

Microsoft Excel: The Essentials

Version 1

By: Raza Tahir

Edited By: Zehra Hasan Zaidi

Microsoft Excel: The Essentials

Version 1



::::::: By: Raza Tahir :::::::

Microsoft Excel: The Essentials

First Edition

Preface

Welcome!

This textbook is written for anyone who wants to learn and build practical skills in Microsoft Excel, whether it be for school, work, or personal projects.

This guidebook is dedicated to all my students who said,
"We hope to remember what you've taught us."
Your words inspired this guide.

Description

We will be creating and using Excel worksheets that can analyze important data for your success. We'll go over refreshers, recaps, shortcut keys, and helpful tips & tricks to help you work more easily, quickly, & efficiently.

Navigating This Book

This book is organized into two sections: Building a strong foundation, and data analysis.

Section 1 covers the basics of navigating Excel, using key tools, and formatting worksheets for clarity.

Section 2 focuses on working with data: sorting, filtering, visualizing, and making sense of information.

Section 3 discusses how to lock worksheets and workbooks, plus using macros and data validation.

Please use the table of contents on the next page to find topics quickly and review them anytime as needed.

Course materials

Required materials

- A computer running the Windows operating system with Microsoft Office installed.

Prerequisites

To succeed in this course, students should be comfortable using a computer with a keyboard and mouse, working in Windows® environment, opening and closing programs, and managing files and folders. Although no prior Excel hands-on experience is required, students will get the most from the course if they already know the basics of Excel and wants to learn more. It's great for analysts, admin staff, project leads, or anyone who uses Excel to work with data, create reports, help make decisions, or organize and analyze data.

Table of Contents

Microsoft Excel Section 1 – Build a Strong Foundation

- Chapter 1: Understand Excel terminology to perform essential tasks
- Chapter 2: Adjusting and changing columns, rows, worksheets, and workbooks
- Chapter 3: Handling Workbooks
- Chapter 4: Learning the Basics: Formulas & Functions
- Chapter 5: Format worksheets (for clarity and visual appeal!) and highlighting trends via conditional formatting
- Chapter 6: Print Excel documents effectively

Microsoft Excel Section 2 – Turn raw data into clear insights

- Chapter 7: Sorting, filtering, grouping and subtotaling our data.
- Chapter 8: Creating Tables
- Chapter 9: Creating Charts

Microsoft Excel Section 3 – Beyond the Essentials

- Chapter 10: Locking & Protecting
- Chapter 11: Data Validation
- Chapter 12: Macros
- Chapter 13: Bibliography
- Chapter 14: The End

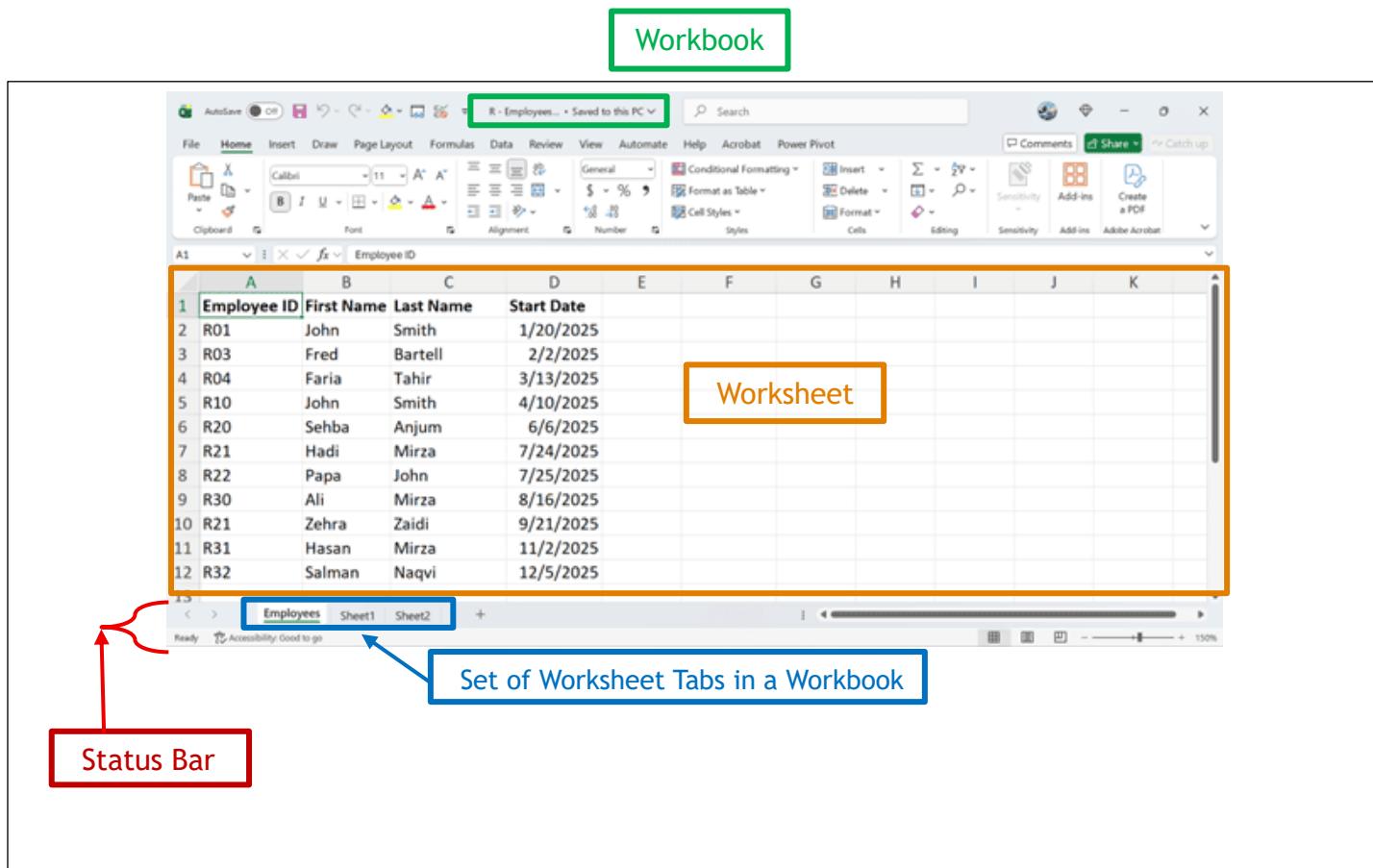
Chapter 1 - Microsoft Excel Basics

Microsoft (MS) Excel is software that allows users to create spreadsheets for data. Microsoft defines a spreadsheet as “a digital document used for storing, organizing, and manipulating data” ([Link](#)). It is the world’s leading software with a vast user community. An Excel file is a document that is also called a **workbook**. Throughout this book, we will be using these words interchangeably.

Scenario 1.1: Open the Excel File: C:\....\R - Employees.xlsx

This file lists employees who work at an ice cream shop.

If a workbook in Microsoft Excel is open, pressing ‘Ctrl’ + ‘N’ will open a new workbook. A workbook is made up of sheets (also called tabs, pages or spreadsheets) just as a book is made up of pages. In an Excel workbook, the status bar at the bottom displays the spreadsheet tabs (e.g., Sheet1, Sheet2, etc.).



Spreadsheet

A **spreadsheet** (i.e. a sheet) is a grid that organizes data into columns and rows:

- **Columns** are labeled with capital letters (A, B, C, etc.) and run vertically across the grid. In formulas, column letters always appear capitalized.
 - To select an entire **column**, either click on the column letter or press **Ctrl + Spacebar**.

	A	B	C	D	E	F	G
--	---	---	---	---	---	---	---

- **Rows** are labeled with numbers (1, 2, 3, etc.) and run horizontally across the grid.
 - To select an entire **row**, either click on the row number or press **Shift + Spacebar**

Columns			
Rows	ID	Name	Age
1	John	21	
2	Jane	21	

Note: In general, **columns** typically represent attributes, categories, fields, or details of data (*what kind of data*) while **rows** represent individual records or entries.

Example:

Name	Age
Alice	21
Bob	22
Carla	23

Data is context-dependent, and a row can sometimes represent a category instead of a record.

Example (Transposed Data):

Name	Alice	Bob	Carla
Age	21	22	23

Throughout this book, this book will consider columns as fields or categories, and rows as records or entries.

A **data set** is a collection of related information in Excel. Data sets are usually comprised of a header row and records:

- The header row is the row that contains the column names.
 - It doesn't have to be Row 1 in Excel, but rather it can be any row that includes the column names/titles.
- Records are entries that represent a single item (e.g. a person or a product) or row of data on a table.

Cells

A **cell** is the intersection of a row and a column. Cells are the backbone and building blocks of every spreadsheet software, whether it be Google Sheets or Microsoft Excel.

- The active or selected cell is the one clicked on and has an outline of a green border.



- Cells are “boxes” that contain data. The values or contents of a cell can be found in the formula bar.

Task 1.1.1: Click a cell to highlight it with a green border. If the cell has data, the value will appear in the **formula bar**.

- Each cell has a name (i.e. reference), and the naming syntax is the column letter immediately followed by the row number.

