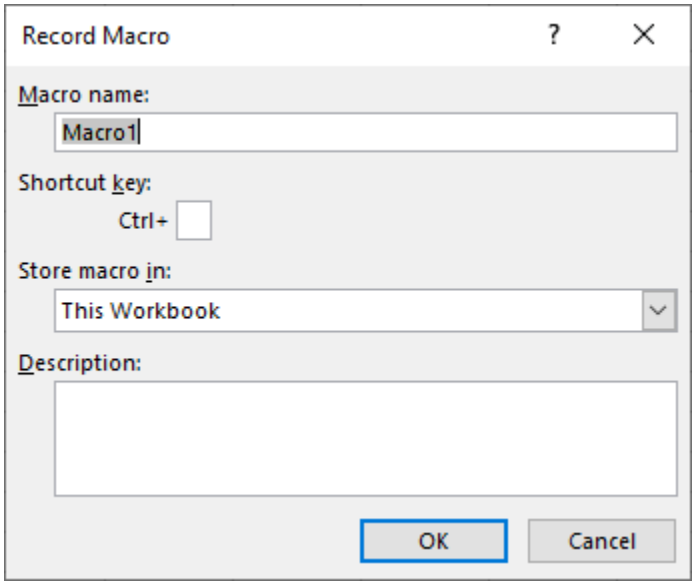
Recording a Macro

Recording a macro is a simple process of turning on a recorder before executing a series of steps in Excel, then stopping the recorder once the steps are complete. In this process you can name and save the macro, assign a shortcut key to activate it, and decide where you would like to store it.

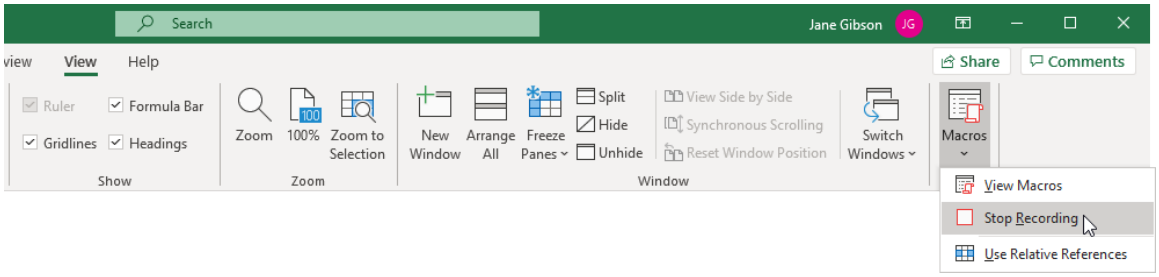
To start recording a macro, open the Record Macro dialog box by clicking **View → Macros → Record Macro**:



In the **Record Macro** dialog box, you can enter a name, assign a shortcut key to execute the macro, define where the macro will be saved, and add a brief description of what the macro does:

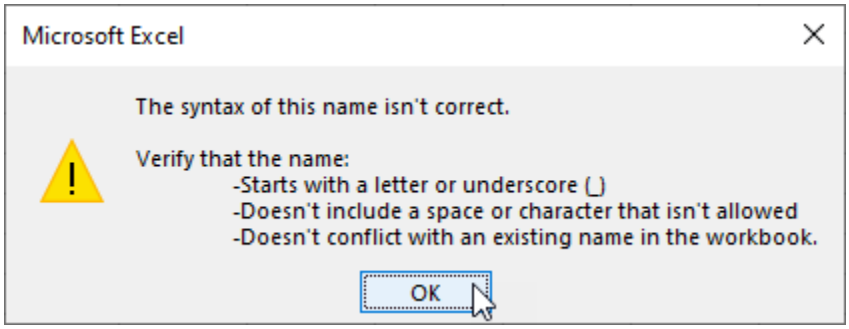


Clicking **OK** in the Record Macro dialog box will start recording any activities you execute in Excel. You can stop recording by clicking **View → Macros → Stop Recording**:

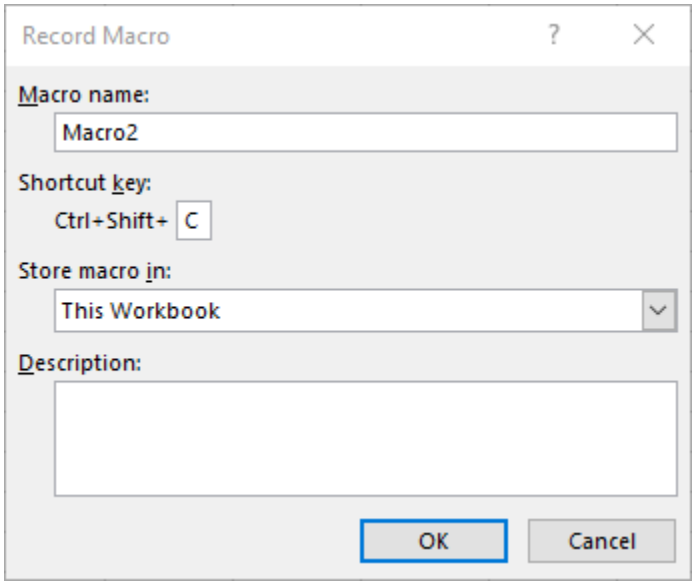


Saving a Macro

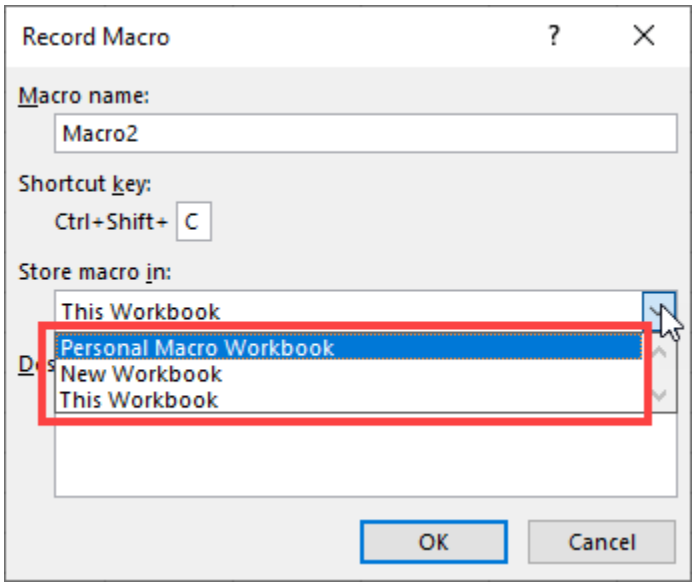
There are very specific rules you must follow when naming your macro. The first character must be a letter, followed by your choice of letters, numbers, or the underscore character. No other characters, such as spaces or symbols, are accepted. The name must also not conflict with any macro names already saved in the workbook. An alert window will open warning you if your macro name syntax is not correct:



Assigning a shortcut key to a macro is as simple as adding a character to the **Shortcut key** field. The Ctrl modifier key is included automatically, but you can add others, such as Shift, or Alt, by holding the selected key when you enter the character in the **Shortcut key** field:



You will be presented with three choices of where you would like to store your macro. They are the **Personal Macro Workbook**, a **New Workbook**, or **This Workbook**:

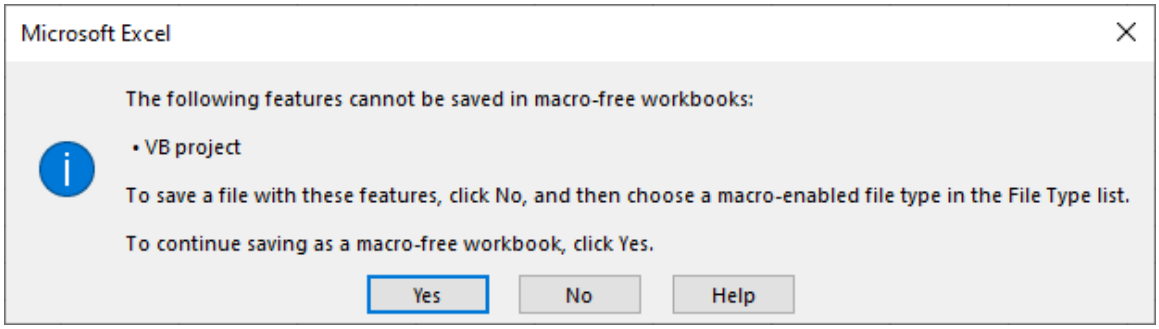


Choosing to save your macro in a new workbook or the current (this) workbook restricts you to only use the macro when that workbook is open.

The **Personal Macro Workbook** is a hidden workbook that is opened whenever you open the Excel desktop application. Storing a macro here makes it available to use any time you have your application open, but it will not be available if the workbook is opened on a different computer.

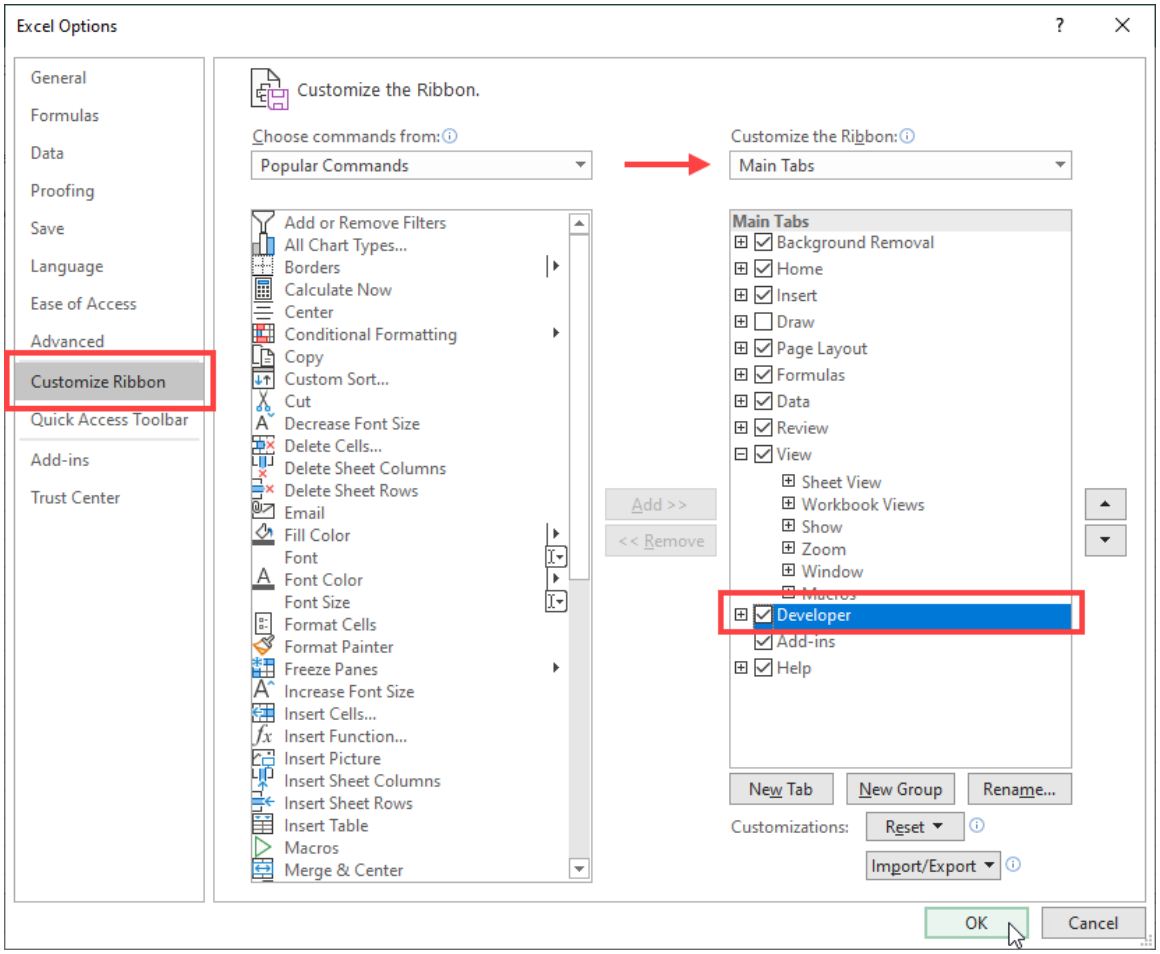
To save a workbook that contains a macro you will be required to save it in a Macro-Enabled Workbook format (.xlsm). Because macros can contain code from an unknown source, there is a security risk to your files and your computer. The macro-enabled workbook format provides increased security against malicious code by allowing users to confirm the trustworthiness of the source before opening the file.

If you try to save a standard (.xlsx) file that contains macros, an alert window will open, giving you the option to save the file without the macro, or directing you to exit the window and choose a macro-enabled file type to save the file with the macro included:

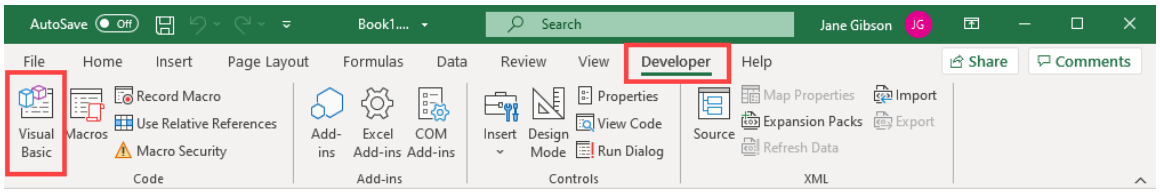


Inspecting and Editing Macros

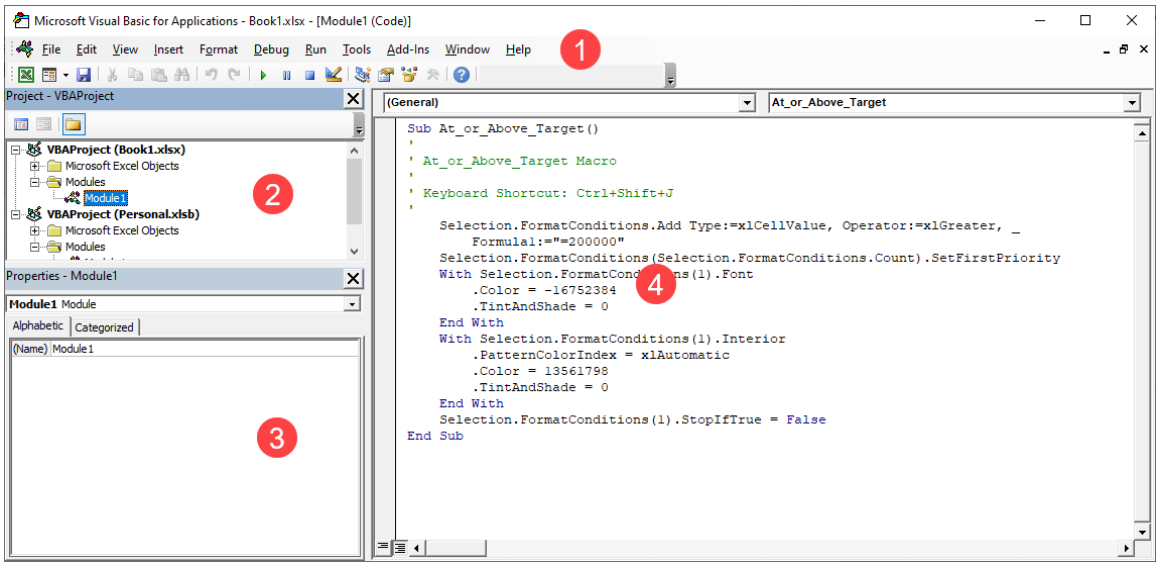
Once you have recorded your macro, you can view and edit the code using the Visual Basics for Applications Editor, a separate application that is built into all the Microsoft Office applications. To access the editor, you first must enable the Developer tab in the ribbon list. To do this, click **File → Options → Customize Ribbon,** then click to enable the **Developer** checkbox in the Main Tabs section of the Customize the Ribbon window, then click **OK**:



You will now see the Developer tab is available in the ribbon list. Clicking on the **Visual Basic** command in the Code group will launch the VBA Editor:



Let's review the basic parts of the VBA Editor interface:

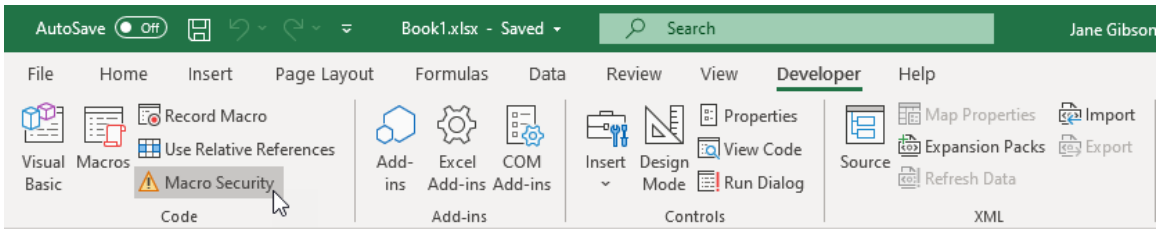


1. **The Standard toolbar**, like other applications, includes commands that allow you to interact with the application.
2. **The Project Explorer pane** lists all open and visible workbooks and the elements that the VBA editor can interact with, including modules and forms. Macros that you record can be found in the Modules of the workbook in which you have stored them.
3. **The Properties window** will display and allow editing of the properties of the elements selected in the Project Explorer
4. **The Code window** allows you to write, display and edit VBA code. You can double-click a module in your workbook and any code in this module will be displayed in this window.

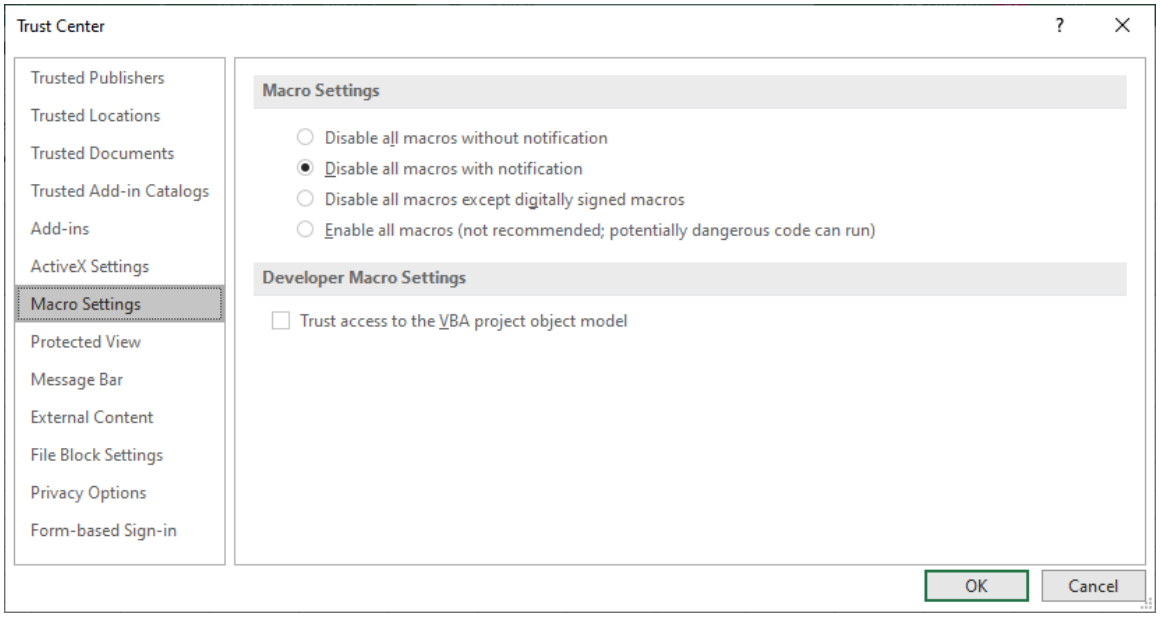
Writing and editing code in VBA can be very complex and is beyond the scope of this lesson, but using the VBA Editor to inspect macros that you record, or Macros that have been written by others, is an excellent way to begin to understand how your macros work and help you explore other opportunities to automate your workbooks.

Macro Security

Because macros carry an increased risk of malicious code, Excel allows the user to set the level of security they would like to use when opening macro-enabled workbooks. To review these settings, click on **Macro Security** in the Code group of the Developer tab:



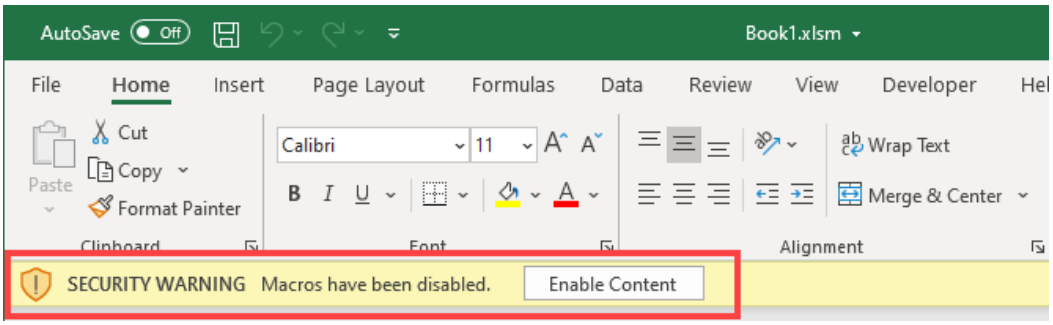
The Trust Center dialog box will be displayed. If it is not already selected, click the **Macro Settings** category:



In this category, there are four radio buttons available, under the Macro Settings heading. These options are arranged in descending order, from most secure to least.

Let’s review the options:

- **Disable all macros without notification** disables all macros and security alerts.
- **Disable all macros with notification** disables all macros, but a security alert will appear if there are macros present in the workbook, and you can selectively enable macros on a case-by-case basis. This is the default selection, and is a good balance between security and function:

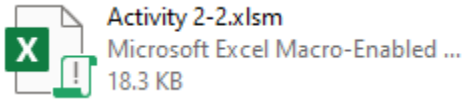


- **Disable all macros except digitally signed macros** disables all macros but a security alert will appear if there are macros present in the workbook. If the macro is digitally signed by a publisher, you will be notified to enable the macro and trust the publisher.
- **Enable all macros** allows all macros to run. This option makes your computer vulnerable to potentially malicious code and is not recommended.

Activity 2-2: Working with Macros

You have been asked to highlight the sales results of representatives that are at or above their sales targets, on a monthly basis.

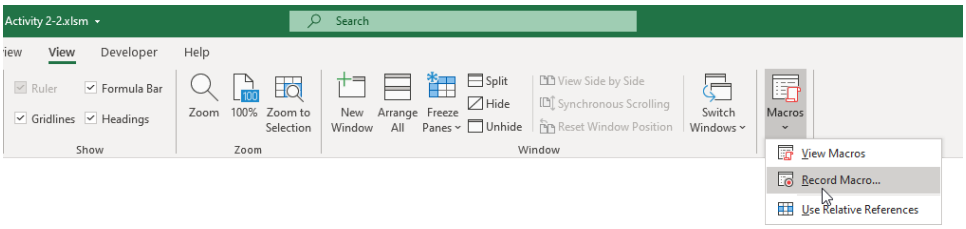
1. To begin, open **Activity 2-2** from your Exercise Files folder:



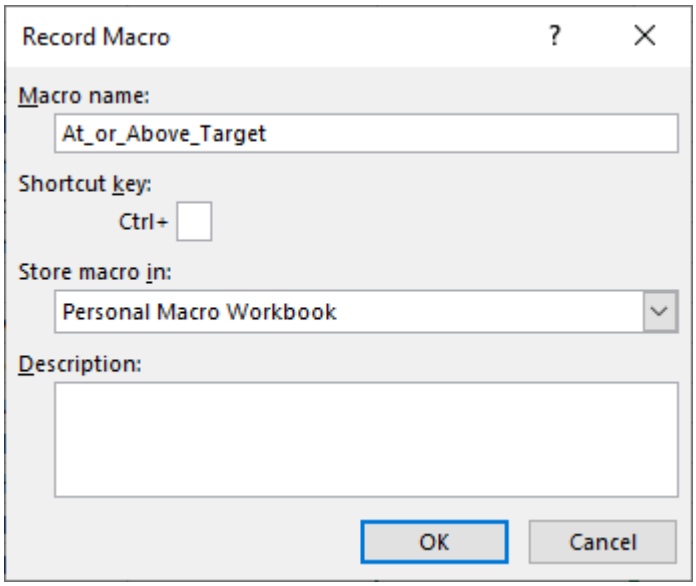
2. On the sheet January, click and drag to select the cells from **D18 to D29**:

	A	B	C	D	E	F	G	H
11	**Year to Date Sales**							
12								
13	Month:	January						
14								
15								
16								
17	First Name	Last Name	Employee Number	Sales				
18	Charlotte	MacKenzie	431	$ 89,863.20				
19	Jaslene	Brennan	271	$ 106,253.22				
20	Marely	Spencer	243	$ 88,500.85				
21	Elisha	Bryant	496	$ 149,164.96				
22	Dixie	Simmons	445	$ 149,527.42				
23	Delilah	Avila	298	$ 80,221.65				
24	Gabrielle	Norton	277	$ 99,080.16				
25	Marvin	Burton	463	$ 117,406.50				
26	Saul	Blevins	111	$ 79,819.36				
27	Coby	Pham	302	$ 75,506.90				
28	Elisha	Mullen	447	$ 106,883.51				
29	Annabelle	Moon	164	$ 84,686.89				
30	Total			$ 1,226,914.62				
31								

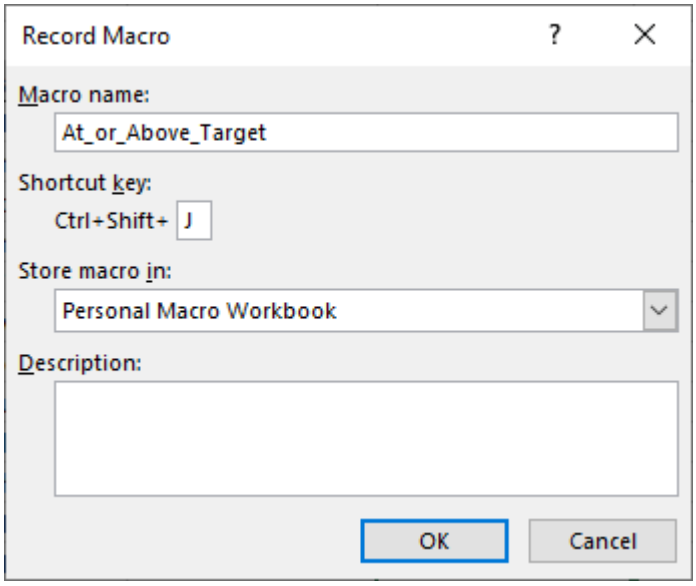
3. Open the Record Macro dialog box by clicking **View → Macros → Record Macro**:



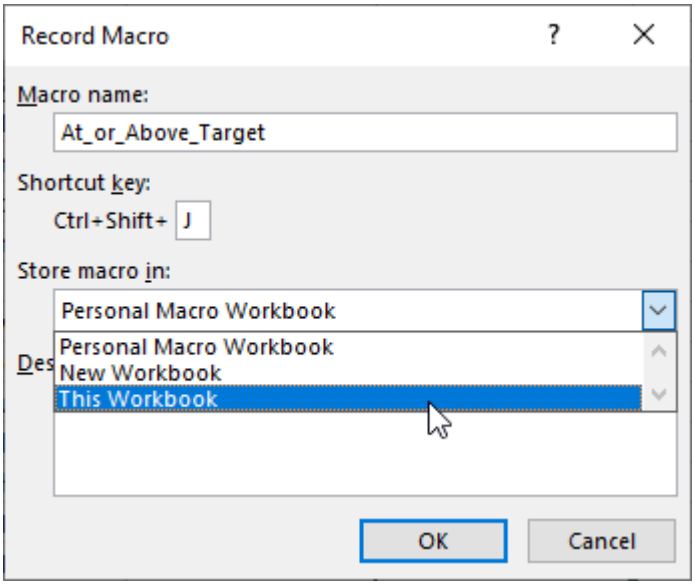
4. In the Record Macro dialog box, type "**At_or_Above_Target**" in the **Macro name** field:



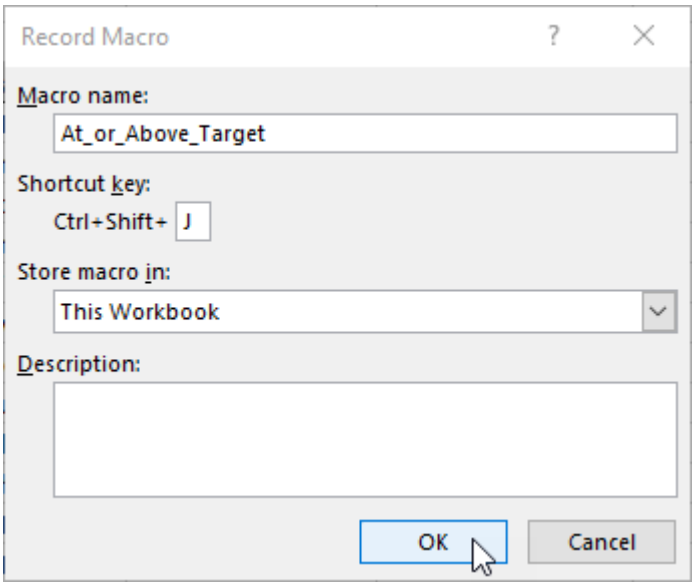
5. Click to select the **Shortcut key** field then press **Shift + J**:



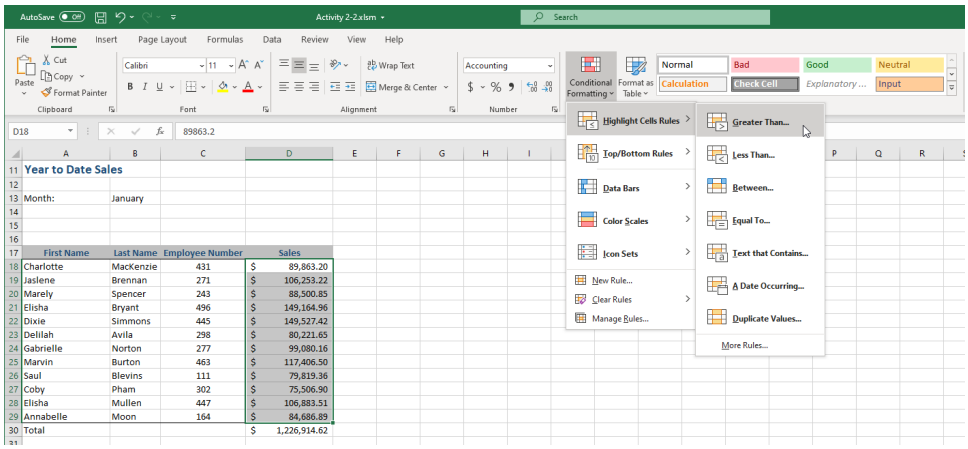
6. Click the **Store macro in** drop-down menu and select **This Workbook**:



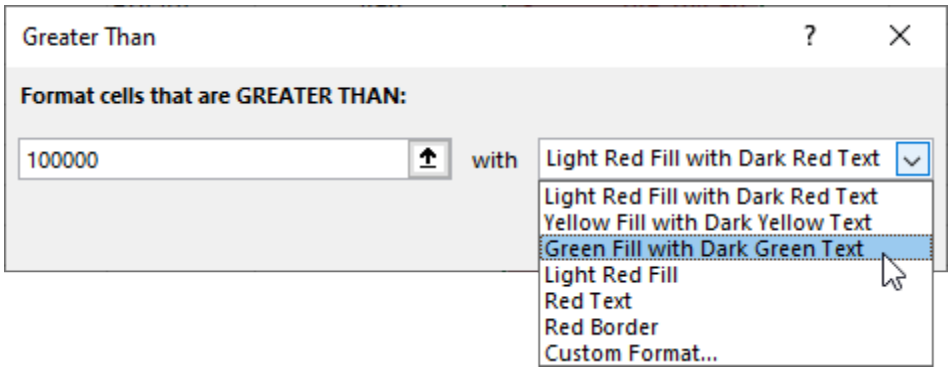
7. Click **OK**:



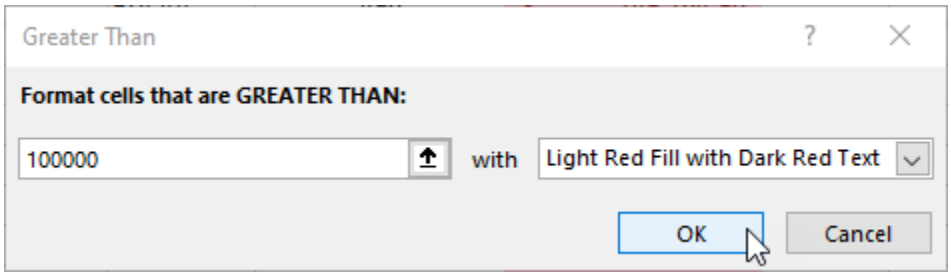
8. The Macro Recorder is now recording all your actions. Click **Home → Conditional Formatting → Highlight Cells Rules → Greater Than…**:



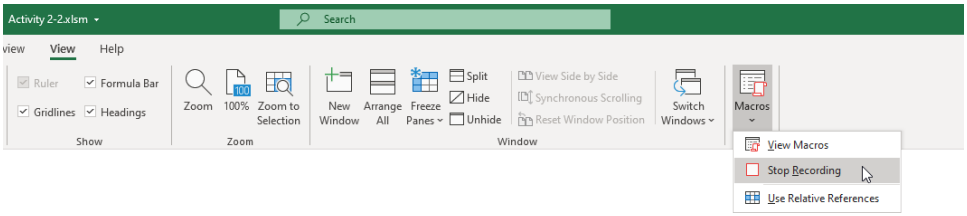
9. Enter "**100000**" in the field under **Format cells that are GREATER THAN:** and then select **Green Fill with Dark Green Text** from the drop-down list:



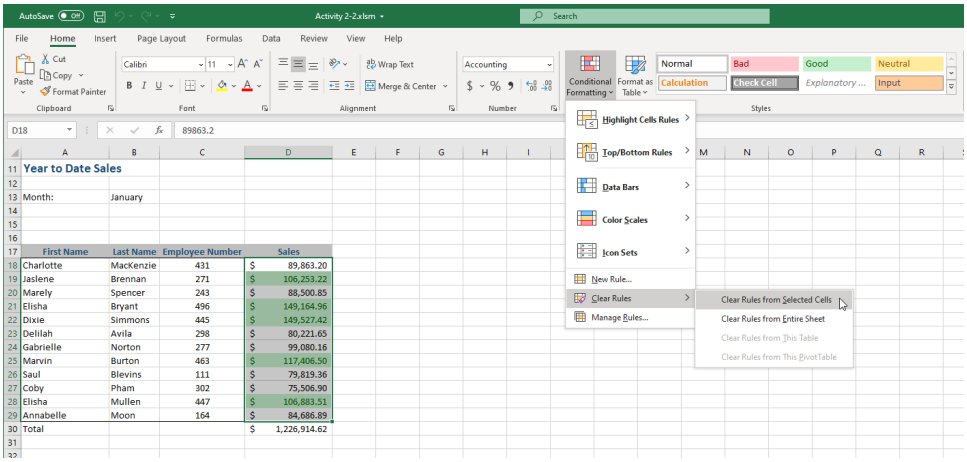
10. Click **OK**:



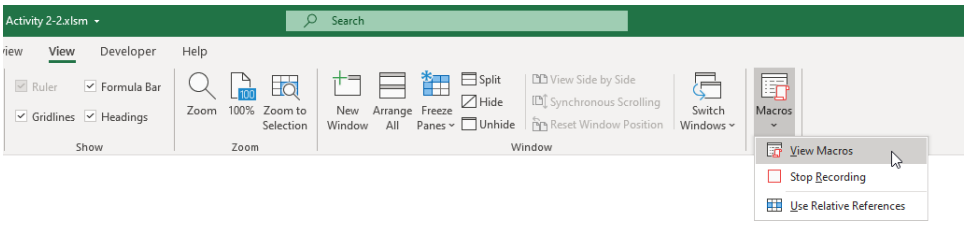
11. Click **View → Macros → Stop Recording**:



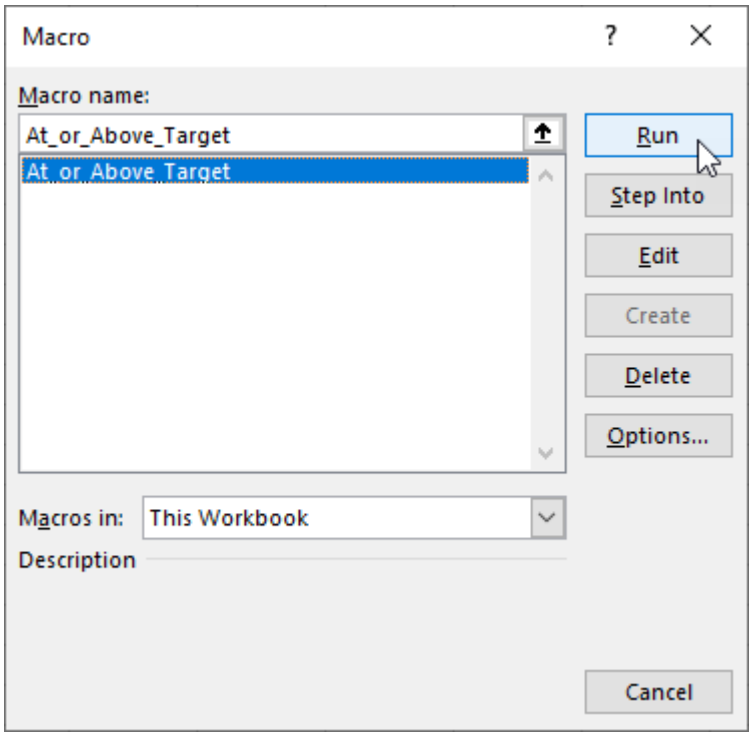
12. To test your macro, clear the conditional formatting by clicking **Home → Conditional Formatting → Clear Rules → Clear Rules from Selected Cells**:



13. Open the Macros dialog box by clicking **View → Macros**:



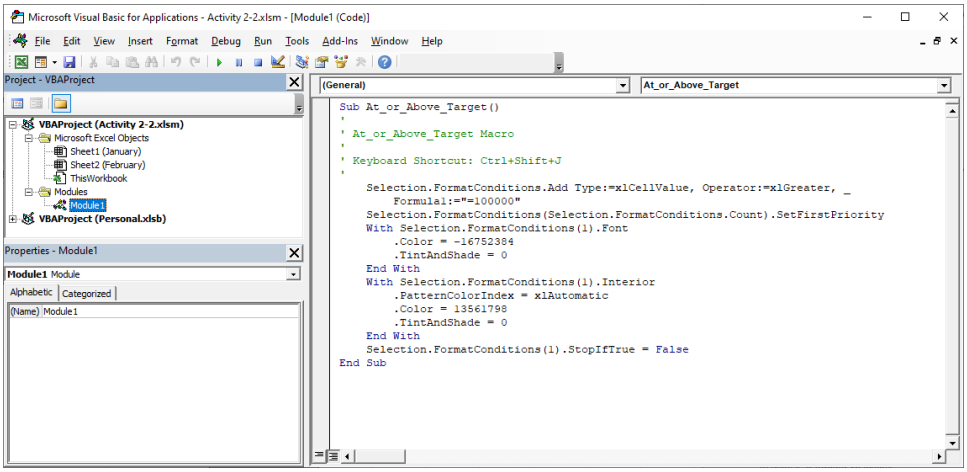
14. In the open Macros dialog box, select the macro you just recorded and execute it by clicking the **Run** button:



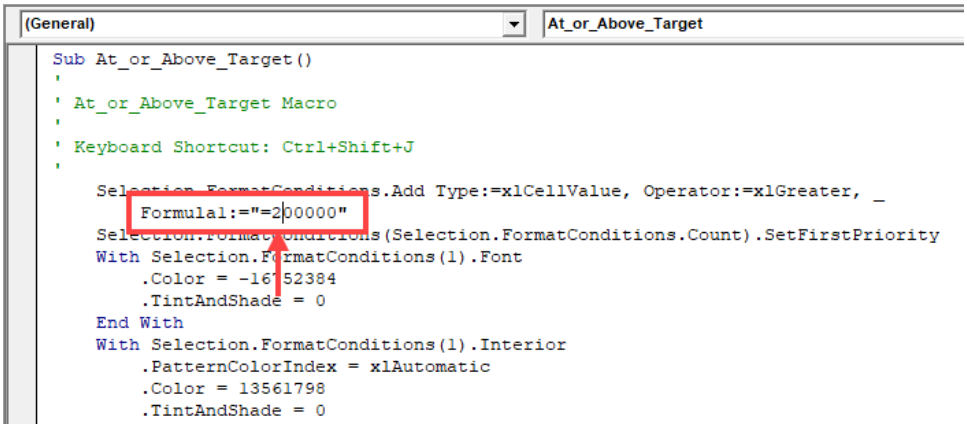
15. All the sales values greater than $100,000 are now highlighted in light green with dark green text:

	A	B	C	D	E	F	G	H
11	**Year to Date Sales**							
12								
13	Month:	January						
14								
15								
16								
17	**First Name**	**Last Name**	**Employee Number**	**Sales**				
18	Charlotte	MacKenzie	431	$ 89,863.20				
19	Jaslene	Brennan	271	$ 106,253.22				
20	Marely	Spencer	243	$ 88,500.85				
21	Elisha	Bryant	496	$ 149,164.96				
22	Dixie	Simmons	445	$ 149,527.42				
23	Delilah	Avila	298	$ 80,221.65				
24	Gabrielle	Norton	277	$ 99,080.16				
25	Marvin	Burton	463	$ 117,406.50				
26	Saul	Blevins	111	$ 79,819.36				
27	Coby	Pham	302	$ 75,506.90				
28	Elisha	Mullen	447	$ 106,883.51				
29	Annabelle	Moon	164	$ 84,686.89				
30	Total			$ 1,226,914.62				
31								
32								

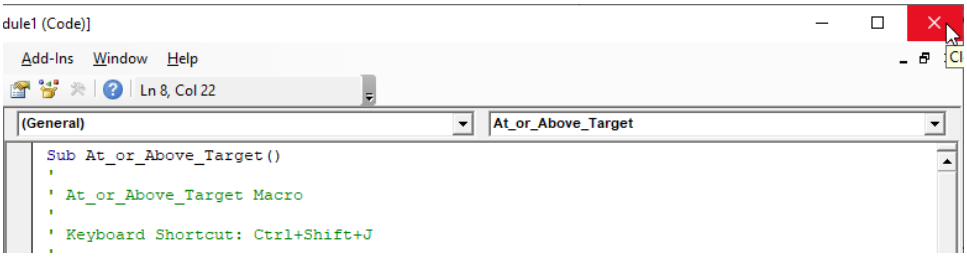
16. Press **Alt + F11** to launch the VBA Editor:



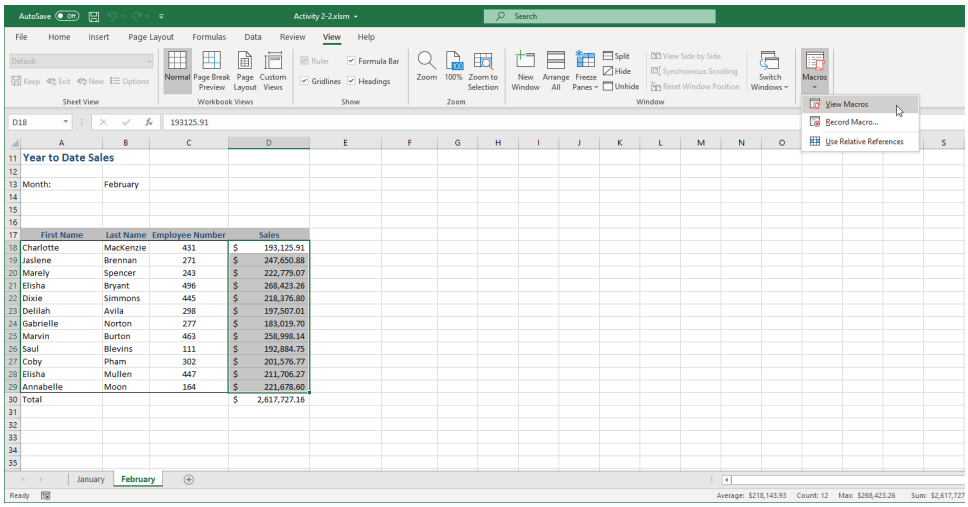
17. You will see the code that was created when you recorded your macro in the Code window. Find the line in the code that reads "**Formula1:="=100000"**" and **replace** the number 1, after the equals (=) sign, with the number **2**:



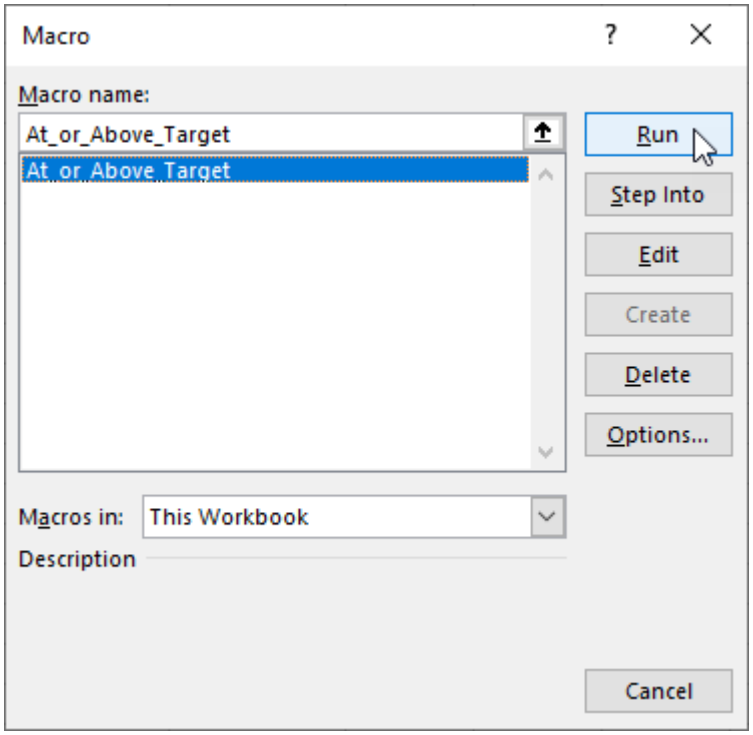
18. Save your changes by pressing **Ctrl + S,** then close the VBA Editor window by clicking the **Close** (**X**) button in the upper right-hand corner:



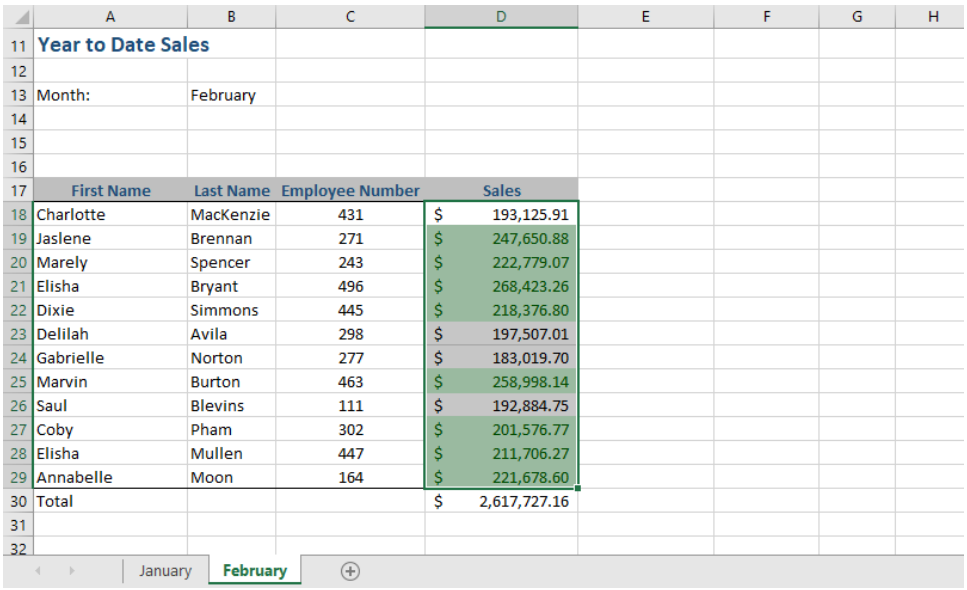
19. Now go to the sheet February, select cells **D18 to D29**, Click **View → Macros → View Macros**:



20. Execute your macro again by selecting **At_or_Above_Target** in the Macro name list and clicking **Run**:



21. Now, all the sales values greater than $200,000 are highlighted in light green with dark green text:



	A	B	C	D	E	F	G	H
11	**Year to Date Sales**							
12								
13	Month:	February						
14								
15								
16								
17	First Name	Last Name	Employee Number	Sales				
18	Charlotte	MacKenzie	431	$ 193,125.91				
19	Jaslene	Brennan	271	$ 247,650.88				
20	Marely	Spencer	243	$ 222,779.07				
21	Elisha	Bryant	496	$ 268,423.26				
22	Dixie	Simmons	445	$ 218,376.80				
23	Delilah	Avila	298	$ 197,507.01				
24	Gabrielle	Norton	277	$ 183,019.70				
25	Marvin	Burton	463	$ 258,998.14				
26	Saul	Blevins	111	$ 192,884.75				
27	Coby	Pham	302	$ 201,576.77				
28	Elisha	Mullen	447	$ 211,706.27				
29	Annabelle	Moon	164	$ 221,678.60				
30	Total			$ 2,617,727.16				
31								
32								

January February

22. Save the current workbook as **Activity 2-2 Complete** and then close Microsoft Excel 365 to complete the activity.

TOPIC C: Create and Use a Template

An Excel template is a tool that you can use to save time and automate your workflow when creating the same type of workbook repeatedly, such as regular reports or analyses. It allows you to build a standard workbook that contains a desired combination of content and formatting, and then use it as a template to create new workbooks, saving you time and helping to keep your work consistent.

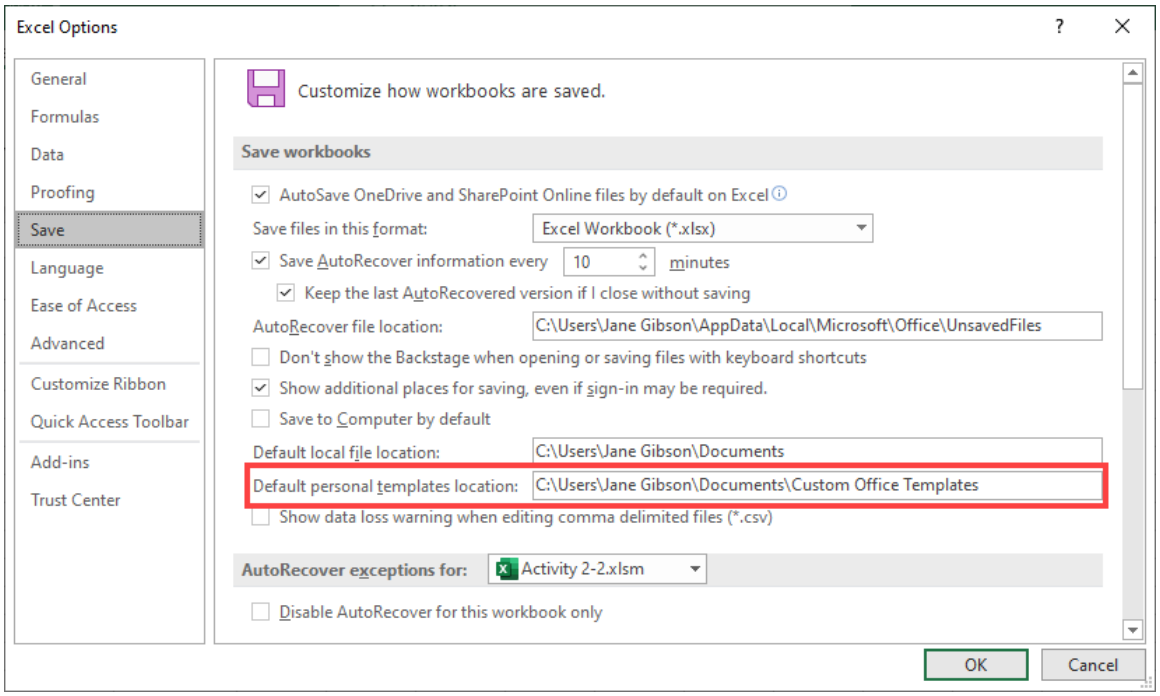
Topic Objectives

In this session, you will learn how to:

- Set the custom template directory
- Save a workbook as a template
- Edit a template
- Open a new workbook based on your template

Set the Custom Template Directory

Access to your custom templates is based on the **Default personal templates location**. You can set this location by clicking on **File → Options,** and then clicking the **Save** category in the Excel Options dialog box:

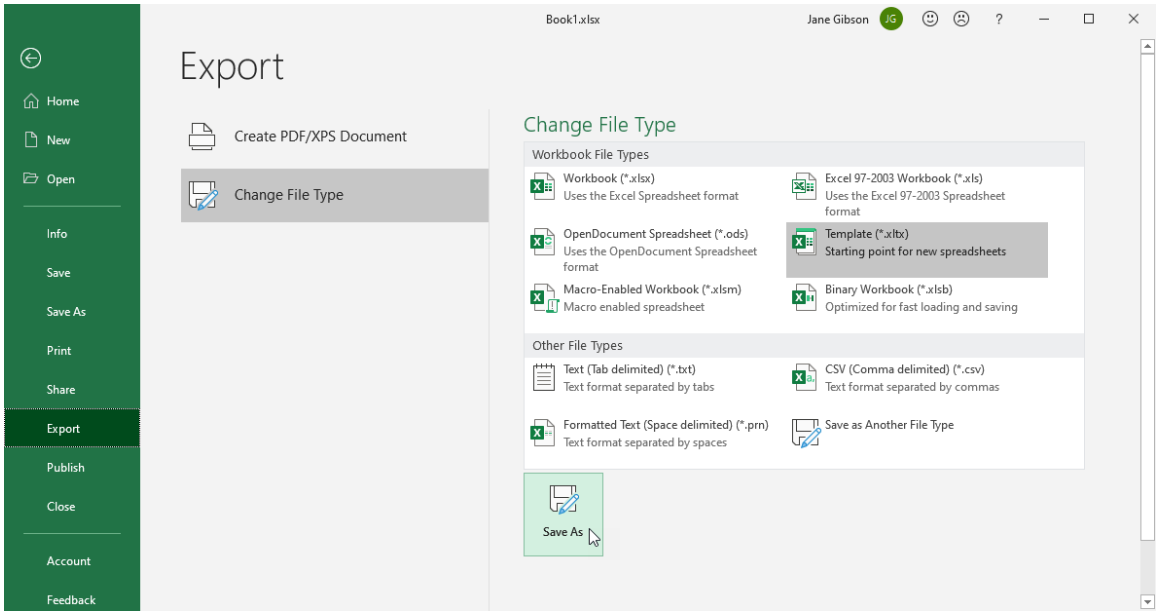


The path is typically "**C:\Users\[UserName]\Documents\Custom Office Templates**" where UserName is your Username on the computer.

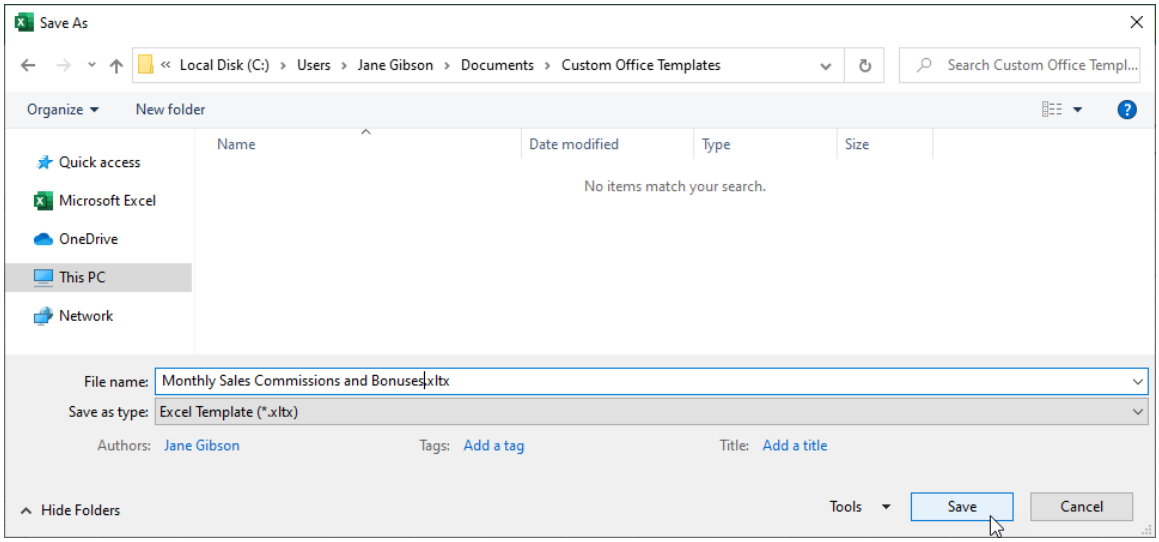
If the location is not already set, you would enter the correct path and click **OK**.

Save a Workbook as a Template

Once you have a workbook set up with all the correct layout and formatting to act as your template going forward, click **File → Export → Change File Type,** then select **Template(*.xltx)** from the Workbook File Types window, and click **Save As**:

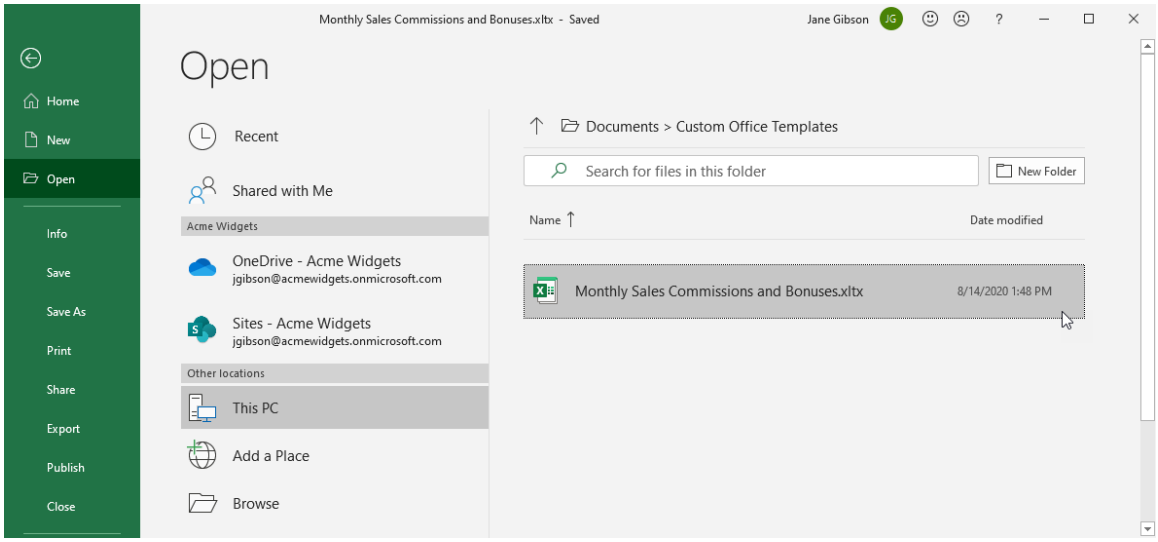


If required, navigate to the Default Personal Templates location, name your template, and click **Save**:



Edit a Template

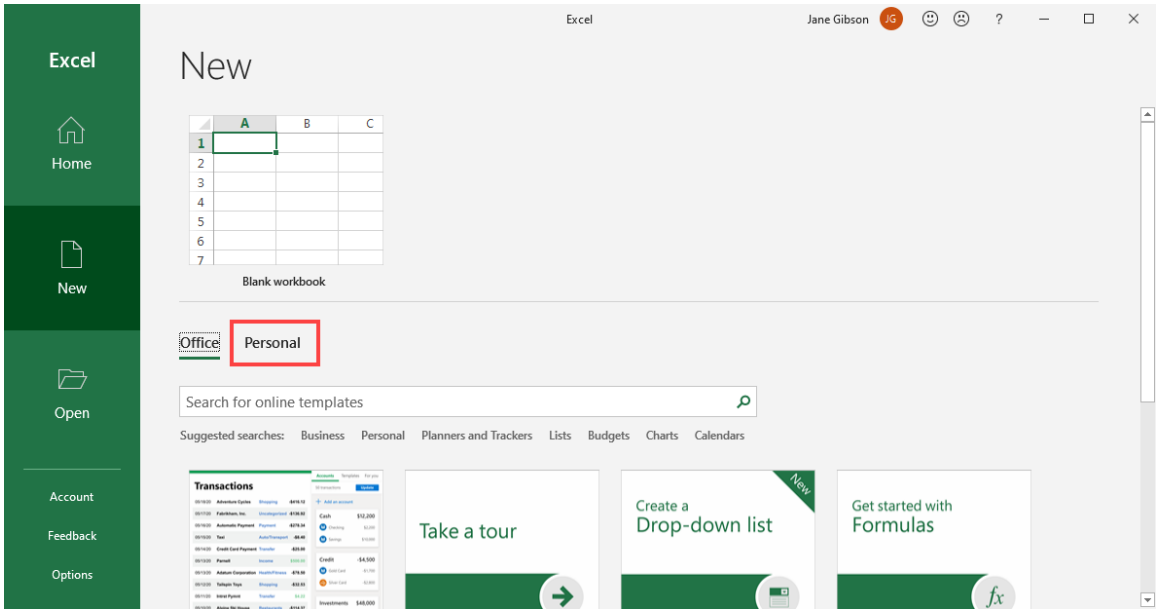
To edit an existing template, click **File → Open,** navigate to the Default Personal Templates location, and double-click on the template you would like to edit:



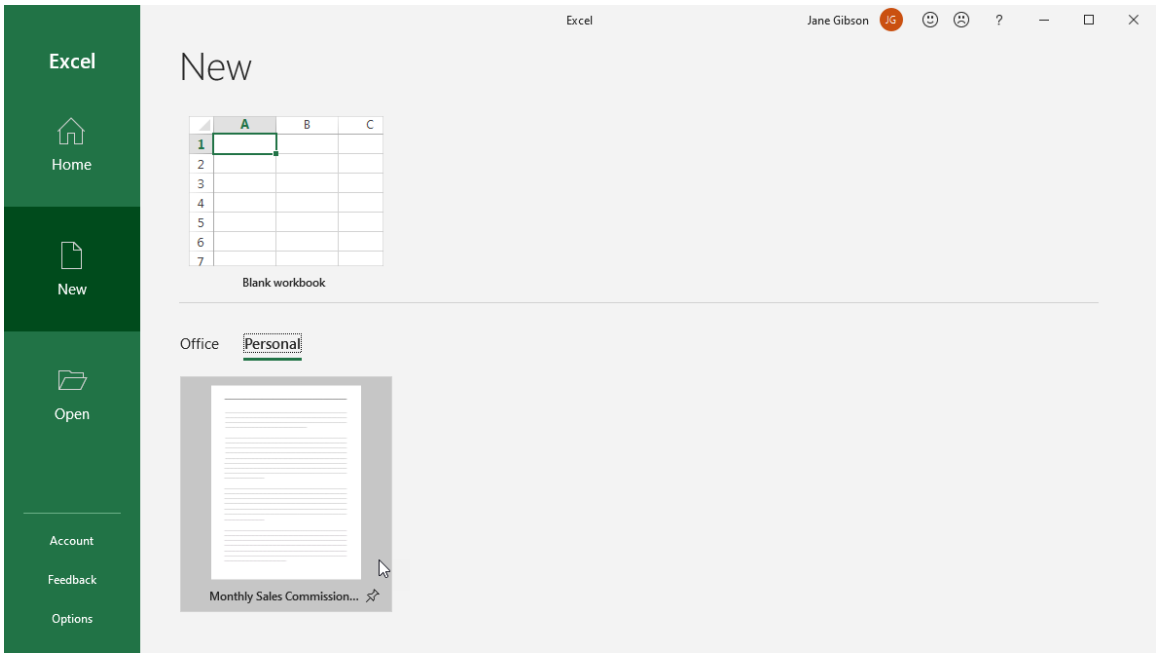
Make any changes you wish to make to the template, and then simply save and close the template.

Open a New Workbook Based on a Template

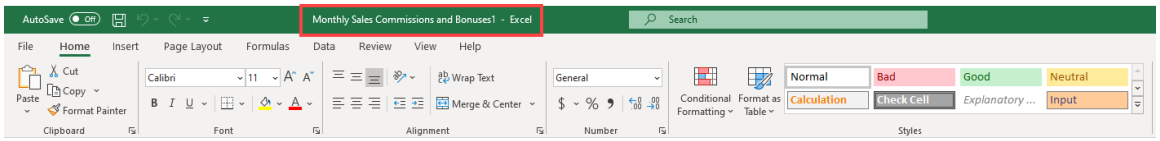
To create a new workbook based on your template, click **File → New,** then click the **Personal** category:



You will be able to select from any available templates in the list. Click the template you would like to open:



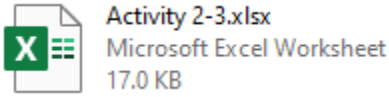
A new workbook will open (named after the template with the addition of a number after the name), and you are ready to continue working with the file:



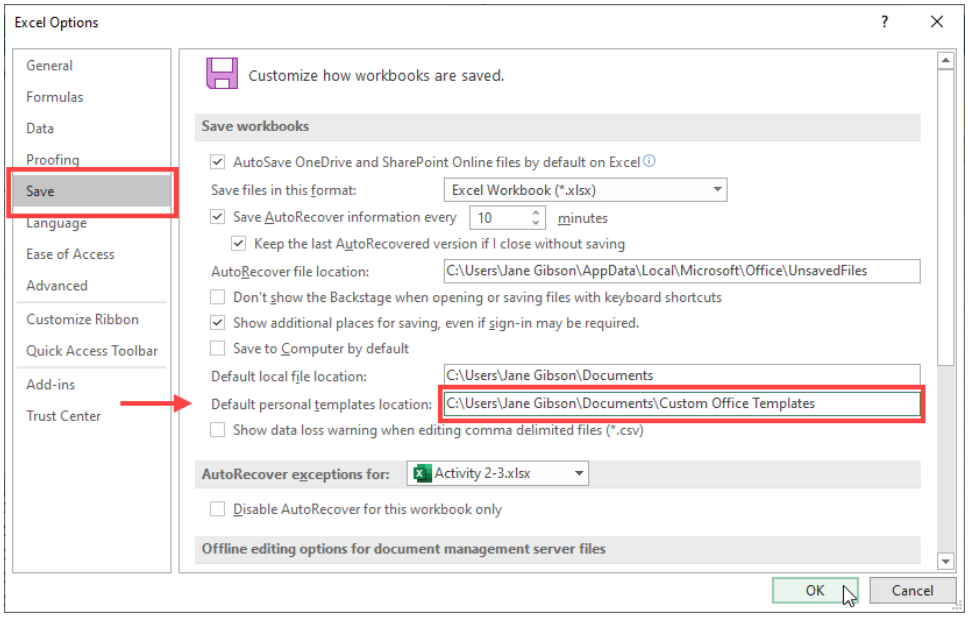
Activity 2-3: Create and Use a Template

Every month you receive sales reports and you are then required to calculate the sales commissions that are payable to the sales reps. You would like to automate the process to save time and reduce the risk of errors.

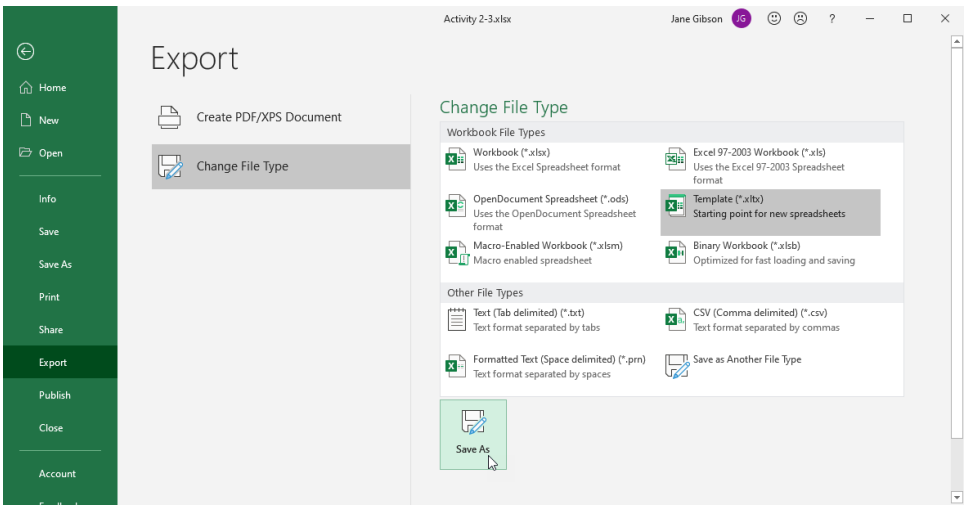
1. To begin, open **Activity 2-3** from your Exercise Files folder:



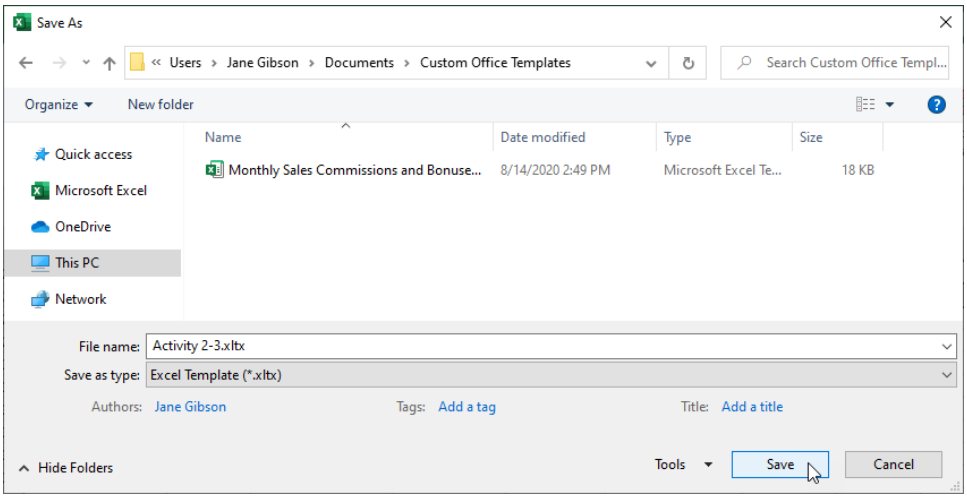
2. Click **File → Options,** and then click on the **Save** category in the Excel Options dialog box to ensure the Default personal templates location is set. Click **OK** once complete:



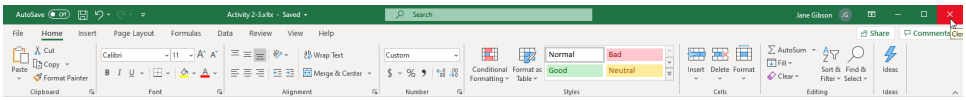
3. Next, click **File → Export → Change File Type,** then select **Template(*.xltx)** from the Workbook File Types window, and click **Save As**:



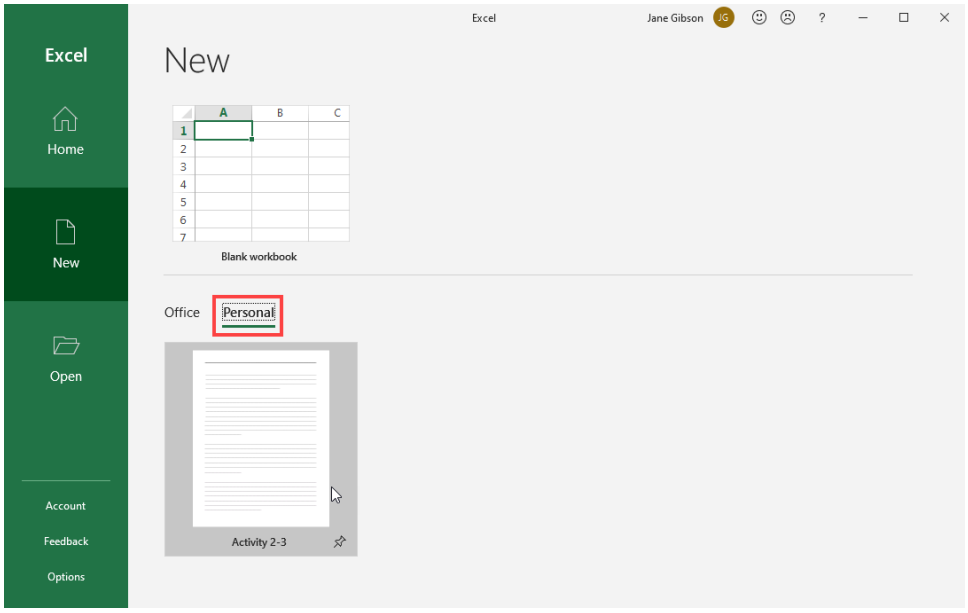
4. If necessary, navigate to the Default personal templates location, and click **Save**:



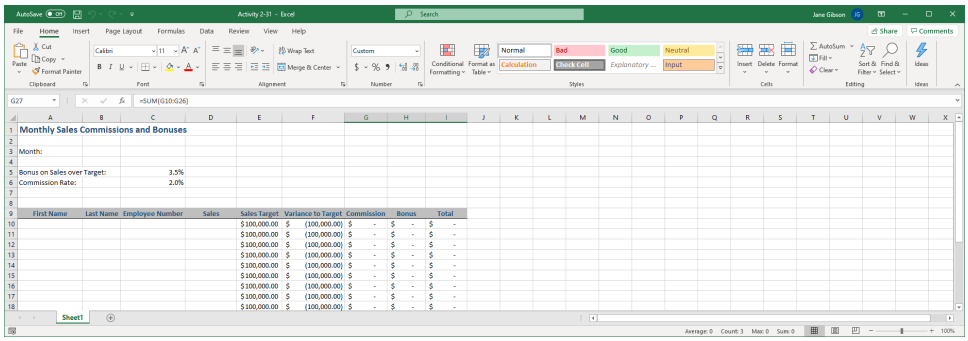
5. Now close the open template, then open Excel 365.



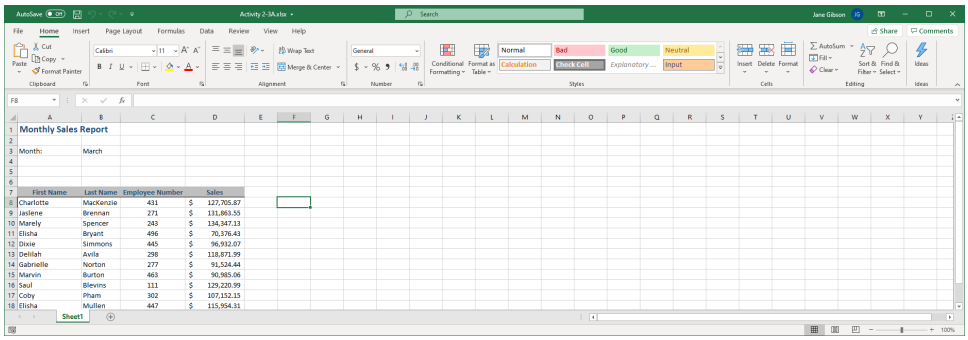
6. Click **File → New,** then click the **Personal** category, and select **Activity 2-3**:



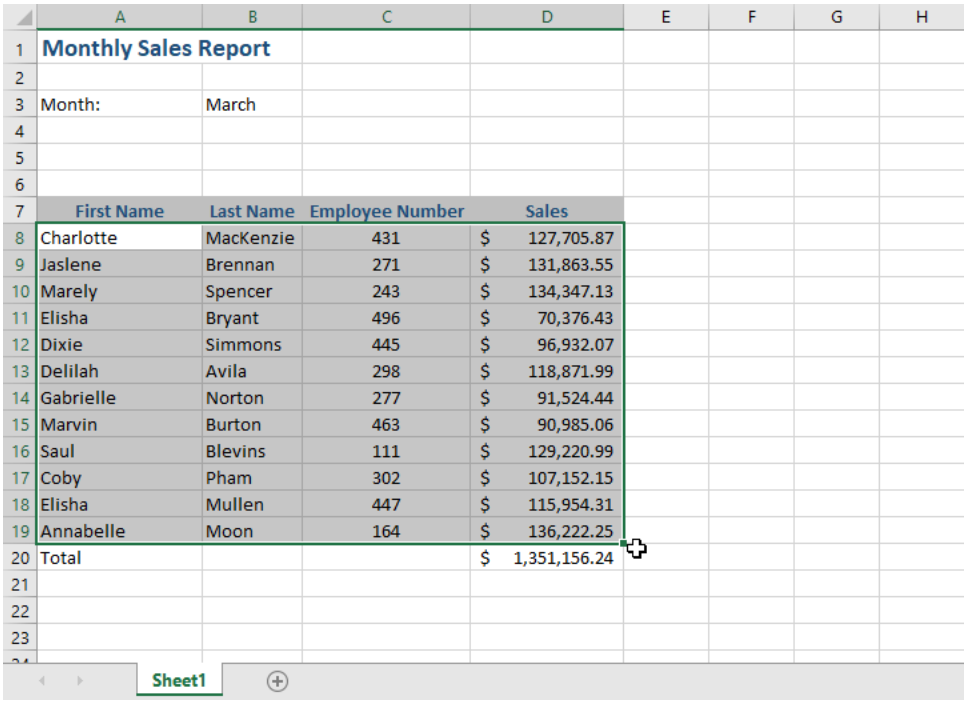
7. A workbook titled Activity 2-31 will now be open:



8. Now open **Activity 2-3A**:



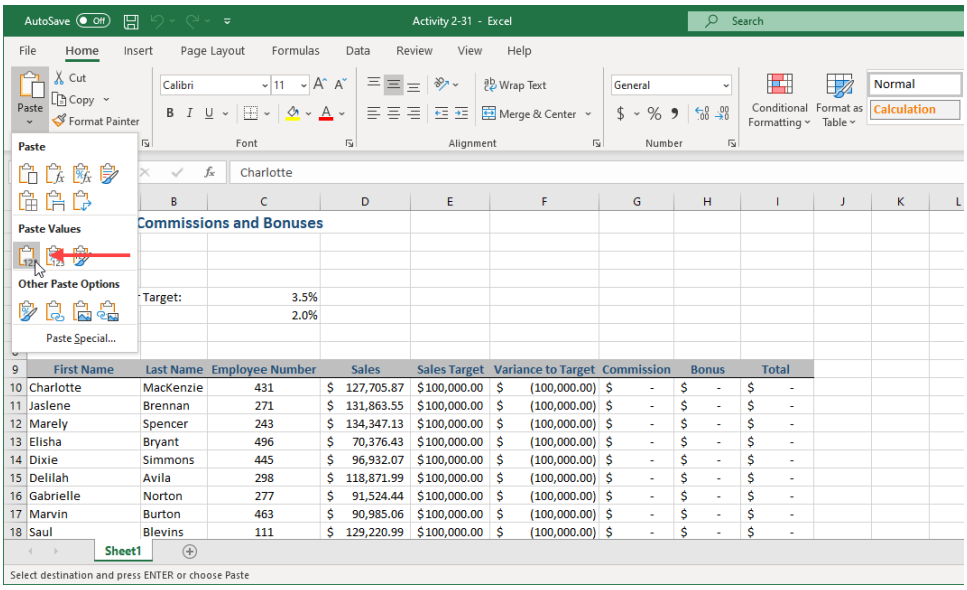
9. Select the data in cells **A8 to D19**, then press **Ctrl + C** to copy the data:



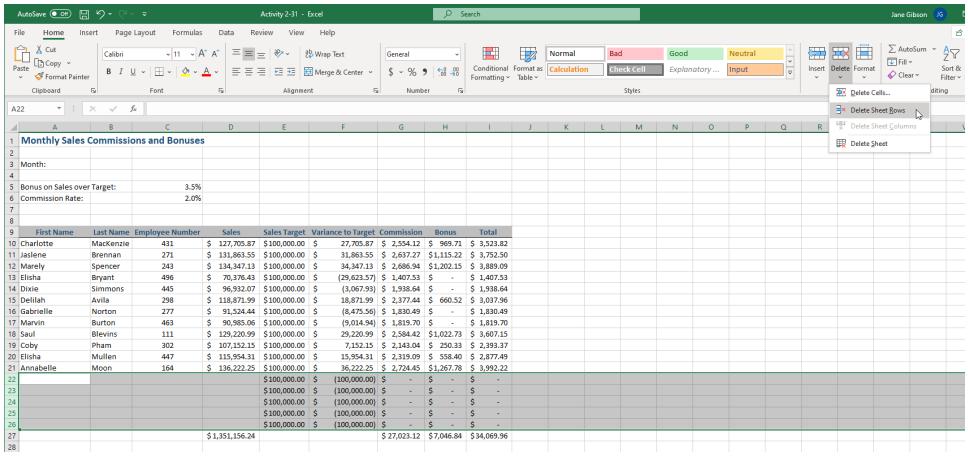
	A	B	C	D
1	**Monthly Sales Report**			
2				
3	Month:	March		
4				
5				
6				
7	**First Name**	**Last Name**	**Employee Number**	**Sales**
8	Charlotte	MacKenzie	431	$ 127,705.87
9	Jaslene	Brennan	271	$ 131,863.55
10	Marely	Spencer	243	$ 134,347.13
11	Elisha	Bryant	496	$ 70,376.43
12	Dixie	Simmons	445	$ 96,932.07
13	Delilah	Avila	298	$ 118,871.99
14	Gabrielle	Norton	277	$ 91,524.44
15	Marvin	Burton	463	$ 90,985.06
16	Saul	Blevins	111	$ 129,220.99
17	Coby	Pham	302	$ 107,152.15
18	Elisha	Mullen	447	$ 115,954.31
19	Annabelle	Moon	164	$ 136,222.25
20	Total			$ 1,351,156.24
21				
22				
23				

Sheet1

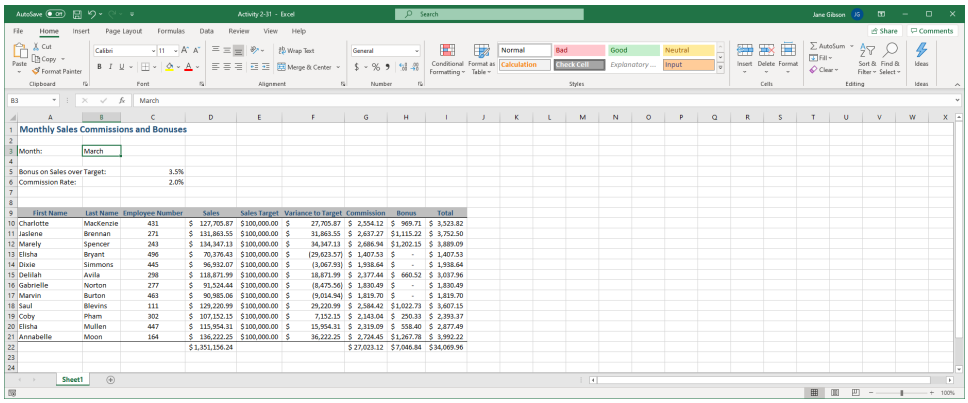
10. Switch to open window of the workbook **Activity 2-31**, place your cursor in cell **A10**, then click **Home → Paste → Paste Values**:



11. You will see that the calculations for commissions and bonuses update automatically. Now you can select rows **22 to 26**, then select the **Delete** drop-down in the Cells group in the Home tab, and click **Delete Sheet Rows**:



12. You can now type "**March**" in cell **B3**, and your report is complete:



13. Save the current workbook as **Activity 2-3 Complete** and then close Microsoft Excel 365 to complete the activity.

TOPIC D: Use Data Validation in a Workbook

Data accuracy is always important when working with and analyzing information in your workbooks, and errors in data input can have embarrassing or time-consuming consequences. Data Validation provides you with tools to make sure that the data being entered in your workbooks is in the correct format and is the correct type. In this topic you will learn how to use data validation to improve data accuracy.

Topic Objectives

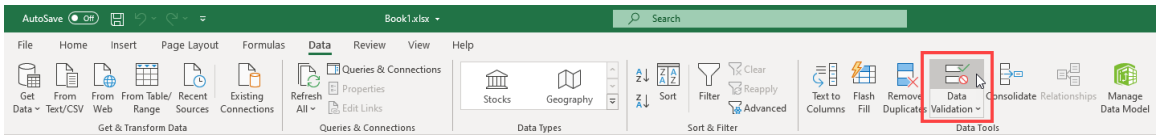
In this session, you will learn about:

- The Data Validation dialog box
- Data validation settings
- Input messages
- Error alerts

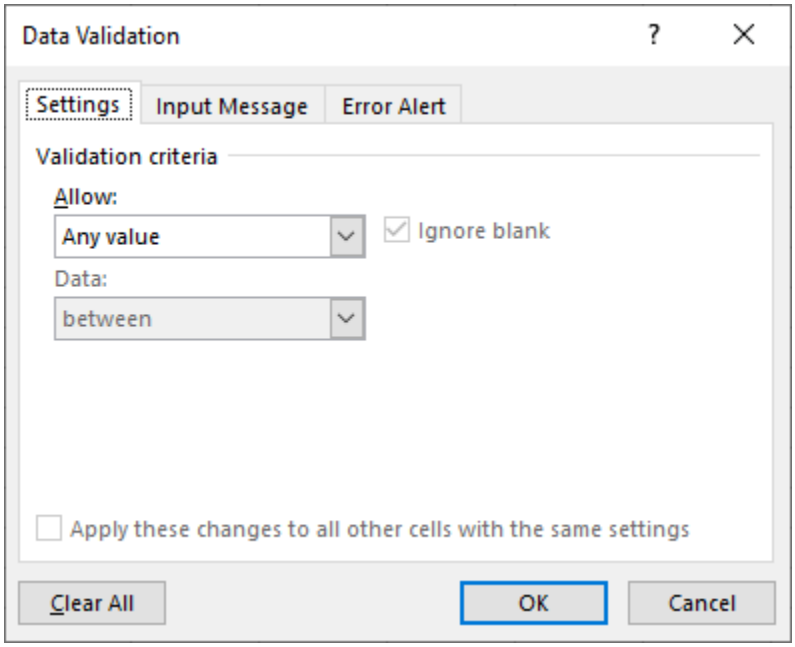
The Data Validation Dialog Box

Microsoft Excel allows you to enter any type of data in any cell by default. This allows a great deal of flexibility when inputting data, but it also creates opportunities for making errors that could have a negative impact on your analysis or presentation. Data validation provides you with tools you can use, not only to prevent errors, but to also help automate your input.

Let's explore the available features of data validation by first looking at the Data Validation dialog box. To open, click the **Data** tab on the ribbon and then click **Data Validation** in the **Data Tools** group:

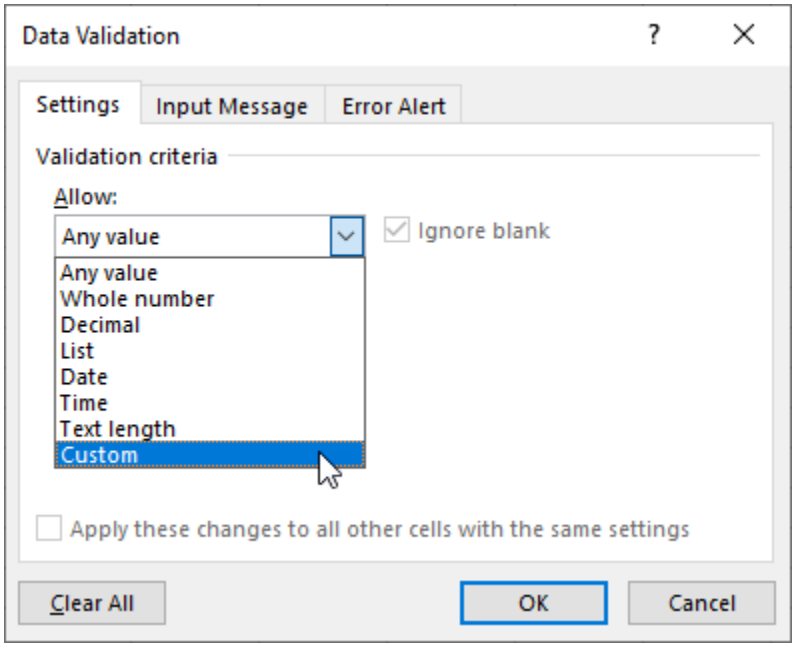


The Data Validation dialog box has three tabs: **Settings**, **Input Message** and **Error Alert**. All three play a part in controlling what happens when entered data does not match the criteria you have defined.



Data Validation Settings

The **Settings** tab allows you to set the Validation criteria to allow certain types of data in a selected cell or range of cells:



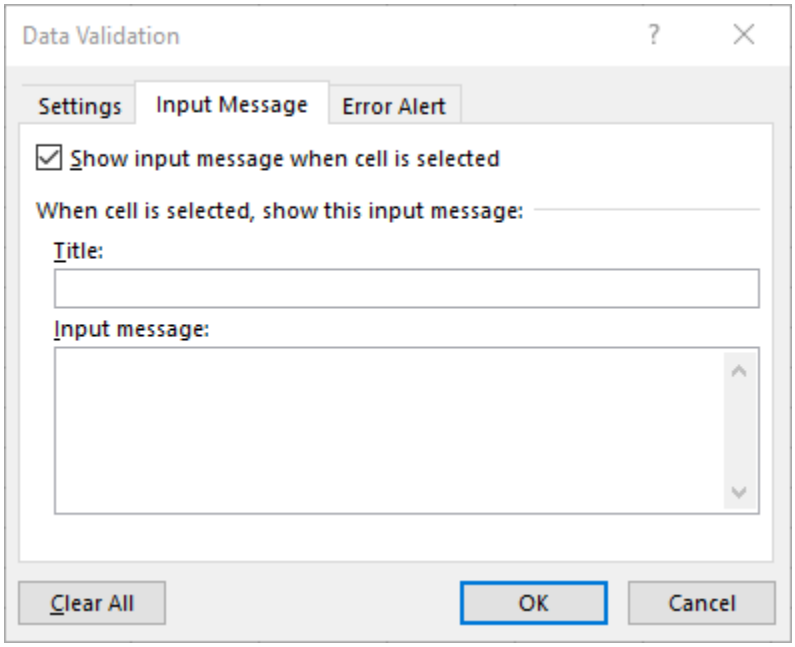
The **Allow** field provides the following options:

- Any value, meaning no restriction on text or numbers
- Whole numbers defined by a logical condition (<, >, >=, etc.)
- Decimal numbers defined by a logical condition
- List, as defined by a range of cells from another location, or an input list
- Date, defined by a logical condition
- Time, defined by a logical condition
- Text length with minimum/maximum length settings
- Custom data, defined by a formula specific to your needs

Each option allows for a set of conditions or a range to give you greater control of what is allowed in this cell or range.

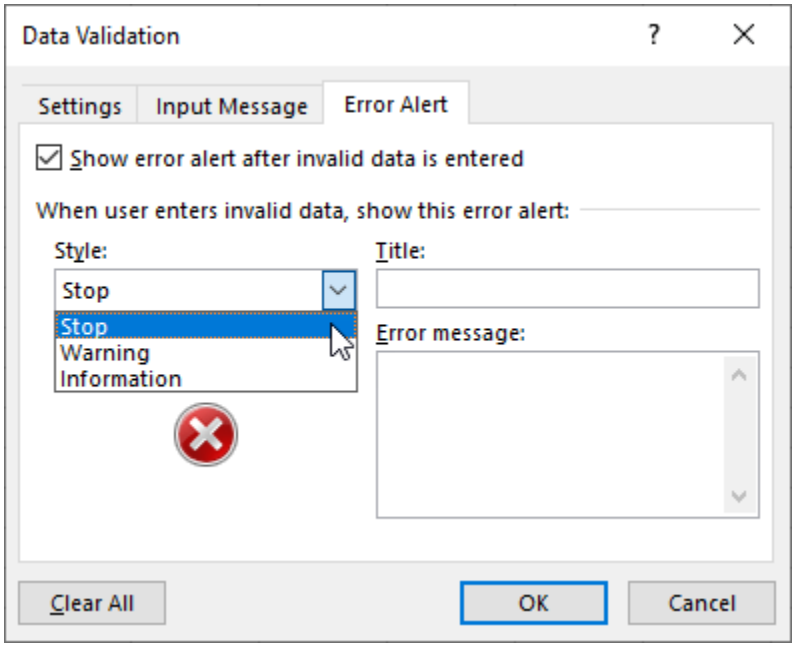
Input Messages

The **Input Message** tab allows you to define a message to be displayed when a user selects a cell that has data validation settings applied.

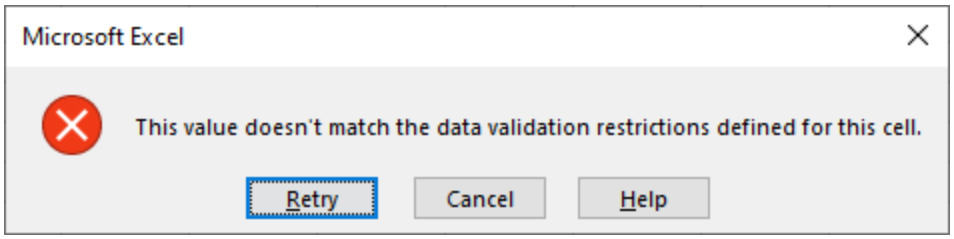


Error Alerts

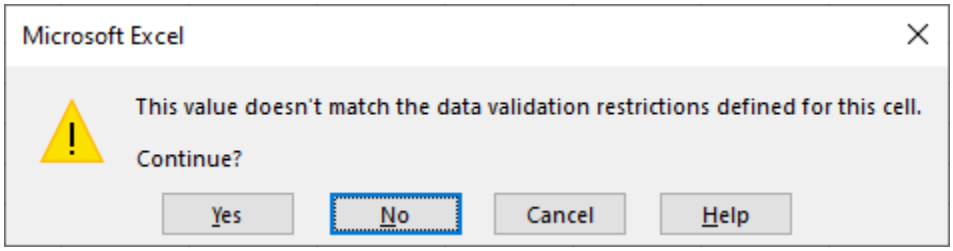
The **Error Alert** tab lets you define a custom message to display after invalid data is entered in a cell, and the **Style** drop-down determines how you enforce your validation rules:



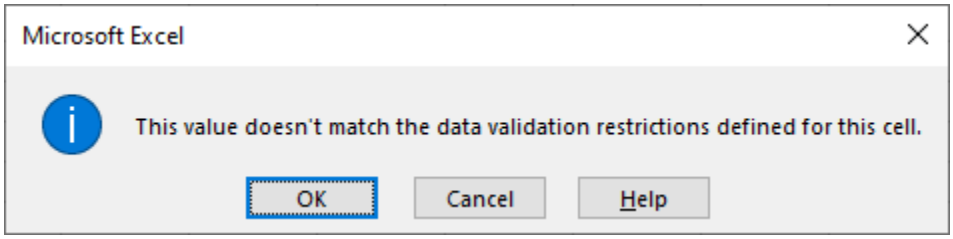
When the Style is set to **Stop**, invalid data will trigger the error message and the input is not allowed. Options are **Retry**, **Cancel**, and **Help**:



When the Style is set to **Warning**, invalid data will trigger the error message and the Warning alert will give the user four options: **Yes**, to accept the invalid data, **No**, to edit the data, **Cancel**, to remove the data, and **Help**:



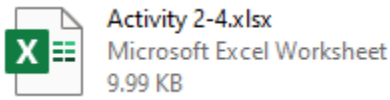
When the style is set to **Information**, invalid data will trigger the error message and the Information alert will give the user the option to accept the value, cancel the entry, or seek help:



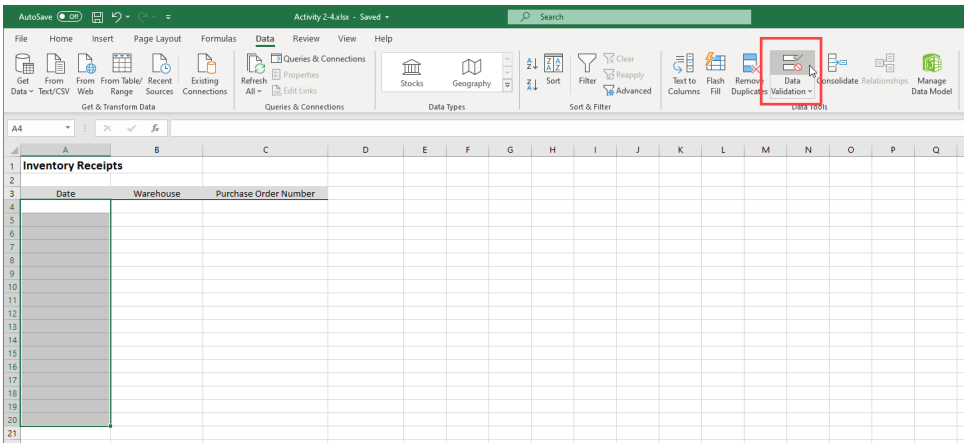
Activity 2-4: Use Data Validation

You are creating a worksheet to keep track of inventory receipts from three separate warehouses. The data will be used to update the company inventory records, so your data must be accurate.

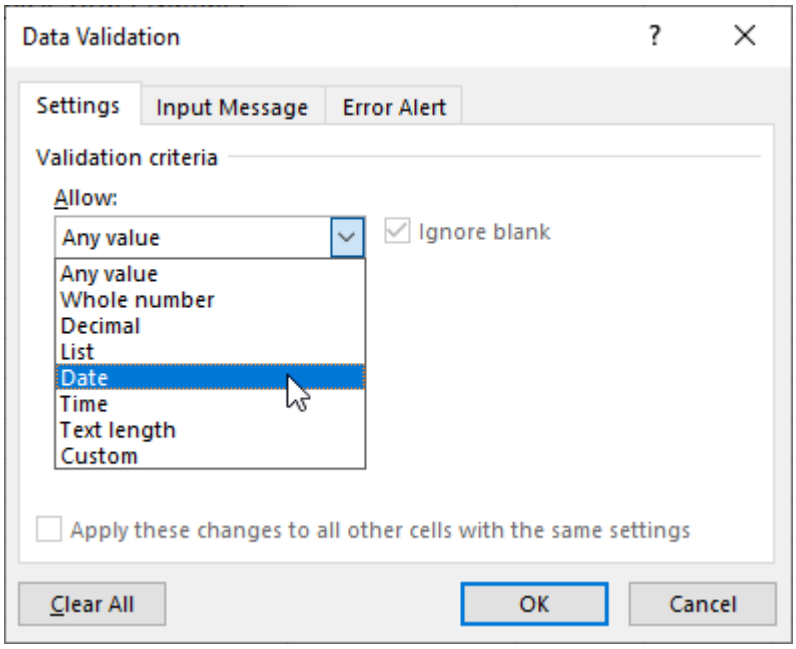
1. To begin, open **Activity 2-4** from your Exercise Files folder:



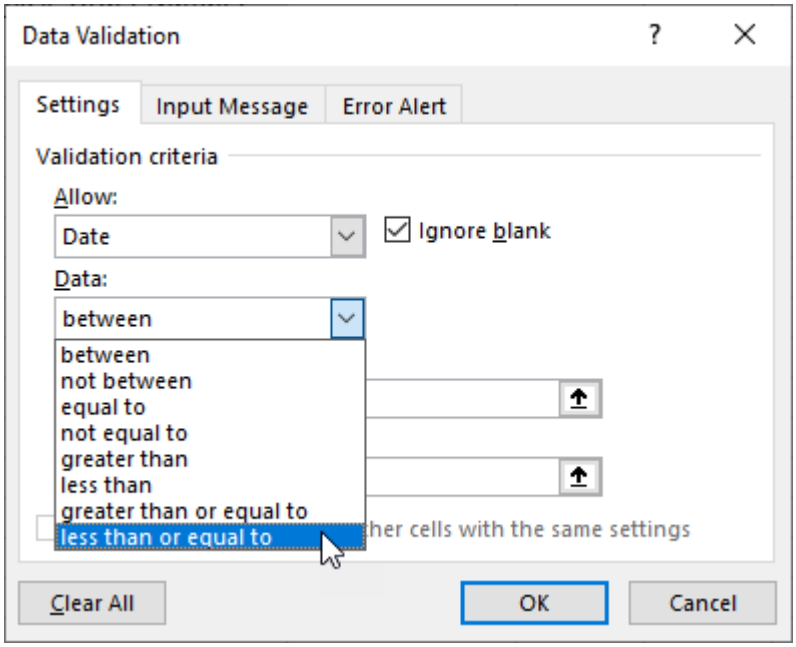
2. Select cells **A4 to A20**, then Click **Data → Data Validation**:



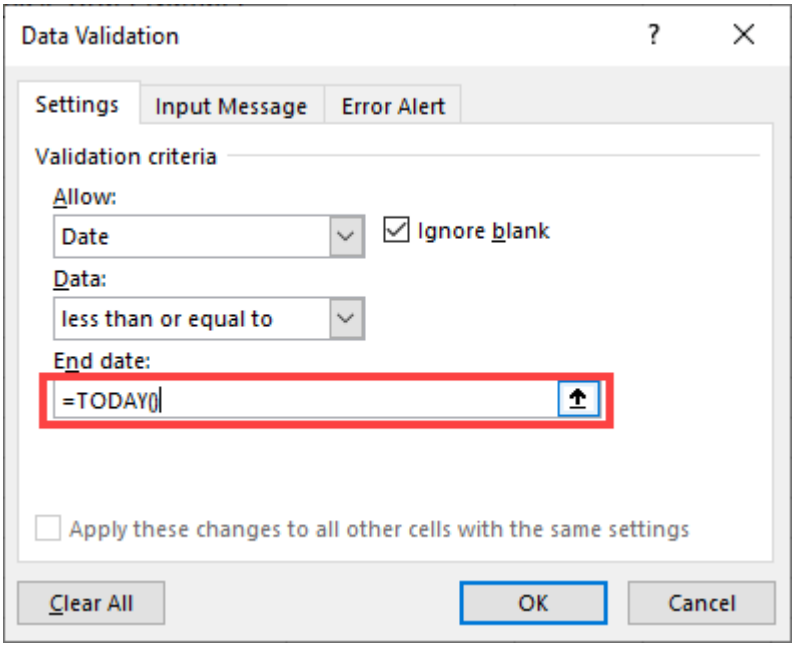
3. Select **Date** from the Allow drop-down list in the Settings tab. Ensure there is a **checkmark** in the checkbox labeled **Ignore blank**:



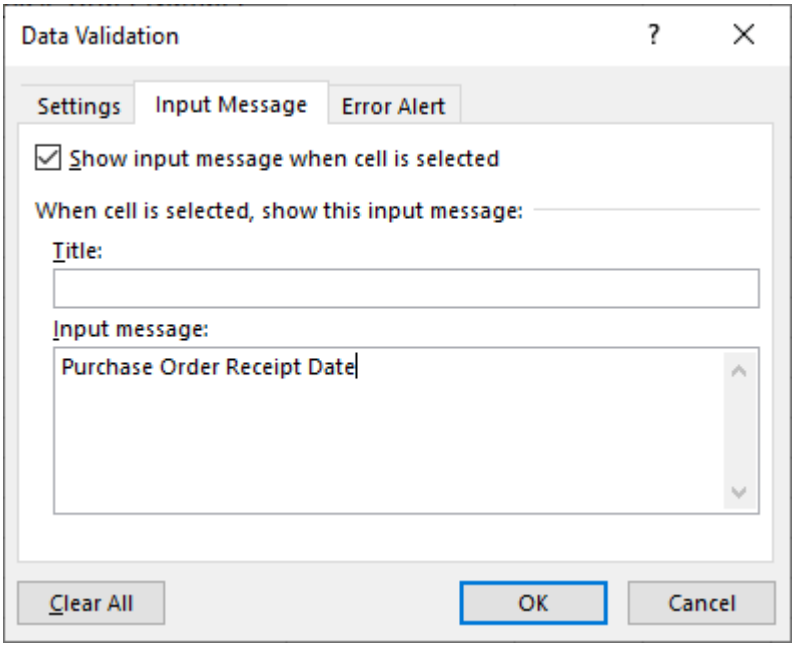
4. Select **Less than or equal to** in the Data drop-down list:



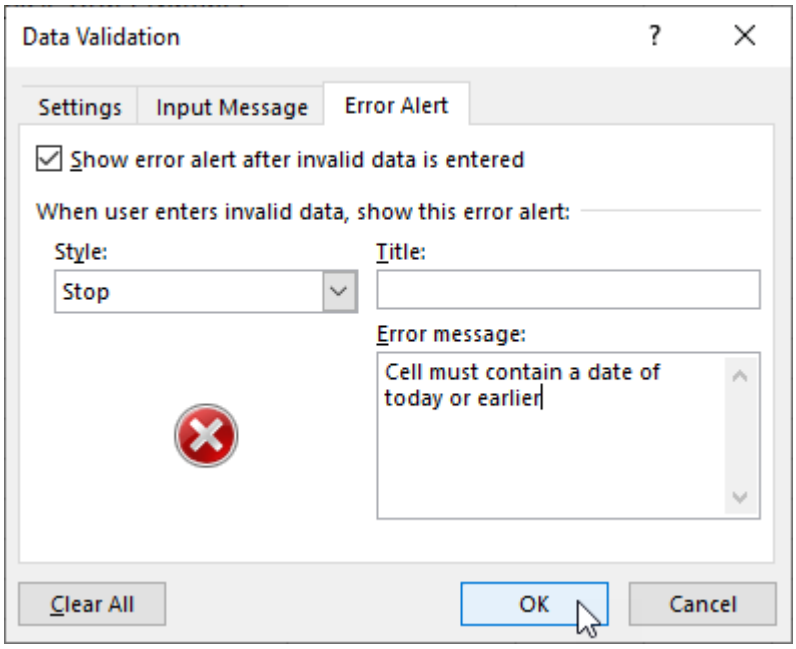
5. Enter "**=TODAY()**" in the **End date** field:



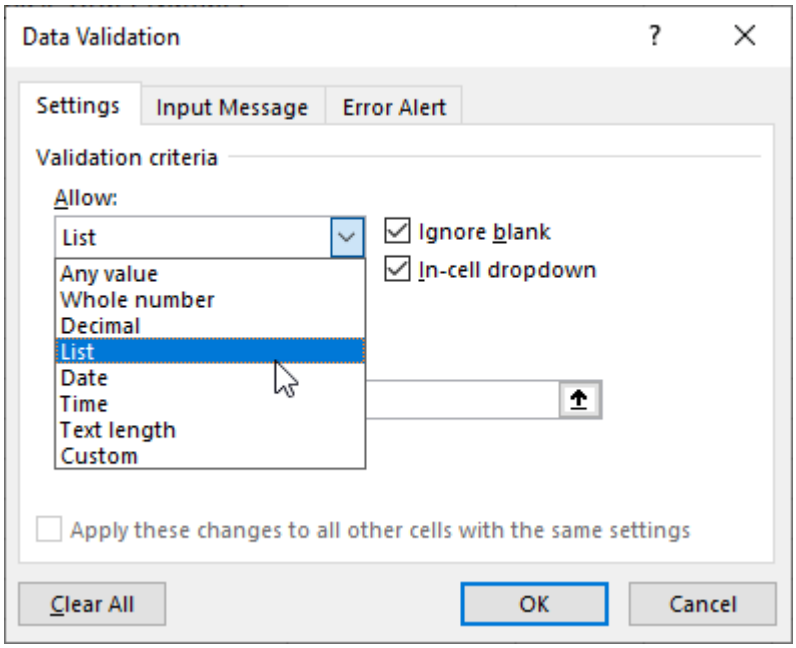
6. Select the **Input Message** tab, and enter "**Purchase Order Receipt Date**" in the **Input message** field:



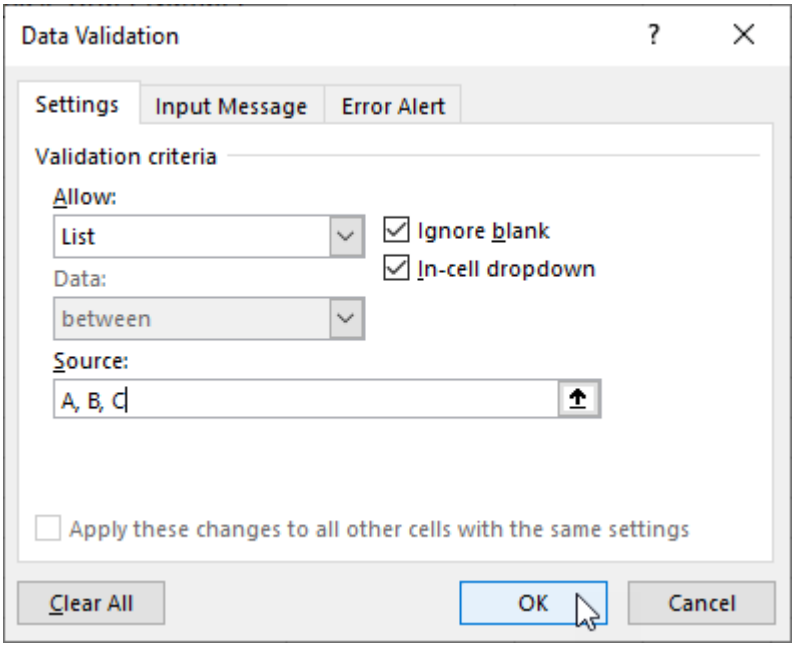
7. Select the **Error Alert** tab, and enter "**Cell must contain a date of today or earlier**" in the **Error message** field, then click **OK**:



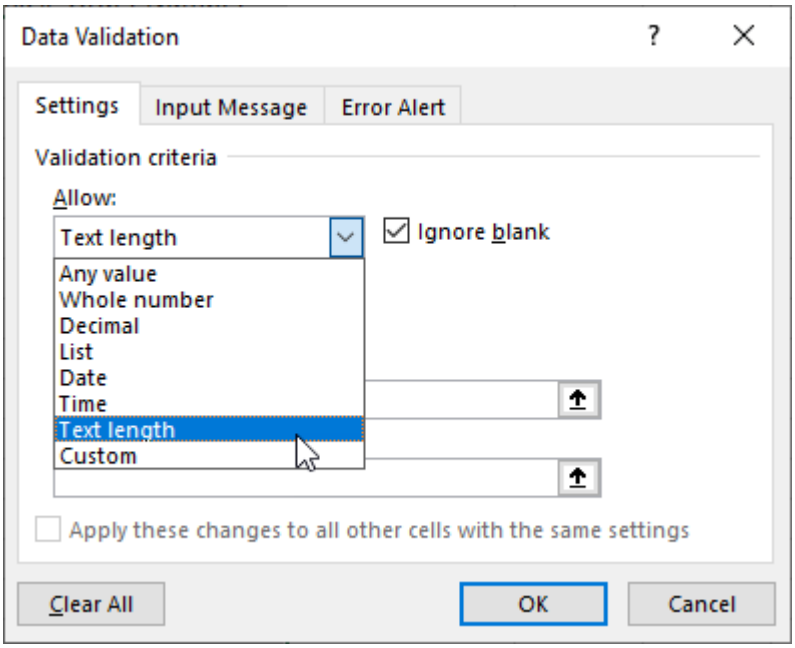
8. Now select cells **B4 to B20**, click **Data → Data Validation,** and select **List** from the **Allow** drop-down list in the **Settings** tab. Ensure there are checkmarks in the checkboxes labeled **Ignore blank** and **In-cell dropdown**:



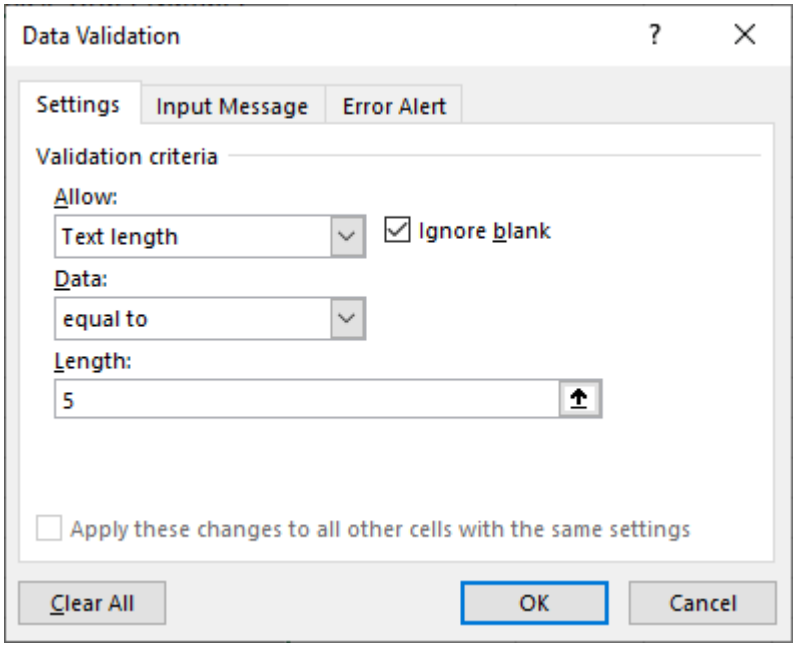
9. Type "**A, B, C**" in the **Source** field and click **OK**:



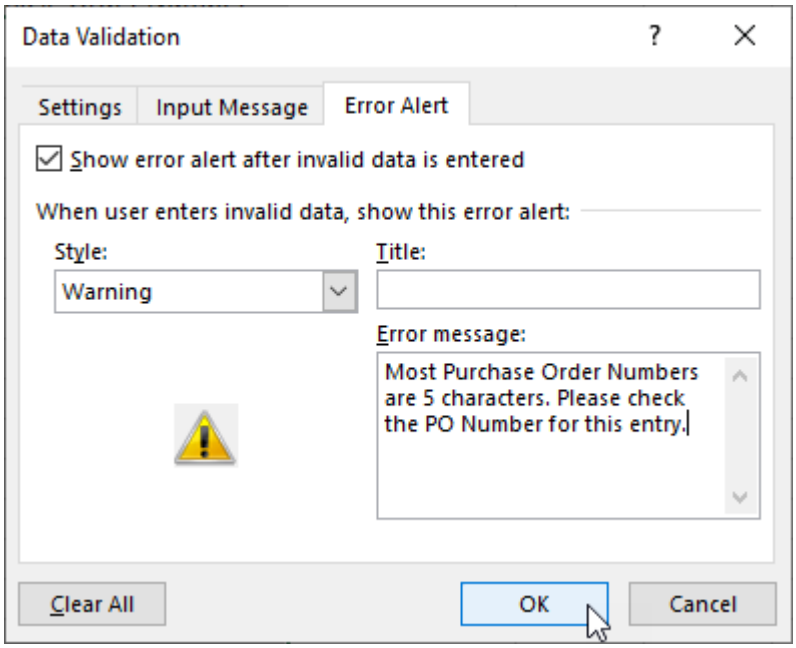
10. Now select cells **C4 to C20**, click **Data → Data Validation,** and select **Text Length** from the **Allow** drop-down list in the **Settings** tab. Ensure there is a **checkmark** in the checkbox labeled **Ignore blank**:



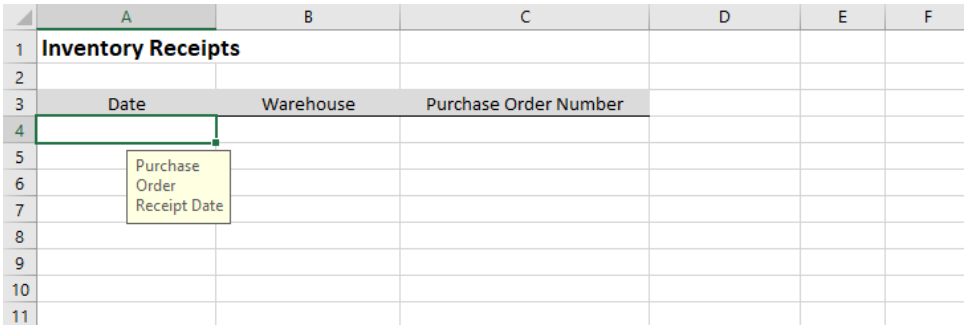
11. Select **equal to** in the **Data** drop-down list, and type "**5**" in the **Length** field:



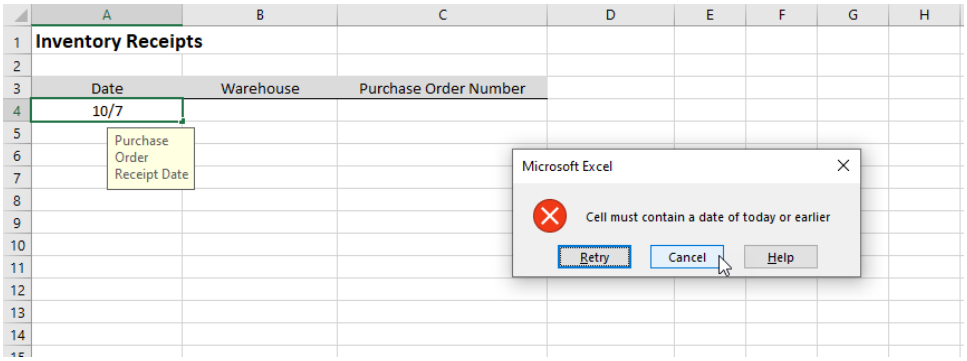
12. Click on the **Error Alert** tab and select **Warning** from the **Style** drop-down list. Type "**Most Purchase Order Numbers are 5 characters. Please check the PO Number for this entry.**" Click **OK** to apply your changes:



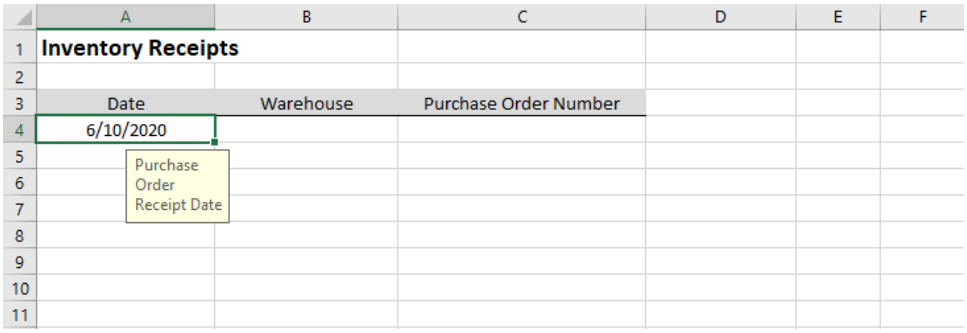
13. To test your new data validation, first select cell **A4**. You will see a ScreenTip appear with the input message you added:



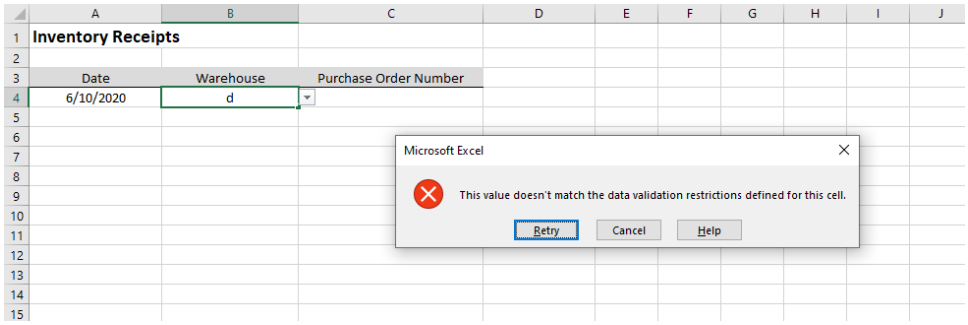
14. Now **enter a date that is greater than today**. You will see the error message you configured in the Error Alert tab. Click **Cancel**:



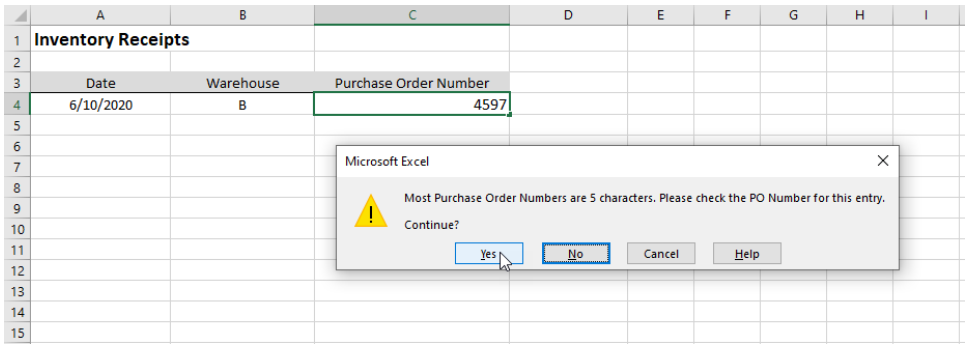
15. In the same cell, A4, **enter the current date**. As the date falls within your guidelines nothing will happen, and the value will be accepted:



16. Now select cell **B4**, click on the **drop-down arrow**, and you will be presented with the list you configured in the Data Validation dialog box. If you type "**D**", an Error Alert window will open with the message "This value doesn't match the data validation restrictions defined for this cell." This is the default message that will appear if you do not enter a custom message in the Error Alert tab. Click **Cancel** and select **B** from the drop-down list:



17. Finally, select cell **C4** and type "**4597**", then press **Tab.** An Error Alert window will appear with the message you configured. Because you selected Warning in the Style drop-down list, you can accept this entry as correct by clicking **Yes**:



18. Save the current workbook as **Activity 2-4 Complete** and then close Microsoft Excel 365 to complete the activity.

Summary

In this lesson you have learned about ways to automate worksheets and their functionality. You should now be comfortable managing workbook properties, recording and running basic macros, creating and using templates, and using data validation criteria.

Review Questions

1. **Where can you find the Workbook Properties displayed?**

2. **What is the name of the programming language that you can use to write Macros?**

3. **Where can you store macros that you have recorded?**

4. **How do you create a new workbook from a Personal template?**

5. **How can Data Validation help you automate data entry?**

LESSON 3:
AUDITING AND ERROR CHECKING

Lesson Objectives

In this lesson you will learn about:

- Tracing cells
- Error checking
- Evaluating formulas and using the Watch Window
- Data List Outlines

TOPIC A: Tracing Cells

An important part of being able to build accurate and error-free workbooks is understanding how your formulas work, where they source their data, and how the results may impact other elements in the workbook. Tracing cells can be a valuable tool to help you do this, by graphically displaying where data is coming from in your formulas, or how data in a cell is being used by other formulas. In this topic you will learn about these tools and how you can use them.

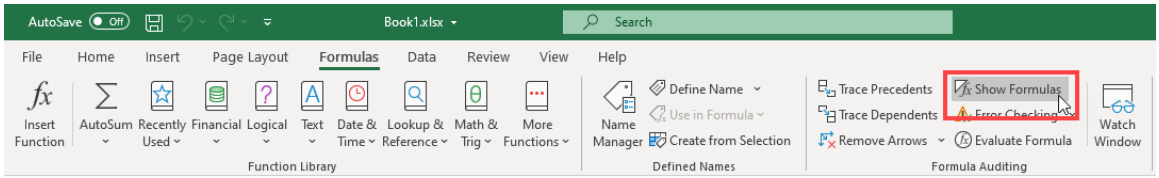
Topic Objectives

In this session, you will learn:

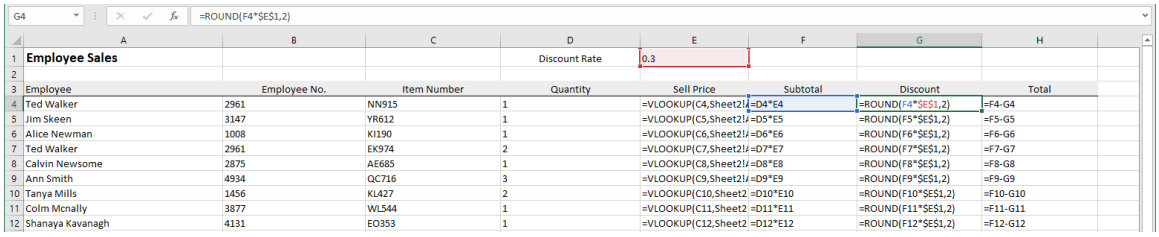
- How to show formulas
- How to trace precedents and dependents
- About tracer arrows

Show Formulas

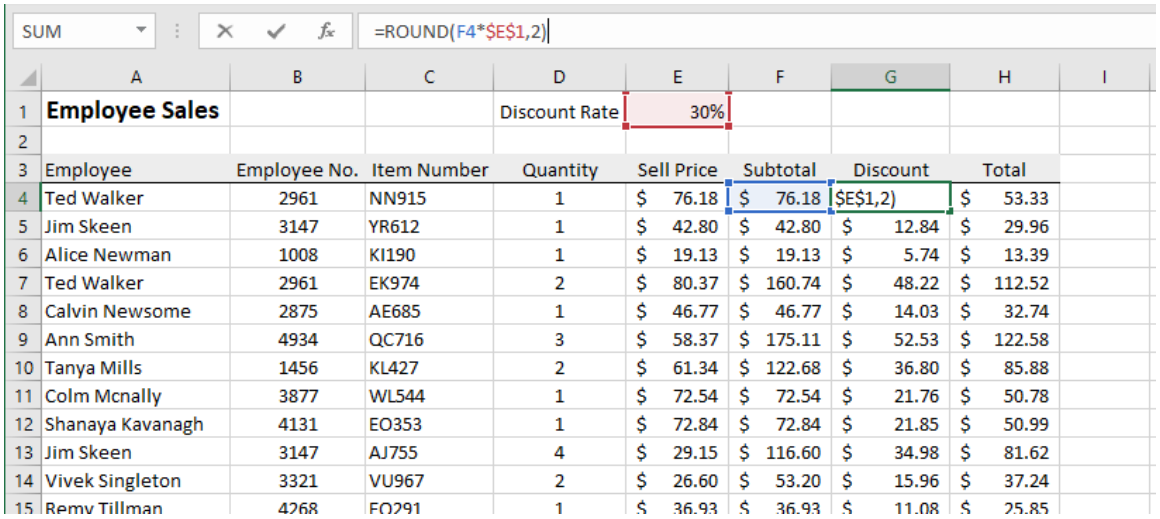
By default, Microsoft Excel shows the calculated results of a formula, but there are times you may find it easier to understand what is happening in a worksheet, or identify the source of a problem, by being able to see which cells contain data and which contain formulas. You can quickly change the display in your worksheet to show formulas by clicking the **Formulas** tab, and then clicking **Show Formulas** in the Formula Auditing group. Clicking **Show Formulas** again will switch the view back to calculated results:



When formulas are being displayed, you can click on any formula and Excel will display color-coded highlights that show all the cells that are used in the formula:



When calculated results are displayed, you first must select the cell that contains the formula then click your cursor in the formula bar to display these highlights:

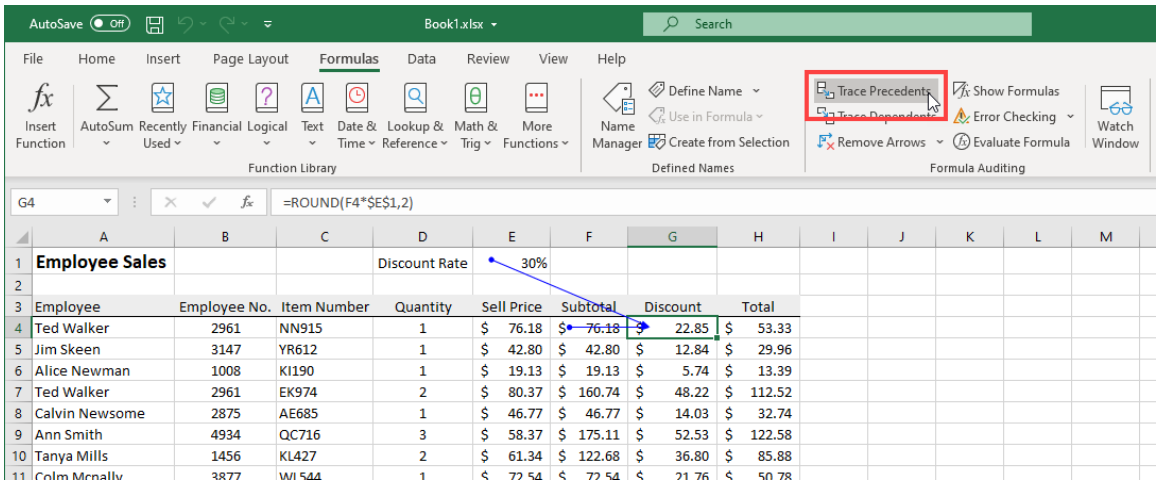


	A	B	C	D	E	F	G	H	I
1	**Employee Sales**			Discount Rate	30%				
2									
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total	
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$E$1,2)	$ 53.33	
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96	
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39	
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52	
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74	
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58	
10	Tanya Mills	1456	KL427	2	$ 61.34	$ 122.68	$ 36.80	$ 85.88	
11	Colm Mcnally	3877	WL544	1	$ 72.54	$ 72.54	$ 21.76	$ 50.78	
12	Shanaya Kavanagh	4131	EO353	1	$ 72.84	$ 72.84	$ 21.85	$ 50.99	
13	Jim Skeen	3147	AJ755	4	$ 29.15	$ 116.60	$ 34.98	$ 81.62	
14	Vivek Singleton	3321	VU967	2	$ 26.60	$ 53.20	$ 15.96	$ 37.24	
15	Remy Tillman	4268	EO291	1	$ 36.93	$ 36.93	$ 11.08	$ 25.85	

Trace Precedents and Dependents

To get a more detailed view of how a formula is working, you can use either the **Trace Precedents** or **Trace Dependents** commands. This will display tracer arrows that will indicate the direction of the data flow to and from cells and formulas.

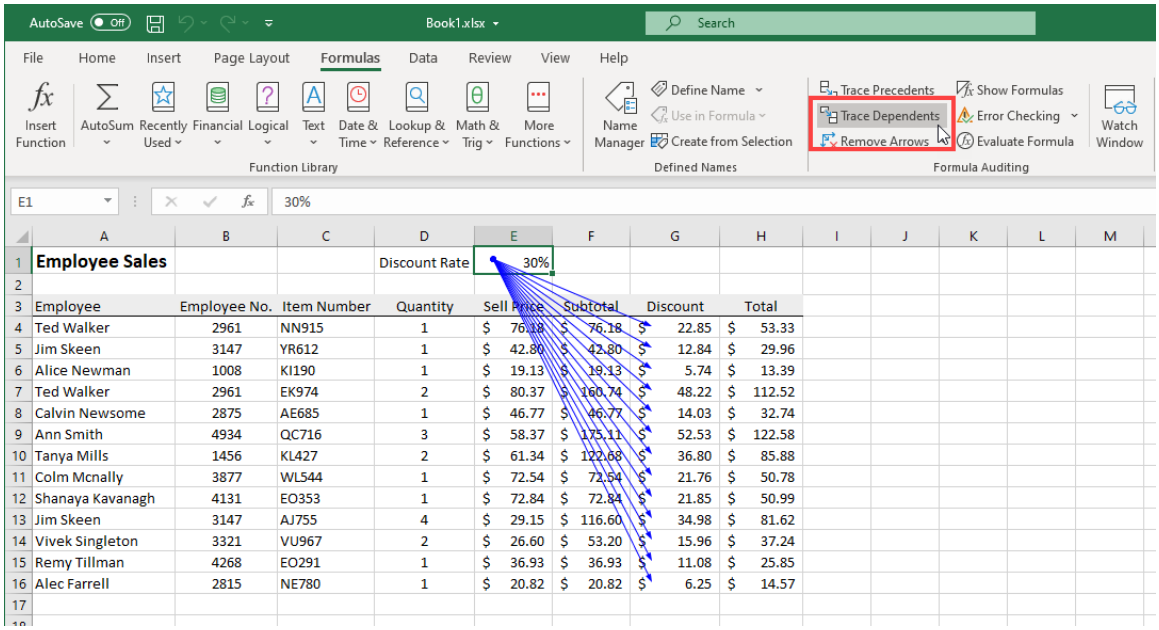
Precedent cells are cells within a worksheet that are the source of data for a formula in the active cell. To display tracer arrows that indicate precedent cells, select a cell containing a formula and click **Formulas → Trace Precedents**:



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Employee Sales**			Discount Rate	30%								
2													
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total					
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$ 22.85	$ 53.33					
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96					
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39					
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52					
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74					
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58					
10	Tanya Mills	1456	KL427	2	$ 61.34	$ 122.68	$ 36.80	$ 85.88					
11	Colm Mcnally	3877	WL544	1	$ 72.54	$ 72.54	$ 21.76	$ 50.78					

Blue arrows will appear, originating from any cells that provide source data to the selected formula.

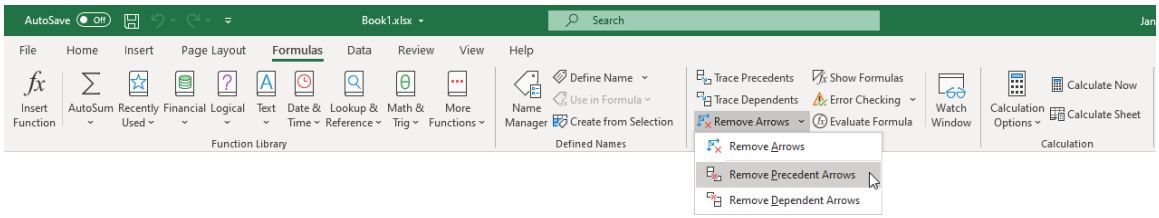
Dependent cells are cells within a worksheet that use the contents of the active cell in formulas. To display tracer arrows that indicate dependent cells, select a cell that is referenced in a formula and click the **Trace Dependents** command:



	A	B	C	D	E	F	G	H
1	**Employee Sales**			Discount Rate	30%			
2								
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$ 22.85	$ 53.33
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58
10	Tanya Mills	1456	KL427	2	$ 61.34	$ 122.68	$ 36.80	$ 85.88
11	Colm Mcnally	3877	WL544	1	$ 72.54	$ 72.54	$ 21.76	$ 50.78
12	Shanaya Kavanagh	4131	EO353	1	$ 72.84	$ 72.84	$ 21.85	$ 50.99
13	Jim Skeen	3147	AJ755	4	$ 29.15	$ 116.60	$ 34.98	$ 81.62
14	Vivek Singleton	3321	VU967	2	$ 26.60	$ 53.20	$ 15.96	$ 37.24
15	Remy Tillman	4268	EO291	1	$ 36.93	$ 36.93	$ 11.08	$ 25.85
16	Alec Farrell	2815	NE780	1	$ 20.82	$ 20.82	$ 6.25	$ 14.57
17								

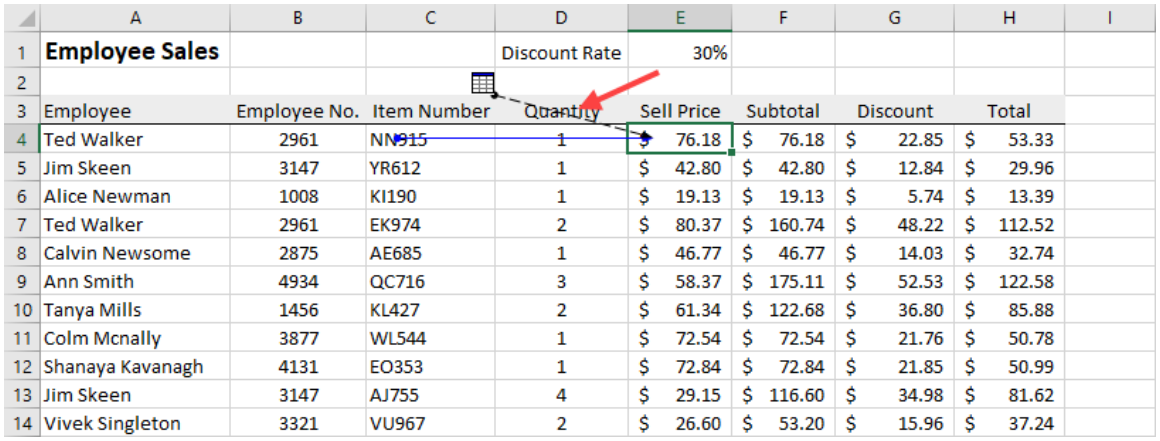
Blue arrows will appear, originating from the selected cell, and pointing to any cell that contains a formula that references that cell.

Tracer arrows will continue to be displayed, even if you choose to select other cells and continue to add more tracer arrows. Clicking **Formulas → Remove Arrows** will remove all arrows. You also have the option to selectively remove either precedent or dependent arrows by clicking the **Remove Arrows** drop-down, and selecting either **Remove Precedent Arrows**, or **Remove Dependent Arrows:**



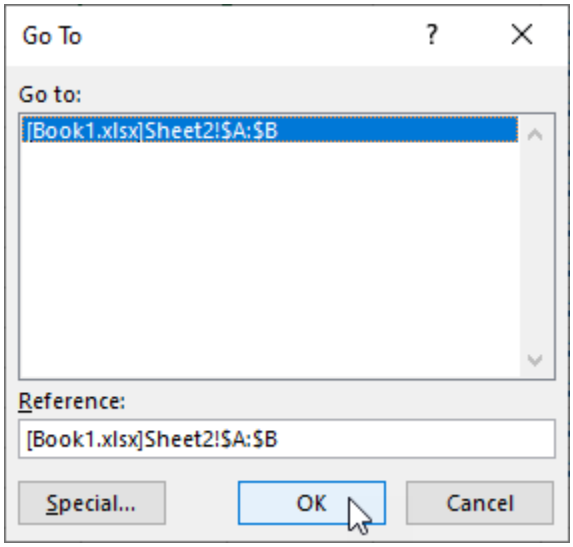
Tracer Arrows

As illustrated, tracer arrows referring to cells on the active worksheet will appear in blue. References to cells on other sheets in the workbook, or in other workbooks, will display the tracer arrow as a dotted black line that ends in a small worksheet icon.



	A	B	C	D	E	F	G	H	I
1	**Employee Sales**			Discount Rate	30%				
2									
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total	
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$ 22.85	$ 53.33	
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96	
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39	
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52	
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74	
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58	
10	Tanya Mills	1456	KL427	2	$ 61.34	$ 122.68	$ 36.80	$ 85.88	
11	Colm Mcnally	3877	WL544	1	$ 72.54	$ 72.54	$ 21.76	$ 50.78	
12	Shanaya Kavanagh	4131	EO353	1	$ 72.84	$ 72.84	$ 21.85	$ 50.99	
13	Jim Skeen	3147	AJ755	4	$ 29.15	$ 116.60	$ 34.98	$ 81.62	
14	Vivek Singleton	3321	VU967	2	$ 26.60	$ 53.20	$ 15.96	$ 37.24	

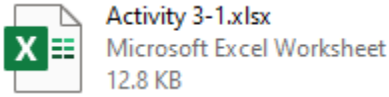
You can double-click this dashed arrow to display the **Go To** dialog box. Selecting a reference in the Go to list and clicking **OK** will open the corresponding worksheet or workbook:



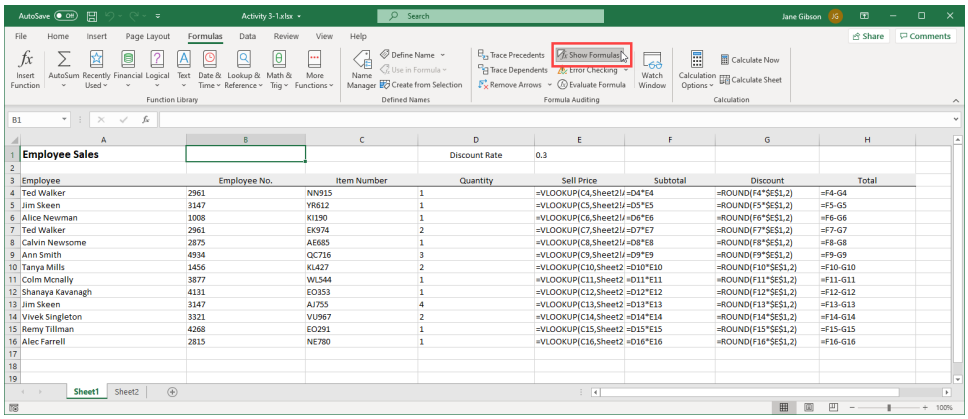
Activity 3-1: Tracing Cells

You have been asked to take over the job of updating a workbook that tracks employee purchases of company products. To help you understand how the formulas work, you use the trace cells feature.

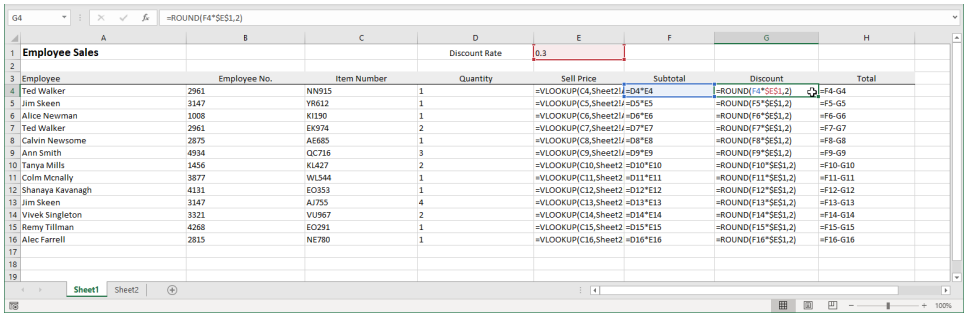
1. To begin, open **Activity 3-1** from your Exercise Files folder:



2. First, let's look at the formulas on the sheet. Click **Formulas → Show Formulas**:



3. Now click cell **G4** to highlight the elements of the formula:

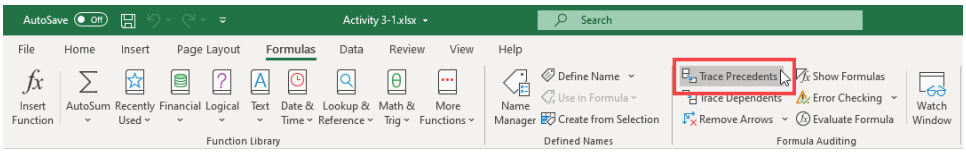


4. To switch back to viewing calculated results Press **Ctrl + `**:

	A	B	C	D	E	F	G	H	I
1	**Employee Sales**			Discount Rate	30%				
2									
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total	
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$ 22.85	$ 53.33	
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96	
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39	
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52	
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74	
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58	
10	Tanya Mills	1456	KL427	2	$ 61.34	$ 122.68	$ 36.80	$ 85.88	
11	Colm Mcnally	3877	WL544	1	$ 72.54	$ 72.54	$ 21.76	$ 50.78	
12	Shanaya Kavanagh	4131	EO353	1	$ 72.84	$ 72.84	$ 21.85	$ 50.99	
13	Jim Skeen	3147	AJ755	4	$ 29.15	$ 116.60	$ 34.98	$ 81.62	
14	Vivek Singleton	3321	VU967	2	$ 26.60	$ 53.20	$ 15.96	$ 37.24	
15	Remy Tillman	4268	EO291	1	$ 36.93	$ 36.93	$ 11.08	$ 25.85	
16	Alec Farrell	2815	NE780	1	$ 20.82	$ 20.82	$ 6.25	$ 14.57	
17									
18									
19									

Sheet1 Sheet2

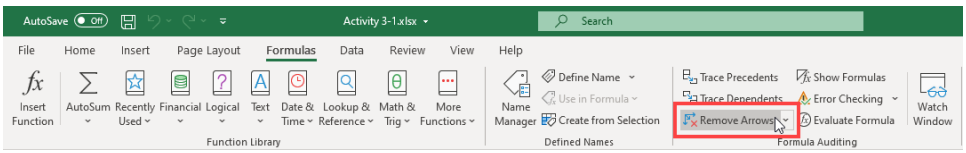
5. Cell G4 should still be the active cell. Click **Formulas → Trace Precedents**:



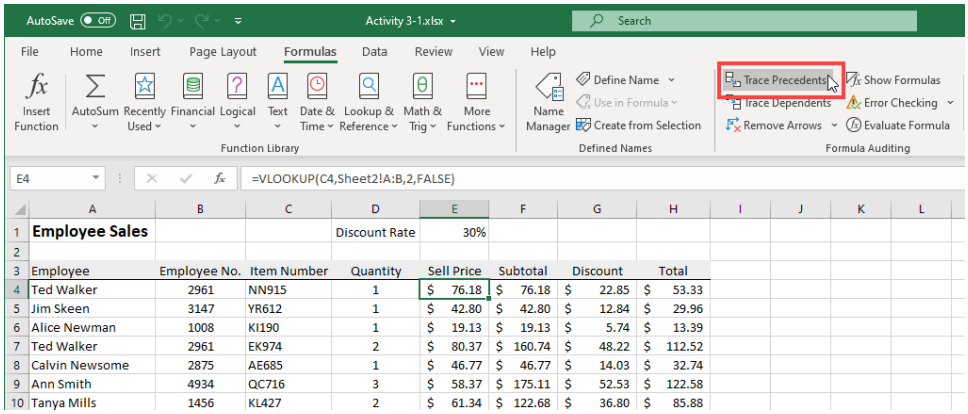
6. A blue arrow will be drawn through all the precedent cells for the formula in cell G4. You will see that Cells E1 and F4 are being used to calculate this value:

	A	B	C	D	E	F	G	H	I
1	**Employee Sales**			Discount Rate	30%				
2									
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total	
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$ 22.85	$ 53.33	
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96	
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39	
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52	
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74	
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58	
10	Tanya Mills	1456	KL427	2	$ 61.34	$ 122.68	$ 36.80	$ 85.88	
11	Colm Mcnally	3877	WL544	1	$ 72.54	$ 72.54	$ 21.76	$ 50.78	

7. Remove the tracer arrow by clicking **Formulas → Remove Arrows**:



8. Now click to select cell **E4**, then click **Formulas → Trace Precedents**:

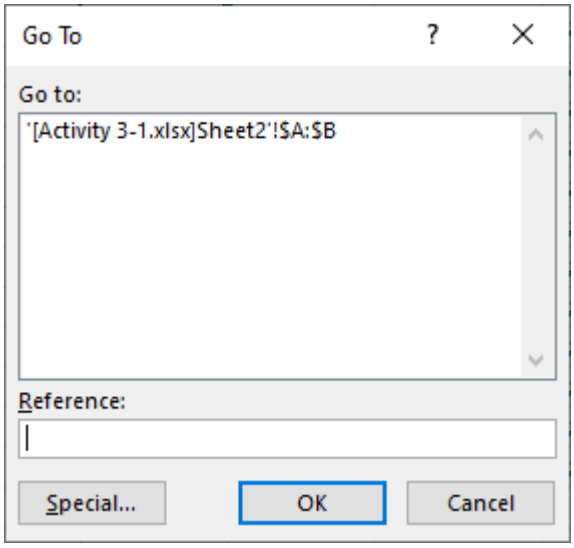


	A	B	C	D	E	F	G	H	I	J	K	L
1	**Employee Sales**			Discount Rate	30%							
2												
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total				
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$ 22.85	$ 53.33				
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96				
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39				
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52				
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74				
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58				
10	Tanya Mills	1456	KL427	2	$ 61.34	$ 122.68	$ 36.80	$ 85.88				

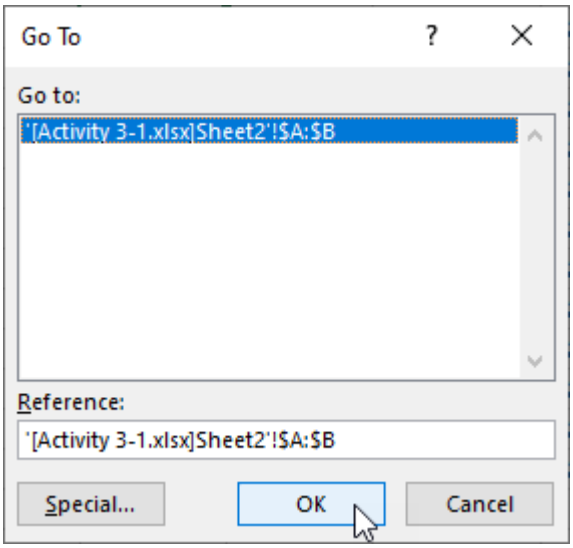
9. You will see a blue arrow originating in cell C4, as well as a black dotted arrow that originates from a small worksheet icon. Double-click on the **black dotted line**:

	A	B	C	D	E	F	G	H	I
1	**Employee Sales**			Discount Rate	30%				
2									
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total	
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$ 22.85	$ 53.33	
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96	
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39	
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52	
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74	
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58	
10	Tanya Mills	1456	KL427	2	$ 61.34	$ 122.68	$ 36.80	$ 85.88	

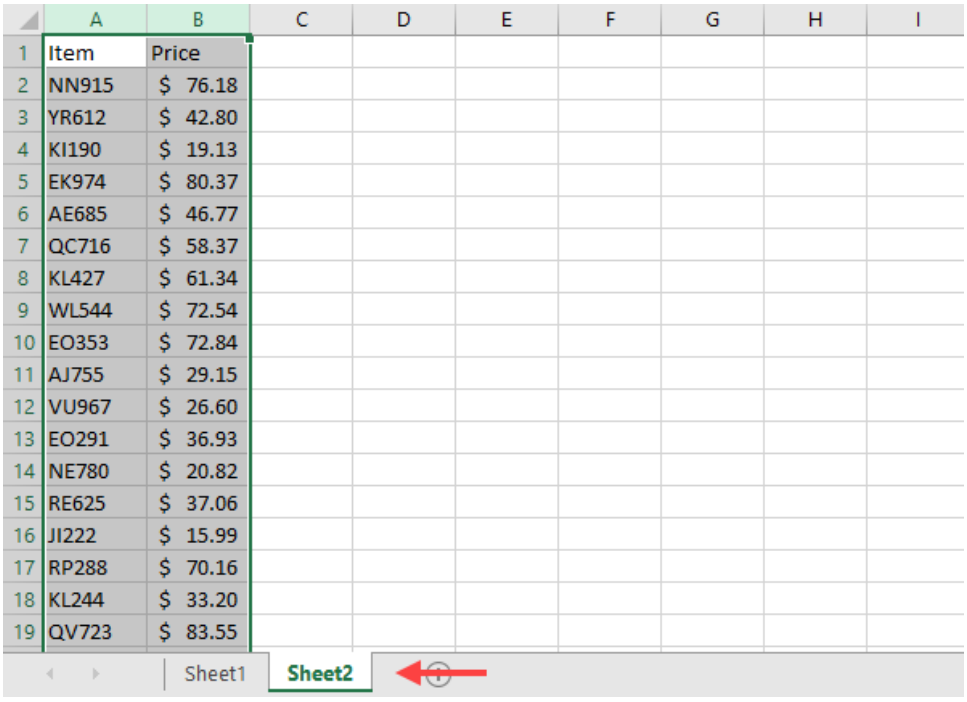
10. The Go To dialog box will appear and list the reference "'[Activity 3-1.xlsx]Sheet2'!$A:$B" in the Go to window:



11. When you select this reference, it will appear in the Reference window. You can now click **OK**:

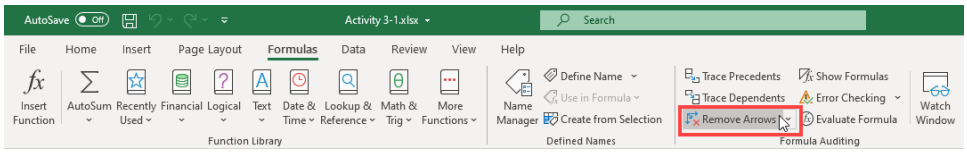


12. Sheet2 will become active and you will see the source of the data used in the formula:

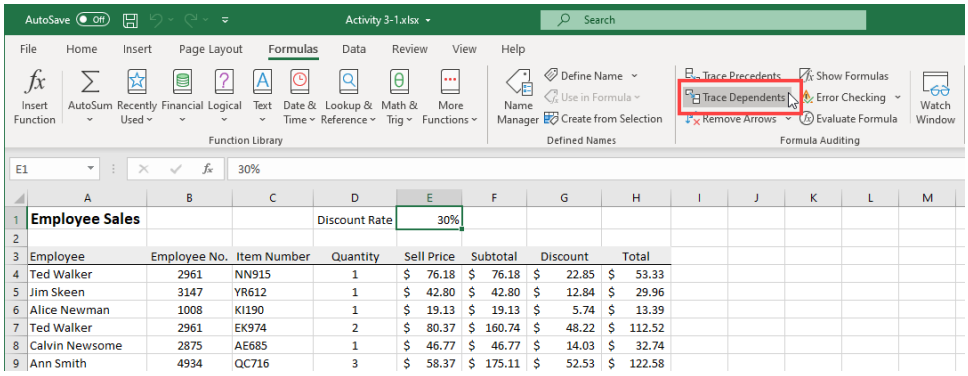


	A	B	C	D	E	F	G	H	I
1	Item	Price							
2	NN915	$ 76.18							
3	YR612	$ 42.80							
4	KI190	$ 19.13							
5	EK974	$ 80.37							
6	AE685	$ 46.77							
7	QC716	$ 58.37							
8	KL427	$ 61.34							
9	WL544	$ 72.54							
10	EO353	$ 72.84							
11	AJ755	$ 29.15							
12	VU967	$ 26.60							
13	EO291	$ 36.93							
14	NE780	$ 20.82							
15	RE625	$ 37.06							
16	JI222	$ 15.99							
17	RP288	$ 70.16							
18	KL244	$ 33.20							
19	QV723	$ 83.55							

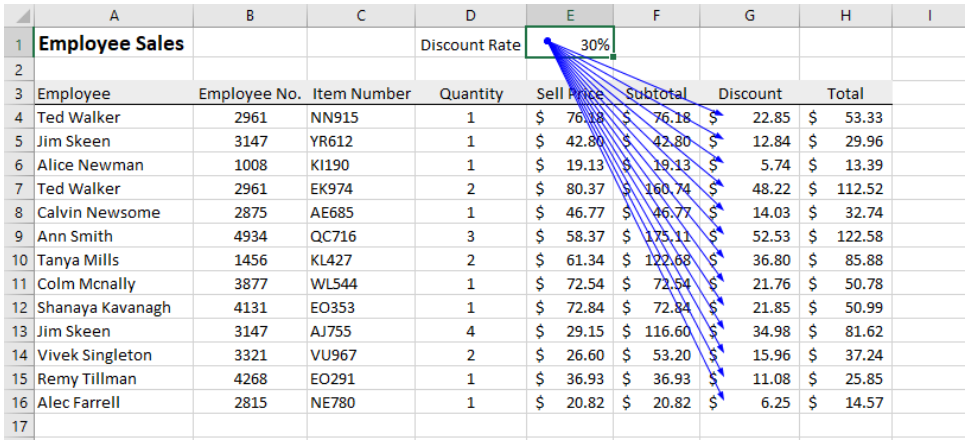
13. Now click on **Sheet1** to make it the active sheet, and click **Formulas → Remove Arrows**:



14. Then click to select cell **E1**. Click **Formulas → Trace Dependents**:



15. Multiple blue arrows will show that the value in cell E1 is being used by the formulas in cells G4 to G16:



16. Save the current workbook as **Activity 3-1 Complete** and then close Microsoft Excel 365 to complete the activity.

TOPIC B: Error Checking

Now that you have an understanding of how to identify formulas and trace their elements, we will look at the different types of errors that you may encounter, and the tools that you can use to identify and repair them. In this topic you will learn about invalid data, formula errors, and how to check for them.

Topic Objectives

In this session, you will learn about:

- Invalid data
- Formula errors and their types
- How to check for errors

Invalid Data

Even with our best efforts there are times that invalid data can be introduced into a spreadsheet. Invalid data is data that is not the correct type or quality required for any functions or formulas that make use of it. As an example, if you have a column of dollar values, and a date is inserted into a cell in this column, not only is the cell value incorrect, but it could also impact any dependent calculations the refer to this column. Fortunately, invalid data will often result in formula errors, which will alert you to a problem in your worksheet.

Formula Errors and Their Types

When you use functions to build formulas in Excel, it is expected that the data you reference has certain characteristics. For instance, when you multiply values, it is assumed that all the cells referenced in the function are numbers.

When Excel does not find what it expects in precedent cells, it will often return an error value in the dependent cell that will give you an indication of the type of error that has occurred, which you can then use to resolve the error.

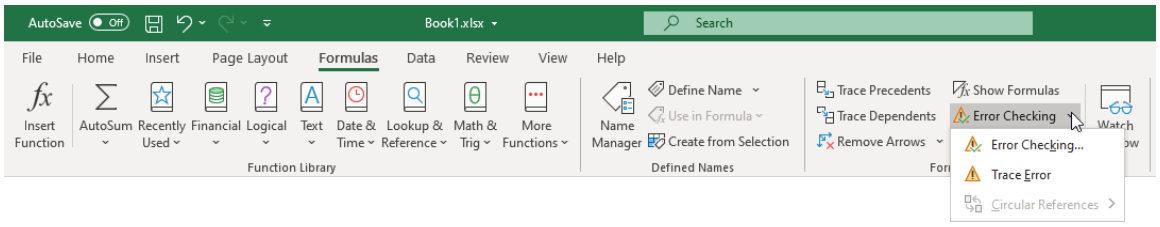
Below is an overview of the error types and what they mean:

Error Name	Error Description
#VALUE!	Occurs when the type of data referenced does not match what the function expects. An example would be adding a text value where a number is expected.
#REF!	Occurs when a referenced cell is deleted or moved. An example would be creating a formula adding the values of two cells then deleting one of the cells.
#DIV/0!	Occurs when a mathematical function tries to divide a number by zero.
#NAME?	Occurs when Excel cannot find a named element. This often occurs when a string in a formula does not include quotation marks.

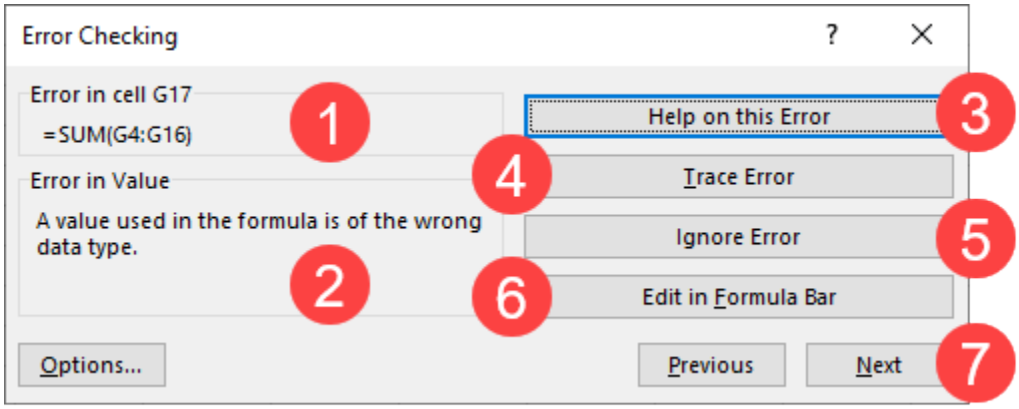
#NULL!	Occurs when there is an incorrect operator in a range function. An example would be using a space instead of a colon in a sum function.
#N/A	Occurs when a function cannot find the value it is looking for. An example would be the VLOOKUP function not finding a result.
#NUM!	Occurs when a function references an invalid numeric value or returns a value larger that Excel can use.
########	Occurs when the contents of a cell are too wide to be displayed. This can often be resolved by enlarging the column.

How to Check for Errors

To access error checking tools in Excel, you would first click the Formulas tab, then click the **Error Checking** drop-down arrow. The three available options are **Error Checking**, **Trace Error**, and **Circular References**.



Error Checking works in a similar way to a Spell Check function in a word processing program. When launched it will allow you to cycle through all the existing errors on the worksheet and use the available tools to resolve them:

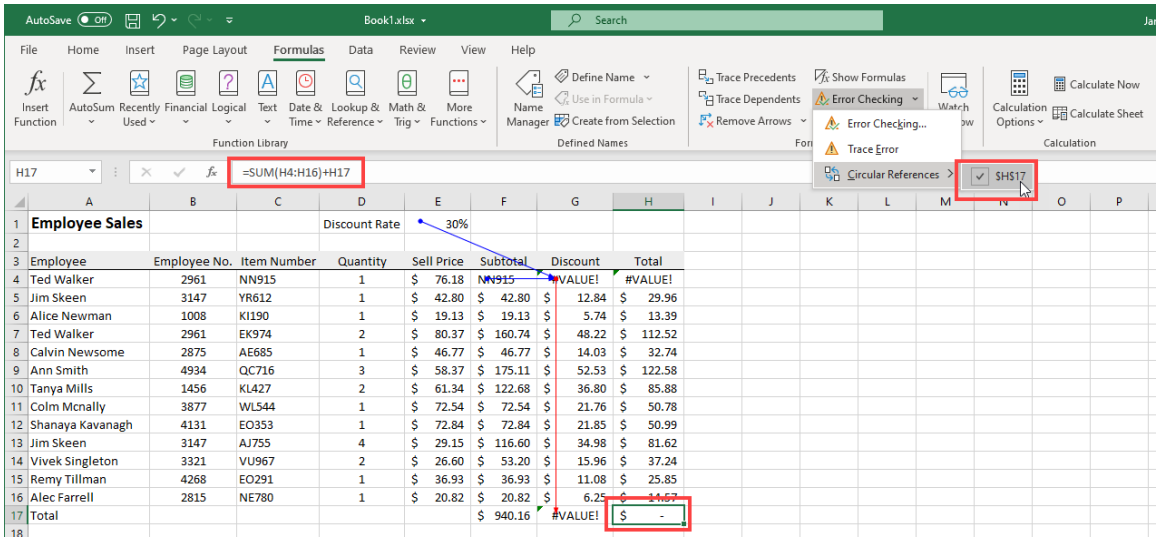


The Error Checking dialog box provides information on **(1) the location of the error**, and **(2) a description of the error**. You can use the buttons on the right to **(3) Open the Help file** for information on the error, **(4) Show the calculation steps** in the formula (or Trace the Error, if there is only one step), **(5) Ignore the Error** for the time being, and **(6) Edit in the Formula Bar** to manually correct the error. You can use the **(7) Previous** and **Next** buttons to cycle through all errors on the sheet.

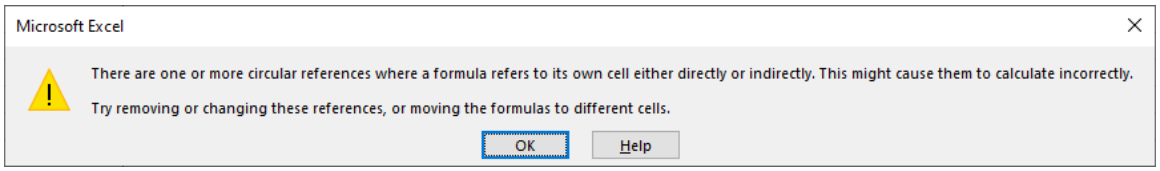
The **Trace Error** command will display tracer arrows to indicate any precedents in the formula. A red arrow will indicate the source of the error. Blue and black arrows behave the same as in the Trace Precedents command. This will often provide you with the information you need to correct the error:

	A	B	C	D	E	F	G	H	I
1	**Employee Sales**			Discount Rate	30%				
2									
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total	
4	Ted Walker	2961	NN915	1	$ 76.18	NN91	#VALUE!	#VALUE!	
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96	
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39	
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52	
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74	
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58	
10	Tanya Mills	1456	KL427	2	$ 61.34	$ 122.68	$ 36.80	$ 85.88	
11	Colm Mcnally	3877	WL544	1	$ 72.54	$ 72.54	$ 21.76	$ 50.78	
12	Shanaya Kavanagh	4131	EO353	1	$ 72.84	$ 72.84	$ 21.85	$ 50.99	
13	Jim Skeen	3147	AJ755	4	$ 29.15	$ 116.60	$ 34.98	$ 81.62	
14	Vivek Singleton	3321	VU967	2	$ 26.60	$ 53.20	$ 15.96	$ 37.24	
15	Remy Tillman	4268	EO291	1	$ 36.93	$ 36.93	$ 11.08	$ 25.85	
16	Alec Farrell	2815	NE780	1	$ 20.82	$ 20.82	$ 6.25	$ 14.57	
17	Total					$ 940.16	#VALUE!	#VALUE!	
18									

The **Circular References** command highlights any cells that contain a formula with a circular reference. A circular reference is when a formula refers to any cell that contains a reference to the results of that formula.



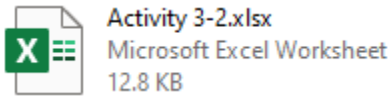
Typically, Excel will warn you at the time you attempt to create a circular reference:



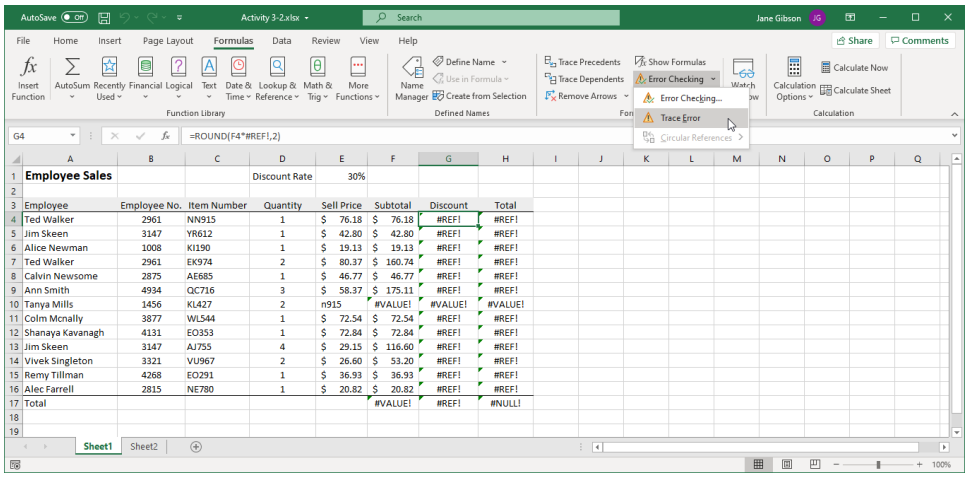
Activity 3-2: Error Checking

A colleague has been managing a worksheet for you while you were on holiday. When you return and review the worksheet, you notice there are errors in some of the formulas. You need to troubleshoot the errors:

1. To begin, open **Activity 3-2** from your Exercise Files folder:



2. You notice there are several error types. Start by selecting cell **G4**, which contains a #REF! error, then click **Formulas → Error Checking → Trace Error**:

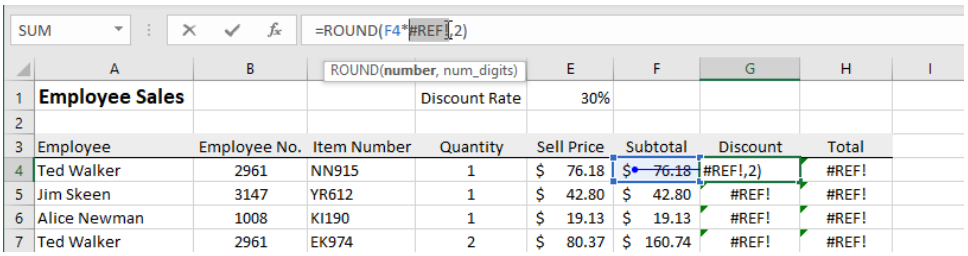


	A	B	C	D	E	F	G	H
1	**Employee Sales**			Discount Rate	30%			
2								
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	#REF!	#REF!
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	#REF!	#REF!
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	#REF!	#REF!
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	#REF!	#REF!
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	#REF!	#REF!
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	#REF!	#REF!
10	Tanya Mills	1456	KL427	2	n915	#VALUE!	#VALUE!	#VALUE!
11	Colm Mcnally	3877	WL544	1	$ 72.54	$ 72.54	#REF!	#REF!
12	Shanaya Kavanagh	4131	EO353	1	$ 72.84	$ 72.84	#REF!	#REF!
13	Jim Skeen	3147	AJ755	4	$ 29.15	$ 116.60	#REF!	#REF!
14	Vivek Singleton	3321	VU967	2	$ 26.60	$ 53.20	#REF!	#REF!
15	Remy Tillman	4268	EO291	1	$ 36.93	$ 36.93	#REF!	#REF!
16	Alec Farrell	2815	NE780	1	$ 20.82	$ 20.82	#REF!	#REF!
17	Total					#VALUE!	#REF!	#NULL!

3. You will see that there is only one blue arrow tracing from the cell F4. It seems the formula has lost the reference to the discount amount:

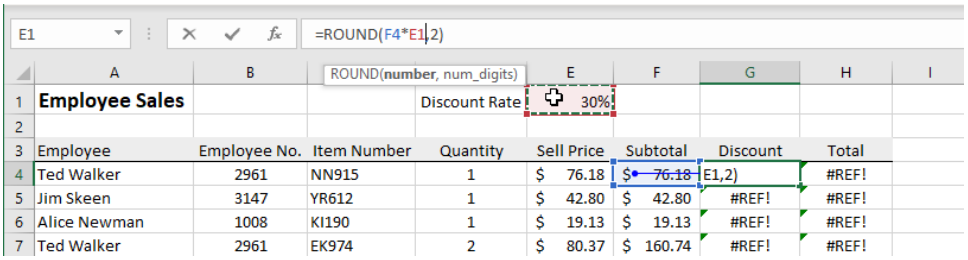
	A	B	C	D	E	F	G	H	I
1	**Employee Sales**			Discount Rate	30%				
2									
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total	
4	Ted Walker	2961	NN915	1	$ 76.18	$ 7 8	#REF!	#REF!	
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	#REF!	#REF!	
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	#REF!	#REF!	
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	#REF!	#REF!	
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	#REF!	#REF!	

4. Click in the formula bar and select the "**#REF!**" text:



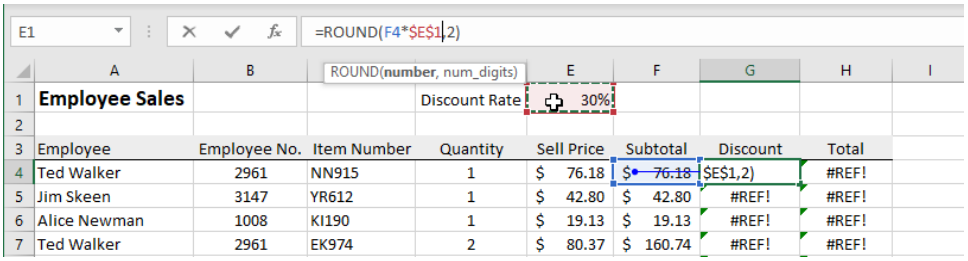
	A	B	C	D	E	F	G	H	I
1	**Employee Sales**			Discount Rate	30%				
2									
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total	
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	#REF!,2)	#REF!	
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	#REF!	#REF!	
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	#REF!	#REF!	
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	#REF!	#REF!	

5. Now click on cell **E1** to insert a reference to that cell in the formula:



	A	B	C	D	E	F	G	H	I
1	**Employee Sales**			Discount Rate	30%				
2									
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total	
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	E1,2)	#REF!	
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	#REF!	#REF!	
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	#REF!	#REF!	
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	#REF!	#REF!	

6. Make sure to press **F4** to create an absolute reference:

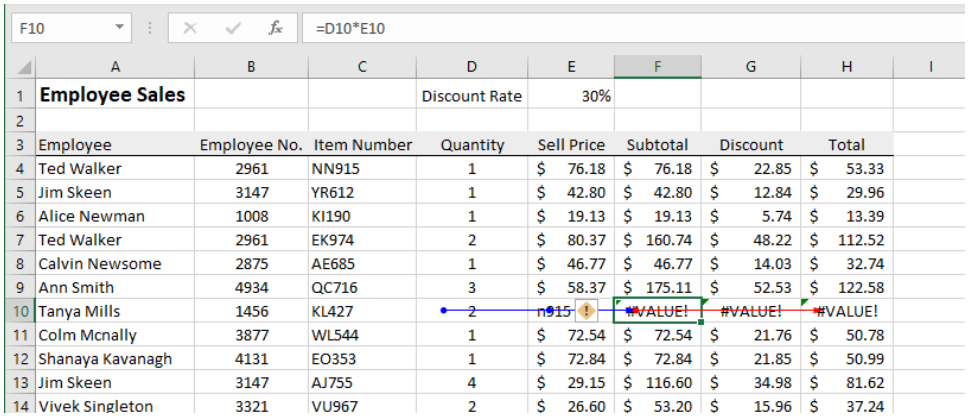


	A	B	C	D	E	F	G	H	I
1	**Employee Sales**			Discount Rate	30%				
2									
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total	
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$E$1,2)	#REF!	
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	#REF!	#REF!	
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	#REF!	#REF!	
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	#REF!	#REF!	

7. Then **copy** the corrected formula down to cell **G16**:

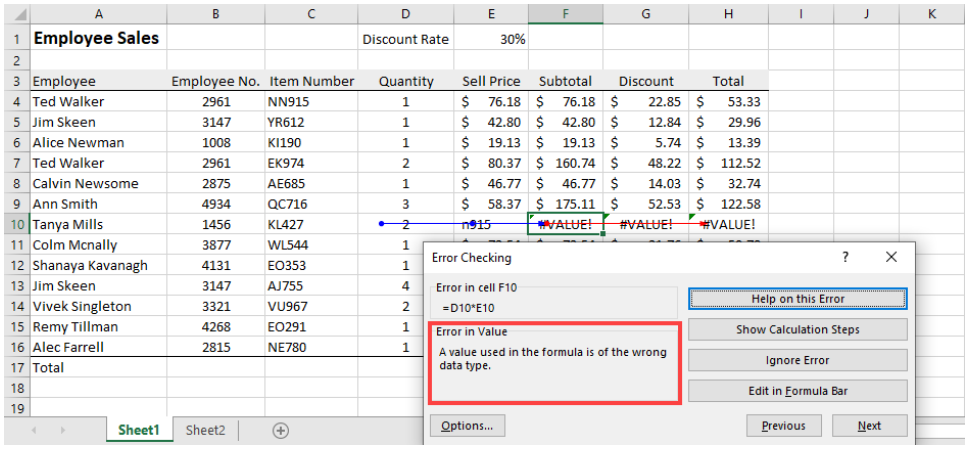
	A	B	C	D	E	F	G	H	I
1	**Employee Sales**			Discount Rate	30%				
2									
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total	
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$ 22.85	$ 53.33	
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	#REF!	#REF!	
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	#REF!	#REF!	
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	#REF!	#REF!	
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	#REF!	#REF!	
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	#REF!	#REF!	
10	Tanya Mills	1456	KL427	2	n915	#VALUE!	#VALUE!	#VALUE!	
11	Colm Mcnally	3877	WL544	1	$ 72.54	$ 72.54	#REF!	#REF!	
12	Shanaya Kavanagh	4131	EO353	1	$ 72.84	$ 72.84	#REF!	#REF!	
13	Jim Skeen	3147	AJ755	4	$ 29.15	$ 116.60	#REF!	#REF!	
14	Vivek Singleton	3321	VU967	2	$ 26.60	$ 53.20	#REF!	#REF!	
15	Remy Tillman	4268	EO291	1	$ 36.93	$ 36.93	#REF!	#REF!	
16	Alec Farrell	2815	NE780	1	$ 20.82	$ 20.82	#REF!	#REF!	
17	Total					#VALUE!	#REF!	#NULL!	
18									

8. Now click on cell **H10**, where there is a #VALUE! error, and again click **Formulas → Error Checking → Trace Error**. You will see a red arrow indicating the source of the value error, and that cell F10 will be selected:



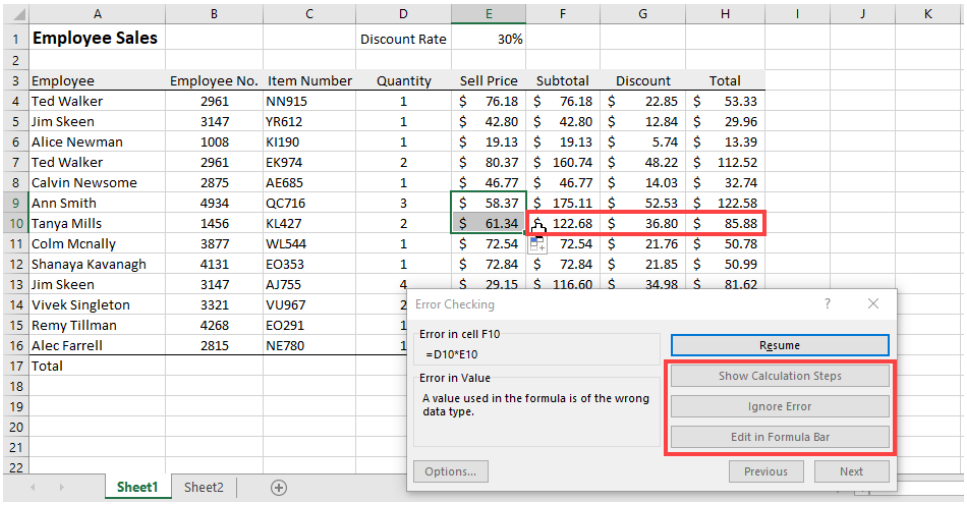
	A	B	C	D	E	F	G	H	I
1	**Employee Sales**			Discount Rate	30%				
2									
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total	
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$ 22.85	$ 53.33	
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96	
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39	
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52	
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74	
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58	
10	Tanya Mills	1456	KL427	2	n915	#VALUE!	#VALUE!	#VALUE!	
11	Colm Mcnally	3877	WL544	1	$ 72.54	$ 72.54	$ 21.76	$ 50.78	
12	Shanaya Kavanagh	4131	EO353	1	$ 72.84	$ 72.84	$ 21.85	$ 50.99	
13	Jim Skeen	3147	AJ755	4	$ 29.15	$ 116.60	$ 34.98	$ 81.62	
14	Vivek Singleton	3321	VU967	2	$ 26.60	$ 53.20	$ 15.96	$ 37.24	

9. Click **Formulas → Error Checking,** and you will see, under the Error in Value heading, that a value used in the formula is of the wrong data type:

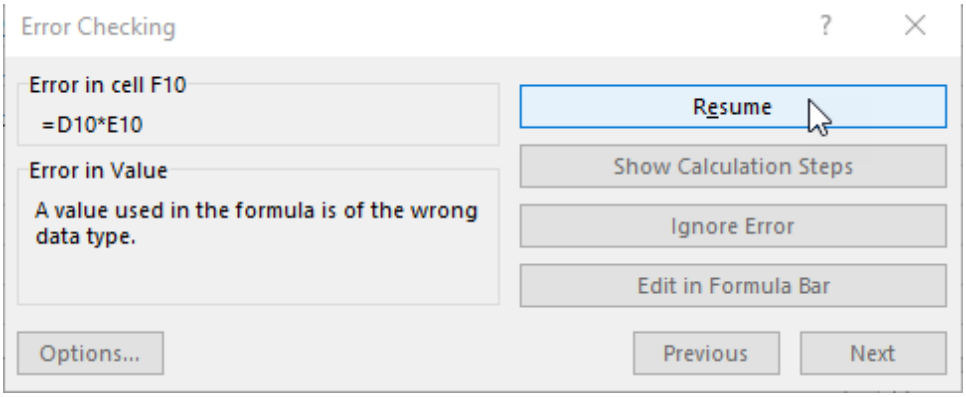


	A	B	C	D	E	F	G	H	I	J	K
1	**Employee Sales**			Discount Rate	30%						
2											
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total			
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$ 22.85	$ 53.33			
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96			
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39			
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52			
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74			
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58			
10	Tanya Mills	1456	KL427	2	n915	#VALUE!	#VALUE!	#VALUE!			
11	Colm Mcnally	3877	WL544	1							
12	Shanaya Kavanagh	4131	EO353	1							
13	Jim Skeen	3147	AJ755	4							
14	Vivek Singleton	3321	VU967	2							
15	Remy Tillman	4268	EO291	1							
16	Alec Farrell	2815	NE780	1							
17	Total										
18											
19											

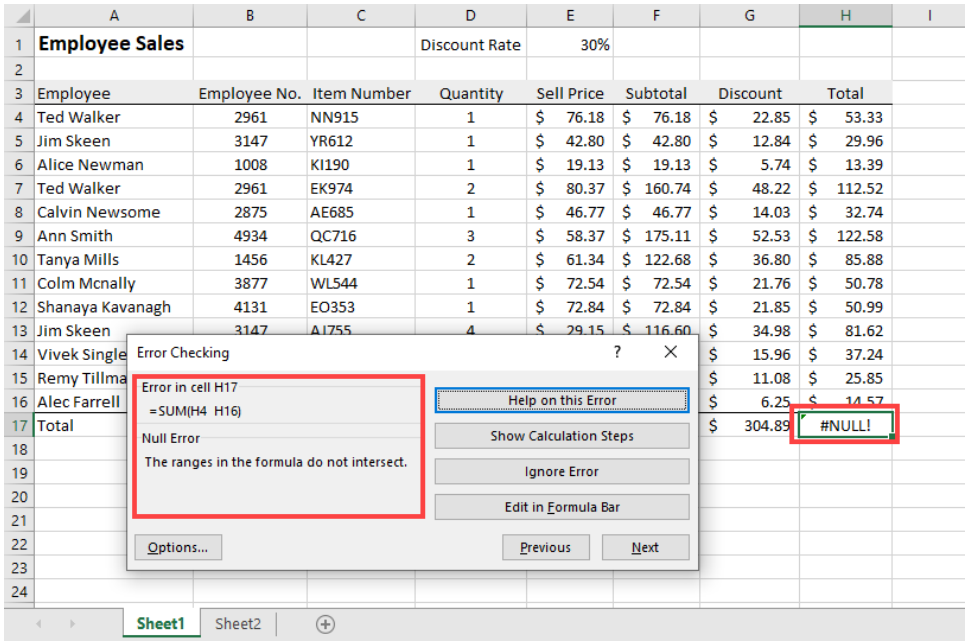
10. Click cell **E9** and drag the handle down to copy the formula to cell **E10**. You will see that the error in cell F10 is replaced by the correct calculated amount, and the options in the Error Checking dialog are grayed out:



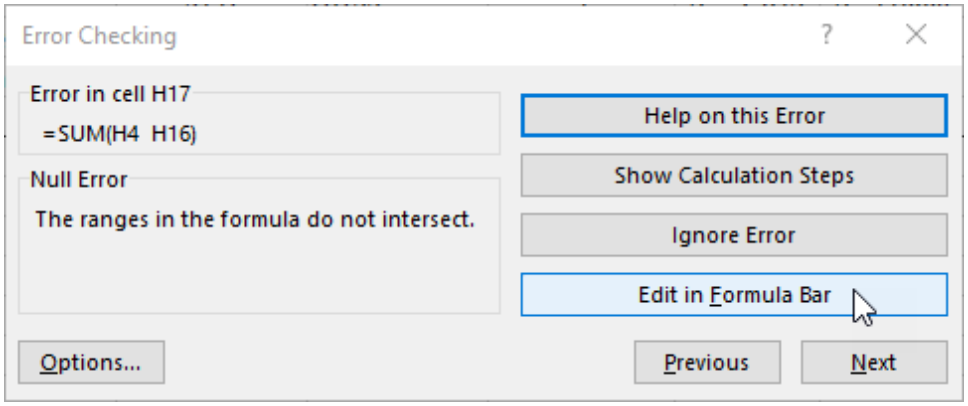
11. Click the **Resume** button in the Error Checking dialog box to move to the next error:



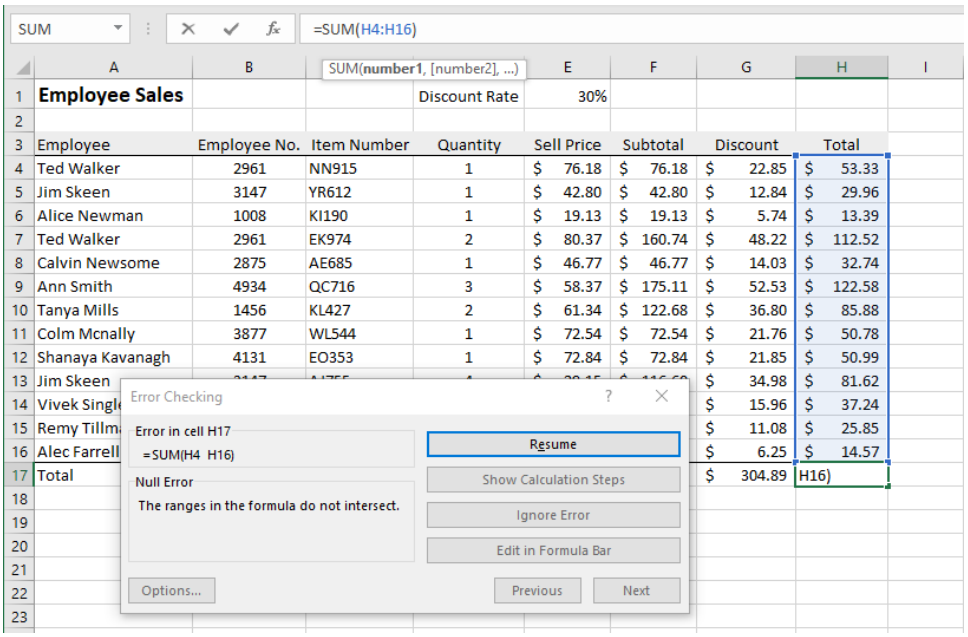
12. The Error Checking dialog box will now be referencing a #NULL! error in cell H17, where the ranges in the formula do not intersect. As you can see in the formula, "=SUM(H4 H16)," a space has been used instead of a colon to separate the two cell references:



13. Click the **Edit in Formula Bar** button:

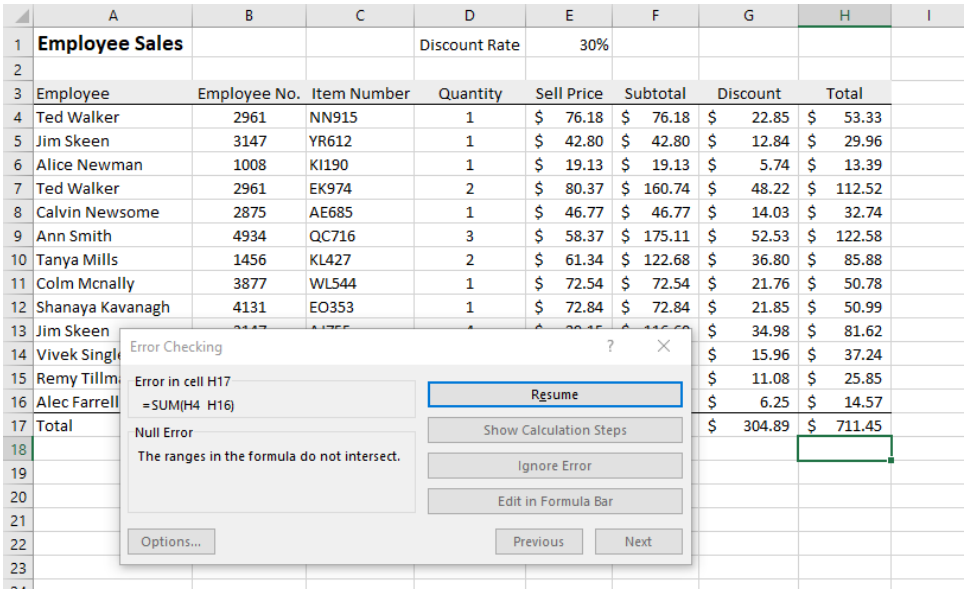


14. **Replace** the space with a colon, then press **Enter:**



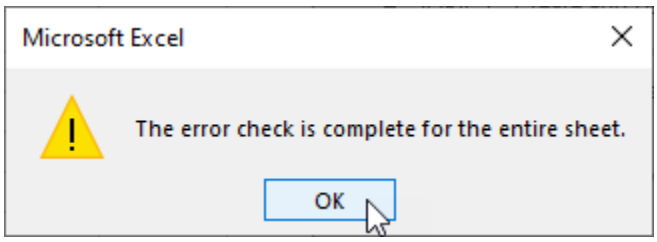
	A	B	C	D	E	F	G	H
1	**Employee Sales**			Discount Rate	30%			
2								
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$ 22.85	$ 53.33
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58
10	Tanya Mills	1456	KL427	2	$ 61.34	$ 122.68	$ 36.80	$ 85.88
11	Colm Mcnally	3877	WL544	1	$ 72.54	$ 72.54	$ 21.76	$ 50.78
12	Shanaya Kavanagh	4131	EO353	1	$ 72.84	$ 72.84	$ 21.85	$ 50.99
13	Jim Skeen						$ 34.98	$ 81.62
14	Vivek Singl						$ 15.96	$ 37.24
15	Remy Tillm						$ 11.08	$ 25.85
16	Alec Farrell						$ 6.25	$ 14.57
17	Total						$ 304.89	H16)
18								
19								
20								
21								
22								
23								

15. The #NULL! Error is replaced with the correct calculated value:

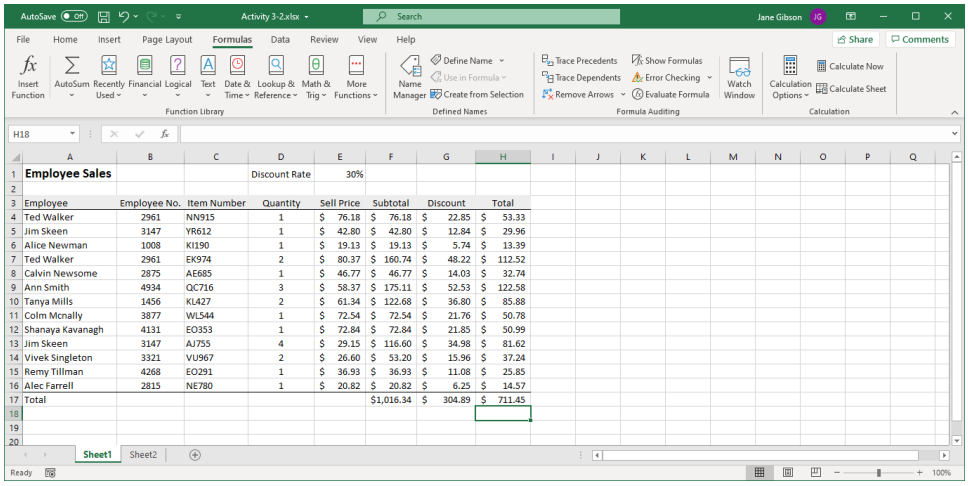


	A	B	C	D	E	F	G	H
1	**Employee Sales**			Discount Rate	30%			
2								
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$ 22.85	$ 53.33
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58
10	Tanya Mills	1456	KL427	2	$ 61.34	$ 122.68	$ 36.80	$ 85.88
11	Colm Mcnally	3877	WL544	1	$ 72.54	$ 72.54	$ 21.76	$ 50.78
12	Shanaya Kavanagh	4131	EO353	1	$ 72.84	$ 72.84	$ 21.85	$ 50.99
13	Jim Skeen						$ 34.98	$ 81.62
14	Vivek Singl						$ 15.96	$ 37.24
15	Remy Tillm						$ 11.08	$ 25.85
16	Alec Farrell						$ 6.25	$ 14.57
17	Total						$ 304.89	$ 711.45
18								
19								
20								
21								
22								
23								

16. Click the **Resume** button again and an Alert window will appear indicating that the error chick is complete. Click **OK**:



17. The Error Checking dialog box will close, and you will see that all the errors have been resolved:



	A	B	C	D	E	F	G	H
1	**Employee Sales**			Discount Rate	30%			
2								
3	Employee	Employee No.	Item Number	Quantity	Sell Price	Subtotal	Discount	Total
4	Ted Walker	2961	NN915	1	$ 76.18	$ 76.18	$ 22.85	$ 53.33
5	Jim Skeen	3147	YR612	1	$ 42.80	$ 42.80	$ 12.84	$ 29.96
6	Alice Newman	1008	KI190	1	$ 19.13	$ 19.13	$ 5.74	$ 13.39
7	Ted Walker	2961	EK974	2	$ 80.37	$ 160.74	$ 48.22	$ 112.52
8	Calvin Newsome	2875	AE685	1	$ 46.77	$ 46.77	$ 14.03	$ 32.74
9	Ann Smith	4934	QC716	3	$ 58.37	$ 175.11	$ 52.53	$ 122.58
10	Tanya Mills	1456	KL427	2	$ 61.34	$ 122.68	$ 36.80	$ 85.88
11	Colm Mcnally	3877	WL544	1	$ 72.54	$ 72.54	$ 21.76	$ 50.78
12	Shanaya Kavanagh	4131	EO353	1	$ 72.84	$ 72.84	$ 21.85	$ 50.99
13	Jim Skeen	3147	AJ755	4	$ 29.15	$ 116.60	$ 34.98	$ 81.62
14	Vivek Singleton	3321	VU967	2	$ 26.60	$ 53.20	$ 15.96	$ 37.24
15	Remy Tillman	4268	EO291	1	$ 36.93	$ 36.93	$ 11.08	$ 25.85
16	Alec Farrell	2815	NE780	1	$ 20.82	$ 20.82	$ 6.25	$ 14.57
17	Total					$1,016.34	$ 304.89	$ 711.45
18								
19								
20								

18. Save the current workbook as **Activity 3-2 Complete** and then close Microsoft Excel 365 to complete the activity.

TOPIC C: Evaluating Formulas and Using the Watch Window

As your formulas and workbooks become more complex, it can become difficult to keep track of the impact that any changes will make when you update and edit your files. Fortunately, Excel provides you with tools that you can use to monitor and evaluate your formulas so you can be sure they are operating correctly. In this topic you will learn about the tools you can use to track activity in your workbook or other open workbooks.

Topic Objectives

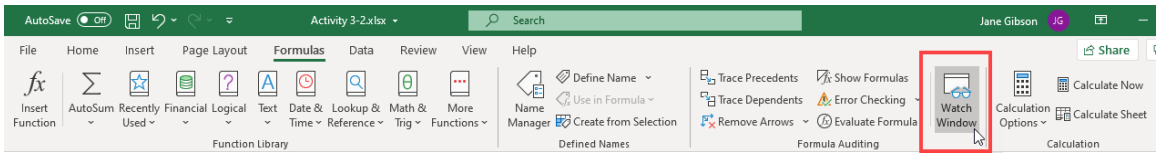
In this session, you will learn about:

- The Watch Window
- The Camera tool
- The Evaluate Formula tool

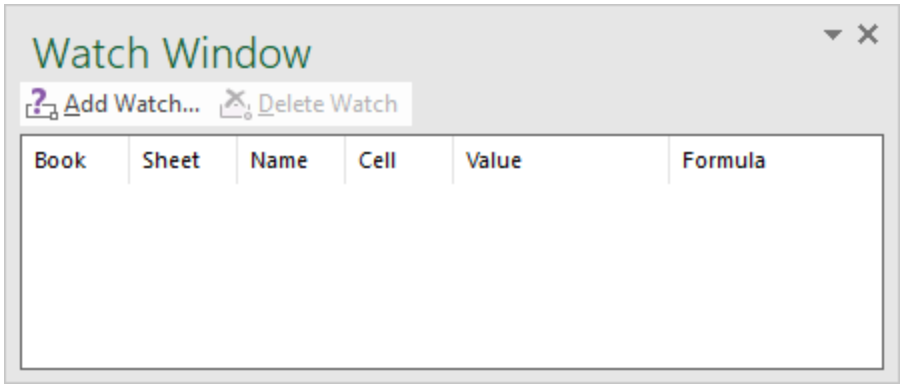
The Watch Window

As the workbooks you create or work with become larger and more complicated, you may find that there are formulas throughout the workbook that you will need to frequently check on as you work to ensure the values are correct, or that the results of changes are what you expect. The **Watch Window** provides you with the ability to display, in one place, the results of many formulas throughout your workbook.

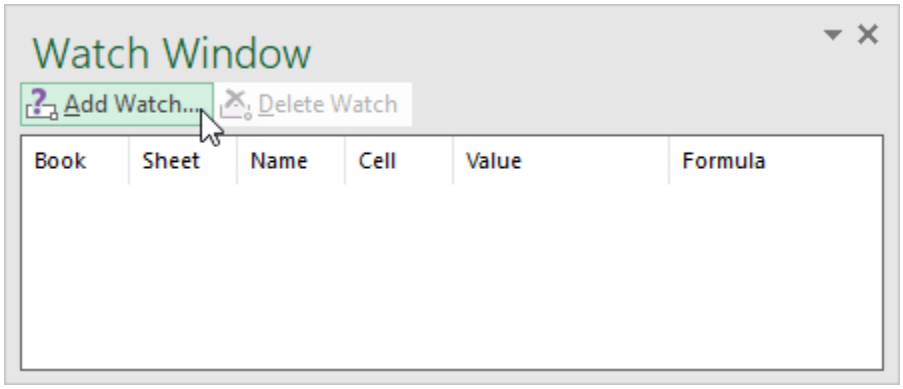
To use the Watch Window, click **Formulas → Watch Window:**



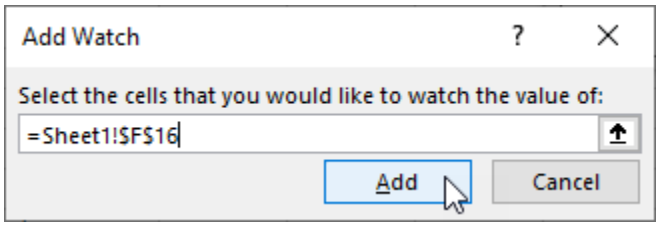
The **Watch Window** dialog box will appear:



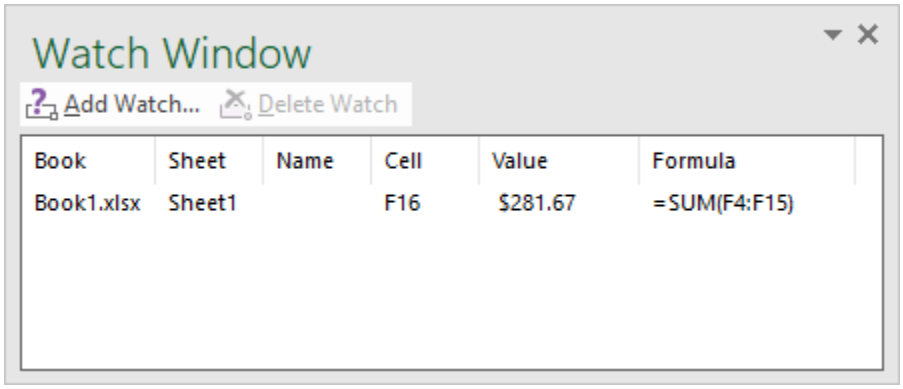
To add a formula, or formulas, to the Watch Window, click the **Add Watch** button:



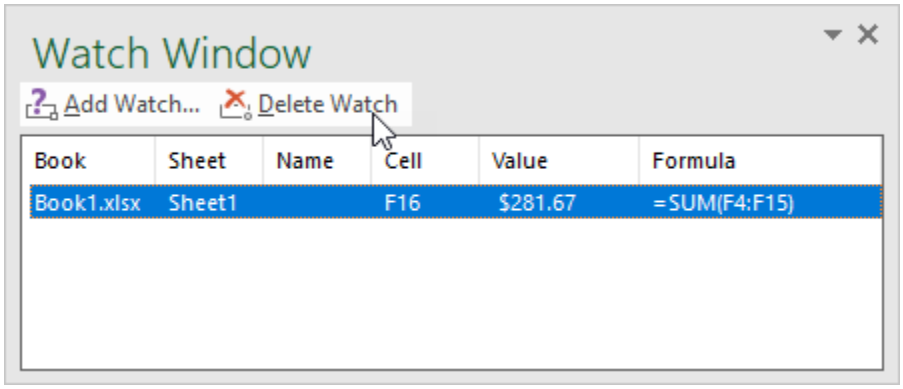
In the **Add Watch** dialog box that opens, you can select a cell, or cells, to watch. Once you have selected the cell(s), click **Add**:



The watch window will now display information about your watched cells, including the workbook and worksheet in which the cells reside, the name of the cell (if it has been given a name), the cell reference, the value, and the formula. The Watch Window will remain visible even if you switch to another worksheet, or another workbook. Any changes to the watched value or to the formula will display immediately in the window:



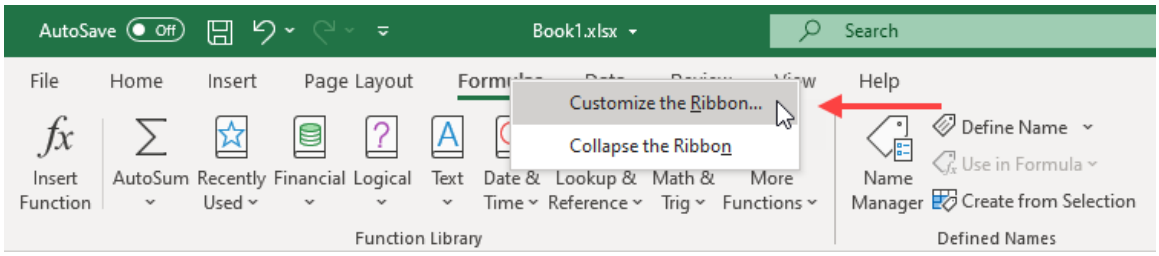
You can add more values to the window by clicking **Add Watch** and selecting more cells. To remove values, select the cell you would like to remove and click **Delete Watch.** When you are finished with the watch window you can simply click the Close (**X**) button.



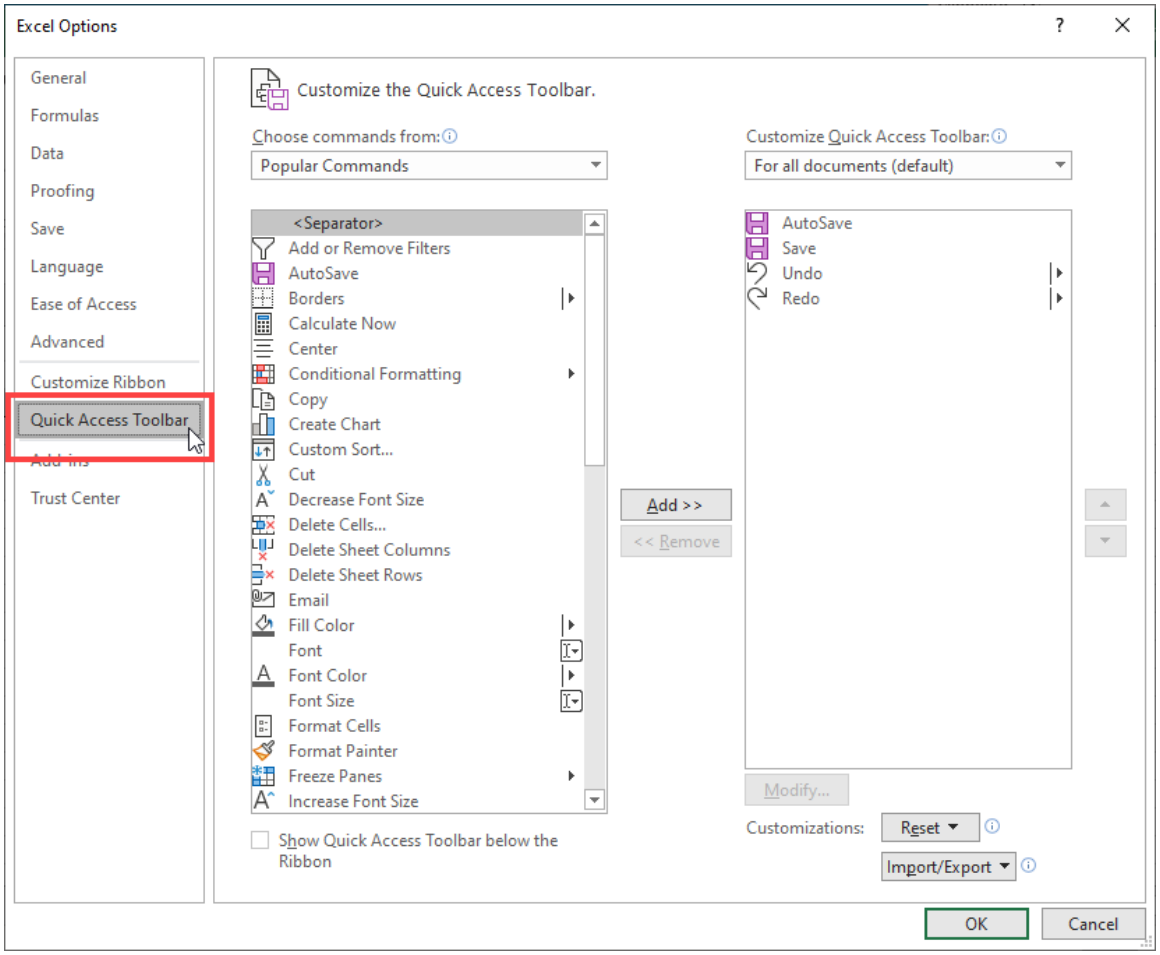
The Camera Tool

Another way to track changes in a separate worksheet or workbook is using the **Camera** tool. With it you can capture an image of a cell, a group of cells, or even charts or images. You can then place the image on the sheet you are working on, and it will update in real time to any changes that are made.