- Example: The cell in column **B** and row **2** is called **B2**.
- Even blank or empty cells have a name.
- The cell name contains no spaces, colons, or dashes.

- The cell name appears in the **Name Box** above the worksheet.

Task 1.1.2: Click a cell and check whether the cell name appears in the Name Box.

The screenshot shows a spreadsheet interface with a green-bordered cell at the top left. The Name Box above the sheet shows 'B2'. The Formula Bar to the right shows 'John'. The Active Cell is highlighted with a green border and an arrow points to it from the text 'Active Cell' below. The spreadsheet table has rows 1 and 2, columns A and B, and data cells R01 and John.

Ranges

Ranges are a combination or group of one or more cells. Ranges can be horizontal, vertical, or even empty.

Naming Syntax:

- The name of the range is found by finding the **top-leftmost cell**, and the **bottom-rightmost cell**, separated by a colon (:).
- Example: The range from B2 ‘to’ C3 is written as **B2:C3**. Ranges use a colon to separate the start and end cells as shown below. Use of other symbols such as a semicolon, underscore, or space will not work.

	A	B	C
1	Employee ID	First Name	Last Name
2	R01	John	Smith
3	R03	Fred	Bartell

Task 1.1.3: Select range A5:C7.

Task 1.1.4: Select an entire column (single column range)

- Move the cursor to the column header which is the letter at the top of the column, e.g., A, B, C
- Click on the column letter to highlight or select the entire column.

Below are useful keyboard shortcuts:

- **Shift + Spacebar** -> Select a row
- **Ctrl + Spacebar** -> Select a column

Result: Selecting a column selects every cell within it, thereby forming a single-column range. For example, clicking on column letter 'C' selects everything within column C, resulting in the range "C:C".

Task 1.1.5: Click another letter (e.g. F) to select another column (Reminder: This selects the entire column).

Task 1.1.6: Select multiple entire columns (multi-column range) C:F

There are two ways of doing this.

Option 1:

1. Select the header of the first column e.g. Column C (As shown in Task 1.3)
2. Holding the left mouse button, click and drag to the right to highlight until the last column e.g. Column F.

Option 2:

1. Select the header of the first column e.g. Column C (As shown in Task 1.3)
2. Hold down the 'Shift' key on the keyboard.
3. While holding 'Shift', press the right arrow key repeatedly until column F has been selected.

Task 1.1.7: Select the entire worksheet

The **Select All Triangle** at the top-left corner of the worksheet is used to select the entire worksheet.



- Pressing **Ctrl + A while selecting any box within a data set** selects the current dataset completely and pressing **Ctrl + A again** the second time will then select the entire sheet.
- Selecting **Ctrl + A while outside the data set** will select the entire sheet.

Basic Tips & Keyboard Shortcuts

Moving a Range

1. Select any range.
2. Place the **cursor on the border of the range** until the cursor changes to a **four-headed arrow**. 
3. **Click and drag** the range to the new desired location.

Note: As the range moves, Excel will show the new range reference before letting go of the mouse, which is helpful if the original name has been forgotten.

Copying a Range

1. Select the range.
2. Press ‘Ctrl’ + ‘C’ to copy the range.
3. Across the ranges border, notice the moving dashed lines called the “marching ants”
4. Click on a cell where the range will be pasted and either press “Ctrl” + “V” or simply press “Enter”.

Alternatively, to copy a range:

1. Select the range.
2. Place the cursor on the border.
3. Hold down ‘Ctrl’ then click and drag the range to move it to the new location.

As a result, the original range stays in place, and a duplicate is placed where it was dragged.

Other Shortcuts

1. Press ‘**Ctrl + Z**’ to undo any mistakes. Pressing ‘Alt’ + ‘Backspace’ will also work.
2. **Shift + Arrow Keys** -> Resize a selected range.
 - o Example: Start at A1, then hold **Shift** and press the arrow keys to expand the selection.
3. **Ctrl + Shift + Arrow Keys** -> Select from the current cell to the end of the data set in that direction.
 - o Example: On cell A1, press **Ctrl + Shift + Down Arrow** to select all cells from A1 down to the last filled cell in that column.
4. **Ctrl + Shift + G**: Shows Workbook Statistics

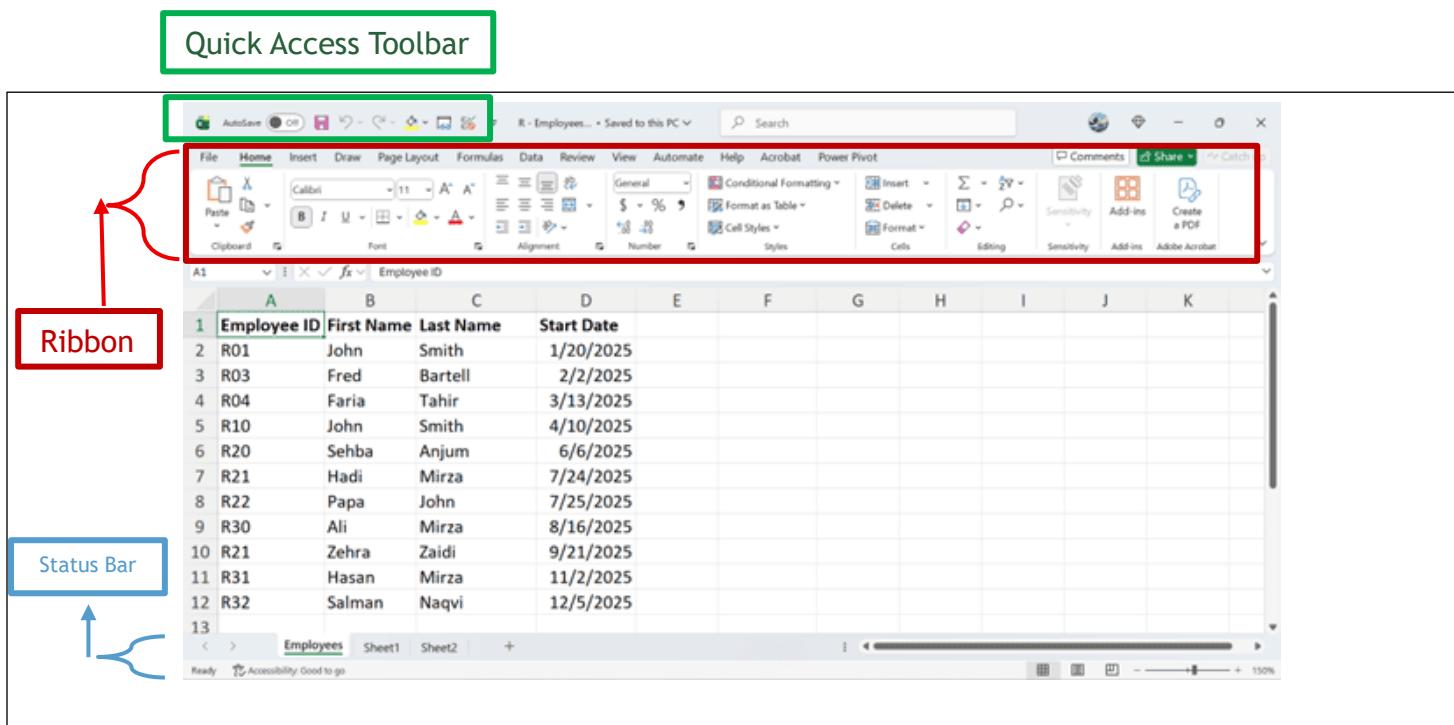
Pro Tip:

Using a **mouse** makes it easier to drag than using a trackpad.

Excel Interface Overview

The basic layout of Excel includes tools that help users navigate the program more efficiently. These elements are:

- **Status Bar** (found at the bottom of the window)
- **Quick Access Toolbar** (found at the top of the window)
- **Ribbon** (the menu bar located at the top and consists of tabs, groups, and commands)
- **Backstage View** (found by clicking on the 'File' tab)



The following is a breakdown of each element:

1. Status Bar (Bottom of the Window)

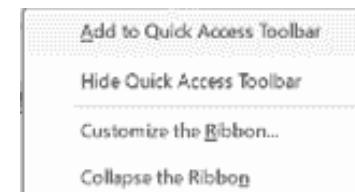
This bar is found at the bottom of Microsoft Excel (and is available in most of the Microsoft apps). The status bar:

- Displays the various worksheets in a workbook (more to be discussed later).
- Displays the status of the document or selection.
 - For example, selecting cells that contain names will show the total count of the selected cells.
 - Provides different controls to zoom in and out of the document.

2. Quick Access Toolbar (Top of the Window)

This small toolbar is at the very top-leftmost area of Microsoft Excel. It provides quick access to common commands such as Save, Undo, and Redo. Commands can be used either by clicking them or by pressing **Alt** to activate Key Tips.

Additionally, commands can be added by right clicking any command of choice on the ribbon (e.g., Fill Color) and select 'Add to Quick Access Toolbar'. As a result, the command will then be found on the Quick Access Toolbar. While not heavily used in Excel, it can be handy for frequently used commands like Clear Formats.



3. Ribbon (Below the Quick Access Toolbar)

The ribbon is the main top area in Excel which consists of **Tabs** (Home, Insert, Page Layout, etc.) and **Commands** (buttons/actions). Hover over a command to see a **screen tip**.