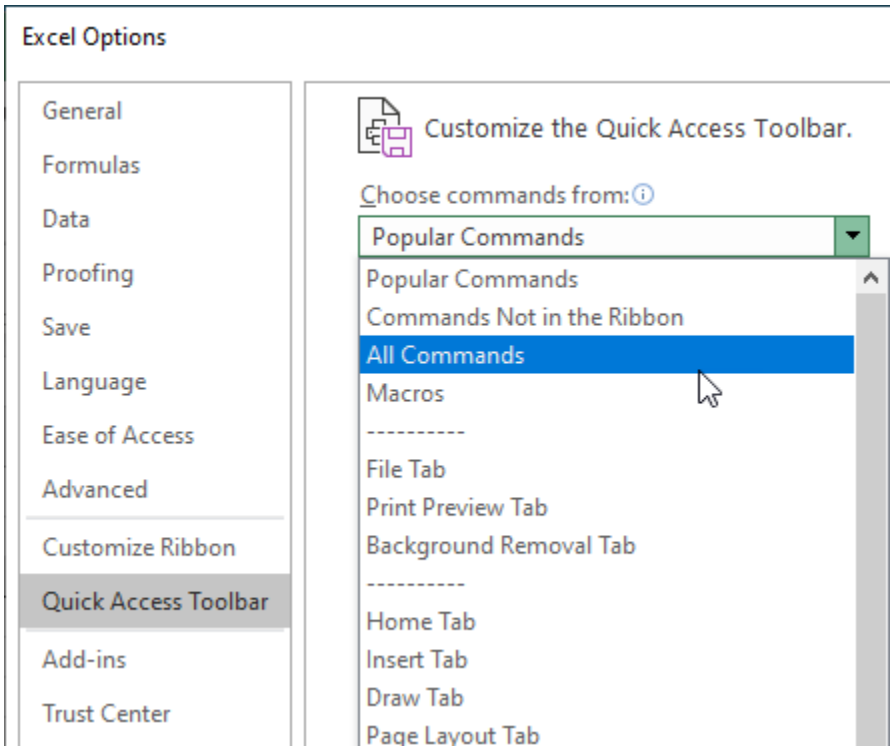
The Camera tool is not available by default. To enable it right-click on any of the tabs in the ribbon list and click **Customize the Ribbon**:



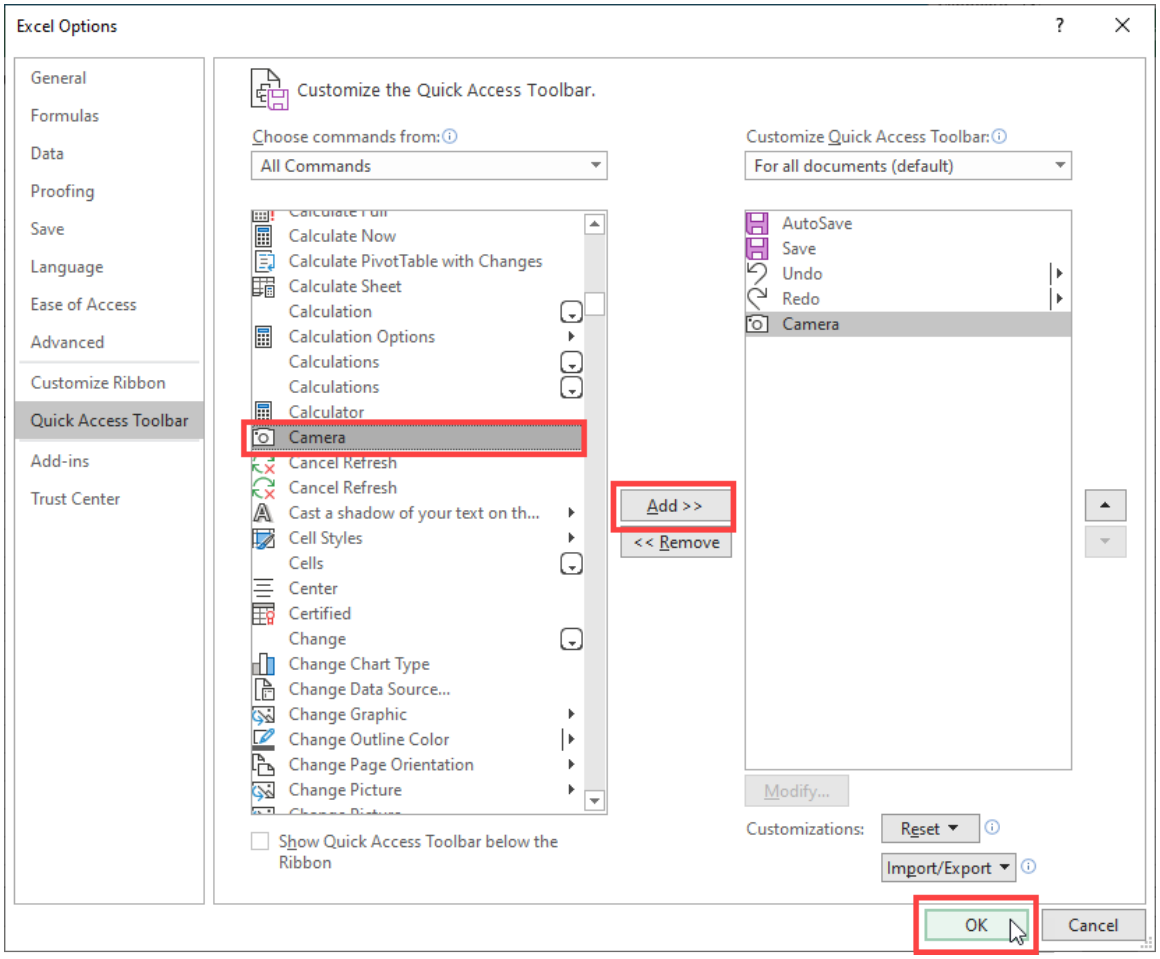
The Excel Options dialog box will open with the Customize the Ribbon category selected. Select the **Quick Access Toolbar** category instead:



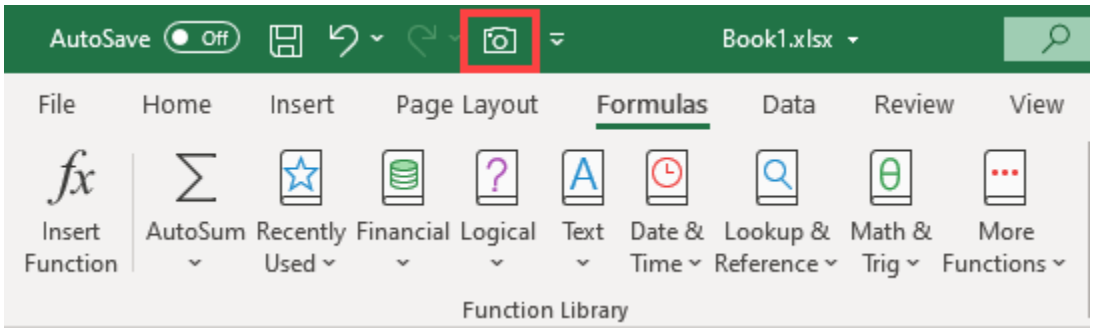
In the **Choose commands from** drop-down list select **All Commands**:



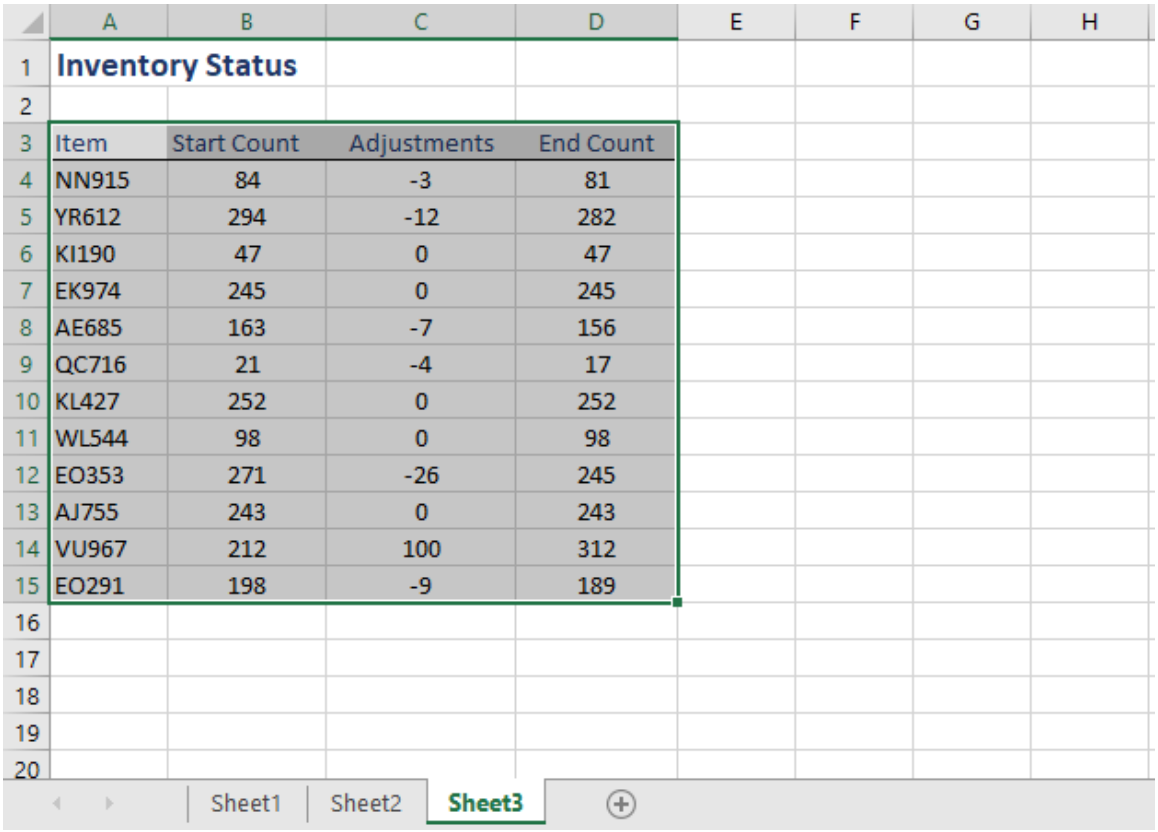
Scroll down the list and select **Camera**, then click the **Add** button to the right of the list, then click **OK**:



You will now see the **Camera** tool icon in the Quick Access Toolbar:



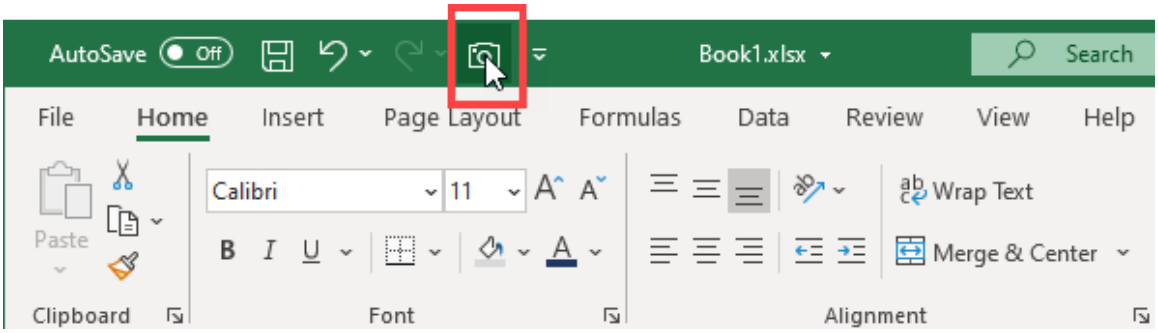
To capture an image, first select the range of cells that you would like to monitor:



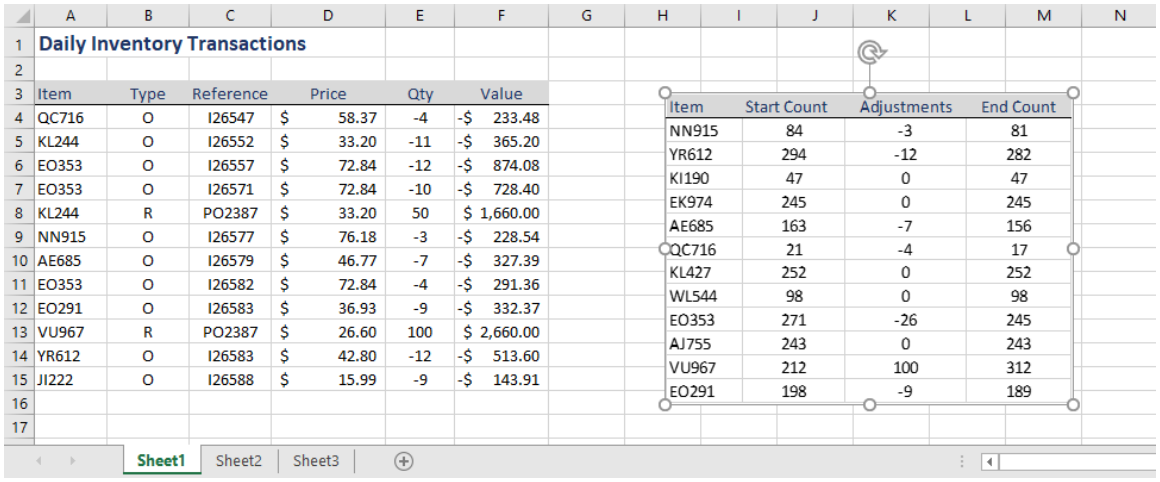
	A	B	C	D	E	F	G	H
1	**Inventory Status**							
2								
3	Item	Start Count	Adjustments	End Count				
4	NN915	84	-3	81				
5	YR612	294	-12	282				
6	KI190	47	0	47				
7	EK974	245	0	245				
8	AE685	163	-7	156				
9	QC716	21	-4	17				
10	KL427	252	0	252				
11	WL544	98	0	98				
12	EO353	271	-26	245				
13	AJ755	243	0	243				
14	VU967	212	100	312				
15	EO291	198	-9	189				
16								
17								
18								
19								
20								

Sheet1 Sheet2 **Sheet3**

Next, click the **Camera** icon in the Quick Access Toolbar:



Finally, go to the location where you want to place the image and click where you would like to place the top left corner. The image will be placed, and when data changes in the original range, it will be updated in the image. The image can also be moved, scaled, or formatted like any other picture:



	A	B	C	D	E	F
1	Daily Inventory Transactions					
2						
3	Item	Type	Reference	Price	Qty	Value
4	QC716	O	I26547	$ 58.37	-4	-$ 233.48
5	KL244	O	I26552	$ 33.20	-11	-$ 365.20
6	EO353	O	I26557	$ 72.84	-12	-$ 874.08
7	EO353	O	I26571	$ 72.84	-10	-$ 728.40
8	KL244	R	PO2387	$ 33.20	50	$ 1,660.00
9	NN915	O	I26577	$ 76.18	-3	-$ 228.54
10	AE685	O	I26579	$ 46.77	-7	-$ 327.39
11	EO353	O	I26582	$ 72.84	-4	-$ 291.36
12	EO291	O	I26583	$ 36.93	-9	-$ 332.37
13	VU967	R	PO2387	$ 26.60	100	$ 2,660.00
14	YR612	O	I26583	$ 42.80	-12	-$ 513.60
15	JI222	O	I26588	$ 15.99	-9	-$ 143.91
16						
17						

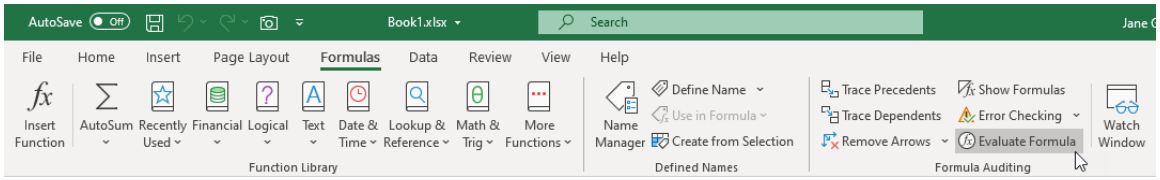
Item	Start Count	Adjustments	End Count
NN915	84	-3	81
YR612	294	-12	282
KI190	47	0	47
EK974	245	0	245
AE685	163	-7	156
QC716	21	-4	17
KL427	252	0	252
WL544	98	0	98
EO353	271	-26	245
AJ755	243	0	243
VU967	212	100	312
EO291	198	-9	189

Sheet1 Sheet2 Sheet3

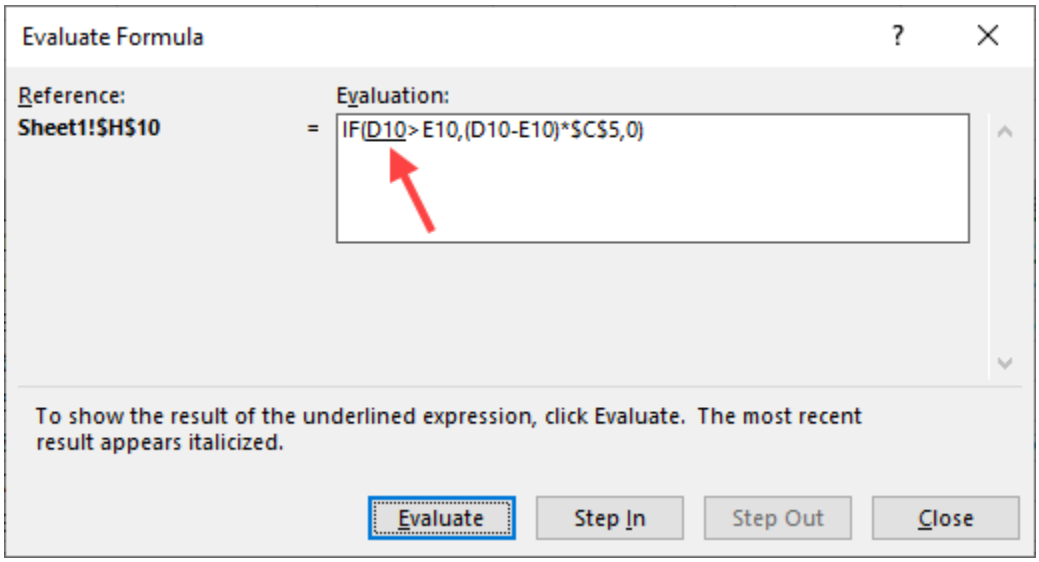
The Evaluate Formula Tool

As your formulas become more complex, and their data sources expand, it can become more difficult to understand exactly how the result is calculated. The **Evaluate Formula** tool allows you to follow the steps through each operation in a formula, in the order they are executed, and see the values and functions that contribute to the result.

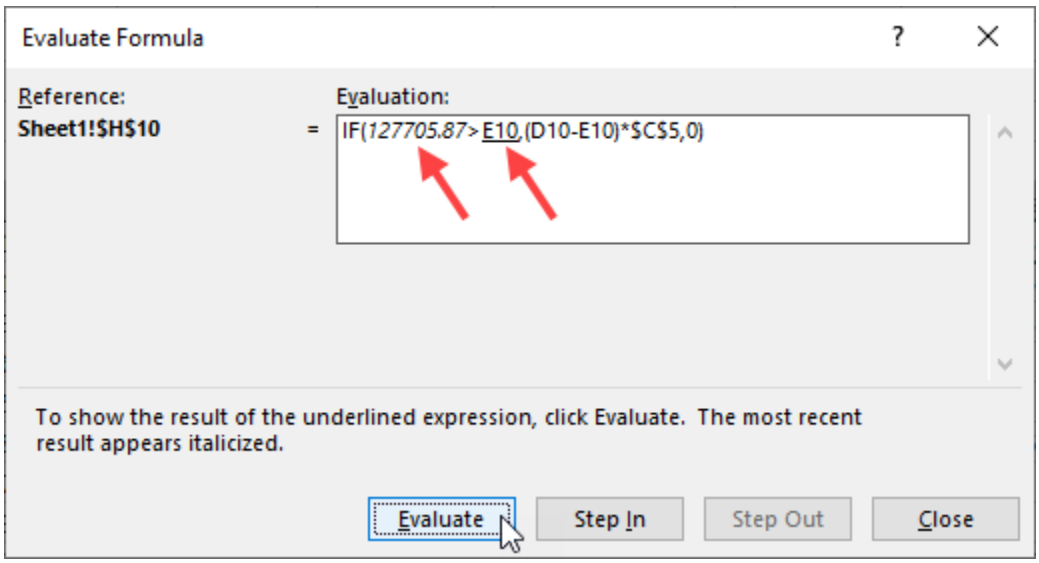
To begin, first select a formula that you would like to evaluate and click **Formulas → Evaluate Formula:**



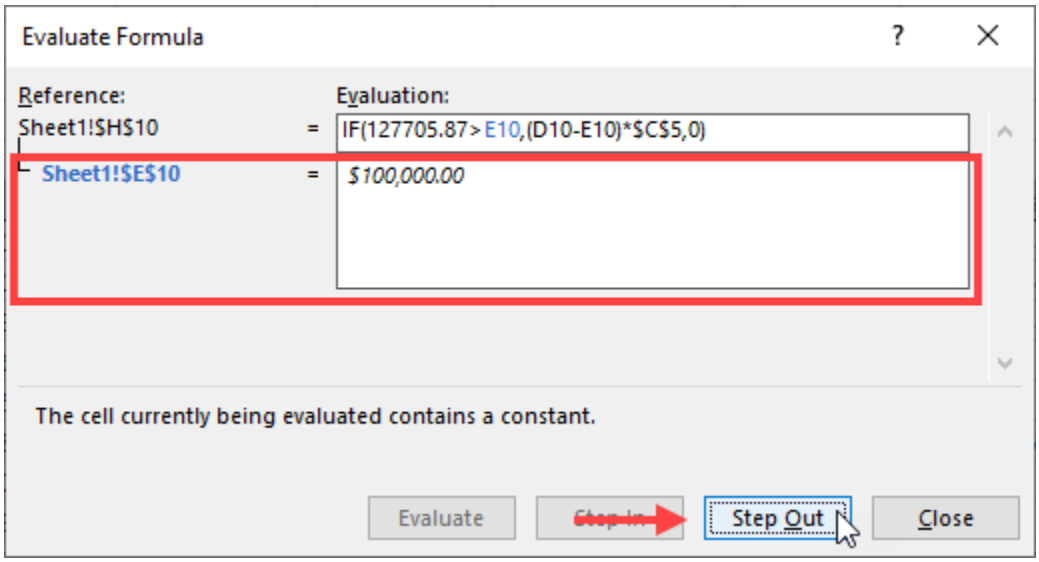
When the **Evaluate Formula** window opens, Excel will display the formula as it is written in the worksheet. The first part of the formula to be evaluated will be underlined:



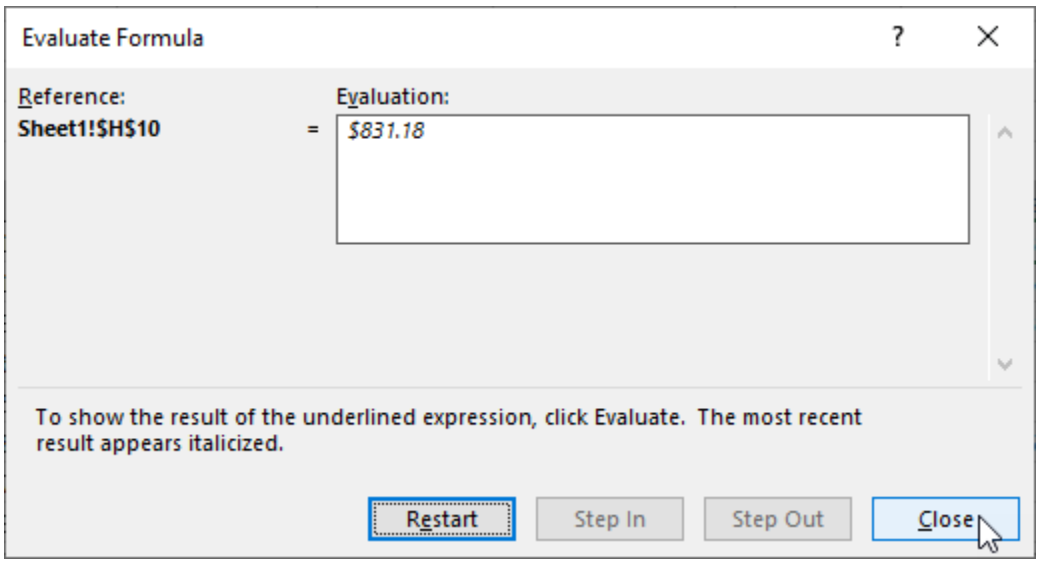
Clicking **Evaluate** triggers Excel to evaluate the underlined part of the formula and display the result, in italics. The next element of the formula to be evaluated will then be underlined:



Clicking **Step In** will let you examine the formula or value of the underlined cell. To continue evaluating click **Step Out**:



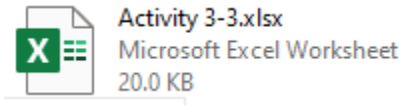
You can continue to evaluate each step in the formula until you have reached the result, which is the result displayed in the cell you have selected. You can begin the evaluation again by clicking **Restart,** or finish the evaluation by clicking **Close**:



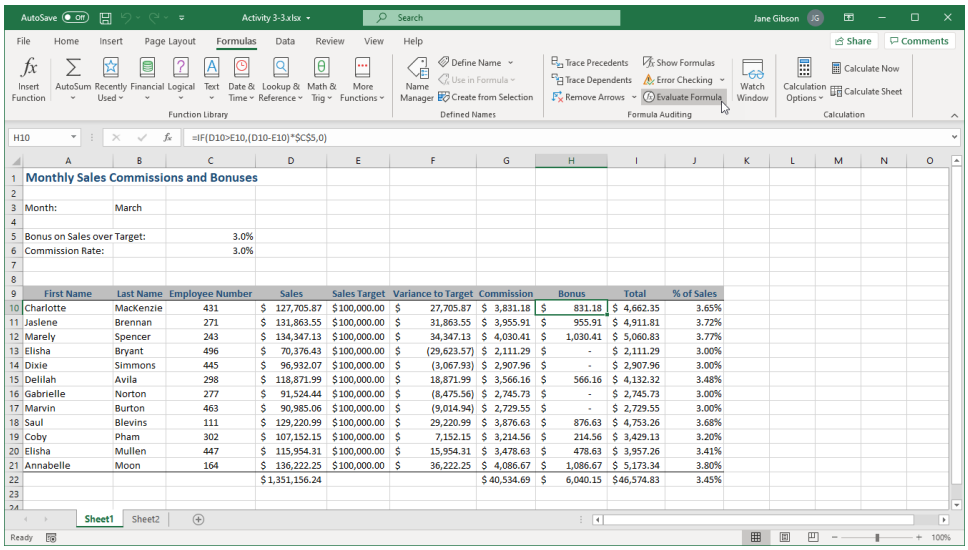
Activity 3-3: Evaluating Formulas and Using the Watch Window

You have been asked to look at the impact of adjusting the sales commissions and bonuses for the sales team, but the inputs are on a separate sheet from the calculations.

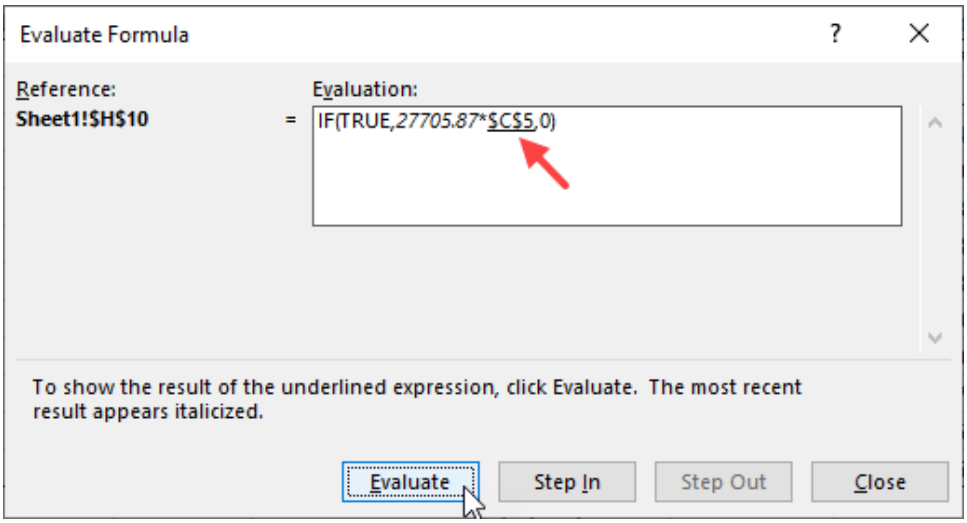
1. To begin, open **Activity 3-3** from your Exercise Files folder:



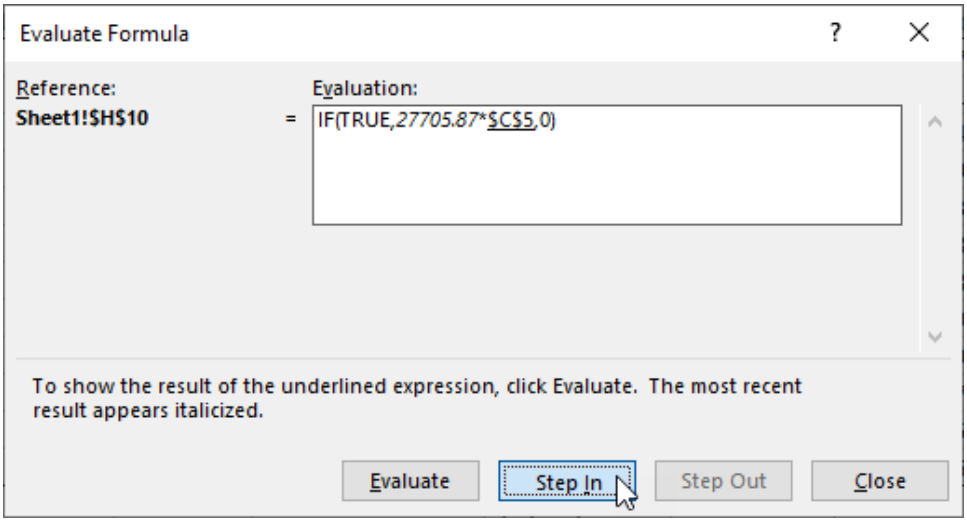
2. First, to understand the bonus calculation, click to select cell **H10**, then click **Formulas → Evaluate Formula**:



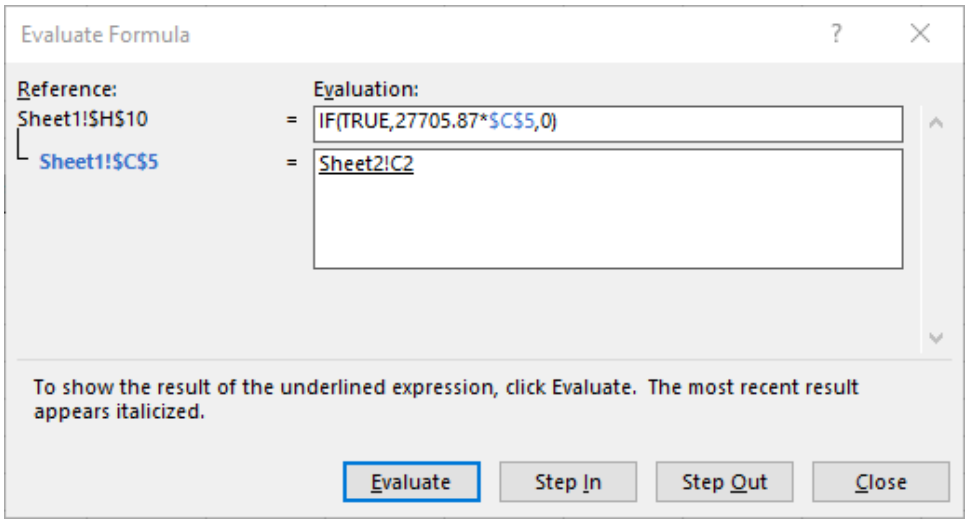
3. In the Evaluate Formula dialog box, click the **Evaluate** button until the reference **"$C$5**" is underlined:



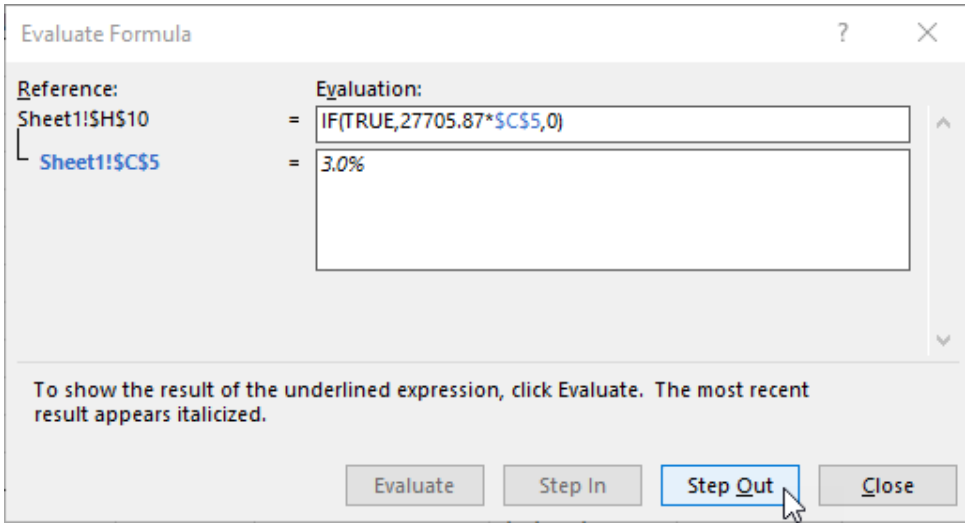
4. Now click the **Step In** button to show the value or source of the reference.



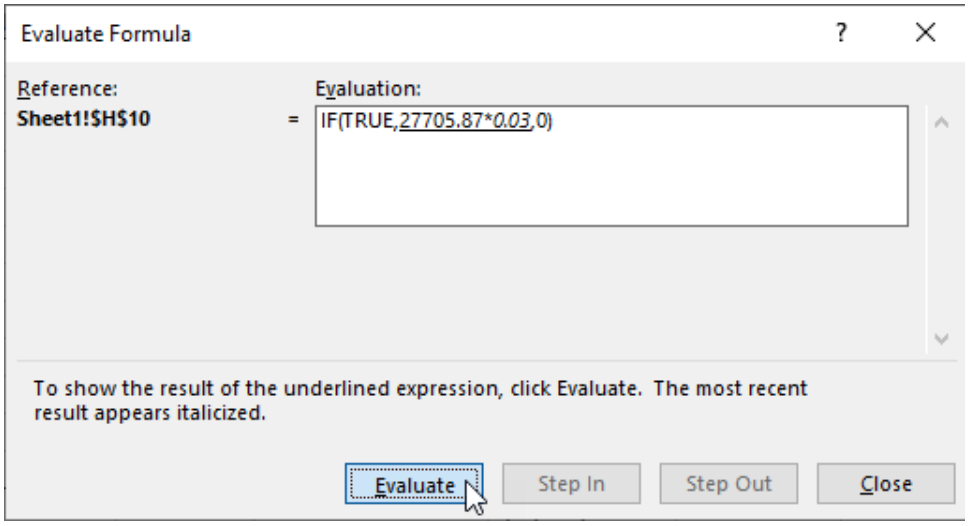
5. You will see that the bonus percentage in cell C5 is located on Sheet2 in cell C2. Click the **Evaluate** button:



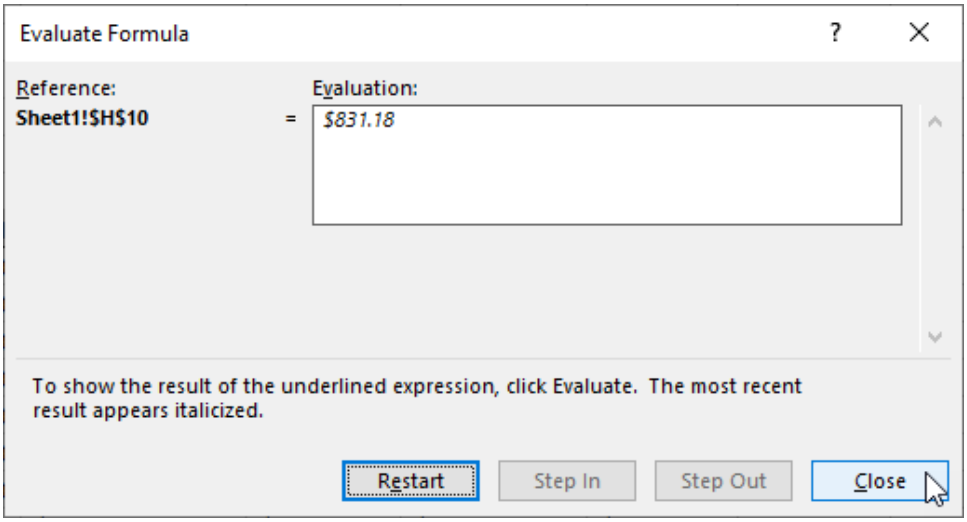
6. You will see that the value of cell C2 in Sheet2 is 3%. Click **Step Out** to return to the formula evaluation:



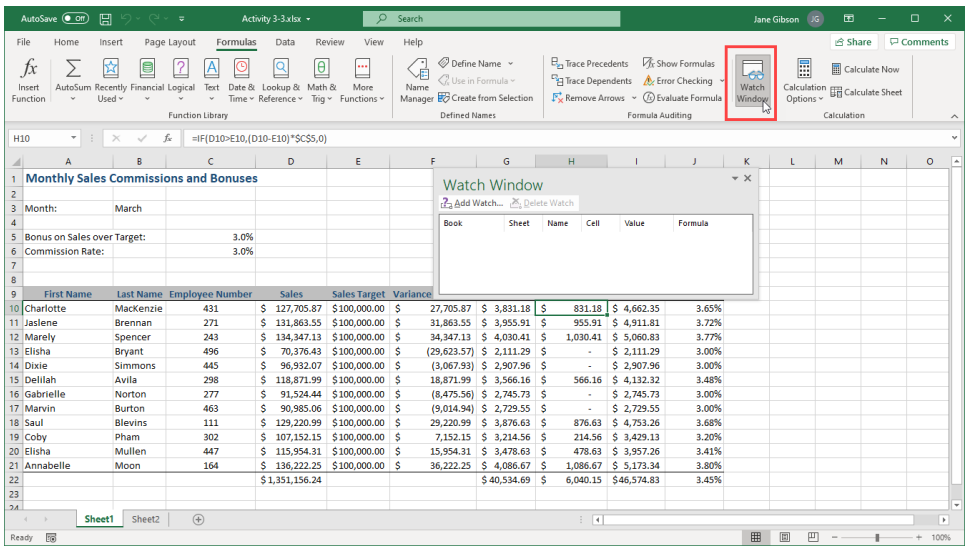
7. Click the **Evaluate** button until the result is displayed.



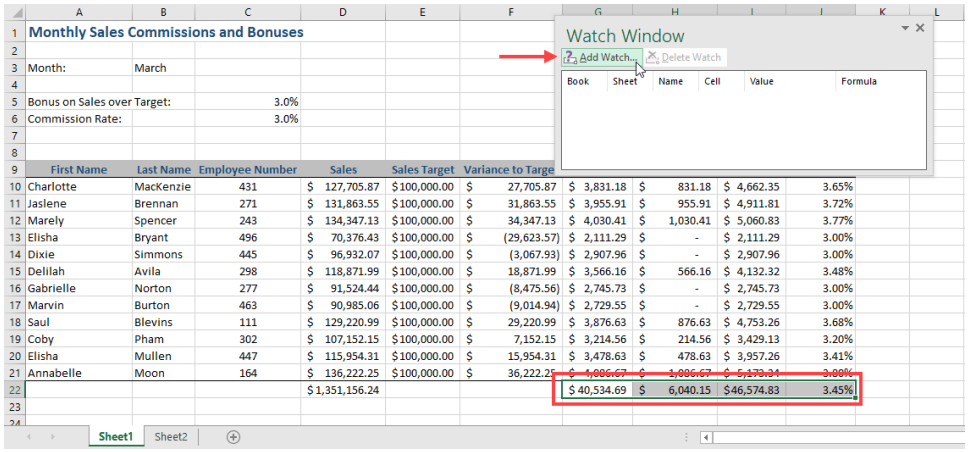
8. You can now click the **Close** button to exit the dialog box:



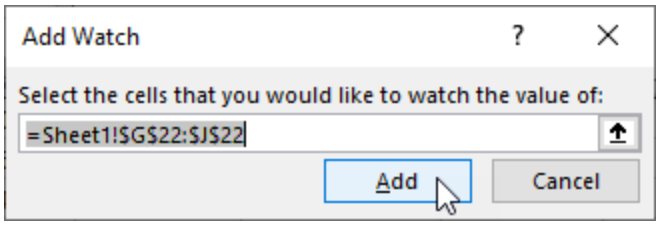
9. You now know you must change the commission and bonus values on Sheet2 to see the results in the total commissions and bonuses on Sheet1. Click **Formulas → Watch Window** to launch the Watch Window dialog box:



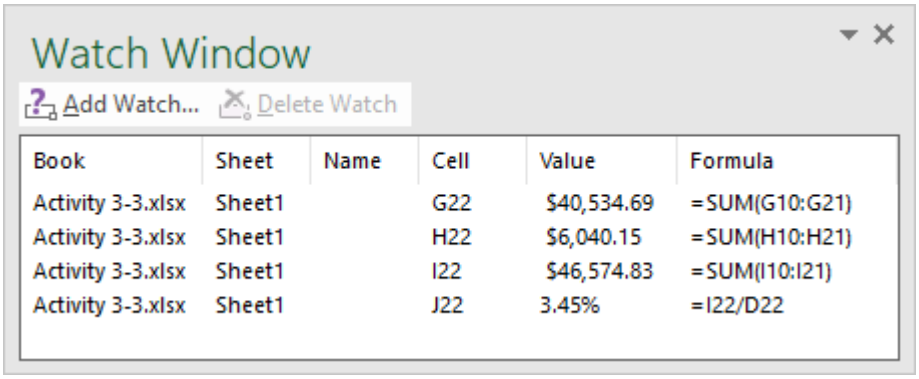
10. Now click and drag to select cells **G22:J22**, then click **Add Watch** in the Watch Window dialog box:



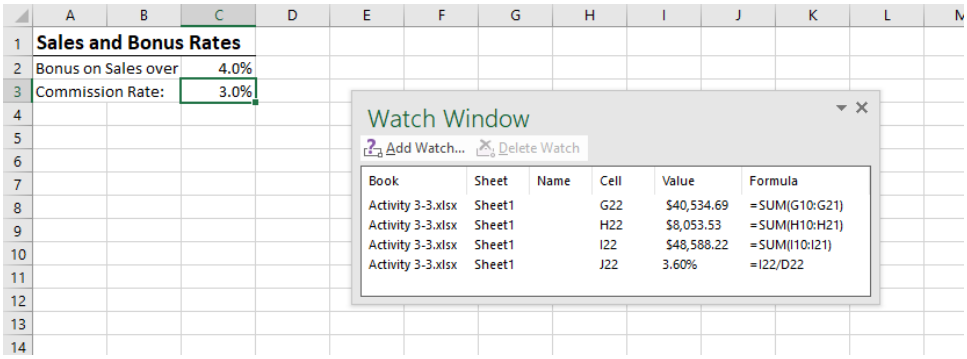
11. The Add Watch dialog box will appear. Confirm the selection is correct and click the **Add** button:



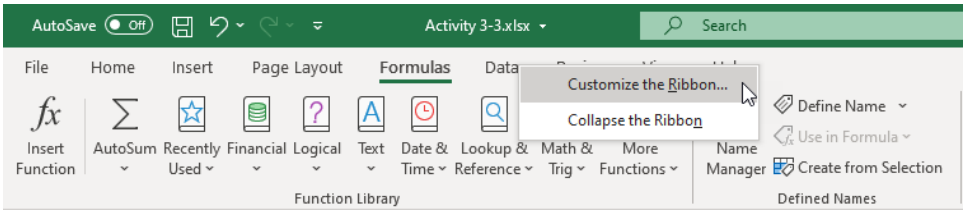
12. The Watch Window dialog box will appear, and the details of the selected cells will be displayed:



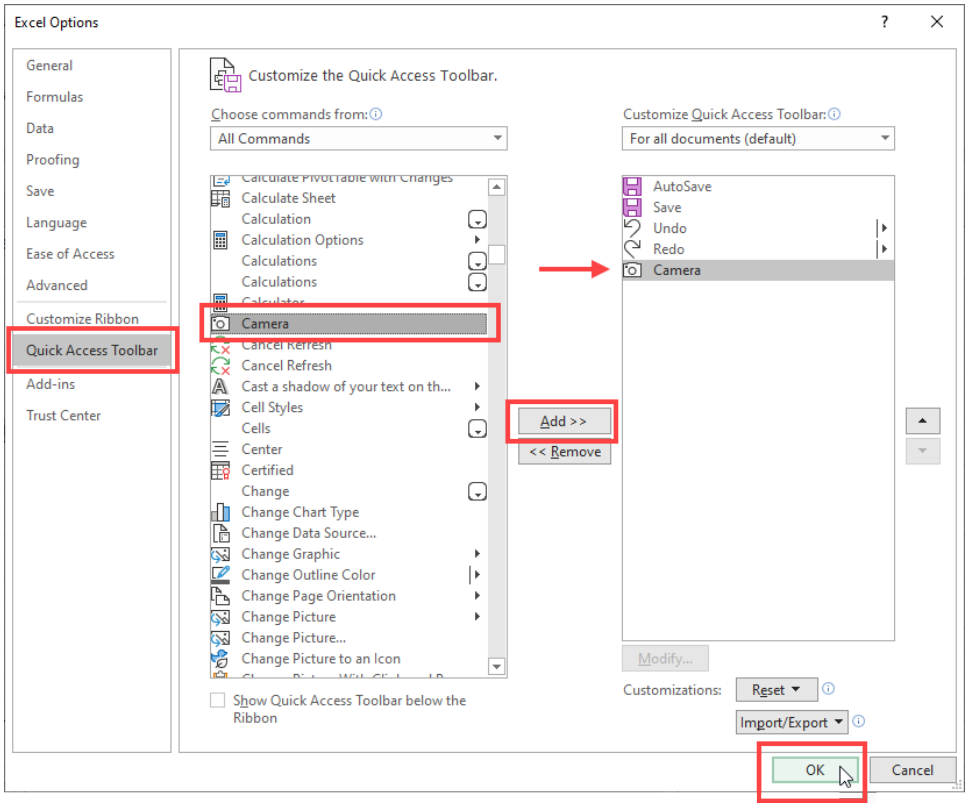
13. Now click on the **Sheet2** tab to switch to Sheet2. Select cell **C2** and change the value to **4%**. You will see the values in the Watch Window update to reflect this change:



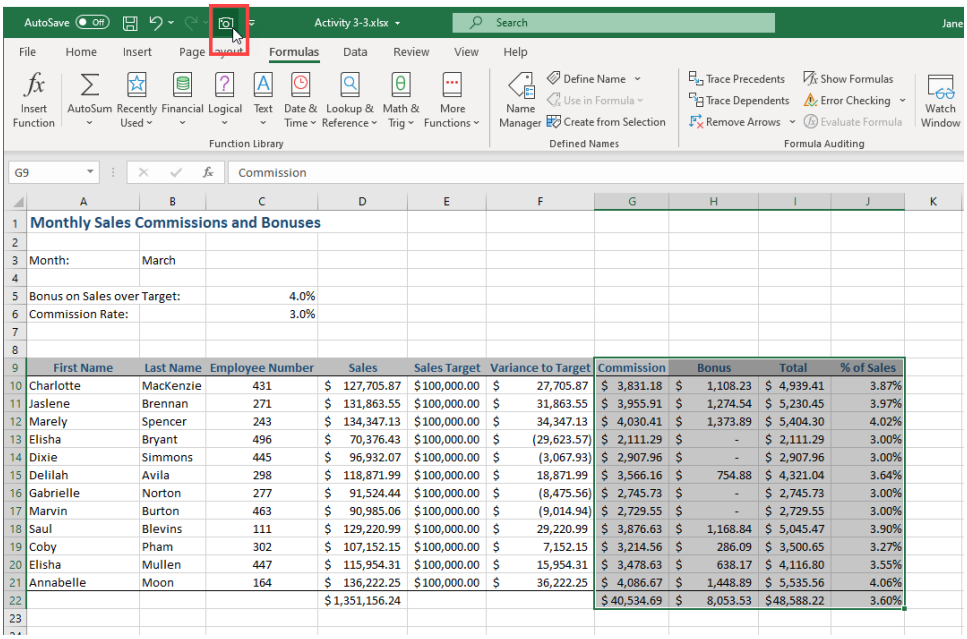
14. You can now close the Watch Window dialog box and return to **Sheet1**. You can add the Camera tool to the Quick Access Toolbar by right-clicking any of the tabs in the ribbon list and clicking **Customize the Ribbon**:



15. Select the **Quick Access Toolbar** category, then select **All Commands** from the **Choose Commands From** drop-down list, scroll down and click the **Camera** option. Click the **Add** button to add the Camera tool to the **Customize Quick Access Toolbar** list, then click **OK**:



16. Click and drag to select cells **G9:J22**, then click the **Camera** icon in the Quick Access Toolbar:



	A	B	C	D	E	F	G	H	I	J	K
1	**Monthly Sales Commissions and Bonuses**										
2											
3	Month:	March									
4											
5	Bonus on Sales over Target:		4.0%								
6	Commission Rate:		3.0%								
7											
8											
9	First Name	Last Name	Employee Number	Sales	Sales Target	Variance to Target	Commission	Bonus	Total	% of Sales	
10	Charlotte	MacKenzie	431	$ 127,705.87	$100,000.00	$ 27,705.87	$ 3,831.18	$ 1,108.23	$ 4,939.41	3.87%	
11	Jaslene	Brennan	271	$ 131,863.55	$100,000.00	$ 31,863.55	$ 3,955.91	$ 1,274.54	$ 5,230.45	3.97%	
12	Marely	Spencer	243	$ 134,347.13	$100,000.00	$ 34,347.13	$ 4,030.41	$ 1,373.89	$ 5,404.30	4.02%	
13	Elisha	Bryant	496	$ 70,376.43	$100,000.00	$ (29,623.57)	$ 2,111.29	$ -	$ 2,111.29	3.00%	
14	Dixie	Simmons	445	$ 96,932.07	$100,000.00	$ (3,067.93)	$ 2,907.96	$ -	$ 2,907.96	3.00%	
15	Delilah	Avila	298	$ 118,871.99	$100,000.00	$ 18,871.99	$ 3,566.16	$ 754.88	$ 4,321.04	3.64%	
16	Gabrielle	Norton	277	$ 91,524.44	$100,000.00	$ (8,475.56)	$ 2,745.73	$ -	$ 2,745.73	3.00%	
17	Marvin	Burton	463	$ 90,985.06	$100,000.00	$ (9,014.94)	$ 2,729.55	$ -	$ 2,729.55	3.00%	
18	Saul	Blevins	111	$ 129,220.99	$100,000.00	$ 29,220.99	$ 3,876.63	$ 1,168.84	$ 5,045.47	3.90%	
19	Coby	Pham	302	$ 107,152.15	$100,000.00	$ 7,152.15	$ 3,214.56	$ 286.09	$ 3,500.65	3.27%	
20	Elisha	Mullen	447	$ 115,954.31	$100,000.00	$ 15,954.31	$ 3,478.63	$ 638.17	$ 4,116.80	3.55%	
21	Annabelle	Moon	164	$ 136,222.25	$100,000.00	$ 36,222.25	$ 4,086.67	$ 1,448.89	$ 5,535.56	4.06%	
22				$ 1,351,156.24			$ 40,534.69	$ 8,053.53	$ 48,588.22	3.60%	
23											

17. Now switch to **Sheet2** and click your mouse to the right of the **Sales and Bonus Rates** data. An image of the cells selected on Sheet1 will appear:

	A	B	C	D	E	F	G	H	I	J	K
1	**Sales and Bonus Rates**										
2	Bonus on Sales over		4.0%								
3	Commission Rate:		3.0%								
4					Commission		Bonus		Total	% of Sales	
5					$ 3,831.18		$ 1,108.23		$ 4,939.41	3.87%	
6					$ 3,955.91		$ 1,274.54		$ 5,230.45	3.97%	
7					$ 4,030.41		$ 1,373.89		$ 5,404.30	4.02%	
8					$ 2,111.29		$ -		$ 2,111.29	3.00%	
9					$ 2,907.96		$ -		$ 2,907.96	3.00%	
10					$ 3,566.16		$ 754.88		$ 4,321.04	3.64%	
11					$ 2,745.73		$ -		$ 2,745.73	3.00%	
12					$ 2,729.55		$ -		$ 2,729.55	3.00%	
13					$ 3,876.63		$ 1,168.84		$ 5,045.47	3.90%	
14					$ 3,214.56		$ 286.09		$ 3,500.65	3.27%	
15					$ 3,478.63		$ 638.17		$ 4,116.80	3.55%	
16					$ 4,086.67		$ 1,448.89		$ 5,535.56	4.06%	
17					$ 40,534.69		$ 8,053.53		$ 48,588.22	3.60%	
18											

18. Change the value in cell **C2** to **5%** and notice the values have changed in your image:

	A	B	C	D	E	F	G	H	I	J	K
1	**Sales and Bonus Rates**										
2	Bonus on Sales over		5.0%								
3	Commission Rate:		3.0%								
4											
5					Commission		Bonus		Total	% of Sales	
6					$ 3,831.18		$ 1,385.29		$ 5,216.47	4.08%	
7					$ 3,955.91		$ 1,593.18		$ 5,549.08	4.21%	
8					$ 4,030.41		$ 1,717.36		$ 5,747.77	4.28%	
9					$ 2,111.29		$ -		$ 2,111.29	3.00%	
10					$ 2,907.96		$ -		$ 2,907.96	3.00%	
11					$ 3,566.16		$ 943.60		$ 4,509.76	3.79%	
12					$ 2,745.73		$ -		$ 2,745.73	3.00%	
13					$ 2,729.55		$ -		$ 2,729.55	3.00%	
14					$ 3,876.63		$ 1,461.05		$ 5,337.68	4.13%	
15					$ 3,214.56		$ 357.61		$ 3,572.17	3.33%	
16					$ 3,478.63		$ 797.72		$ 4,276.34	3.69%	
17					$ 4,086.67		$ 1,811.11		$ 5,897.78	4.33%	
18					$ 40,534.69		$ 10,066.91		$ 50,601.60	3.75%	
19											

19. Save the current workbook as **Activity 3-3 Complete** and then close Microsoft Excel 365 to complete the activity.

TOPIC D: Data List Outlines

Dealing with large amounts of data in a worksheet can make it difficult to isolate and understand the information that is most important for you, or other users. Outlines and subtotals are tools that can help you summarize and present information in a clear and concise way. In this topic you will learn how to use outlines and subtotals to organize your data.

Topic Objectives

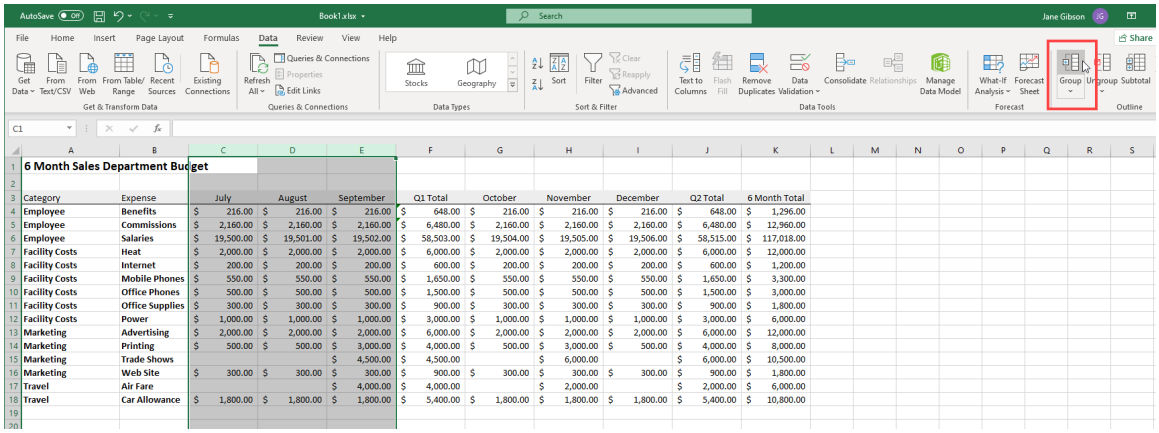
In this session, you will learn about:

- Outlines
- Auto outlines
- The Subtotal command

Outlines

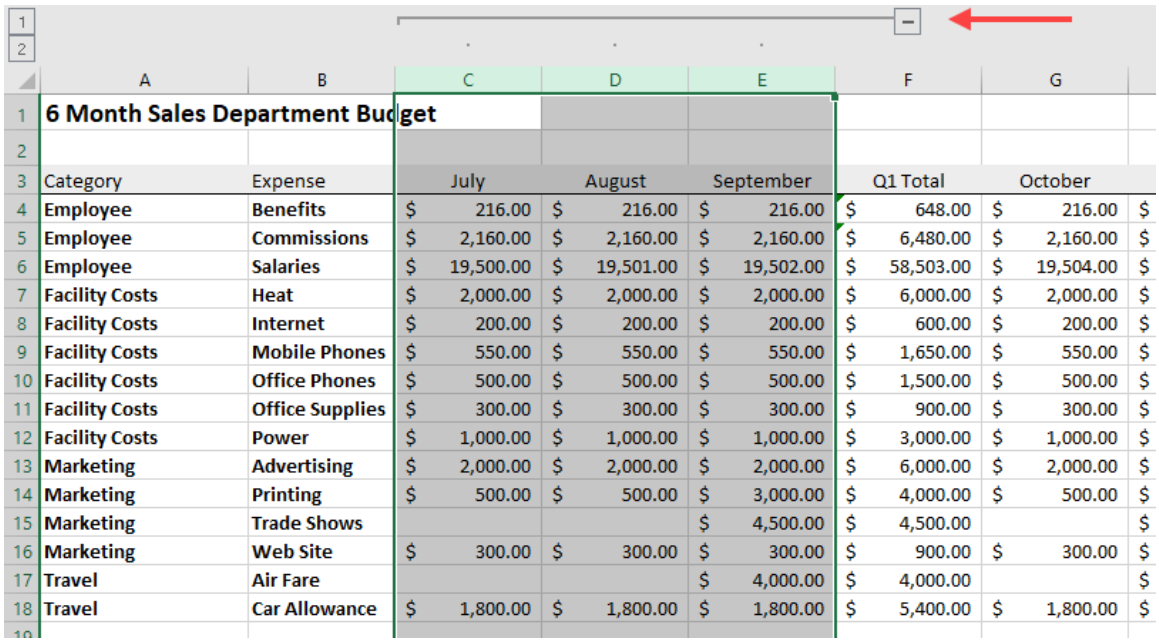
Outlines are an organizational tool that will allow you to group and present large amounts of data in a way that is easy to read and understand, while maintaining the ability to drill down into a detailed view.

The first step to creating outlines is to group your data. You can do this manually by selecting rows or columns in your worksheet and clicking **Data → Group**:



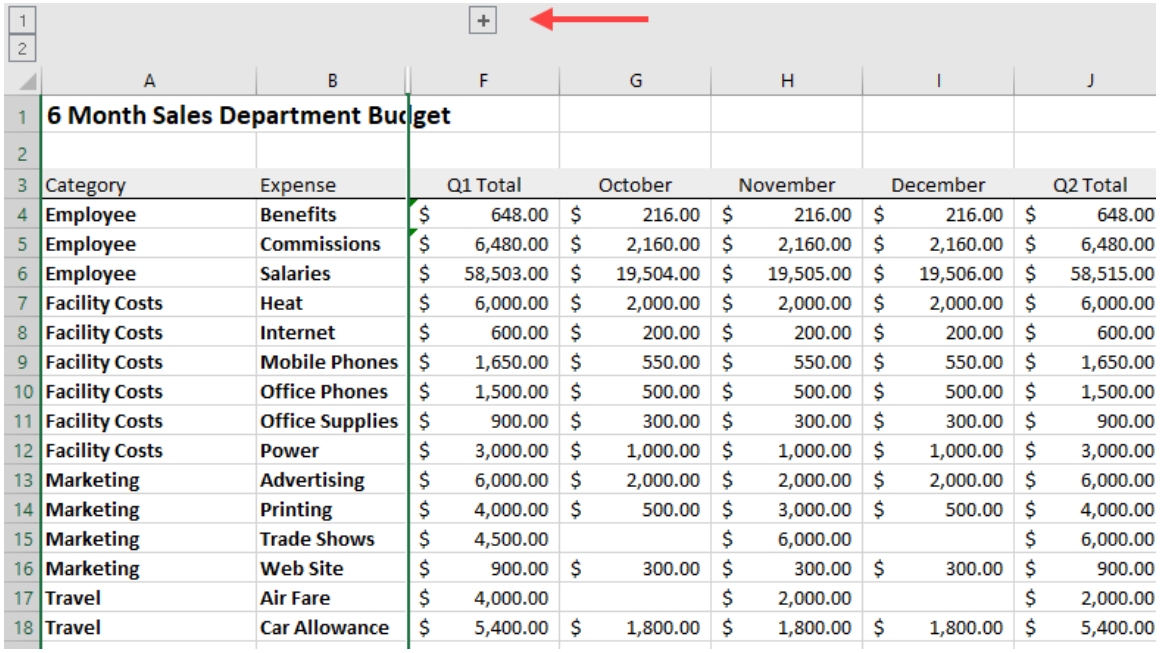
	A	B	C	D	E	F	G	H	I	J	K
1	6 Month Sales Department Budget										
2											
3	Category	Expense	July	August	September	Q1 Total	October	November	December	Q2 Total	6 Month Total
4	Employee	Benefits	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 1,296.00
5	Employee	Commissions	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 12,960.00
6	Employee	Salaries	$ 19,500.00	$ 19,501.00	$ 19,502.00	$ 58,503.00	$ 19,504.00	$ 19,505.00	$ 19,506.00	$ 58,515.00	$ 117,018.00
7	Facility Costs	Heat	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 12,000.00
8	Facility Costs	Internet	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 1,200.00
9	Facility Costs	Mobile Phones	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 3,300.00
10	Facility Costs	Office Phones	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 3,000.00
11	Facility Costs	Office Supplies	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 1,800.00
12	Facility Costs	Power	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 6,000.00
13	Marketing	Advertising	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 12,000.00
14	Marketing	Printing	$ 500.00	$ 500.00	$ 3,000.00	$ 4,000.00	$ 500.00	$ 3,000.00	$ 500.00	$ 4,000.00	$ 8,000.00
15	Marketing	Trade Shows			$ 4,500.00	$ 4,500.00		$ 6,000.00		$ 6,000.00	$ 10,500.00
16	Marketing	Web Site	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 1,800.00
17	Travel	Air Fare			$ 4,000.00	$ 4,000.00		$ 2,000.00		$ 2,000.00	$ 6,000.00
18	Travel	Car Allowance	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 10,800.00

Above the selected columns, a bar will appear, with a minus (-) sign in a box to the right:



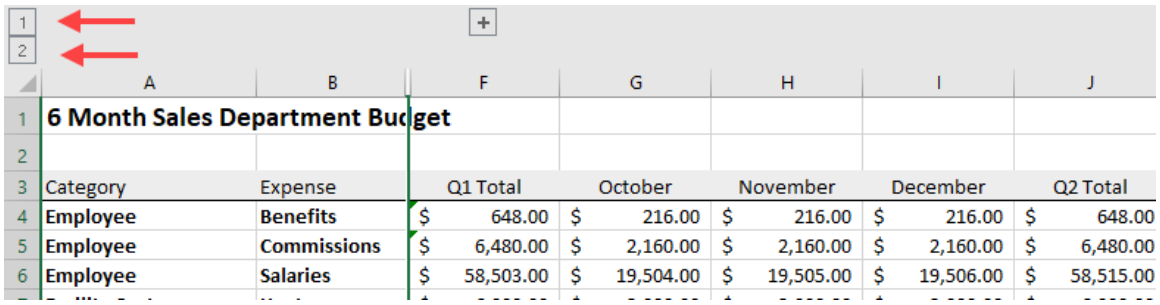
	A	B	C	D	E	F	G	
1	6 Month Sales Department Budget							
2								
3	Category	Expense	July	August	September	Q1 Total	October	
4	Employee	Benefits	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 216.00	$
5	Employee	Commissions	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 2,160.00	$
6	Employee	Salaries	$ 19,500.00	$ 19,501.00	$ 19,502.00	$ 58,503.00	$ 19,504.00	$
7	Facility Costs	Heat	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$
8	Facility Costs	Internet	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 200.00	$
9	Facility Costs	Mobile Phones	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 550.00	$
10	Facility Costs	Office Phones	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 500.00	$
11	Facility Costs	Office Supplies	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$
12	Facility Costs	Power	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 1,000.00	$
13	Marketing	Advertising	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$
14	Marketing	Printing	$ 500.00	$ 500.00	$ 3,000.00	$ 4,000.00	$ 500.00	$
15	Marketing	Trade Shows			$ 4,500.00	$ 4,500.00		$
16	Marketing	Web Site	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$
17	Travel	Air Fare			$ 4,000.00	$ 4,000.00		$
18	Travel	Car Allowance	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 1,800.00	$

Clicking the minus (-) sign will collapse the columns so that they are no longer visible, and only a box will remain, containing a plus (**+**) sign:



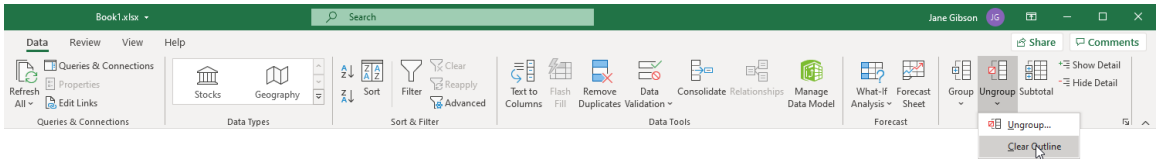
	A	B	F	G	H	I	J
1	**6 Month Sales Department Budget**						
2							
3	Category	Expense	Q1 Total	October	November	December	Q2 Total
4	**Employee**	**Benefits**	$ 648.00	$ 216.00	$ 216.00	$ 216.00	$ 648.00
5	**Employee**	**Commissions**	$ 6,480.00	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00
6	**Employee**	**Salaries**	$ 58,503.00	$ 19,504.00	$ 19,505.00	$ 19,506.00	$ 58,515.00
7	**Facility Costs**	**Heat**	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00
8	**Facility Costs**	**Internet**	$ 600.00	$ 200.00	$ 200.00	$ 200.00	$ 600.00
9	**Facility Costs**	**Mobile Phones**	$ 1,650.00	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00
10	**Facility Costs**	**Office Phones**	$ 1,500.00	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00
11	**Facility Costs**	**Office Supplies**	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00
12	**Facility Costs**	**Power**	$ 3,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00
13	**Marketing**	**Advertising**	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00
14	**Marketing**	**Printing**	$ 4,000.00	$ 500.00	$ 3,000.00	$ 500.00	$ 4,000.00
15	**Marketing**	**Trade Shows**	$ 4,500.00		$ 6,000.00		$ 6,000.00
16	**Marketing**	**Web Site**	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00
17	**Travel**	**Air Fare**	$ 4,000.00		$ 2,000.00		$ 2,000.00
18	**Travel**	**Car Allowance**	$ 5,400.00	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00

You will also see there are two boxes, in the top left of the window, one above the other, numbered one (**1**) and two (**2**). Clicking two (**2**) will expand the group, while clicking one (**1**) will collapse the group:



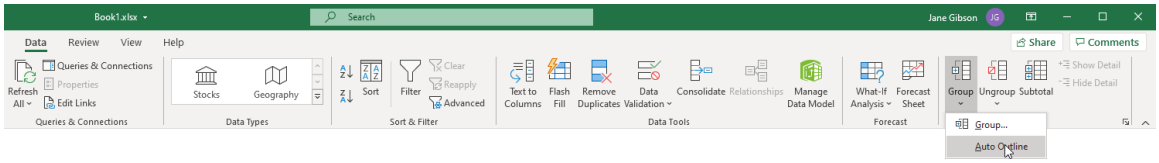
	A	B	F	G	H	I	J
1	**6 Month Sales Department Budget**						
2							
3	Category	Expense	Q1 Total	October	November	December	Q2 Total
4	**Employee**	**Benefits**	$ 648.00	$ 216.00	$ 216.00	$ 216.00	$ 648.00
5	**Employee**	**Commissions**	$ 6,480.00	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00
6	**Employee**	**Salaries**	$ 58,503.00	$ 19,504.00	$ 19,505.00	$ 19,506.00	$ 58,515.00

To remove outlines, click the **Ungroup** drop-down in the Outline group, then click **Clear Outline**:



Auto Outline

You can also have Excel group your data automatically, based on the data structure. To do this, click the **Group** drop-down arrow, then click **Auto Outline**:



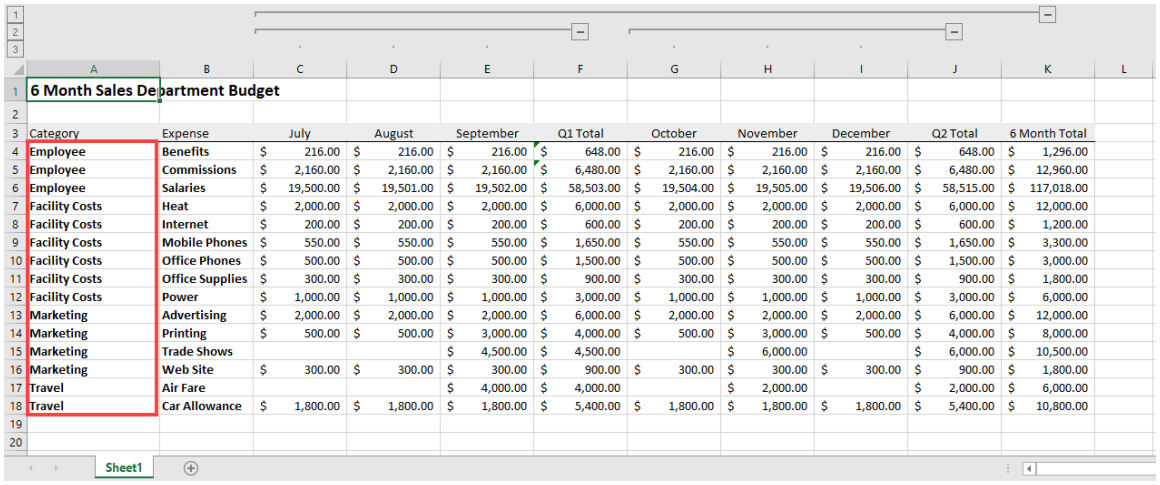
Excel will examine your data and create groups based on the structure. In this example, Excel has created a group for each quarter total and another one for the 6 Month Total:

	A	B	C	D	E	F	G	H	I	J	K	L
1	6 Month Sales Department Budget											
2												
3	Category	Expense	July	August	September	Q1 Total	October	November	December	Q2 Total	6 Month Total	
4	Employee	Benefits	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 1,296.00	
5	Employee	Commissions	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 12,960.00	
6	Employee	Salaries	$ 19,500.00	$ 19,501.00	$ 19,502.00	$ 58,503.00	$ 19,504.00	$ 19,505.00	$ 19,506.00	$ 58,515.00	$ 117,018.00	
7	Facility Costs	Heat	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 12,000.00	
8	Facility Costs	Internet	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 1,200.00	
9	Facility Costs	Mobile Phones	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 3,300.00	
10	Facility Costs	Office Phones	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 3,000.00	
11	Facility Costs	Office Supplies	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 1,800.00	
12	Facility Costs	Power	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 6,000.00	
13	Marketing	Advertising	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 12,000.00	
14	Marketing	Printing	$ 500.00	$ 500.00	$ 3,000.00	$ 4,000.00	$ 500.00	$ 3,000.00	$ 500.00	$ 4,000.00	$ 8,000.00	
15	Marketing	Trade Shows			$ 4,500.00	$ 4,500.00		$ 6,000.00		$ 6,000.00	$ 10,500.00	
16	Marketing	Web Site	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 1,800.00	
17	Travel	Air Fare			$ 4,000.00	$ 4,000.00		$ 2,000.00		$ 2,000.00	$ 6,000.00	
18	Travel	Car Allowance	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 10,800.00	
19												
20												

Sheet1

The Subtotal Command

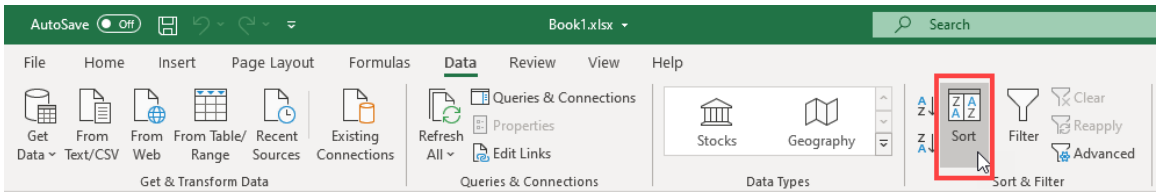
In the previous example, you may have noticed that the two quarter period subtotals were already built into the data, so Excel was able to accurately assign the group to these columns. In Column A, though, there are no subtotals for the expense categories, therefore no groups were assigned. Using the **Subtotal** command, you can quickly add subtotals based on a column of data, in this case, the expense categories:



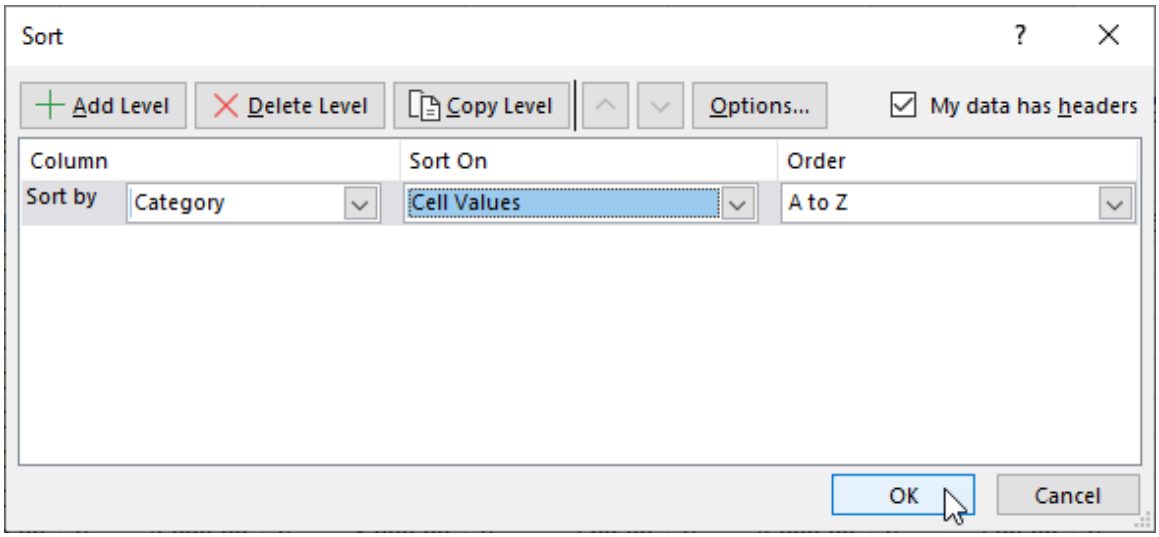
	A	B	C	D	E	F	G	H	I	J	K	L
1	6 Month Sales Department Budget											
2												
3	Category	Expense	July	August	September	Q1 Total	October	November	December	Q2 Total	6 Month Total	
4	Employee	Benefits	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 1,296.00	
5	Employee	Commissions	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 12,960.00	
6	Employee	Salaries	$ 19,500.00	$ 19,501.00	$ 19,502.00	$ 58,503.00	$ 19,504.00	$ 19,505.00	$ 19,506.00	$ 58,515.00	$ 117,018.00	
7	Facility Costs	Heat	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 12,000.00	
8	Facility Costs	Internet	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 1,200.00	
9	Facility Costs	Mobile Phones	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 3,300.00	
10	Facility Costs	Office Phones	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 3,000.00	
11	Facility Costs	Office Supplies	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 1,800.00	
12	Facility Costs	Power	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 6,000.00	
13	Marketing	Advertising	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 12,000.00	
14	Marketing	Printing	$ 500.00	$ 500.00	$ 3,000.00	$ 4,000.00	$ 500.00	$ 3,000.00	$ 500.00	$ 4,000.00	$ 8,000.00	
15	Marketing	Trade Shows			$ 4,500.00	$ 4,500.00		$ 6,000.00		$ 6,000.00	$ 10,500.00	
16	Marketing	Web Site	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 1,800.00	
17	Travel	Air Fare			$ 4,000.00	$ 4,000.00		$ 2,000.00		$ 2,000.00	$ 6,000.00	
18	Travel	Car Allowance	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 10,800.00	
19												
20												

Sheet1

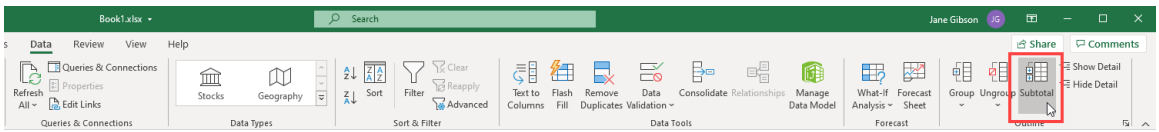
First, you must make sure that your data is sorted by the column on which you wish to calculate the subtotal. To sort the data, click to select any cell in the data set and click **Data → Sort**:



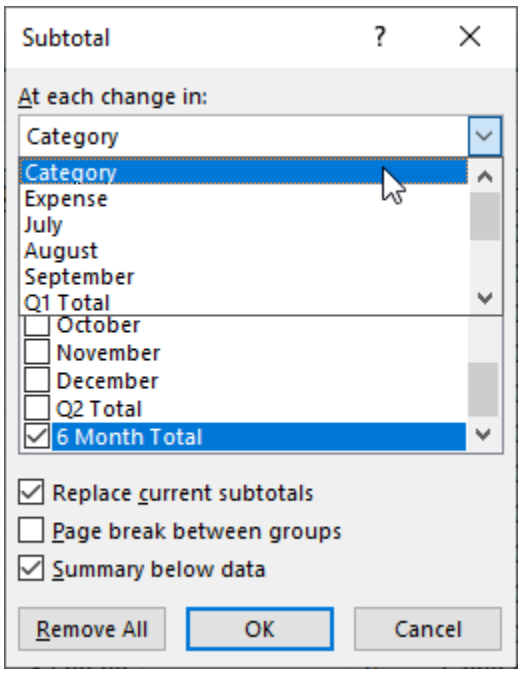
The **Sort** dialog box will open. Select the column to sort by in the **Sort by** drop-down list, and click **OK**:



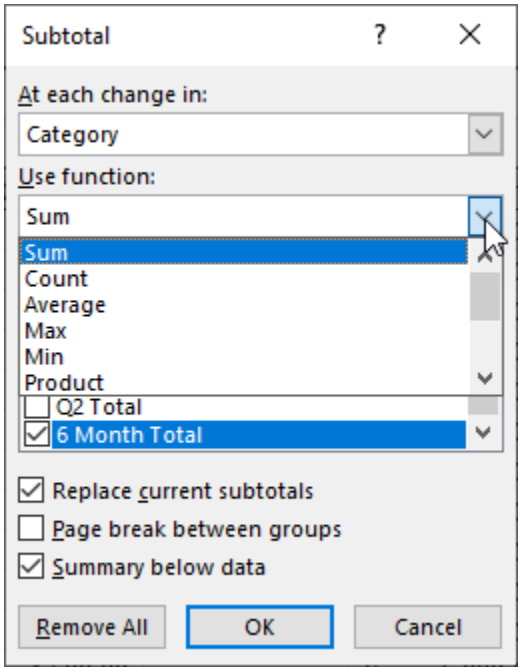
With the data sorted correctly, the Subtotal dialog box can be launched by clicking to select any cell in the data set, and clicking **Data → Subtotal**:



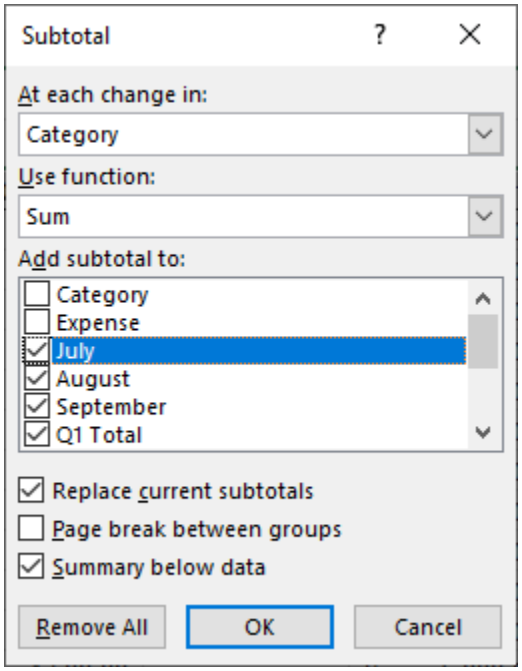
In the **At each change in** drop-down list, you can select the column you wish to subtotal:



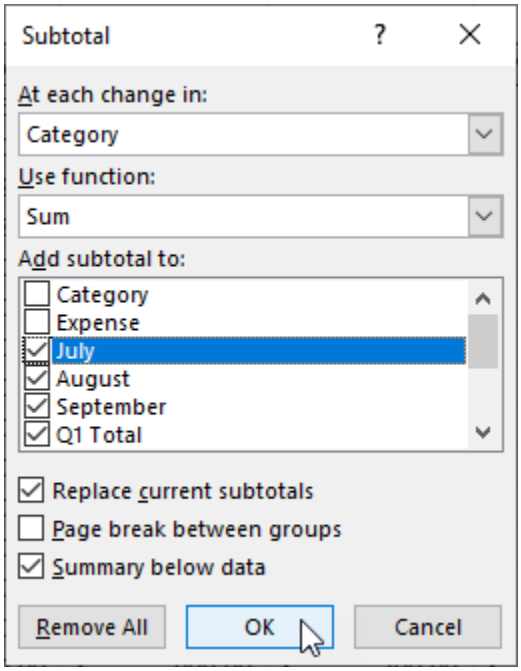
In the **Use function** drop-down list, you can select the function to use for the subtotal. The most commonly used function is **Sum**, but you can also use choose from other options, including **Count**, **Average**, **Max**, **Min**, and **Product**:



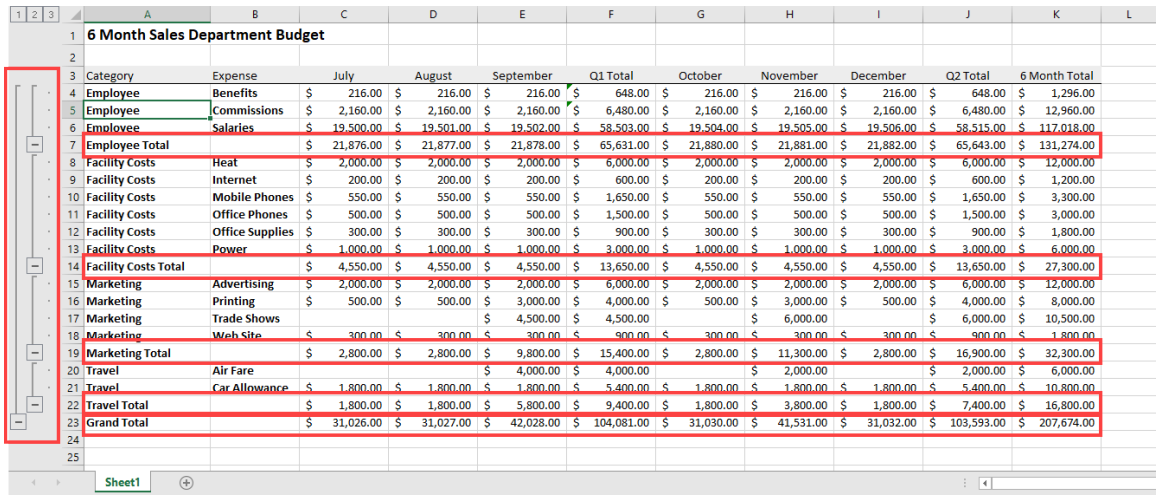
In the **Add subtotal to** list, select the columns that you want to show a subtotal value in. Click the checkbox next to each column to select or deselect it:



Finally, you can choose to replace current subtotals, add page breaks between groups, or add a **Summary** (grand total) below your data, by clicking to select the corresponding checkbox. To complete the process, click **OK**:



Subtotals for each category will be created, a grand total will be added, if selected, and outline bars will appear to the left of the window:

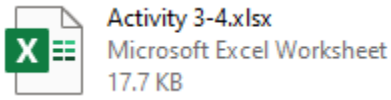


	A	B	C	D	E	F	G	H	I	J	K	L
1	6 Month Sales Department Budget											
2												
3	Category	Expense	July	August	September	Q1 Total	October	November	December	Q2 Total	6 Month Total	
4	Employee	Benefits	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 1,296.00	
5	Employee	Commissions	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 12,960.00	
6	Employee	Salaries	$ 19,500.00	$ 19,501.00	$ 19,502.00	$ 58,503.00	$ 19,504.00	$ 19,505.00	$ 19,506.00	$ 58,515.00	$ 117,018.00	
7	Employee Total		$ 21,876.00	$ 21,877.00	$ 21,878.00	$ 65,631.00	$ 21,880.00	$ 21,881.00	$ 21,882.00	$ 65,643.00	$ 131,274.00	
8	Facility Costs	Heat	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 12,000.00	
9	Facility Costs	Internet	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 1,200.00	
10	Facility Costs	Mobile Phones	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 3,300.00	
11	Facility Costs	Office Phones	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 3,000.00	
12	Facility Costs	Office Supplies	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 1,800.00	
13	Facility Costs	Power	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 6,000.00	
14	Facility Costs Total		$ 4,550.00	$ 4,550.00	$ 4,550.00	$ 13,650.00	$ 4,550.00	$ 4,550.00	$ 4,550.00	$ 13,650.00	$ 27,300.00	
15	Marketing	Advertising	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 12,000.00	
16	Marketing	Printing	$ 500.00	$ 500.00	$ 3,000.00	$ 4,000.00	$ 500.00	$ 3,000.00	$ 500.00	$ 4,000.00	$ 8,000.00	
17	Marketing	Trade Shows			$ 4,500.00	$ 4,500.00		$ 6,000.00		$ 6,000.00	$ 10,500.00	
18	Marketing	Web Site	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 1,800.00	
19	Marketing Total		$ 2,800.00	$ 2,800.00	$ 9,800.00	$ 15,400.00	$ 2,800.00	$ 11,300.00	$ 2,800.00	$ 16,900.00	$ 32,300.00	
20	Travel	Air Fare			$ 4,000.00	$ 4,000.00		$ 2,000.00		$ 2,000.00	$ 6,000.00	
21	Travel	Car Allowance	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 10,800.00	
22	Travel Total		$ 1,800.00	$ 1,800.00	$ 5,800.00	$ 9,400.00	$ 1,800.00	$ 3,800.00	$ 1,800.00	$ 7,400.00	$ 16,800.00	
23	Grand Total		$ 31,026.00	$ 31,027.00	$ 42,028.00	$ 104,081.00	$ 31,030.00	$ 41,531.00	$ 31,032.00	$ 103,593.00	$ 207,674.00	
24												
25												

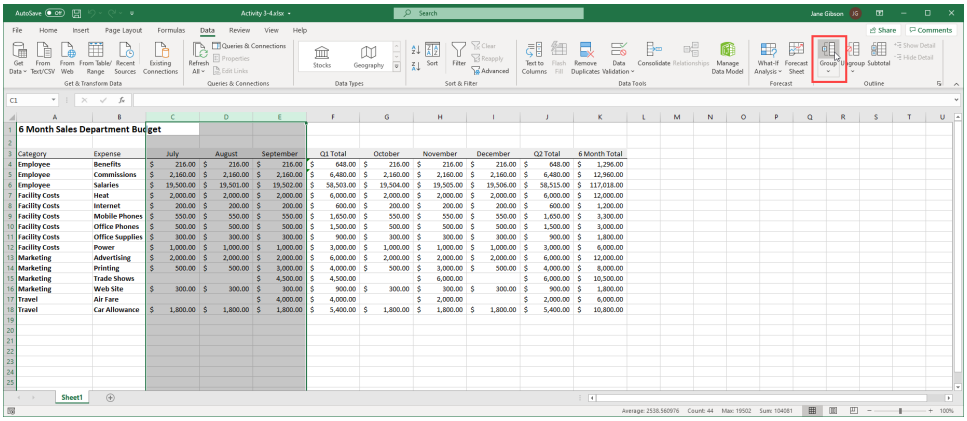
Activity 3-4: Creating a Data List Outline

You have been asked to create a Sales Expense budget for the last six months of the year. To simplify the presentation of the data you choose to use outlines.