1. Each tab contains **Groups**, which organize related commands (e.g., Font group, Alignment group).
2. If the window is resized to be smaller, some commands may be hidden and only their group names will be shown. If so, click on the group name to access the hidden commands.
3. Some groups include a small Dialog Launcher button for advanced options.

Throughout this book, basic instructions for finding a command will follow this format:

The tab name, followed then by group name, and finally the command itself.

Example Task: Use the Bold command:

Go to the Home (tab) -> Font (group) -> Select the ‘Bold’ command (button)

[Add picture!]

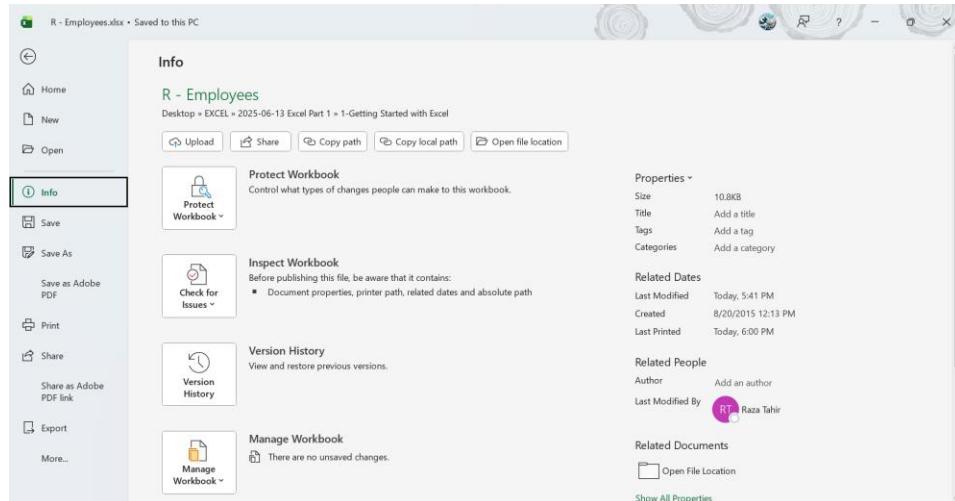
When the command appears in a dropdown list, we'll use this format for instructions:

Example Task: Use the clear formats command:

On the Home (tab) -> Editing (group) -> Select the ‘Clear’ arrow and then from the drop down list, select “Clear Formats”.

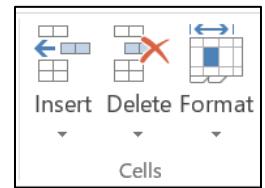
4. Backstage View (File Tab)

Clicking **File** opens the **Backstage View**. This view provides file-related actions such as **Info, Save, Open, and Print**. For instance, the ‘Info’ tab shows details about the file’s name, location and size, and last modification date. This is especially useful when working with shared drives or Teams files, to find out where a file is stored. To exit Backstage View, click the back arrow or press **Esc**.



Chapter 2 - Refining worksheets

Microsoft Excel offers a variety of tools for making modifications to worksheets. This chapter will cover how to adjust, hide, group, add, and delete columns and rows, as well as how to find and replace data. This chapter will focus on faster, more efficient ways to do these tasks via keyboard shortcuts and context menus. These actions can also be found on the ribbon by going to “Home” tab -> “Cells” group. This group includes commands such as Insert, Delete, and Format which is used for modifying the worksheet’s cells, columns, and rows.



The general rule for this chapter is that whatever concept applies to columns (e.g. resizing), the same concept can be applied to rows and vice versa.

Scenario 2.1: Open the File: C:\....\R - Modifying Worksheets.xlsx

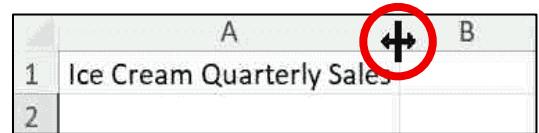
This file includes a dataset of ice cream sales across four quarterly periods within one year. Each row corresponds to a single flavor, and the dataset includes additional columns that detail each flavor, including its total annual sales, average quarterly sales, and unique product ID.

Adjusting row width or column height

Sometimes, there is a need to adjust row heights or column widths to fit the data or make the sheet easier to read.

Task 2.1.1: Make a column wider (e.g. Column A)

1. Hover over the right edge border of column letter header 'A' at the top of the worksheet.
2. When the cursor changes to a double-sided arrow , drag the mouse to adjust and resize the column



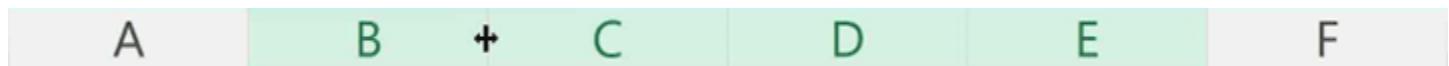
A	B
1	Ice Cream Quarterly Sales
2	

Note:

- When resizing columns, do not place the cursor on the edge of a cell. Instead, place the cursor between two column letters at the top.
- If a column that contains numbers becomes too small or narrow, Excel will display the values in scientific notation (like "1.23E+05") or as a row of pound signs #####. This doesn't mean the data is missing; it simply indicates that the column isn't wide enough. To fix this, either resize the column or use **AutoFit** to display it properly.

Task 2.1.2: Make multiple columns wider (e.g. columns B through E)

1. First, select multiple columns (see *Task 1.1.4*)
2. After selecting multiple columns, change the column width of one of them (see *Task 2.1.1*) to see how all of them will resize to match.



A	B	C	D	E	F

AutoFit a Column

AutoFit changes the column width to match the cell with the longest content.

Task 2.1.3: Autofit a column (e.g. column J)

1. Move the mouse to the right edge of the column letter heading.
2. Once the double-headed arrow appears, double-click the border.

Result: Once the effect is applied, the column width is automatically adjusted to fit the content. In short, instead of manually dragging the column border (as shown in *Task 2.1.1*), simply double-click the boundary of a column or row header to apply *AutoFit*.

Note: For Auto Fit to work, a column must have content and a width that has been adjusted.

Task 2.1.4: Autofit multiple columns

- To adjust *all* columns at once, click the **Select All triangle** at the top-left corner of the worksheet (as shown in *Task 1.1.7*), then apply AutoFit. This will resize every column and row automatically.

Hiding rows and columns

Realistic data sets have extra columns that take up space and aren't essential for every task. Viewing many columns (e.g. 30 or more columns) all at once can be hard to read and manage.

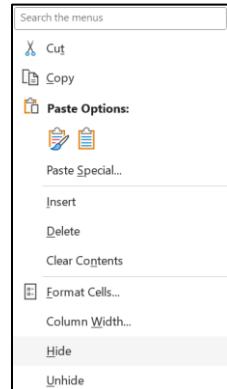
Task 2.1.5: Hide a column (e.g. Column G).

1. Select column G (See Task 1.1.4).
2. Right-click the column header G, and press **Hide** from the context menu. As a result, column G will disappear.

Task 2.1.6: Unhide the column hidden in the previous task (e.g. column G).

1. Select the columns adjacent to Column G (columns F and H).
2. Right-click the column header and choose 'Unhide'.

When printing a sheet, hidden columns will be excluded even though the data still exists in the spreadsheet. However, the data in hidden columns remains searchable using the command 'Ctrl' + 'F'.



Task 2.1.7: Hide multiple columns (e.g. I through L).

1. Select the columns to hide (see Task 1.1.4). For example, select I through L.
2. Right-click any of the selected column headers and select 'Hide'

Result: The sheet will now display Columns A through H. This is useful when preparing reports for management, since they usually want a *big picture* rather than every detail.

Task 2.1.8: Unhide every column all at once.

1. Click the 'Select Triangle' button (See Task 1.1.7) in the top-left corner to select every column.
2. Right-click on any column letter and select 'Unhide'.

Note: If the sheet is protected, it needs to be unprotected first.

A frequently raised concern is: "When this spreadsheet is provided to employees for a specific purpose, such as entering time on a timesheet, how can users be prevented from unhiding and accessing other parts of the sheet?"

Hiding columns only hides them visually; it does not prevent edits. To restrict changes, the sheet must be protected while leaving only specific cells unlocked for editing. This will be discussed further in **Task 10.1.3** in Chapter 10.

Hiding extra blank columns is a useful technique managers use to create a more professional view that directs attention solely to the form or data entry area (e.g. when sharing a timesheet or expense report with employees).

Task 2.1.9: Hide any extra blank columns and rows to show only the Excel report.

1. Select the first blank column to the right of the data set (e.g. column N).
2. Press 'Ctrl' + 'Shift' + 'Right Arrow' to select all columns to the end.
3. Right-click and select 'Hide' to hide the data.

Result: All the extra columns beyond column M is hidden, making the sheet look simplistic and focused.

The same works for rows:

1. Select the first blank unused row to hide, and
2. Press 'Ctrl' + 'Shift' + 'Down Arrow' to select all the rows until the very bottom. Right-click and hide the rows.

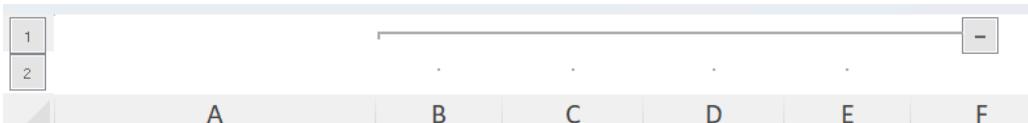
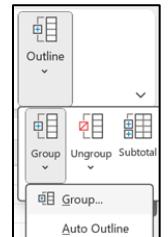
To have the rows to appear again, unhide as before.

Grouping Columns

The issue with hiding columns is that hidden data can easily be overlooked. Unless someone is specifically checking for missing columns, it's very easy to overlook hidden columns. People often forget to check that all columns are visible and for this reason, grouping columns can be a more effective alternative than simply hiding them.

Task 2.1.10: How to group columns:

1. First select the columns needed for a group. Do not select a few cells but rather the entire column (e.g. select columns C through E).
2. Go to the 'Data' tab and on the 'Outline' group, there will be a command named 'Group'. (No matter how commands appear for various Excel versions, their functionality is unchanged)
3. Click 'Group'.
4. Once grouped, a small minus icon (-) will appear at the top above the column letters. Clicking it collapses the columns. Clicking the resulting plus icon (+) expands them.



Result: Grouping columns in Excel creates an outline. It's easy to see which columns are hidden since it adds:

- a toggle button above the spreadsheet for quickly showing or hiding selected columns.
- Level 1 and Level 2 buttons on the side allow all groups to be expanded or collapsed at once, which is useful when multiple groups exist.

Note: When a new group is created adjacent to an existing one, both groups merge into a single group.

Task 2.1.11: Ungroup the columns that were previously grouped.

1. Simply reselect the grouped columns (C through E), and on the Ribbon in the Outline group, click 'Ungroup'. This removes the grouping and restores the columns to normal.

Moving Columns

Rearranging columns as needed can prove to be helpful.

Task 2.1.12: Move column L, which contains ‘Employee ID,’ closer to the beginning of the worksheet.

1. Select the entire column.
2. Place the cursor on the column border (not between two columns). The cursor changes to a four-arrow icon .

3. Holding down ‘Shift’, click and drag the column to its new position.

Result: The ‘Employee ID’ field shifts over neatly to column B without the need to cut and paste.

Adding and deleting rows/columns:

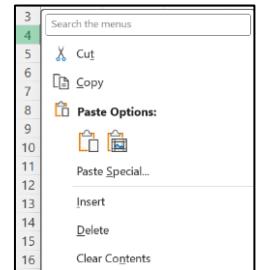
At times, it is helpful to create additional space for information by adding or deleting columns, rows, or cells.

Task 2.1.13: Insert a row

- Right-clicking on a row number (or column) and click ‘Insert’ to add the row above. This allows a new record to be added (e.g., a person, a transaction, etc.) in a blank new row, and all existing content will be shifted down by one.

Task 2.1.14: Delete a row

Right-click on the row number -> Press ‘Delete’ to remove.



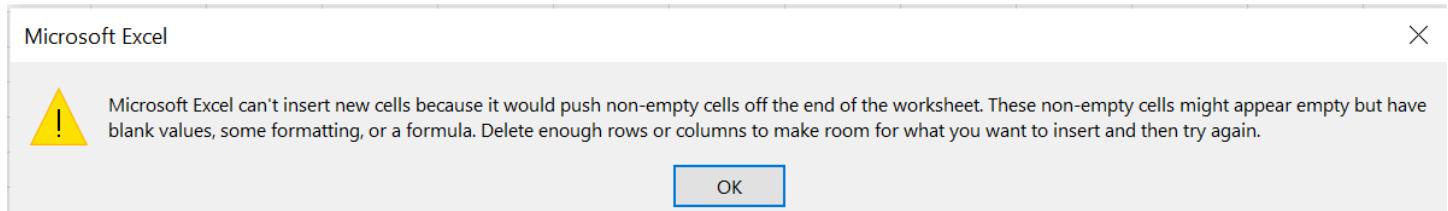
Task 2.1.15: Add several rows at once (e.g. to add 4 people to the list, 4 rows will need to be added):

1. Select however many rows you’d like to add
2. Right-click and choose Insert.

Result: The empty, new rows will appear. Multiple rows can be deleted in the same way.

Note: There is a limit to how many rows there can be in a spreadsheet. In Excel, the first row is always Row 1 and goes up to the maximum row limit of 1,048,576 in current versions. Row numbers are fixed and sequential, meaning that they remain constant and stay the same no matter what happens in the worksheet.

For instance, adding a row at the bottom of the spreadsheet results in the following error message:



Key Takeaway: Inserting or deleting Excel rows will move the content, but the row numbers stay the same.

Keyboard Shortcuts:

- **Ctrl + Shift + Plus** -> Add a row/column
- **Ctrl + Minus** -> Delete a row/column

Navigation tips:

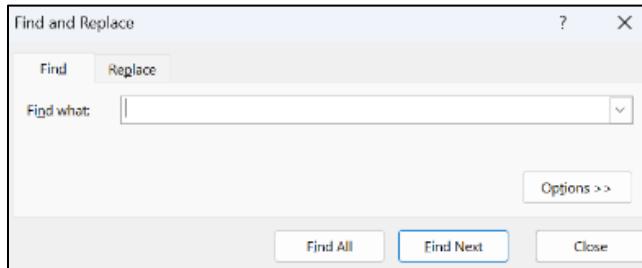
- **Ctrl + Down Arrow** -> Go to the last row on the edge of the data set.
- **Ctrl + Right Arrow** -> Go to the last column on the edge of the data set.
- **Ctrl + Home** -> Go to cell A1
- **Ctrl + End** -> Go to last cell in data set.
- **Shift + F10** -> The shortcut for the right-click context menu in Excel

Finding/Replacing Data

The Find & Replace tool can be used to search for specific values in the Excel worksheet. To find data, either:

- press 'Ctrl + F' to quickly search for data (press 'Command' + 'F' on Mac) or
- find the command on the ribbon via Home (tab) -> Editing (group) -> Find & Select (command)

Task: Using the Find & Replace box, search for the value "Chocolate" and press 'Find All' to show every cell containing that name. Values can also be searched throughout the entire workbook if needed.



Note: Click "Options" to refine the search if they are not already visible.

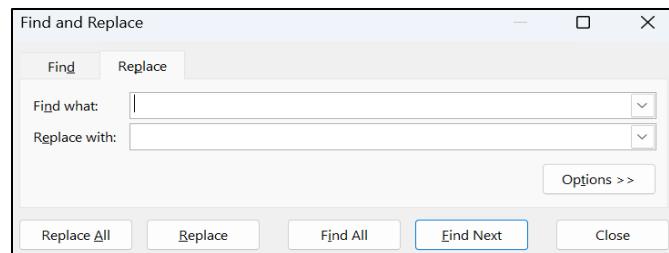
There are two helpful options in the Find tool:

- Match Case - Finds cells that only match the exact capitalization entered i.e. it makes the search **case-sensitive**.
 - Suppose a worksheet contains these cells:
 - A1: Chocolate
 - A2: chocolate
 - A3: CHOCOLATE
 - Searching for 'Chocolate' **without match case** will ignore capitalization and find all three cells.
 - Searching for 'Chocolate' **with Match Case** will only find what is in cell A1.
 - Cells A2 and A3 won't be found due to different capitalizations.
- Match Entire Cell Contents - Finds cells where the content exactly matches the entered search term.
 - For example, if this option is selected, then searching for "Chocolate" will ignore "Chocolate Chip"

To replace words, use 'Ctrl' + 'H' (Press 'Command' + 'H' on Mac) to open the Replace tool. This feature enables replacing one word with another. Before replacing data, it's highly recommended to first click 'Find All' to verify what data will be updated before it is replaced.

Task 2.1.16: Replace "Smith" with another name by clicking 'Replace All'.

Optional Task 2.16.1: Open the spreadsheet 'Student Enrollments'. Remove the word 'NEW' from student names in Column A to ensure consistency.



These tools work similarly to the Find and Replace features in Word or Adobe Acrobat, so using those programs will make the experience feel more familiar. Remember to always find the cells before attempting to replace any of them since the wrong items might be replaced accidentally.

Chapter 3 – Handling Workbooks

Scenario: Open the file: C:\....\R - Production Tracker FY2025.xlsx

This file contains multiple worksheets:

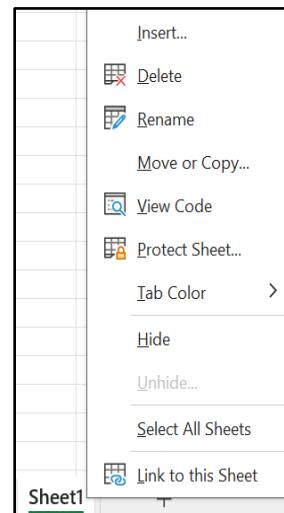
- A lookup table that ties each product's ID to its ice cream flavor and production cost (per Liter).
- Four spreadsheets, one named for each quarter (Q1–Q4) that show production information for the ice cream flavors sold in that period.
- A worksheet named '2025 – Production Expenses' that shows 2025 quarterly production details for each ice cream product, along with the total annual volume and cost.