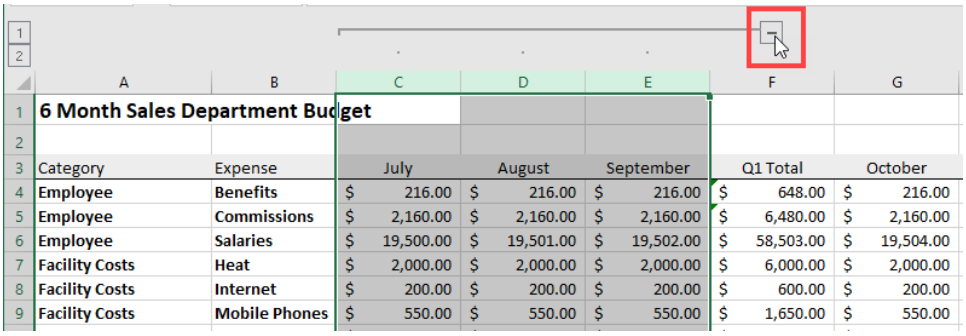
1. To begin, open **Activity 3-4** from your Exercise Files folder:



2. Select columns **C to E**, then click **Data → Group**:

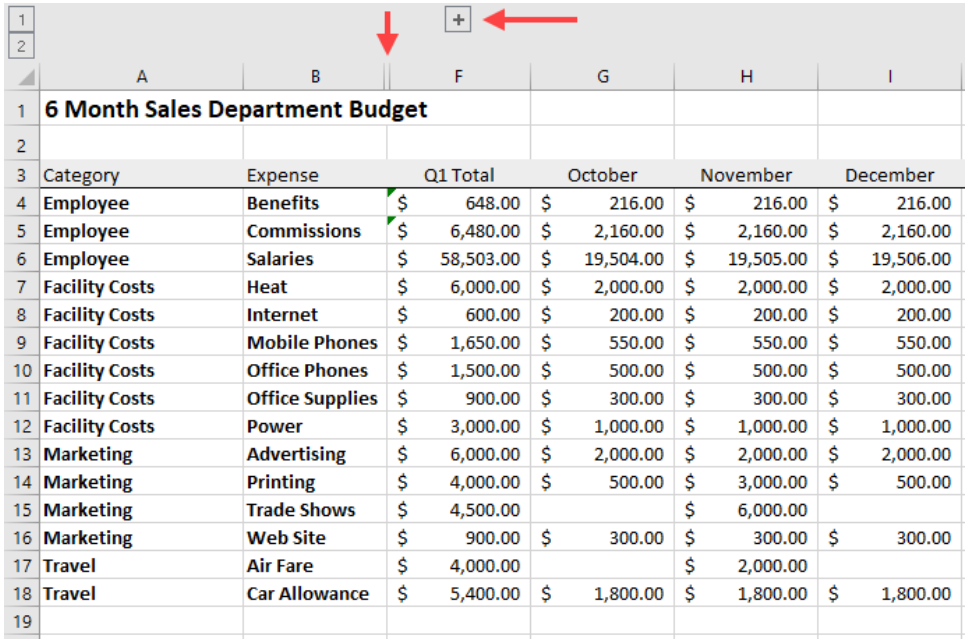


3. Click on the minus (-) sign next to the outline bar above the data:



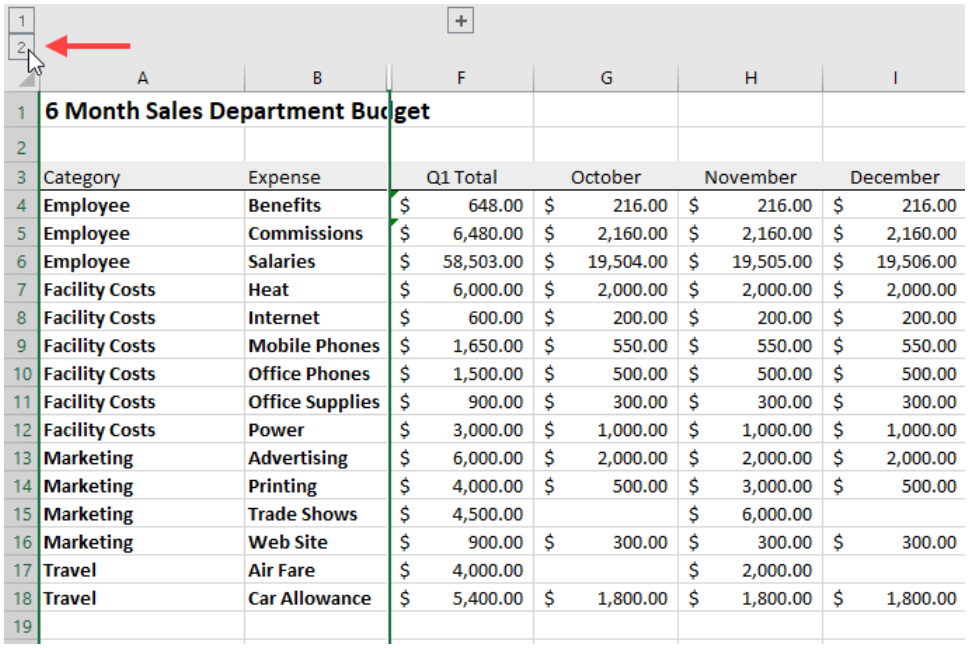
	A	B	C	D	E	F	G
1	6 Month Sales Department Budget						
2							
3	Category	Expense	July	August	September	Q1 Total	October
4	Employee	Benefits	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 216.00
5	Employee	Commissions	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 2,160.00
6	Employee	Salaries	$ 19,500.00	$ 19,501.00	$ 19,502.00	$ 58,503.00	$ 19,504.00
7	Facility Costs	Heat	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00
8	Facility Costs	Internet	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 200.00
9	Facility Costs	Mobile Phones	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 550.00

4. You will see that the columns have collapsed and there is a plus (**+**) sign above column F:



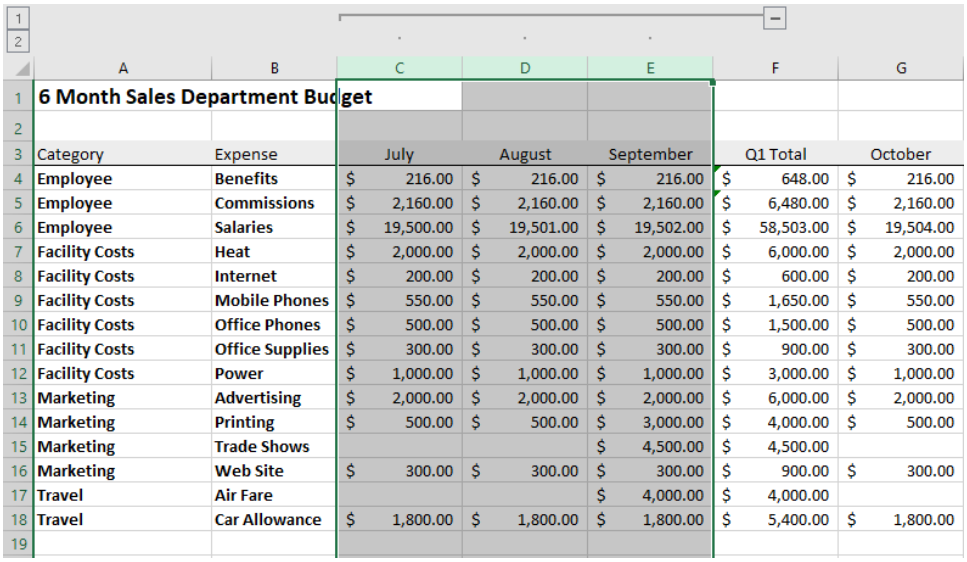
	A	B	F	G	H	I
1	**6 Month Sales Department Budget**					
2						
3	Category	Expense	Q1 Total	October	November	December
4	**Employee**	**Benefits**	$ 648.00	$ 216.00	$ 216.00	$ 216.00
5	**Employee**	**Commissions**	$ 6,480.00	$ 2,160.00	$ 2,160.00	$ 2,160.00
6	**Employee**	**Salaries**	$ 58,503.00	$ 19,504.00	$ 19,505.00	$ 19,506.00
7	**Facility Costs**	**Heat**	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00
8	**Facility Costs**	**Internet**	$ 600.00	$ 200.00	$ 200.00	$ 200.00
9	**Facility Costs**	**Mobile Phones**	$ 1,650.00	$ 550.00	$ 550.00	$ 550.00
10	**Facility Costs**	**Office Phones**	$ 1,500.00	$ 500.00	$ 500.00	$ 500.00
11	**Facility Costs**	**Office Supplies**	$ 900.00	$ 300.00	$ 300.00	$ 300.00
12	**Facility Costs**	**Power**	$ 3,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00
13	**Marketing**	**Advertising**	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00
14	**Marketing**	**Printing**	$ 4,000.00	$ 500.00	$ 3,000.00	$ 500.00
15	**Marketing**	**Trade Shows**	$ 4,500.00		$ 6,000.00	
16	**Marketing**	**Web Site**	$ 900.00	$ 300.00	$ 300.00	$ 300.00
17	**Travel**	**Air Fare**	$ 4,000.00		$ 2,000.00	
18	**Travel**	**Car Allowance**	$ 5,400.00	$ 1,800.00	$ 1,800.00	$ 1,800.00
19						

5. Now click the number two (**2**) in the box above the row numbers:



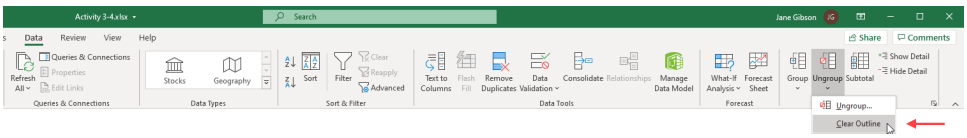
	A	B	F	G	H	I
1	**6 Month Sales Department Budget**					
2						
3	Category	Expense	Q1 Total	October	November	December
4	**Employee**	**Benefits**	$ 648.00	$ 216.00	$ 216.00	$ 216.00
5	**Employee**	**Commissions**	$ 6,480.00	$ 2,160.00	$ 2,160.00	$ 2,160.00
6	**Employee**	**Salaries**	$ 58,503.00	$ 19,504.00	$ 19,505.00	$ 19,506.00
7	**Facility Costs**	**Heat**	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00
8	**Facility Costs**	**Internet**	$ 600.00	$ 200.00	$ 200.00	$ 200.00
9	**Facility Costs**	**Mobile Phones**	$ 1,650.00	$ 550.00	$ 550.00	$ 550.00
10	**Facility Costs**	**Office Phones**	$ 1,500.00	$ 500.00	$ 500.00	$ 500.00
11	**Facility Costs**	**Office Supplies**	$ 900.00	$ 300.00	$ 300.00	$ 300.00
12	**Facility Costs**	**Power**	$ 3,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00
13	**Marketing**	**Advertising**	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00
14	**Marketing**	**Printing**	$ 4,000.00	$ 500.00	$ 3,000.00	$ 500.00
15	**Marketing**	**Trade Shows**	$ 4,500.00		$ 6,000.00	
16	**Marketing**	**Web Site**	$ 900.00	$ 300.00	$ 300.00	$ 300.00
17	**Travel**	**Air Fare**	$ 4,000.00		$ 2,000.00	
18	**Travel**	**Car Allowance**	$ 5,400.00	$ 1,800.00	$ 1,800.00	$ 1,800.00
19						

6. The columns C through E will be expanded:

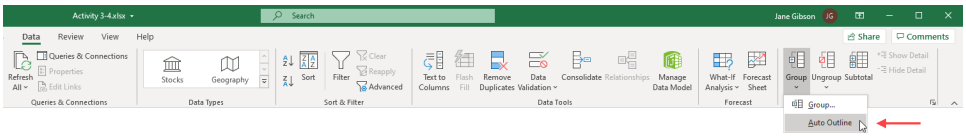


	A	B	C	D	E	F	G
1	6 Month Sales Department Budget						
2							
3	Category	Expense	July	August	September	Q1 Total	October
4	Employee	Benefits	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 216.00
5	Employee	Commissions	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 2,160.00
6	Employee	Salaries	$ 19,500.00	$ 19,501.00	$ 19,502.00	$ 58,503.00	$ 19,504.00
7	Facility Costs	Heat	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00
8	Facility Costs	Internet	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 200.00
9	Facility Costs	Mobile Phones	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 550.00
10	Facility Costs	Office Phones	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 500.00
11	Facility Costs	Office Supplies	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00
12	Facility Costs	Power	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 1,000.00
13	Marketing	Advertising	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00
14	Marketing	Printing	$ 500.00	$ 500.00	$ 3,000.00	$ 4,000.00	$ 500.00
15	Marketing	Trade Shows			$ 4,500.00	$ 4,500.00	
16	Marketing	Web Site	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00
17	Travel	Air Fare			$ 4,000.00	$ 4,000.00	
18	Travel	Car Allowance	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 1,800.00
19							

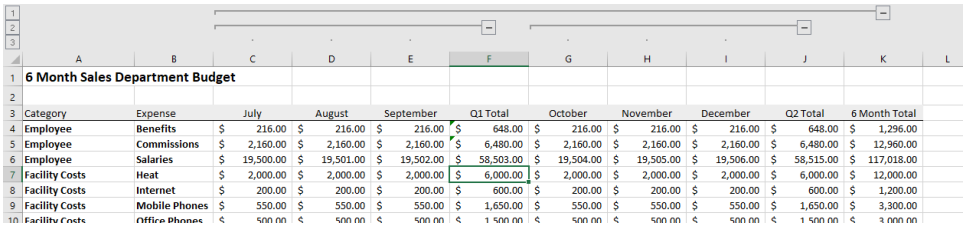
7. To remove the outline, click the **Ungroup** drop-down in the **Outline** group, then click **Clear Outline**:



8. Now click on any cell in your sheet to clear the selection of columns C to E, then click the **Group** drop-down in the **Outline** group, then click **Auto Outline**:

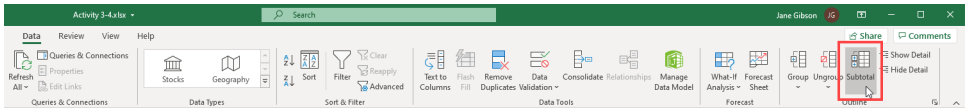


9. You will see that there are now outlines above both quarters, and also above the full six months, but there are no groups for the expense categories:

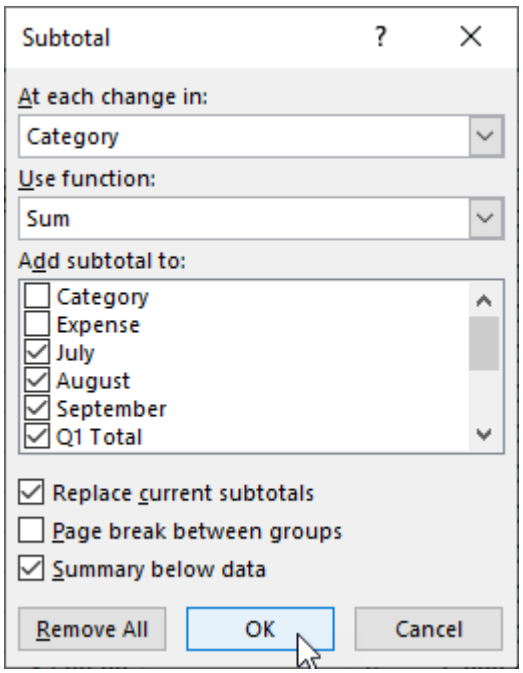


	A	B	C	D	E	F	G	H	I	J	K	L
1	6 Month Sales Department Budget											
2												
3	Category	Expense	July	August	September	Q1 Total	October	November	December	Q2 Total	6 Month Total	
4	Employee	Benefits	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 1,296.00	
5	Employee	Commissions	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 12,960.00	
6	Employee	Salaries	$ 19,500.00	$ 19,501.00	$ 19,502.00	$ 58,503.00	$ 19,504.00	$ 19,505.00	$ 19,506.00	$ 58,515.00	$ 117,018.00	
7	Facility Costs	Heat	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 12,000.00	
8	Facility Costs	Internet	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 1,200.00	
9	Facility Costs	Mobile Phones	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 3,300.00	
10	Facility Costs	Office Phones	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 3,000.00	

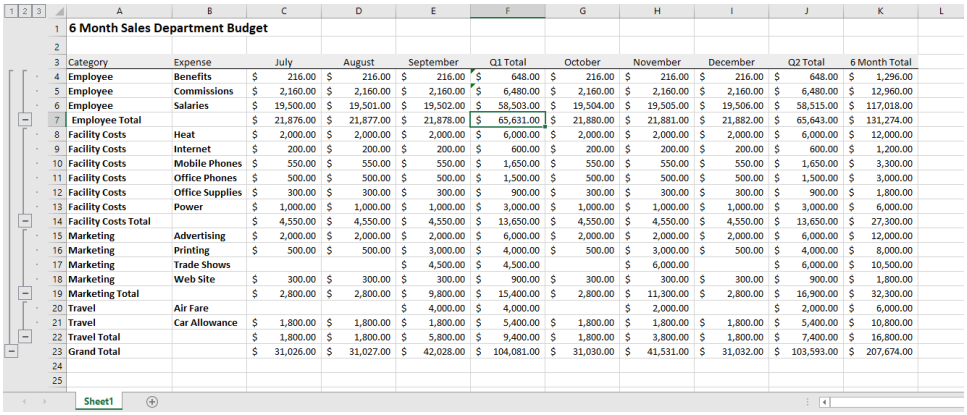
10. To subtotal the expense categories, click **Data → Subtotal**:



11. Select **Category** in the **At each change in** drop-down list, select **Sum** in the **Use function** drop-down list, click in the **checkboxes** for all columns **except for Category and Expense**, and ensure the **Summary below data** checkbox is enabled, then click **OK**:



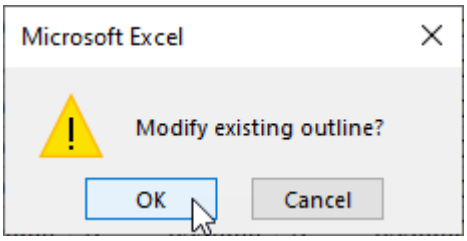
12. You will see that subtotals have been added for each category and that the outline bars have appeared to the left of the data. You will also note that the outline bars above your columns are no longer there:



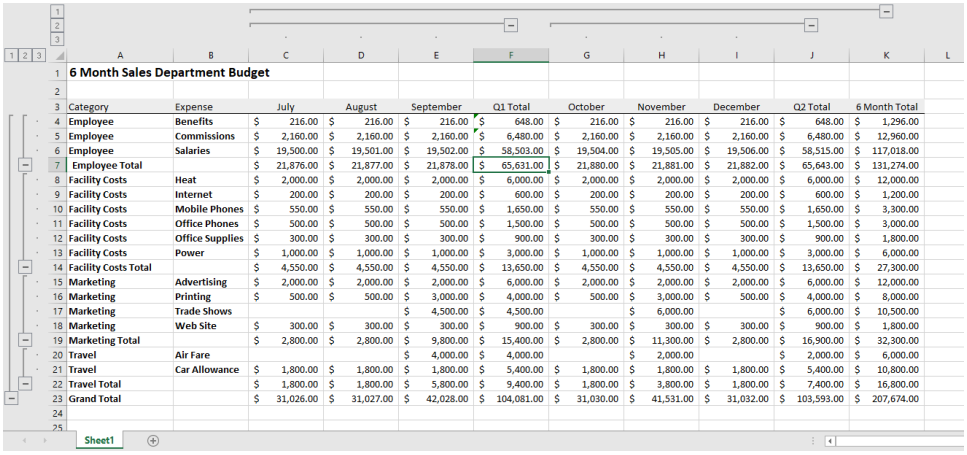
	A	B	C	D	E	F	G	H	I	J	K	L
1	6 Month Sales Department Budget											
2												
3	Category	Expense	July	August	September	Q1 Total	October	November	December	Q2 Total	6 Month Total	
4	Employee	Benefits	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 1,296.00	
5	Employee	Commissions	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 12,960.00	
6	Employee	Salaries	$ 19,500.00	$ 19,501.00	$ 19,502.00	$ 58,503.00	$ 19,504.00	$ 19,505.00	$ 19,506.00	$ 58,515.00	$ 117,018.00	
7	Employee Total		$ 21,876.00	$ 21,877.00	$ 21,878.00	$ 65,631.00	$ 21,880.00	$ 21,881.00	$ 21,882.00	$ 65,643.00	$ 131,274.00	
8	Facility Costs	Heat	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 12,000.00	
9	Facility Costs	Internet	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 1,200.00	
10	Facility Costs	Mobile Phones	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 3,300.00	
11	Facility Costs	Office Phones	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 3,000.00	
12	Facility Costs	Office Supplies	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 1,800.00	
13	Facility Costs	Power	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 6,000.00	
14	Facility Costs Total		$ 4,550.00	$ 4,550.00	$ 4,550.00	$ 13,650.00	$ 4,550.00	$ 4,550.00	$ 4,550.00	$ 13,650.00	$ 27,300.00	
15	Marketing	Advertising	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 12,000.00	
16	Marketing	Printing	$ 500.00	$ 500.00	$ 3,000.00	$ 4,000.00	$ 500.00	$ 3,000.00	$ 500.00	$ 4,000.00	$ 8,000.00	
17	Marketing	Trade Shows			$ 4,500.00	$ 4,500.00		$ 6,000.00		$ 6,000.00	$ 10,500.00	
18	Marketing	Web Site	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 1,800.00	
19	Marketing Total		$ 2,800.00	$ 2,800.00	$ 9,800.00	$ 15,400.00	$ 2,800.00	$ 11,300.00	$ 2,800.00	$ 16,900.00	$ 32,300.00	
20	Travel	Air Fare			$ 4,000.00	$ 4,000.00		$ 2,000.00		$ 2,000.00	$ 6,000.00	
21	Travel	Car Allowance	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 10,800.00	
22	Travel Total		$ 1,800.00	$ 1,800.00	$ 5,800.00	$ 9,400.00	$ 1,800.00	$ 3,800.00	$ 1,800.00	$ 7,400.00	$ 16,800.00	
23	Grand Total		$ 31,026.00	$ 31,027.00	$ 42,028.00	$ 104,081.00	$ 31,030.00	$ 41,531.00	$ 31,032.00	$ 103,593.00	$ 207,674.00	
24												
25												

Sheet1

13. Click **Data → Group → Auto Outline** again. An alert window will appear to confirm you want to modify the existing outline. Click **OK**:



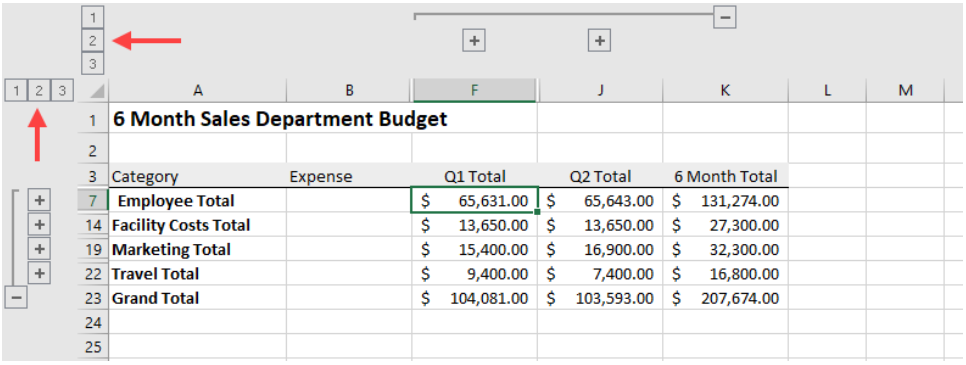
14. You will now see that outlines have been applied for all columns and rows:



	A	B	C	D	E	F	G	H	I	J	K	L
1	6 Month Sales Department Budget											
2												
3	Category	Expense	July	August	September	Q1 Total	October	November	December	Q2 Total	6 Month Total	
4	Employee	Benefits	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 216.00	$ 216.00	$ 216.00	$ 648.00	$ 1,296.00	
5	Employee	Commissions	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 2,160.00	$ 2,160.00	$ 2,160.00	$ 6,480.00	$ 12,960.00	
6	Employee	Salaries	$ 19,500.00	$ 19,501.00	$ 19,502.00	$ 58,503.00	$ 19,504.00	$ 19,505.00	$ 19,506.00	$ 58,515.00	$ 117,018.00	
7	Employee Total		$ 21,876.00	$ 21,877.00	$ 21,878.00	$ 65,631.00	$ 21,880.00	$ 21,881.00	$ 21,882.00	$ 65,643.00	$ 131,274.00	
8	Facility Costs	Heat	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 12,000.00	
9	Facility Costs	Internet	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 200.00	$ 200.00	$ 200.00	$ 600.00	$ 1,200.00	
10	Facility Costs	Mobile Phones	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 550.00	$ 550.00	$ 550.00	$ 1,650.00	$ 3,300.00	
11	Facility Costs	Office Phones	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 500.00	$ 500.00	$ 500.00	$ 1,500.00	$ 3,000.00	
12	Facility Costs	Office Supplies	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 1,800.00	
13	Facility Costs	Power	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00	$ 6,000.00	
14	Facility Costs Total		$ 4,550.00	$ 4,550.00	$ 4,550.00	$ 13,650.00	$ 4,550.00	$ 4,550.00	$ 4,550.00	$ 13,650.00	$ 27,300.00	
15	Marketing	Advertising	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 6,000.00	$ 12,000.00	
16	Marketing	Printing	$ 500.00	$ 500.00	$ 3,000.00	$ 4,000.00	$ 500.00	$ 3,000.00	$ 500.00	$ 4,000.00	$ 8,000.00	
17	Marketing	Trade Shows			$ 4,500.00	$ 4,500.00		$ 6,000.00		$ 6,000.00	$ 10,500.00	
18	Marketing	Web Site	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 300.00	$ 300.00	$ 300.00	$ 900.00	$ 1,800.00	
19	Marketing Total		$ 2,800.00	$ 2,800.00	$ 9,800.00	$ 15,400.00	$ 2,800.00	$ 11,300.00	$ 2,800.00	$ 16,900.00	$ 32,300.00	
20	Travel	Air Fare			$ 4,000.00	$ 4,000.00		$ 2,000.00		$ 2,000.00	$ 6,000.00	
21	Travel	Car Allowance	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 5,400.00	$ 10,800.00	
22	Travel Total		$ 1,800.00	$ 1,800.00	$ 5,800.00	$ 9,400.00	$ 1,800.00	$ 3,800.00	$ 1,800.00	$ 7,400.00	$ 16,800.00	
23	Grand Total		$ 31,026.00	$ 31,027.00	$ 42,028.00	$ 104,081.00	$ 31,030.00	$ 41,531.00	$ 31,032.00	$ 103,593.00	$ 207,674.00	
24												
25												

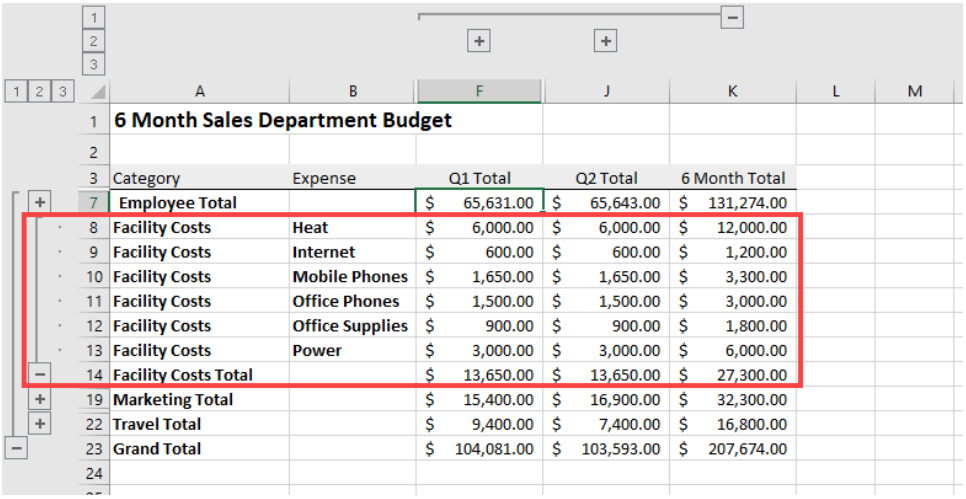
Sheet1

15. Now click the number two (**2**) in the box above the row numbers, and in the box across from the column letters. You now have a simplified view of your data:



	A	B	F	J	K	L	M
1	**6 Month Sales Department Budget**						
2							
3	Category	Expense	Q1 Total	Q2 Total	6 Month Total		
7	**Employee Total**		$ 65,631.00	$ 65,643.00	$ 131,274.00		
14	**Facility Costs Total**		$ 13,650.00	$ 13,650.00	$ 27,300.00		
19	**Marketing Total**		$ 15,400.00	$ 16,900.00	$ 32,300.00		
22	**Travel Total**		$ 9,400.00	$ 7,400.00	$ 16,800.00		
23	**Grand Total**		$ 104,081.00	$ 103,593.00	$ 207,674.00		
24							
25							

16. You can now click the plus (**+**) sign beside any of the categories, or above either of the quarters, to show the detailed data:



	A	B	F	J	K	L	M
1	**6 Month Sales Department Budget**						
2							
3	Category	Expense	Q1 Total	Q2 Total	6 Month Total		
7	**Employee Total**		$ 65,631.00	$ 65,643.00	$ 131,274.00		
8	**Facility Costs**	**Heat**	$ 6,000.00	$ 6,000.00	$ 12,000.00		
9	**Facility Costs**	**Internet**	$ 600.00	$ 600.00	$ 1,200.00		
10	**Facility Costs**	**Mobile Phones**	$ 1,650.00	$ 1,650.00	$ 3,300.00		
11	**Facility Costs**	**Office Phones**	$ 1,500.00	$ 1,500.00	$ 3,000.00		
12	**Facility Costs**	**Office Supplies**	$ 900.00	$ 900.00	$ 1,800.00		
13	**Facility Costs**	**Power**	$ 3,000.00	$ 3,000.00	$ 6,000.00		
14	**Facility Costs Total**		$ 13,650.00	$ 13,650.00	$ 27,300.00		
19	**Marketing Total**		$ 15,400.00	$ 16,900.00	$ 32,300.00		
22	**Travel Total**		$ 9,400.00	$ 7,400.00	$ 16,800.00		
23	**Grand Total**		$ 104,081.00	$ 103,593.00	$ 207,674.00		
24							

17. Save the current workbook as **Activity 3-4 Complete** and then close Microsoft Excel 365 to complete the activity.

Summary

During this lesson, you learned about the variety of tools you can use to help you understand errors in your formulas and data, and how they work together. You also learned about tools to help you summarize and present your data clearly. You should now be comfortable using the formula auditing tools to trace errors and evaluate formulas. You should also be able to track your formulas using the Watch Window, and the Camera tool. Finally, you should have a good understanding of how to arrange and display your data using the Group commands.

Review Questions

1. **What does a black dotted tracer arrow indicate?**

2. **What are dependent cells?**

3. **What does the “#DIV/0!” error indicate?**

4. **What does the Step In button in the Evaluate Formula dialog box do?**

5. **What needs to be done to your data before you use the Subtotal command?**

LESSON 4:
DATA ANALYSIS AND PRESENTATION

Lesson Objectives

In this lesson you will learn how to:

- Use the Quick Analysis tool
- Add sparklines
- Perform What-If analysis
- Load and use the Analysis ToolPak

TOPIC A: Quick Analysis Tool

In previous lessons you have learned about many of the tools that are available to analyze your data, including Custom Formatting, Charts, and Formulas. The Quick Analysis tool provides you with access to many of these tools in one location so you can quickly analyze a selected set of data. In this topic you will learn about the Quick Analysis tool and how to use it.

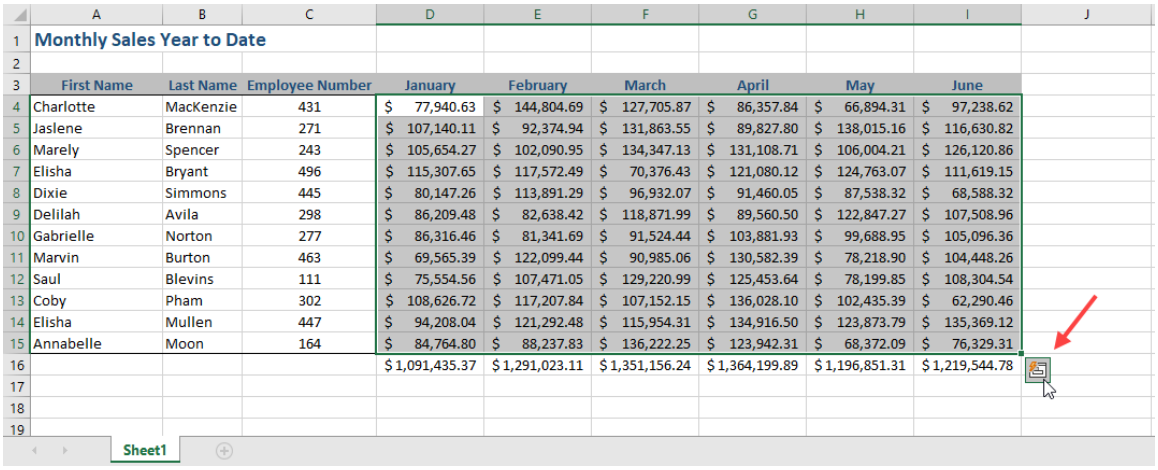
Topic Objectives

In this session, you will learn:

- How to access the Quick Analysis tool
- About available Quick Analysis options

Access the Quick Analysis Tool

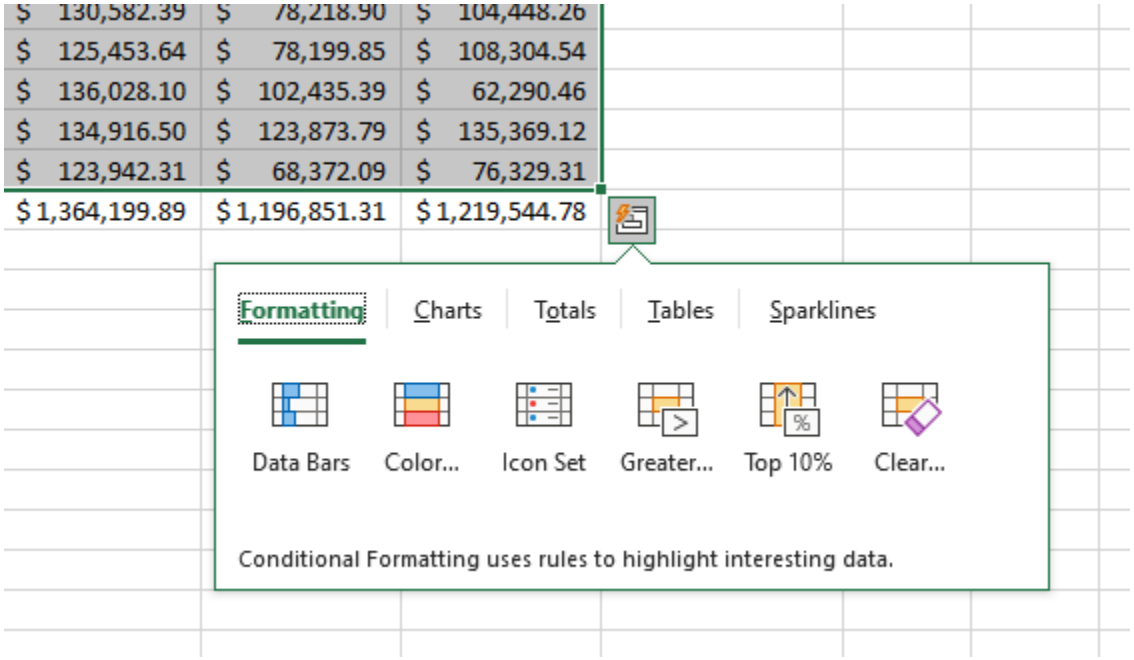
The **Quick Analysis** tool is a feature in Excel 365 that lets you quickly select from many of the application's most commonly used analysis tools after selecting a range of data. It presents itself as a small button, at the bottom right corner of a selection of two or more cells. To access the options in the tool, simply click the button:



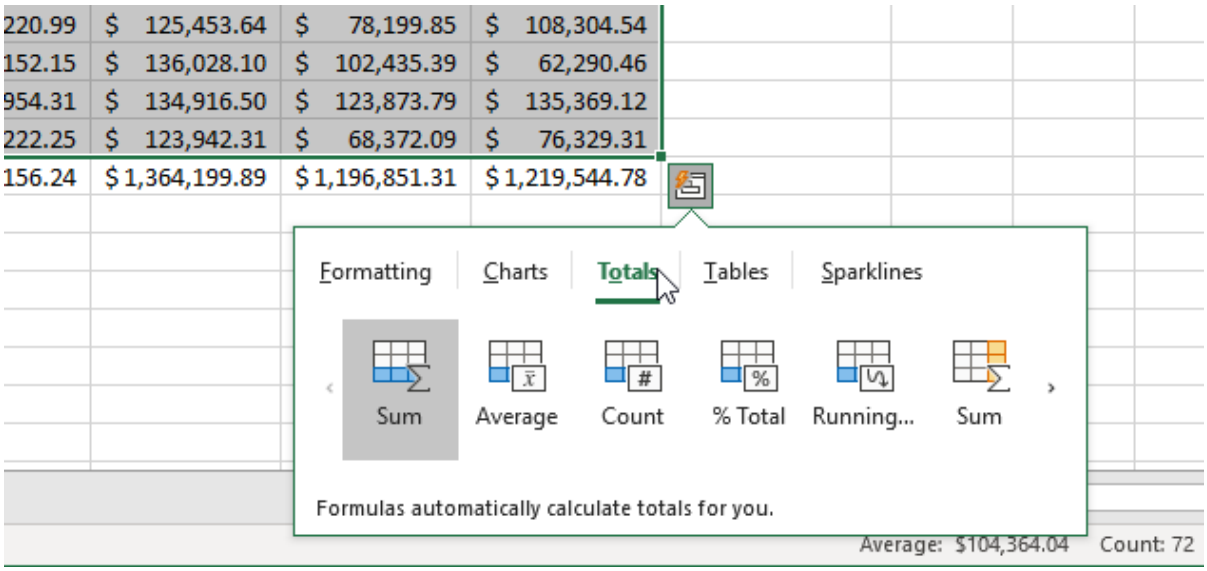
	A	B	C	D	E	F	G	H	I	J
1	Monthly Sales Year to Date									
2										
3	First Name	Last Name	Employee Number	January	February	March	April	May	June	
4	Charlotte	MacKenzie	431	$ 77,940.63	$ 144,804.69	$ 127,705.87	$ 86,357.84	$ 66,894.31	$ 97,238.62	
5	Jaslene	Brennan	271	$ 107,140.11	$ 92,374.94	$ 131,863.55	$ 89,827.80	$ 138,015.16	$ 116,630.82	
6	Marely	Spencer	243	$ 105,654.27	$ 102,090.95	$ 134,347.13	$ 131,108.71	$ 106,004.21	$ 126,120.86	
7	Elisha	Bryant	496	$ 115,307.65	$ 117,572.49	$ 70,376.43	$ 121,080.12	$ 124,763.07	$ 111,619.15	
8	Dixie	Simmons	445	$ 80,147.26	$ 113,891.29	$ 96,932.07	$ 91,460.05	$ 87,538.32	$ 68,588.32	
9	Delilah	Avila	298	$ 86,209.48	$ 82,638.42	$ 118,871.99	$ 89,560.50	$ 122,847.27	$ 107,508.96	
10	Gabrielle	Norton	277	$ 86,316.46	$ 81,341.69	$ 91,524.44	$ 103,881.93	$ 99,688.95	$ 105,096.36	
11	Marvin	Burton	463	$ 69,565.39	$ 122,099.44	$ 90,985.06	$ 130,582.39	$ 78,218.90	$ 104,448.26	
12	Saul	Blevins	111	$ 75,554.56	$ 107,471.05	$ 129,220.99	$ 125,453.64	$ 78,199.85	$ 108,304.54	
13	Coby	Pham	302	$ 108,626.72	$ 117,207.84	$ 107,152.15	$ 136,028.10	$ 102,435.39	$ 62,290.46	
14	Elisha	Mullen	447	$ 94,208.04	$ 121,292.48	$ 115,954.31	$ 134,916.50	$ 123,873.79	$ 135,369.12	
15	Annabelle	Moon	164	$ 84,764.80	$ 88,237.83	$ 136,222.25	$ 123,942.31	$ 68,372.09	$ 76,329.31	
16				$ 1,091,435.37	$ 1,291,023.11	$ 1,351,156.24	$ 1,364,199.89	$ 1,196,851.31	$ 1,219,544.78	
17										
18										
19										

Sheet1

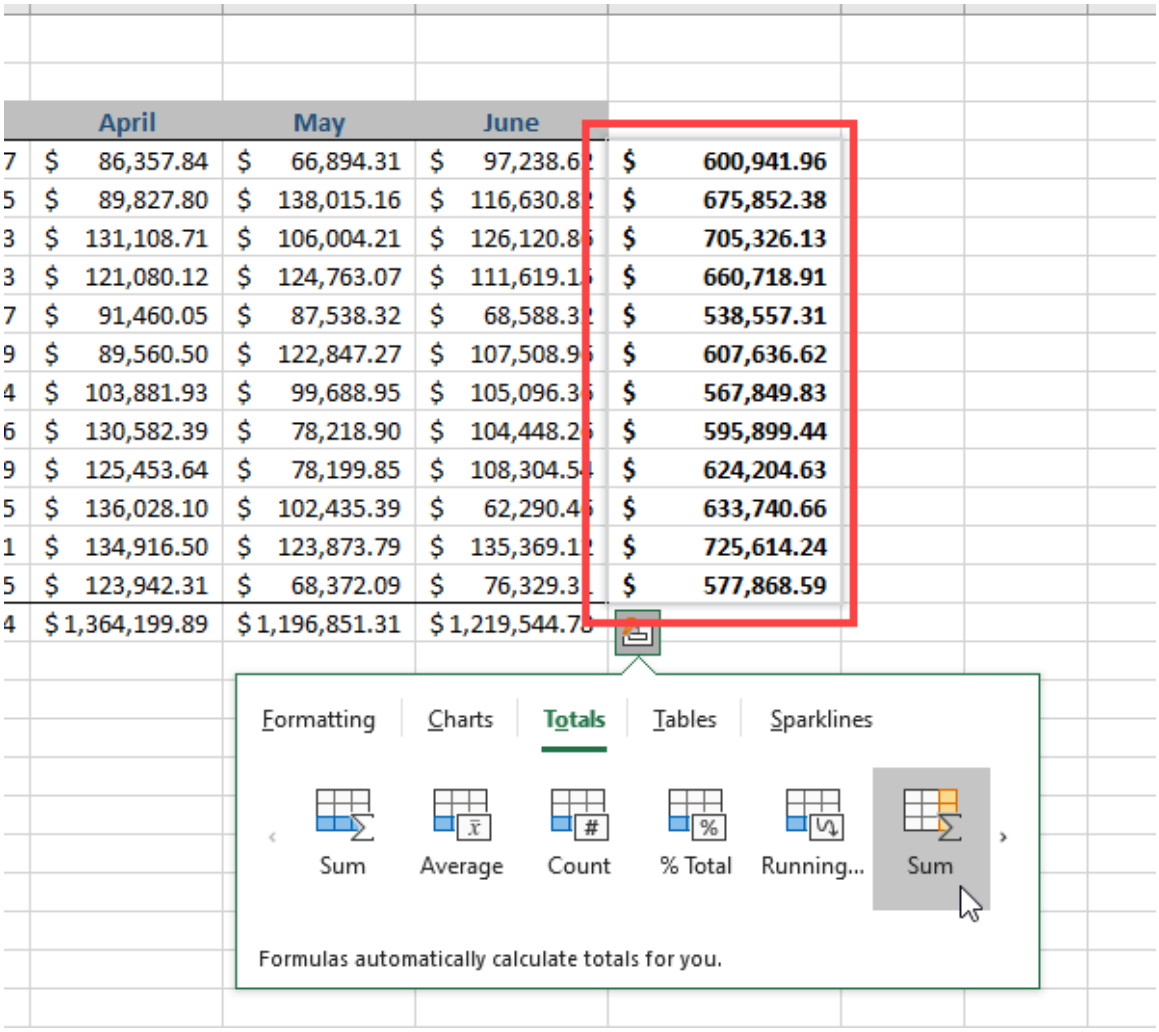
The Quick Analysis toolbar will appear with tabs for **Formatting**, **Charts**, **Totals**, **Tables**, and **Sparklines**. Below each heading tab are buttons to select specific actions to apply to your data:



Clicking on a heading tab will reveal the options under that heading:



Hovering over an option will display a preview of the analysis:



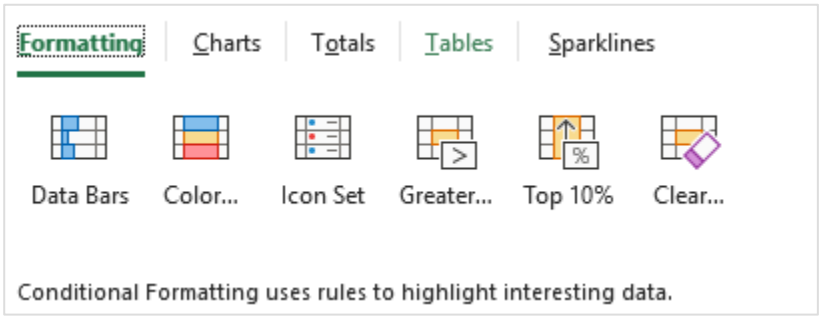
Clicking the option will complete the analysis and close the Quick Analysis toolbar:

	A	B	C	D	E	F	G	H	I	J	K
1	Monthly Sales Year to Date										
2											
3	First Name	Last Name	Employee Number	January	February	March	April	May	June		
4	Charlotte	MacKenzie	431	$ 77,940.63	$ 144,804.69	$ 127,705.87	$ 86,357.84	$ 66,894.31	$ 97,238.62	$ 600,941.96	
5	Jaslene	Brennan	271	$ 107,140.11	$ 92,374.94	$ 131,863.55	$ 89,827.80	$ 138,015.16	$ 116,630.82	$ 675,852.38	
6	Marely	Spencer	243	$ 105,654.27	$ 102,090.95	$ 134,347.13	$ 131,108.71	$ 106,004.21	$ 126,120.86	$ 705,326.13	
7	Elisha	Bryant	496	$ 115,307.65	$ 117,572.49	$ 70,376.43	$ 121,080.12	$ 124,763.07	$ 111,619.15	$ 660,718.91	
8	Dixie	Simmons	445	$ 80,147.26	$ 113,891.29	$ 96,932.07	$ 91,460.05	$ 87,538.32	$ 68,588.32	$ 538,557.31	
9	Delilah	Avila	298	$ 86,209.48	$ 82,638.42	$ 118,871.99	$ 89,560.50	$ 122,847.27	$ 107,508.96	$ 607,636.62	
10	Gabrielle	Norton	277	$ 86,316.46	$ 81,341.69	$ 91,524.44	$ 103,881.93	$ 99,688.95	$ 105,096.36	$ 567,849.83	
11	Marvin	Burton	463	$ 69,565.39	$ 122,099.44	$ 90,985.06	$ 130,582.39	$ 78,218.90	$ 104,448.26	$ 595,899.44	
12	Saul	Blevins	111	$ 75,554.56	$ 107,471.05	$ 129,220.99	$ 125,453.64	$ 78,199.85	$ 108,304.54	$ 624,204.63	
13	Coby	Pham	302	$ 108,626.72	$ 117,207.84	$ 107,152.15	$ 136,028.10	$ 102,435.39	$ 62,290.46	$ 633,740.66	
14	Elisha	Mullen	447	$ 94,208.04	$ 121,292.48	$ 115,954.31	$ 134,916.50	$ 123,873.79	$ 135,369.12	$ 725,614.24	
15	Annabelle	Moon	164	$ 84,764.80	$ 88,237.83	$ 136,222.25	$ 123,942.31	$ 68,372.09	$ 76,329.31	$ 577,868.59	
16				$ 1,091,435.37	$ 1,291,023.11	$ 1,351,156.24	$ 1,364,199.89	$ 1,196,851.31	$ 1,219,544.78		
17											
18											

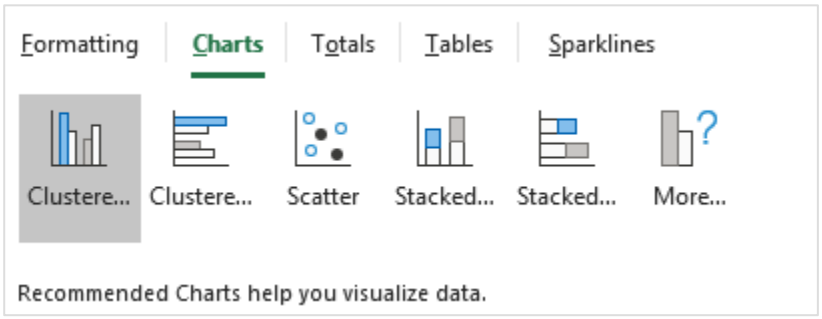
Quick Analysis Options

Each headings tab in the **Quick Analysis** toolbar presents options for analysis:

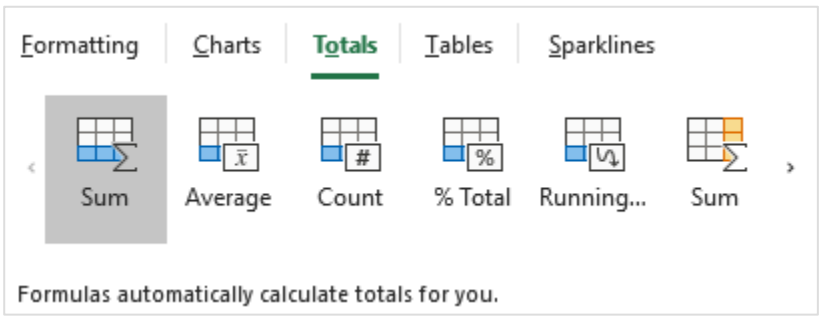
The **Formatting** tab allows you to preview and apply the most popular conditional formats:



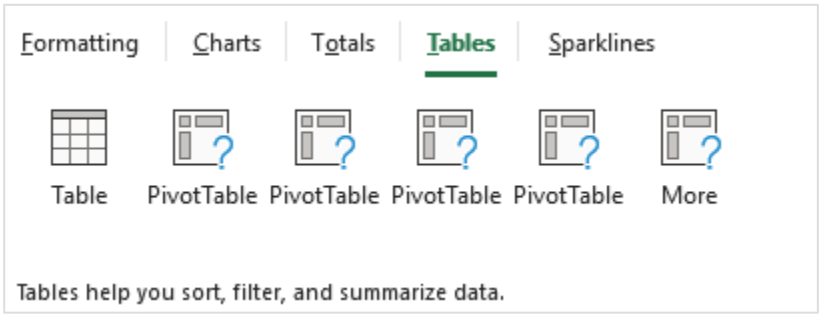
The **Charts** tab allows you to preview and select recommended charts:



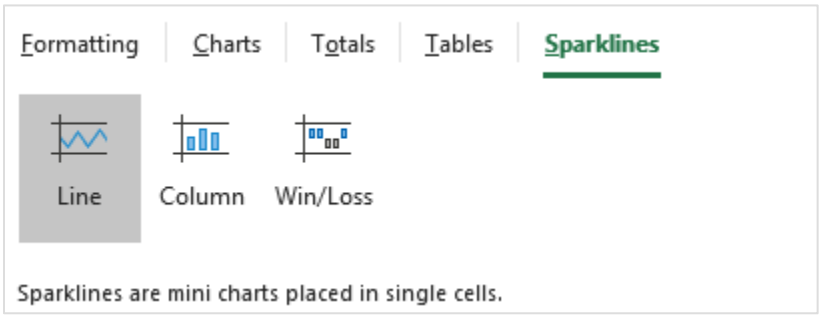
The **Totals** tab allows you to preview and insert basic calculations. Clicking the arrows at either end allows you to see more options:



The **Tables** tab allows you to preview and insert a table or different pivot tables options:



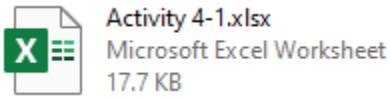
The **Sparklines** tab allows you to preview and insert Sparkline graphics:



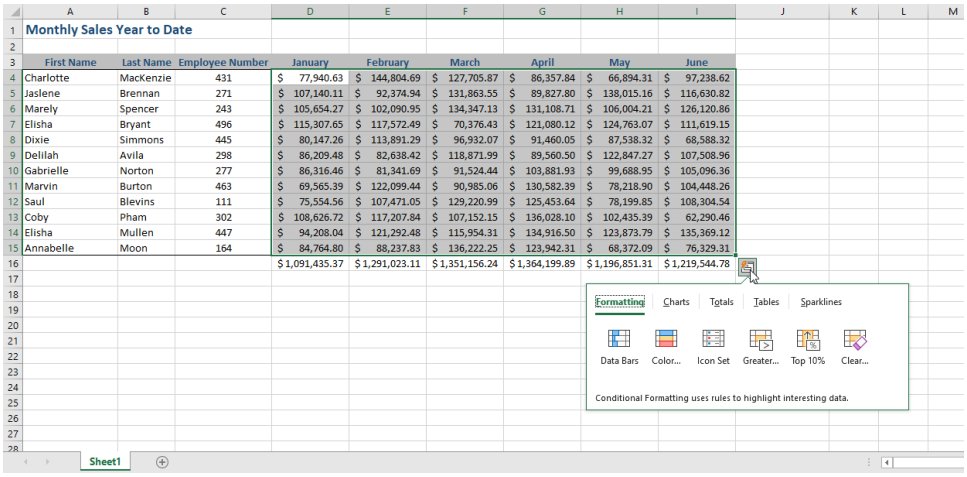
Activity 4-1: The Quick Analysis Tool

You are considering ways to analyze and present the data in one of your worksheets, but you are not sure what the best approach would be.

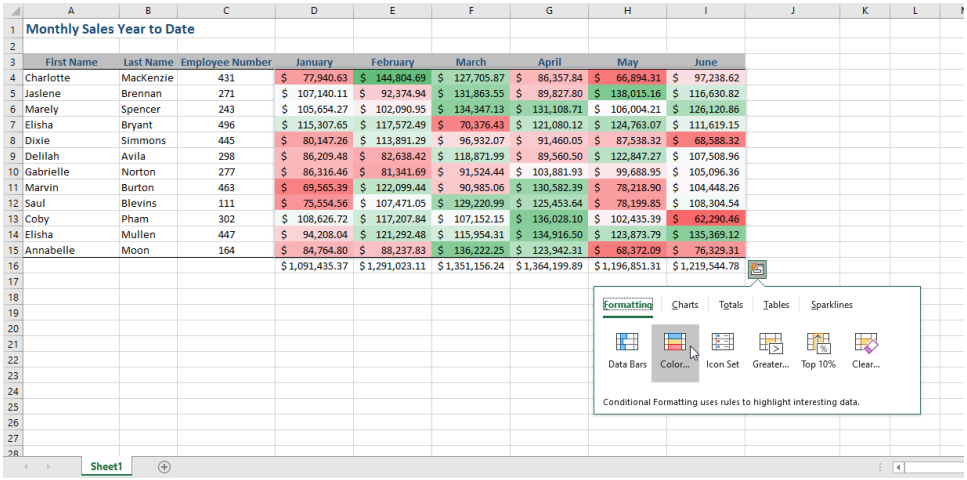
1. To begin, open **Activity 4-1** from your Exercise Files folder:



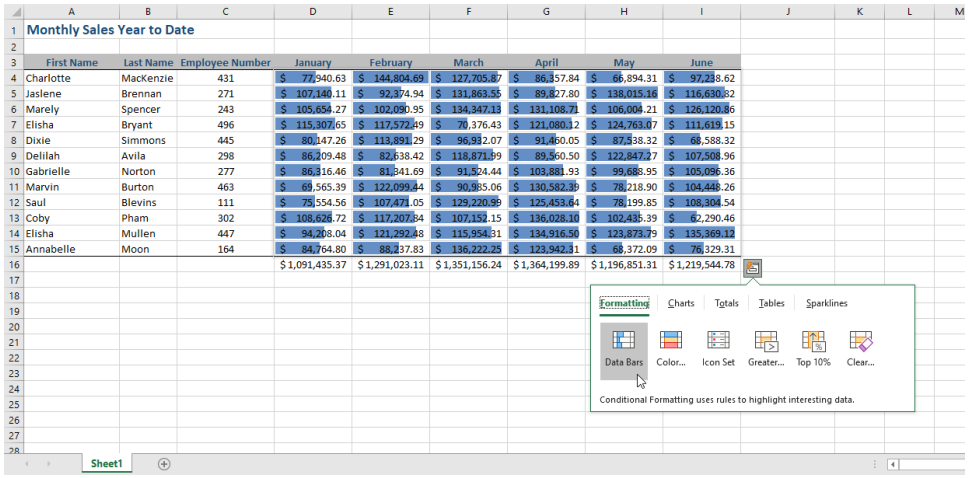
2. Click and drag to select cells **D4 to I15**. Click on the **Quick Analysis Tool** button that appears at the bottom right of your selection:



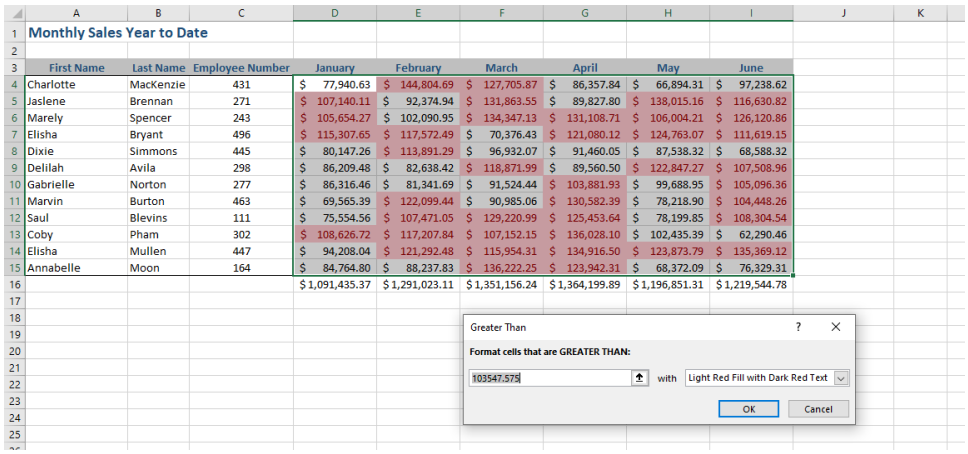
3. Try using conditional formatting to highlight the differences in the sales results for each sales rep. Hover your mouse over the **Color** button:



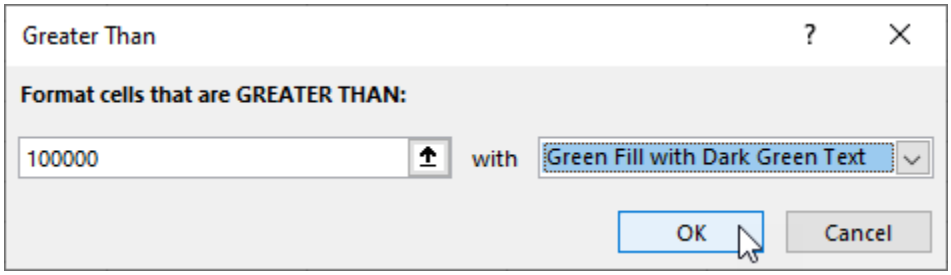
4. Next, hover your mouse over the **Data Bars** button:



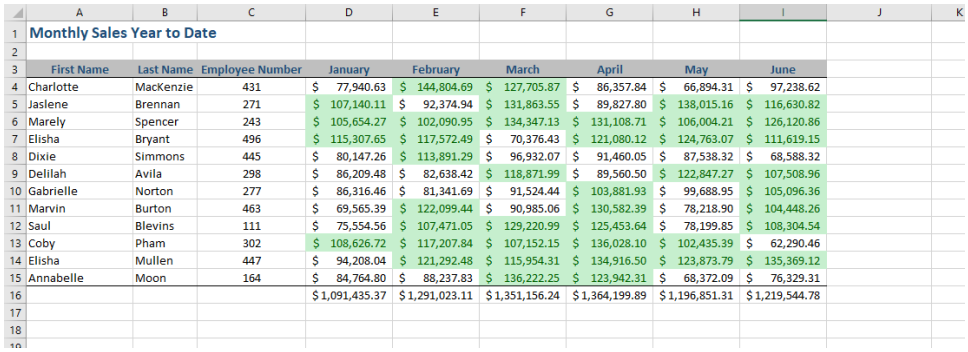
5. You decide you want to highlight sales amounts that were above the monthly sales target. Click on the **Greater (than)** button:



6. In the Greater Than dialog box that appears, type "**100,000**" in the **Format cells that are GREATER THAN:** field, then select **Green Fill with Dark Green Text** from the **with** drop-down list. Click **OK**:

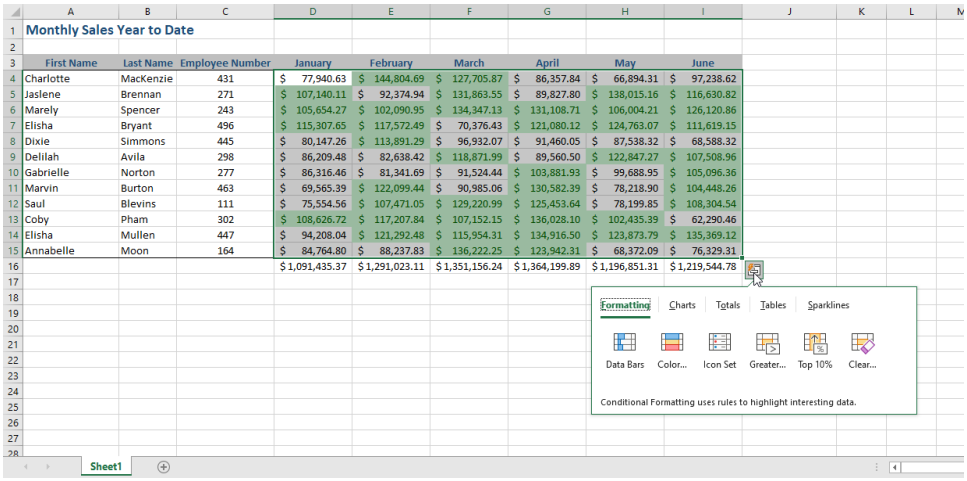


7. Cells with a value greater than $100,000 are now highlighted so they can be quickly identified:

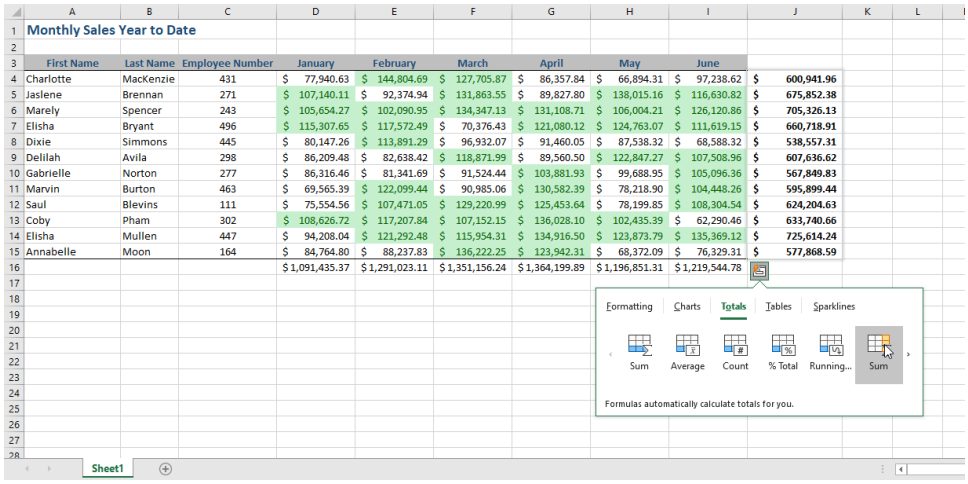


	A	B	C	D	E	F	G	H	I	J	K
1	Monthly Sales Year to Date										
2											
3	First Name	Last Name	Employee Number	January	February	March	April	May	June		
4	Charlotte	MacKenzie	431	$ 77,940.63	$ 144,804.69	$ 127,705.87	$ 86,357.84	$ 66,894.31	$ 97,238.62		
5	Jaslene	Brennan	271	$ 107,140.11	$ 92,374.94	$ 131,863.55	$ 89,827.80	$ 138,015.16	$ 116,630.82		
6	Marely	Spencer	243	$ 105,654.27	$ 102,090.95	$ 134,347.13	$ 131,108.71	$ 106,004.21	$ 126,120.86		
7	Elisha	Bryant	496	$ 115,307.65	$ 117,572.49	$ 70,376.43	$ 121,080.12	$ 124,763.07	$ 111,619.15		
8	Dixie	Simmons	445	$ 80,147.26	$ 113,891.29	$ 96,932.07	$ 91,460.05	$ 87,538.32	$ 68,588.32		
9	Delilah	Avila	298	$ 86,209.48	$ 82,638.42	$ 118,871.99	$ 89,560.50	$ 122,847.27	$ 107,508.96		
10	Gabrielle	Norton	277	$ 86,316.46	$ 81,341.69	$ 91,524.44	$ 103,881.93	$ 99,688.95	$ 105,096.36		
11	Marvin	Burton	463	$ 69,565.39	$ 122,099.44	$ 90,985.06	$ 130,582.39	$ 78,218.90	$ 104,448.26		
12	Saul	Blevins	111	$ 75,554.56	$ 107,471.05	$ 129,220.99	$ 125,453.64	$ 78,199.85	$ 108,304.54		
13	Coby	Pham	302	$ 108,626.72	$ 117,207.84	$ 107,152.15	$ 136,028.10	$ 102,435.39	$ 62,290.46		
14	Elisha	Mullen	447	$ 94,208.04	$ 121,292.48	$ 115,954.31	$ 134,916.50	$ 123,873.79	$ 135,369.12		
15	Annabelle	Moon	164	$ 84,764.80	$ 88,237.83	$ 136,222.25	$ 123,942.31	$ 68,372.09	$ 76,329.31		
16				$ 1,091,435.37	$ 1,291,023.11	$ 1,351,156.24	$ 1,364,199.89	$ 1,196,851.31	$ 1,219,544.78		
17											
18											

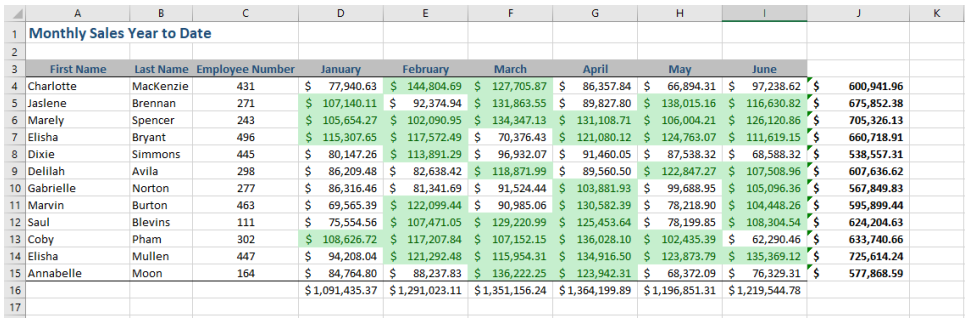
8. Now you would like to compare sales performance by sales rep for the year to date. Again, select cells **D4 to I15** (if required) and click on the **Quick Analysis Tool** button that appears at the bottom right of your selection:



9. Click the **Totals** tab and hover over the **Sum** button on the right:

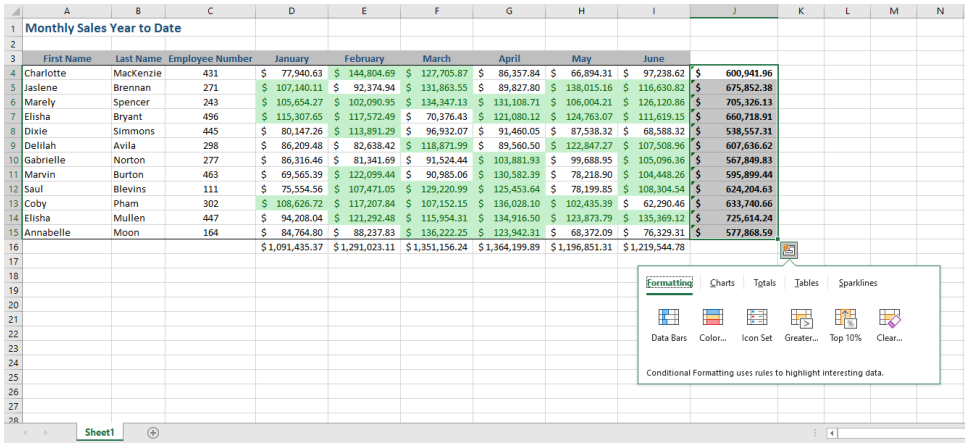


10. Now that you see the preview, click on the **Sum** button to accept adding the sum formulas:

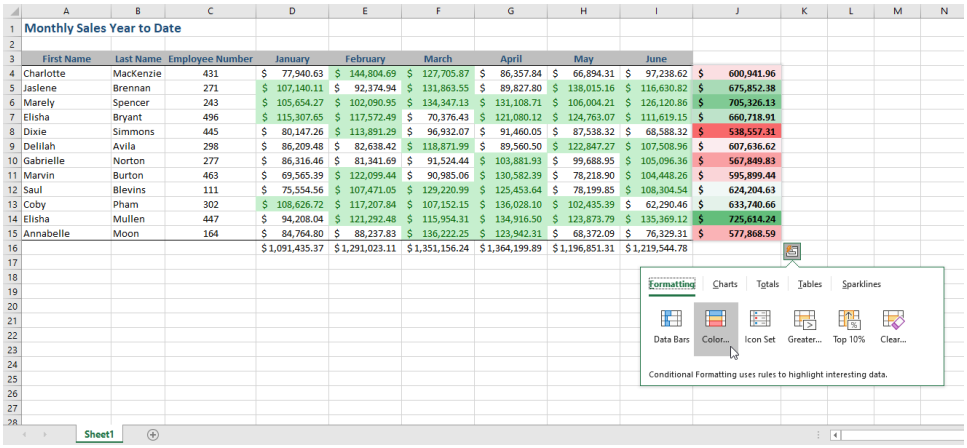


First Name	Last Name	Employee Number	January	February	March	April	May	June	
Charlotte	MacKenzie	431	$ 77,940.63	$ 144,804.69	$ 127,705.87	$ 86,357.84	$ 66,894.31	$ 97,238.62	$ 600,941.96
Jaslene	Brennan	271	$ 107,140.11	$ 92,374.94	$ 131,863.55	$ 89,827.80	$ 138,015.16	$ 116,630.82	$ 675,852.38
Marely	Spencer	243	$ 105,654.27	$ 102,090.95	$ 134,347.13	$ 131,108.71	$ 106,004.21	$ 126,120.86	$ 705,326.13
Elisha	Bryant	496	$ 115,307.65	$ 117,572.49	$ 70,376.43	$ 121,080.12	$ 124,763.07	$ 111,619.15	$ 660,718.91
Dixie	Simmons	445	$ 80,147.26	$ 113,891.29	$ 96,932.07	$ 91,460.05	$ 87,538.32	$ 68,588.32	$ 538,557.31
Delilah	Avila	298	$ 86,209.48	$ 82,638.42	$ 118,871.99	$ 89,560.50	$ 122,847.27	$ 107,508.96	$ 607,636.62
Gabrielle	Norton	277	$ 86,316.46	$ 81,341.69	$ 91,524.44	$ 103,881.93	$ 99,688.95	$ 105,096.36	$ 567,849.83
Marvin	Burton	463	$ 69,565.39	$ 122,099.44	$ 90,985.06	$ 130,582.39	$ 78,218.90	$ 104,448.26	$ 595,899.44
Saul	Blevins	111	$ 75,554.56	$ 107,471.05	$ 129,220.99	$ 125,453.64	$ 78,199.85	$ 108,304.54	$ 624,204.63
Coby	Pham	302	$ 108,626.72	$ 117,207.84	$ 107,152.15	$ 136,028.10	$ 102,435.39	$ 62,290.46	$ 633,740.66
Elisha	Mullen	447	$ 94,208.04	$ 121,292.48	$ 115,954.31	$ 134,916.50	$ 123,873.79	$ 135,369.12	$ 725,614.24
Annabelle	Moon	164	$ 84,764.80	$ 88,237.83	$ 136,222.25	$ 123,942.31	$ 68,372.09	$ 76,329.31	$ 577,868.59
			$ 1,091,435.37	$ 1,291,023.11	$ 1,351,156.24	$ 1,364,199.89	$ 1,196,851.31	$ 1,219,544.78	

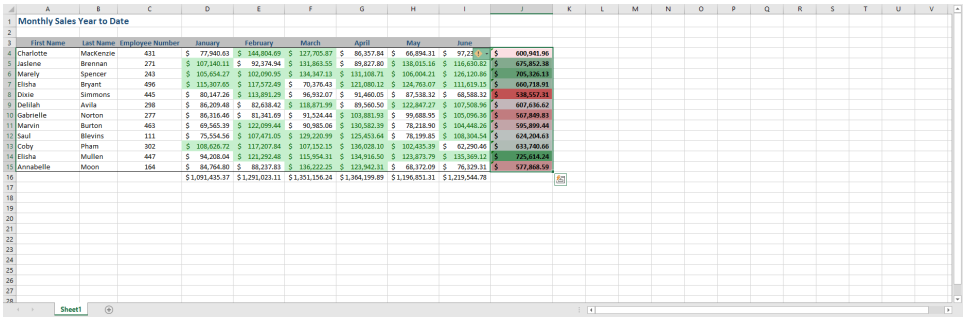
11. Now select cells **J4 to J15**, the totals you just added, and click on click on the **Quick Analysis Tool** button:



12. Hover over the **Color** button to preview the conditional formatting:



13. The colors allow you to see at a glance the sales performance of the sales reps, relative to each other. Click the **Color** button to accept the conditional formatting:



14. Save the current workbook as **Activity 4-1 Complete** and then close Microsoft Excel 365 to complete the activity.

TOPIC B: Adding Sparklines

A Sparkline is a small chart graphic that is contained within a single cell to provide a visual representation of a set of data. You can use Sparklines to show trends in a series of values so users can quickly analyze the related information. To be effective, they should be positioned close the data they are representing. In this topic you will learn about the different kinds of Sparklines and how to use them.

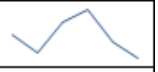
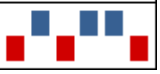
Topic Objectives

In this session, you will learn about:

- Available Sparkline types
- Inserting and editing Sparklines
- The Sparkline Design tab

Sparkline Types

Like regular charts in Excel, different types of **Sparklines** are available to help you better show the trends in the data with which you are working. The three types of Sparklines you can use are **Line**, **Column**, and **Win/Loss**:

	A	B	C	D	E	F	G
1	January	February	March	April	May	June	
2	30	22	36	42	27	19	
3	30	22	36	42	27	19	
4	-2	1	-1	3	2	-3	

The **Line** type of Sparkline is used to show the upward or downward trend for a set of data, just like the standard line chart in Excel:

2	30	22	36	42	27	19	

The **Column** type of Sparkline also shows upwards or downwards trends, but the data is plotted using a column graph instead of a line graph:

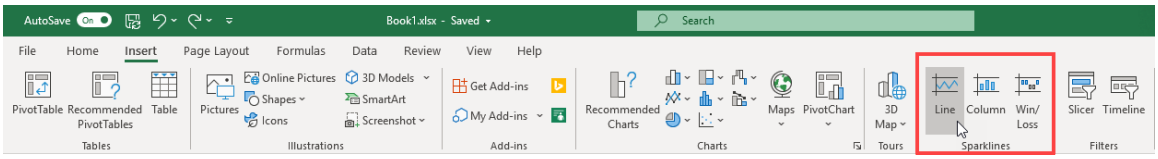
3	30	22	36	42	27	19	

The **Win/Loss** type of Sparkline shows if the referenced data is above or below zero:

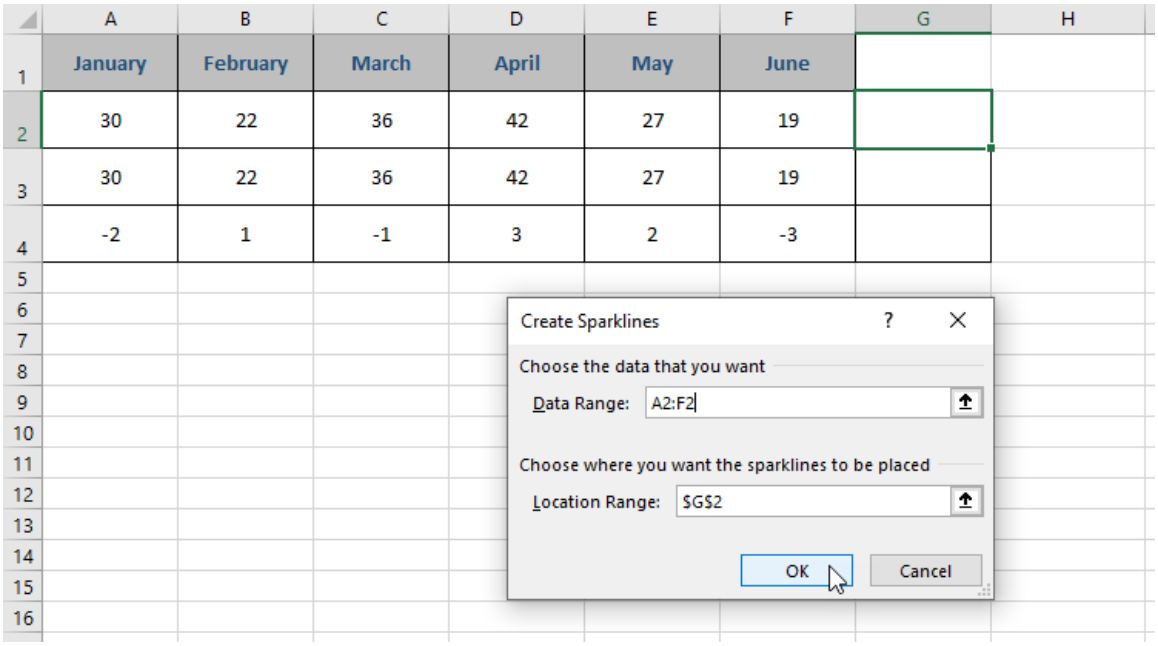
4	-2	1	-1	3	2	-3	

Inserting and Editing Sparklines

To launch the **Create Sparkline** dialog box, click the **Insert** tab on the ribbon list, then from the Sparklines group, click on the button representing the type of Sparkline you would like to insert:



In the **Create Sparklines** dialog box, select or type the data range in the **Data Range** field, then select or type the location you would like the Sparkline to be placed, in the **Location Range** field:

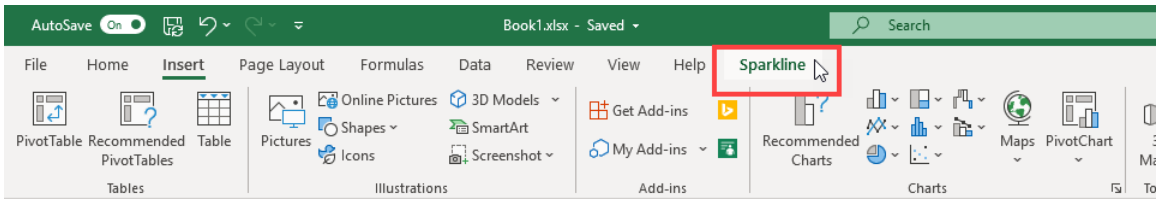


To complete the process, click **OK.** The Sparkline will appear in the selected cell:

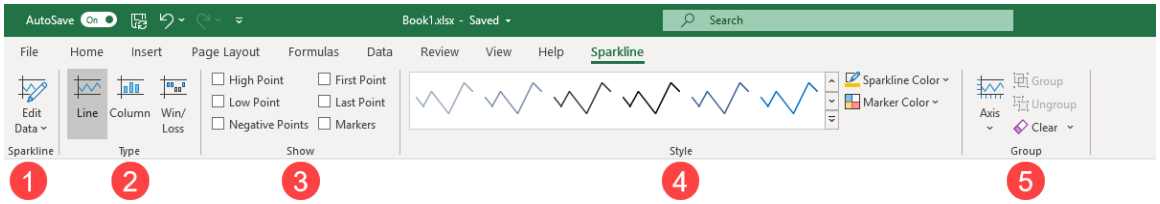
	A	B	C	D	E	F	G	H
1	January	February	March	April	May	June		
2	30	22	36	42	27	19		
3	30	22	36	42	27	19		
4	-2	1	-1	3	2	-3		
5								
6								
7								

The Sparkline Tab

Once a Sparkline has been inserted into a cell, and that cell is the active cell, the **Sparkline** contextual tab will be displayed on the ribbon:



Clicking on the Sparkline contextual tab in the ribbon will present several groups of options for modifying your Sparkline(s):



The **(1) Sparkline group** contains a single drop-down command that you can use to edit the data source and the Sparkline placement.

The **(2) Type** group lets you select between the three types of Sparklines.

The **(3) Show** group contains six checkboxes that let you use markers or colors to highlight elements of the data.

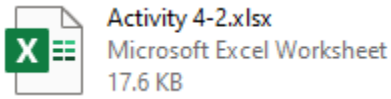
The **(4) Style** group contains the style gallery, where you can choose from an assortment of preconfigured styles for each Sparkline type. You can also choose colors for the lines or columns, as well as for the markers.

The **(5) Group** lets you select options for grouping or ungrouping Sparklines. Grouping Sparklines lets you make modifications to all the Sparklines in the group at once. You will also find options here to control the axis features, such as scaling, and direction.

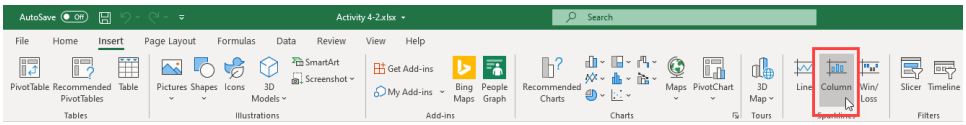
Activity 4-2: Adding Sparklines

You are preparing a worksheet showing the monthly sales revenue for each member of your sales team. You would like to be able to visualize the trends from month to month for each salesperson, and decide to try Sparklines.

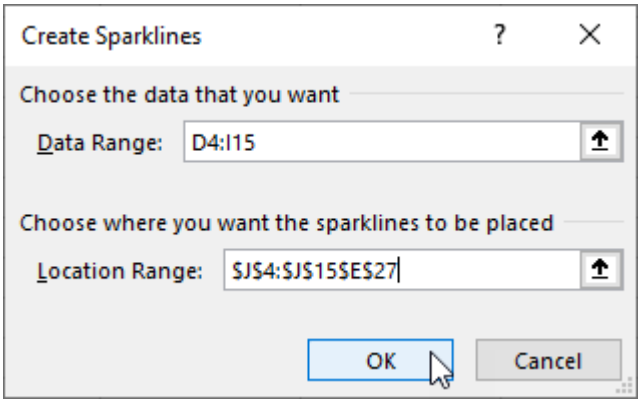
1. To begin, open Activity 4-2 from your Exercise Files folder:



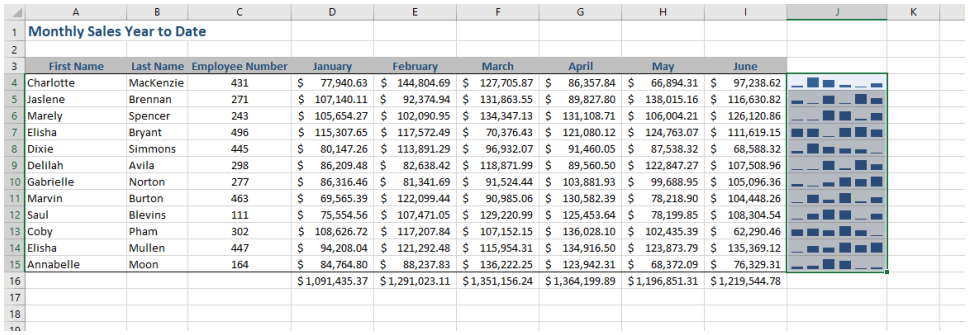
2. Click the **Insert** tab, then click the **Column** button in the Sparklines group:



3. In the Create Sparkline dialog box, type or select the range "**D4:I15**" in the **Data Range** field. In the **Location Range** field type or select "**$J$4:$J$15,**" then click **OK**:

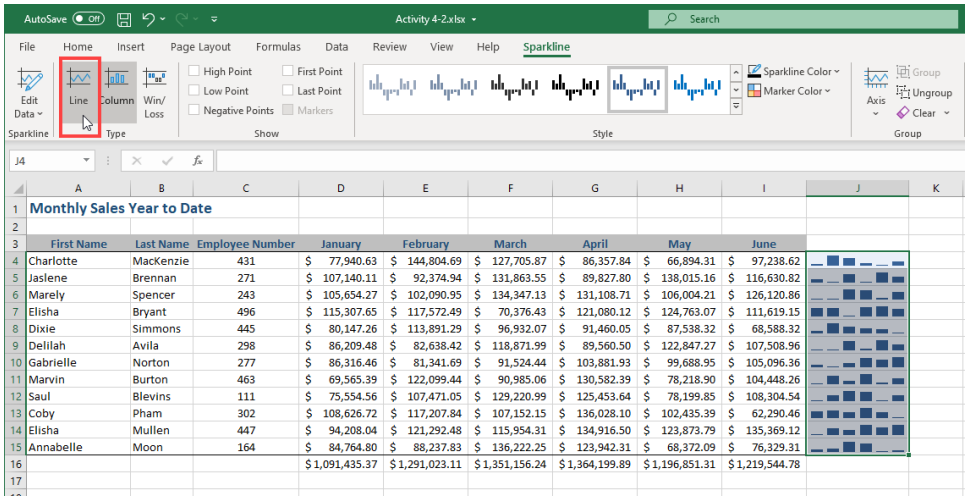


4. The column Sparklines, showing the monthly trends for each salesperson, will be displayed in column J:



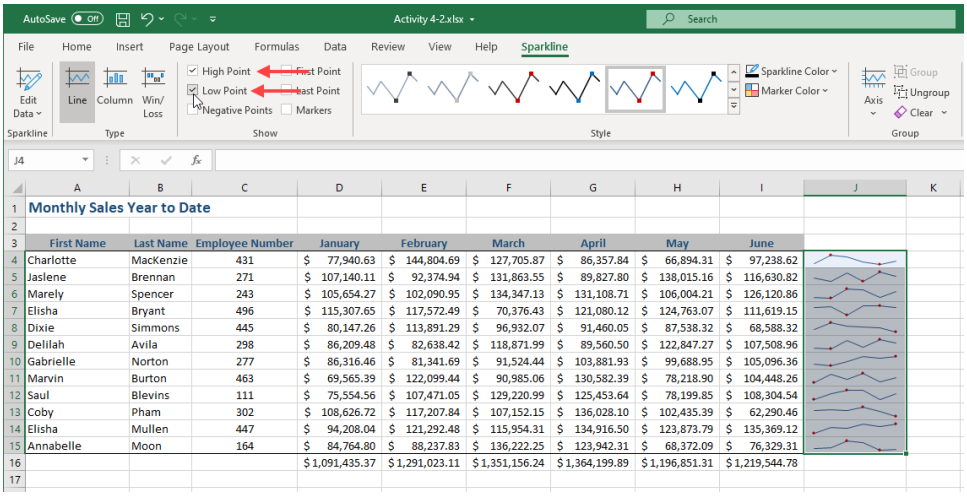
	A	B	C	D	E	F	G	H	I	J	K
1	Monthly Sales Year to Date										
2											
3	First Name	Last Name	Employee Number	January	February	March	April	May	June		
4	Charlotte	MacKenzie	431	$ 77,940.63	$ 144,804.69	$ 127,705.87	$ 86,357.84	$ 66,894.31	$ 97,238.62		
5	Jaslene	Brennan	271	$ 107,140.11	$ 92,374.94	$ 131,863.55	$ 89,827.80	$ 138,015.16	$ 116,630.82		
6	Marely	Spencer	243	$ 105,654.27	$ 102,090.95	$ 134,347.13	$ 131,108.71	$ 106,004.21	$ 126,120.86		
7	Elisha	Bryant	496	$ 115,307.65	$ 117,572.49	$ 70,376.43	$ 121,080.12	$ 124,763.07	$ 111,619.15		
8	Dixie	Simmons	445	$ 80,147.26	$ 113,891.29	$ 96,932.07	$ 91,460.05	$ 87,538.32	$ 68,588.32		
9	Delilah	Avila	298	$ 86,209.48	$ 82,638.42	$ 118,871.99	$ 89,560.50	$ 122,847.27	$ 107,508.96		
10	Gabrielle	Norton	277	$ 86,316.46	$ 81,341.69	$ 91,524.44	$ 103,881.93	$ 99,688.95	$ 105,096.36		
11	Marvin	Burton	463	$ 69,565.39	$ 122,099.44	$ 90,985.06	$ 130,582.39	$ 78,218.90	$ 104,448.26		
12	Saul	Blevins	111	$ 75,554.56	$ 107,471.05	$ 129,220.99	$ 125,453.64	$ 78,199.85	$ 108,304.54		
13	Coby	Pham	302	$ 108,626.72	$ 117,207.84	$ 107,152.15	$ 136,028.10	$ 102,435.39	$ 62,290.46		
14	Elisha	Mullen	447	$ 94,208.04	$ 121,292.48	$ 115,954.31	$ 134,916.50	$ 123,873.79	$ 135,369.12		
15	Annabelle	Moon	164	$ 84,764.80	$ 88,237.83	$ 136,222.25	$ 123,942.31	$ 68,372.09	$ 76,329.31		
16				$ 1,091,435.37	$ 1,291,023.11	$ 1,351,156.24	$ 1,364,199.89	$ 1,196,851.31	$ 1,219,544.78		
17											
18											

5. You decide you would like to try the Line type Sparklines to see if they will illustrate the trends better. With the Sparklines selected, the Sparkline contextual tab should be displayed in the ribbon list. Click the **Line** button in the **Type** group, to convert the Sparklines:



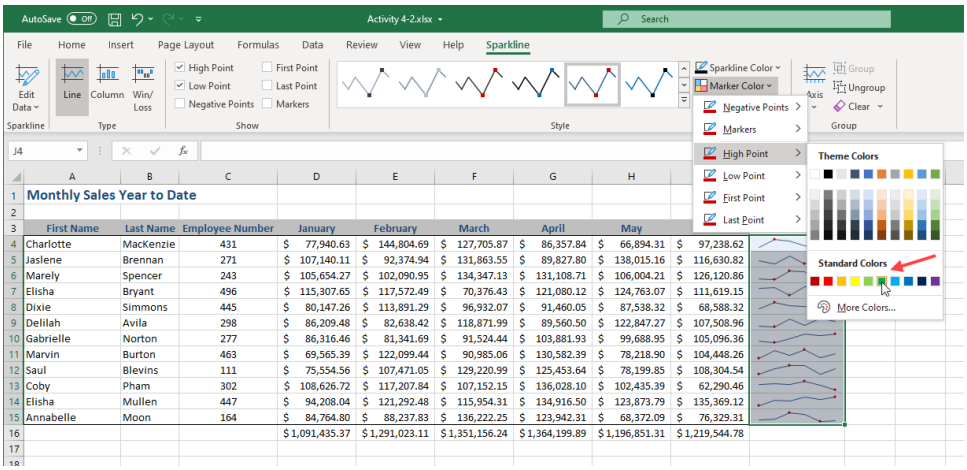
	A	B	C	D	E	F	G	H	I	J	K
1	Monthly Sales Year to Date										
2											
3	First Name	Last Name	Employee Number	January	February	March	April	May	June		
4	Charlotte	MacKenzie	431	$ 77,940.63	$ 144,804.69	$ 127,705.87	$ 86,357.84	$ 66,894.31	$ 97,238.62		
5	Jaslene	Brennan	271	$ 107,140.11	$ 92,374.94	$ 131,863.55	$ 89,827.80	$ 138,015.16	$ 116,630.82		
6	Marely	Spencer	243	$ 105,654.27	$ 102,090.95	$ 134,347.13	$ 131,108.71	$ 106,004.21	$ 126,120.86		
7	Elisha	Bryant	496	$ 115,307.65	$ 117,572.49	$ 70,376.43	$ 121,080.12	$ 124,763.07	$ 111,619.15		
8	Dixie	Simmons	445	$ 80,147.26	$ 113,891.29	$ 96,932.07	$ 91,460.05	$ 87,538.32	$ 68,588.32		
9	Delilah	Avila	298	$ 86,209.48	$ 82,638.42	$ 118,871.99	$ 89,560.50	$ 122,847.27	$ 107,508.96		
10	Gabrielle	Norton	277	$ 86,316.46	$ 81,341.69	$ 91,524.44	$ 103,881.93	$ 99,688.95	$ 105,096.36		
11	Marvin	Burton	463	$ 69,565.39	$ 122,099.44	$ 90,985.06	$ 130,582.39	$ 78,218.90	$ 104,448.26		
12	Saul	Blevins	111	$ 75,554.56	$ 107,471.05	$ 129,220.99	$ 125,453.64	$ 78,199.85	$ 108,304.54		
13	Coby	Pham	302	$ 108,626.72	$ 117,207.84	$ 107,152.15	$ 136,028.10	$ 102,435.39	$ 62,290.46		
14	Elisha	Mullen	447	$ 94,208.04	$ 121,292.48	$ 115,954.31	$ 134,916.50	$ 123,873.79	$ 135,369.12		
15	Annabelle	Moon	164	$ 84,764.80	$ 88,237.83	$ 136,222.25	$ 123,942.31	$ 68,372.09	$ 76,329.31		
16				$ 1,091,435.37	$ 1,291,023.11	$ 1,351,156.24	$ 1,364,199.89	$ 1,196,851.31	$ 1,219,544.78		
17											

6. In the **Show** group, click the **High Point** and **Low Point** checkboxes to enable them. You will see that red markers have been placed on the Sparklines to indicate the highest and lowest value:



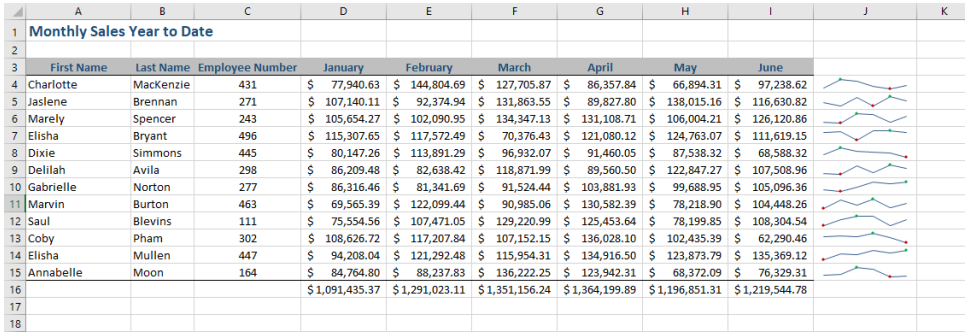
First Name	Last Name	Employee Number	January	February	March	April	May	June
Charlotte	MacKenzie	431	$ 77,940.63	$ 144,804.69	$ 127,705.87	$ 86,357.84	$ 66,894.31	$ 97,238.62
Jaslene	Brennan	271	$ 107,140.11	$ 92,374.94	$ 131,863.55	$ 89,827.80	$ 138,015.16	$ 116,630.82
Marely	Spencer	243	$ 105,654.27	$ 102,090.95	$ 134,347.13	$ 131,108.71	$ 106,004.21	$ 126,120.86
Elisha	Bryant	496	$ 115,307.65	$ 117,572.49	$ 70,376.43	$ 121,080.12	$ 124,763.07	$ 111,619.15
Dixie	Simmons	445	$ 80,147.26	$ 113,891.29	$ 96,932.07	$ 91,460.05	$ 87,538.32	$ 68,588.32
Delilah	Avila	298	$ 86,209.48	$ 82,638.42	$ 118,871.99	$ 89,560.50	$ 122,847.27	$ 107,508.96
Gabrielle	Norton	277	$ 86,316.46	$ 81,341.69	$ 91,524.44	$ 103,881.93	$ 99,688.95	$ 105,096.36
Marvin	Burton	463	$ 69,565.39	$ 122,099.44	$ 90,985.06	$ 130,582.39	$ 78,218.90	$ 104,448.26
Saul	Blevins	111	$ 75,554.56	$ 107,471.05	$ 129,220.99	$ 125,453.64	$ 78,199.85	$ 108,304.54
Coby	Pham	302	$ 108,626.72	$ 117,207.84	$ 107,152.15	$ 136,028.10	$ 102,435.39	$ 62,290.46
Elisha	Mullen	447	$ 94,208.04	$ 121,292.48	$ 115,954.31	$ 134,916.50	$ 123,873.79	$ 135,369.12
Annabelle	Moon	164	$ 84,764.80	$ 88,237.83	$ 136,222.25	$ 123,942.31	$ 68,372.09	$ 76,329.31
			$ 1,091,435.37	$ 1,291,023.11	$ 1,351,156.24	$ 1,364,199.89	$ 1,196,851.31	$ 1,219,544.78

7. To differentiate between the high and low values, click the **Marker Color** drop-down command, click **High Point**, then click the **Green** standard color:



First Name	Last Name	Employee Number	January	February	March	April	May	
Charlotte	MacKenzie	431	$ 77,940.63	$ 144,804.69	$ 127,705.87	$ 86,357.84	$ 66,894.31	$ 97,238.62
Jaslene	Brennan	271	$ 107,140.11	$ 92,374.94	$ 131,863.55	$ 89,827.80	$ 138,015.16	$ 116,630.82
Marely	Spencer	243	$ 105,654.27	$ 102,090.95	$ 134,347.13	$ 131,108.71	$ 106,004.21	$ 126,120.86
Elisha	Bryant	496	$ 115,307.65	$ 117,572.49	$ 70,376.43	$ 121,080.12	$ 124,763.07	$ 111,619.15
Dixie	Simmons	445	$ 80,147.26	$ 113,891.29	$ 96,932.07	$ 91,460.05	$ 87,538.32	$ 68,588.32
Delilah	Avila	298	$ 86,209.48	$ 82,638.42	$ 118,871.99	$ 89,560.50	$ 122,847.27	$ 107,508.96
Gabrielle	Norton	277	$ 86,316.46	$ 81,341.69	$ 91,524.44	$ 103,881.93	$ 99,688.95	$ 105,096.36
Marvin	Burton	463	$ 69,565.39	$ 122,099.44	$ 90,985.06	$ 130,582.39	$ 78,218.90	$ 104,448.26
Saul	Blevins	111	$ 75,554.56	$ 107,471.05	$ 129,220.99	$ 125,453.64	$ 78,199.85	$ 108,304.54
Coby	Pham	302	$ 108,626.72	$ 117,207.84	$ 107,152.15	$ 136,028.10	$ 102,435.39	$ 62,290.46
Elisha	Mullen	447	$ 94,208.04	$ 121,292.48	$ 115,954.31	$ 134,916.50	$ 123,873.79	$ 135,369.12
Annabelle	Moon	164	$ 84,764.80	$ 88,237.83	$ 136,222.25	$ 123,942.31	$ 68,372.09	$ 76,329.31
			$ 1,091,435.37	$ 1,291,023.11	$ 1,351,156.24	$ 1,364,199.89	$ 1,196,851.31	$ 1,219,544.78

8. The marker indicating the highest value in the data series is now green. You can quickly see the trends in sales revenue for each salesperson and you can also quickly locate their highest and lowest revenue months:



	A	B	C	D	E	F	G	H	I	J	K
1	**Monthly Sales Year to Date**										
2											
3	**First Name**	**Last Name**	**Employee Number**	**January**	**February**	**March**	**April**	**May**	**June**		
4	Charlotte	MacKenzie	431	$ 77,940.63	$ 144,804.69	$ 127,705.87	$ 86,357.84	$ 66,894.31	$ 97,238.62		
5	Jaslene	Brennan	271	$ 107,140.11	$ 92,374.94	$ 131,863.55	$ 89,827.80	$ 138,015.16	$ 116,630.82		
6	Marely	Spencer	243	$ 105,654.27	$ 102,090.95	$ 134,347.13	$ 131,108.71	$ 106,004.21	$ 126,120.86		
7	Elisha	Bryant	496	$ 115,307.65	$ 117,572.49	$ 70,376.43	$ 121,080.12	$ 124,763.07	$ 111,619.15		
8	Dixie	Simmons	445	$ 80,147.26	$ 113,891.29	$ 96,932.07	$ 91,460.05	$ 87,538.32	$ 68,588.32		
9	Delilah	Avila	298	$ 86,209.48	$ 82,638.42	$ 118,871.99	$ 89,560.50	$ 122,847.27	$ 107,508.96		
10	Gabrielle	Norton	277	$ 86,316.46	$ 81,341.69	$ 91,524.44	$ 103,881.93	$ 99,688.95	$ 105,096.36		
11	Marvin	Burton	463	$ 69,565.39	$ 122,099.44	$ 90,985.06	$ 130,582.39	$ 78,218.90	$ 104,448.26		
12	Saul	Blevins	111	$ 75,554.56	$ 107,471.05	$ 129,220.99	$ 125,453.64	$ 78,199.85	$ 108,304.54		
13	Coby	Pham	302	$ 108,626.72	$ 117,207.84	$ 107,152.15	$ 136,028.10	$ 102,435.39	$ 62,290.46		
14	Elisha	Mullen	447	$ 94,208.04	$ 121,292.48	$ 115,954.31	$ 134,916.50	$ 123,873.79	$ 135,369.12		
15	Annabelle	Moon	164	$ 84,764.80	$ 88,237.83	$ 136,222.25	$ 123,942.31	$ 68,372.09	$ 76,329.31		
16				$ 1,091,435.37	$ 1,291,023.11	$ 1,351,156.24	$ 1,364,199.89	$ 1,196,851.31	$ 1,219,544.78		
17											
18											

9. Save the current workbook as **Activity 4-2 Complete** and then close Microsoft Excel 365 to complete the activity.

TOPIC C: What-If Analysis

Excel users often encounter situations where they want to understand what would happen if certain variables in their data changed. One example would be wanting to understand how your profit would be impacted by changes in your revenue. Another example would be wanting to know what price you should set for a product if you want to make a specific profit. Approaching these problems manually could mean creating many different versions of the same worksheet, or even entering guesses in a field repeatedly until you get the result you are looking for. Fortunately, Excel provides us with tool that can help us automate this process and make it easier to explore many what-if scenarios. In this topic you will learn about the tools available in the What-If Analysis command and how to use them:

Topic Objectives

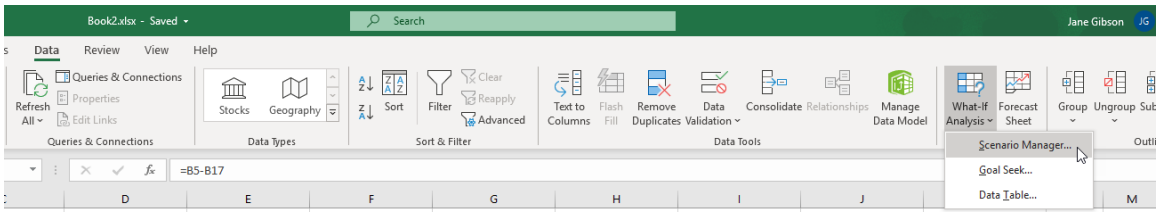
In this session, you will learn about:

- Using the Scenario Manager
- Using Goal Seek
- Using the Solver

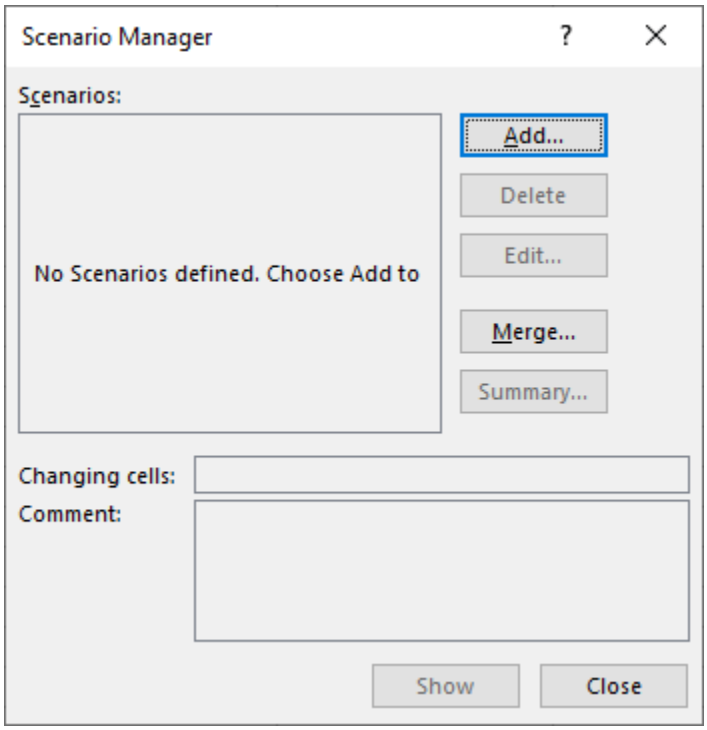
The Scenario Manager

The **Scenario Manager** is a tool that will let you create and store different sets of variables as scenarios, which you can then apply to a data set to understand their impact. You can also create a summary report that will let you view the results of all your scenarios together.

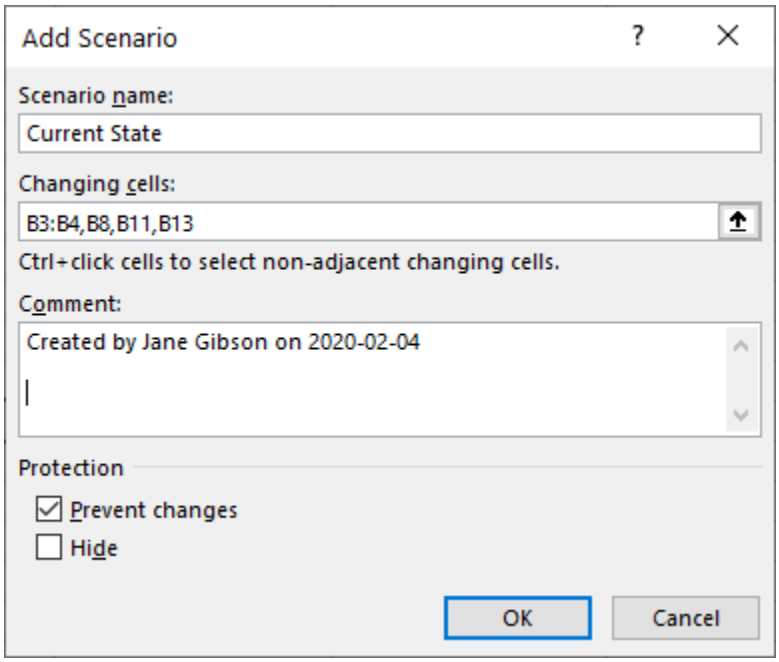
To access the Scenario Manager dialog box, click **Data → What-If analysis → Scenario Manager**:



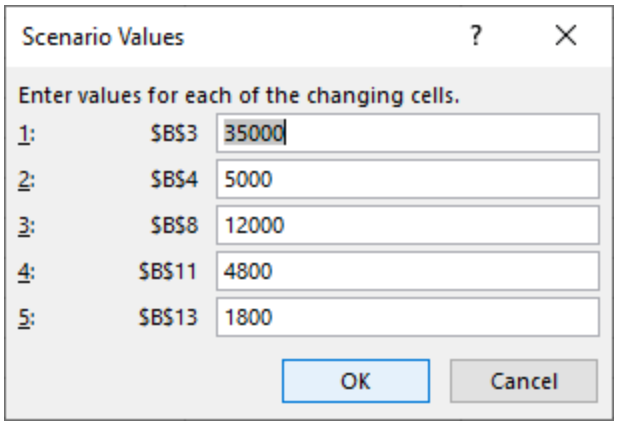
Once open, the **Scenario Manager** dialog box allows you to create a series of scenarios based on changing the values in key cells in your worksheet:



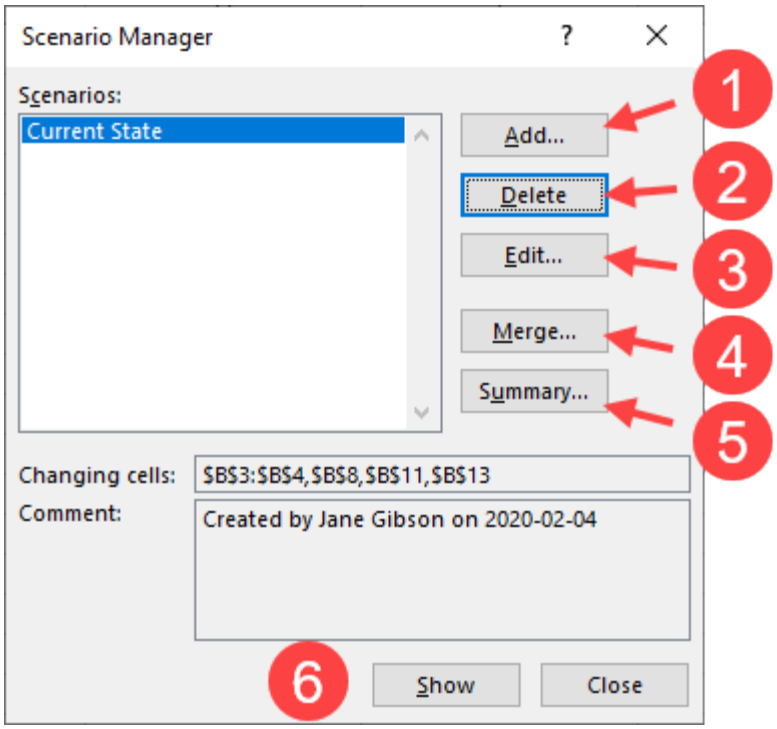
Clicking the **Add** button will open the **Add Scenario** dialog box, where you can assign a name for your first scenario and select the cells that will be changing:



Clicking the **OK** button will open the **Scenario Values** dialog box, where the values that will change with each scenario can be added:



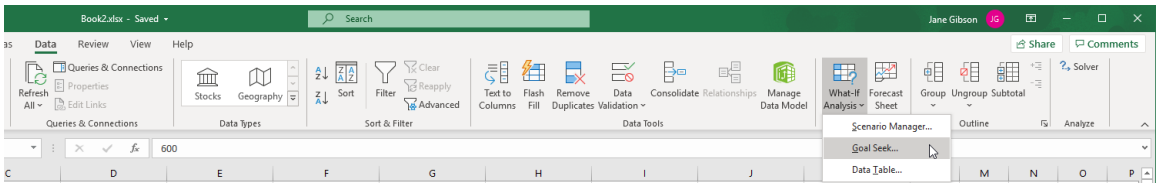
Clicking the **OK** button in the Scenario Values dialog box will return you to the Scenario Manager dialog box, which will now list the scenario created. You can now continue to build scenarios by clicking the **(1) Add** button and following the same sequence. The **(2) Delete** button removes the currently selected scenario. Using the **(3) Edit** button allows you to make changes to the currently selected scenario. The **(4) Merge** button allows you to import scenarios from other worksheets. The **(5) Summary** button allows you to create a report comparing all your scenarios, and the **(6) Show** button displays the values for the currently selected scenario in your worksheet:



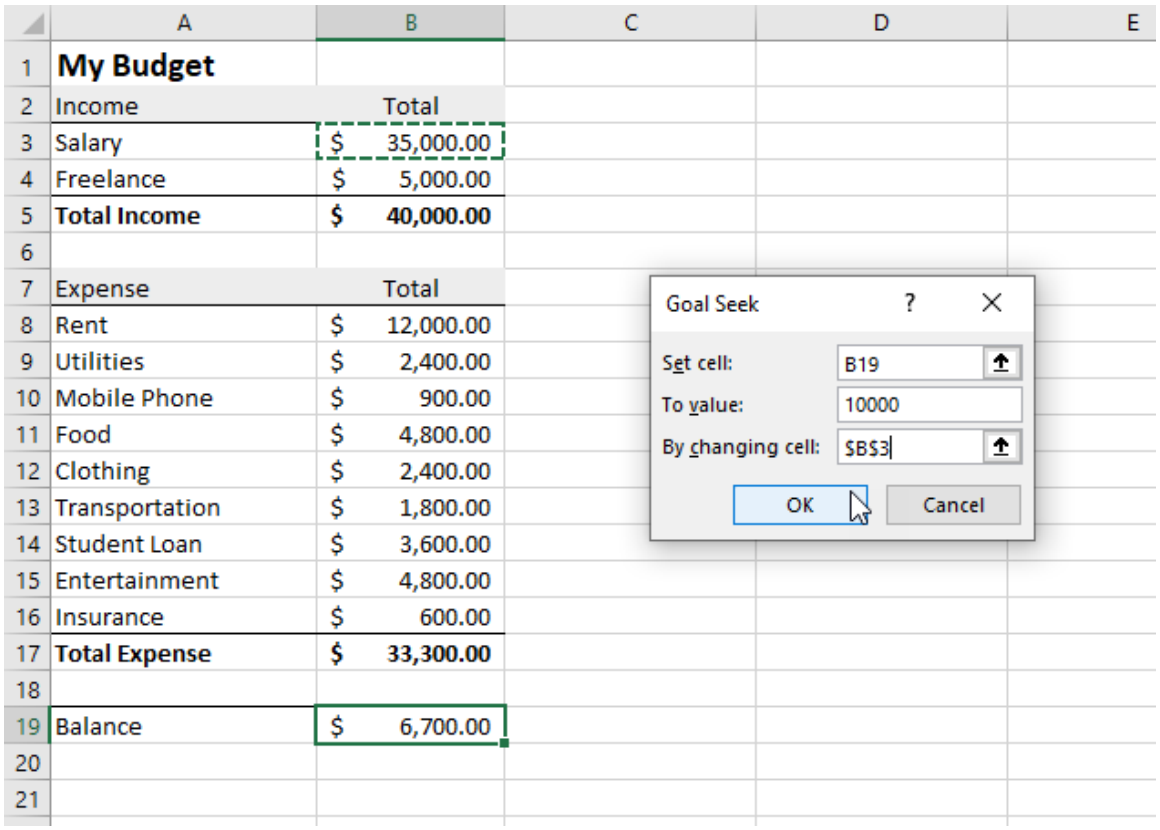
Using Goal Seek

If you know the result you want in a formula, **Goal Seek** can find the input value for one of the cells referenced in that formula, to produce that result (or goal) that you want to achieve. For instance, if you know you want your profit to be 10%, Goal Seek can calculate the revenue you will require, assuming your costs remain constant.