Working with Multiple Worksheets (Tabs)

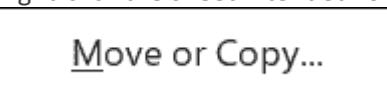
An Excel file is called a workbook, and each workbook includes multiple sheets displayed as tabs on the status bar at the bottom of the window. Click a tab to view the sheet or press 'Ctrl' + 'Page Up'/'Page Down' to switch between sheets.

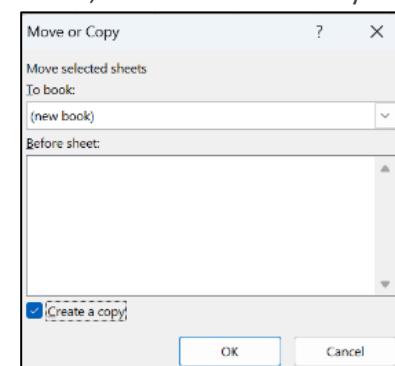
Many actions that can organize and manage spreadsheets are available on the Home tab of the Ribbon, but right clicking a sheet tab at the bottom opens a context menu that contains options such as:

- “**Insert**” option to add a sheet.
 - A sheet can also be added by clicking on the “+” icon in the status bar.
- “**Rename**” option to rename a sheet
 - Double-clicking the sheet tab can also be used to rename the name.
- “**Delete**” option to delete a sheet.
- “**Protect Sheet**” option to lock a worksheet (protection and locking will be covered in a future chapter).
- “**Tab Color**” option to change the tab color to stay organized.
- “**Hide**” option which can hide a sheet, preventing users from viewing it.
- “**Move or Copy**” command to move or copy a sheet
 - A sheet can be duplicated in the same workbook or moved to a new file.
 - To make a quick copy of a worksheet, hold ‘Ctrl’ and drag the worksheet over.
 - Note: Be careful when copying and pasting data using ‘Ctrl’ + ‘C’ and ‘Ctrl’ + ‘V’, since not all data may be copied, especially in worksheets with multiple tables or ranges.



Task 3.1.1: Duplicate the spreadsheet’s data by copying it into a new workbook.

1. Right-click the sheet intended for copying and press “Move or Copy”.

2. In the pop-up window, from the “To book” dropdown, select “(New Book)”.
3. In the same window, check the box “Create a copy” and then press “Ok”.



Grouping Worksheets

Grouped worksheets are useful since any work done on one worksheet (such as typing, formatting, or entering data), will automatically apply on all the grouped worksheets. This concept parallels how ranges work: a change applied to one cell in a range will apply the same formatting to all cells within that range.

Task 3.1.2: Create a group of sheets for Q1-Q4

While pressing and holding the ‘Ctrl’ key, select the worksheet tabs to group.

Result: Once grouped, any changes done (like formatting or tab color) on one sheet will then apply to all selected sheets.

Task 3.1.3: Ungroup a group the groups:

Press and hold the ‘Ctrl’ key, then select the worksheet tabs to ungroup.

Freezing Panes

When scrolling through a spreadsheet, the header row at the top naturally can disappear. For instance, data entry can be frustrating because if the header row is not visible on the screen, the user needs to scroll up to see the headers just to ensure that the data is going in the correct column. Freezing panes can keep those headers visible so that the user can always see them even as they move through the spreadsheet. This is sometimes called a ‘sticky’ or ‘fixed’ header since it keeps key information stuck visible at the top while scrolling.

Task 3.1.4: Freeze multiple rows to create a fixed/sticky header

- Select the row or cell immediately below the rows to be frozen.
E.g. To freeze the first three rows, select row 4 or simply cell A4
- Go to the ‘View’ tab -> Select ‘Freeze Panes’ to lock rows or columns

Result: The frozen rows are marked by a gray line and will stay at the top even when the user scrolls down the page.

Note: This is helpful since the header rows (e.g. “Qtr.”) always stay visible upon scrolling.

The ‘Freeze Top Row’ command on the ribbon keeps only row 1 visible upon scrolling.

Task 3.1.5: Undo frozen panes.

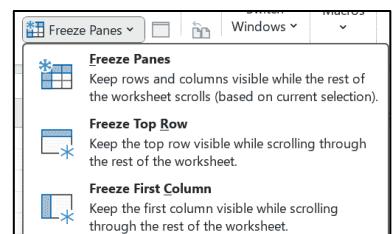
Select the command ‘Unfreeze Panes’ from the ribbon.

Task 3.1.6: Freeze Column A

Select entire column B or cell B4 & then click ‘Freeze Panes’. Column A will then remain visible as we scroll right.

Alternatives:

- Selecting a cell within a table created with headers will freeze the header row as the user scrolls down and replace the column letters (A, B, C) with structured references. This is mentioned more in the “Tables” chapter.
- The “Split” command is another way to create separate scrollable sections.



Arranging Excel Workbooks:

Useful Shortcuts:

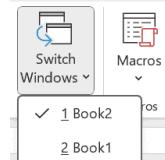
- **Ctrl + N**: Open a new workbook.
- **Ctrl + W**: Close the current workbook window.
- Use the **Windows Key + Arrow keys** to snap windows to the side, top, or bottom of the screen.

Handling a few worksheets can be simple, but viewing many worksheets can simply be overwhelming.

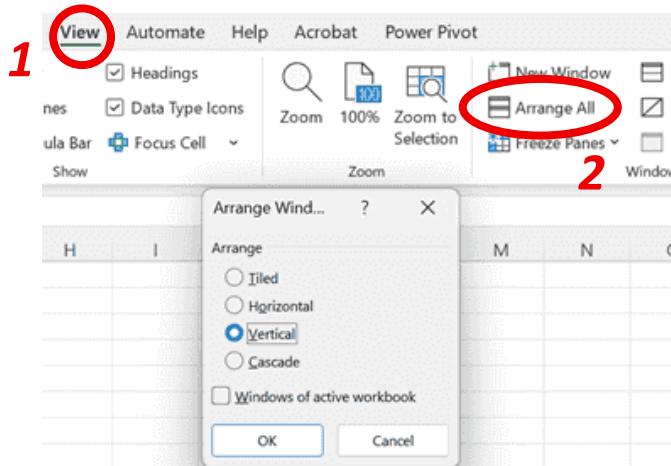
Task 3.1.7: View & compare two different open Excel files side by side.

Prerequisite: Ensure that two separate Excel files are currently open.

(This can be verified by going to the ‘View’ Tab -> click ‘Switch’ Windows)



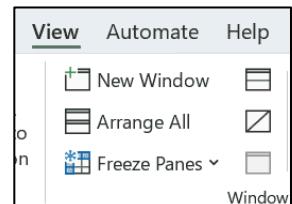
On the ‘View’ tab -> click ‘Arrange All’ to arrange multiple Excel windows (e.g. Vertical or Cascade).



Task 3.1.8: Compare two sheets within the same Excel file side-by-side (e.g., Q1 vs FY 2017 Totals).

First, ensure that the Excel file is open and that it has two separate worksheets.

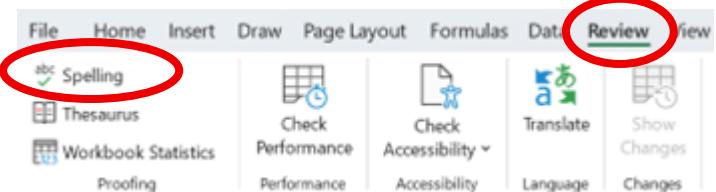
1. On the ‘View’ tab -> “Window” group -> click ‘New Window’ to open another view of the same workbook.
2. Once there are 2 excel windows opened, click ‘Arrange All’ to display them side by side for easy comparison.



Result: We can now view the same document in two windows, allowing the user to see the Q1 and Q2 worksheets simultaneously *at the same time*.

Spell Check

To check spelling in Excel, go to the ‘Review’ tab and select ‘Spelling’, or press **F7**. Excel will flag misspelled words, though uncommon names may still be marked as incorrect.



Chapter 4 – Formulas & Functions

Microsoft Excel is powerful tool for analyzing data. When a spreadsheets numbers change frequently, updating them by hand is slow and prone to errors, to which Excel offers a way to handle said calculations automatically.

Scenario 4.1: Open the File: C:\....\R - Formulas.xlsx

This file includes several spreadsheets.

Formulas

We enter math expressions or what are called **formulas** into cells. Excel formulas are expressions that perform arithmetic operations and calculations within a cell. Formulas perform math in worksheets such as adding and multiplying numbers or applying tax and return calculated results within those cells. Excel formulas can perform math calculations using the following arithmetic operators:

- '+' is used for Addition
- '-' is used for Subtraction
- '*' is used for Multiplication (use the asterisk symbol)
- '/' is used for Division (the forward slash symbol)

Every Excel formula **must** start with an equal's sign (=). For instance, to add 3 and 3 in cell A1, enter the following:

=3+3

Pressing the '**Enter**' key will display the result 6 appears in the cell.

Entering a formula in a cell shows the output result instead of the formula itself.