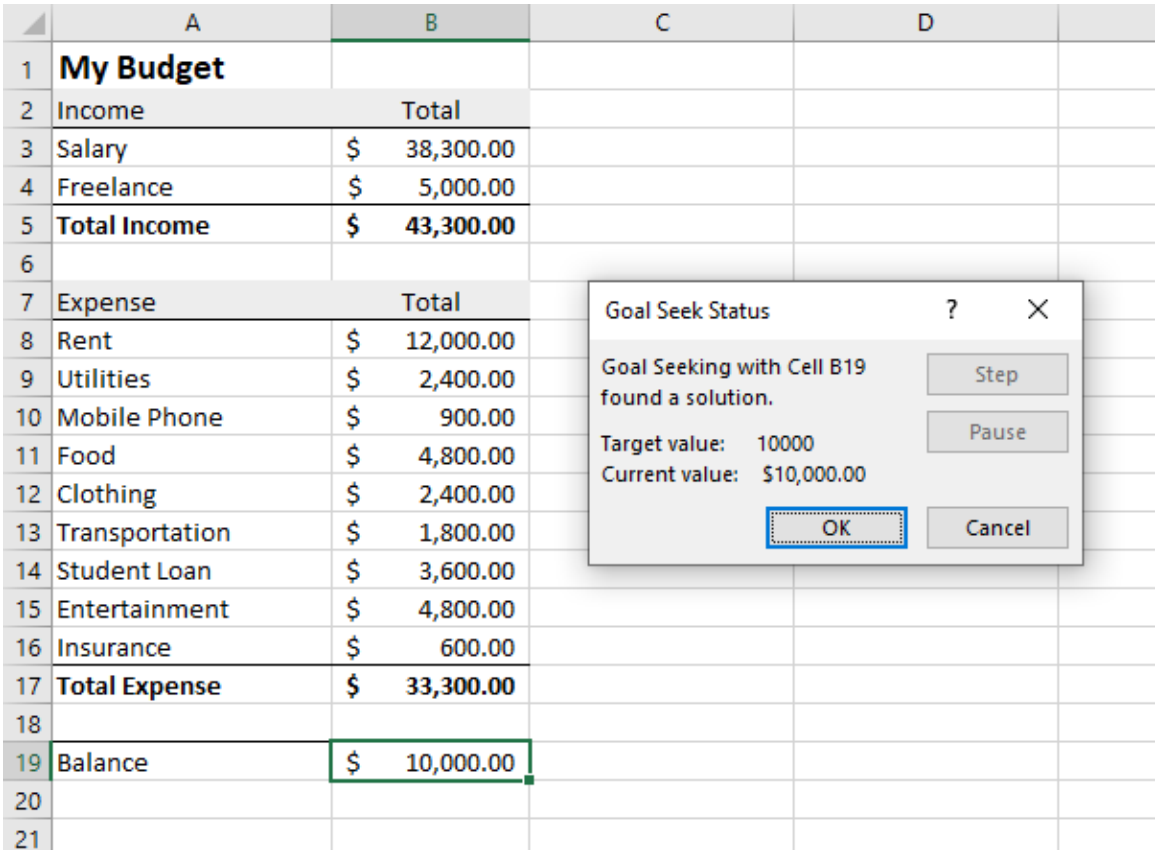
To access the Goal Seek tool, click **Data → What-If Analysis → Goal Seek**:



In the **Goal Seek** dialog box, type the cell reference, or click the cell, that you want to set as your goal value in the **Set cell** field. Type the goal value in the **To value** field, then type the cell reference, or click the cell, that you want to change to reach your goal value. In this example we are asking how much more salary (Cell B3) we need to make to save $10,000 (Cell B19) a year:



Clicking the **OK** button will display the Goal Seek Status dialog box, confirming the solution, and will adjust the values in both the goal cell and the changing cell:



	A	B	C	D
1	**My Budget**			
2	Income	Total		
3	Salary	$ 38,300.00		
4	Freelance	$ 5,000.00		
5	**Total Income**	**$ 43,300.00**		
6				
7	Expense	Total		
8	Rent	$ 12,000.00		
9	Utilities	$ 2,400.00		
10	Mobile Phone	$ 900.00		
11	Food	$ 4,800.00		
12	Clothing	$ 2,400.00		
13	Transportation	$ 1,800.00		
14	Student Loan	$ 3,600.00		
15	Entertainment	$ 4,800.00		
16	Insurance	$ 600.00		
17	**Total Expense**	**$ 33,300.00**		
18				
19	Balance	$ 10,000.00		
20				
21				

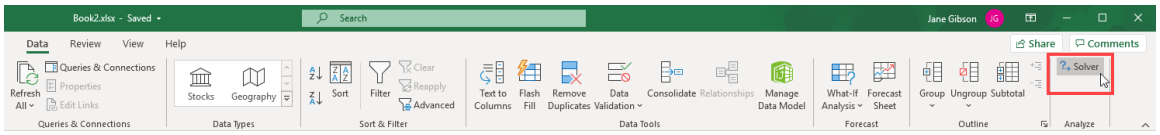
Note that changes made by the Goal Seek tool can be undone by pressing **Ctrl + Z.**

Using Solver

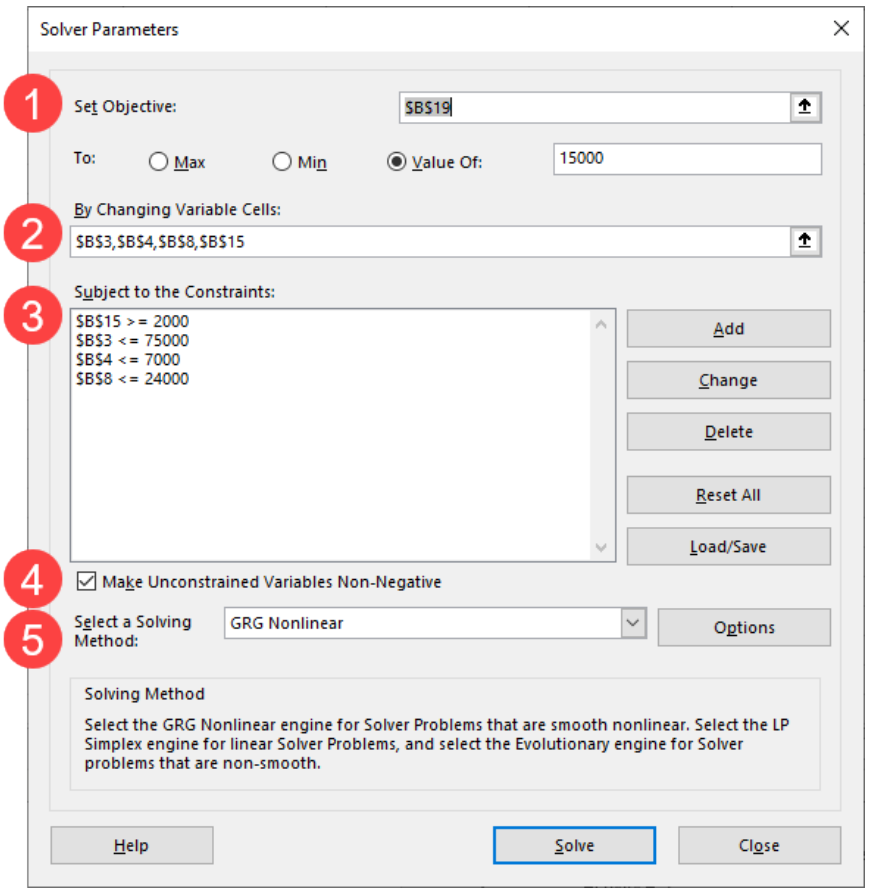
The **Solver** is a Microsoft Excel add-in program with a similar purpose as the Goal Seek tool, but it has the added ability to change more than just one variable to reach your goal, and also lets you set constraints on those variables using logical conditions.

The Solver tool is an add-in that is included with Excel but is not loaded by default. To use the Solver, you must first enable the add-in in the **Add-ins** category of the Excel Options dialog box. We will show the steps of this process in this topic's activity.

Once the Solver add-in is loaded, you can access it by clicking **Data → Solver**:



The **Solver Parameters** dialog box will open:



The **(1) Set Objective** field lets you set the objective cell, and the result that you want to achieve. You can set the value of the desired result by using the **Max** or **Min** radio buttons, or by selecting the **Value of** radio button and entering a specific value in the field.

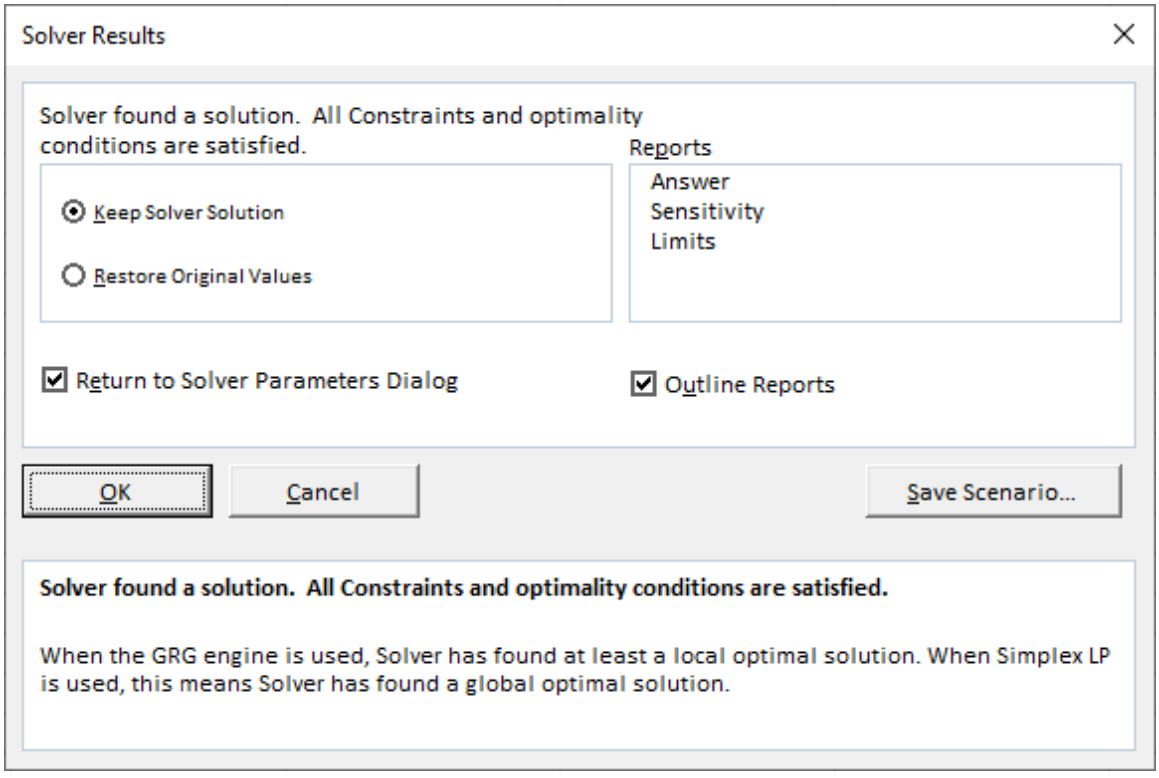
In the **(2) By Changing Variable Cells** field you can select or type the cells that will be changed to achieve the value in the Set Objective cell.

The **(3) Subject to the Constrains** list box allows you to add, change, or delete constraints for any of the variable cells. Clicking the Add button will open the Add Constraint dialog box and allow you to select the variable cells and choose a constraint.

The **(4) Make Unconstrained Variables Non-Negative** checkbox prevents the solver from setting variables without a constraint to a negative number.

Solving Method descriptions can be selected in the **(5) Select a Solving Method** drop-down list. A description of the different methods and their use is below the drop-down list. Clicking the Options button will open an advanced feature option set.

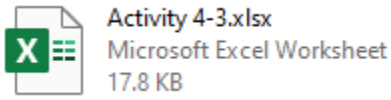
Once the Solver Parameters have been configured, clicking the Solve button will attempt to solve the variables to achieve the objective. The **Solver Results** dialog box will open, and any solution results will be displayed in your variables on your worksheet. You will have the option to keep the results or to restore the original values:



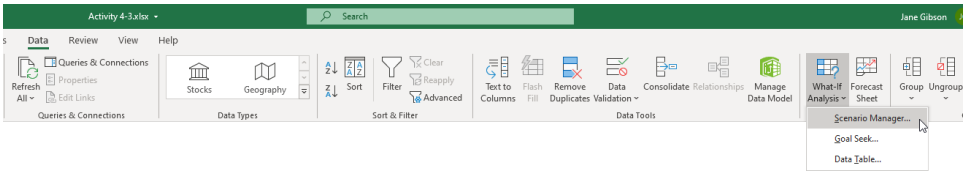
Activity 4-3: What-If Analysis

You are thinking about moving to advance your career, but you want to understand how that might impact your finances.

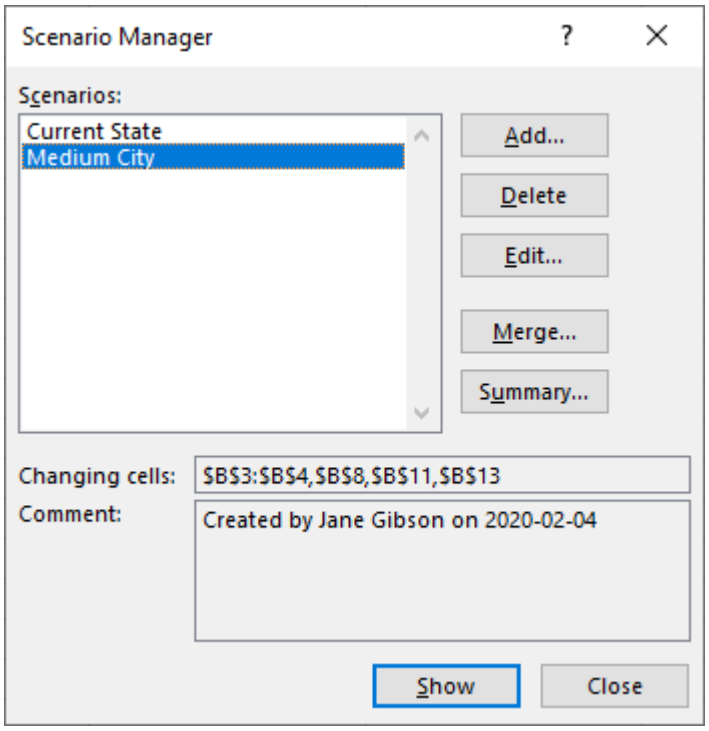
1. To begin, open **Activity 4-3** from your Exercise Files folder:



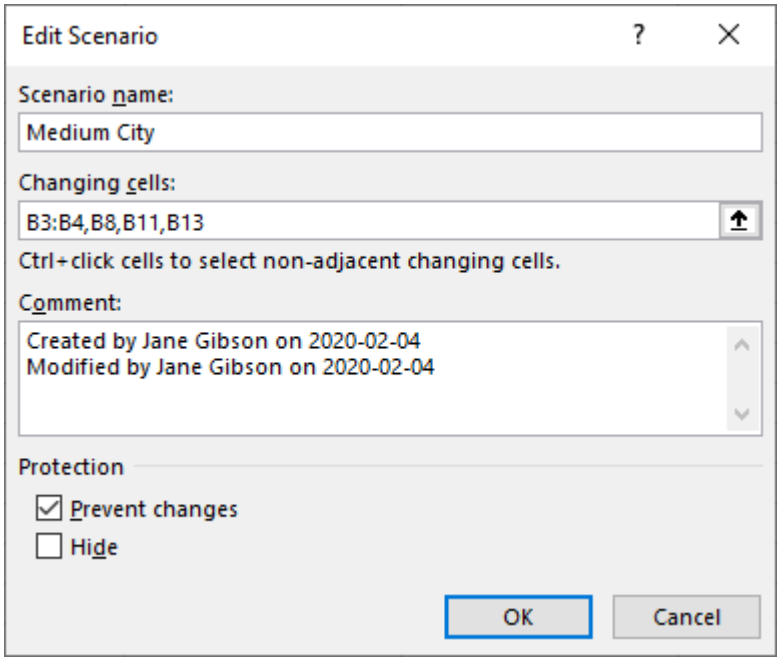
2. You have your budget based on your current income and expenses, and you have researched potential salaries and the cost of living in medium and large cities that you would consider moving to. To compare the different scenarios, click **Data → What-if Analysis → Scenario Manager**:



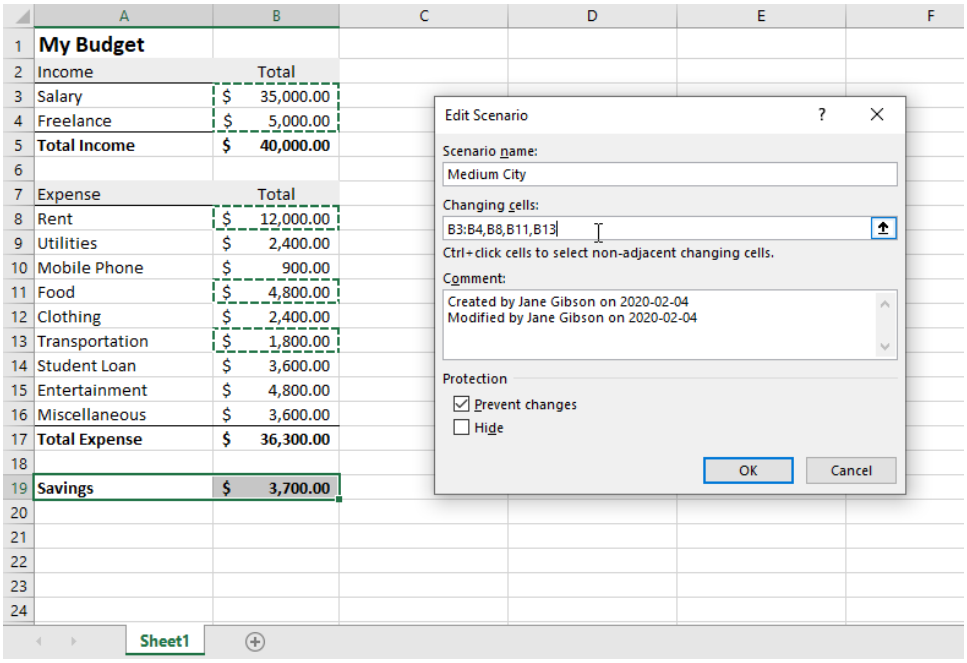
3. Note in the Scenario Manager dialog box that opens, two scenarios have already been created, one named Current State and one named Medium City:



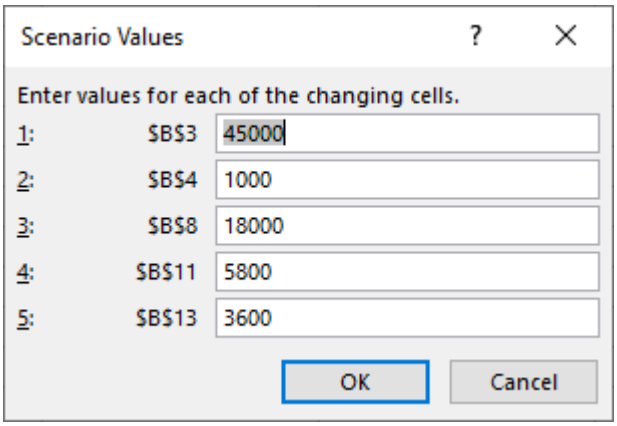
4. Click to select the **Medium City** scenario, then click the **Edit** button. You will see that the **Changing cells** field contains the cells that will change in this scenario:



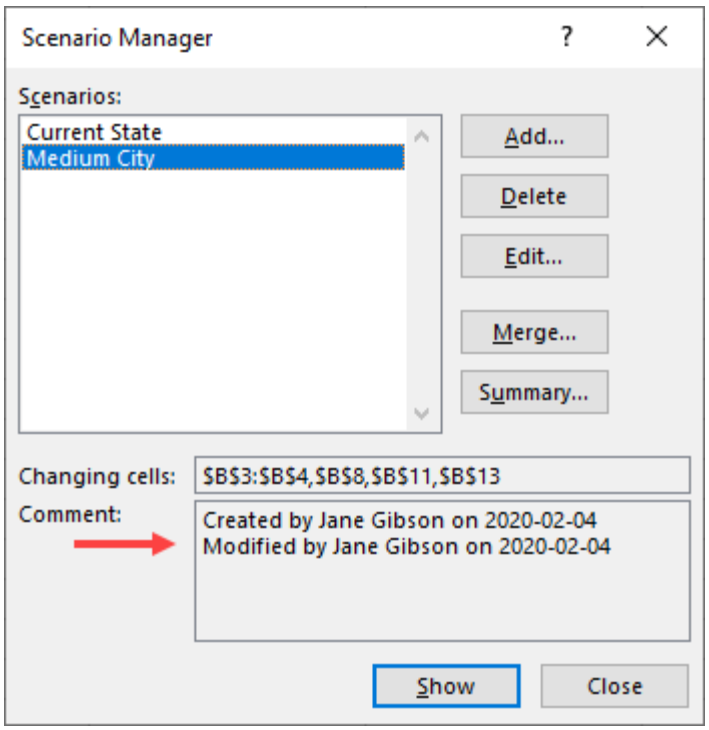
5. If you click to select the **Changing cells** field, you will see that the cells on the worksheet become highlighted:



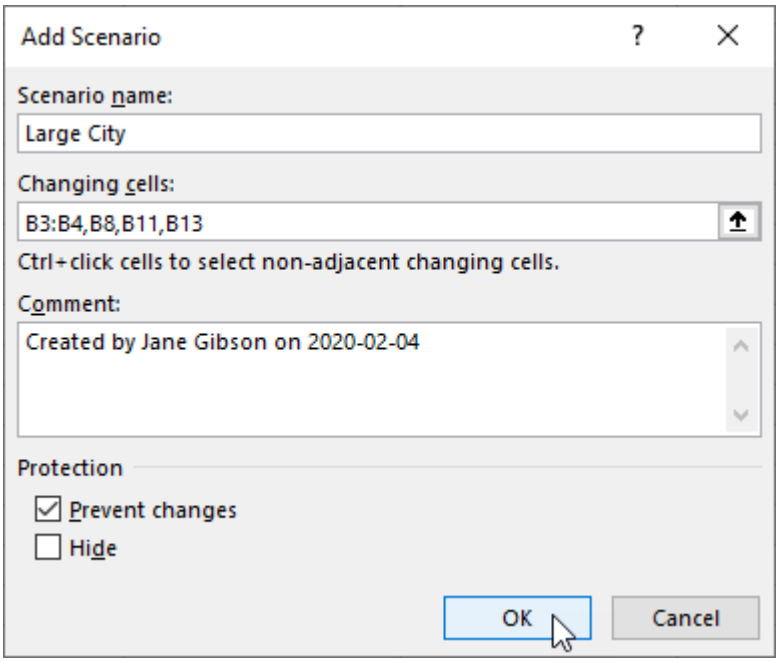
6. Click **OK,** and in the Scenario Values dialog box you will see the values that have been entered for the corresponding cells for this scenario, based on your research:



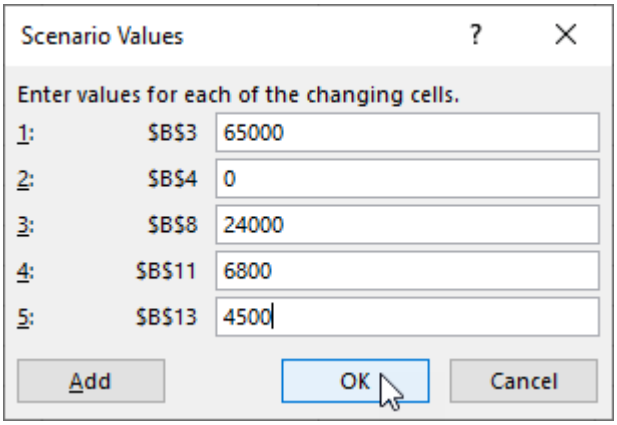
7. Clicking the **OK** button will return you to the Scenario Manager dialog box, where you will notice that a comment has been added for the Medium City scenario, indicating that you have modified the scenario:



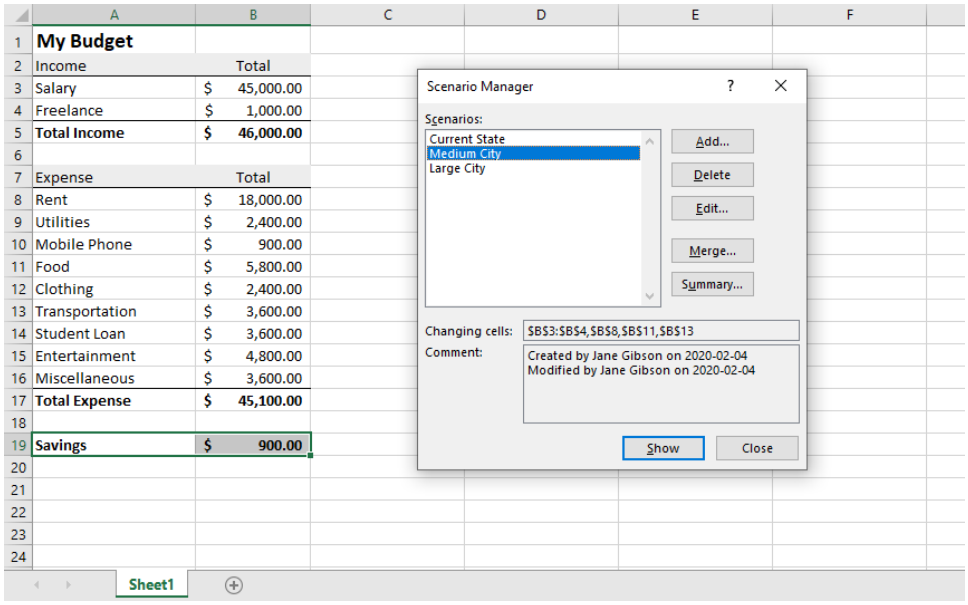
8. Click the **Add** button to create a new scenario. Type "**Large City**" in the **Scenario name** field, then click **OK**:



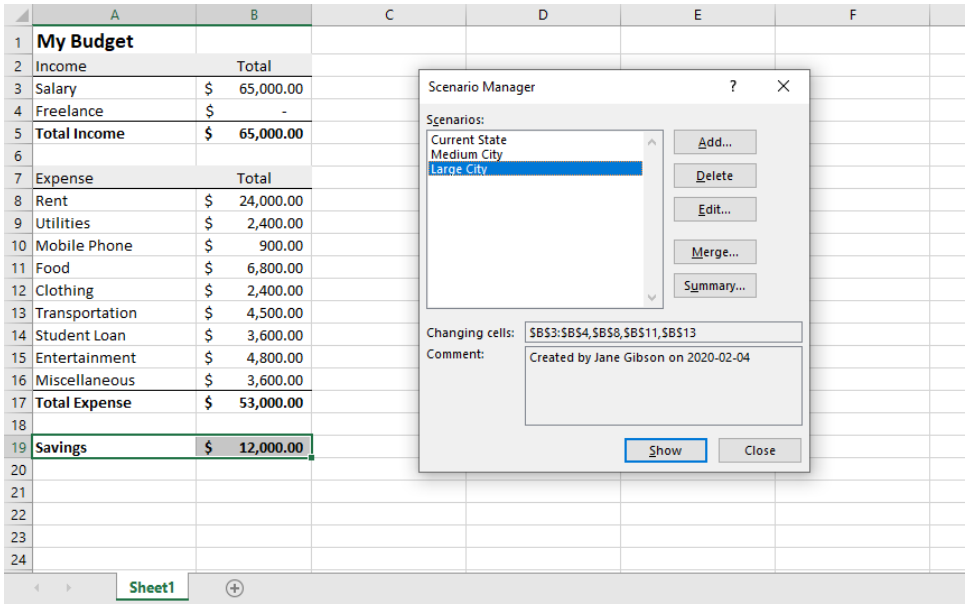
9. In the Scenario Values dialog box that opens, type "**65000**" in the **$B$3** field, "**0**" in the **$B$4** field, "**24000**" in the **$B$8** field, "**6800**" in the **$B$11** field, and "**4500**" in the **$B$13** field. Click **OK** once complete:



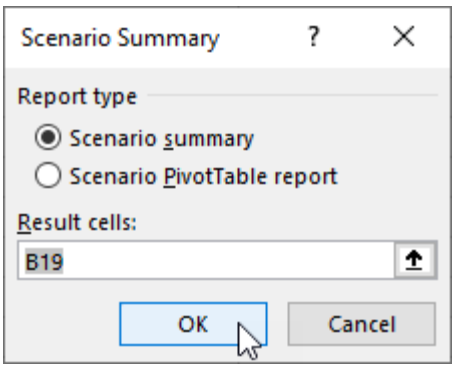
10. Click to select the **Medium City** scenario in the Scenarios list box, then click the **Show** button. You will see the values in the changing cells replaced. Note the decrease in Savings:



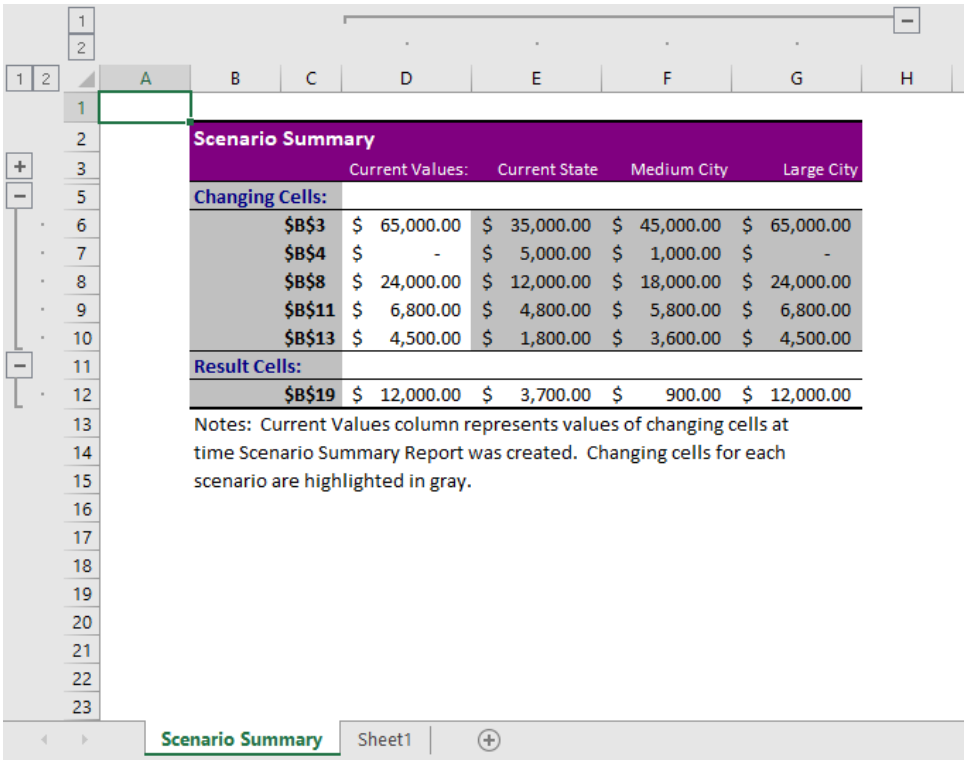
11. Follow the same steps to see the results for **Large City**:



12. Now click the **Summary** button. The Scenario Summary dialog box will appear. Click to select the **Scenario Summary** radio button, and confirm the **Results cells** field contains the reference to cell **B19**, the yearly savings, then click **OK**:



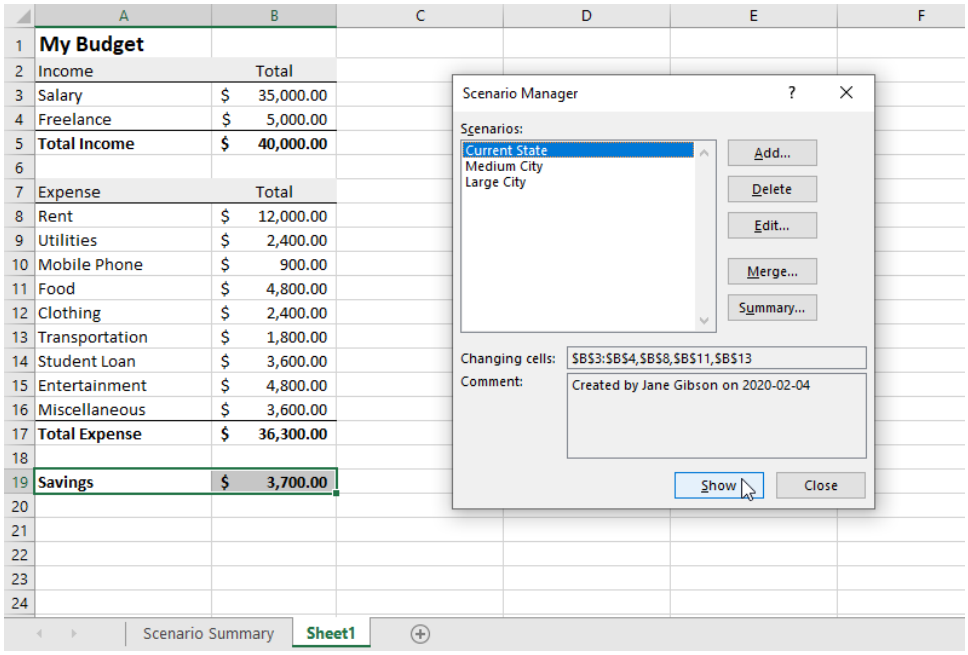
13. The Scenario Summary dialog box will close, and a new worksheet, named Scenario Summary, will be created. The worksheet contains a table comparing the results of the scenarios:



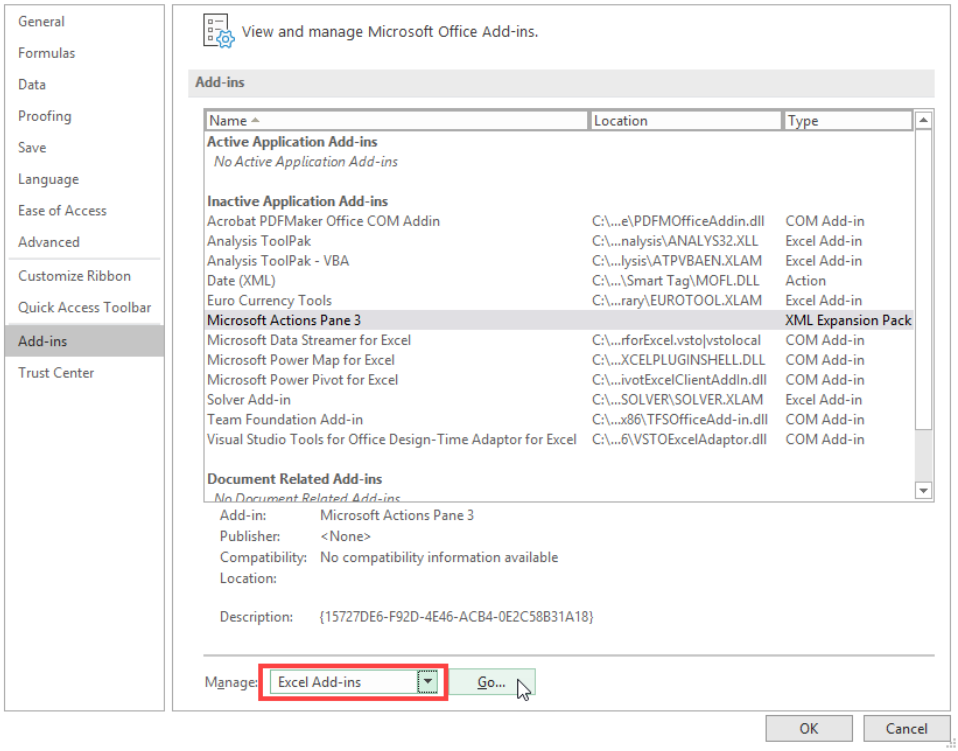
Scenario Summary				
	Current Values:	Current State	Medium City	Large City
Changing Cells:				
$B$3	$ 65,000.00	$ 35,000.00	$ 45,000.00	$ 65,000.00
$B$4	$ -	$ 5,000.00	$ 1,000.00	$ -
$B$8	$ 24,000.00	$ 12,000.00	$ 18,000.00	$ 24,000.00
$B$11	$ 6,800.00	$ 4,800.00	$ 5,800.00	$ 6,800.00
$B$13	$ 4,500.00	$ 1,800.00	$ 3,600.00	$ 4,500.00
Result Cells:				
$B$19	$ 12,000.00	$ 3,700.00	$ 900.00	$ 12,000.00

Notes: Current Values column represents values of changing cells at time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.

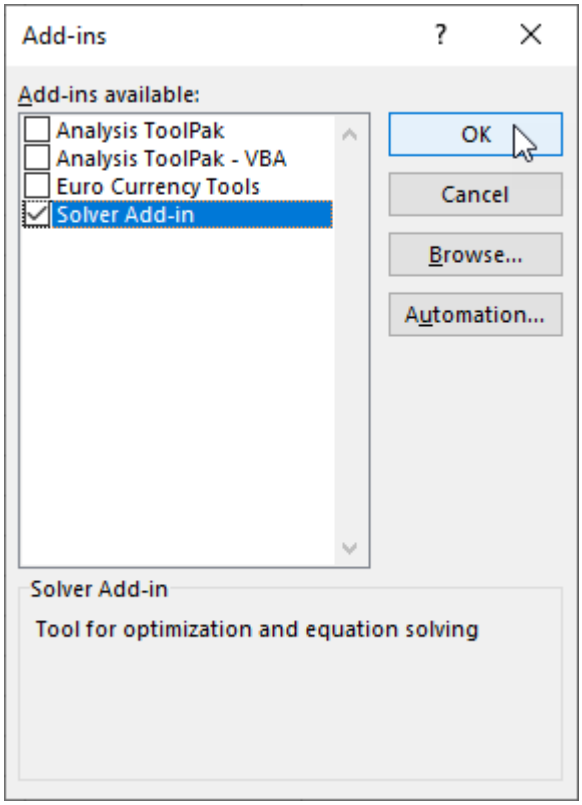
14. To restore your worksheet to the original, click the **Sheet1** tab to return to Sheet1, click the **What-If Analysis** drop-down command, and click **Scenario Manager**. With the Scenario Manager dialog box open, click to select the **Current State** scenario, click the **Show** button, then click **Close**:



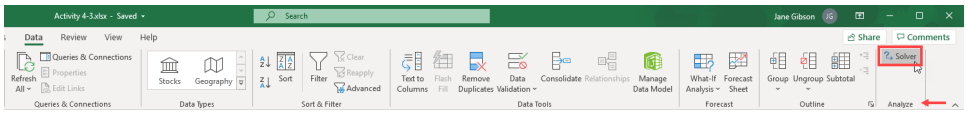
15. In the Large City Scenario, you discovered that it would be possible to save $12,000 a year. You would now like to explore how to do that in your current job. Close the Scenario Manager dialog box by clicking the **Close** button, so we can now load the Solver add-in. Click **File → Options,** then select **Add-ins** from the Excel Options dialog box categories. Select **Excel Add-ins** from the **Manage** drop-down list, then click the **Go** button:



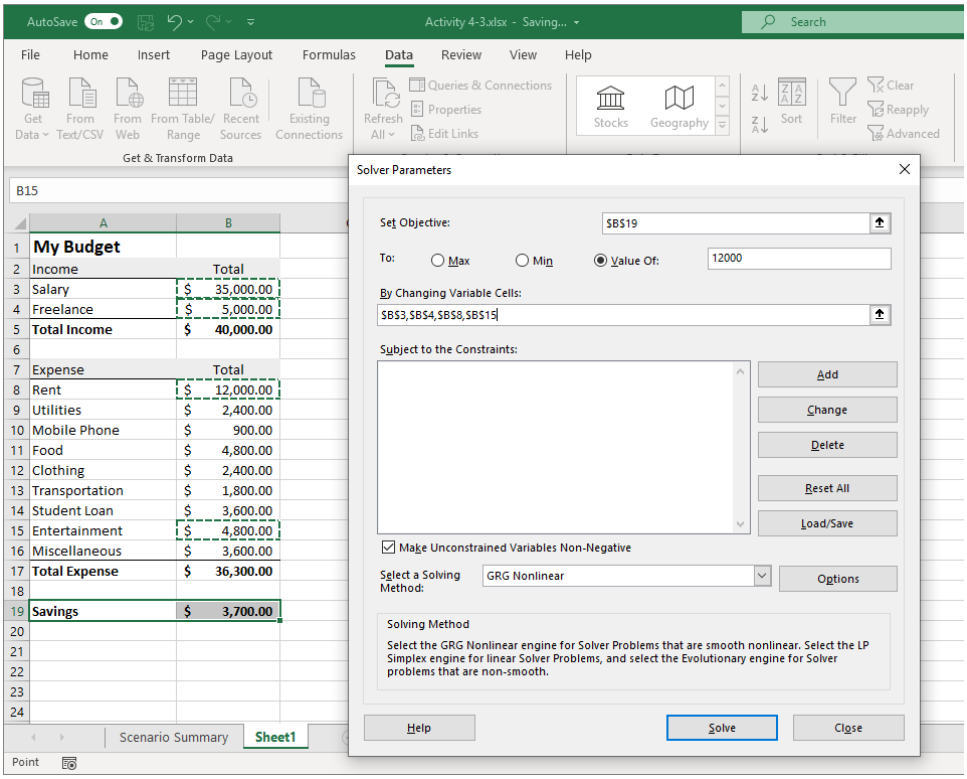
16. In the Add-ins dialog box, click the **Solver Add-in** checkbox to enable, then click **OK**:



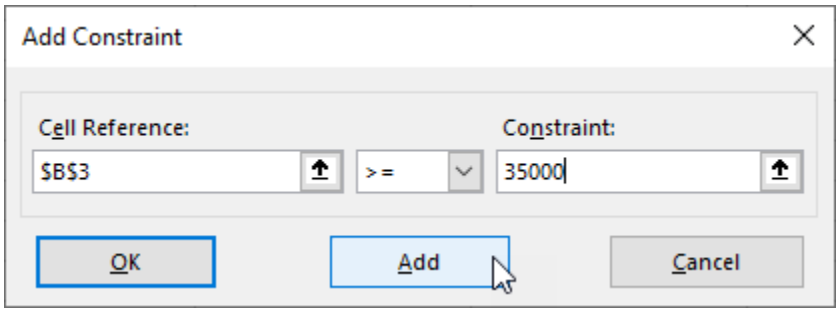
17. You will see that the Data tab now has a new group, Analyze, containing the Solver command. Click the **Solver** command to launch the **Solver** dialog box:



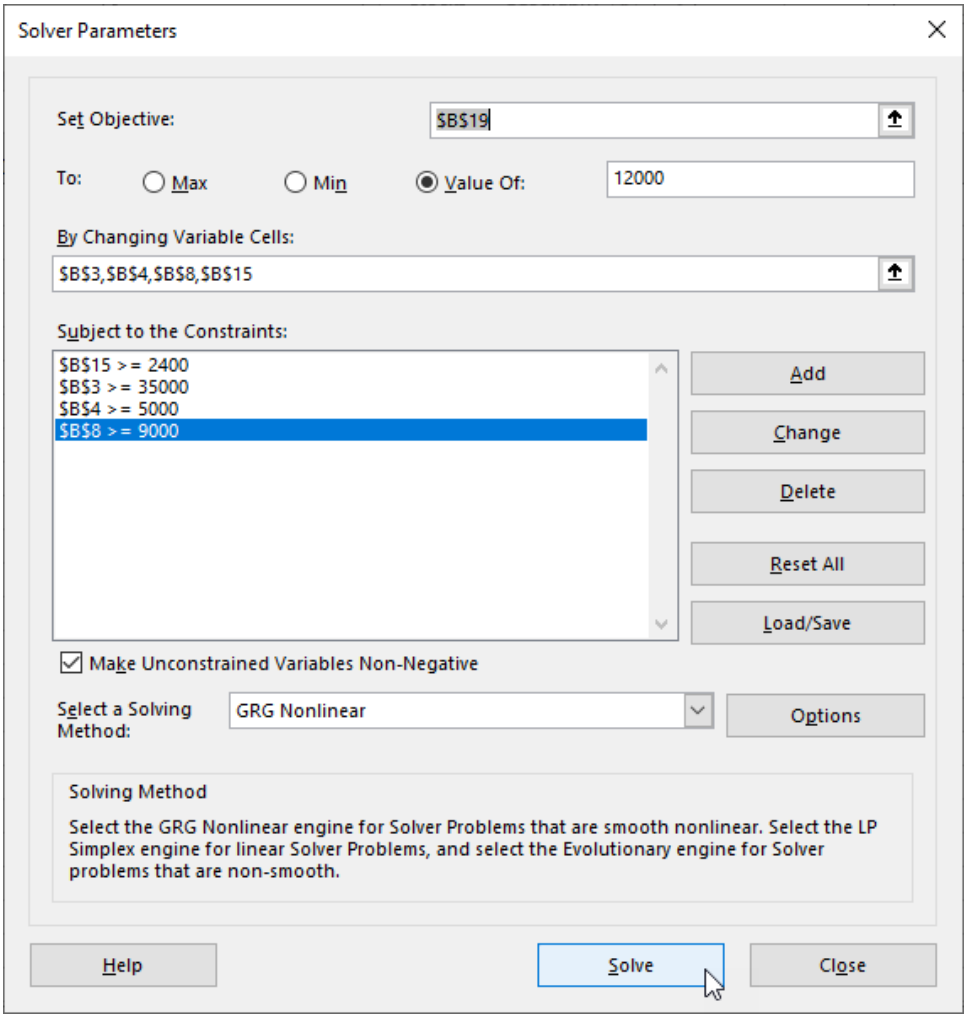
18. In the Solver Parameters dialog box, click to select or type cell **$B$19** in the **Set Objective** field, then click to enable the **Value Of** radio button in the **To** section and type "**12000**" in the field. Now place your cursor in the **By Changing Variable Cells** field, then hold down the control key while you click to select cells **B3, B4, B8, and B15**. These are the variable that the Solver will adjust to achieve your objective:



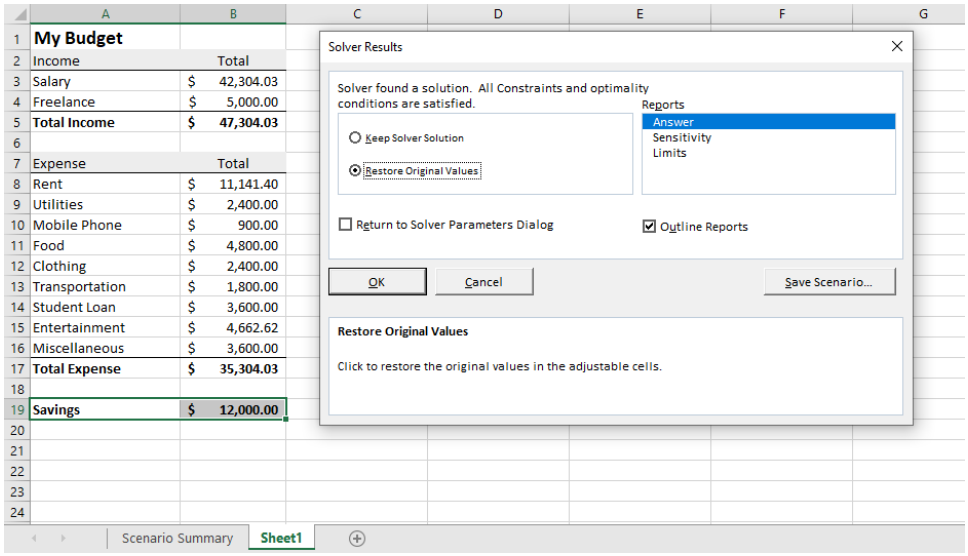
19. Click the **Add** button to the right of the **Subject to the Constraints** list box to add constraints to the variables. In the **Add Constraint** dialog box, click to select cell **B3** (Salary) in the **Cell Reference** field. Click the drop-down button on the **logic operator list**, select the **Greater than or Equal to (>=)** operator, then type "**35000**" in the **Constraint** field. Click the **Add** button to continue adding constraints to cells **B4 (>=, 5000), B8 (>= , 9000) and B15 (>=, 2400)**. Once your constraints are added, click **OK**:



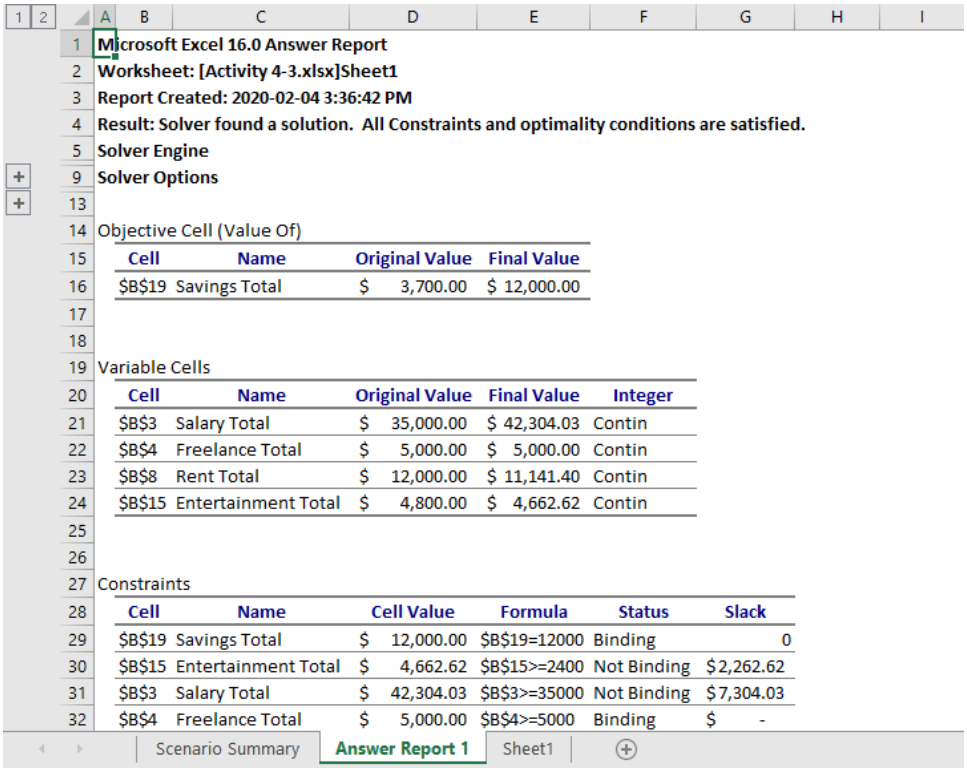
20. Now that your constraints are set, click the **Solve** button:



21. The Solver Results dialog box opens, reporting that Solver found a solution. You will see that the values in your worksheet have been updated. Click to enable the **Restore Original Values** radio button. In the Reports list box, click to select the **Answer** report, click to enable the **Outline Reports** checkbox, then click **OK**:



22. Your variables are reset to their original values and a report is created in a new sheet named Answer Report 1, providing the details on the original and final values of both your objective cell and your variable cells:



Microsoft Excel 16.0 Answer Report
Worksheet: [Activity 4-3.xlsx]Sheet1
Report Created: 2020-02-04 3:36:42 PM
Result: Solver found a solution. All Constraints and optimality conditions are satisfied.
Solver Engine
Solver Options

Objective Cell (Value Of)

Cell	Name	Original Value	Final Value
$B$19	Savings Total	$ 3,700.00	$ 12,000.00

Variable Cells

Cell	Name	Original Value	Final Value	Integer
$B$3	Salary Total	$ 35,000.00	$ 42,304.03	Contin
$B$4	Freelance Total	$ 5,000.00	$ 5,000.00	Contin
$B$8	Rent Total	$ 12,000.00	$ 11,141.40	Contin
$B$15	Entertainment Total	$ 4,800.00	$ 4,662.62	Contin

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
$B$19	Savings Total	$ 12,000.00	$B$19=12000	Binding	0
$B$15	Entertainment Total	$ 4,662.62	$B$15>=2400	Not Binding	$2,262.62
$B$3	Salary Total	$ 42,304.03	$B$3>=35000	Not Binding	$7,304.03
$B$4	Freelance Total	$ 5,000.00	$B$4>=5000	Binding	$ -

Scenario Summary | Answer Report 1 | Sheet1

23. Save the current workbook as **Activity 4-3 Complete** and then close Microsoft Excel 365 to complete the activity.

TOPIC D: The Analysis ToolPak

Like the Solver tool, the Analysis ToolPak is an add-in program that is included with Microsoft Excel 365. It provides advanced and specific tools for financial, statistical, and engineering data analysis. While a comprehensive exploration of these complex analysis tools is beyond the scope of this course, this topic you will show you how to load the Analysis ToolPak and help you explore the tools.

Topic Objectives

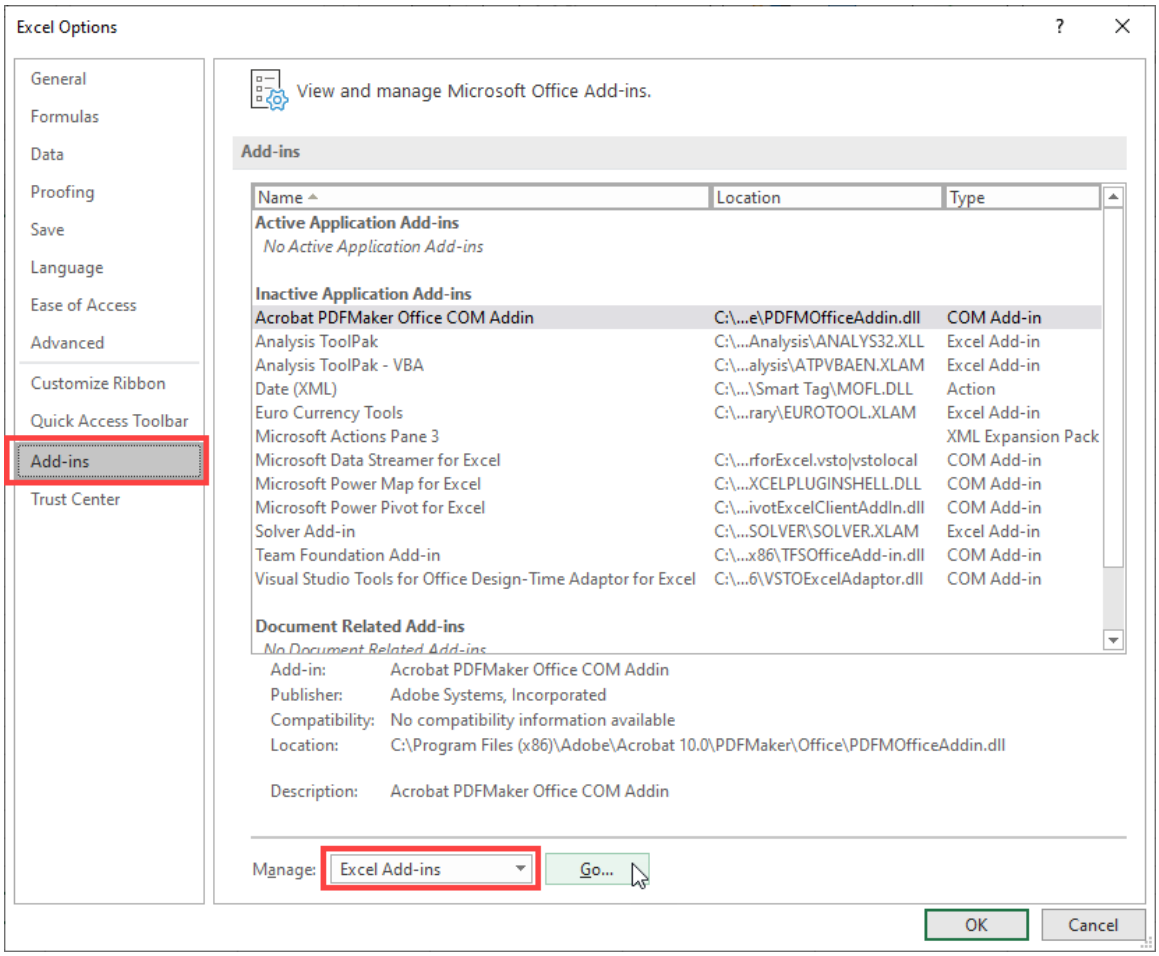
In this session, you will learn:

- How to load the Analysis ToolPak
- About the Data Analysis dialog box

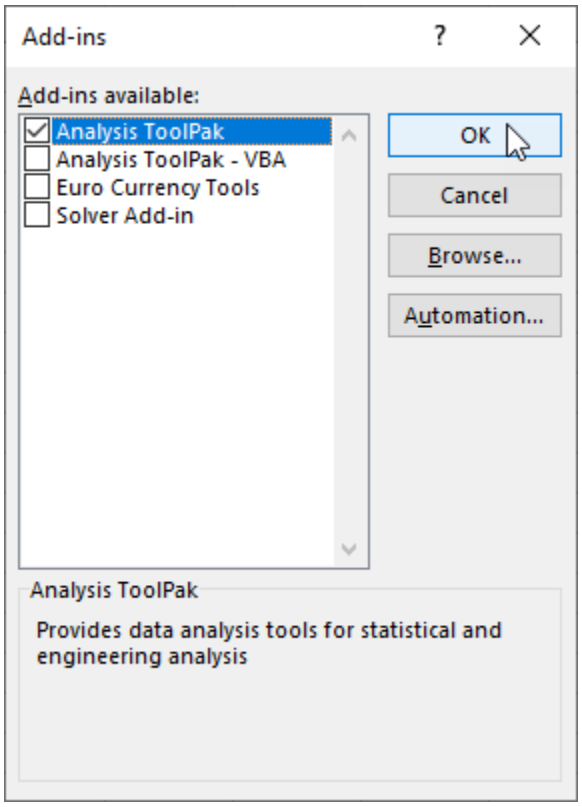
Load the Analysis ToolPak

To load the **Analysis ToolPak** click **File → Options**:

Select **Add-ins** in the Excel Options categories, then ensure that the **Excel Add-ins** option is selected in the **Manage** drop-down menu, then click **Go**:

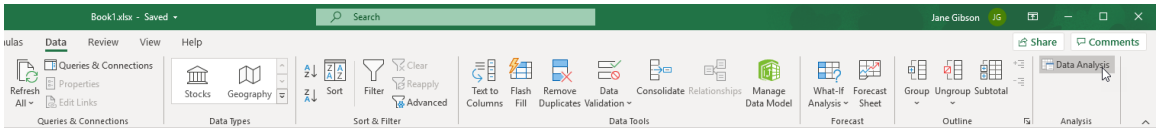


In the **Add-ins** dialog box, in the **Add-ins available** list box, click to enable the **Analysis ToolPak** checkbox, then click **OK**:

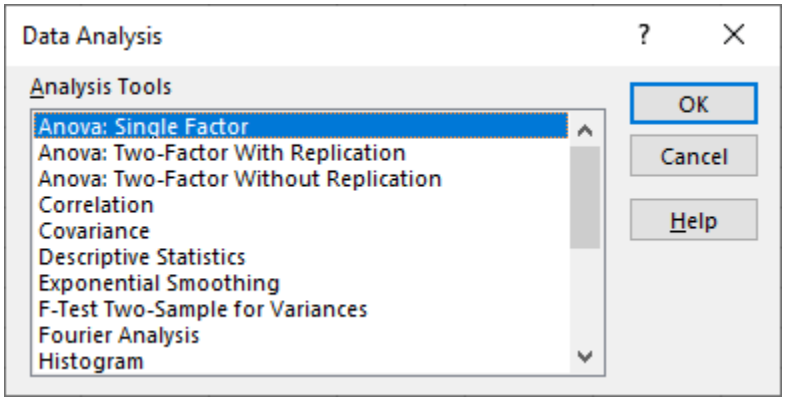


The Data Analysis Dialog Box

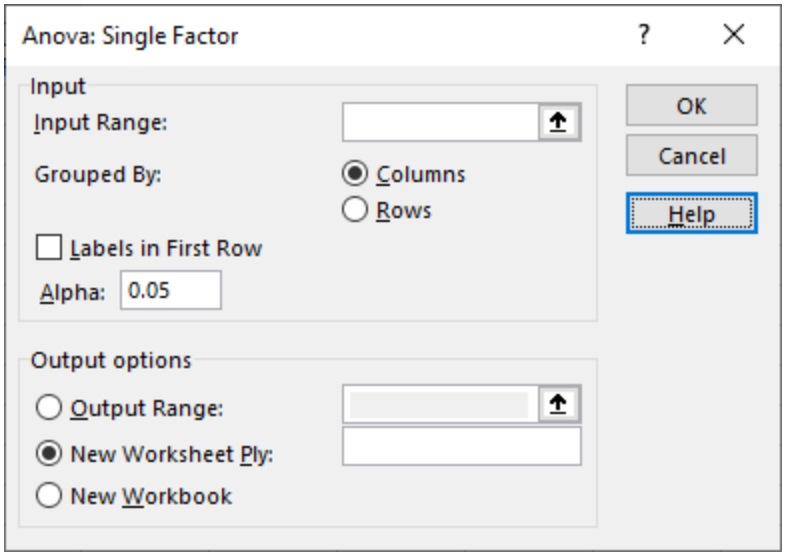
Now that the Analysis ToolPak is loaded, click **Data → Data Analysis** to open the **Data Analysis** dialog box:



The **Data Analysis** dialog box will be displayed, with a scrollable list of the available analysis tools:



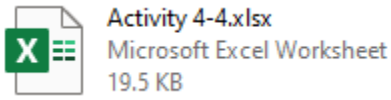
To launch an Analysis tool, click to select it from the list and click **OK**. A dialog box for that specific tool will be displayed:



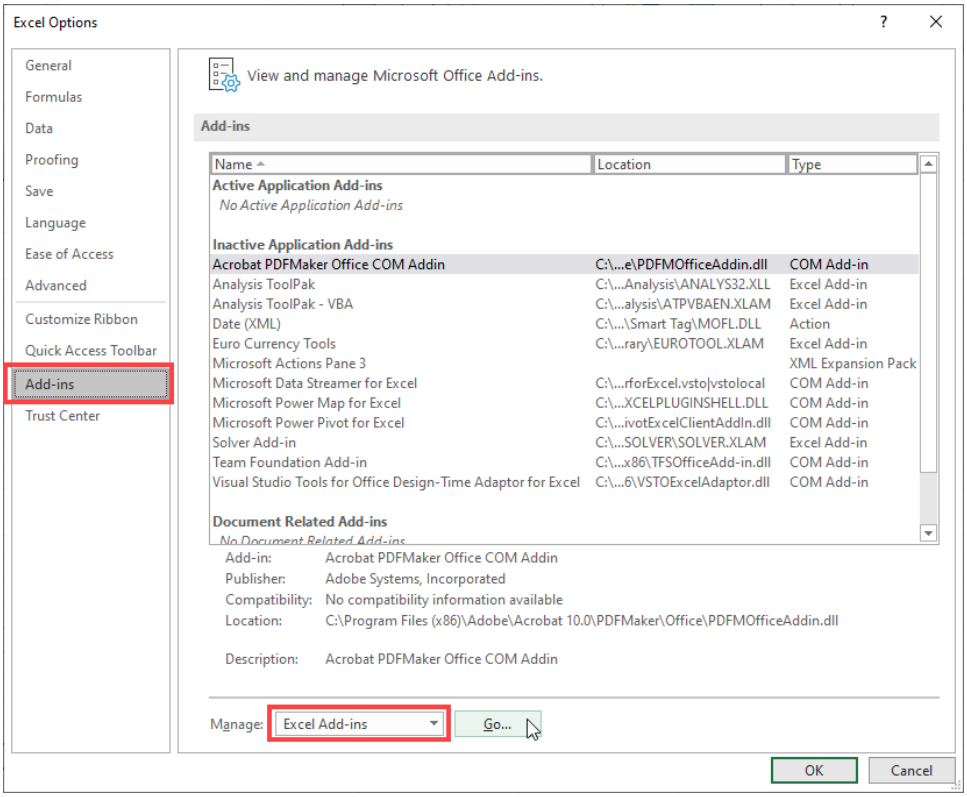
Activity 4-4: Perform a Data Analysis with the Analysis ToolPak

You would like to rank the performance of your sales representatives, over the past quarter, compared to sales representatives from other regions. You decide to use the Rank and Percentile analysis tool in the Analysis ToolPak.

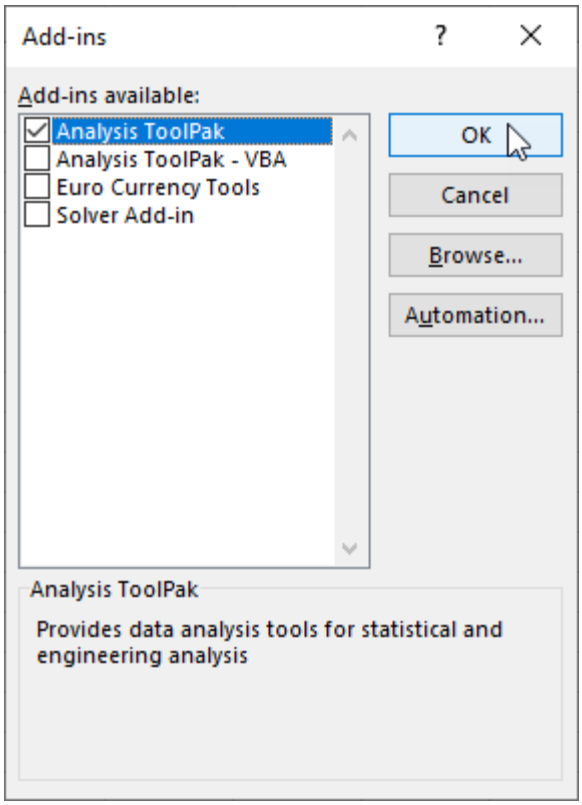
1. To begin, open Activity 4-4 from your Exercise Files folder:



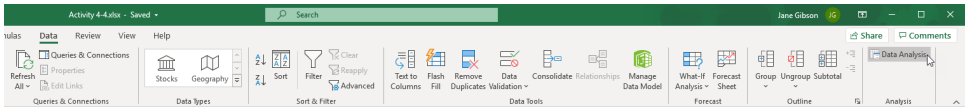
2. To load the Analysis ToolPak add-in. Click **File → Options,** then select **Add-ins** from the Excel Options dialog box categories. Select **Excel Add-ins** from the **Manage** drop-down list, then click the **Go** button:



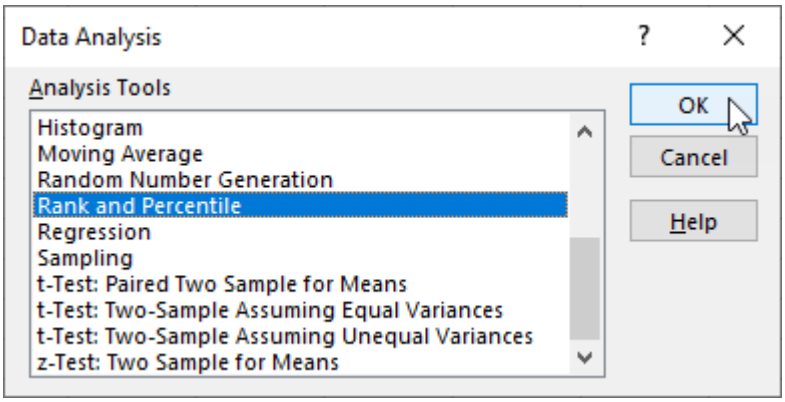
3. In the Add-ins dialog box, click the **Analysis ToolPak** checkbox to enable, then click **OK**:



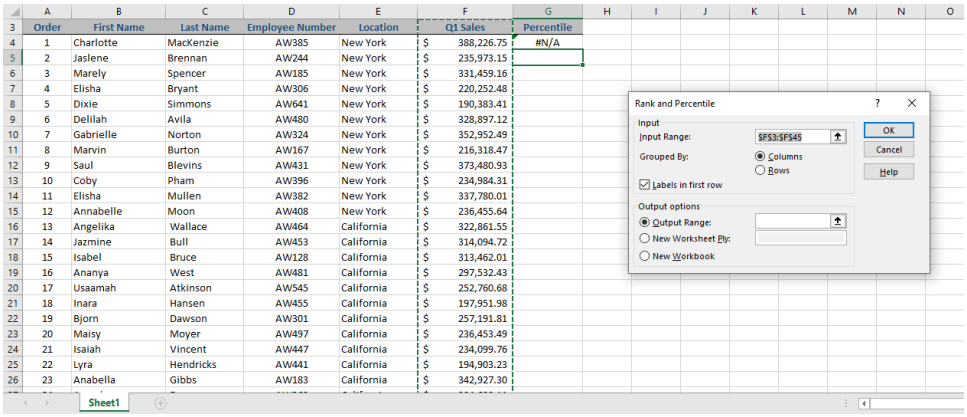
4. Click the **Data Analysis** command in the Analysis group of the Data tab to launch the Data Analysis dialog box:



5. Scroll down the Analysis Tools list box and click to select the **Rank and Percentile** analysis tool, then click **OK**:

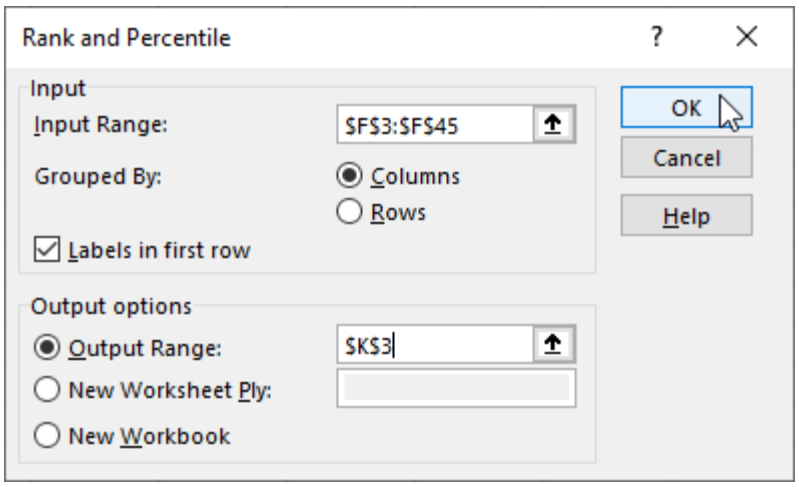


6. Click in the **Input Range** field, then click and drag to select cells **F3 to F45**. Ensure the **Grouped by Columns** radio button is enabled:

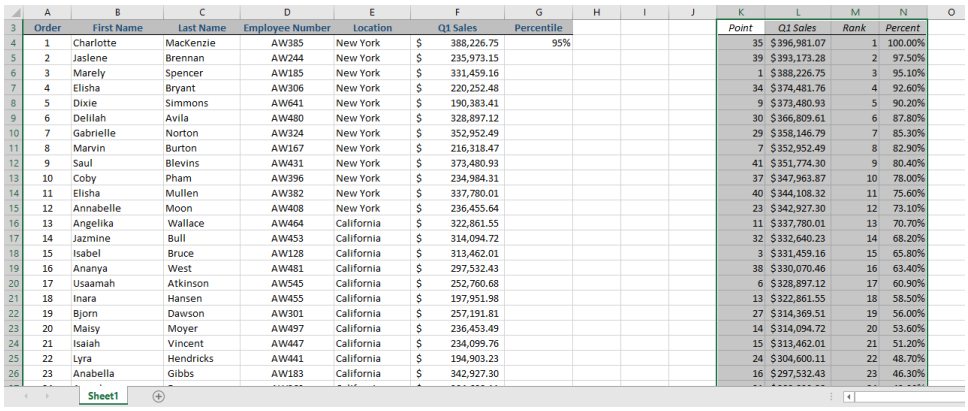


Order	First Name	Last Name	Employee Number	Location	Q1 Sales	Percentile
1	Charlotte	MacKenzie	AW385	New York	$ 388,226.75	#N/A
2	Jaslene	Brennan	AW244	New York	$ 235,973.15	
3	Marely	Spencer	AW185	New York	$ 331,459.16	
4	Elisha	Bryant	AW306	New York	$ 220,252.48	
5	Dixie	Simmons	AW641	New York	$ 190,383.41	
6	Delilah	Avila	AW480	New York	$ 328,897.12	
7	Gabrielle	Norton	AW324	New York	$ 352,952.49	
8	Marvin	Burton	AW167	New York	$ 216,318.47	
9	Saul	Blevins	AW431	New York	$ 373,480.93	
10	Coby	Pham	AW396	New York	$ 234,984.31	
11	Elisha	Mullen	AW382	New York	$ 337,780.01	
12	Annabelle	Moon	AW408	New York	$ 236,455.64	
13	Angelika	Wallace	AW464	California	$ 322,861.55	
14	Jazmine	Bull	AW453	California	$ 314,094.72	
15	Isabel	Bruce	AW128	California	$ 313,462.01	
16	Ananya	West	AW481	California	$ 297,532.43	
17	Usaamah	Atkinson	AW545	California	$ 252,760.68	
18	Inara	Hansen	AW455	California	$ 197,951.98	
19	Bjorn	Dawson	AW301	California	$ 257,191.81	
20	Maisy	Moyer	AW497	California	$ 236,453.49	
21	Isaiah	Vincent	AW447	California	$ 234,099.76	
22	Lyra	Hendricks	AW441	California	$ 194,903.23	
23	Anabella	Gibbs	AW183	California	$ 342,927.30	

7. Next, click to enable the **Labels in first row** checkbox, then click to enable the **Output Range** radio button. Click in the **Output Range** field and then click cell **K3**. Now click **OK**:

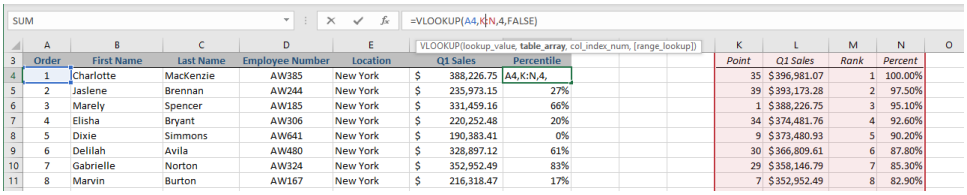


8. You will now see the rank and percentile data has been entered on your sheet, sorted in order of ranking. The Point data, in column K, references the position of the sales representative in the original data set, and the Percent column, N, is the percentile of that ranking:



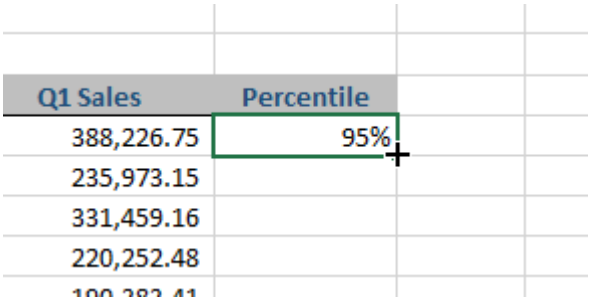
Order	First Name	Last Name	Employee Number	Location	Q1 Sales	Percentile	Point	Q1 Sales	Rank	Percent
1	Charlotte	MacKenzie	AW385	New York	$ 388,226.75	95%	35	$396,981.07	1	100.00%
2	Jaslene	Brennan	AW244	New York	$ 235,973.15		39	$393,173.28	2	97.50%
3	Marely	Spencer	AW185	New York	$ 331,459.16		1	$388,226.75	3	95.10%
4	Elisha	Bryant	AW306	New York	$ 220,252.48		34	$374,481.76	4	92.60%
5	Dixie	Simmons	AW641	New York	$ 190,383.41		9	$373,480.93	5	90.20%
6	Delilah	Avila	AW480	New York	$ 328,897.12		30	$366,809.61	6	87.80%
7	Gabrielle	Norton	AW324	New York	$ 352,952.49		29	$358,146.79	7	85.30%
8	Marvin	Burton	AW167	New York	$ 216,318.47		7	$352,952.49	8	82.90%
9	Saul	Blevins	AW431	New York	$ 373,480.93		41	$351,774.30	9	80.40%
10	Coby	Pham	AW396	New York	$ 234,984.31		37	$347,963.87	10	78.00%
11	Elisha	Mullen	AW382	New York	$ 337,780.01		40	$344,108.32	11	75.60%
12	Annabelle	Moon	AW408	New York	$ 236,455.64		23	$342,927.30	12	73.10%
13	Angelika	Wallace	AW464	California	$ 322,861.55		11	$337,780.01	13	70.70%
14	Jazmine	Bull	AW453	California	$ 314,094.72		32	$332,640.23	14	68.20%
15	Isabel	Bruce	AW128	California	$ 313,462.01		3	$331,459.16	15	65.80%
16	Ananya	West	AW481	California	$ 297,532.43		38	$330,070.46	16	63.40%
17	Usaamah	Atkinson	AW545	California	$ 252,760.68		6	$328,897.12	17	60.90%
18	Inara	Hansen	AW455	California	$ 197,951.98		13	$322,861.55	18	58.50%
19	Bjorn	Dawson	AW301	California	$ 257,191.81		27	$314,369.51	19	56.00%
20	Maisy	Moyer	AW497	California	$ 236,453.49		14	$314,094.72	20	53.60%
21	Isaiah	Vincent	AW447	California	$ 234,099.76		15	$313,462.01	21	51.20%
22	Lyra	Hendricks	AW441	California	$ 194,903.23		24	$304,600.11	22	48.70%
23	Anabella	Gibbs	AW183	California	$ 342,927.30		16	$297,532.43	23	46.30%

9. Click to select cell **G4** and examine the formula in the formula bar. This VLOOKUP formula compares the row value in the Point column (K) to the row value in the Order column (A), and returns the Percent in column N, aligning the correct percentile with the sales representative:



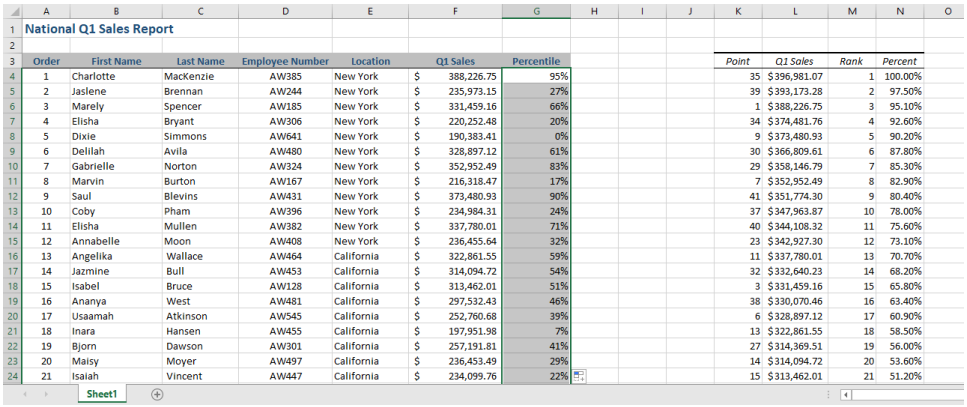
	A	B	C	D	E	F	G	K	L	M	N
3	Order	First Name	Last Name	Employee Number	Location	Q1 Sales	Percentile	Point	Q1 Sales	Rank	Percent
4	1	Charlotte	MacKenzie	AW385	New York	$ 388,226.75	A4,K:N,4,	35	$396,981.07	1	100.00%
5	2	Jaslene	Brennan	AW244	New York	$ 235,973.15	27%	39	$393,173.28	2	97.50%
6	3	Marely	Spencer	AW185	New York	$ 331,459.16	66%	1	$388,226.75	3	95.10%
7	4	Elisha	Bryant	AW306	New York	$ 220,252.48	20%	34	$374,481.76	4	92.60%
8	5	Dixie	Simmons	AW641	New York	$ 190,383.41	0%	9	$373,480.93	5	90.20%
9	6	Delilah	Avila	AW480	New York	$ 328,897.12	61%	30	$366,809.61	6	87.80%
10	7	Gabrielle	Norton	AW324	New York	$ 352,952.49	83%	29	$358,146.79	7	85.30%
11	8	Marvin	Burton	AW167	New York	$ 216,318.47	17%	7	$352,952.49	8	82.90%

10. You can extend this formula down the column by hovering your mouse over the bottom right corner of cell **G4** until the mouse pointer turns into a cross, then **double-click**:



Q1 Sales	Percentile
388,226.75	95%
235,973.15	
331,459.16	
220,252.48	

11. The Percentiles are now displayed for all the Sales Representatives:



	A	B	C	D	E	F	G	K	L	M	N
1	National Q1 Sales Report										
2											
3	Order	First Name	Last Name	Employee Number	Location	Q1 Sales	Percentile	Point	Q1 Sales	Rank	Percent
4	1	Charlotte	MacKenzie	AW385	New York	$ 388,226.75	95%	35	$396,981.07	1	100.00%
5	2	Jaslene	Brennan	AW244	New York	$ 235,973.15	27%	39	$393,173.28	2	97.50%
6	3	Marely	Spencer	AW185	New York	$ 331,459.16	66%	1	$388,226.75	3	95.10%
7	4	Elisha	Bryant	AW306	New York	$ 220,252.48	20%	34	$374,481.76	4	92.60%
8	5	Dixie	Simmons	AW641	New York	$ 190,383.41	0%	9	$373,480.93	5	90.20%
9	6	Delilah	Avila	AW480	New York	$ 328,897.12	61%	30	$366,809.61	6	87.80%
10	7	Gabrielle	Norton	AW324	New York	$ 352,952.49	83%	29	$358,146.79	7	85.30%
11	8	Marvin	Burton	AW167	New York	$ 216,318.47	17%	7	$352,952.49	8	82.90%
12	9	Saul	Blevins	AW431	New York	$ 373,480.93	90%	41	$351,774.30	9	80.40%
13	10	Coby	Pham	AW396	New York	$ 234,984.31	24%	37	$347,963.87	10	78.00%
14	11	Elisha	Mullen	AW382	New York	$ 337,780.01	71%	40	$344,108.32	11	75.60%
15	12	Annabelle	Moon	AW408	New York	$ 236,455.64	32%	23	$342,927.30	12	73.10%
16	13	Angelika	Wallace	AW464	California	$ 322,861.55	59%	11	$337,780.01	13	70.70%
17	14	Jazmine	Bull	AW453	California	$ 314,094.72	54%	32	$332,640.23	14	68.20%
18	15	Isabel	Bruce	AW128	California	$ 313,462.01	51%	3	$331,459.16	15	65.80%
19	16	Ananya	West	AW481	California	$ 297,532.43	46%	38	$330,070.46	16	63.40%
20	17	Usaamah	Atkinson	AW545	California	$ 252,760.68	39%	6	$328,897.12	17	60.90%
21	18	Inara	Hansen	AW455	California	$ 197,951.98	7%	13	$322,861.55	18	58.50%
22	19	Bjorn	Dawson	AW301	California	$ 257,191.81	41%	27	$314,369.51	19	56.00%
23	20	Maisy	Moyer	AW497	California	$ 236,453.49	29%	14	$314,094.72	20	53.60%
24	21	Isaiah	Vincent	AW447	California	$ 234,099.76	22%	15	$313,462.01	21	51.20%

Sheet1

12. Save the current workbook as Activity 4-4 Complete and then close Microsoft Excel 365 to complete the activity.

Summary

In this lesson you learned about many of the advanced tools available in Excel 365 that you can use to analyze and present your data. You should now be comfortable using the Quick Analysis Tool to quickly access many of the standard analysis options. You should also be comfortable adding Sparklines to your data to illustrate trends. You should have a good understanding of the What-If Analysis tools and how to use them to explore different outcomes, and you should be familiar with the potential of the analysis tools in the Analysis ToolPak.

Review Questions

1. **How do you access the Quick Analysis Tool?**

2. **What are the three types of Sparklines?**

3. **How many cell values can you change to reach the goal value in the Goal Seek tool?**

4. **What should you use to create your first scenario in the Scenario Manager?**

5. **What types of analysis tools are available in the Analysis ToolPak?**

LESSON 5:
WORKING WITH MULTIPLE WORKBOOKS

Lesson Objectives

In this lesson you will learn how to:

- Arrange windows
- Link to data in multiple workbooks
- Consolidate data

TOPIC A: Arrange Workbooks

It is not uncommon for Excel users to work in multiple workbooks at the same time, sourcing data and calculations from one or more workbooks into another. Switching back and forth between workbooks can be time consuming and, sometimes, confusing. In this topic you will learn about the tools that are available in Excel 365 to view and compare your open workbooks quickly and easily.

Topic Objectives

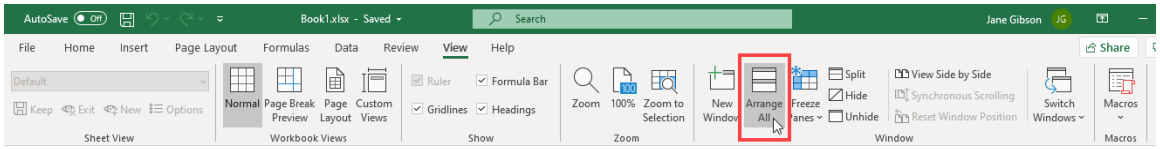
In this session, you will learn how to:

- Arrange workbooks for viewing
- View workbooks side by side
- Use synchronous scrolling

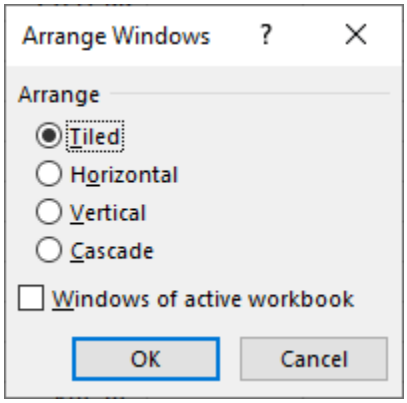
Arrange Workbooks for Viewing

Managing the on-screen presentation of your workbooks does not need to be a complicated series of selecting and resizing workbooks. You can quickly display and compare two or more workbooks at the same time by using the tools in the Window group of the View tab.

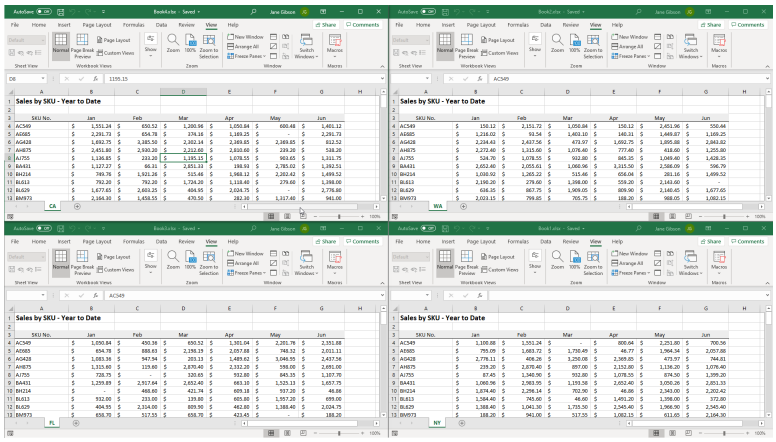
To view two or more workbooks together on the same screen, click **View → Arrange All**:



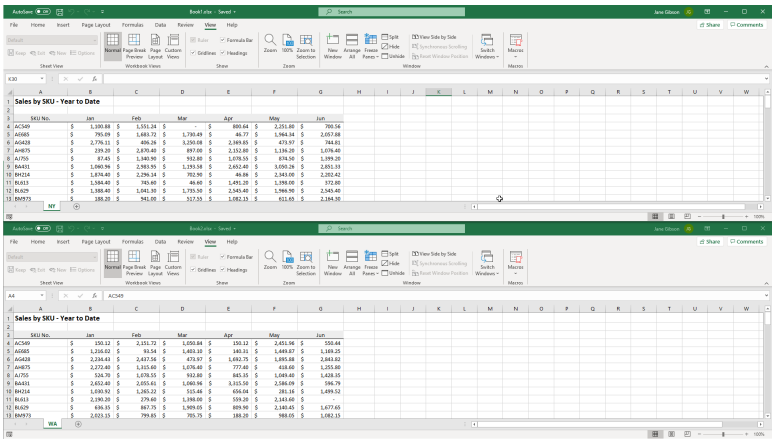
The **Arrange Windows** dialog box will open, with options for how you would like to display your workbooks:



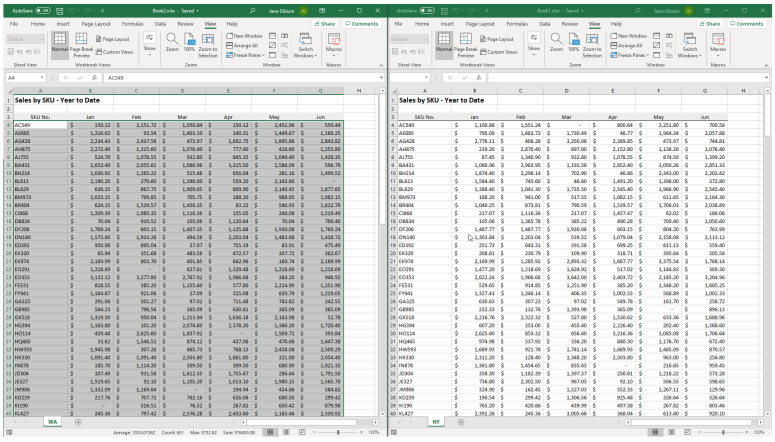
The **Tiled** option will display all open workbook windows, so they all fit on the screen:



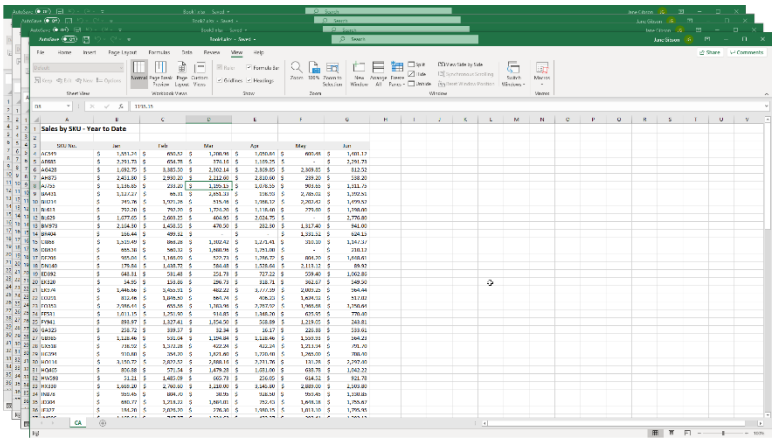
Horizontal will display all open workbooks one above the other:



Vertical will display all open windows side by side:



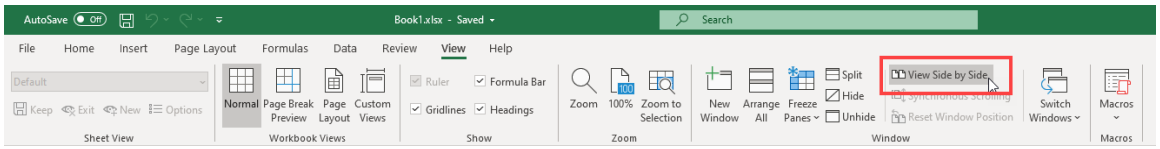
Cascade will display all open windows overlapping one another, descending to the right:



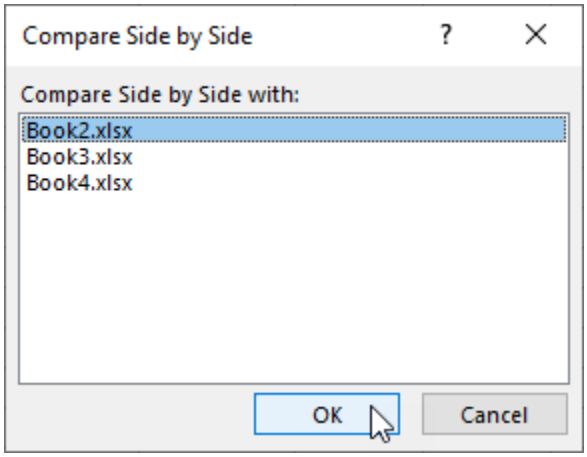
View Workbooks Side by Side

There are times that you may want to compare two specific workbooks, though you may have more than two open. You can do this by using the **View Side by Side** command to select specific workbooks to compare.

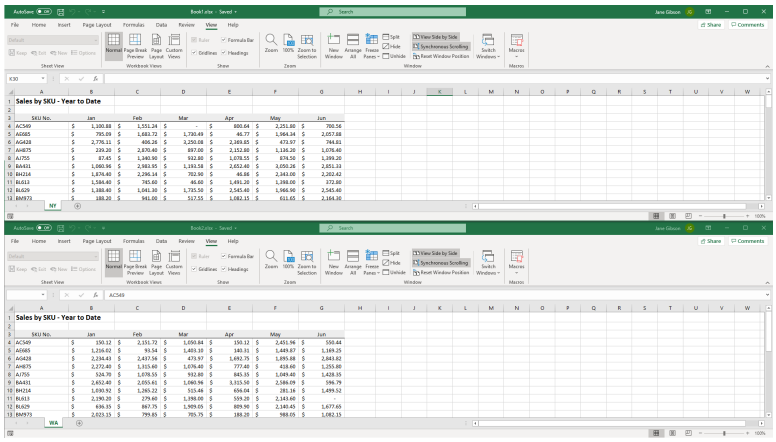
To use the View Side by Side command, you would select the first workbook you would like to use in the comparison. You would then click **View → View Side by Side**:



The **Compare Side by Side** dialog box will open. You can now select the second workbook you would like to use in the comparison and click **OK**:



The View Side by Side button will remain highlighted in gray and the two workbooks you want to compare now appear side by side (or one above the other) on your screen:

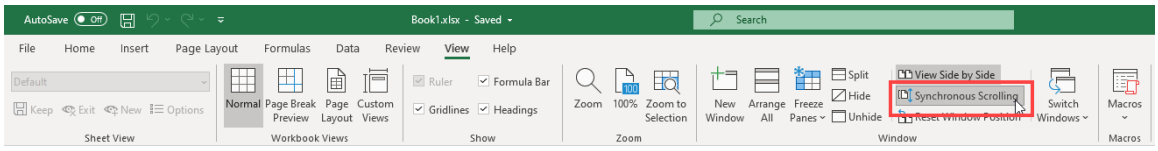


To cancel viewing your workbooks side by side simply click **View → View Side by Side** again to deselect.

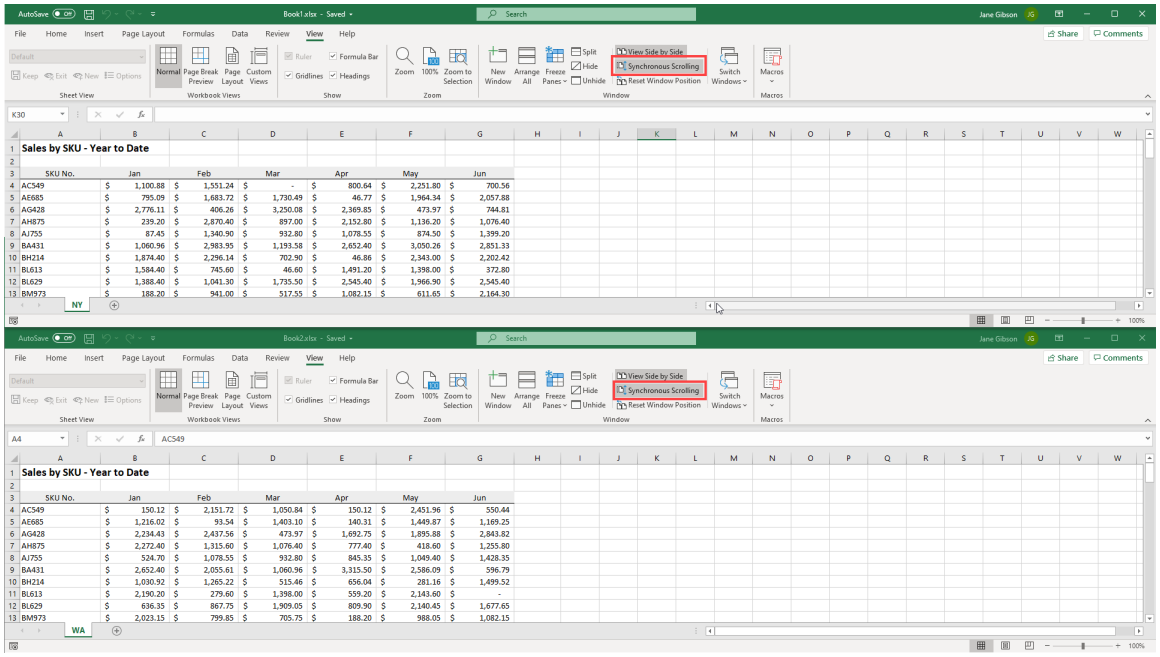
Use Synchronous Scrolling

Visually comparing two workbooks can be greatly simplified by using **Synchronous Scrolling**. Rather than switching between workbooks to scroll through your data, Synchronous Scrolling aligns the scrolling between the visible workbooks, so scrolling in one will result in the same scrolling in the other.

To enable Synchronous Scrolling (once you have two or more workbooks arranged together on your display), first align the starting point by scrolling to the top of each sheet, then click **View → Synchronous Scrolling**:



The Synchronous Scrolling button remains highlighted in gray and, now, any navigation you perform on one workbook will occur simultaneously on the other workbook:

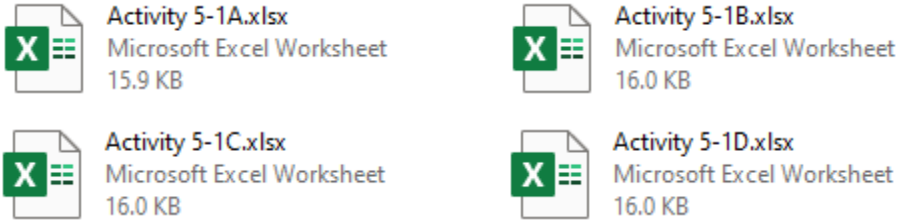


To cancel Synchronous Scrolling simply click **View → Synchronous Scrolling** again to deselect.

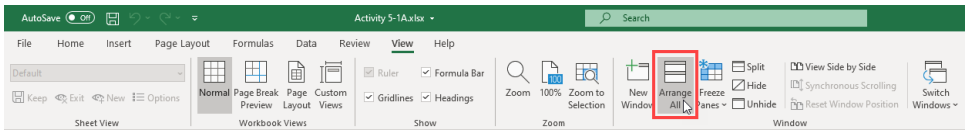
Activity 5-1: Arrange Workbooks

You are working on several workbooks containing product sales for different divisions and you would like to arrange and compare them to simplify your work.

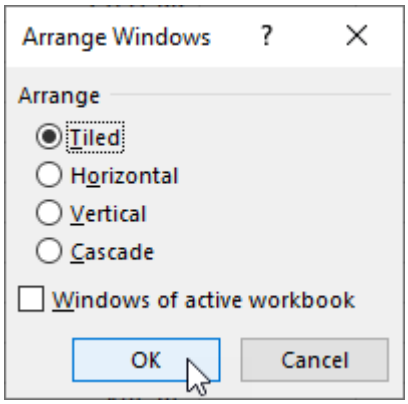
1. To begin, open **Activity 5-1A**, **Activity 5-1B**, **Activity 5-1C**, and **Activity 5-1D** from your Exercise Files folder:



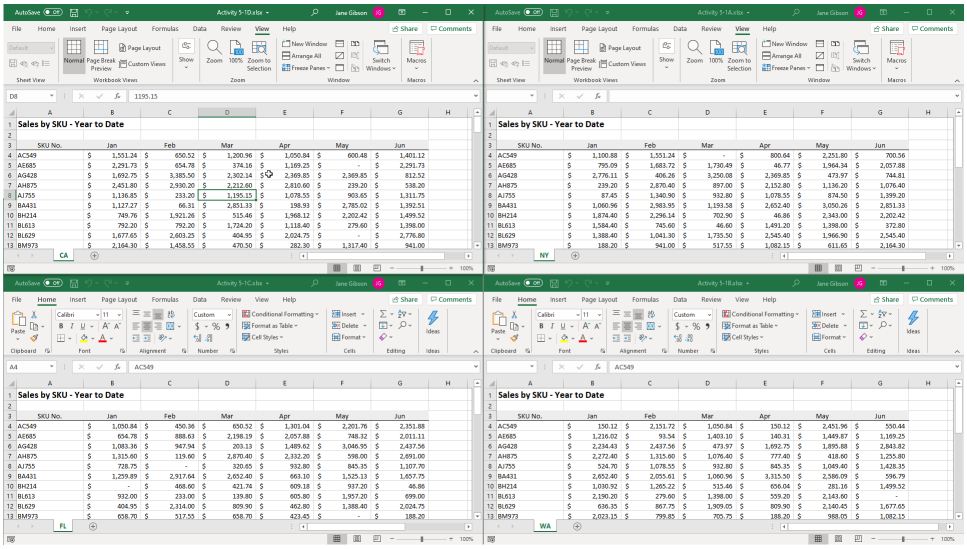
2. Once all your workbooks are open, select the frontmost window and Click **View → Arrange All**:



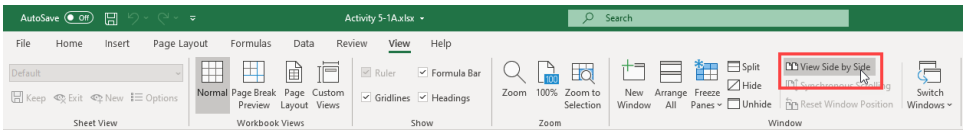
3. Click to enable the **Tile** radio button, then click **OK**:



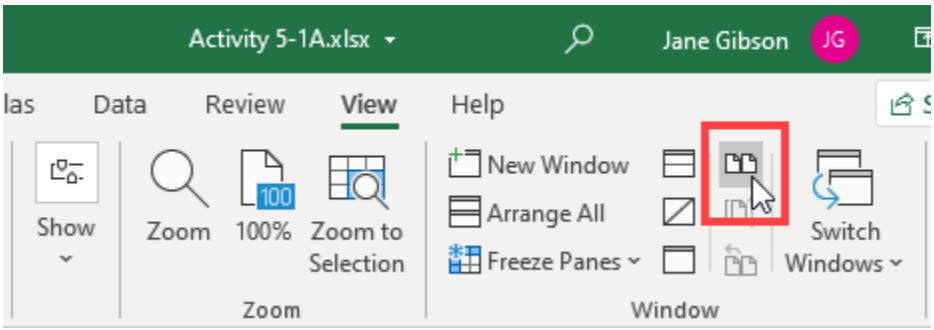
4. The four workbooks will be arranged equally on your screen:



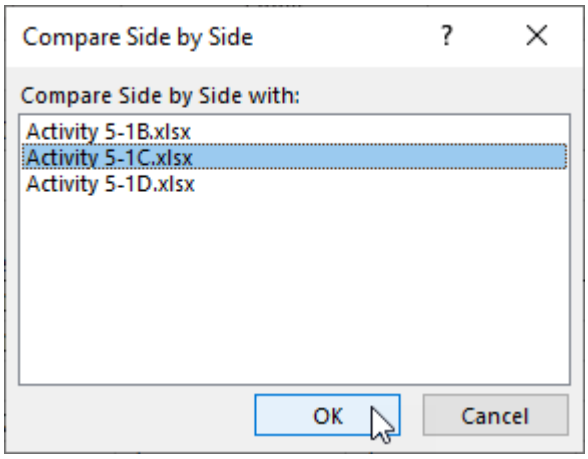
5. Click in the window of **Activity 5-1A** to make it the active sheet, then click **View → View Side by Side**:



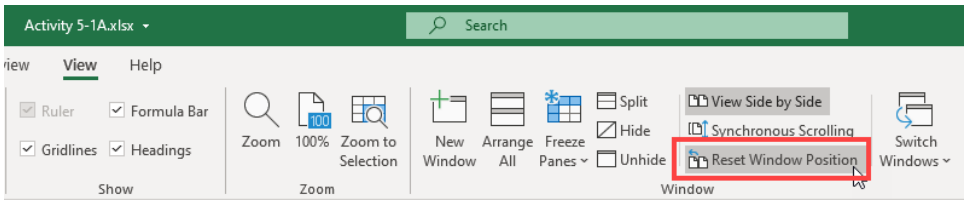
6. Note that the tools in the Window group may be collapsed, due to the size of each workbook window on the screen. The View Side by Side button will look like this:



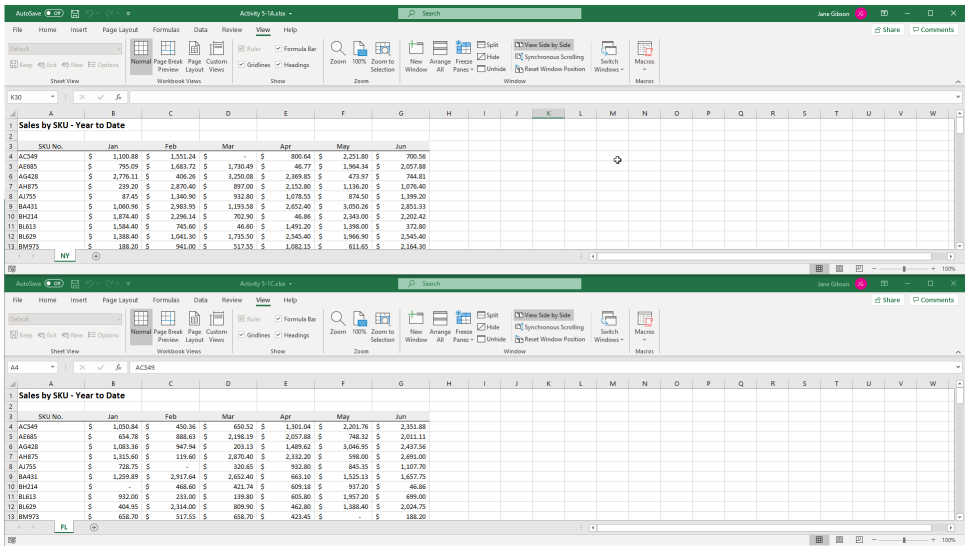
7. The Compare Side by Side dialog box will open. Click to select **Activity 5-1C** in the list box, then click **OK**:



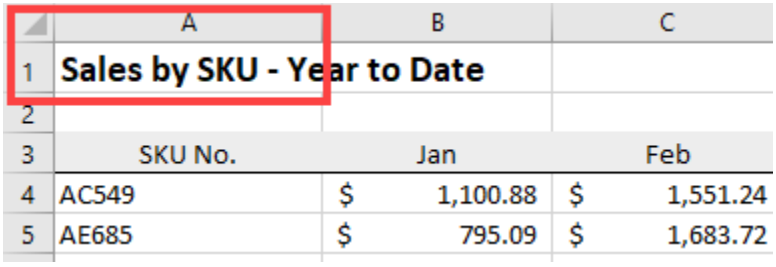
8. If the two selected workbooks did not fill the screen, click the **Reset Window Position** button in the Window group:



9. The Activity 5-1A and Activity 5-1C workbooks will be displayed, one above the other:

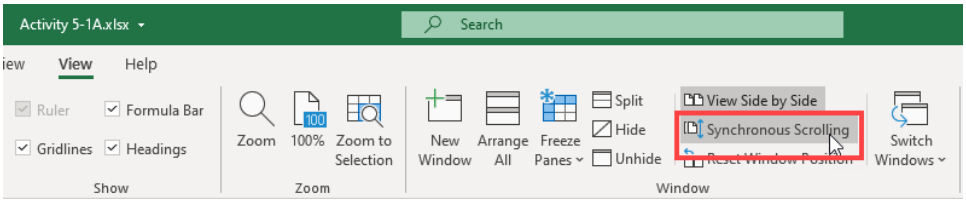


10. Click in the window of each workbook and scroll to the top of the sheet, so both windows show cell **A1** in the top left corner:

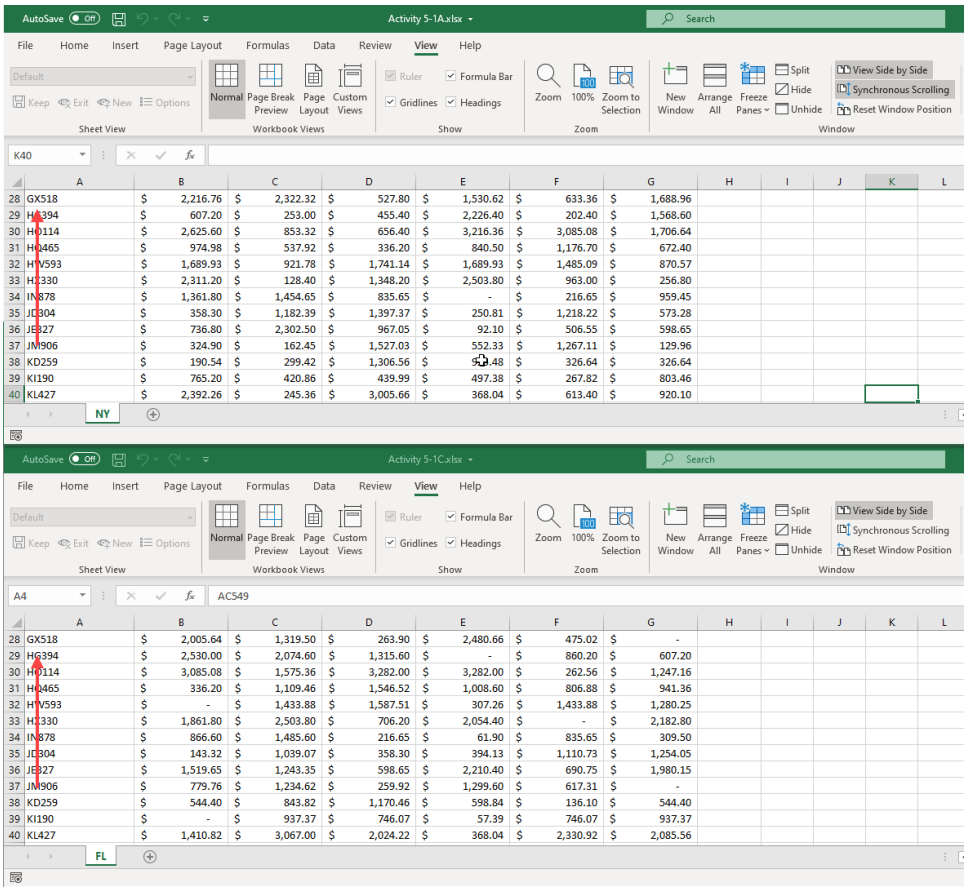


	A	B	C
1	**Sales by SKU - Year to Date**		
2			
3	SKU No.	Jan	Feb
4	AC549	$ 1,100.88	$ 1,551.24
5	AE685	$ 795.09	$ 1,683.72

11. Click in the window of **Activity 5-1A**, then click **View → Synchronous Scrolling**:



12. Press the **PgDn** (Page Down) key, or the down arrow, repeatedly and watch the data in each workbook scroll at the same time:



13. You can now close the open workbooks, and close Microsoft Excel 365 to complete the activity.

TOPIC B: Linking to Data in Multiple Workbooks

As your work in Excel becomes more advanced you will likely find yourself wanting to include data and calculations from other workbooks when you are building new ones. While it is fairly simple to copy data from a source workbook and paste it into a new one, that data then becomes static, and you would have to copy and paste the data again, every time the data in your source workbook changes. In this topic, you will learn how to create and edit links to other workbooks so that it is always up to date.

Topic Objectives

In this session, you will learn about:

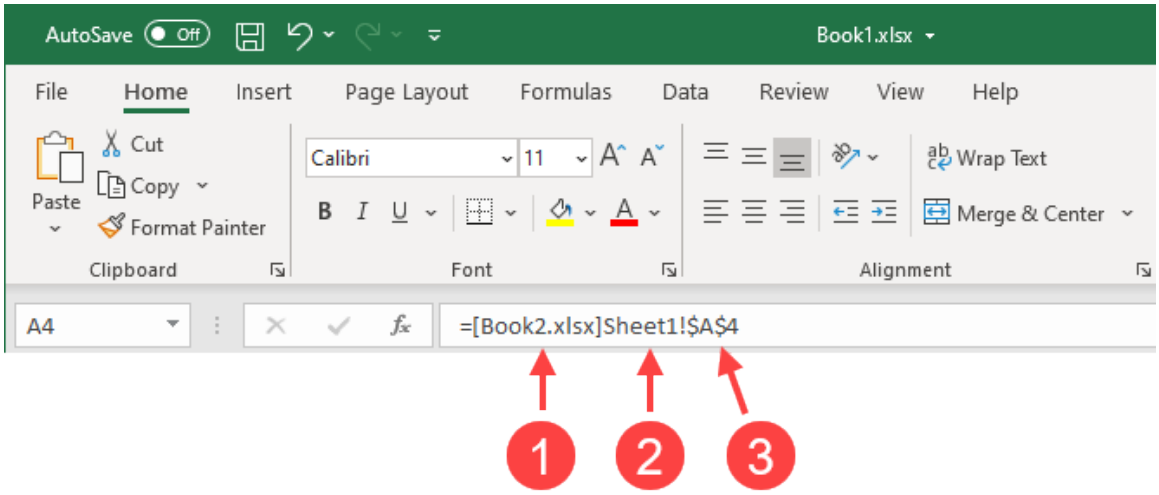
- External references
- Editing links
- Broken links

External References

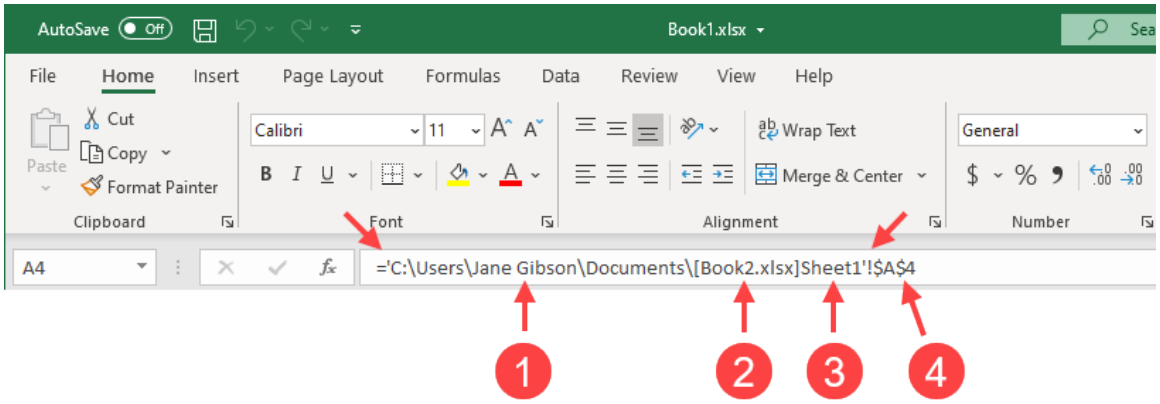
External references, which are sometimes referred to as links, are the same as cell references, but they refer to cells or ranges in other workbooks. Using external references avoids duplicate data in different locations and it also ensures that the data is up to date.

The syntax of an external reference can appear in one of two ways, depending on whether the workbook containing the reference is open, or closed.

If the workbook containing the referenced cell(s) is open, the external reference first refers to the **(1) Workbook name**, including the file extension, in square brackets, then the **(2) Worksheet name**, followed by an exclamation mark, and finally the **(3) Cell reference**, which can be relative, or absolute:



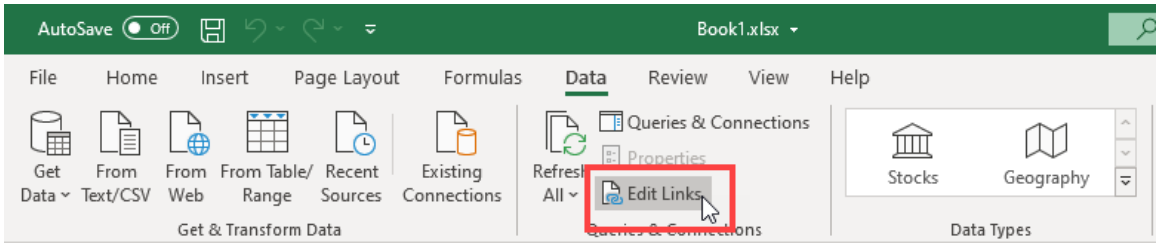
If the workbook containing the referenced cell(s) is closed, the external reference first refers to the **(1) entire file path to the workbook**, followed by the **(2) Workbook name**, (including the file extension), in square brackets, then the **(3) Worksheet name**, followed by an exclamation mark, and finally the **(4) Cell Reference**, which can be relative, or absolute. Note that the file path, workbook name, and the worksheet name, but not the exclamation are enclosed in single quotation marks:



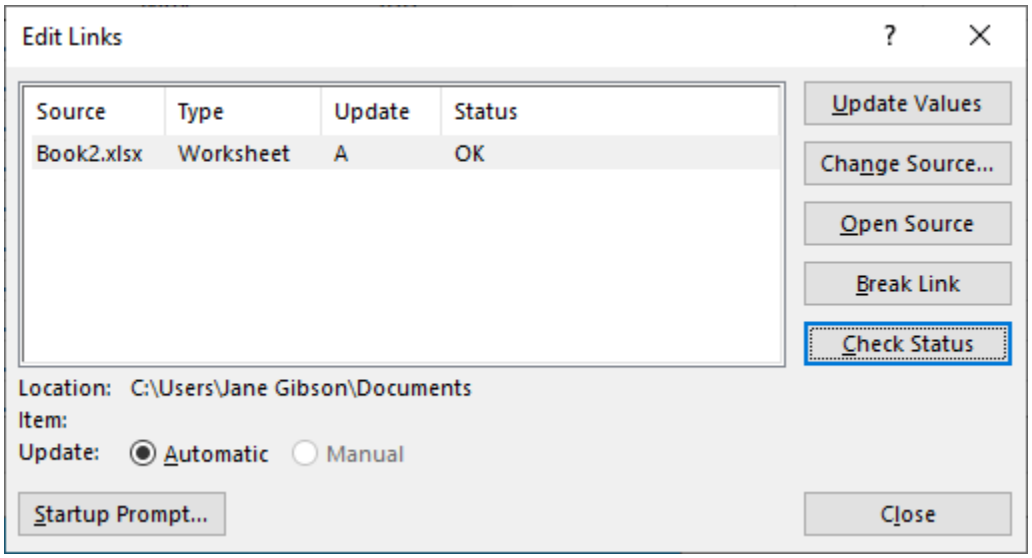
Editing Links

It is easy to imagine a workbook that contains many external references to one or more workbooks, and how confusing that could become. Using the **Edit Links** tool is a simple and easy way to identify external links in your workbook and to manage them.

To launch the Edit Links tool, click **Data → Edit Links,** in the Queries & Connections group:

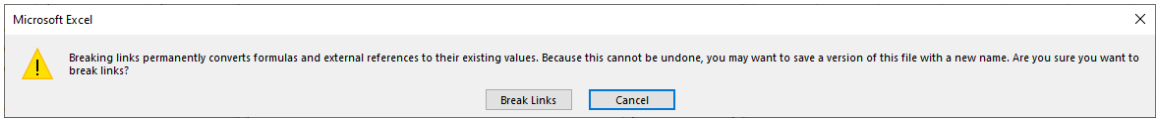


The **Edit Links** dialog box appears. The list box will display a list of all the links in the workbook, indicating the source, the type, and the status:



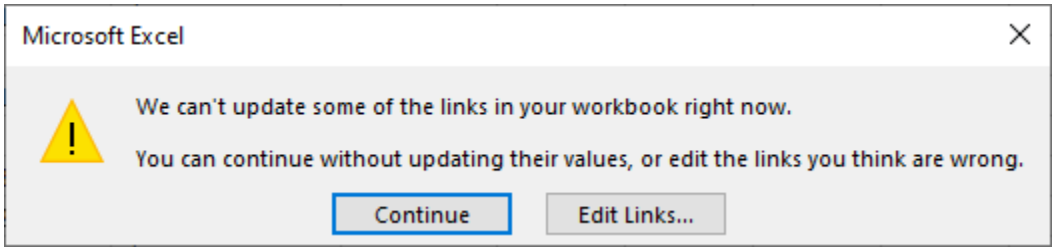
Click to select a link in the list box and use the command buttons on the right of the dialog box to update the values, change the source workbook, open the source workbook, break the link, or check the status of the link.

If you choose to break a link, a caution window will appear, warning that breaking links permanently converts the formulas and external references to the existing value, and cannot be undone:



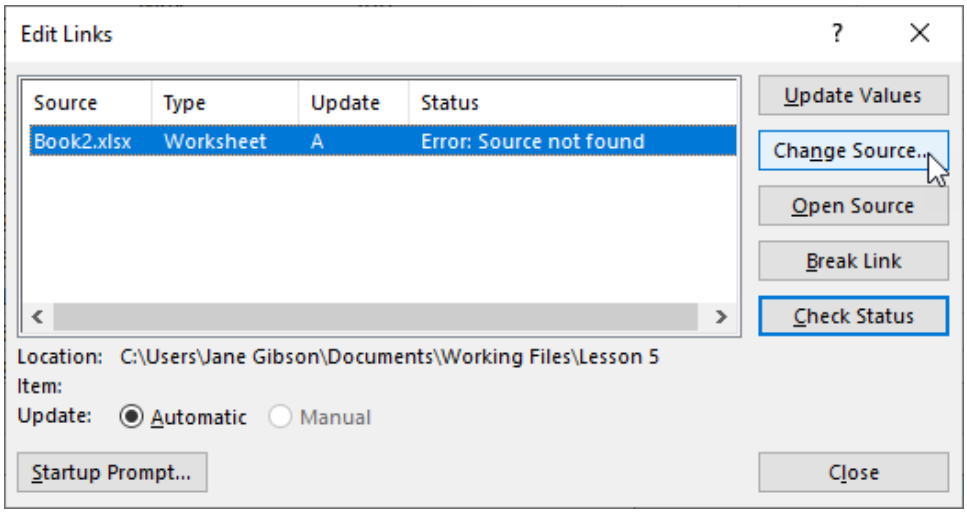
Broken Links

Because external references are based on file paths, there is a risk that the link to your source data could be broken, as the result of a file being moved, or renamed. When you open a file that contains an external reference that cannot be resolved, you will see a caution window, informing you that Excel could not update some of the links in your workbook, and giving you the option to continue, or edit links:

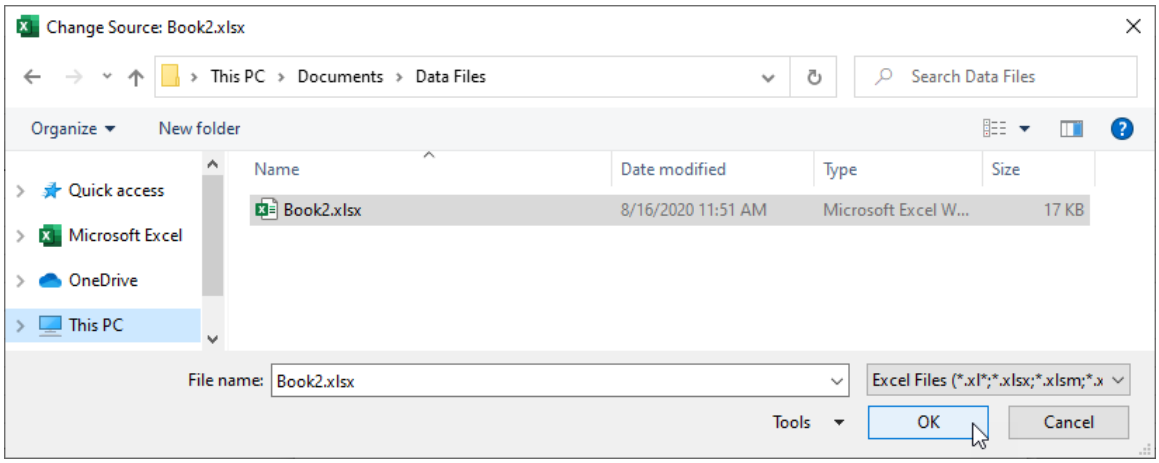


If you choose to continue, the link path will still be displayed in the formula, and the last known value will be displayed in the cell, but data will not be updated.

If you choose Edit Links, the **Edit Links** dialog box will open. Click to select the broken link in the list box, then click the **Change Source** button:



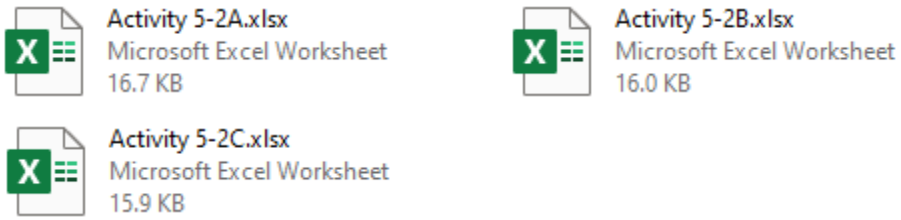
A **Change Source** dialog box will open, where you can navigate to and select the correct source workbook. Click **OK** to confirm your selection:



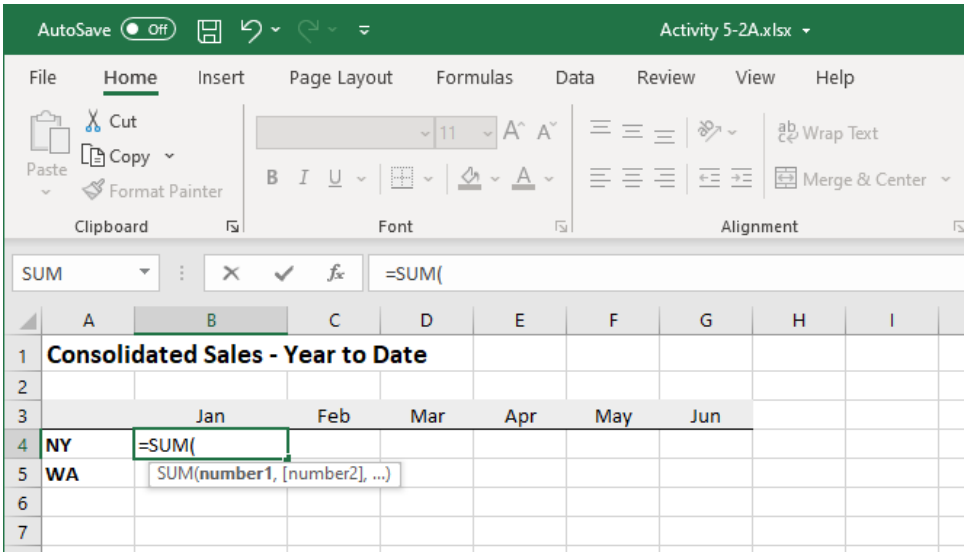
Activity 5-2: Linking to Data in Multiple Workbooks

You would like to summarize the sales results for several of your regional offices. You decide to use external references to collect the data.

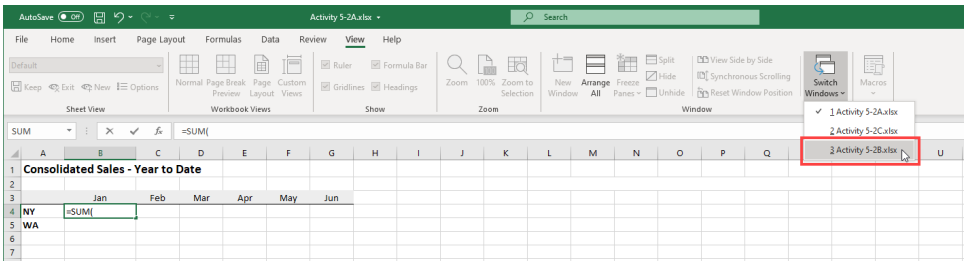
1. To begin, open **Activity 5-2A**, **Activity 5-2B**, and **Activity 5-2C** from your Exercise Files folder:



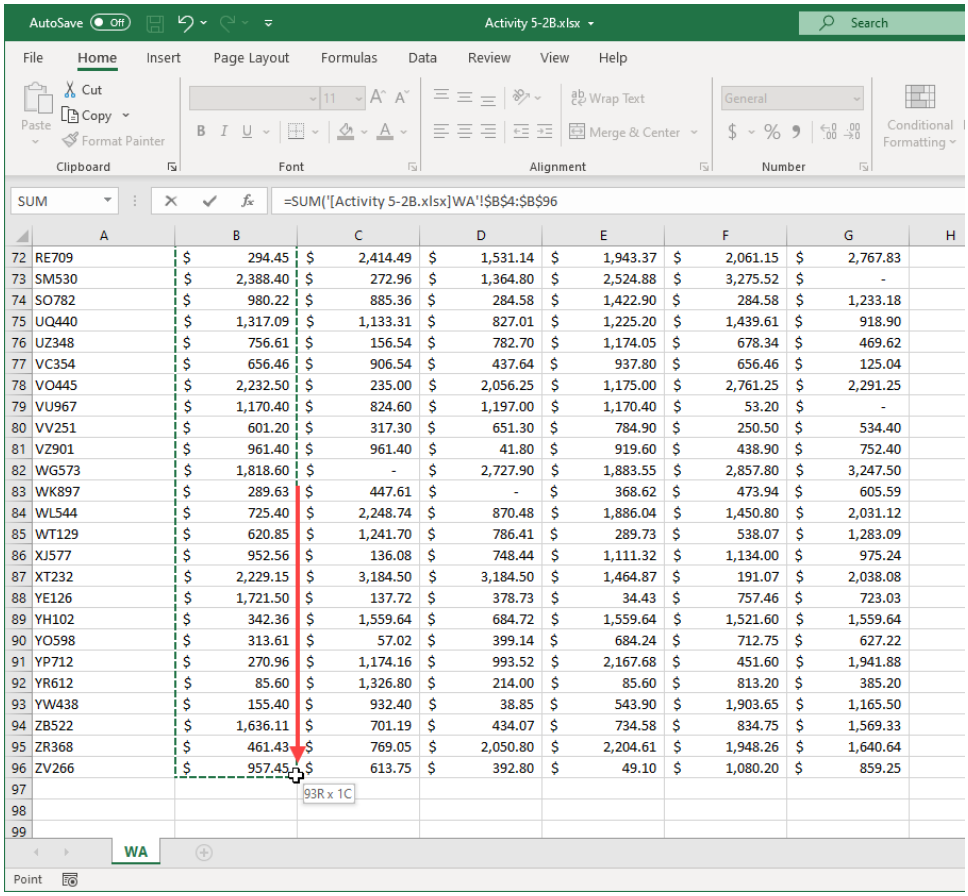
2. Click to make **Activity 5-2A** the active workbook, then click to select cell **B4**, and type "**=SUM(**":



3. Click **View → Switch Windows,** then click to select **Activity 5-2B.xlsx**:

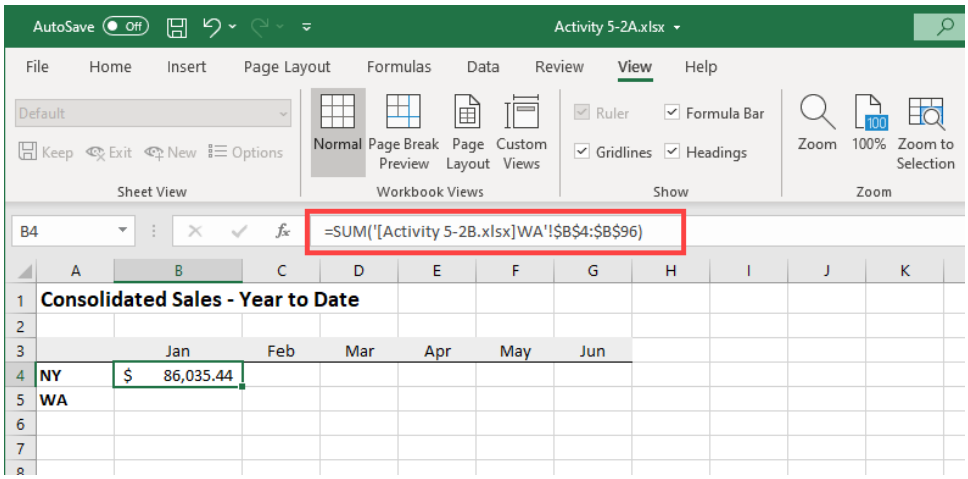


4. Click and drag to select cells **B4 to B96**, then press the **Enter** key:



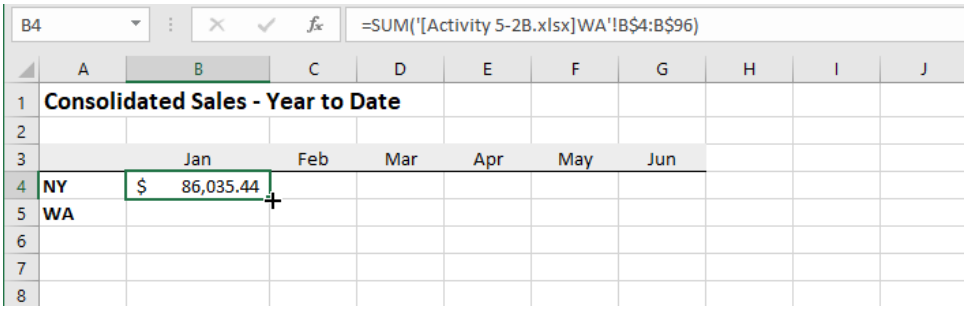
	A	B	C	D	E	F	G
72	RE709	$ 294.45	$ 2,414.49	$ 1,531.14	$ 1,943.37	$ 2,061.15	$ 2,767.83
73	SM530	$ 2,388.40	$ 272.96	$ 1,364.80	$ 2,524.88	$ 3,275.52	$ -
74	SO782	$ 980.22	$ 885.36	$ 284.58	$ 1,422.90	$ 284.58	$ 1,233.18
75	UQ440	$ 1,317.09	$ 1,133.31	$ 827.01	$ 1,225.20	$ 1,439.61	$ 918.90
76	UZ348	$ 756.61	$ 156.54	$ 782.70	$ 1,174.05	$ 678.34	$ 469.62
77	VC354	$ 656.46	$ 906.54	$ 437.64	$ 937.80	$ 656.46	$ 125.04
78	VO445	$ 2,232.50	$ 235.00	$ 2,056.25	$ 1,175.00	$ 2,761.25	$ 2,291.25
79	VU967	$ 1,170.40	$ 824.60	$ 1,197.00	$ 1,170.40	$ 53.20	$ -
80	VV251	$ 601.20	$ 317.30	$ 651.30	$ 784.90	$ 250.50	$ 534.40
81	VZ901	$ 961.40	$ 961.40	$ 41.80	$ 919.60	$ 438.90	$ 752.40
82	WG573	$ 1,818.60	$ -	$ 2,727.90	$ 1,883.55	$ 2,857.80	$ 3,247.50
83	WK897	$ 289.63	$ 447.61	$ -	$ 368.62	$ 473.94	$ 605.59
84	WL544	$ 725.40	$ 2,248.74	$ 870.48	$ 1,886.04	$ 1,450.80	$ 2,031.12
85	WT129	$ 620.85	$ 1,241.70	$ 786.41	$ 289.73	$ 538.07	$ 1,283.09
86	XJ577	$ 952.56	$ 136.08	$ 748.44	$ 1,111.32	$ 1,134.00	$ 975.24
87	XT232	$ 2,229.15	$ 3,184.50	$ 3,184.50	$ 1,464.87	$ 191.07	$ 2,038.08
88	YE126	$ 1,721.50	$ 137.72	$ 378.73	$ 34.43	$ 757.46	$ 723.03
89	YH102	$ 342.36	$ 1,559.64	$ 684.72	$ 1,559.64	$ 1,521.60	$ 1,559.64
90	YO598	$ 313.61	$ 57.02	$ 399.14	$ 684.24	$ 712.75	$ 627.22
91	YP712	$ 270.96	$ 1,174.16	$ 993.52	$ 2,167.68	$ 451.60	$ 1,941.88
92	YR612	$ 85.60	$ 1,326.80	$ 214.00	$ 85.60	$ 813.20	$ 385.20
93	YW438	$ 155.40	$ 932.40	$ 38.85	$ 543.90	$ 1,903.65	$ 1,165.50
94	ZB522	$ 1,636.11	$ 701.19	$ 434.07	$ 734.58	$ 834.75	$ 1,569.33
95	ZR368	$ 461.43	$ 769.05	$ 2,050.80	$ 2,204.61	$ 1,948.26	$ 1,640.64
96	ZV266	$ 957.45	$ 613.75	$ 392.80	$ 49.10	$ 1,080.20	$ 859.25
97							
98							
99							

5. Activity 5-2A will again become the active workbook. Click to select cell **B4** and review the formula in the formula bar:

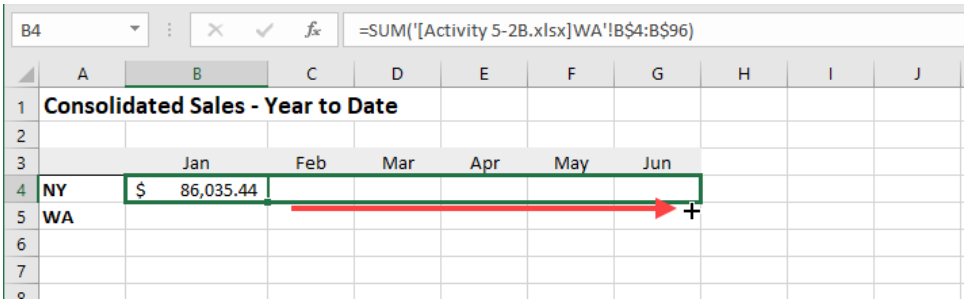


6. Edit the formula to remove the dollar symbol (**$**) from before both column references (**B**) in the formula, then press the **Enter** key to confirm the change:

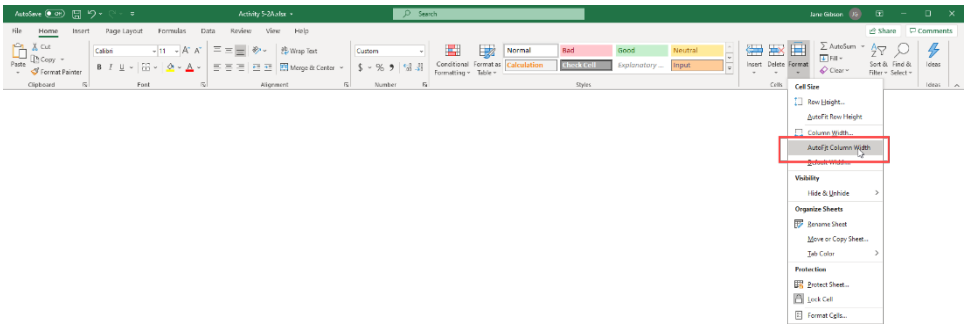
7. Hover your mouse over the bottom right corner of cell **B4**, until the mouse icon becomes a cross:



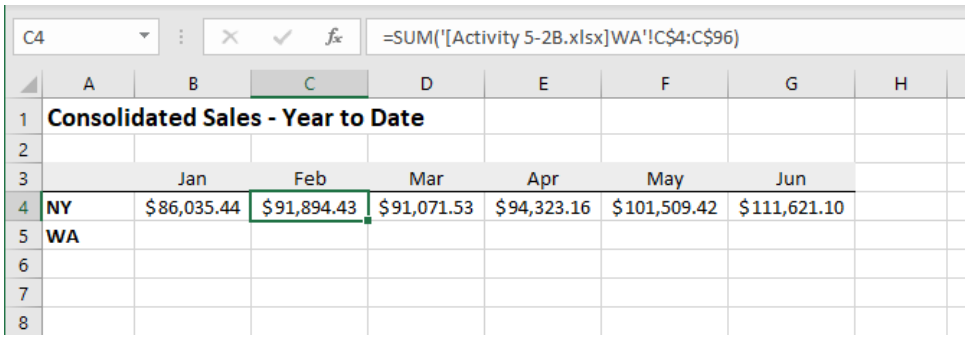
8. Click and drag to the right to copy the formula to cells **C4 through G4**:



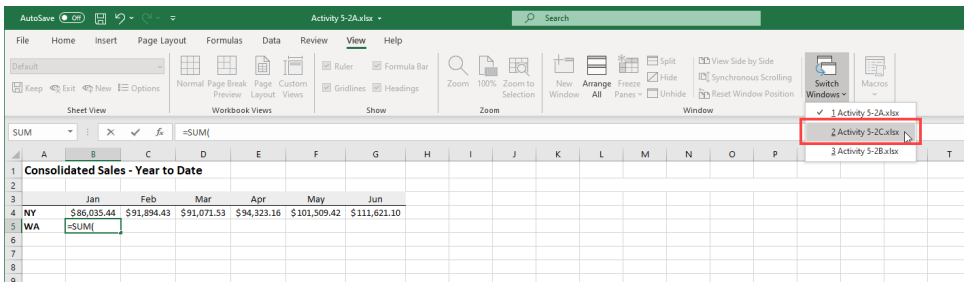
9. Select the cells **C4:G4**, then click **Home → Format → AutoFit Column Width** to resize the cells:



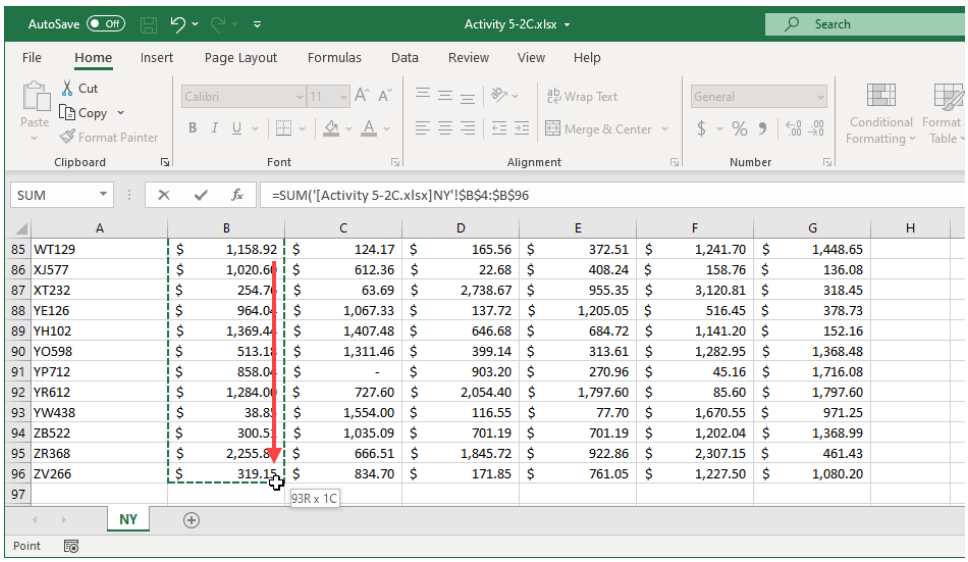
10. The formulas now summarize the sales for each month. Click to select cell **C4** and inspect the formula:



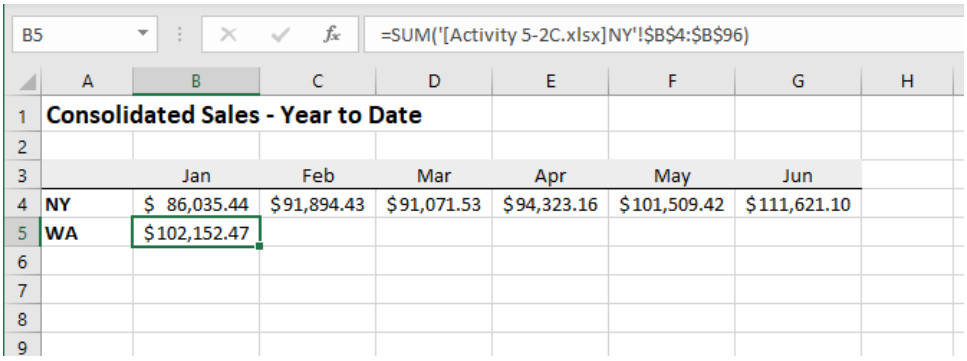
11. Now click to select cell **B5**. Complete the same steps using workbook **Activity 5-2C**. Type "**=SUM(**" in cell **B5**, click **View → Switch Windows,** and click to select **Activity 5-2C.xlsx**:



12. Click and drag to select cells **B4 to B96**, then press the **Enter** key:



13. Activity 5-2A will again become the active workbook. Click to select cell B5 and review the formula in the formula bar:



	A	B	C	D	E	F	G	H
1	**Consolidated Sales - Year to Date**							
2								
3		Jan	Feb	Mar	Apr	May	Jun	
4	**NY**	$ 86,035.44	$91,894.43	$91,071.53	$94,323.16	$101,509.42	$111,621.10	
5	**WA**	$102,152.47						
6								
7								
8								
9								

14. Edit the formula to remove the dollar symbol (**$**) from before both column references (**B**) in the formula, then press **Enter** to confirm the change:

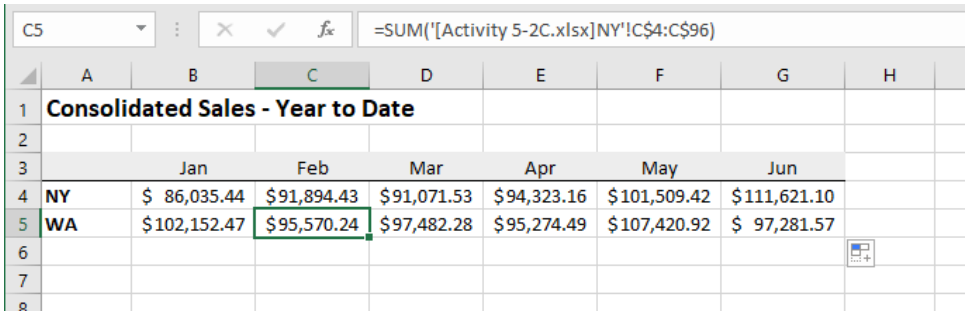
15. Hover your mouse over the bottom right corner of cell **B5**, until the mouse icon becomes a cross:

	A	B	C	D	E	F	G	H	I
1	**Consolidated Sales - Year to Date**								
2									
3		Jan	Feb	Mar	Apr	May	Jun		
4	**NY**	$ 86,035.44	$91,894.43	$91,071.53	$94,323.16	$101,509.42	$111,621.10		
5	**WA**	$102,152.47							
6									
7									
8									

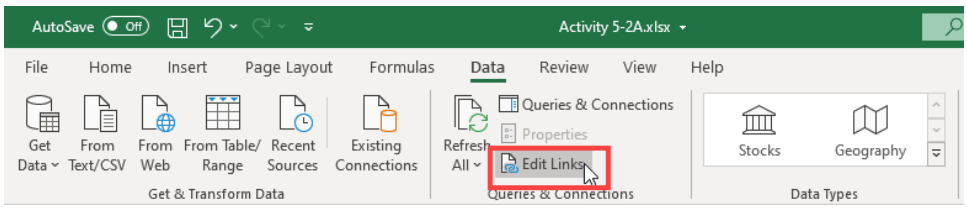
16. Click and drag to the right to copy the formula to cells **C5 through G5**:

	A	B	C	D	E	F	G	H	I
1	**Consolidated Sales - Year to Date**								
2									
3		Jan	Feb	Mar	Apr	May	Jun		
4	**NY**	$ 86,035.44	$91,894.43	$91,071.53	$94,323.16	$101,509.42	$111,621.10		
5	**WA**	$102,152.47							
6									
7									
8									

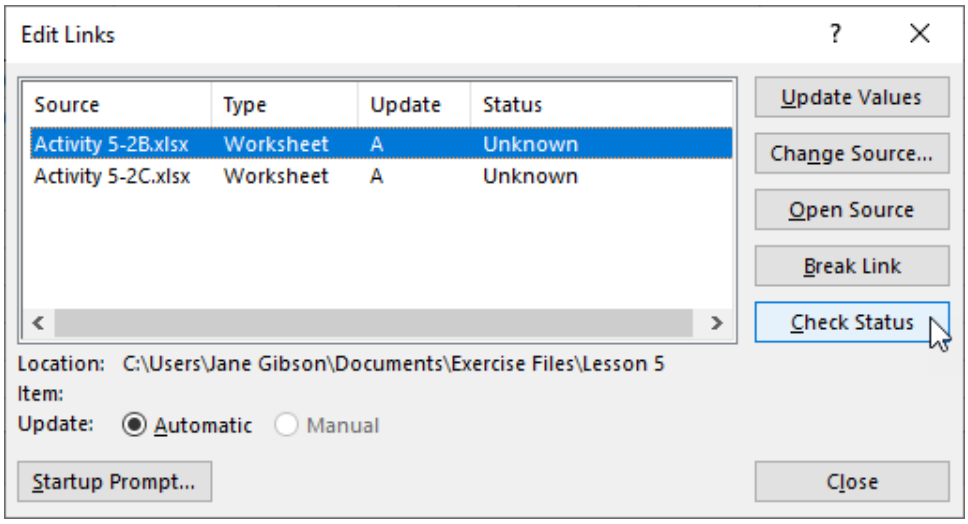
17. The formulas now summarize the sales for each month. Click to select cell **C5** and inspect the formula:



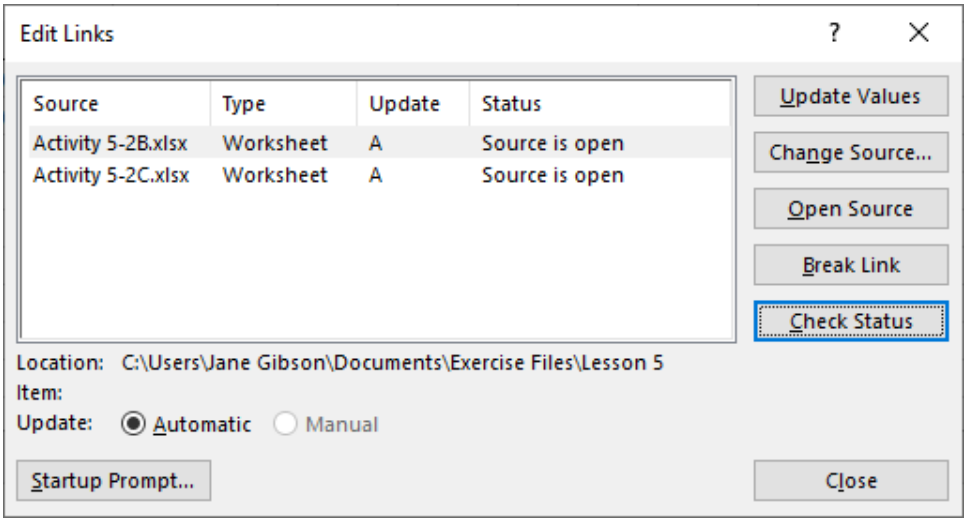
18. Now click **Data → Edit Links**:



19. The Edit Links dialog box will open, listing the external references. Click the **Check Status** button:



20. The status in the list box for both links will switch to Source is Open:



21. Save Activity 5-2A as **Activity 5-2A Complete**, close the remaining workbooks, and you can now close Excel 365 to complete the activity.

TOPIC C: Consolidating Data

When you want to gather large amounts of data, from multiple workbooks, the process of creating many formulas with external references to summarize the data can seem like a difficult task. Fortunately, Excel's data consolidation features provide a simple and effective way to consolidate data from multiple workbooks, or worksheets, that contain a similar structure. During this topic you will learn about the Excel Consolidate tool and how it can help you collect and analyze data from multiple workbooks.

Topic Objectives

In this session, you will learn:

- About data consolidation
- About consolidation functions
- How to use the Consolidate dialog box

Data Consolidation

When you consolidate data, you collect and summarize values from different sources that are based on common references. As an example, a company has several divisions that all sell the same products. Each division reports their sales in a separate workbook, but the structure of each workbook is similar. With the **Consolidate** tool, you can quickly select the different sources of sales data, choose how you would like to analyze it, then collect it into a summary data set.

Consolidation Functions

When consolidating data, you have the option to summarize the result using a variety of functions. For instance, you may want to see an average of the related values in your sources, or you may want to sum the related values.

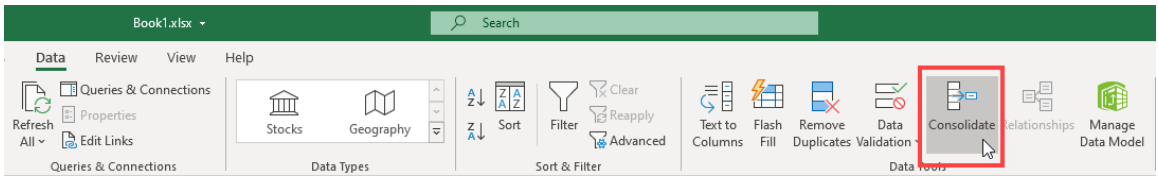
Below is a list of the available functions and a brief explanation of the result they will return from the referenced sources:

Sum	Returns a Total of the related values.
Count	Returns a count of the related value cells.
Average	Returns an average of the related values.
Max	Returns the maximum of the related values.
Min	Returns the minimum of the related values.
Product	Returns the result of multiplying all the related values.
Count Numbers	Returns a count of the related value cells that are numbers.
StdDev	Returns the standard deviation of the related values.
StdDevp	Returns the standard deviation of the related values based on the entire population.
Var	Returns the estimated variance of the related values.
Varp	Returns the estimated variance of the related values based on the entire population.

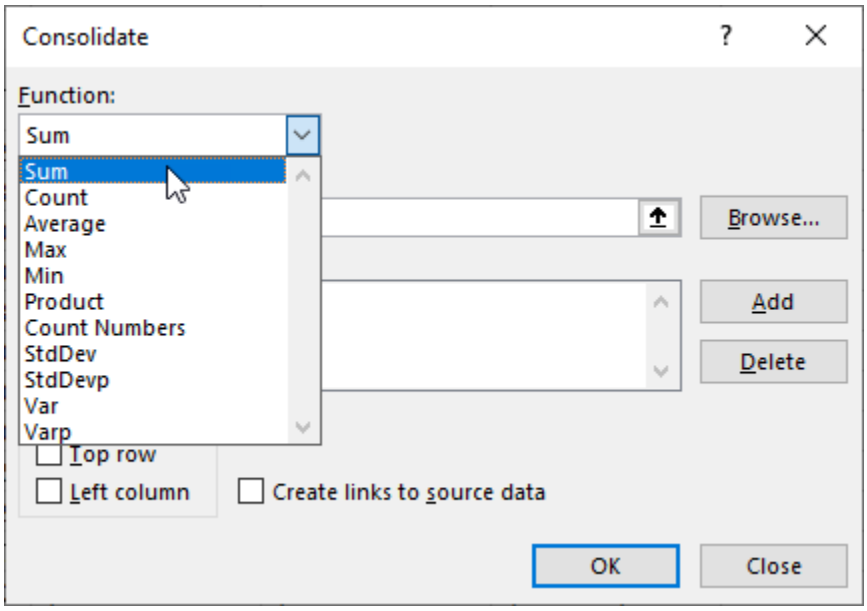
Use the Consolidate Dialog Box

When consolidating data from multiple sources it is recommended that you choose an empty worksheet, or ensure you have ample space for the consolidated data before you begin.

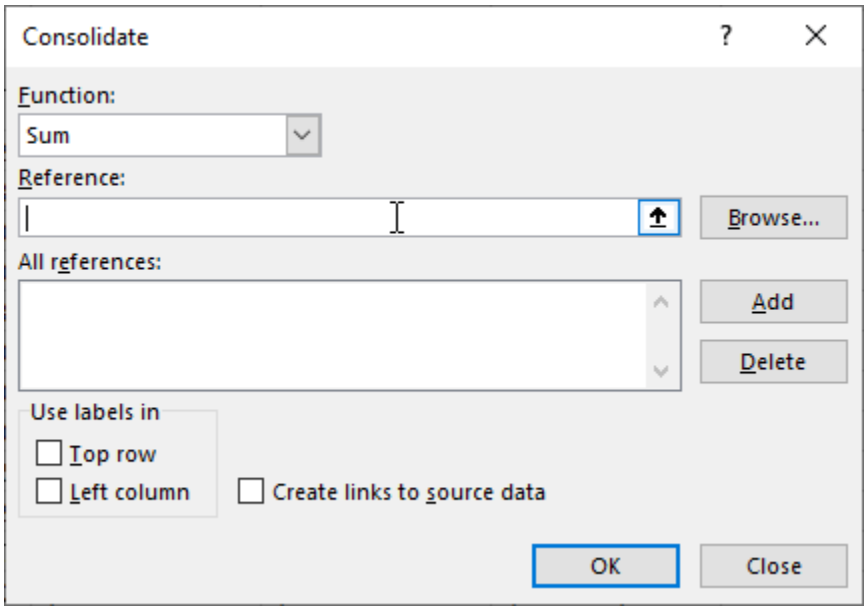
To open the **Consolidate** dialog box, first select the cell you want to set as the starting point for your consolidated data, then click **Data → Consolidate**:



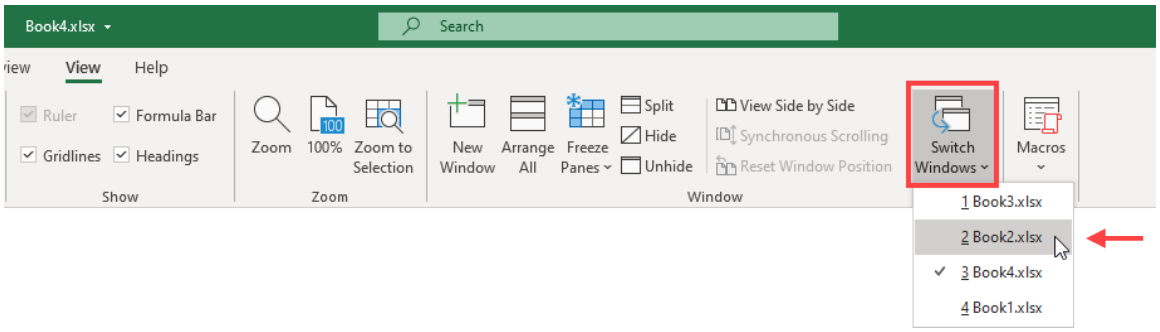
The **Consolidate** dialog box will open. Here you can choose the function to apply to the related values in the referenced sources:



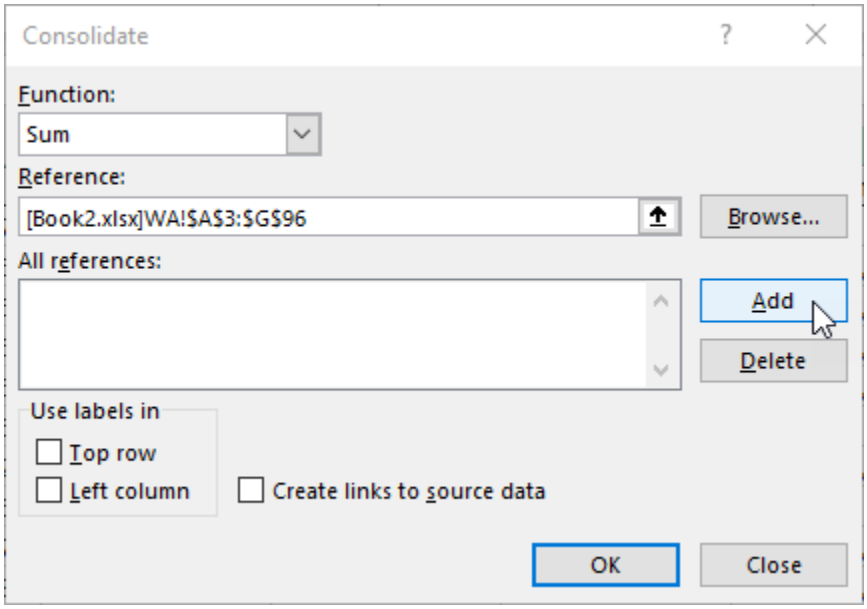
Click in the **Reference** field to select a data source for the consolidation:



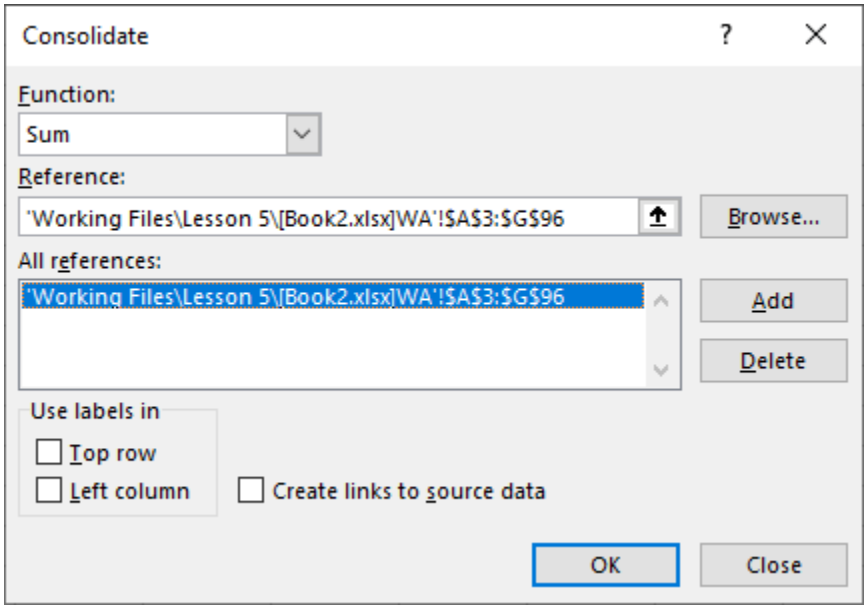
The simplest way to define a reference is to click **View → Switch Windows,** then select one of the source workbooks:



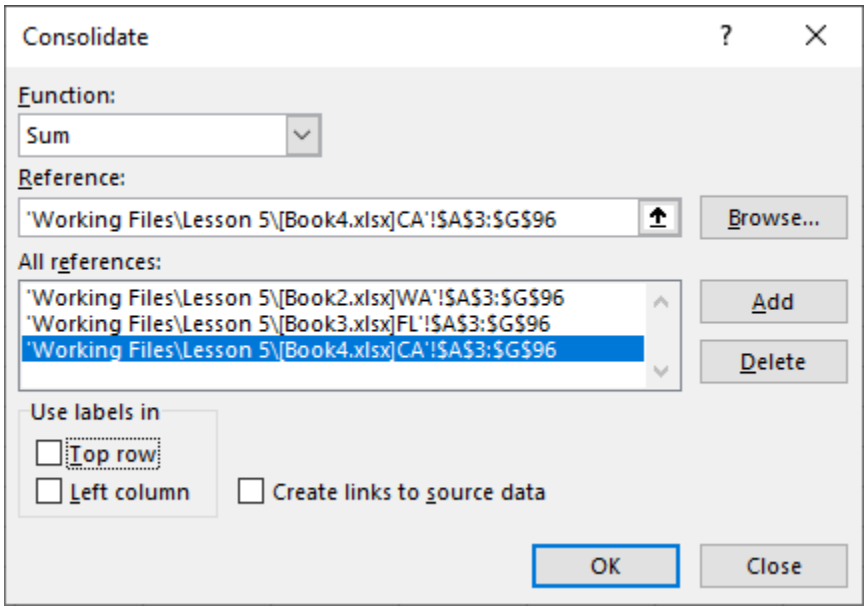
Click and drag to define the range of the data you wish to consolidate in the source, then click the **Add** button:



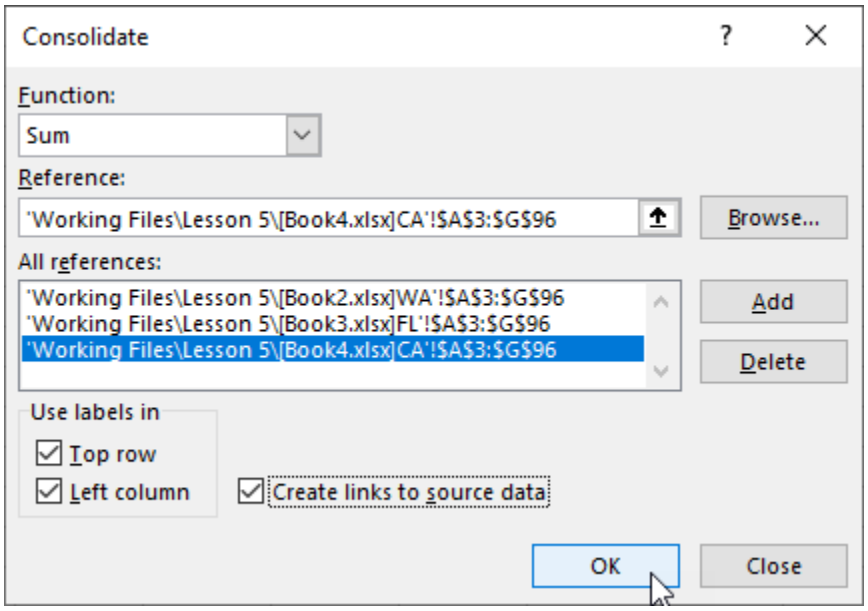
The reference will appear in the **All references** list box:



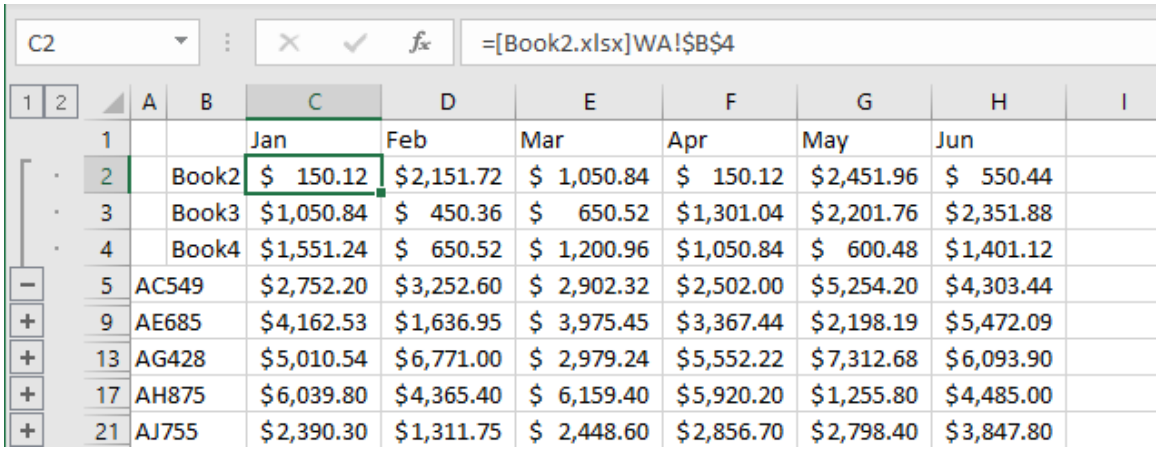
Repeat the process until all sources have been added:



Under **Use labels in**, click to enable the **Top row** and/or **Left column** checkboxes, if you want to use column and/or row labels to group the results. Click to enable the **Create links to source data** checkbox if you want to maintain the references to the source data. To complete the consolidation, click **OK**:



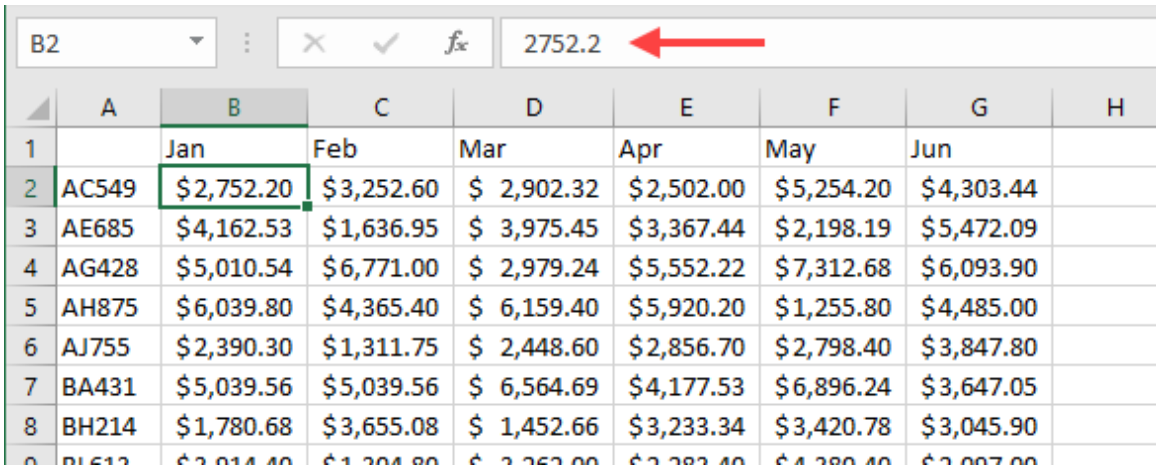
The consolidated data is loaded to your worksheet. If you have chosen to create links to the source data, the data will be grouped by the row and/or column headers. Clicking the plus (**+**) sign on one of the grouped outlines will reveal the source data, and you will see that the cells contain an external reference to the source:



C2 =[Book2.xlsx]WA!$B$4

		A	B	C	D	E	F	G	H	I
	1			Jan	Feb	Mar	Apr	May	Jun	
	2		Book2	$ 150.12	$2,151.72	$ 1,050.84	$ 150.12	$2,451.96	$ 550.44	
	3		Book3	$1,050.84	$ 450.36	$ 650.52	$1,301.04	$2,201.76	$2,351.88	
	4		Book4	$1,551.24	$ 650.52	$ 1,200.96	$1,050.84	$ 600.48	$1,401.12	
−	5	AC549		$2,752.20	$3,252.60	$ 2,902.32	$2,502.00	$5,254.20	$4,303.44	
+	9	AE685		$4,162.53	$1,636.95	$ 3,975.45	$3,367.44	$2,198.19	$5,472.09	
+	13	AG428		$5,010.54	$6,771.00	$ 2,979.24	$5,552.22	$7,312.68	$6,093.90	
+	17	AH875		$6,039.80	$4,365.40	$ 6,159.40	$5,920.20	$1,255.80	$4,485.00	
+	21	AJ755		$2,390.30	$1,311.75	$ 2,448.60	$2,856.70	$2,798.40	$3,847.80	

If you have chosen not to create links to your source data only the result will be returned, with no reference to the source data:



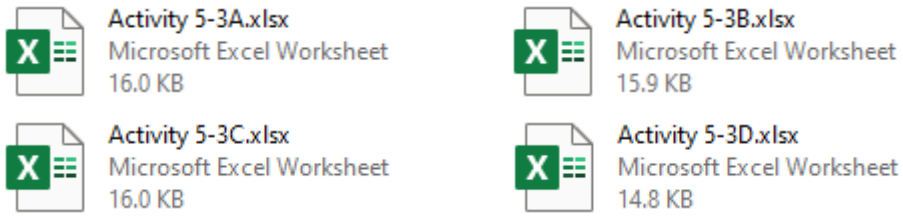
B2 2752.2

	A	B	C	D	E	F	G	H
1		Jan	Feb	Mar	Apr	May	Jun	
2	AC549	$2,752.20	$3,252.60	$ 2,902.32	$2,502.00	$5,254.20	$4,303.44	
3	AE685	$4,162.53	$1,636.95	$ 3,975.45	$3,367.44	$2,198.19	$5,472.09	
4	AG428	$5,010.54	$6,771.00	$ 2,979.24	$5,552.22	$7,312.68	$6,093.90	
5	AH875	$6,039.80	$4,365.40	$ 6,159.40	$5,920.20	$1,255.80	$4,485.00	
6	AJ755	$2,390.30	$1,311.75	$ 2,448.60	$2,856.70	$2,798.40	$3,847.80	
7	BA431	$5,039.56	$5,039.56	$ 6,564.69	$4,177.53	$6,896.24	$3,647.05	
8	BH214	$1,780.68	$3,655.08	$ 1,452.66	$3,233.34	$3,420.78	$3,045.90	

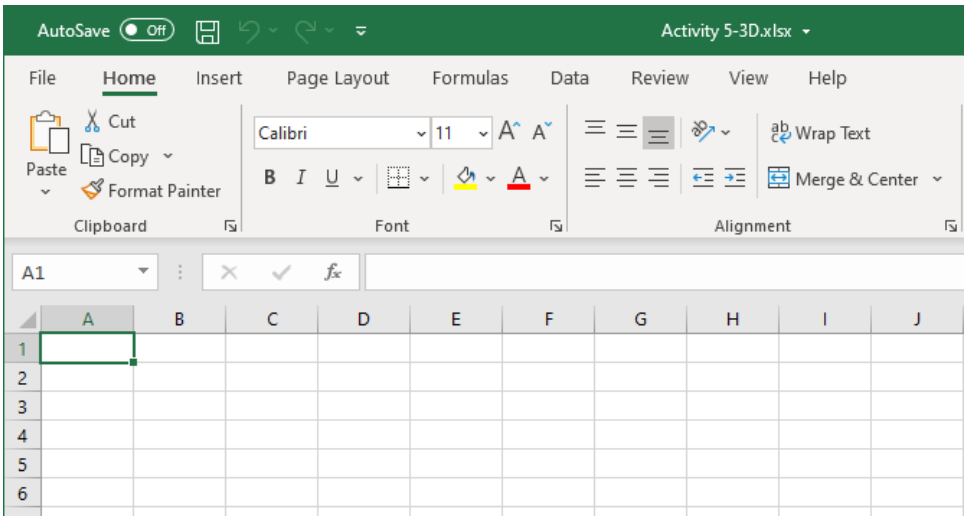
Activity 5-3: Consolidating Data

You have been asked to summarize the sales report from three of your company's regional divisions. You have been given a separate workbook for each region.

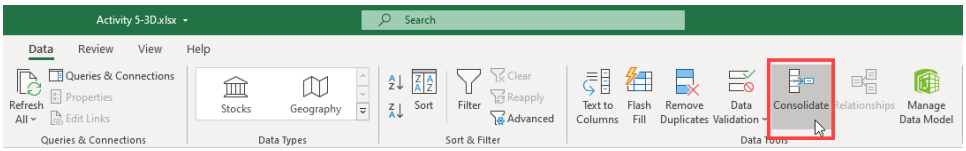
1. To begin, open **Activity 5-3A**, **Activity 5-3B**, **Activity 5-3C**, and **Activity 5-3D** from your Exercise Files folder:



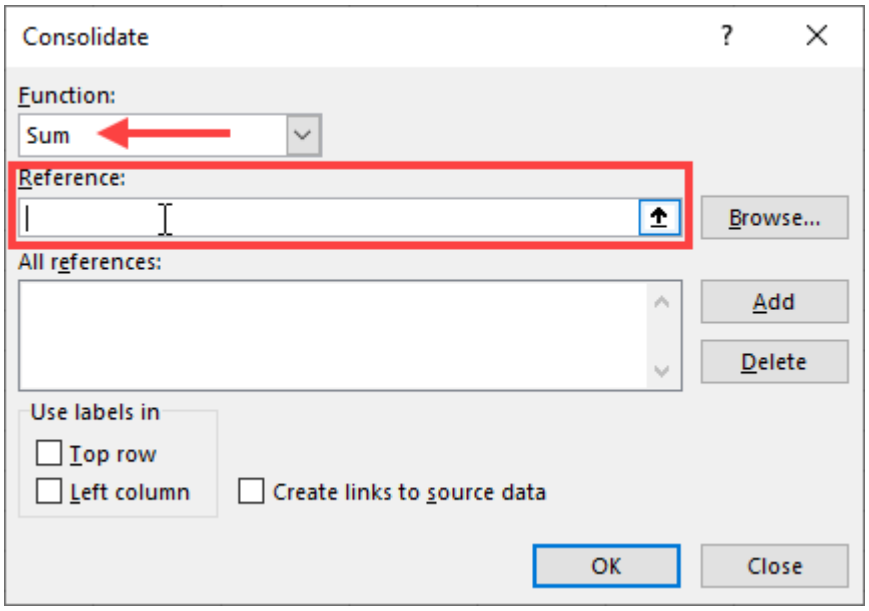
2. In the **Activity 5-3D** workbook, on **Sheet1**, select cell **A1**. This will be the starting point for the placement of the consolidated data:



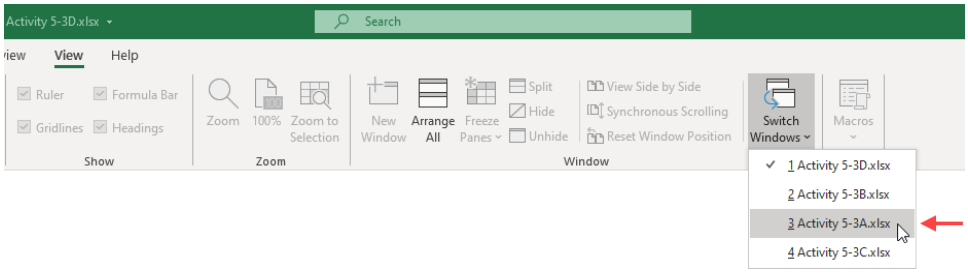
3. Now click **Data → Consolidate**:



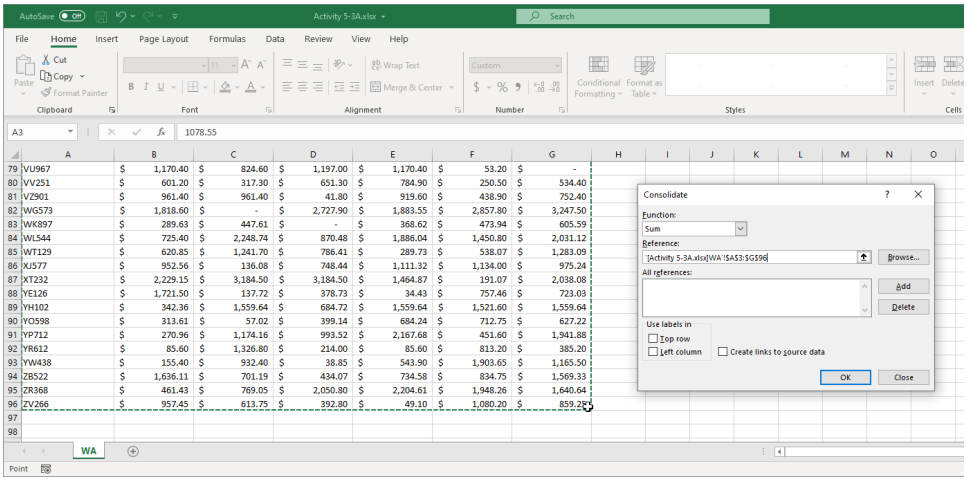
4. The Consolidate dialog box will now be displayed. Select **SUM** from the Function drop-down list, then click to select the **Reference** field:



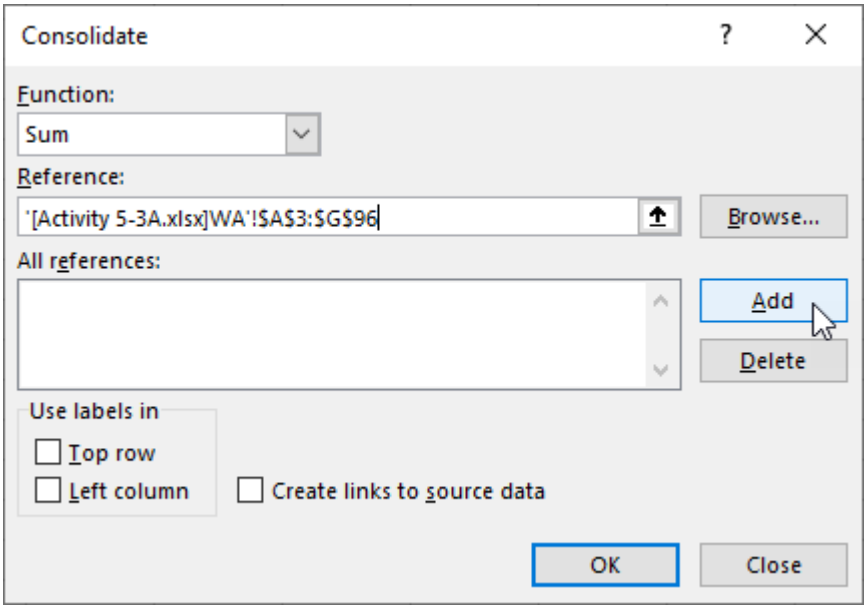
5. Click **View → Switch Windows,** then click to select the **Activity 5-3A** workbook:



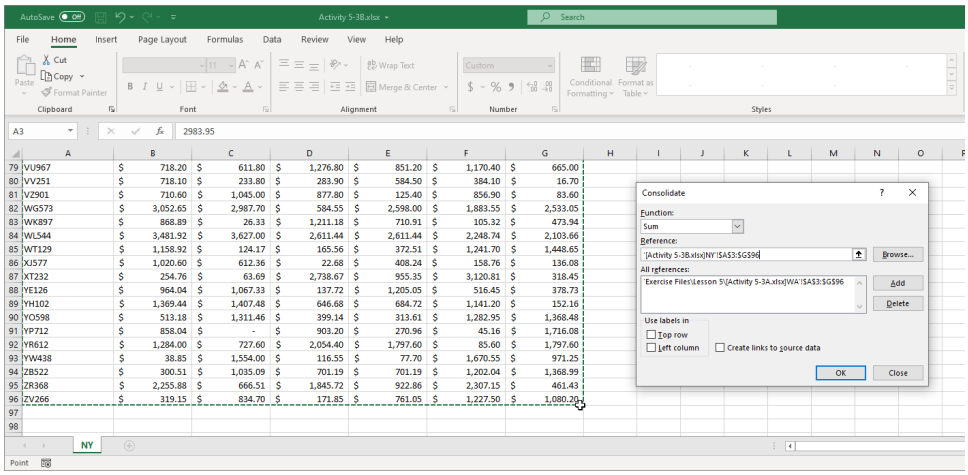
6. Click and drag to select cells **A3 to G96**:



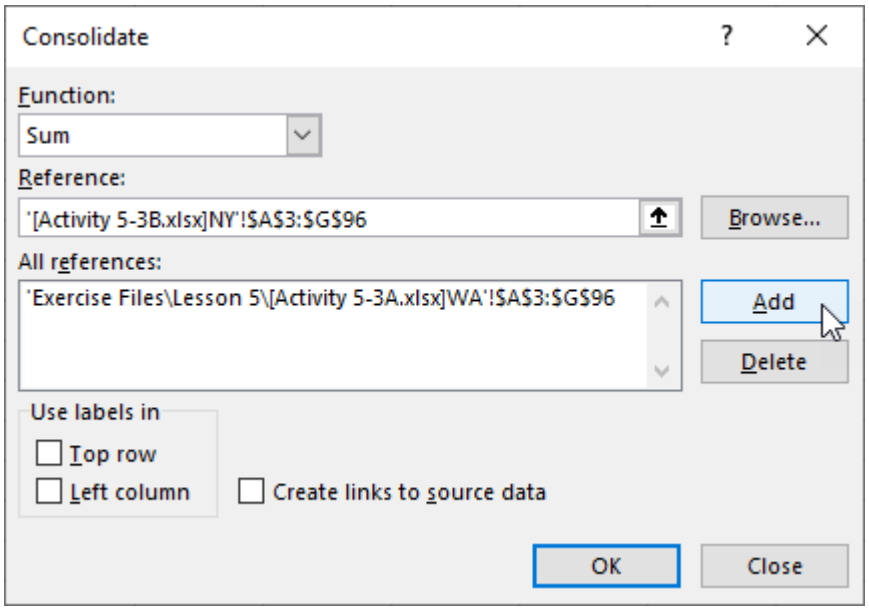
7. In the Consolidate dialog box, click the **Add** button:



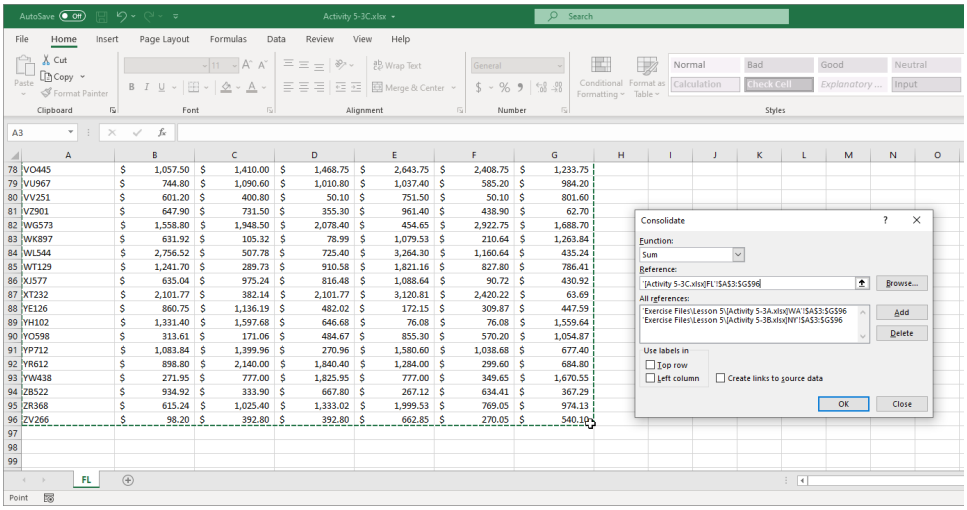
8. Now repeat the process to open the **Activity 5-3B** workbook and select cells **A3 to G96**:



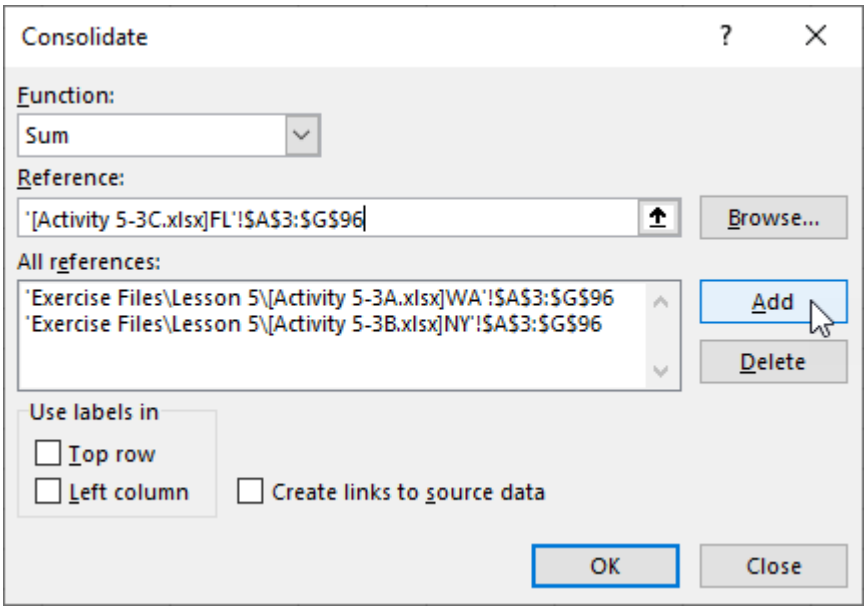
9. Back in the Consolidate dialog box, click the **Add** button:



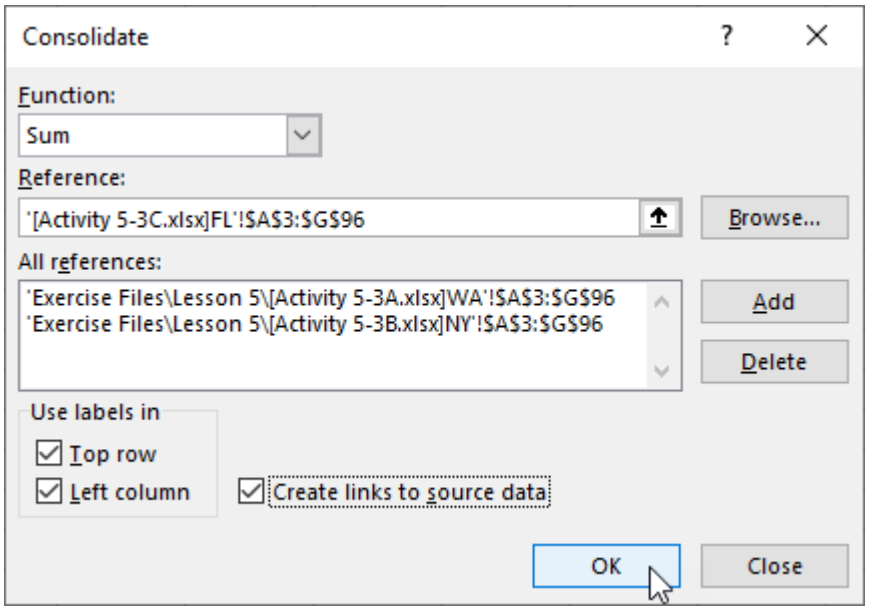
10. Now open the **Activity 5-3C** workbook and select cells **A3 to G96**:



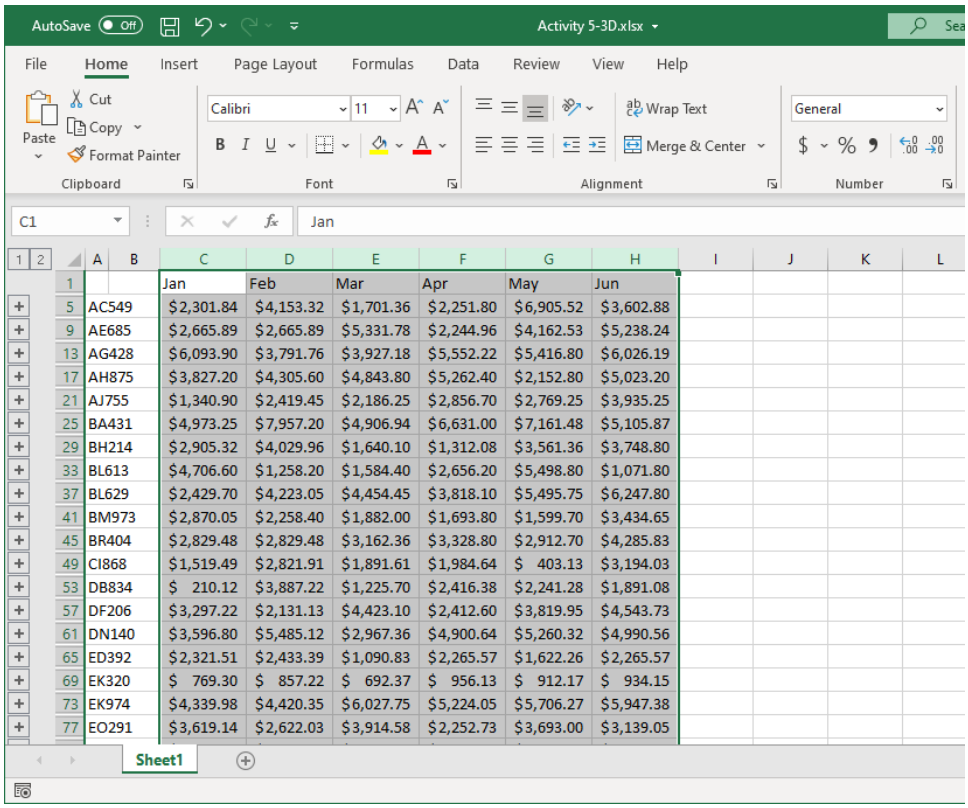
11. Back in the Consolidate dialog box, click the **Add** button:



12. Click to enable the **Top row**, **Left column**, and **Create links to source data** checkboxes, then click **OK**:

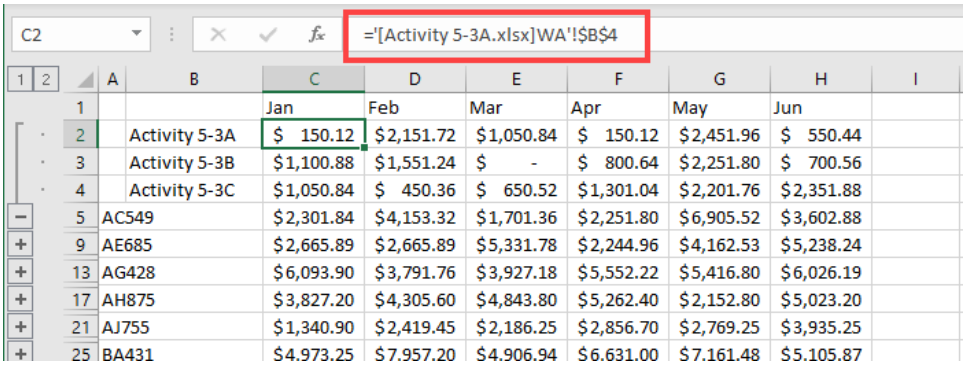


13. The consolidated data is now displayed, and is grouped and outlined by SKU number:



	Jan	Feb	Mar	Apr	May	Jun
AC549	$2,301.84	$4,153.32	$1,701.36	$2,251.80	$6,905.52	$3,602.88
AE685	$2,665.89	$2,665.89	$5,331.78	$2,244.96	$4,162.53	$5,238.24
AG428	$6,093.90	$3,791.76	$3,927.18	$5,552.22	$5,416.80	$6,026.19
AH875	$3,827.20	$4,305.60	$4,843.80	$5,262.40	$2,152.80	$5,023.20
AJ755	$1,340.90	$2,419.45	$2,186.25	$2,856.70	$2,769.25	$3,935.25
BA431	$4,973.25	$7,957.20	$4,906.94	$6,631.00	$7,161.48	$5,105.87
BH214	$2,905.32	$4,029.96	$1,640.10	$1,312.08	$3,561.36	$3,748.80
BL613	$4,706.60	$1,258.20	$1,584.40	$2,656.20	$5,498.80	$1,071.80
BL629	$2,429.70	$4,223.05	$4,454.45	$3,818.10	$5,495.75	$6,247.80
BM973	$2,870.05	$2,258.40	$1,882.00	$1,693.80	$1,599.70	$3,434.65
BR404	$2,829.48	$2,829.48	$3,162.36	$3,328.80	$2,912.70	$4,285.83
CI868	$1,519.49	$2,821.91	$1,891.61	$1,984.64	$ 403.13	$3,194.03
DB834	$ 210.12	$3,887.22	$1,225.70	$2,416.38	$2,241.28	$1,891.08
DF206	$3,297.22	$2,131.13	$4,423.10	$2,412.60	$3,819.95	$4,543.73
DN140	$3,596.80	$5,485.12	$2,967.36	$4,900.64	$5,260.32	$4,990.56
ED392	$2,321.51	$2,433.39	$1,090.83	$2,265.57	$1,622.26	$2,265.57
EK320	$ 769.30	$ 857.22	$ 692.37	$ 956.13	$ 912.17	$ 934.15
EK974	$4,339.98	$4,420.35	$6,027.75	$5,224.05	$5,706.27	$5,947.38
EO291	$3,619.14	$2,622.03	$3,914.58	$2,252.73	$3,693.00	$3,139.05

14. Click the plus (**+**) sign on the outline next to cell **A5**, then click to select cell **C2**. You will see the external reference to the source data in the formula bar:



	A	B	C	D	E	F	G	H	I
1			Jan	Feb	Mar	Apr	May	Jun	
2		Activity 5-3A	$ 150.12	$2,151.72	$1,050.84	$ 150.12	$2,451.96	$ 550.44	
3		Activity 5-3B	$1,100.88	$1,551.24	$ -	$ 800.64	$2,251.80	$ 700.56	
4		Activity 5-3C	$1,050.84	$ 450.36	$ 650.52	$1,301.04	$2,201.76	$2,351.88	
5	AC549		$2,301.84	$4,153.32	$1,701.36	$2,251.80	$6,905.52	$3,602.88	
9	AE685		$2,665.89	$2,665.89	$5,331.78	$2,244.96	$4,162.53	$5,238.24	
13	AG428		$6,093.90	$3,791.76	$3,927.18	$5,552.22	$5,416.80	$6,026.19	
17	AH875		$3,827.20	$4,305.60	$4,843.80	$5,262.40	$2,152.80	$5,023.20	
21	AJ755		$1,340.90	$2,419.45	$2,186.25	$2,856.70	$2,769.25	$3,935.25	
25	BA431		$4,973.25	$7,957.20	$4,906.94	$6,631.00	$7,161.48	$5,105.87	

15. Save Activity 5-3D as **Activity 5-3D Complete**, close the remaining workbooks, and you can now close Excel 365 to complete the activity.

Summary

In this lesson you learned about working with multiple workbooks. You should now be comfortable arranging, viewing, and navigating between multiple workbooks. You should also have a good understanding of how to create and maintain links between workbooks, and how to resolve broken connections. You should also be comfortable with knowing when and how you can consolidate data from multiple sources.

Review Questions

1. **How will multiple workbook windows appear if you arrange them vertically?**

2. **How many ways can the syntax of an external reference appear?**

3. **How can a link to an external data source be broken?**

4. **Where is the best place to consolidate data?**

5. **Do data consolidation sources have to have the exact same structure?**

LESSON 6:
EXPORTING AND SOURCING DATA

Lesson Objectives

In this lesson you will learn how to:

- Export data
- Use data sources
- Use Microsoft Forms

TOPIC A: Exporting Data

While Microsoft Excel is an excellent tool for storing, analyzing, and presenting data, there will be occasions where your data needs to be delivered in a different format. There could be many different reasons for this. The audience for the data may not have access to Excel, or you may want to prevent other users from making changes to your worksheet. It could also be that there is a wide audience for the information in your workbook and it is more practical to use a different platform to share it. Because there are many reasons to export your data, Excel provides several options to support them. In this topic you will learn about Excel's export options and how to use them.

Topic Objectives

In this session, you will learn:

- About export file format options
- How to export worksheet data

Export File Format Options

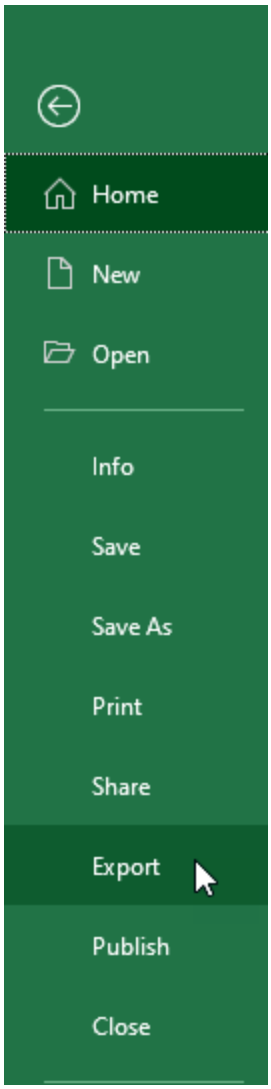
Excel provides you with several file format options to export your data, each with its own purpose and characteristics. Below we have outlined the more common options:

Format	Description
CSV	Comma-Separated Values – A simple file format used to store tabular data. Column data is separated by commas. All formatting is removed. Excel only saves the active worksheet.
HTML	Hypertext Markup Language – A file format used to enable viewing in a web-based browser application.
ODS	OpenDocument Spreadsheet – A file format used to store tabular data that is compatible with open source spreadsheet applications.
PDF	Portable Document Format – A file format, created by Adobe, used to create documents that maintain the format of the source, are highly accessible, but allow only limited editing.
TXT	Tab-Delimited Text – A simple file format used to store tabular data. Column data is separated by tabs. All formatting is removed. Excel only saves the active worksheet.
XLS	Excel 97-2003 Workbook – A file format compatible with older versions of Excel. Some current features or functionality may be lost.
XML	Extensible Markup Language – A complex file format used to store data in a text format, with custom tags to describe the structure.
XPS	XML Paper Specification – A file format, created by Microsoft, similar to PDF, used to create documents that maintain the original format, are highly accessible, but allow only limited editing.

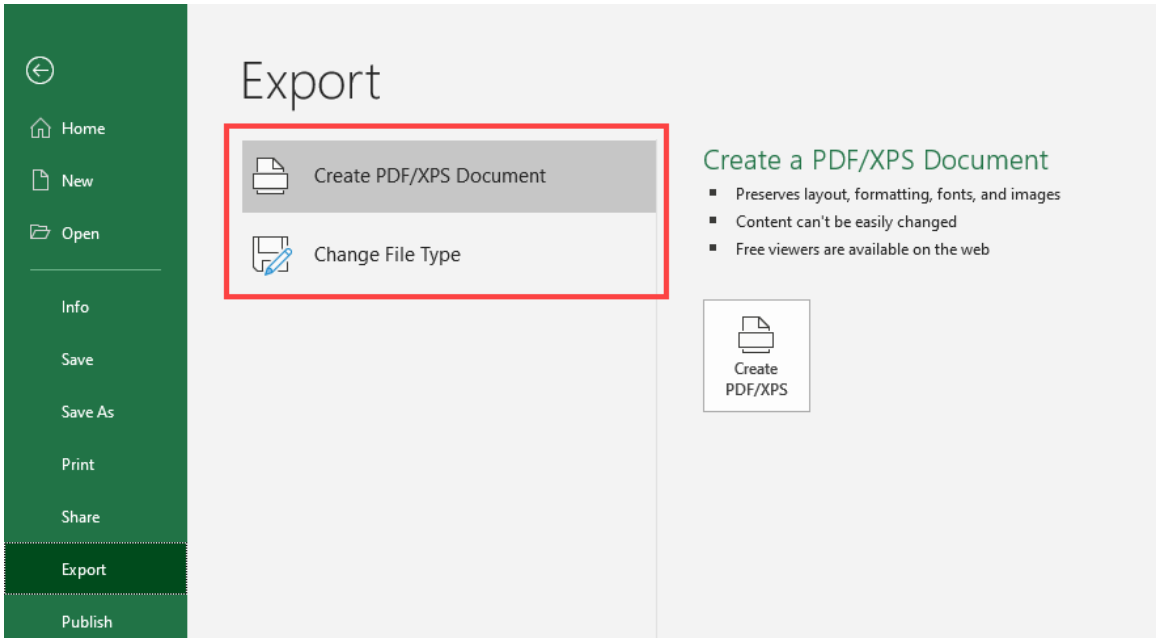
Exporting Worksheet Data

Exporting data enables you to create your data set in a format that is compatible with its intended use outside of Excel. While we have reviewed the more common options above, there are other options available, and even sub-categories for the options we have reviewed.