Excel formulas can be entered directly in cells or via the Formula Bar. The Formula Bar can be used to edit cell contents, move between cells, and see what's in the selected cell. It also helps quickly insert existing formulas, and the buttons to its left give extra options.

Note: The **formula bar** still shows =3+3, which is the actual input. Press Ctrl + Shift + U to expand the formula bar.

The output is what's in the cell (the result).

The input is what is in the formula bar (the formula).

Let's try a few examples:

- = 7 - 1 => Result: 6
- = 7 * 2 => Result: 14
- =100/4 => Result: 25

To edit a formula, either:

- Double-click the cell
- Use the formula bar
- Or press **F2** to enter **edit mode** (you'll see the ribbon grayed out while editing)

Press '**Enter**' to save changes or '**Escape**' to cancel.

Formula Formatting Tips

1. Start every formula with =
 - o No spaces are allowed before the equal sign. Even a single space will cause the formula to fail.
2. Spaces can be used between numbers and operators for clarity.
 - o For example:
 $=3 + 3$ is the same as $=3+3$
3. Use parentheses to control order of operations & change the outcome. For example:
 - o $=4 * (3 + 2)$ → Result: 20
 - o $=4 * 3 + 2$ → Result: 14

Normally, a cell that contains a formula will show the result (e.g. 100). The Show Formulas command in Excel displays all formulas in the sheet instead of the results. Consider it as 'peeking behind the curtain,' since it shows the makeup of the formula which makes it much easier to spot errors.

Task: Show All Formulas

Action: Go to the Formulas(tab) and under Formula Auditing (group), click Show Formulas(command)

Shortcut: Ctrl + ` (backtick key)

Remember to treat it like a light switch; turn it on to see the formulas and turn it off to return back to the results.

Using Cell References

Situation: Open 'Sheet2.xlsx'

Although basic formulas can be made using constants (e.g. $=3+3$), we can reference other cells in formulas instead of typing in the numbers directly. A cell reference is another name for cell name or cell address. Cell references help keep formulas correct because they update automatically when the cell value changes. One key benefit is that updating a value used in a formula will automatically update the result.

Example:

B3 contains 500 and

B4 contains 700,

On B7 we can add them together with: $=B3 + B4$. This returns 1200.

Note: Updating cell B3 or B4 will automatically update the total too.

Precedents and Dependents

- A **dependent** is the cell that contains the formula (e.g., B7).
- **Precedents** are the cells that the formula depends on (e.g., B3 and B4).

Note: Moving the dependent cell (B7), the formula and result stay the same. But moving the precedent cells will update the formula and yet keep the result to be the same. This can be visualized using:

- **Trace Precedents** in the Formulas tab
 - **Trace Dependents** to see where a cell is being used
 - Use **Remove Arrows** to clear those traces
-

Formulas with Dates and Text

On any cell, we can press 'Ctrl' + ';' to get today's **static date**.

To add a single day, we can enter: =E1 + 1

To combine (concatenate) text, we can type:

G1: "North"

G2: "east"

To now combine two cells: =G1 & G2

The & symbol is the concatenate operator that joins the contents of the two cells (e.g., "North" & "east" → "Northeast").

Practice Example: Grocery Cart

Let's switch to **Sheet 3** and do a fun example.

Imagine we're buying grocery!

A2: Bananas **B2:** \$1.50

A3: Avocados B3: \$2.00

A4: Milk **B4:** \$0.99

A5: Eggs **B5:** \$10.00 (yes, that's the real price in California!)

Let's first apply formatting:

- Apply a **currency format** by selecting cells B2 to B5, and clicking the \$ icon on **Home** tab -> **Number** group.
 - Use **Increase/Decrease Decimal** command to control decimal places
 - Note: Formatting (like rounding) doesn't change the actual input

Task: With our items written, in cell B8 let's write a formula to calculate the total price using cell names:

In cell B8 we can write: $=B2 + B3 + B4 + B5$

As a result, the total provided is: **\$16.00**

To verify, select B2 to B5 and check the Status Bar at the bottom of the Excel window to show the sum.

Note #2: Writing = B2 + B5 will only add two cells i.e. not everything in between! We are simply adding the price of each individual cost. We could absolutely use the SUM function, which requires a colon (:) to specify the full range and this will be explained in a later task!

Now, let's assume that there is a tax of **10%**.

In B9, we write the tax: $\tau = 0.1$

In B10, we write the Taxed Amount: = B8 * B9

In cell B11 to get the grand total (a.k.a. the damage to your wallet), type:

B11 (Grand Total): =B8 + B10

If you decide to add another item (like peanut butter for \$3.00), just update the formula in cell B8:

=B2 + B3 + B4 + B5 + B6

Thanks to our formulas, Excel will automatically recalculate the total, tax, and grand total.

Functions

Formulas are useful because they provide a quick way to add or multiply constant or cell values. We will now shift our focus to functions which can make work even more efficient

Scenario 4.2: Open the File: [C:\....\R - Functions.xlsx](#)

This file includes a dataset of ice cream sales across four quarterly periods within one year, presented in a Sales Ledger similar to the workbook we used earlier. Each row corresponds to a single flavor, and in this file, we'll complete columns F through J shortly which provides columns outlining each flavor's total annual sales, average quarterly sales, and unique product ID.

A function is essentially a pre-built formula that's already stored in MS Excel's memory. Instead of writing a drawn-out formula, simply call the function by name, and MS Excel will handle the calculation because a function is a ready-made formula.

Similar to formulas, all functions **must** start with an equal sign. Omitting the equal sign when entering a value will cause Excel to interpret the value as literal text. Contrary to formulas however, every function has its own name and purpose. For example, even if two functions have similar names, such as SUMIF and SUMIFS, they'll operate differently. Functions typically take in inputs called "parameters" or "arguments". These parameters can be:

- numbers,
- text,
- dates,
- cell references,
- cell ranges,
- and even other formulas and functions!

For example, one of the most common functions is the TODAY() function. In cell F10 of a worksheet, we can display today's date by typing:

=TODAY()

This will return a result such as **3/7/2025**. The **TODAY** function takes no arguments, and Excel automatically updates the cell to the current date. Typically, by default, Excel workbooks are set to update automatically. This can be confirmed by going to: **Formulas (tab) -> Calculation (group) -> Calculation Options -> Automatic**

Microsoft and Google offer comprehensive documentation on functions that is worth exploring. Many Excel functions work the same way in Google Sheets.

Among the most widely used functions is the SUM() function. The following two pages will show examples and cover common functions—SUM, AVERAGE, MAX, and MIN—as well as AutoFill patterns and loops. These are core Excel skills that apply in both Microsoft Excel and Google Sheets.

Situation 1: Open ‘Sheet1’

The spreadsheet ‘Sheet1’ shows the following examples of how the SUM Function will be used to add constant numbers.

Recall the earlier task where we can toggle and show the formulas via

Shortcut toggle: Ctrl + ` (backtick)

Press it once to show formulas, press it again to return to normal view.

Example 1: Cell A1 uses the SUM function to add the constants 1, 3, and 5 directly:

A1: = SUM(1,3,5)

The name of the function is SUM, and the parentheses contain the input values that will be added, separated by commas. In this case, it adds $1 + 3 + 5$, giving a result of 9.

If we have selected a cell that contains a function (e.g. Cell A1) and then we click on the Insert Function button (I.e. the f(x) button), Excel opens the Function Arguments dialog box.

Excel’s Function Arguments pop-up box will display the function name, its arguments and descriptions, and the current results for both the function and the formula.

Task: Click cell A1 and then open the Function Arguments dialog box.

Example 2: Even if the **spacing inside the parentheses** varies, Cell A2 still returns 9.

A2: = SUM(1, 3, 5)

Example 3: We can also perform arithmetic inside the SUM() function:

A3: = SUM(1, 2+1, 5 * 1)

Note: Excel will evaluate each argument automatically, so we do not place an '=' before each input argument.

Example 4:

In Microsoft Excel, we can place functions inside other functions; this is known as *nesting functions* and is one of the most powerful features of Excel formulas.

A4: = SUM(1, SUM(2,1), 5)

Situation #2: Open ‘Sheet2’

In the previous grocery cart example, we used a simple formula to find the total amount using cell names. Let’s now see how we can use the **SUM** function to calculate that value.

First, we must ask ourselves: What is the range of data to add up? Since we are totaling each individual cost, the range starts at cell B2 and ends at cell B6. So, the range is written as **B2:B6** (that’s B2 colon B6). Hopefully, you remember this from Chapter 1 since this ranges name represents all the cells between B2 and B6.

To get the sum, we do NOT type in a blank cell (say, F2) =B2:B6, Excel will simply display the contents of those cells—it won’t add them. To actually calculate a total, we need to use a function.

B8: =SUM(B2:B6)

Pressing Enter will return the sum of all those values.

Example 5:

Excel has a huge library of built-in functions available on the Formulas tab.

Situation #3: Open ‘Sheet 3’.

We’ll focus on Silva’s data for this part.

1. hide the rows below Silva so we can concentrate on that single row.

Rows 4:26 have data hidden for simplicities sake.

To understand how to use the **SUM** function, we first need to consider what we’re adding.

The main question to ask ourselves is: In the spreadsheet, what range of cells contains Silva’s quarterly expenses?

Answer: Since the first cell in the range is B4 and the last one is E4, the range of data for Silva’s quarterly expenses is **B4:E4**

With this in mind, we can wrap the range in the **SUM** function to calculate the total of Silva’s quarterly values.

F4: =SUM(B4:E4)

There are different ways to enter this information, but all methods produce the same result.

Option 1: We could type the function directly into cell F4 to output the total.

Option 2: Alternatively, there’s a great shortcut for this:

Select the range B4:E4 and press Alt + =.

Excel automatically inserts the SUM function and displays the total in the cell immediately to the right (F4).

Microsoft actually added this shortcut because the **SUM** function is used so frequently.

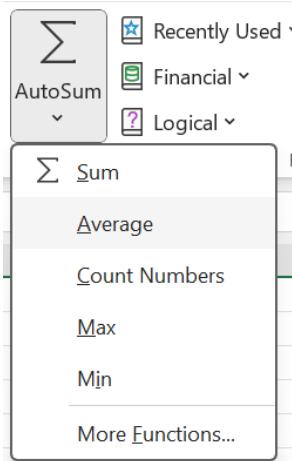
Option 3: If you prefer doing it manually through the ribbon, you can also go to the Formulas tab, click AutoSum, and choose Sum from the dropdown. That will produce the same result in cell F4.

Example 4:

Next, let's calculate some other statistics for Silva's data.

First select the same range (B4:E4) again (Make sure not to include F4, since it contains the total. To include it would skew the average, since F4 already sums the values in B4:E4).

Having selected our range B4:E4, click the AutoSum dropdown and choose Average instead.



This will now insert the AVERAGE function in cell G4, which provides the average of Silva's quarterly amounts.

Note: If your column is too narrow, the number may appear rounded, so you can widen the column to see the exact value.

Task: Find the highest Quarter Sales value:

To find the highest, use the MAX function in cell H4: =MAX(B4:E4)

OR Highlight cells B4:E4 and then click on MAX()

Task: Find the lowest Quarter Sale value:

To find the lowest, use the MIN function in cell I4: =MIN(B4:E4)

So, across row 4, we'll have:

F4 = SUM(B4:E4)

G4 = AVERAGE(B4:E4)

H4 = MAX(B4:E4)

I4 = MIN(B4:E4)

All of these were inserted using the AutoSum dropdown or typed directly.

Result: The SUM, AVERAGE, MAX, and MIN formulas are showing correctly.

We do not need to write the same functions for each of the columns but rather have autofill do the work for us.

Autofill

Let's take a moment to talk about **Autofill** in Excel. Autofill is a powerful feature that allows you to quickly extend patterns or sequences in your worksheet.

In the previous tasks, we've entered functions describing the sales (e.g. SUM, AVERAGE, etc.) for the first record of line 4. AutoFill is a tool we can use to quickly copy functions from one cell down a column. It's useful because:

- It saves time by entering the same function across on a column without the need to manually type the function repeatedly for each row.
- It keeps formulas consistent and automatically adjusts cell references for each row.

Situation: Open Sheet #4

Task: Use the AutoFill handle to quickly copy or extend a function down the column

- Click on the cell with the formula (for example, cell F4 contains the SUM function).
- Move your cursor to the bottom-right corner of that cell. You'll see a black cross/ '+' sign appear.
 - This small plus sign is called the AutoFill handle.
- To automatically fill the formula into the cells below, either:
 - Double-click that plus sign
 - OR
 - Click and drag the small square at the bottom-right corner of the cell (the AutoFill handle)

Result: This will automatically copy the formula down to all the other rows, adjusting the references accordingly.

Task: Use the autofill function to now quickly copy the cells containing the other functions (AVERAGE, MAX, and MIN) down their respective column for all of the other records.

- Select the cell that has a function
- Hover over the bottom-right corner, then either
 - double-click, or
 - drag down to apply the formula to the remaining records.

As a result, the functions will populate across your spreadsheet, with each row showing its correct result. That is what the AutoFill tool is; it fills cells with data that follows a pattern.

Some More Examples of Autofill Patterns

Situation: Open up “AutoFill Practice Examples”. We will practice using autofill on different sets of data.

Task #1: Drag and autofill a single cell to copy the value in A1 (e.g. “Hello World!”) to other cells.

Select the cell (A1), hover over the lower-right corner until a black cross appears, click and drag to fill and repeat “Hello World” across cells.

We use AutoFill to continue patterns by selecting at least two cells and dragging them to fill.

Task #2: Use AutoFill in Column B to extend the simple numeric pattern 1, 2, 3.

First select the range and then drag the fill handle to automatically extend the series—up to 12, for example.

Task #3: Use AutoFill to fill a series with decreasing numbers.

Select the range C1:C3, then drag down to continue the pattern, with each entry decreasing by 100.

Note: Selecting only one cell before dragging will simply copy the same value instead of extending the pattern.

Autofill works with various types of data:

Self-Exercise: Use autofill to continue:

- Text patterns like “Order 1,” “Order 2,” or “Product 1,” “Product 2.”
- Dates and times, such as “1:00,” “1:30,” “2:00,” etc.
- Months (“January,” “February,” “March,” ...) and days of the week (“Sun,” “Mon,” “Tue,” ...).
- For days, use the first three letters (e.g., “Sun,” not “Sunday”).

Autofill works both vertically and horizontally, so we can also extend sequences across columns or rows.

Repeating Patterns

By default, Autofill continues the series. If you’d like the pattern to repeat (e.g., 1, 2, 3, 1, 2, 3...), first apply an autofill. After doing so, look for the Autofill Options button that appears after you drag. Click the dropdown and select Copy Cells instead of Fill Series. This will loop your pattern instead of extending it.

Creating Tables

Once your data is filled, we can also format it as a table for better organization. Simply click inside your dataset and press **Ctrl + T** (T for Table!). This will automatically convert your range into a formatted table. We shall discuss this more in the Tables section.

Topic: Calculating Commission with Formulas

Next, let's calculate sales commissions.

Suppose the commission rate is stored in cell M3 (4%), and a salesperson's total sales are in cell F4.

Your formula for commission in J4 would be:

=F4*M3

However, when you autofill this formula down, you might notice all other rows return 0. This happens because Excel uses relative referencing—it adjusts cell references as you drag.

So in the next row, it looks at M4, which is empty.

To fix this, lock the reference to the commission rate in M3 by making it absolute:

=F4*\$M\$3

The dollar signs keep that reference fixed when you autofill.

You can quickly toggle between relative, mixed, and absolute references by selecting the cell reference and pressing F4.

More Practice on Functions (SUM, AVERAGE, MAX, MIN)

Let's practice with a worksheet that tracks quarterly sales.

Total:

In F2, use:

=SUM(B2:E2)

Then autofill down.

Overall Total:

In F12, use:

=SUM(F2:F10)

or

=SUM(B2:E10)

Average:

In G2, use:

=AVERAGE(B2:E2)

Then autofill down.

Highest and Lowest Quarters:

Highest:

=MAX(B2:E10)

Lowest:

=MIN(B2:E10)

Difference Between Highest and Lowest:

=B12-B13

Chapter 5 - Formatting

Worksheets can be hard to read, especially with large amounts of data. Microsoft Excel has formatting tools that help organize information and make important details stand out, so that worksheets are clear and easy to use.

Situation: Open the file:

C:\.....\R - Formatting.xlsx

Scenario: The worksheet “Issue Log” presents a log that tracks problems arising during a renovation project, their impacts, and how they’re being resolved.

Most of the tools we’ll use in this chapter are found on the **Home** tab. You may already be familiar with many of these individual icons (for example, the Font group is very similar to Microsoft Word), so this book will focus on the most useful ones. For instance, we often need to change the fill color of our cells which can be done via Home tab -> Font Group -> Fill Effect.



Font

We can also access formats by pressing **Ctrl + Shift + F** OR **Ctrl + Shift + P**.

Clearing Formats

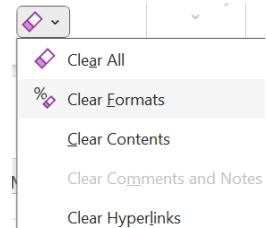
Cells can contain multiple formats such as purple text, bold, underlined, or a larger font size. A useful command is **Clear Formatting**, which removes all formatting from the selected text and leaves only plain, uniform text.

Task: Use ‘Clear Formatting’ button on cell J1

Prerequisites: Have a cell that contains some formats (e.g. bold and red font)

Action:

- 1: Select a cell that has formatting
- 2: Go to Home (Tab) -> Editing (Group) -> Clear Formats



Format Painter

The Format Painter allows formatting (which could be the color, font style and size, or borders) to be copied from one cell and applied to another.

Task: Use Format Painter to copy and paste formatting onto another cell.

Prerequisite: Assure that there is a cell that has formatting we’d like to copy.

Action:

1. Make sure we’re on the cell we’d like to copy.
2. Double-click the Format Painter button to have the cursor change into a paintbrush icon.
3. From there, simply select the cells you want to format.

Results Result: We should see the formatting is then applied and copied over to other cells. Once we’re done, press ‘Esc’ to turn Format Painter off.