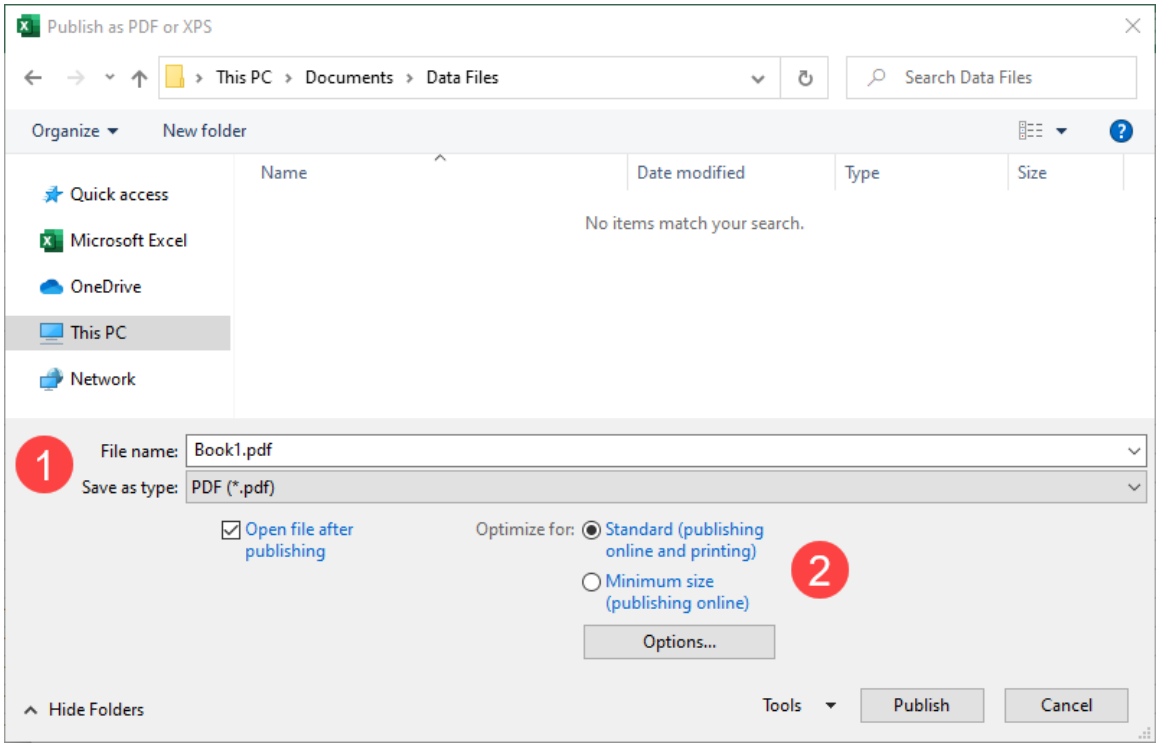
To explore the different types of files you can create from your workbooks, click **File → Export**:



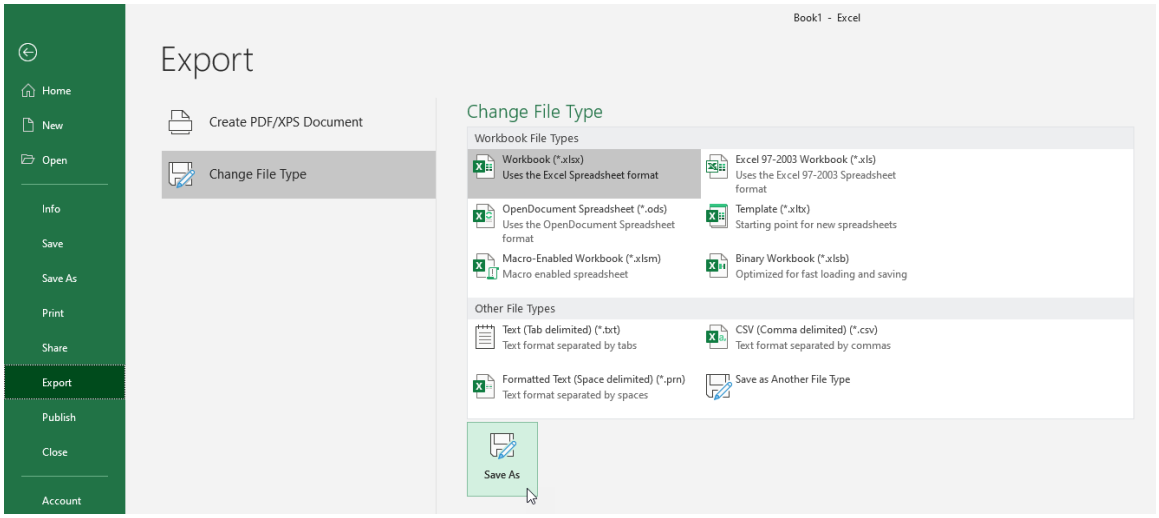
The options in the Export window are **Create PDF/XPS Document**, or **Change File Type**:



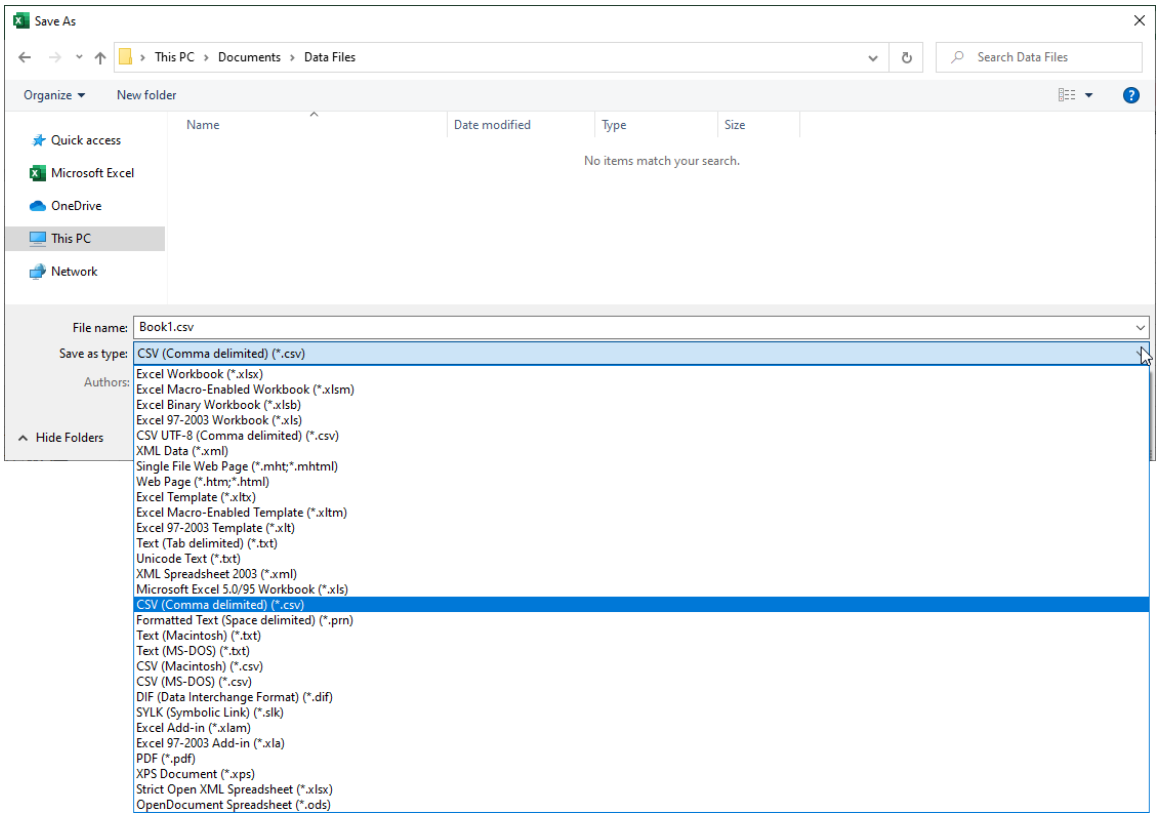
Clicking the **Create PDF/XPS Document** button will open the **Publish as PDF or XPS** dialog box, where you will be presented with options to **(1) name the file and select the file type**, and **(2) customize the available options**:



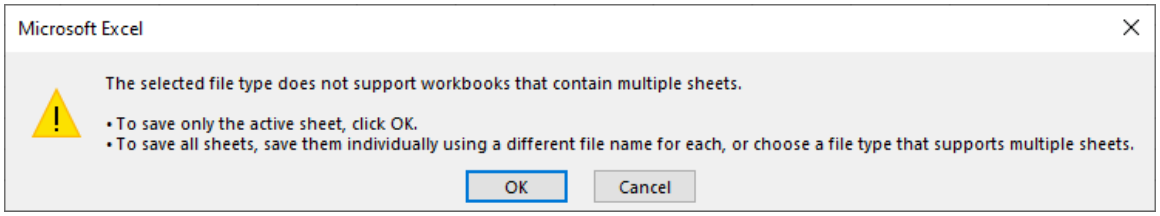
Clicking the **Change File Type** button will show the **Change File Type** category, where you can select from the many available file types, and click the **Save As** button:



The **Save As** dialog box will open, where you can select the destination of your file, name it, and select a file type, this time from a more extensive list:



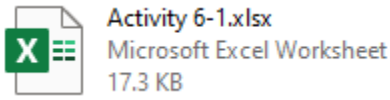
Clicking the **Save** button will initiate the export of your data. If there are any alerts, or errors, they will be presented at this point. In the example below, the Alert window cautions that the selected file type does not support workbooks that contain multiple sheets:



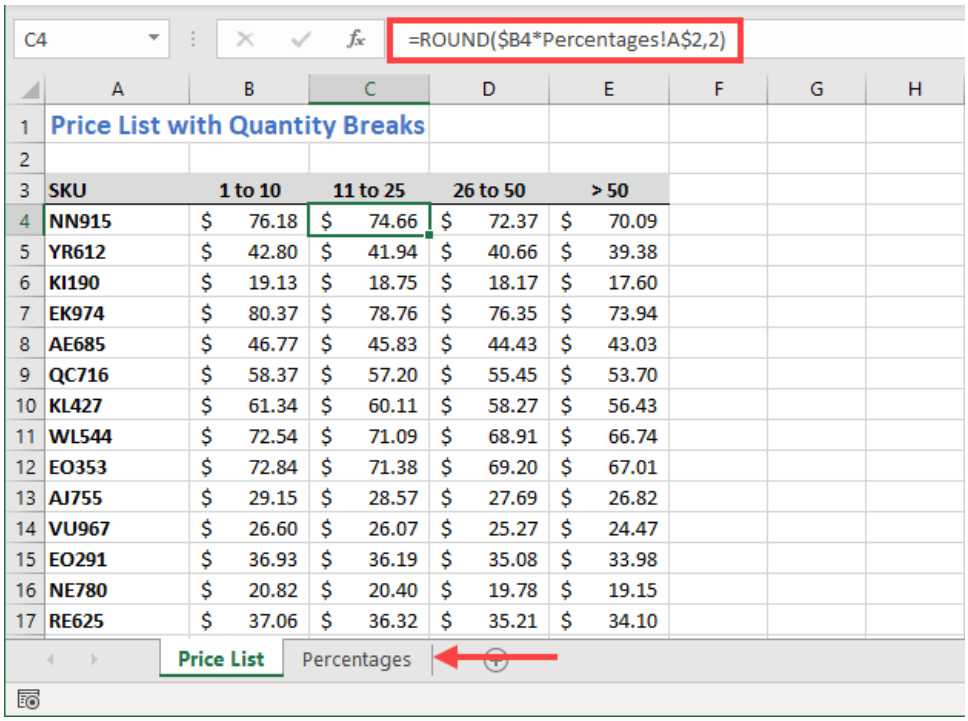
Activity 6-1: Export Worksheet Data

A customer has asked for a price list that they can load into their proprietary system. They have asked you to provide comma-separated values as it is the most compatible with their process. You need to export the price list as a CSV file.

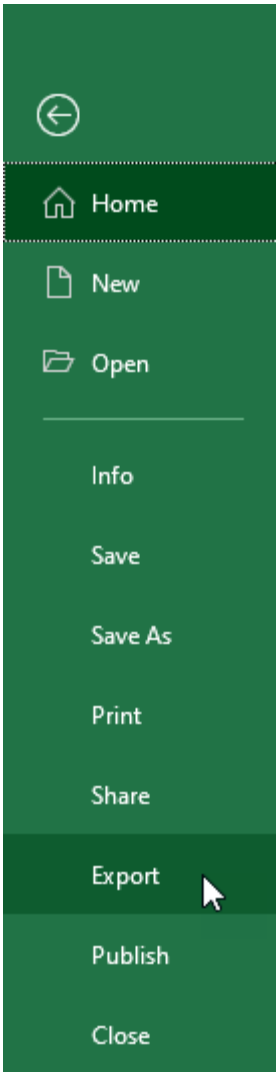
1. To begin, open **Activity 6-1** from your Exercise Files folder:



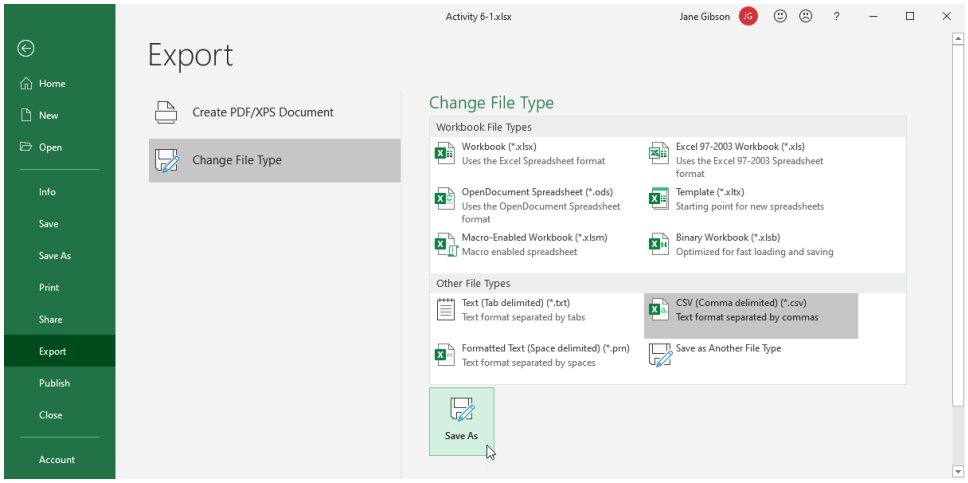
2. Before we begin the export, take note of some of the elements of the workbook. Click to select cell **C4**, and observe the formula used to calculate the price. Also note the formatting of the cells. Some have colored text, colored fill, or bold type. There is also a second worksheet, called Percentages:



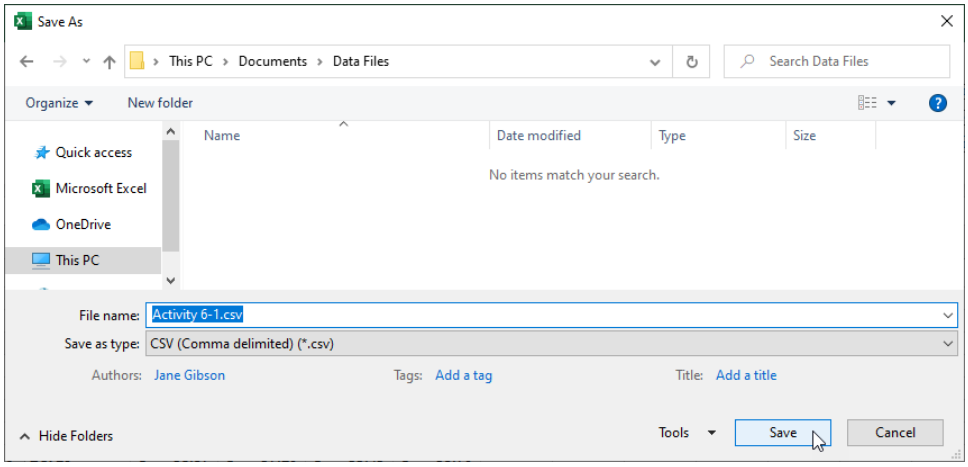
3. To export the file, Click **File → Export**:



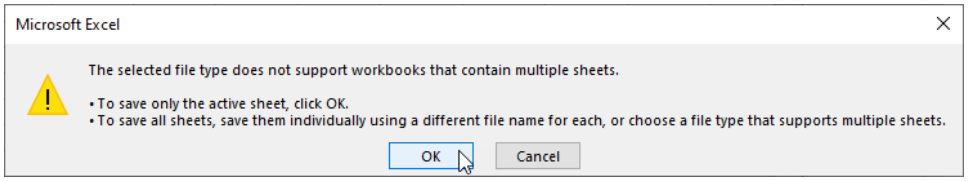
4. In the Export window, click to select **Change File Type**, then click to select **CSV (Comma delimited) (*.csv)** from the Change File Type category. Finally click **Save As**:



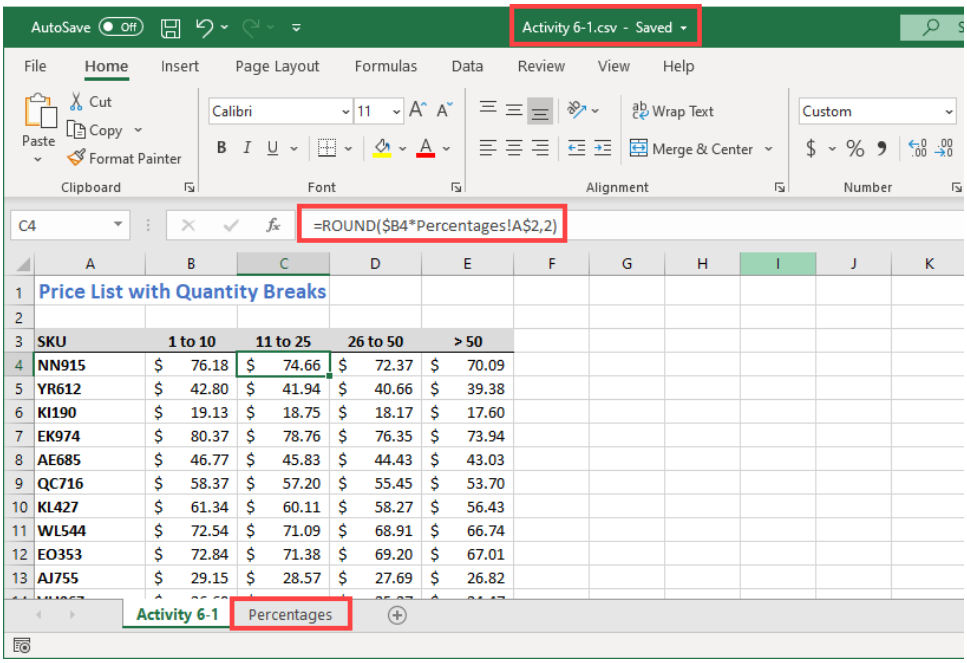
5. Choose a location for your file, leave the File Name as **Activity 6-1.csv**, and click the **Save** button:



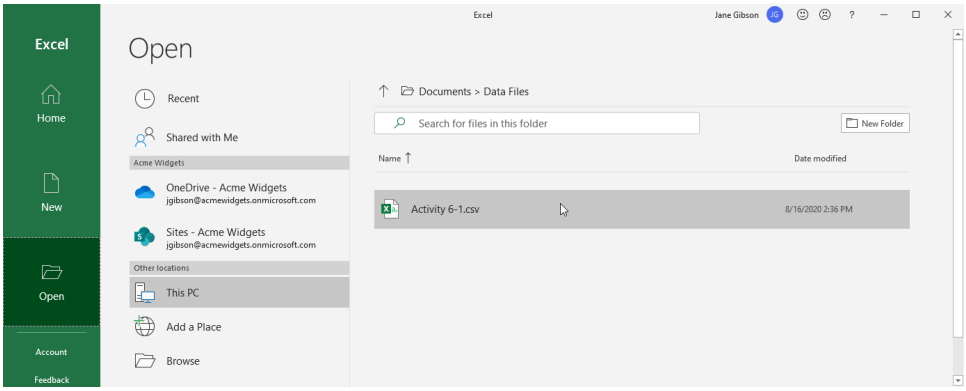
6. Note the alert regarding multiple sheets, then click **OK**:



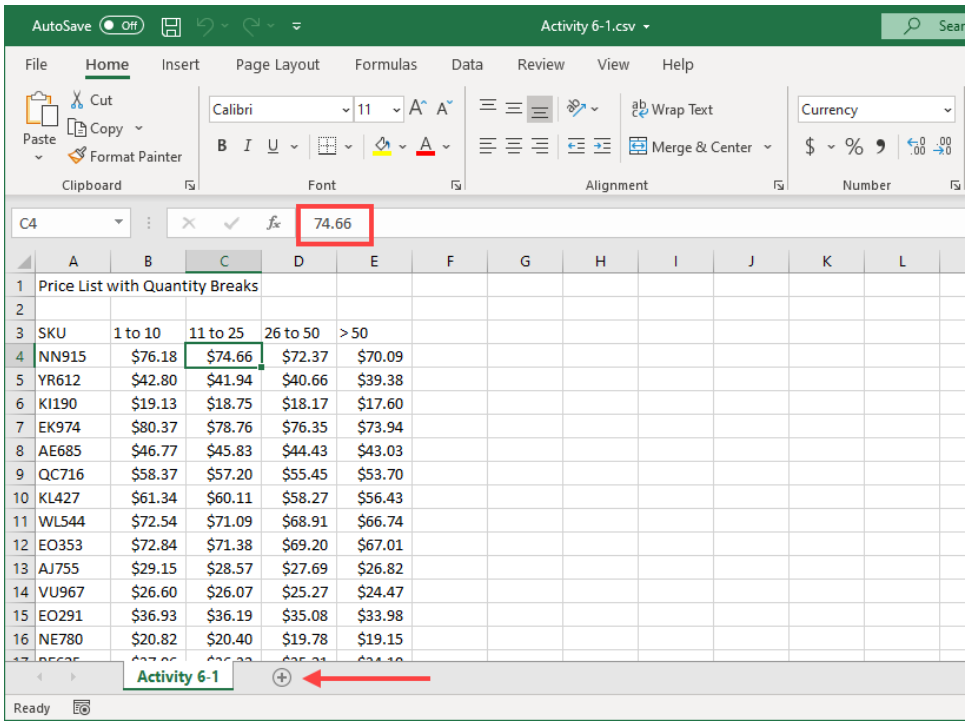
7. The open workbook is now called Activity 6-1.csv, but you will note that the formatting and formulas are still visible, and the Percentages worksheet is still visible. You can now **close** the file:



8. If necessary, open Excel 365, then click **File → Open** and navigate to the **Activity 6-1.csv** file you just saved. Click on the file to **open** it:



9. You will now see that the formatting has been removed, the formulas are replaced with values, and the Percentages worksheet has been removed:



	A	B	C	D	E
1	Price List with Quantity Breaks				
2					
3	SKU	1 to 10	11 to 25	26 to 50	> 50
4	NN915	$76.18	$74.66	$72.37	$70.09
5	YR612	$42.80	$41.94	$40.66	$39.38
6	KI190	$19.13	$18.75	$18.17	$17.60
7	EK974	$80.37	$78.76	$76.35	$73.94
8	AE685	$46.77	$45.83	$44.43	$43.03
9	QC716	$58.37	$57.20	$55.45	$53.70
10	KL427	$61.34	$60.11	$58.27	$56.43
11	WL544	$72.54	$71.09	$68.91	$66.74
12	EO353	$72.84	$71.38	$69.20	$67.01
13	AJ755	$29.15	$28.57	$27.69	$26.82
14	VU967	$26.60	$26.07	$25.27	$24.47
15	EO291	$36.93	$36.19	$35.08	$33.98
16	NE780	$20.82	$20.40	$19.78	$19.15

10. You can now save your changes as **Activity 6-1 Complete.csv** and close Microsoft Excel 365 to complete the activity.

TOPIC B: Using Data Sources

The data that you analyze in Excel can come from many sources. How you access that data can have a big impact on the accuracy of your workbooks and your own productivity. During this topic you will learn about the tools available in Excel to help you access data quickly and efficiently.

Topic Objectives

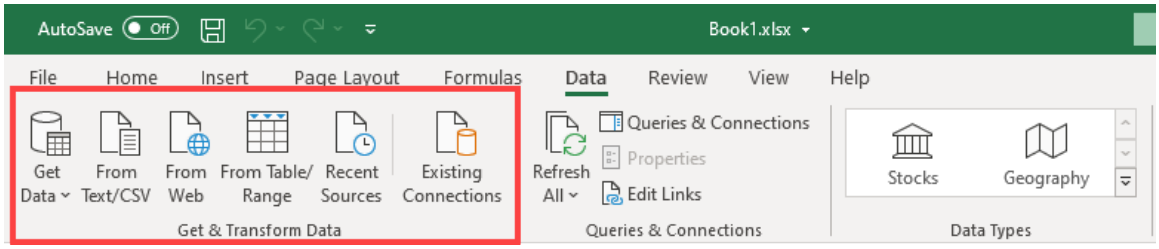
In this session, you will learn about:

- Data sources you can use in Excel
- Importing a delimited file
- Using a web query

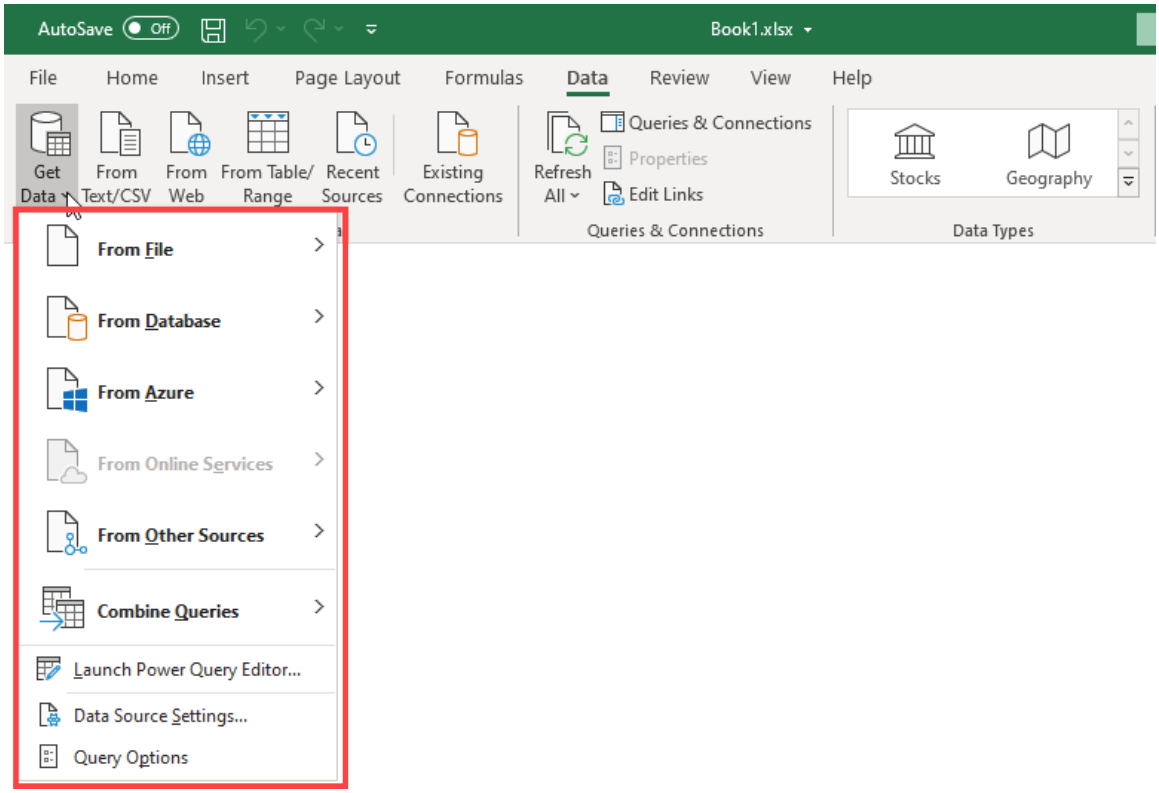
Data Sources in Excel

Not only does Microsoft Excel provide you with powerful tools to analyze and present your data, it also give the tools to access data from a wide array of sources, so the data in your workbooks can be as current and reliable as possible. The sources, and how you access them, vary from simple, to highly complex, and are closely related to the unique situation of the user.

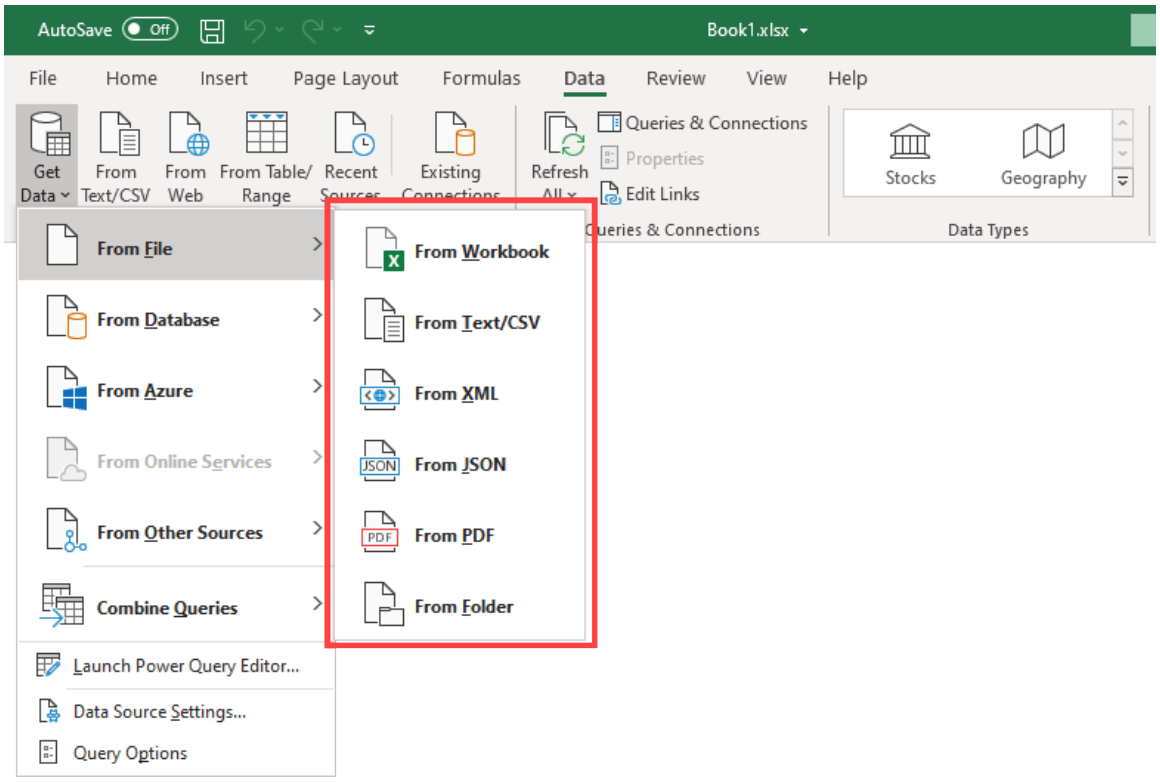
The tools used to access external data are available in the **Get & Transform Data** group of the Data tab:



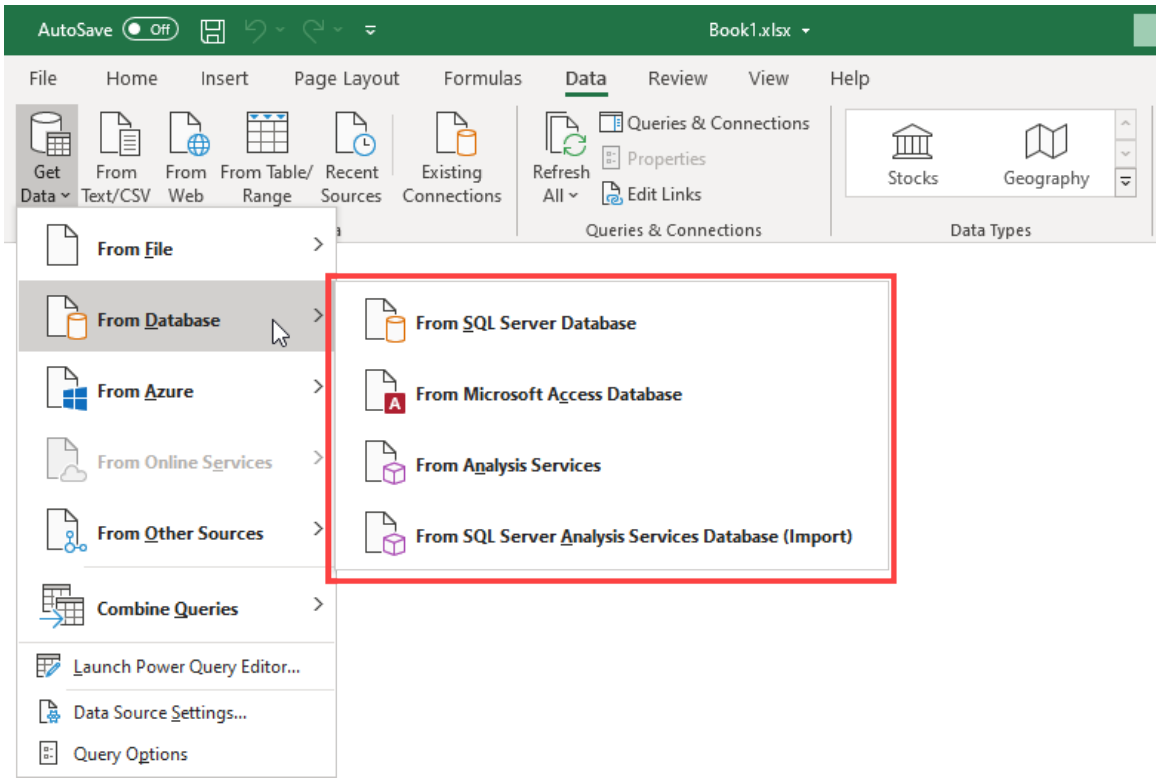
Clicking on the **Get Data** drop-down command will show the wide array of options that are available:



Hovering your cursor over each option in the list will display a sub-menu with more specific options for each group. Below are the options available in the **From File** sub-menu:



And here are the options available in the **From Database** sub-menu:



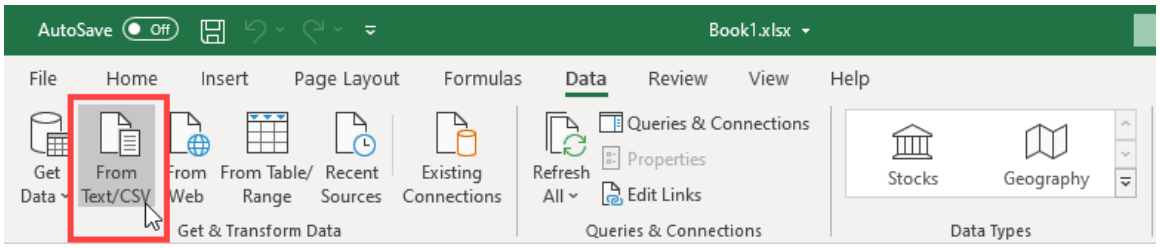
An explanation of all these options, and their individual requirements, is beyond the scope of this course, but being aware of their potential could lead you to explore using some of these tools in your own unique situation.

Importing a Delimited File

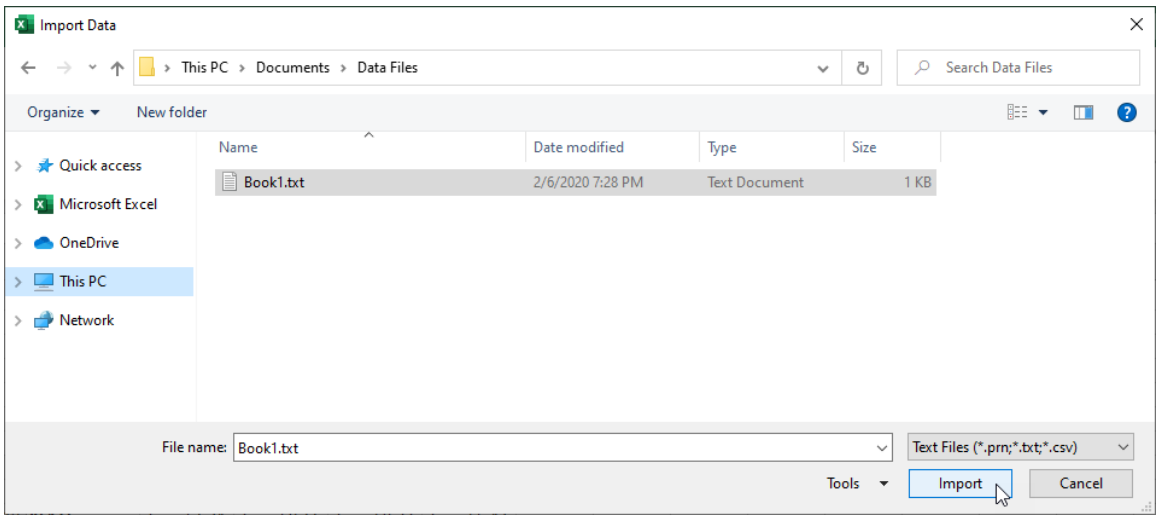
A **delimited** file is a simple file that is used to store tabular data (rows and columns). The column data is delimited (separated) by a unique character, often a tab or a comma, and the file does not contain formatting. Because the structure of these files is simple and predictable, they are very popular for transferring data between programs.

With some delimited files, such as the CSV format, you can open them directly in Excel, by using the **File → Open** command. Excel will make assumptions about what type of data is in each column, and what the separator character is. In most cases this will produce the desired result. There may be times, though, that you need to define some of file's data characteristics, or you just want the convenience of loading the data into an existing workbook. In these cases, you would import the data.

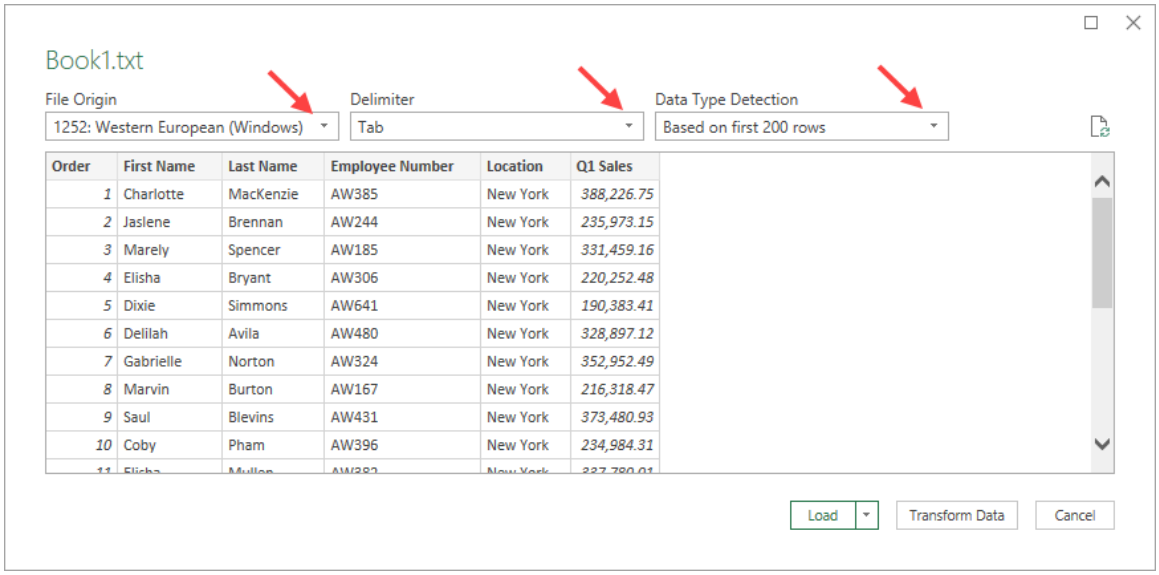
To begin the import process, click **Data → From Text/CSV**:



The **Import Data** dialog box will open, where you can navigate to and select the file you wish to import. Click the **Import** button to start the process:

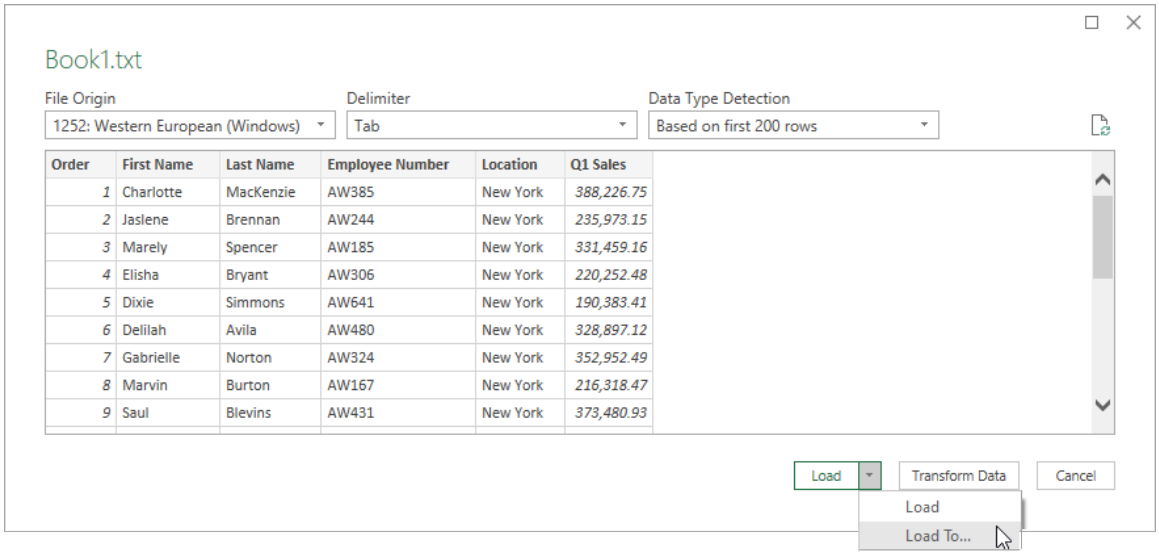


The **Get and Transform Data** dialog box will appear, giving a preview of the data in the file. You can click to select the **File Origin**, **Delimiter**, and **Data Type Detection** options from their respective drop-down lists. Any changes made in these drop-down lists will be previewed in the data list:



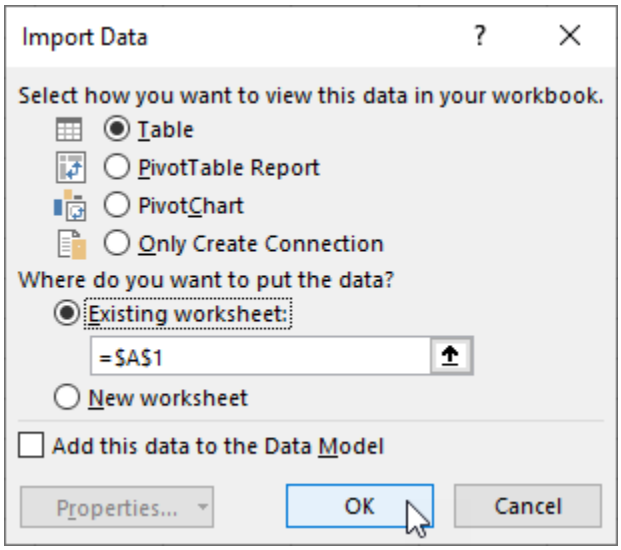
Order	First Name	Last Name	Employee Number	Location	Q1 Sales
1	Charlotte	MacKenzie	AW385	New York	388,226.75
2	Jaslene	Brennan	AW244	New York	235,973.15
3	Marely	Spencer	AW185	New York	331,459.16
4	Elisha	Bryant	AW306	New York	220,252.48
5	Dixie	Simmons	AW641	New York	190,383.41
6	Delilah	Avila	AW480	New York	328,897.12
7	Gabrielle	Norton	AW324	New York	352,952.49
8	Marvin	Burton	AW167	New York	216,318.47
9	Saul	Blevins	AW431	New York	373,480.93
10	Coby	Pham	AW396	New York	234,984.31

To create a new worksheet in the workbook and load the data as a table on that sheet, you would click the **Load** button. To select the destination of the data, you would click the **Load** drop-down arrow, then click **Load To**:

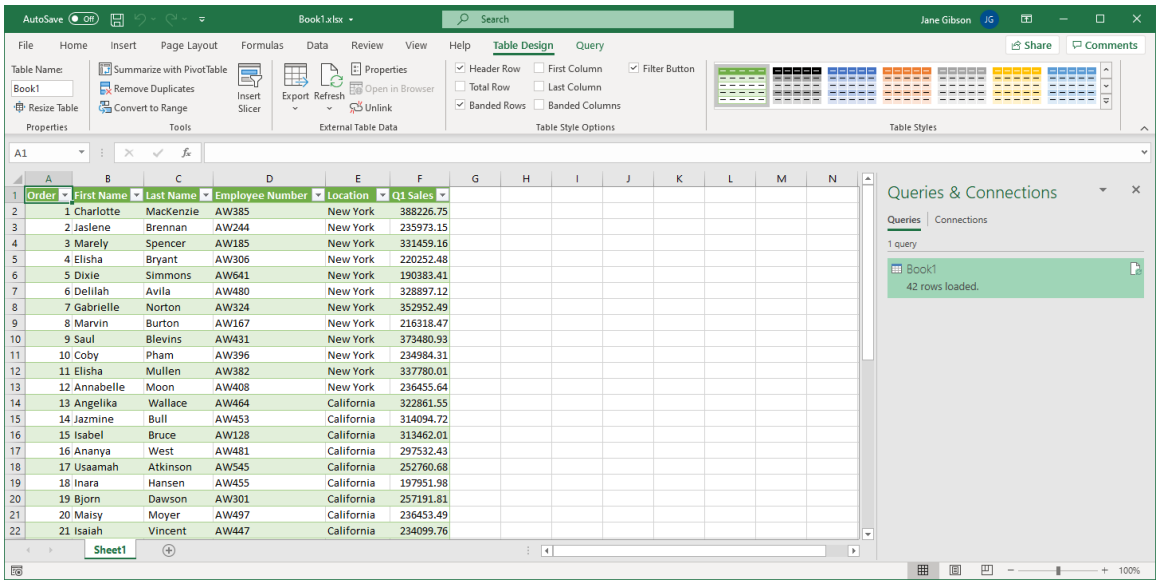


Order	First Name	Last Name	Employee Number	Location	Q1 Sales
1	Charlotte	MacKenzie	AW385	New York	388,226.75
2	Jaslene	Brennan	AW244	New York	235,973.15
3	Marely	Spencer	AW185	New York	331,459.16
4	Elisha	Bryant	AW306	New York	220,252.48
5	Dixie	Simmons	AW641	New York	190,383.41
6	Delilah	Avila	AW480	New York	328,897.12
7	Gabrielle	Norton	AW324	New York	352,952.49
8	Marvin	Burton	AW167	New York	216,318.47
9	Saul	Blevins	AW431	New York	373,480.93

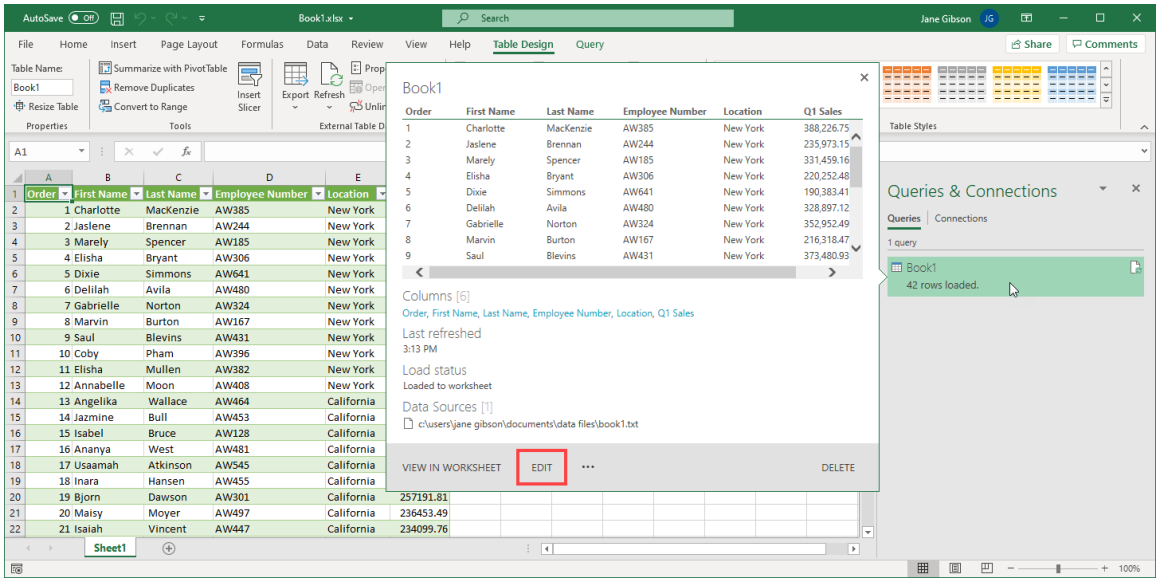
The **Import Data** dialog box will open, allowing you to select how you want to view the data in your workbook and where you want to put it. Clicking the **OK** button will load the data:



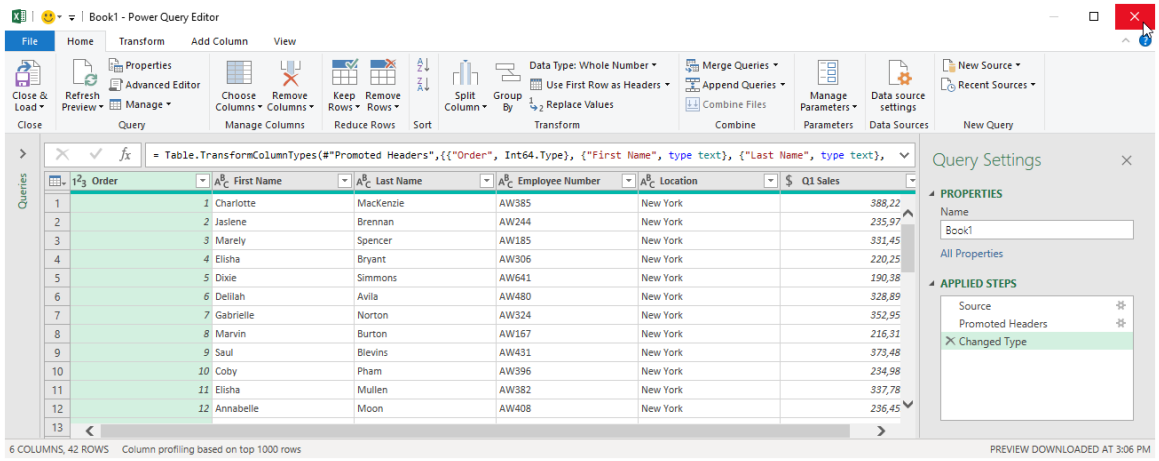
You would then see the data loaded as a table on your worksheet. The **Queries & Connections** task pane will appear on the right of the window, and you will see that, under the Queries tab, the imported data source is displayed, and also indicating the number of rows which have been loaded:



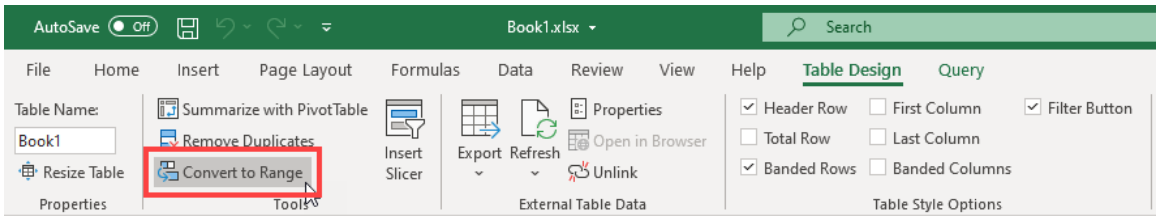
Hovering your mouse over the query will display a Query dialog box, showing a preview of the data, and information on its contents, its status, and its source. To launch the **Power Query Editor**, an extensive tool that helps you customize your queries, click **Edit**:



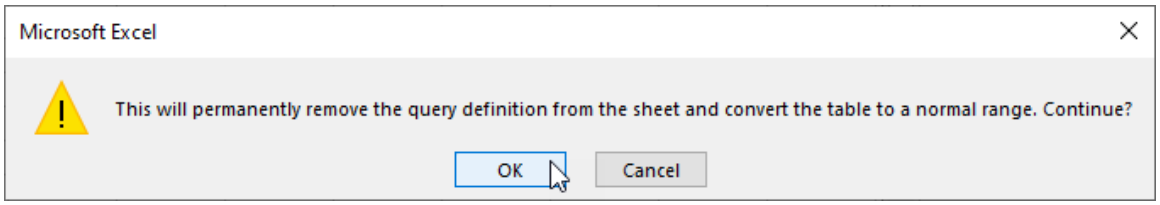
The **Power Query Editor** will appear, with a wide array of tools available to manage how the data from your source file appears in your workbook. To close the editor, click the Close (**X**) button:



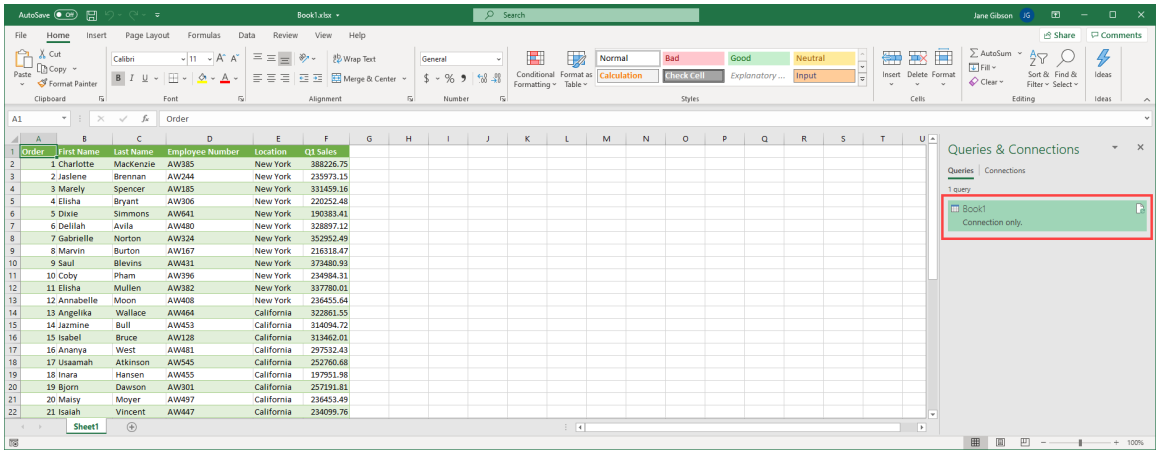
If you are happy with the data, and do not want to maintain a query to the source file, you can click **Convert to Range** in the Tools group of the Table Design tab:



An alert window will appear, warning that the query definition will be permanently removed. To continue, click **OK**:



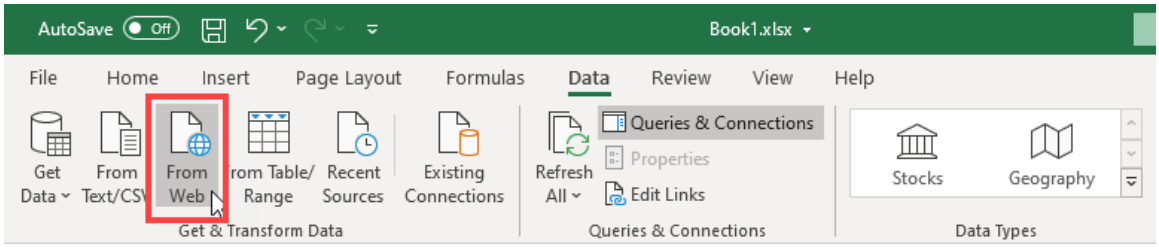
You will see that the data has converted to a normal range (the Table Design contextual tab has disappeared), and the Queries & Connections task pane indicates that the data source is a connection only. A connection is like a pointer to the source of the data that can be used again, but does not allow for updates:



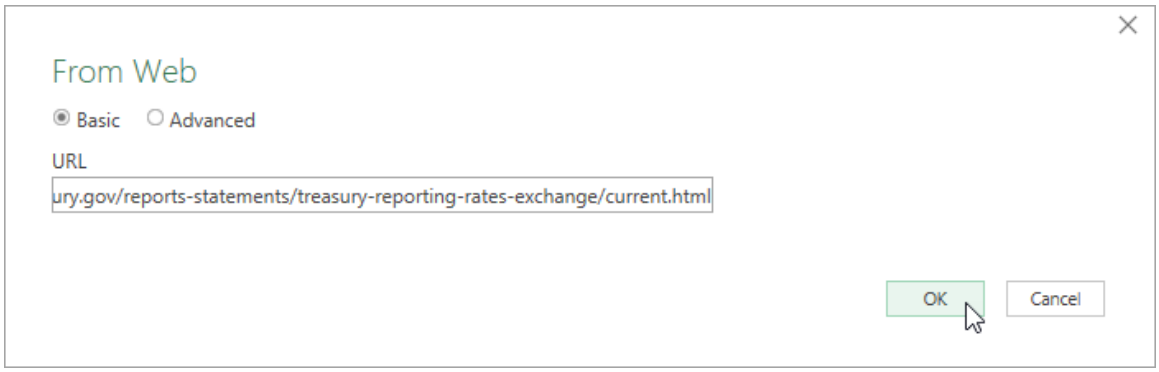
Using a Web Query

The internet can be a great source of useful information for your Excel projects, and using web queries can provide you with a quick and efficient method of loading that information into your workbooks and keeping it current.

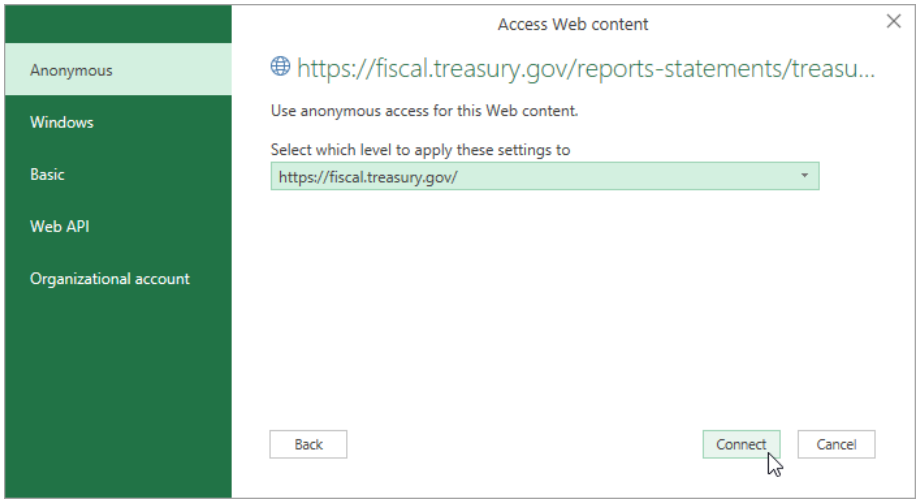
To create a web query, click **Data → From Web**:



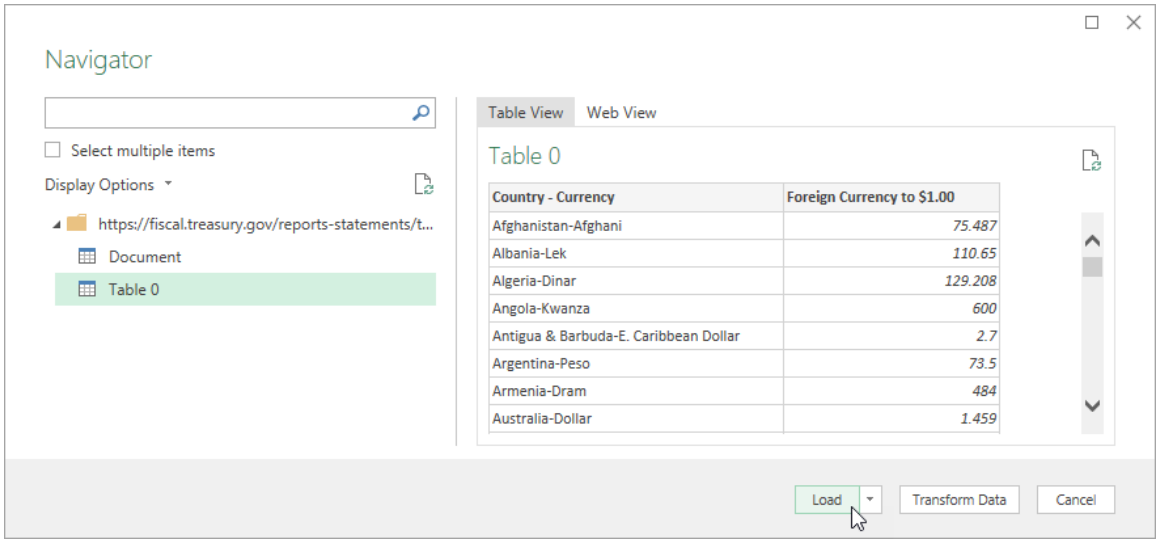
The **From Web** dialog box will open, where you can enter a URL address pointing to a web page that contains a data table you would like to access. You would enter the address in the URL dialog box and click **OK**:



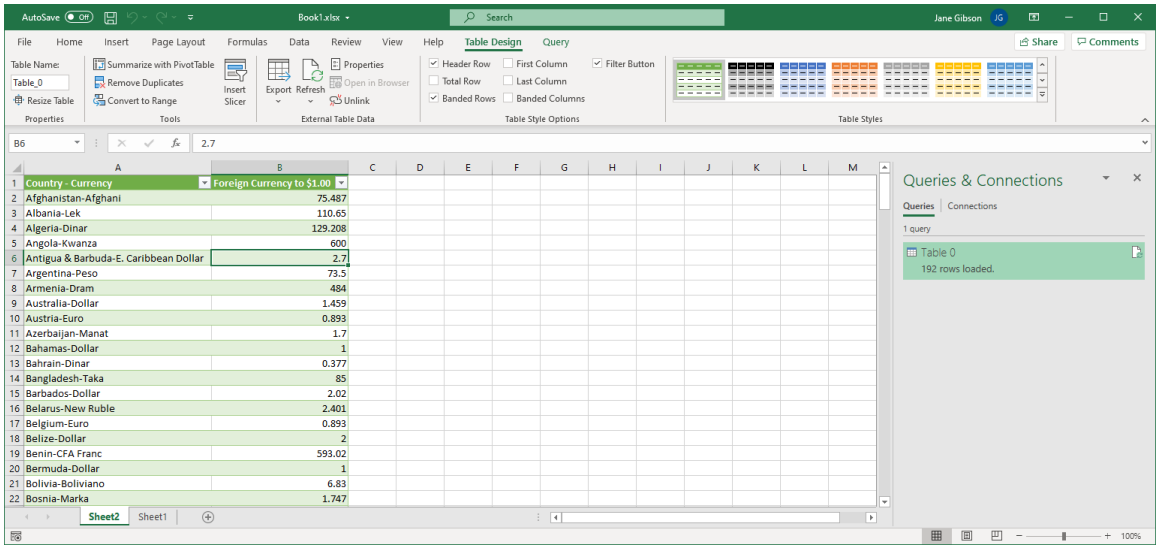
The **Access Web** content dialog box will open, where you can define the type of access to use to access the web content. This allows you to use different types of credentials when accessing secure content. Once you have selected the appropriate type, and entered the correct credentials, click **Connect**:



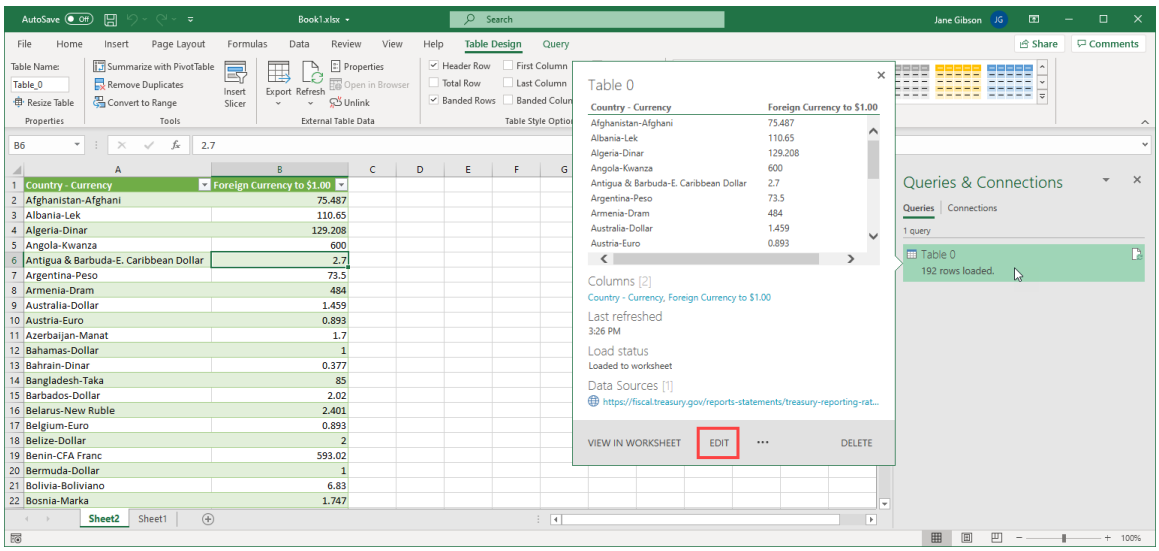
The **Navigator** dialog box will appear, displaying a list of any available tables in the left-hand list box. Selecting a table will display the table data in the **Table View** list box. Once you have located the data that you wish to load to your workbook, you would click the **Load**, or **Load To** button:



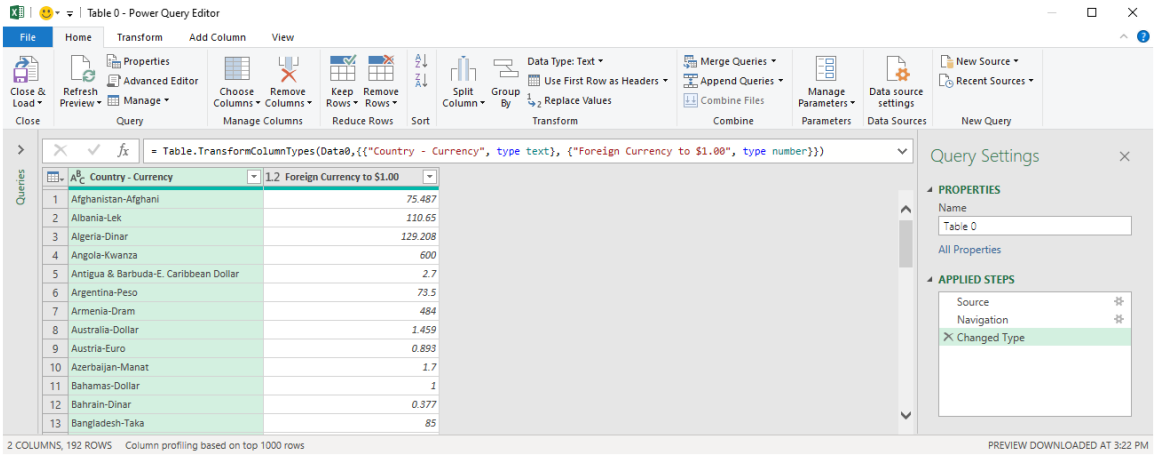
As with importing a delimited file, Excel will create a new worksheet and load the data as a table. The Queries & Connections task pane will appear on the right of the window listing the query in the Queries tab, and indicating the number of rows loaded:



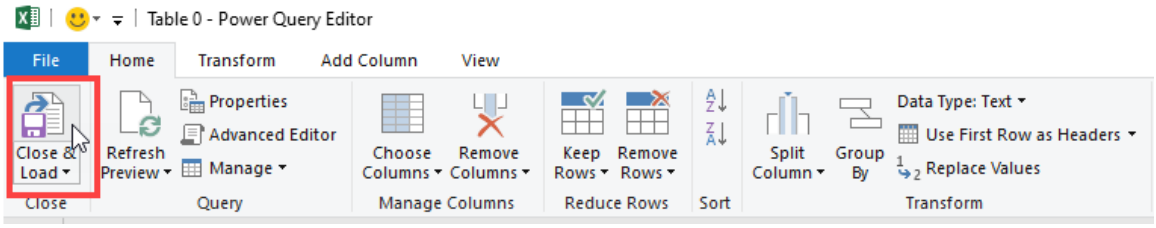
Hovering your mouse over the query will display a dialog box, named after the query, showing a preview of the data, information on its contents, its status, and its source. To make adjustments to the query, you would launch the Power Query Editor, by clicking **Edit**:



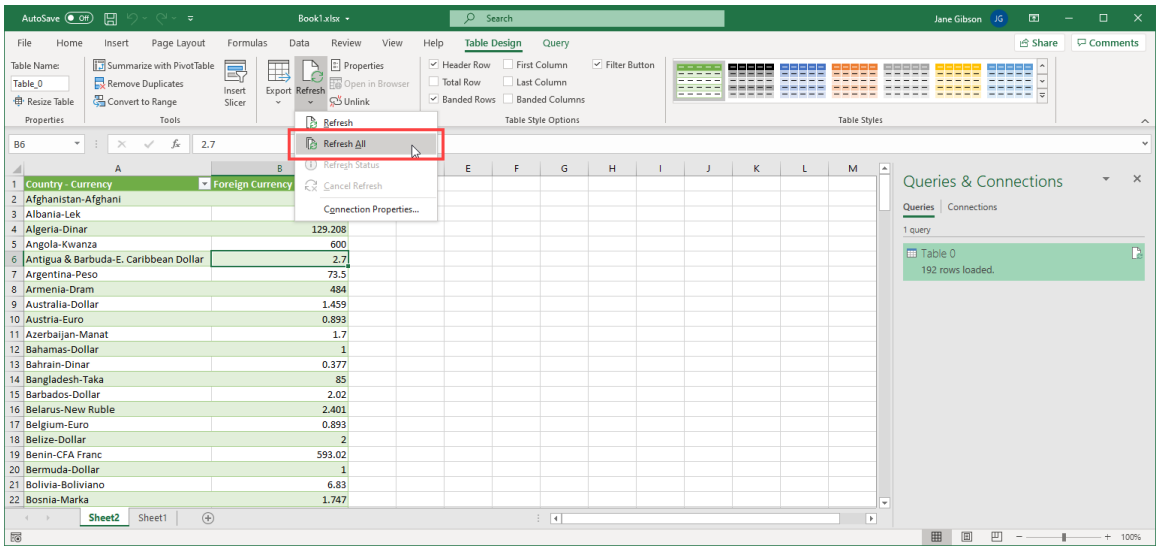
The **Power Query Editor** will open. Some of the many options here allow you to add or remove columns, filter rows, apply logic, or adjust the data type of the columns:



If you have made any changes to your query, click the **Close & Load** command in the Close group of the Home tab to save and apply the changes:



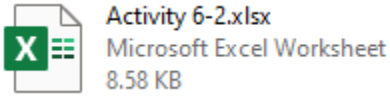
Back in the worksheet window, to refresh, or update, your query, you would first click to select a cell in the query table, click the **Refresh** drop-down arrow in the Queries & Connections group of the Data tab, then click **Refresh All**:



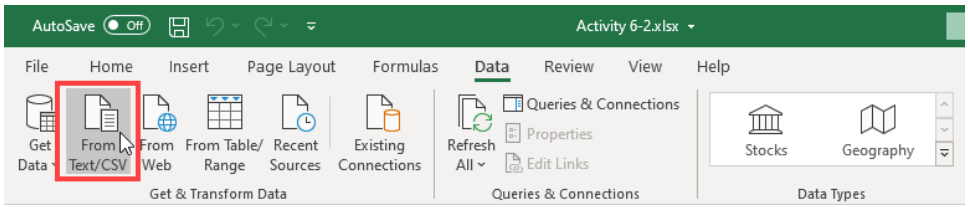
Activity 6-2: Using Data Sources

You have been asked to create a price list, in Canadian dollars, for some of your company's products. You will need to update it regularly using the current exchange rate. You first need to import your price list, then create a web query to load and maintain the current exchange rate.

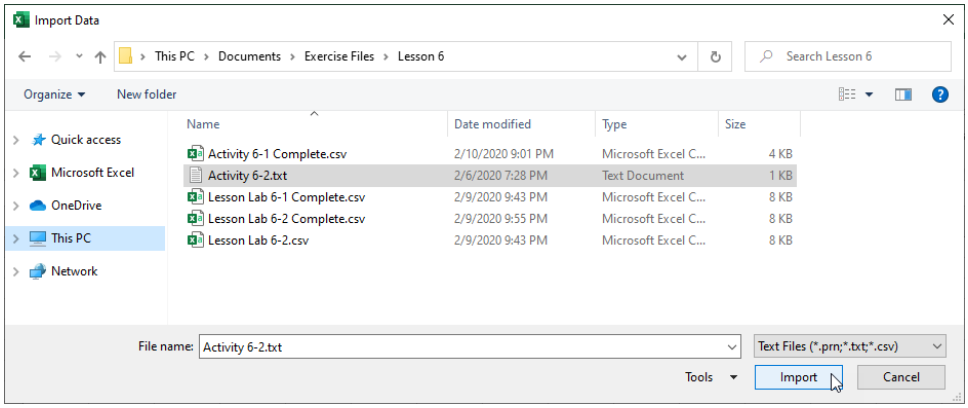
1. To begin, open **Activity 6-2** from your Exercise Files folder:



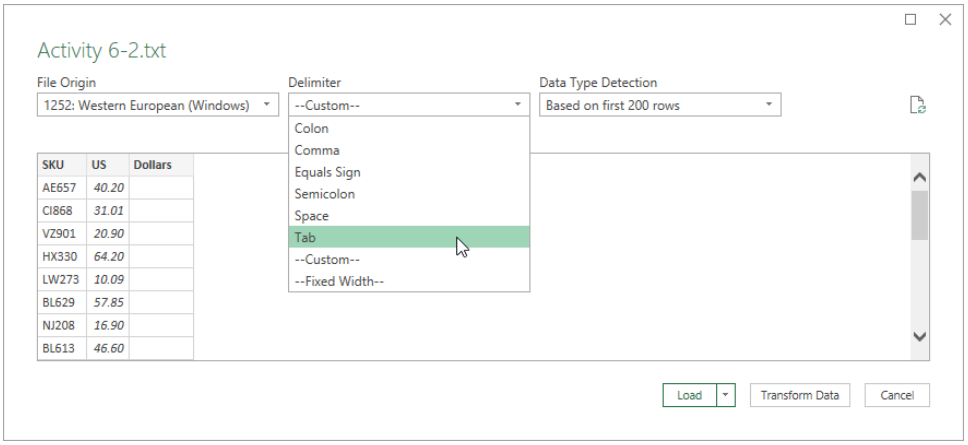
2. Click **Data → From Text/CSV**:



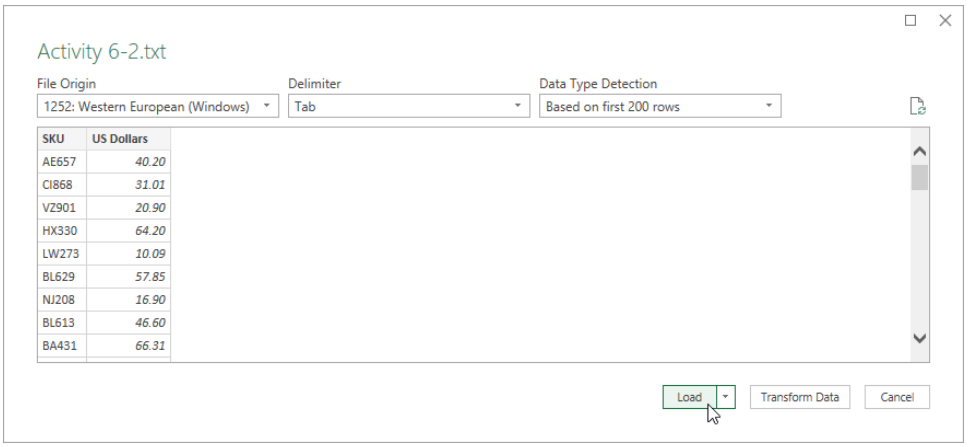
3. The Import Data dialog box will open. Navigate to your activity files and select **Activity 6-2.txt**, then click the **Import** button:



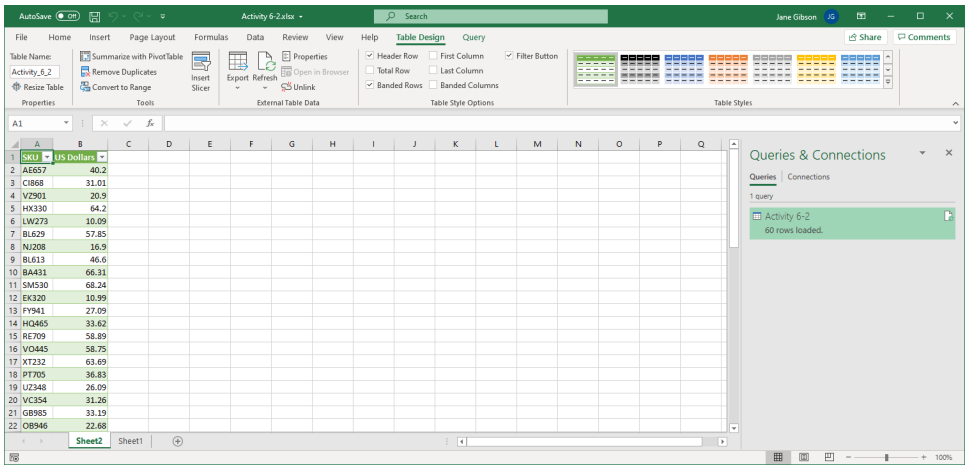
4. The Get & Transform Data dialog box will open, displaying the data in the source file. If the selection in the Delimiter drop-down list reads **--Custom--**, and there is an extra header, click to select the **Tab** option in the **Delimiter** drop-down list:



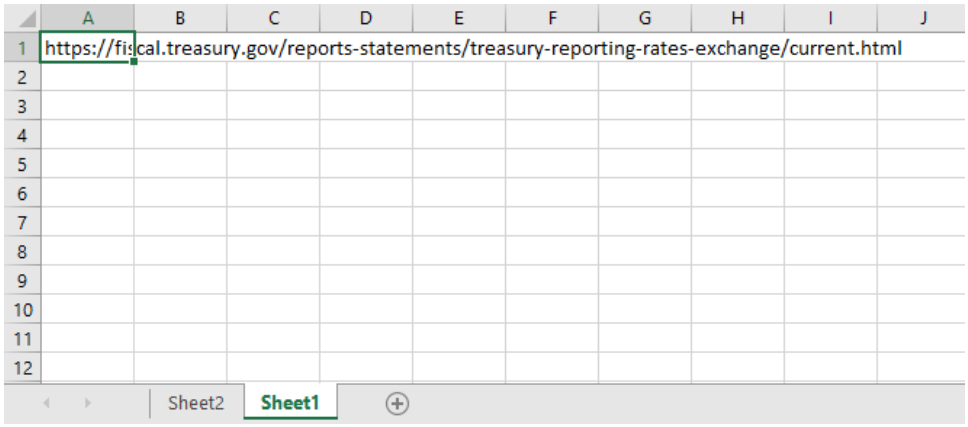
5. With your data properly aligned in the list box, click the **Load** button:



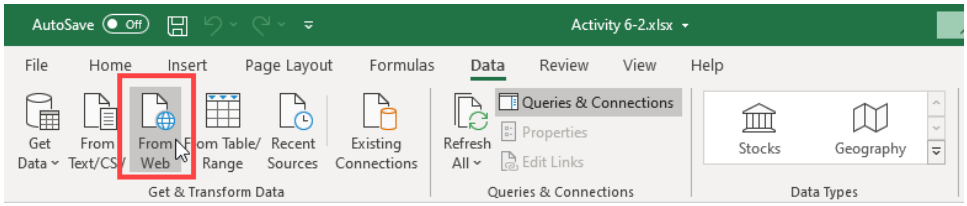
6. A new worksheet is created and the data from your text file is loaded as a table. The Queries & Connections task pane opens on the right of the screen:



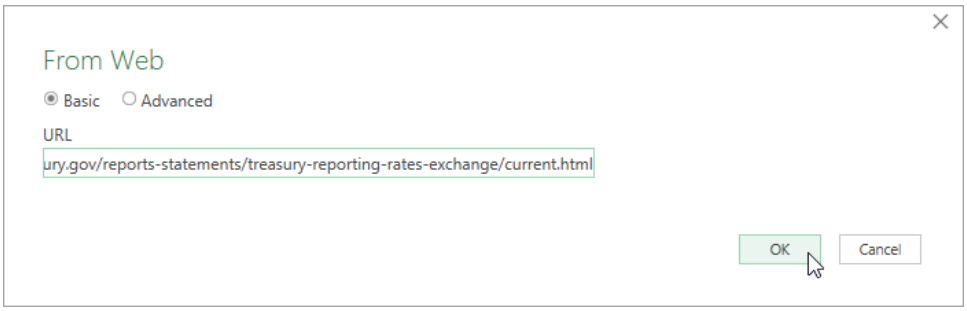
7. Click on the **Sheet1** tab to make it the active worksheet. Click to select cell **A1**, then press **Ctrl + C** to copy the URL of the exchange rate site:



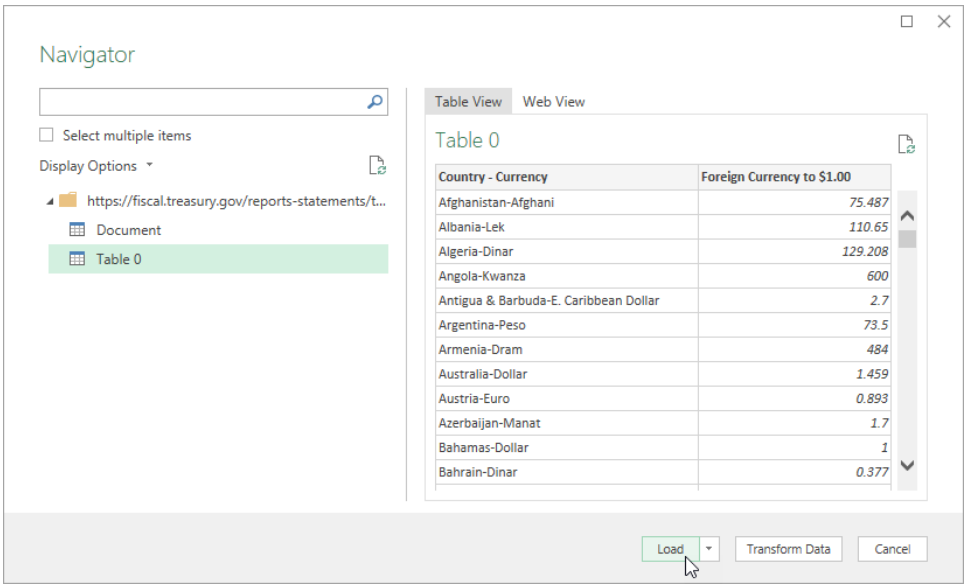
8. Now click **Data → From Web**:



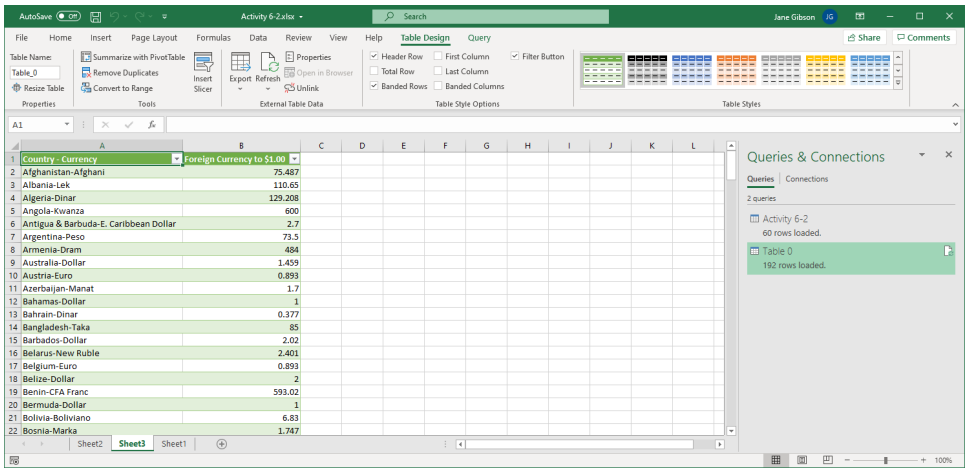
9. The From Web dialog box will open. Click to select the **URL** field, then press **Ctrl + V**, to paste the URL. Click **OK**:



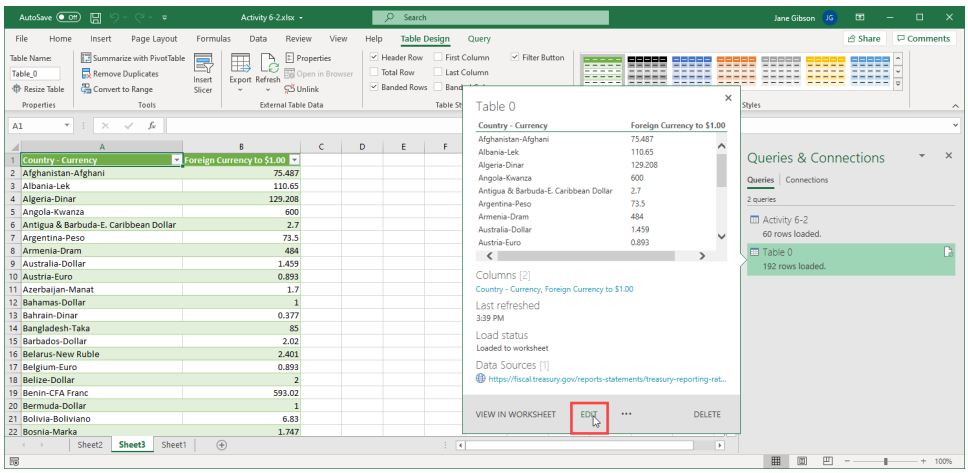
10. The Navigator dialog box will open. Click to select **Table 0** in the list box on the left, confirm the data is present in the Table View window on the right, then click the **Load** button:



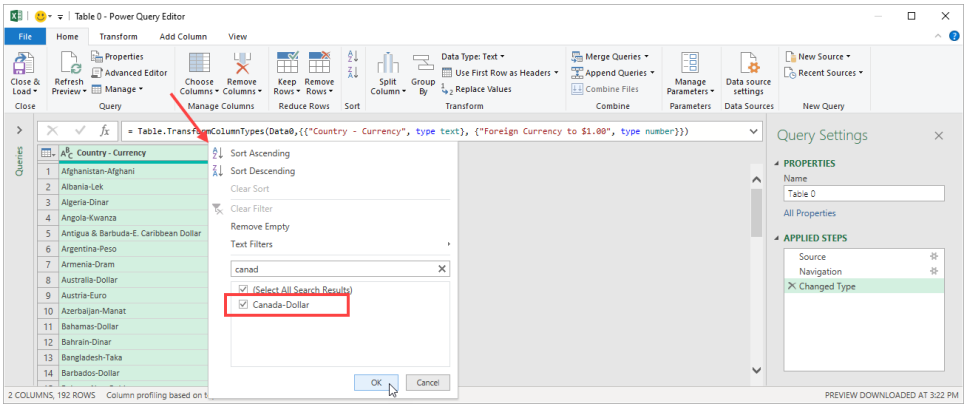
11. A new worksheet is created and the data from the website is loaded as a table. The query appears under the Activity 6-2 query:



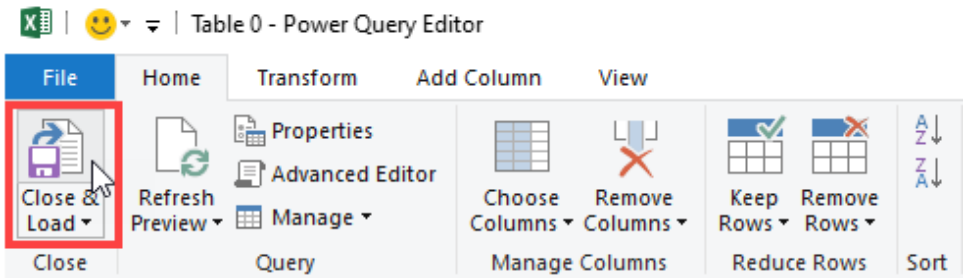
12. Hover your cursor over the **web query** in the Queries & Connections task pane, then click **Edit** in the table dialog box that appears:



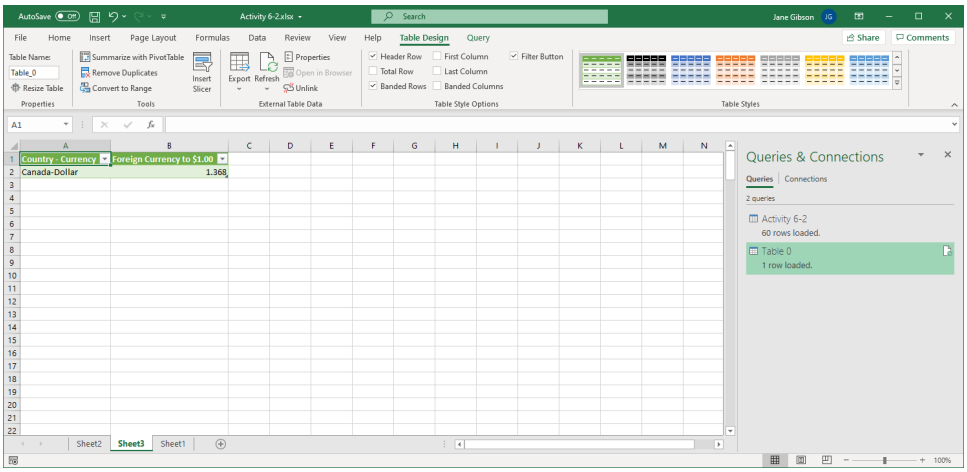
13. The Power Query Editor will launch. Click the **filter** button to the right of the header of the Country-Currency column, then click to select the **Text Filters** field and begin typing "**Canada**". When Canada-Dollar is the only selected item, click **OK**:



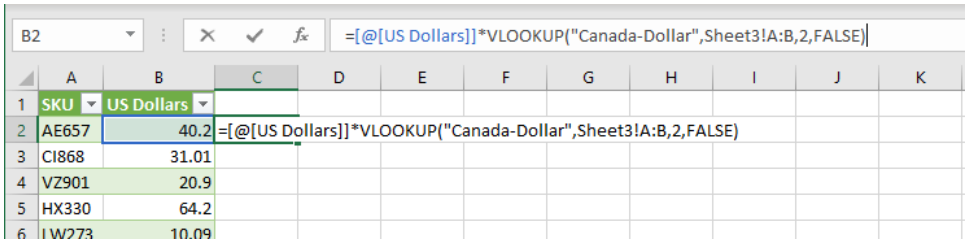
14. Click the **Close and Load** command in the Close group of the Home tab:



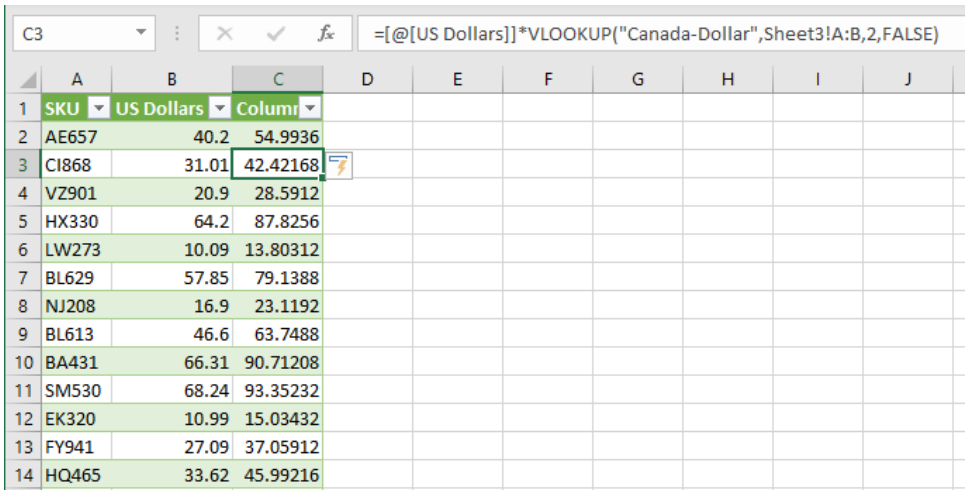
15. You will see that the Web Query table now only displays the Canada-Dollar row of data from the data set:



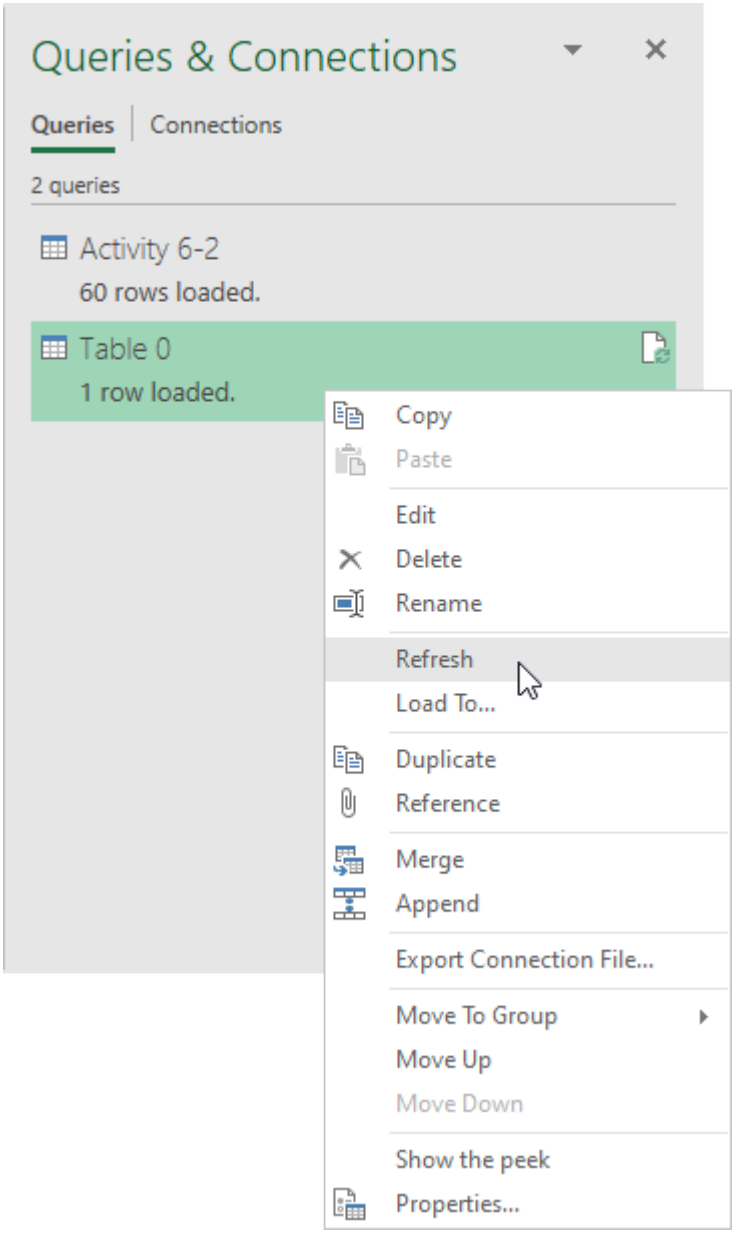
16. Click the **Sheet2** tab to make it the active sheet, then click to select cell **C2**. Type the formula "**=[@[US Dollars]]*VLOOKUP("Canada-Dollar",Sheet3!A:B,2,FALSE)**", then press the **Enter** key:



17. The table containing the price list will auto complete the formula for every row in the column:



18. To refresh the data from the website, right-click on the query in the Queries and Connections task pane, then select **Refresh**:



19. You can now save your changes as **Activity 6-2 Complete** and close Microsoft Excel 365 to complete the activity.

TOPIC C: Use a Microsoft Form for Data Collection

Microsoft Forms is a simple app that lets you easily create online surveys and distribute them to a wide group of users. It is available to all Microsoft 365 subscribers and is integrated into Excel Online, allowing you to collect, analyze and present the data that is collected from the users. In this topic you will learn how to integrate forms into Excel Online, and how to manage them.

Topic Objectives

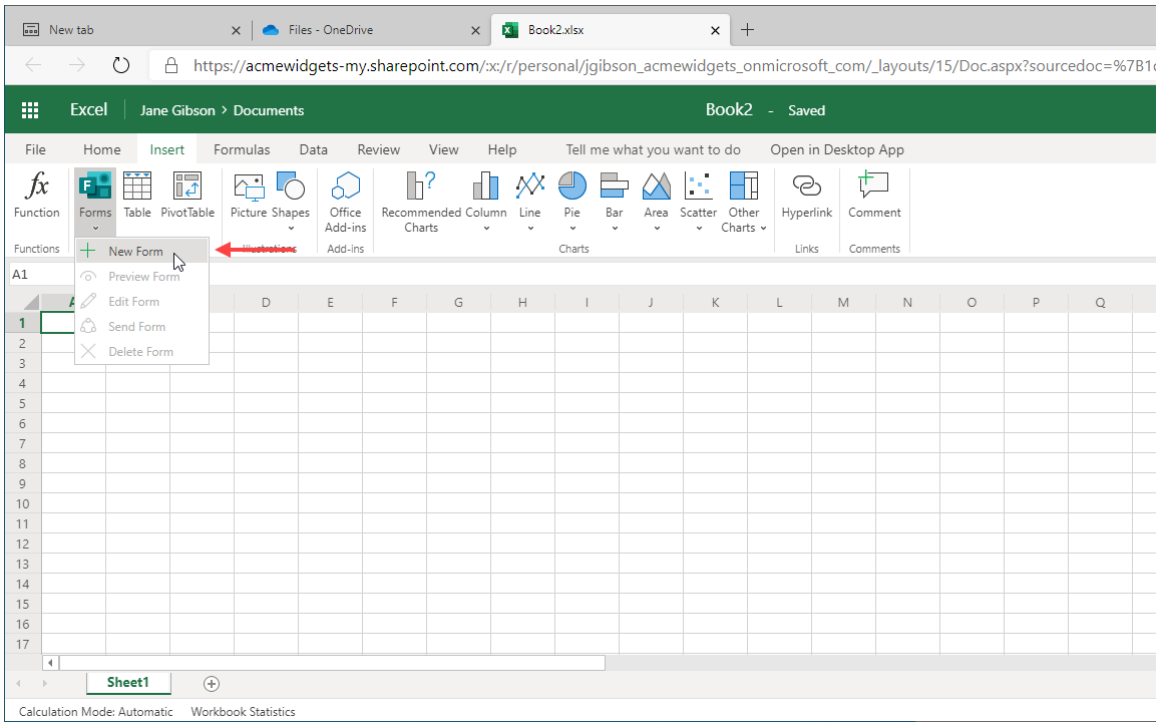
In this session, you will learn how to:

- Insert a Microsoft form into a workbook
- Add questions
- Preview a form
- Share a form
- Review the results

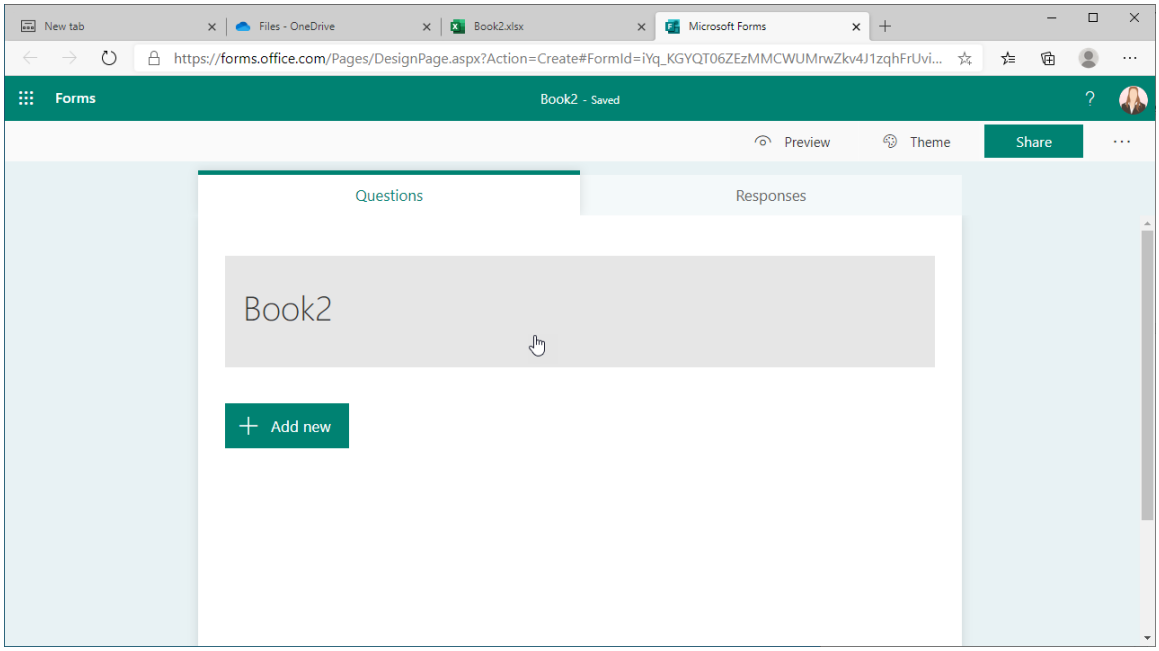
Insert a Microsoft Form into a Workbook

Many Excel projects rely on input from a group of users as an important source of data, but there can be a range of challenges with these processes, from data accuracy, to user access. Integrating a **form** into an Excel workbook is an effective way to simplify user access and to control the quality of the data that you collect.

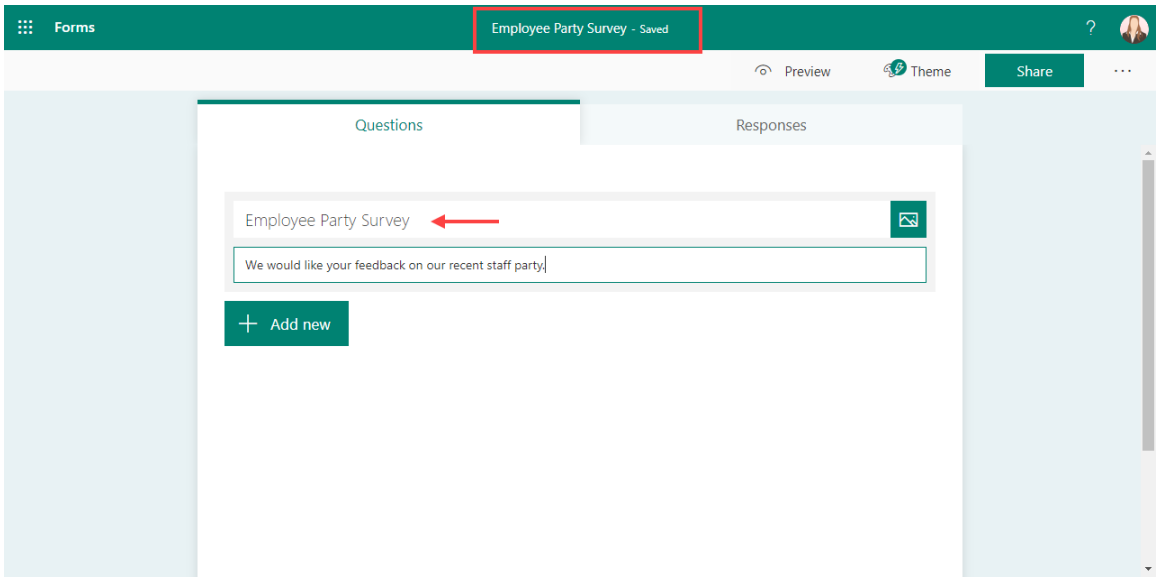
To insert a form into an Excel Online workbook, first click the **Insert** tab, then click the **Forms** drop-down arrow, and click to select **New Form**:



A new window will open in your browser and a new form will be created. Clicking on the name of the form will reveal a field, containing the name of the workbook, where you can give your form a distinct name and description:

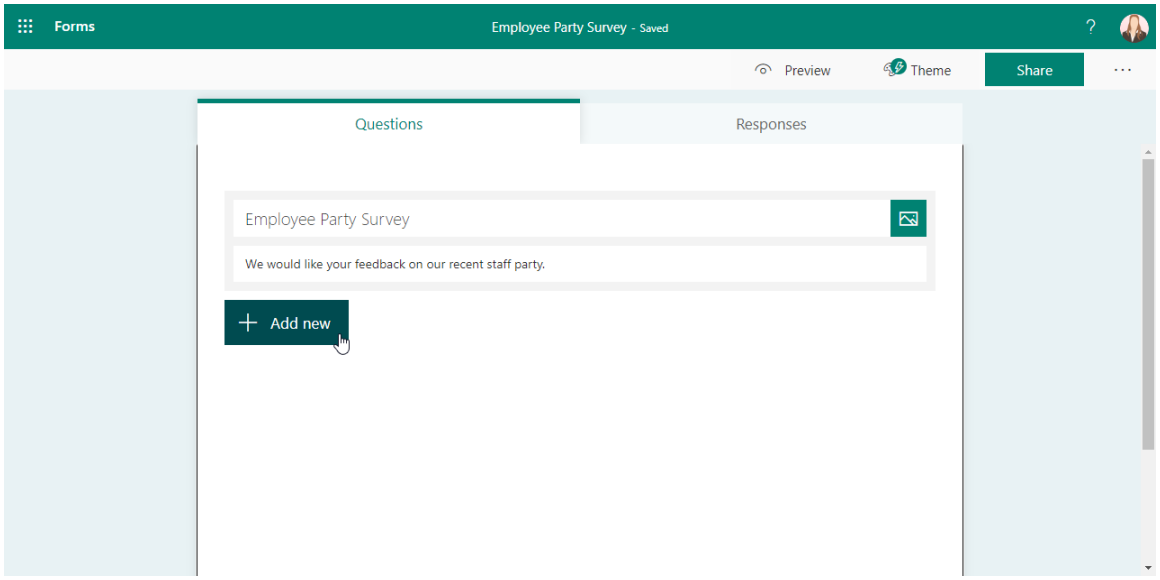


Typing the name of the form in this field will also change the name of the form in the header. You can also type a description that will be displayed to the users of the form:

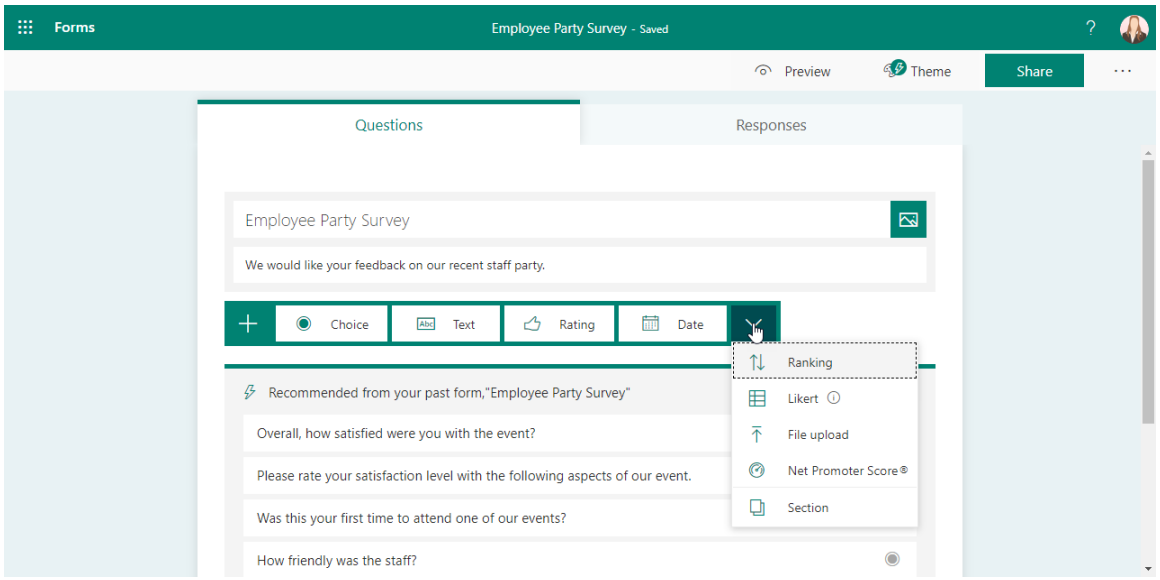


Add Questions

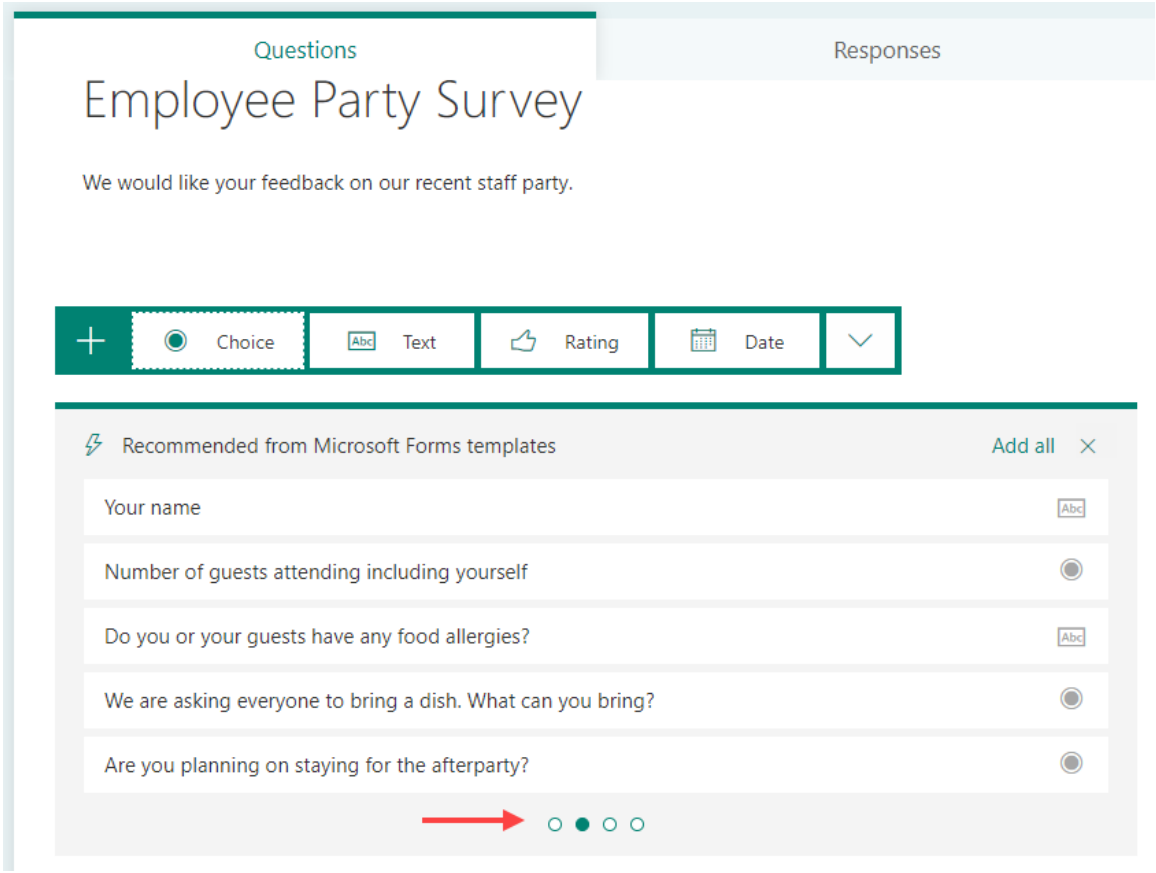
Adding questions allows you to define the type of input you want from your users. To add a question, click the **Add New** button:



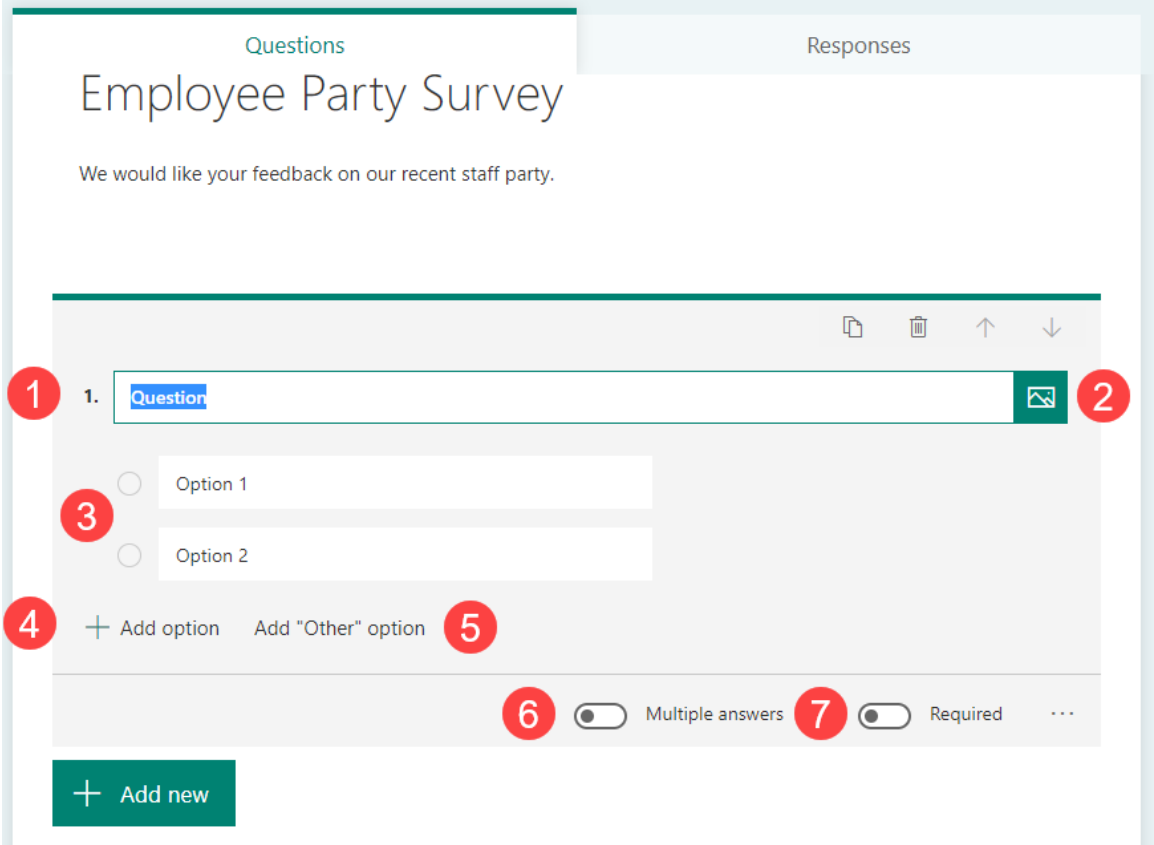
You will be presented with a choice of input methods for the form, including **Choice**, **Text**, **Rating**, and **Date**. By clicking on the drop-down arrow at the end of the choices, you will see the additional options of **Ranking**, **Likert**, **File upload**, and **Net Promoter Score**. There is also an option to create **a Section** in your form. Clicking any of these options will add a new question to your form:



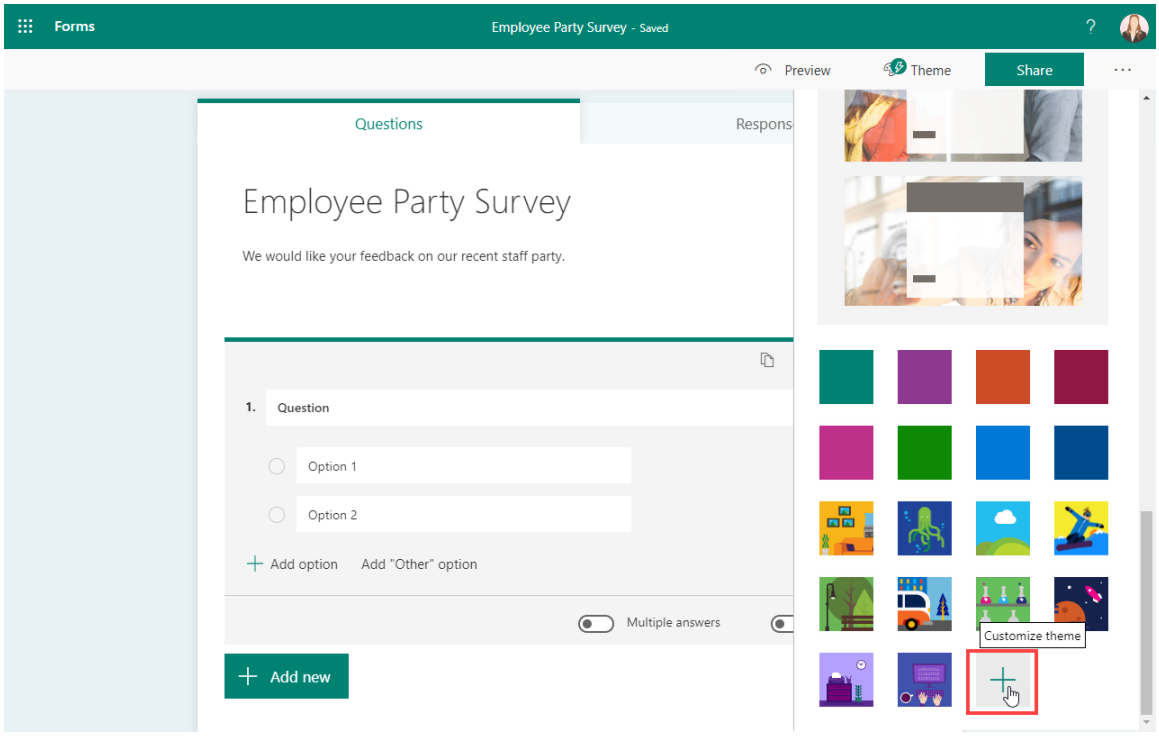
You will also see a dialog box of prebuilt template options, with an icon on the right indicating the format of the user input. You can see additional templates by clicking on the tab buttons at the bottom of the dialog box:



Once a question has been added you will have intuitive options to customize the question. In the case illustrated below you can **(1) define the question**, **(2) add an image** to the question, **(3) define the options**, **(4) add an option**, or **(5) add an "other" option**. You can also **(6) allow multiple answers**, and **(7) require an answer** for this question:

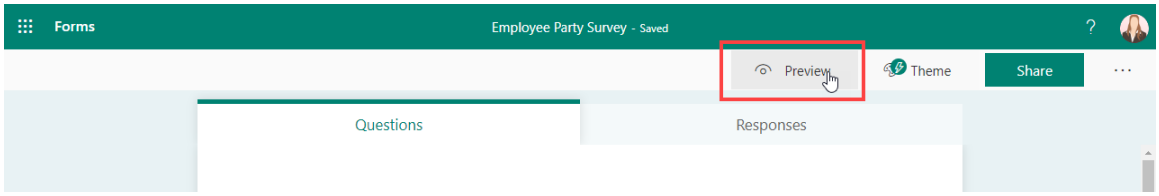


You can also customize the appearance of your form by clicking the **Theme** button. The Theme gallery will be displayed, with many templated options to choose from, but you can also customize the appearance by clicking the **Customize theme** (+) button:

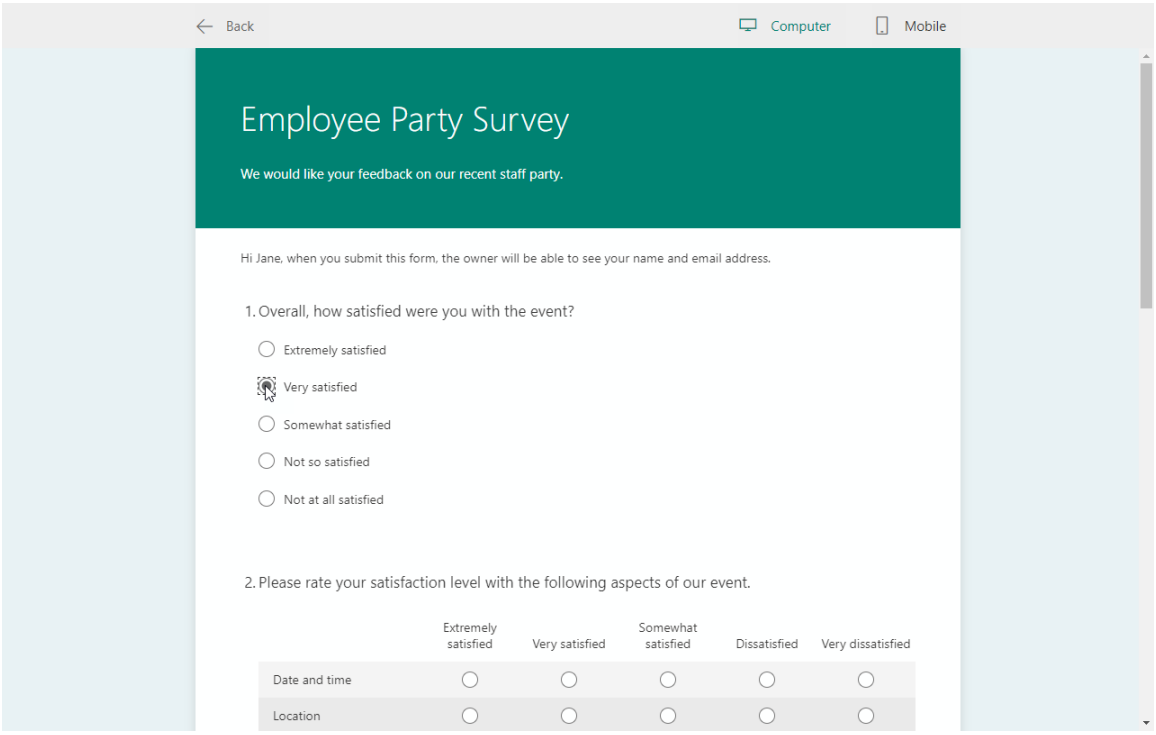


Preview a Form

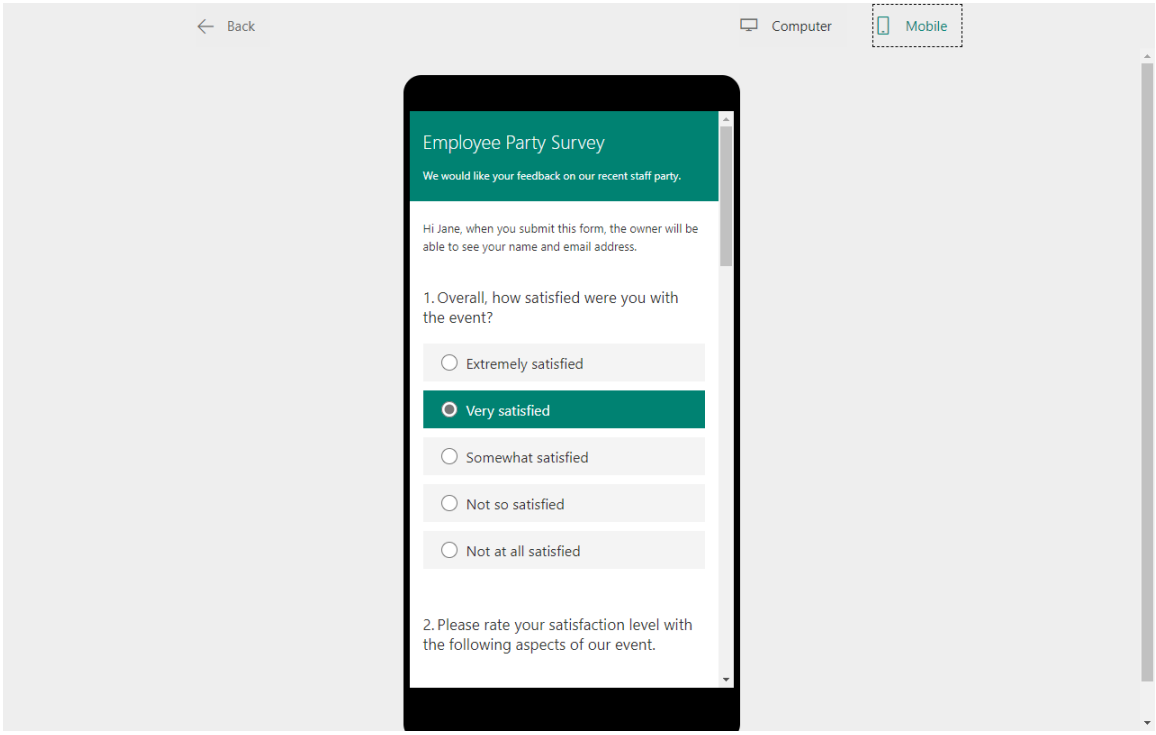
To preview the appearance of your form, click the **Preview** button:



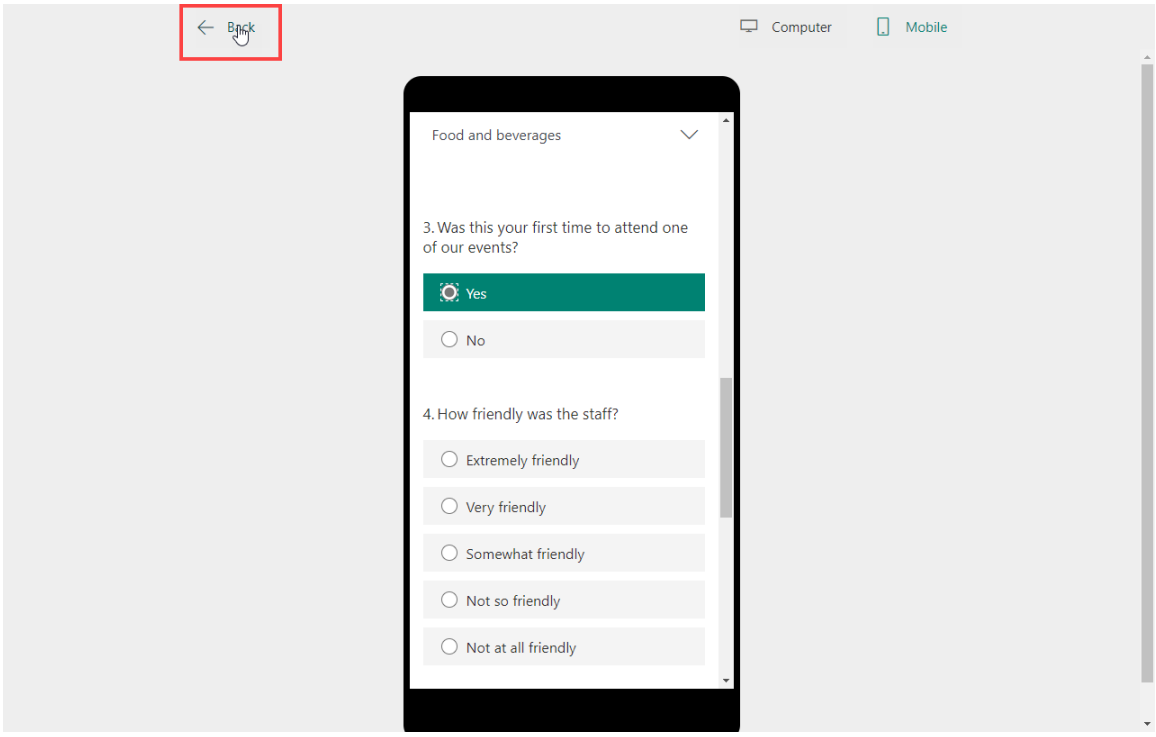
You will see a preview of the form as it will be presented to the user, where you can also test the interaction:



You can also click the **Mobile** button to preview and interact with the form as you would on a mobile device:

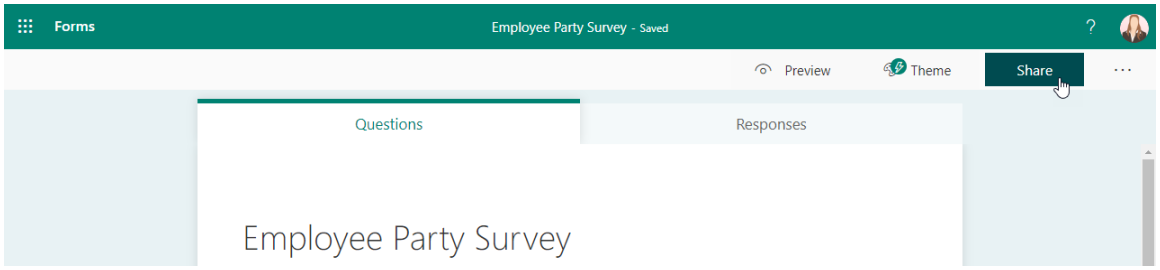


Click the **Back** button to return to the editing screen:

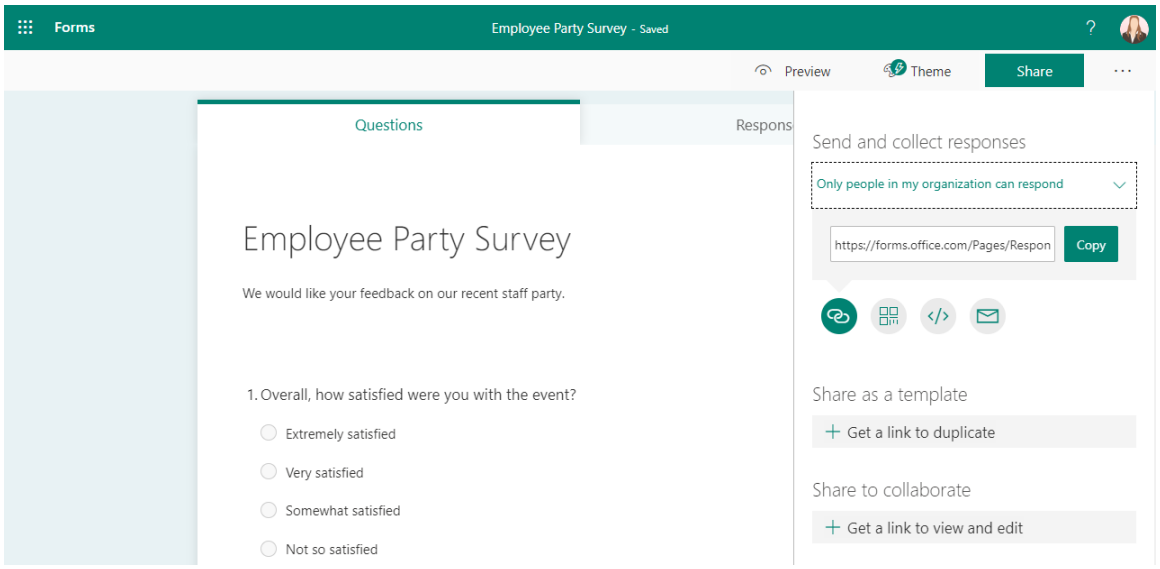


Share a Form

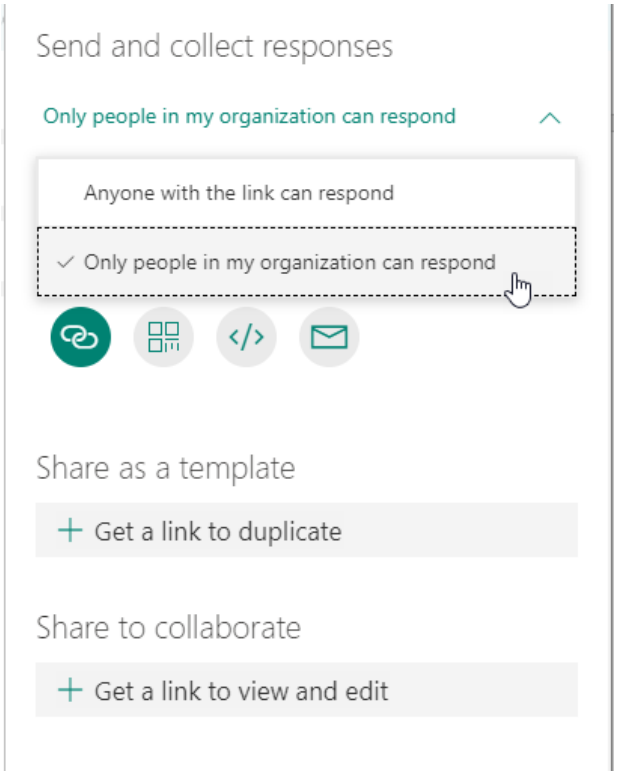
Once you are satisfied with the construction of your form, click the **Share** button:



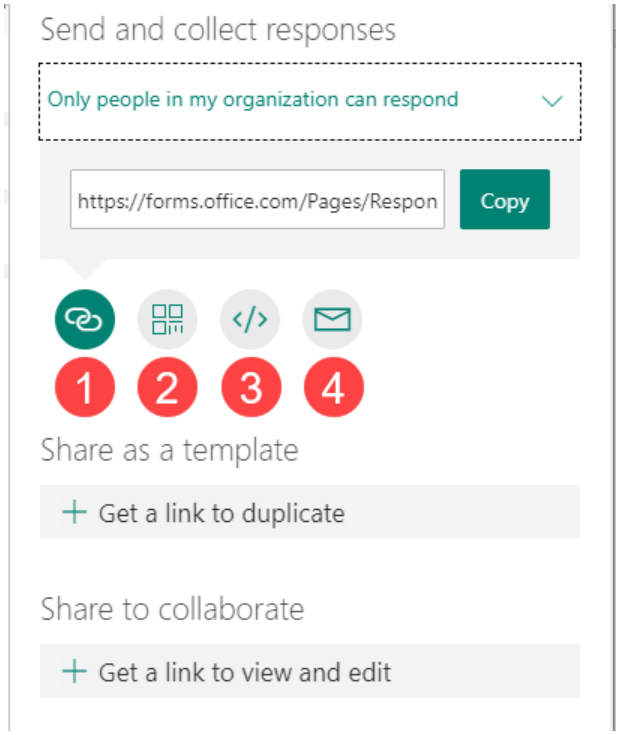
The **Share** task pane will appear on the right side of your browser window:



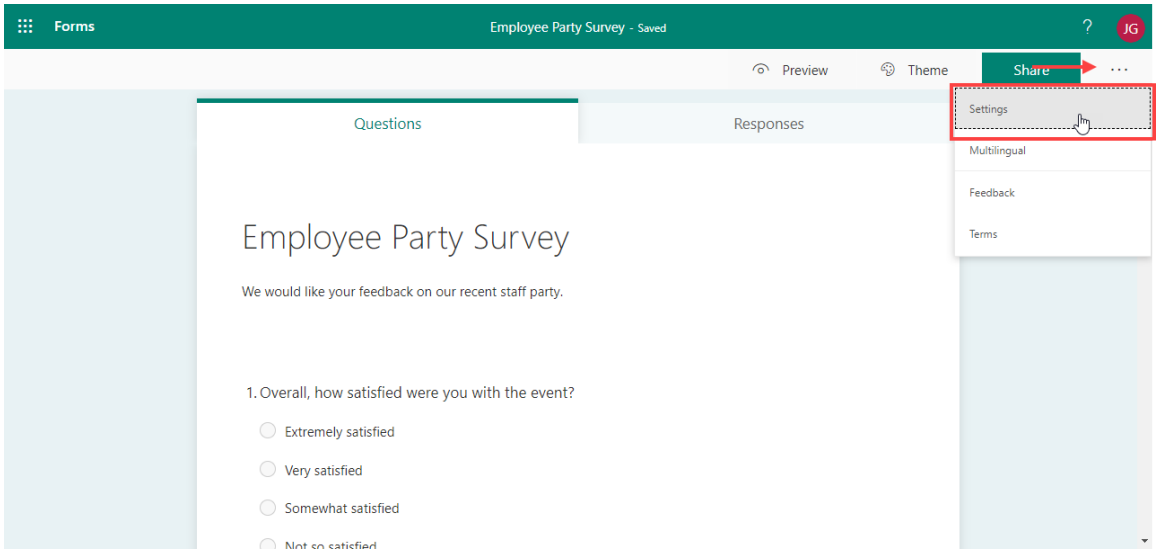
Here you can limit access to the survey to only those within your organization, or allow any user with a link to access it:



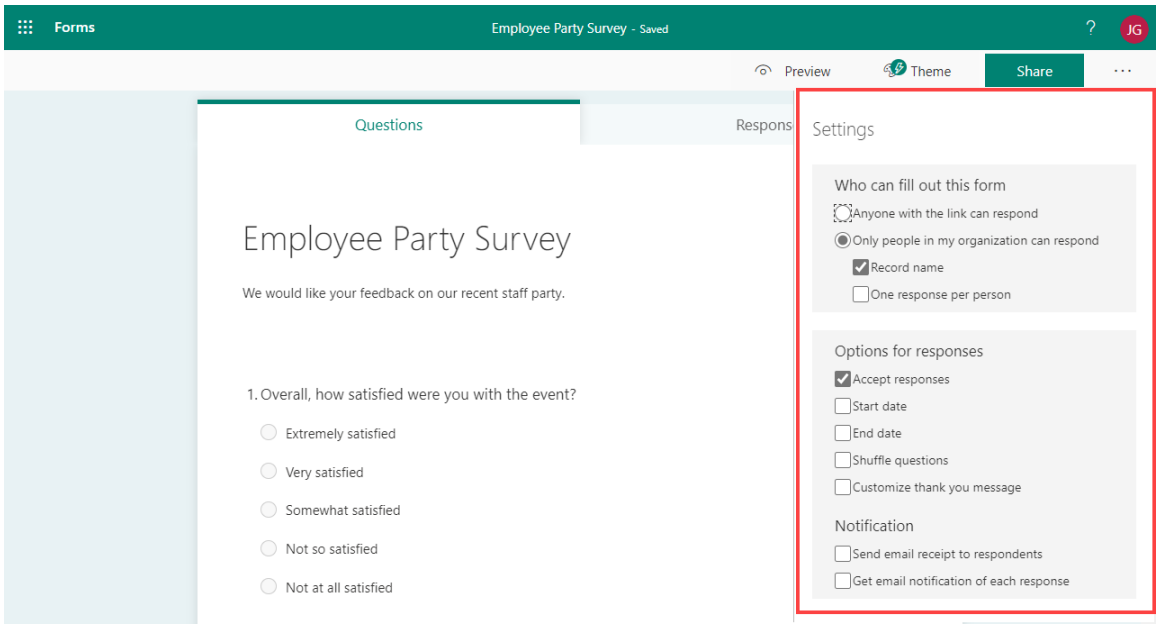
You can also choose how to distribute the survey. The option buttons are (**1) copy and distribute a link**, **(2) create a QR code**, **(3) create code to embed in a website**, or **(4) use your default email application**:



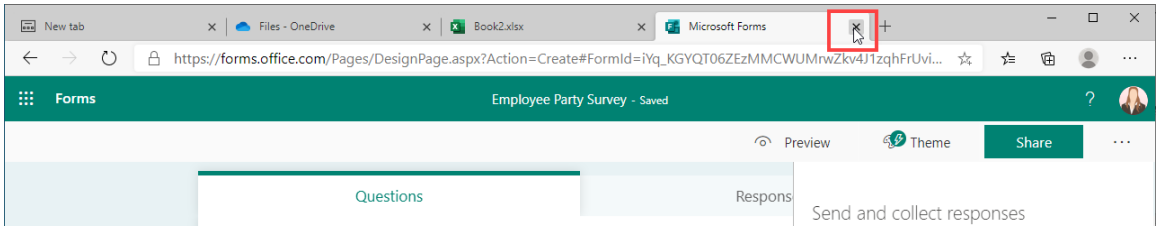
To control the settings of your form, click the ellipsis at the top right of the window and select **Settings**:



The **Settings** task pane will appear at the right of your browser window. Here you can control access to the form, set options for responses, and set up notifications:

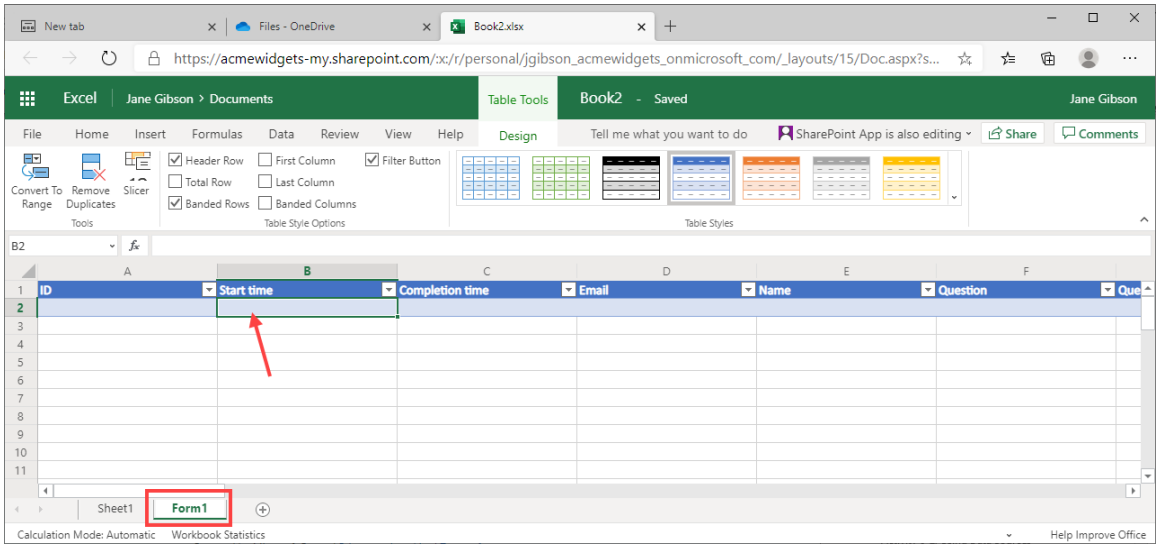


You can close the form by closing your browser window:

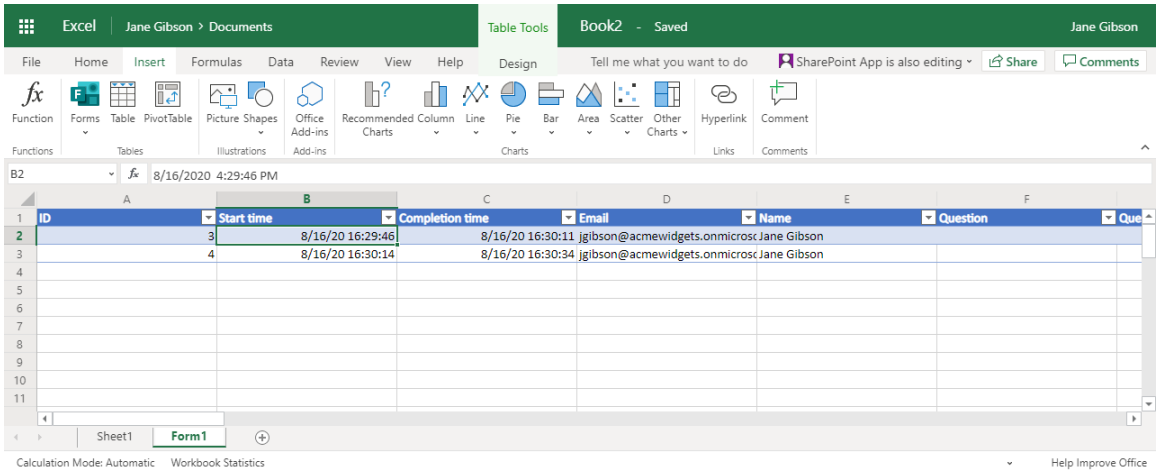


Review the Results

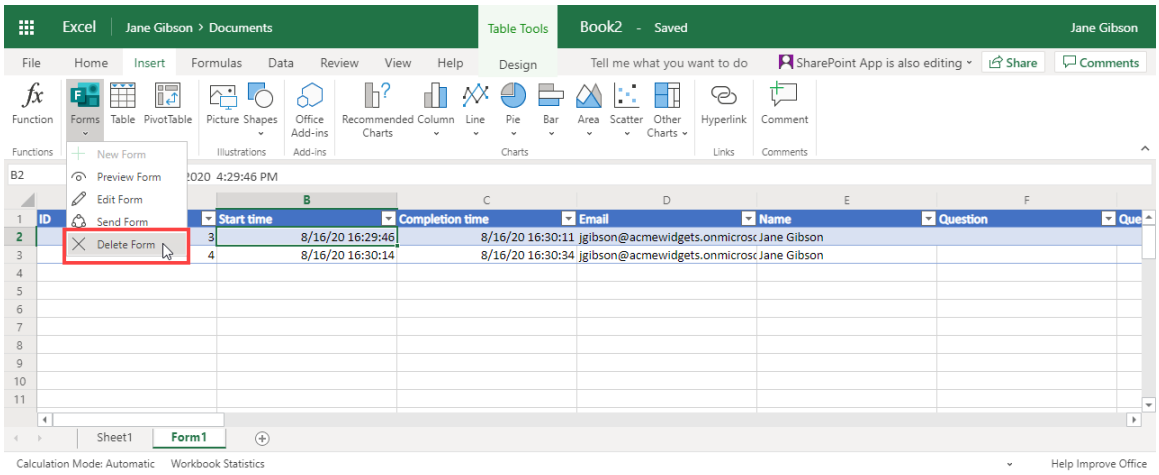
Back in the Excel workbook, a new worksheet will be created, and a table will be added:



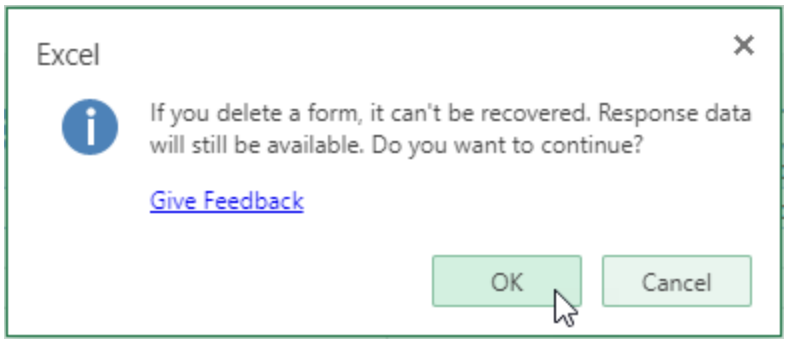
As the invited users respond to the survey, the survey results are added to the table in the Excel workbook, including start and stop time stamps, and identifying information, if available:



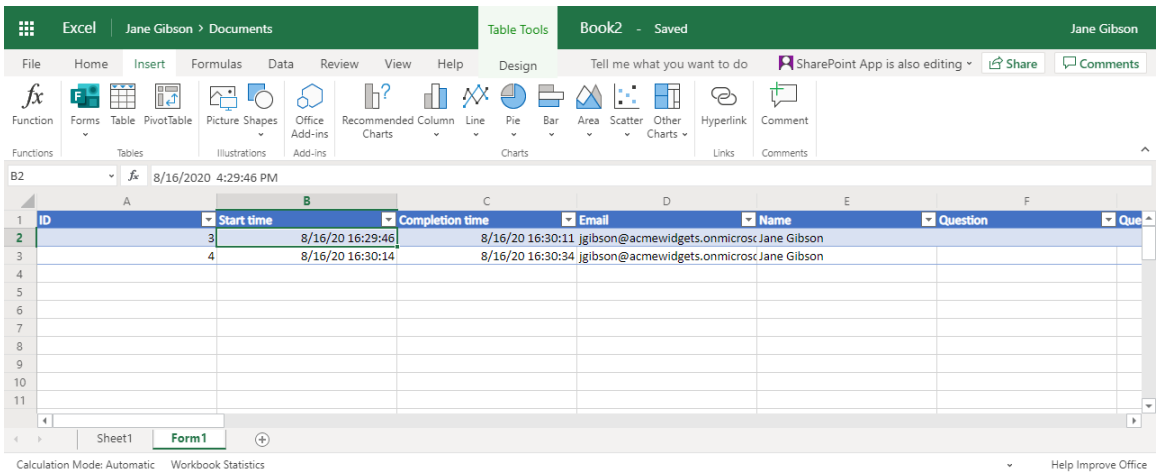
As long as the form exists, it will be available to users online. To delete the form, click the Forms drop-down command in the Insert tab, then click **Delete Form**:



An Excel information alert will appear, warning that if you delete a form it cannot be recovered, but the response data will still be available. To continue, click **OK**:



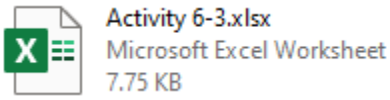
The table, and the data, will remain in the workbook:



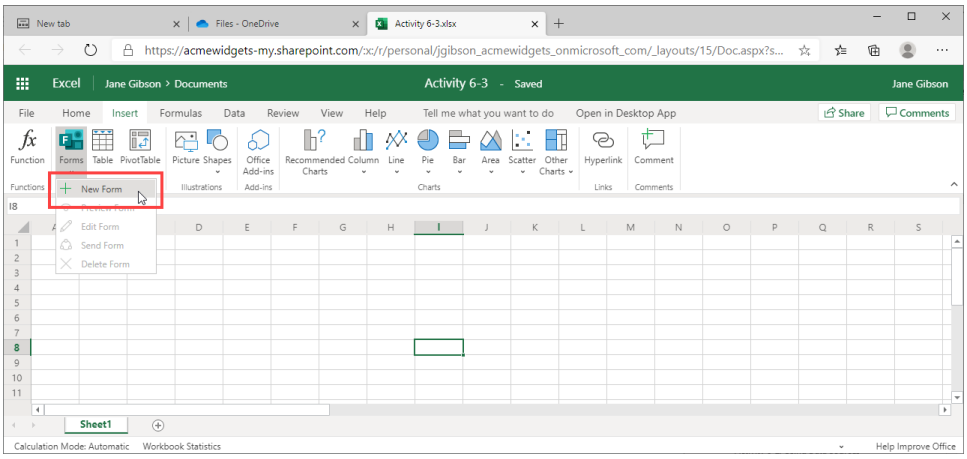
Activity 6-3: Use a Microsoft Form for Data Collection

You have been asked to support the Sales department by helping keep track of their mileage claims. Rather than enter them manually you have decided to integrate a Microsoft Form into an Excel workbook.

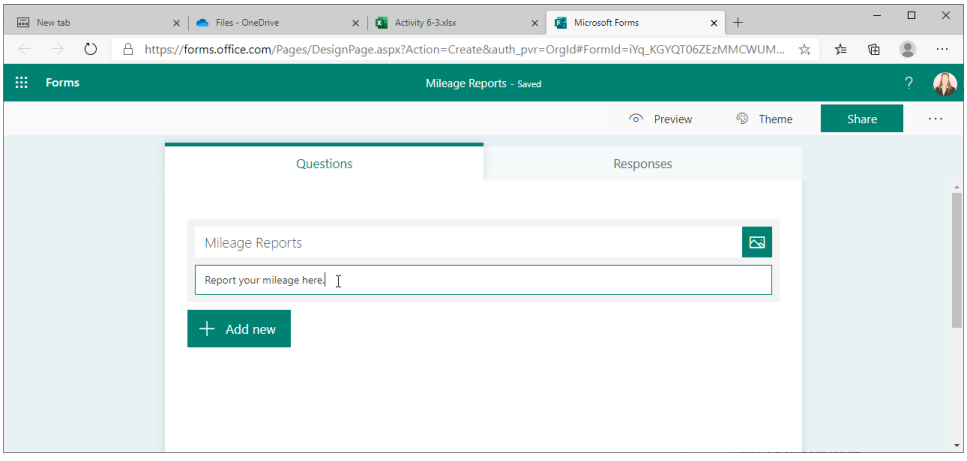
1. To begin, open **Activity 6-3** in Excel Online:



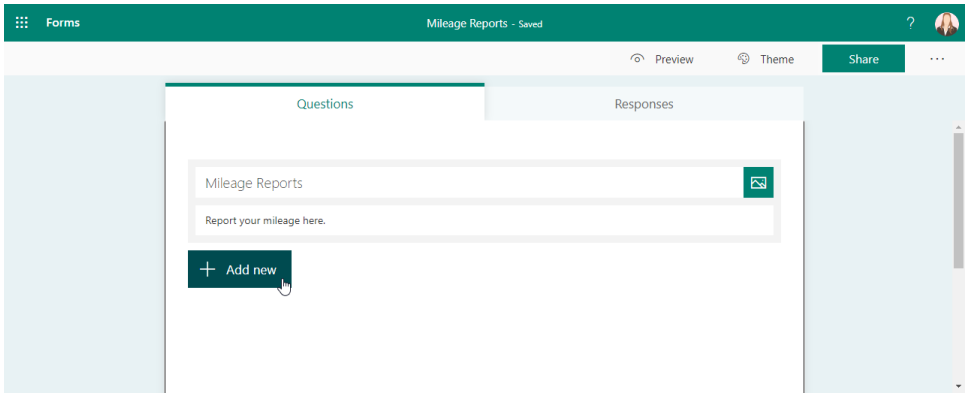
2. Click **Insert → Forms → New Form**:



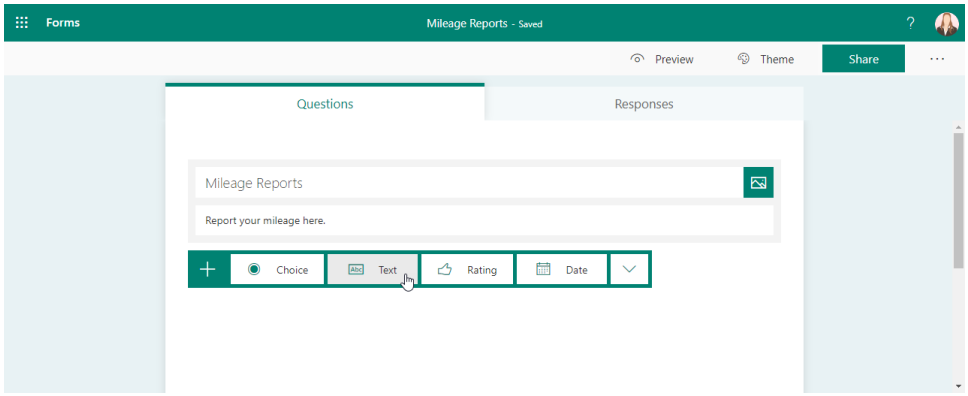
3. In the New Form window, select the **name** field and type "**Mileage Reports**", then select the **Description** field and type "**Report your mileage here**."



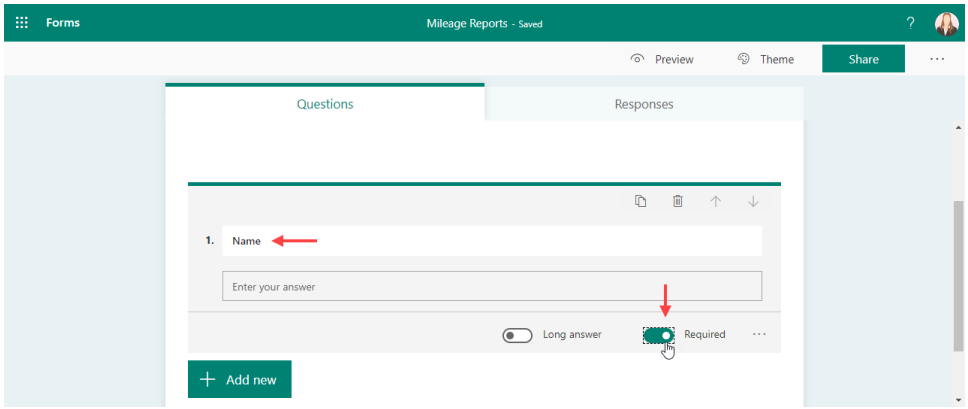
4. Click the **Add New** button:



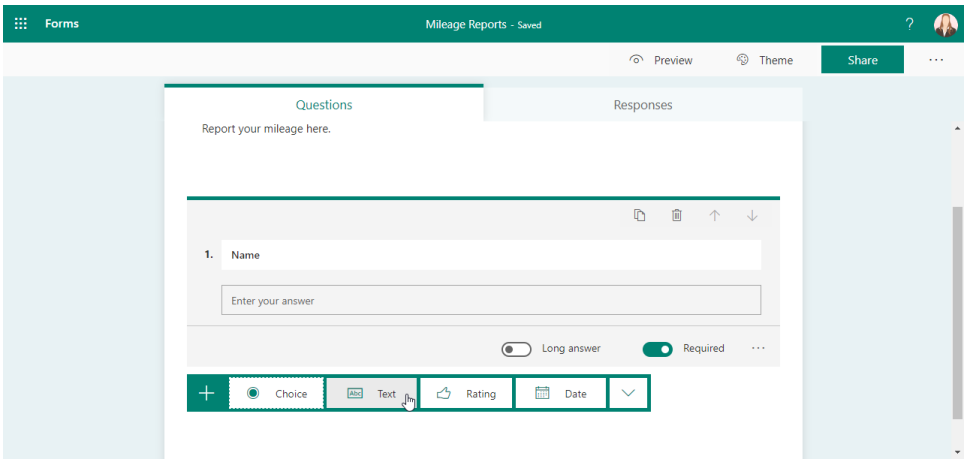
5. Click to select the **Text** option:



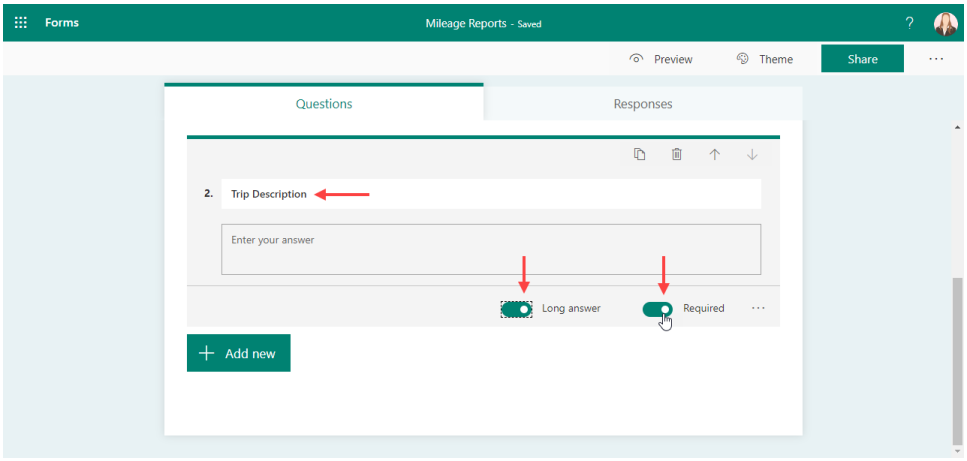
6. Enter **Name** in the **Question** field, then click on the right side of the **Required** toggle button to require an answer:



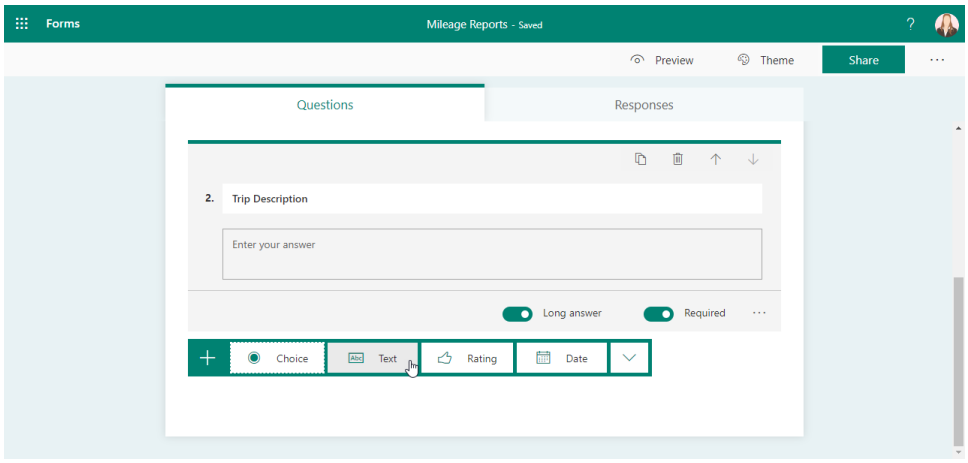
7. Now click the **Add New** button again, to add another question. Again, click the **Text** option button:



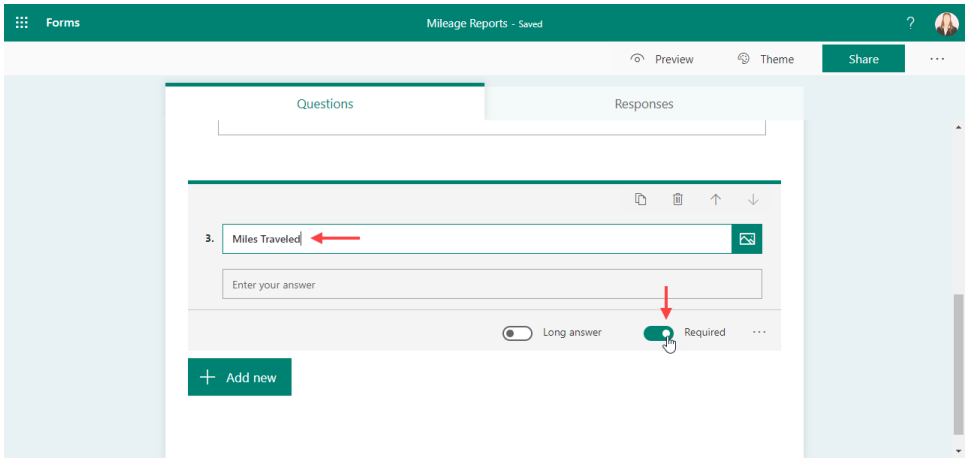
8. Type "**Trip Description**" in the **Question** field, then click the right side of the **Long answer** and **Required** toggle buttons to enable them:



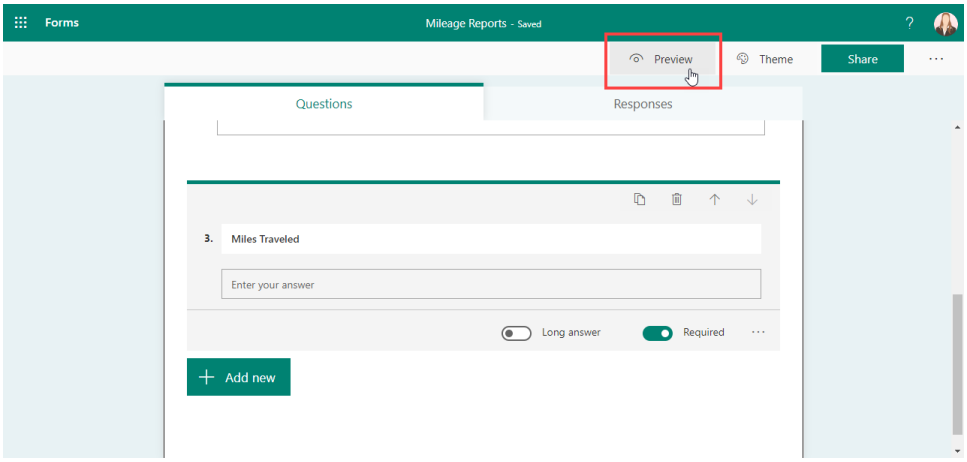
9. Click the **Add New** button again, to add a third question, then, again, click the **Text** option command:



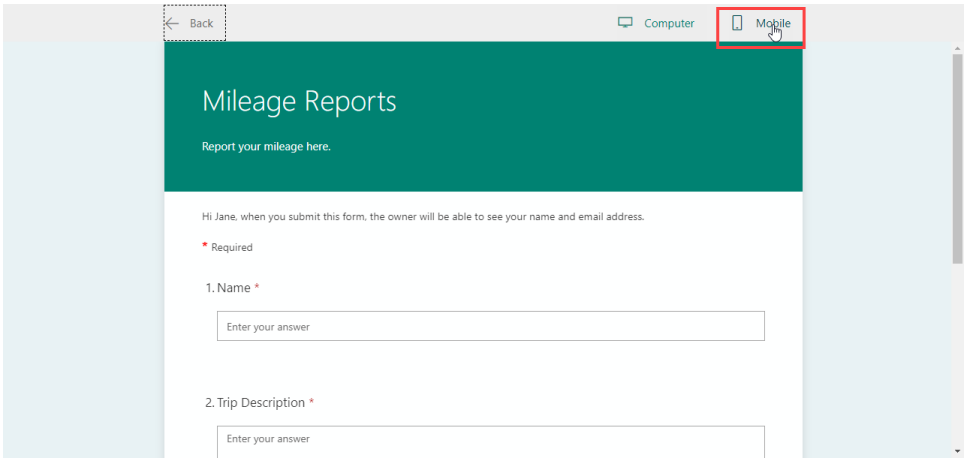
10. Type "**Miles Traveled**" in the **Question** field, then click the right side of the **Required** toggle button to enable it:



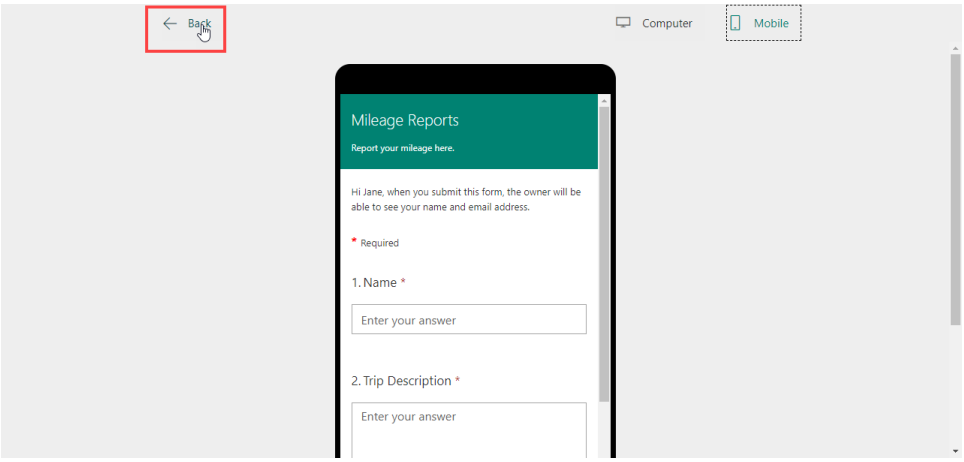
11. Now click on the **Preview** button to review your form:



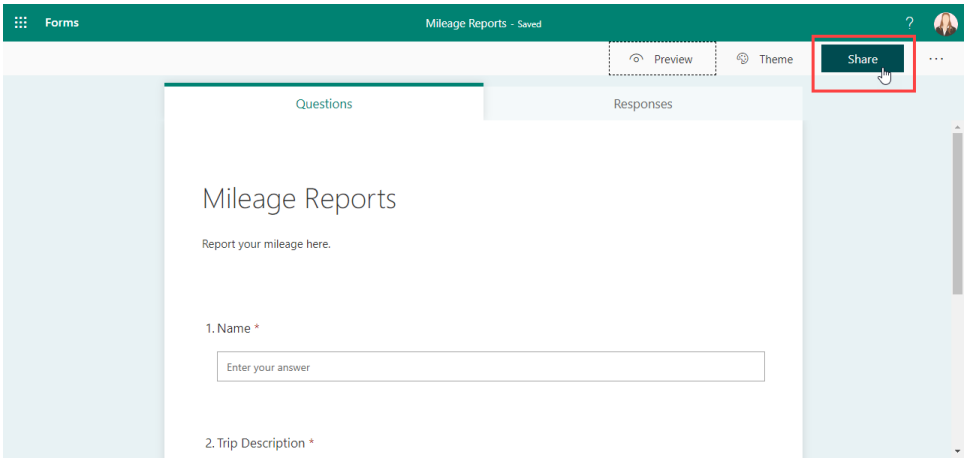
12. After proofing your form for accuracy and appearance, click the **Mobile** button to preview the form's appearance on a mobile device:



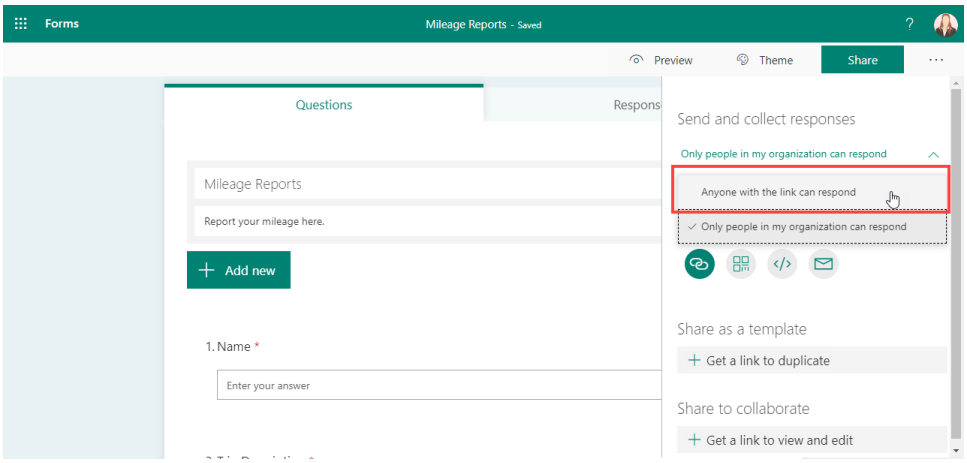
13. Once you are satisfied with your form, click the **Back** button to return to the form editing window:



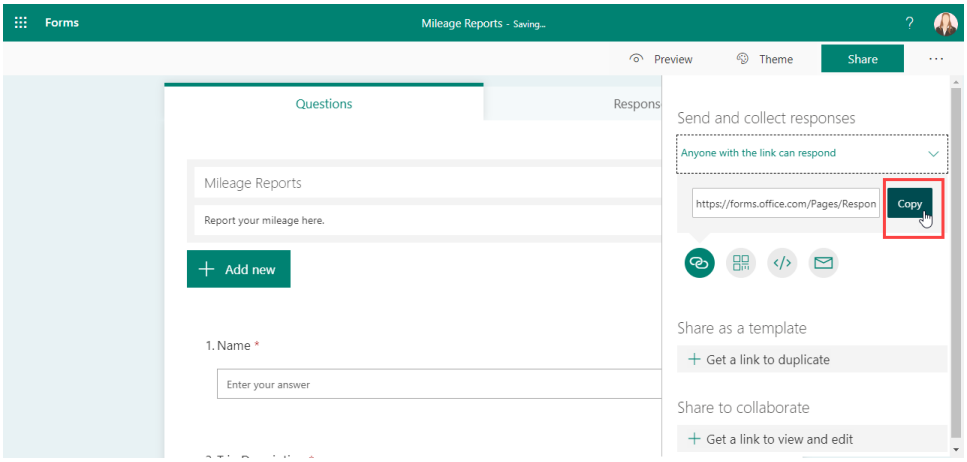
14. Now click on the **Share** button:



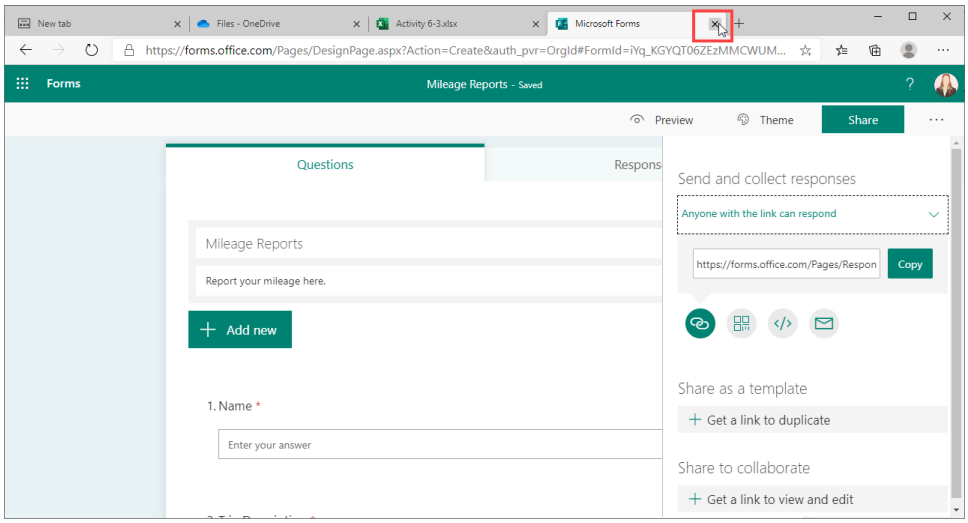
15. Click the drop-down arrow next to the **Only people in my organization can respond** text, then click to select **Anyone with the link can respond**:



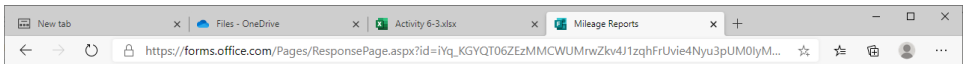
16. Now click the **Copy** button next to the link field:



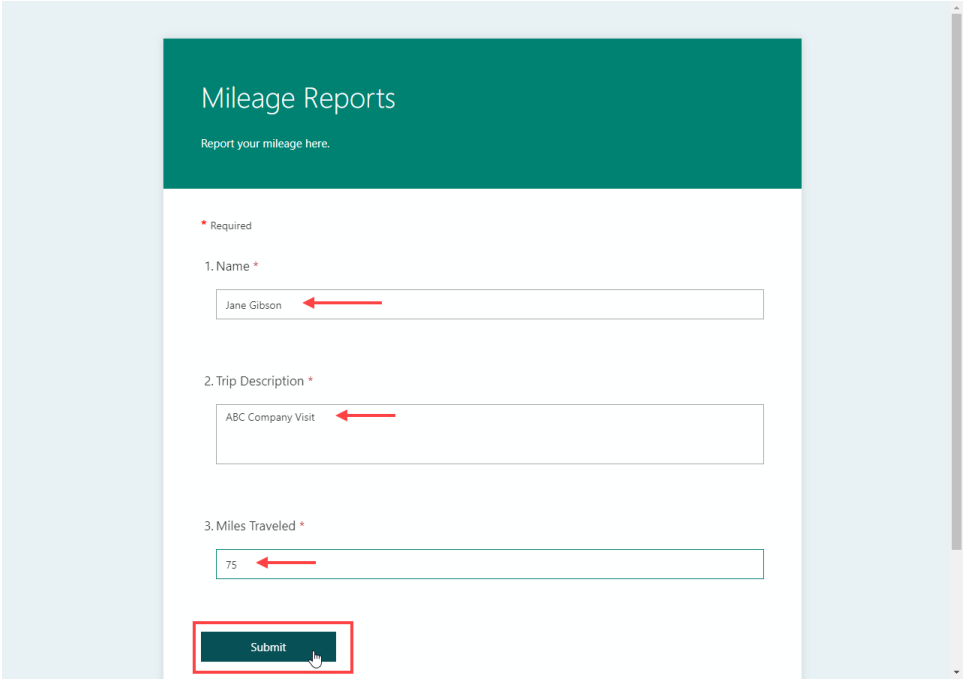
17. You can now close the form by clicking the **Close** (**X**) button in the browser's Microsoft Forms tab:



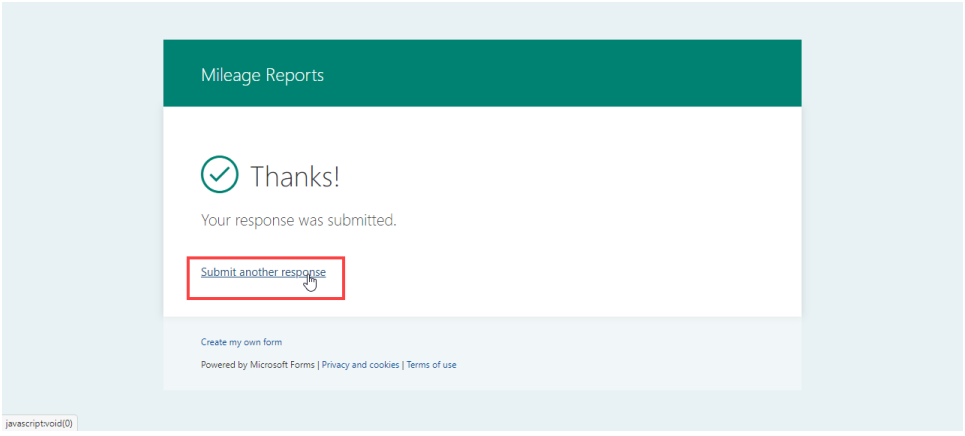
18. **Launch a new tab** in your browser, click to select the **URL** field, paste the copied URL by pressing **Ctrl + V,** then press the **Enter** key:



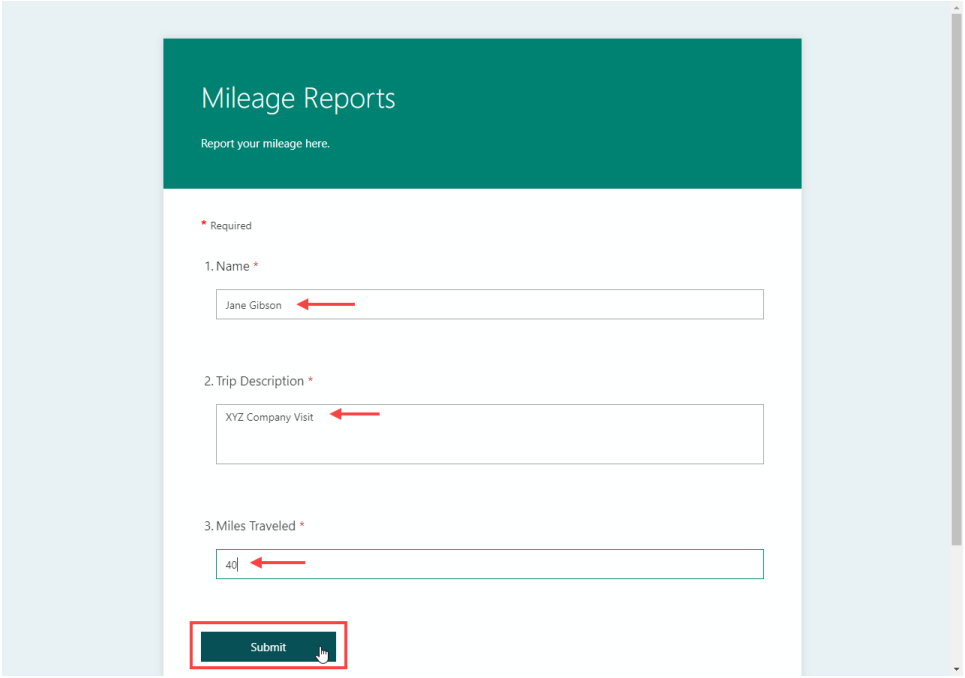
19. The Mileage Reports form will open in your browser. Type your name in the **Name** field, "**ABC Company Visit**" in the **Trip Description** field, and "**75**" in the **Miles Traveled** field. When complete, click the **Submit** button:



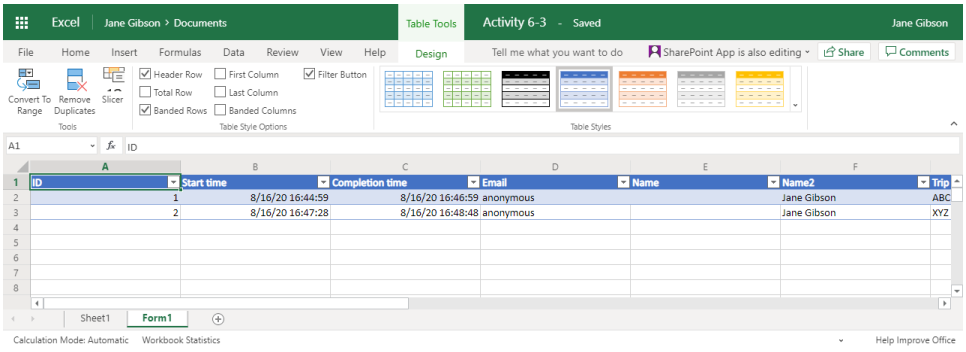
20. The response will be acknowledged as submitted. Click the link **Submit another response**:



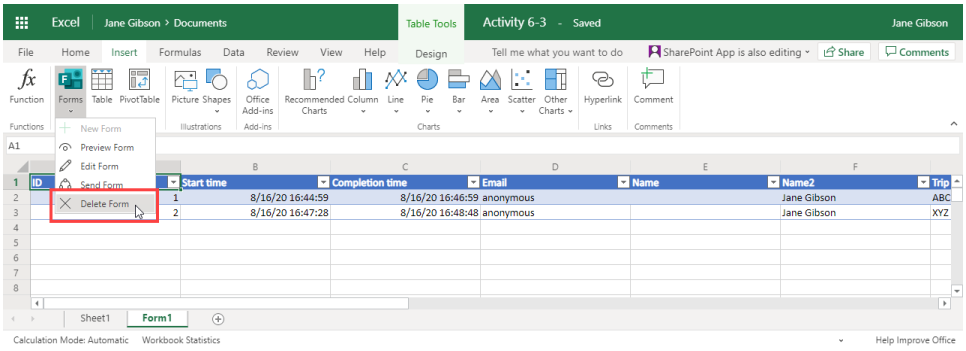
21. Type your name in the **Name** field, "**XYZ Company Visit**" in the **Trip Description** field, and "**40**" in the **Miles Traveled** field. When complete, click the **Submit** button, then close the browser tab by clicking the **Close** (**X**) button:



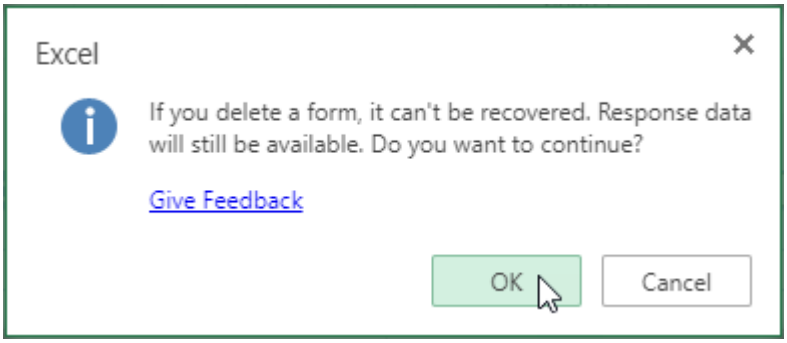
22. Back in Excel Online, you will see that the data from your responses has been entered and time stamped:



23. To delete the form, click **Insert → Forms → Delete Form**:



24. An information alert window will warn that if you delete a form, it cannot be recovered, but the data will still be available. Click **OK**:



25. Save your work as **Activity 6-3 Complete** and close the Excel Online browser tab to complete this activity.

Summary

During this lesson you learned about the options available for exporting and importing data, as well as how to integrate Microsoft Forms with an Excel Online workbook. You should now be comfortable with the available file formats for exporting data, and how to create them. You should also have a good understanding of the different data sources that you can access, and how to use them. Finally, you should be comfortable with process of creating and sharing a Microsoft Form to support data collection.

Review Questions

1. **Can you export more than one worksheet at a time when creating a CSV file?**

2. **What are the benefits of using the PDF file format?**

3. **How does Excel format data from a Web Query?**

4. **What is a quick way to add questions to a Microsoft Form?**

5. **Can you customize the appearance of a Microsoft Form?**

LESSON LABS

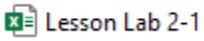
Lesson 1

Lesson Lab 1-1

Objective	To understand how to access workbooks in OneDrive using Excel Desktop, and to explore the different features of each.
Briefing	You have been tasked with creating a chart to compare and visualize the performance of your sales representatives.
Task	Open a workbook in Excel Online and create a stacked bar chart of the sales results, by sales representative (cells A3 to D15), then open the workbook in Excel Desktop to change the color theme, and improve the readability, of your chart.
Hints	Click **Page Layout → Colors** to select a new color theme.
Sample Data	Lesson Lab 1-1
Follow-Up Questions	Click on the file name at the top of workbook window to view the version history of the file.

Lesson 2

Lesson Lab 2-1

Objective	To understand how to update workbook properties and how to record a macro.
Briefing	You need to update the properties of an employee assessment workbook, then record a macro to automate spell checking.
Task	Open the Advanced Properties dialog box and add “Employee Assessment Form” to the **Title** field. Then record a macro, with a keyboard shortcut, to check for spelling errors
Hints	To check for spelling errors, click **Review → Spelling.** Also, make sure you save your work as an Excel Macro-Enabled workbook (*.xlsm)
Sample Data	 Lesson Lab 2-1
Follow-Up Questions	Open the VBA editor to inspect your macro code.

Lesson Lab 2-2

Objective	To understand how to set up data validation and save your workbook as a template.
Briefing	To help automate the use of the employee review workbook, you want to add data validation, then save it as a template.
Task	Apply data validation to cell B4, to only allow dates equal to or less than today, and to cell C4, to select from a list of values, from 1 to 5, then save the workbook as a template.
Sample Data	 Lesson Lab 2-2
Follow-Up Questions	Use your new template to create a new employee assessment workbook.

Lesson 3

Lesson Lab 3-1

Objective	To use cell tracing and error checking to understand formulas and to resolve formula errors.
Briefing	A colleague has given you a workbook that contains a confusing discount reference, and an error. You need to trace the precedents in the discount formula, to understand the correct value, then use Error Checking to resolve the error.
Task	Trace the precedents of the discount formula in cell E9, to confirm the correct discount, then use the Error Checking tool to correct the #NAME? errors in cells E12 and F12.
Sample Data	Lesson Lab 3-1
Follow-Up Questions	Trace the precedents of cell B9 to find the SKU price data.

Lesson Lab 3-2

Objective	To use the Evaluate Formulas tool to understand the sequence of calculations in a formula, and to use the Camera tool to see changes happening on a different worksheet.
Briefing	Your colleague has made some changes to the discount workbook and you would like to understand how the formulas work and see how they impact the SKU prices.
Task	Select Cell A4, then use the Evaluate Formulas tool to help you understand how the formula calculates the discount. To see how changes in the discount affect the SKU prices, select cells A3 to C8 on the Price List sheet, then use the Camera tool to capture an image and place it on Sheet 1. Change the value in cell C4 to see the values in the camera image change.
Hints	Add the Camera tool to the Quick Access Toolbar using the Excel Options dialog box, then click the Camera icon on the Quick Access Toolbar to capture an image of the selected cells.
Sample Data	 Lesson Lab 3-2
Follow-Up Questions	Group columns D and E and close the outline to only show totals.

Lesson 4

Lesson Lab 4-1

Objective	To understand the use of the Quick Analysis Tool to create Sparklines.
Briefing	You are reviewing your sales for the first four months of the year. You would like to visualize your performance from month to month.
Task	Create a Sparkline in cell H8 to visualize your sales performance over the past four months. By selecting cells B8 to G8, you can use the Quick Analysis Tool to accomplish this. Add markers to your Sparkline to highlight the high point and low point.
Hints	Look for the small Quick Analysis Tool icon to appear on the bottom right of your selection.
Sample Data	Lesson Lab 4-1
Follow-Up Questions	Make the marker for the high point green.

Lesson Lab 4-2

Objective	To understand the use of what-if analysis to examine scenarios and seek goals.
Briefing	You would like to understand how much you would have to sell in a month to make $6,000 in commission and bonus, then you want to see what your compensation will look like for the first six months of the year, depending on your sales for the remaining two months.
Task	Use Goal Seek to calculate, in cell F8, how much you would have to sell to make $6,000 in commission and bonus, in cell F11. Then use Scenario Manager to show your total compensation if you sell $90,000, $120,000, or $150,000 in both May and June.
Hints	Remember to make the first scenario your current state.
Sample Data	Lesson Lab 4-2
Follow-Up Questions	Create a scenario summary report, using cell H11 as the results cell.

Lesson 5

Lesson Lab 5-1

Objective	To view and compare multiple workbooks at the same time, and to understand the use of external references in formulas.
Briefing	You have been asked to review inventory counts from two of your regional warehouses, and to summarize the inventory values for both.
Task	Begin by opening Lesson Lab 5-1A, and Lesson Lab 5-1B. View the two workbooks side by side and enable synchronous scrolling to compare the same rows in each. Then open Lesson Lab 5-1C and create formulas in cells B4 and B5 to summarize the values of both inventories.
Hints	Clicking **View → Switch Windows** simplifies navigating between workbooks.
Sample Data	Lesson Lab 5-1A Lesson Lab 5-1B Lesson Lab 5-1C
Follow-Up Questions	Close Lesson Lab 5-1A and Lesson Lab 5-1B, then look at the external references in the sum formulas to note the difference.

Lesson Lab 5-2

Objective	To understand the use of data consolidation to collect and analyze data from different workbooks with similar values.
Briefing	You would like to collect and analyze data on the inventory counts of two warehouses, which have been supplied in different worksheets.
Task	Open Lesson Lab 5-2A and Lesson Lab 5-2B, then create a new worksheet. Use the Consolidate tool to collect the inventory data from both warehouses, in cells A3:D96, into one workbook.
Hints	Be sure to click to enable the checkboxes for Top row, Left column, and Create links to source data.
Sample Data	Lesson Lab 5-2A Lesson Lab 5-2B
Follow-Up Questions	Open the outlines of the individual SKUs to examine the data and links from each source.

Lesson 6

Lesson Lab 6-1

Objective	To understand the process used to export a worksheet as comma separated values.
Briefing	You have been asked to provide the Art department with data on SKU sales for the last six months as a Macintosh compatible CSV file.
Task	Export the SKU sales data as a CSV file.
Hints	Click the **Save** as type drop-down in the **Save As** dialog box to locate the CSV (Macintosh) file type.
Sample Data	Lesson Lab 6-1.xlsx
Follow-Up Questions	Open the CSV file once it has been exported to compare the formatting to the source file.

Lesson Lab 6-2

Objective	To understand the process used to import a CSV file into a workbook and edit the related query.
Briefing	You have been asked to create a table in an Excel workbook, containing the data from a supplied CSV file.
Task	Create a new workbook, then import the data from the supplied CSV file. Use the Power Query Editor to remove any empty columns.
Hints	Select the empty column in the Power Query Editor, then click **Home → Remove Columns.**
Sample Data	Lesson Lab 6-2.csv
Follow-Up Questions	Open the CSV file in a text editor (like Notepad, or Wordpad), and change the name of SKU “AE685” to “New AE685”. Once the CSV file is saved, refresh the query in your new workbook and note the results in the table.

COURSE WRAP-UP

Post-Course Assessment

1. **What ribbon tabs are only found in the Excel Desktop application? (Select all that apply.)**
    a. Insert
    b. Page Layout
    c. Data
    d. Formula

2. **When naming a Macro, which of the following characters is not permitted?**
    a. A letter
    b. An underscore
    c. A space
    d. A number

3. **Which of the following properties can be edited in the Workbook Properties dialog box?**
    a. Type
    b. Title
    c. Modification date
    d. Size

4. What does the #N/A! error indicate?

a. A referenced cell has been deleted or moved

b. A function cannot find the value

c. The contents of the cell are too wide to be displayed

d. A mathematical function is attempting to divide a number by 0

5. When using the Evaluate Formula tool, which part of the formula is underlined?

a. Logical operators

b. Bracketed functions

c. The next part of the formula to be evaluated

d. If statements

6. Which of the following options is not available in the Quick Analysis Tool?

a. Tables

a. Trace Precedents

b. Sparklines

c. Charts

7. Which of the following is a type of Sparkline?

a. Win/loss

b. Doughnut

c. Marker

d. Scatter

8. **Where does Excel store workbook templates?**
    a. The Desktop
    b. The Excel directory
    c. The Downloads folder
    d. The Default Personal Templates location

9. **How many cells can you change to reach your target value when using the Goal Seek tool?**
    a. 1
    b. 3
    c. 10
    d. Unlimited

10. **The Goal Seek tool only allows for one value to be changed to calculate the correct goal.**
    a. How do you refresh a query?
    b. Click **Data → Queries & Connections**
    c. Click **Data → Refresh All**
    d. Click **Data → Get Data**
    e. Save the workbook

Course Summary

Congratulations on completing the **Microsoft 365 Excel: Part 3** courseware. During this course, you learned how to:

- Manage workbooks between Excel Online and Excel Desktop
- Manage workbook properties
- Work with macros
- Create and use a template
- Use Data Validation
- Trace cells
- Use Error Checking
- Evaluate formulas and use the Watch Window
- Create data list outlines
- Use the Quick Analysis Tool
- Add Sparklines
- Perform What-If analysis
- Use the Analysis ToolPak
- Arrange workbooks
- Use external references
- Consolidate data
- Export and import data
- Use the Microsoft Forms app with Excel Online

You should now feel comfortable working in both Excel Online and Excel Desktop, using worksheet automation tools, auditing and error checking your workbooks, using data analysis and presentation tools, working with multiple workbooks, and exporting and sourcing data.

ANSWER KEYS

Lesson 1 Review Questions

1. **How do you open a workbook in the Excel desktop application from Excel Online?**

   To open a workbook in the Excel desktop application from Excel Online, click **Open in Desktop App** on the Excel Online ribbon list.

2. **How can you check where your workbook is saved in the Excel desktop application?**

   To see where your workbook is stored, click the file name at the top of the Excel desktop application workbook window.

3. **What is the one ribbon tab that is not available in Excel Online?**

   The Page Layout tab is only available in the Excel desktop application.

4. **Can you add Sparklines to a workbook in Excel Online?**

   Sparklines can be viewed in Excel Online, but can only be added to a workbook using the Excel desktop application.

5. **Which Excel application, Excel Online or the Excel desktop application, has access to Color themes?**

   Color themes are only available in the Excel desktop application. Excel Online only has access to a limited color palette.

Lesson 2 Review Questions

1. **Where can you find the Workbook Properties displayed?**

   To view the Workbook Properties, click **File → Info,** and you will see the information on the right side of the Info category.

2. **What is the name of the programming language that you can use to write Macros?**

   Macros are written in the Visual Basics for Applications (VBA) language.

3. **Where can you store macros that you have recorded?**

   You can store macros in the current workbook, a new workbook, or the Personal Macro Workbook, a hidden workbook that is opened whenever you open the Excel Desktop application.

4. **How do you create a new workbook from a Personal template?**

   Click **File → New,** then click Personal in the New category, then select the template you want to use as the source for your new workbook.

5. **How can Data Validation help you automate data entry?**

   You can use Data Validation to create drop-down lists in a cell or a range, to allow the user to select from a list of predefined options.

Lesson 3 Review Questions

1. **What does a black dotted tracer arrow indicate?**

   The black dotted tracer arrow indicates that the data referred to in the selected formula is in a different sheet in the workbook or is in a different workbook.

2. **What are dependent cells?**

   Dependent cells are cells within a worksheet that are affected by the contents of the active cell.

3. **What does the "#DIV/0!" error indicate?**

   "#DIV0!" occurs when a mathematical function tries to divide a number by zero.

4. **What does the Step In button in the Evaluate Formula dialog box do?**

   Clicking **Step In** will let you examine the formula or value of the underlined cell.

5. **What do you need to do to your data before you use the Subtotal command?**

   You need to sort your data on the column that contains the categories you wish to subtotal on.

Lesson 4 Review Questions

1. **How do you access the Quick Analysis Tool?**

   To access the Quick Analysis Tool, select a range of text and click on the small icon that appears at the bottom right of your selection.

2. **What are the three types of Sparklines?**

   The three types of Sparklines are line, column, and win/loss.

3. **How many cell values can you change to reach the goal value in the Goal Seek tool?**

   The Goal Seek tool only allows for one value to be changed to calculate the correct goal.

4. **What should you use to create your first scenario in the Scenario Manager?**

   It is a good idea to make your first scenario based on the current state, so you do not risk losing the data.

5. **What types of analysis tools are available in the Analysis ToolPak?**

   The Analysis ToolPak provides advanced and specific tools for financial, statistical, and engineering data analysis.

Lesson 5 Review Questions

1. **How will multiple workbook windows appear if you arrange them vertically?**

   Vertically arranged windows will display side by side.

2. **How many ways can the syntax of an external reference appear?**

   The syntax of an external reference can appear in one of two ways, depending on whether the workbook containing the reference is open, or closed.

3. **How can a link to an external data source be broken?**

   The link to an external data source can be broken as the result of a file being moved from its original location, or from a file being renamed.

4. **Where is the best place to consolidate data?**

   When consolidating data from multiple sources it is best to use an empty worksheet, or to have ample space available for the consolidated data on an existing sheet.

5. **Do data consolidation sources have to have the exact same structure?**

   No. Data consolidation sources should be similar, but do not need to have all the same column and row labels.

Lesson 6 Review Questions

1. **Can you export more than one worksheet at a time when creating a CSV file?**

   No, you can only export one worksheet at a time to a CSV (Comma Separated Value) file.

2. **What are the benefits of using the PDF file format?**

   PDF (Portable Document Format) files maintain the format of the source file and are highly accessible.

3. **How does Excel format data from a Web Query?**

   Data from a Web Query is loaded into an Excel worksheet as a table.

4. **What is a quick way to add questions to a Microsoft Form?**

   The Microsoft Forms app has prebuilt templates that can be quickly loaded into a form and customized for your specific use.

5. **Can you customize the appearance of a Microsoft Form?**

   Yes, you can customize the appearance of a form by clicking the Theme button, where you can select from existing templates, or click the customize button to access custom options.

Post-Course Assessment

1. **What ribbon tabs are only found in the Excel Desktop application? (Select all that apply.)**

    b. Insert

    c. Page Layout

    d. Data

    e. Formula

    The Page Layout tab is not available in Excel Online.

2. **When naming a Macro, which of the following characters is not permitted?**

    a. A letter

    b. An underscore

    c. A space

    d. A number

    The first character of a macro name must be a letter, and can only be followed by letters, numbers, or the underscore character.

3. **Which of the following properties can be edited in the Workbook Properties dialog box?**

    a. Type

    b. Title

    c. Modification date

    d. Size

    General workbook property information cannot be edited in the Workbook Properties dialog box. The Summary tab allows the user to add information, including Title, Subject, Author, Manager, and Company.

4. **What does the #N/A! error indicate?**

    a. A referenced cell has been deleted or moved

    b. A function cannot find the value

    c. The contents of the cell are too wide to be displayed

    d. A mathematical function is attempting to divide a number by 0

    The #N/A error occurs when a function cannot find a value that meets the defined criteria. An example is the VLOOKUP function not finding a result.

5. **When using the Evaluate Formula tool, which part of the formula is underlined?**

    a. Logical operators

    b. Bracketed functions

    c. The next part of the formula to be evaluated

    d. “If” statements

    The Evaluate Formula tool underlines the part of the formula that is the next to be evaluated, based on precedence in the order of operations.

6. **Which of the following options is not available in the Quick Analysis Tool?**

    a. Tables

    d. Trace Precedents

    e. Sparklines

    f. Charts

    The Quick Analysis Tool gives access to Formatting, Charts, Totals, Tables, and Sparklines. Trace Precedents is accessed by clicking **Formulas → Trace Precedents**.

7. **Which of the following is a type of Sparkline?**

    a. Win/loss

    b. Chart

    c. Marker

    d. Scatter

    The three types of Sparklines are line, column, and win/loss.

8. **Where does Excel store workbook templates?**

    a. The Desktop

    b. The Excel directory

    c. The Downloads folder

    d. The Default Personal Templates location

    The Default Personal Templates path is typically "C:\Users\[UserName]\Documents\Custom Office Templates", where UserName is your Username on the computer. The location can be set in the Excel Options dialog box, in the Save category.

9. How many cells can you change to reach your target value when using the Goal Seek tool?

a. 1

b. 3

c. 10

d. Unlimited

The Goal Seek tool only allows for one value to be changed to calculate the correct goal.

10. How do you refresh a query?

a. Click **Data → Queries & Connections**

b. Click Data → Refresh All

c. Click **Data → Get Data**

d. Save the workbook

To refresh a query, and update the data in the table, click **Data → Refresh All**.

APPENDICES

Keyboard Shortcut Quick Reference Sheet

File Management	**Open a new workbook**	Ctrl + N
	Save a file	Ctrl + S
	Open a file	Ctrl + O
	Print worksheet	Ctrl + P
	Close Microsoft Excel	Alt + F4
Worksheet	**Switch between worksheet tabs (left to right)**	Ctrl + Page Up
	Switch between worksheet tabs (right to left)	Ctrl + Page Down
	Insert cells	Ctrl + Shift + +
	Delete cells	Ctrl + -
Text Editing	**Select all items in current worksheet**	Ctrl + A
	Copy text	Ctrl + C
	Cut text	Ctrl + X
	Paste text	Ctrl + V

Open Dialogs	**Open Find tab of Find and Replace dialog**	Ctrl + F
	Open Replace tab of Find and Replace dialog	Ctrl + H
	Open Go To dialog	Ctrl + G
	Open Font tab of Format Cells dialog	Ctrl + Shift + F
	Check spelling	F7
	Get Help	F1
Text Formatting Tools	**Apply bold formatting**	Ctrl + B
	Apply underlining	Ctrl + U
	Apply italic formatting	Ctrl + I
	Align text to center	Ctrl + E
	Align text to left	Ctrl + L
	Align text to right	Ctrl + R
	Justify text	Ctrl + J
	Increase font size	Ctrl + Shift + .
	Decrease font size	Ctrl + Shift + ,
	Undo last action	Ctrl + Z
	Redo last action	Ctrl + Y

Glossary

absolute reference

A type of reference that will not change even if it is moved or copied to another location.

add-in

Small components that can be added to Excel to add features and functionality.

array

Any grouping of two or more adjacent cells.

arguments

Data used by functions to complete calculations.

AutoFill

A feature that is used to automatically fill sequential data into a range of cells.

AutoFilters

Preconfigured filters that can be quickly applied or removed.

Anova

Short for Analysis of Variance. Used to examine if the averages of samples are different in a significant way.

cell

The intersection of a row and column on a worksheet.

charts

Visual representations of numeric data in a dataset.

conditional formatting

A formatting type that will highlight cells whose data satisfies certain criteria.

consolidation

The process of combining, condensing, and summarizing data from multiple sources into one destination.

correlation

Indicates if data sets trend or change with each other.

criteria range

Used in database functions or advanced filters, this refers to the range that contains criteria that is needed in order to perform an operation.

database functions

Functions that allow you to perform operations on multiple fields in an Excel database.

delimited text

Data that is entered with one row equaling one line of text.

dependent cells

Cells that are affected by the contents of another cell.

exporting

The process of sending data from one application to another.

external reference

A link to the contents of one or more cells within the worksheet of another workbook.

fields

Columns that appear in a dataset that is used for a PivotTable.

fill

Formatting that adds background color to cell(s).

fill handle

The small black box that appears in the bottom right-hand corner of a selected cell or cell range. Used to activate the AutoFill feature.

filtering

Removing data from view, based upon set criteria.

Flash Fill

Feature that will automatically extract or combine data based on a pattern.

font

A set of typeface**.**

form

An interface element of a workbook that is used to collect data or execute an action.

Format Painter

A tool that is used to copy formatting from one selection of text to another.

formula

A mathematical relationship expressed through symbols.

Formula Bar

A part of the Excel interface that displays the cell name, as well as values and formulas in the selected cell.

function

A preconfigured formula that is used for a specific purpose.

HTML

A programming language that describes how to display data.

importing

The process of opening data in one application that was saved in another application.

logical operators

A type of operator that is used to compare values and determine whether those values meet specified criteria.

logical values

A type of value that expresses whether data is TRUE or FALSE based on specified criteria.

macros

Small programs that are created to complete a specific task or set of tasks.

mixed references

Cell references that include both relative and absolute references.

multi-cell array formula

A type of array formula that performs multiple calculations on one or more arrays and then displays the results.

outline

A feature in Excel that allows you to organize datasets in a worksheet into hierarchical groups.

PivotChart

Similar to regular Excel charts, a PivotChart is a visual representation of data that is being displayed in a PivotTable.

PivotTable

A data analysis tool that dynamically allows you to pivot columns and rows of raw data without altering it.

precedent cells

Cells within a worksheet that provide data for a formula.

range names

Meaningful names that can be added to cell ranges so that they can be easily referred to and understood later.

relative reference

A cell reference that will change relative to its positioning in a worksheet.

scenario

A set of cell values that are saved and substituted into your worksheet at your convenience.

single-cell array formula

A type of array formula that performs multiple calculations on arrays and then displays the results in a single cell.

slicers

A type of data analysis tool that works in conjunction with PivotTables to sort data based on unique data entries.

Sparklines

Small graphs contained within a single cell that are used to summarize data and display trends.

spreadsheet

Either a paper or electronic file that is used to store and work with data (mostly numbers) in a tabular fashion.

SUBTOTAL function

A type of Excel function that is used to perform calculations on subsets of data.

subtotals feature

A feature that is used to quickly perform the SUBTOTAL function on a subset of data within a dataset.

summary function

A feature that uses SUBTOTAL functions on subsets of data within a table.

table

A dataset that is comprised of rows and columns but is treated as one object (unlike regular data ranges).

Tell Me

Natural language help feature accessed directly on the ribbon interface.

Text pane

Part of the interface when SmartArt is added or selected in Excel. Is typically used to add text to SmartArt.

tracer arrows

Colored arrows used to indicate the direction of the data flow to and from cells and formulas.

transactional data

Data that represents each transaction (or event) in a series. It is not summarized in any way and is considered raw data without row labels.

VBA

Visual Basics for Applications, a programming language that can be used to automate procedures in Microsoft Office.

workbook

An Excel file that stores multiple worksheets.

worksheet

An electronic spreadsheet.

workspace

Saved set of Excel files.

XML

A commonly used programming language that is frequently used to describe data; stands for Extensible Markup Language.

Index

A

C

D

E

F

G

L

M

O

P

Q

S

T

U

V

W

Workbooks