Font Group & Alignment

Let's look at alignment and text overflow. Suppose cell A1 contains the value "Sales Ledger Reported on". Press the command 'Ctrl + ;' at the end to get current date. If the text is too long, it might overflow into the next cell. To fix that, there are three main ways:

1. **AutoFit the column** by double-clicking the right edge of the column header.
2. Use **Wrap Text** (under the Alignment group). This makes the text stay inside the cell and wrap to the next line automatically.
3. **Merge and Center** cells. Select a large group of cells and then on the Home tab, under Alignment (group), click **Merge & Center**. This combines cells and centers the text.
 - Merged Cells usually have the text centered vertically & horizontally.

To have the text display on two separate lines within the same cell, place the cursor where we want the line break and press **Alt + Enter**. This inserts a line break inside the cell.

Task: Apply formatting to change alignment settings such as centering vertically or rotating text slightly.

Result: Some visual effects have been applied.

Number Formats

Next is the **Number group**. Formats can also be copied with Format Painter, but the dialog box gives more options. For example, you can change a number to different currencies (dollars, yen, pesos, etc.), or you can format cells as dates and times.

Task: Cover the difference between accounting & currency formats.

Task: Press **Ctrl + ;** enters today's date.

- Dates and times can then be displayed in different styles (e.g., 24-hour or AM/PM). Note that even though the display changes, the underlying value remains the same.

Styles

Moving on, let's talk about **Cell Styles**. Cells that have a given style will have multiples formats. Styles are prebuilt combinations of formats - useful for labeling, calculations, or highlighting important cells. We can create and save our custom styles instead of formatting cells manually.

There's also **Format as Table**, which we'll cover more in part two.

Conditional Formatting – Part 1

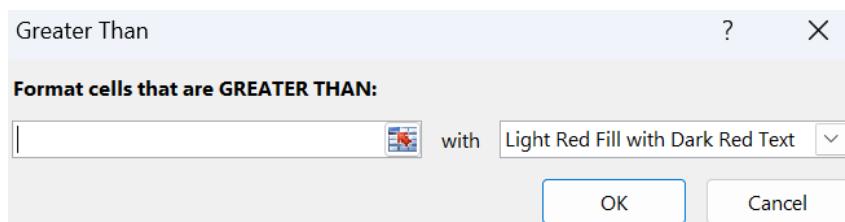
A condition is something that must happen or be true before something else can happen. For instance, conditional love is a type of love that depends on certain things or behaviors. A conditional surrender is a form of surrender that occurs only if specific terms are met. With this in mind, conditional formatting is a feature that automatically applies formatting to cells when certain criteria's or conditions are met. For example, we can highlight the bottom 5% of sales totals to easily see which products are underperforming.

Task: Highlighting cells greater than a certain value (e.g., sales less than \$400,000 turn green).

Action: 1. Select the range of cells F2:F50

2. Click Home (Tab) -> Styles (Group) Conditional Formatting (Drop Down) -> Highlight Cell Rules -> Less Than

3. On the pop up alert, we'll format all cells less than 400,000.

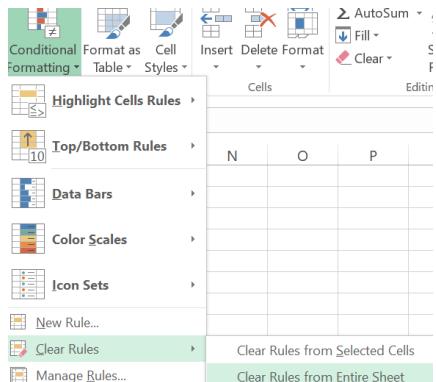


Result: We will see all cells less than 400,000 formatted with a light red fill.

Note: Changing the number will no longer satisfy the condition, causing the formatting to update instantly.

To clear all Conditional Formatting rules, go to:

Home (tab) -> Styles (Group) -> Conditional Formatting -> Clear Rules -> Clear Rules from Entire Sheet



Note: We can also manage each rule individually under *Manage Rules*.

Other common rules can include:

- Equal to (e.g., highlighting all cells where the region is "Southwest").
- Duplicate values (great for finding duplicate emails or names).
- Dates greater than or less than a certain date.

You can also use Color Scales, Data Bars, and Icon Sets to visualize trends.

Chapter 6 – Printing

Although most information today is digital, there are still times when a printed copy of a document is needed. Before printing a workbook, we should always check and preview the print settings to make sure everything looks right.

Scenario: Open the file: C:\....\R - LA County Fighter Roster.xlsx

This workbook is a fun, made-up dataset that places UFC fighters into Los Angeles County public service jobs. Every row records a fighter and the department they are assigned to (DPSS or DCFS) with the columns listing the office location name, office address, first and last name, and a corresponding employee email.

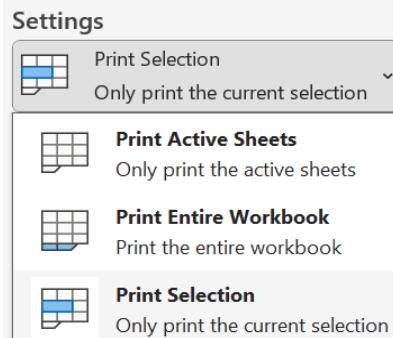
In this example, the workbook looks great with different styles and formatting. The problem is when we open Print Preview by pressing ‘Ctrl’ + ‘P’, we find that the spreadsheet is spread across seven pages. Pages 1–2 show the data from first set of columns, pages 3–4 show the next set, and page 5 shows commission rates and other metrics.

Task: Make the document more printer-friendly by reducing it down to 2 pages.

Subtask #1: Prevent extra columns (e.g. anything past column F) from printing.

There are multiple ways to accomplish this:

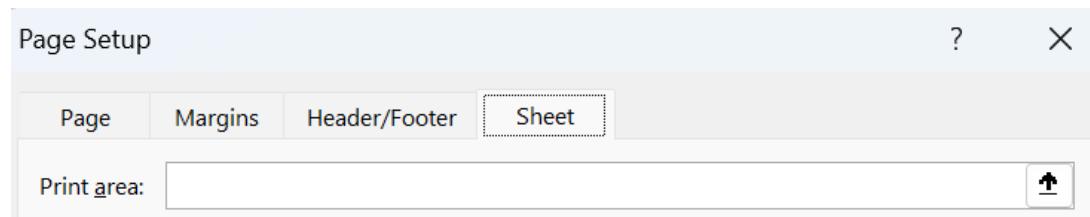
- Option #1: Simply hide excess columns past Column F, which will then reduce the page count.
- Option #2: Use the “Print Selection” option to print only the selected cells (not the whole worksheet).
 - First, we must select the cells that we want to print:
 - Select any cell within the main dataset.
 - Then press Ctrl + A to select the entire dataset.
 - Once the data has been selected, go to print settings (press ‘Ctrl’ + ‘P’ or go to ‘File’ -> ‘Print’).
 - Under the Print settings, select the “Print Selection” option



- Option #3: The third and final way is to set up a **print area**, so that only the selected range prints.
 - Just as shown in the first step of Option #2, first we must select the cells that we want to print:
 - Select any cell within the main dataset.
 - Then press Ctrl + A to select the entire dataset.
 - Once we’ve selected the data to print, go to Page Layout (tab) -> Print Area -> Set Print Area.



Option #3 Result: The print area is set, but there are no visual indicators showing that it's been set. We can confirm the print area by going to Page Layout -> Print Titles and viewing the print area there.



As a result, using any of these three options will cause the print preview (Ctrl + P) to show a decreased page count.

On the Print Preview Page, we can further reduce the number of pages printed by:

- Changing the orientation from "Portrait" to "Landscape"
- Adjusting the page margins from "Normal" to "Narrow"
- Finally, use the Scaling option to select "Fit All Columns on One Page"
 - Be careful when using the 'Fit Sheet on One Page' option, because although it works, the trade-off is that it makes the text hard to read.
 - Therefore, "Fit All Columns on One Page" is often the best option.

Result: Our document has been reduced to two pages, thereby successfully finishing our task.

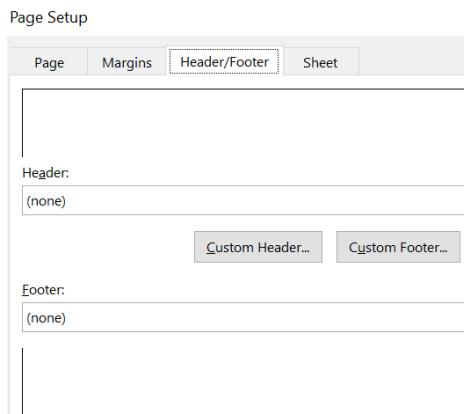
Task: Add headers and footers to a printed Excel worksheet | [Link](#)

1. On the Page Layout (tab) -> Page Setup (group) -> Select **Print Titles** (Command)

Word of Caution: The Print Titles command will be greyed out if you're editing a cell or have a chart selected.

2. On the 'Page Setup' alert window, click the "Header/Footer" tab

3. Choose a header (like "Created by [Name]") and a footer (like "Page 1 of ?") to appear in Print Preview.

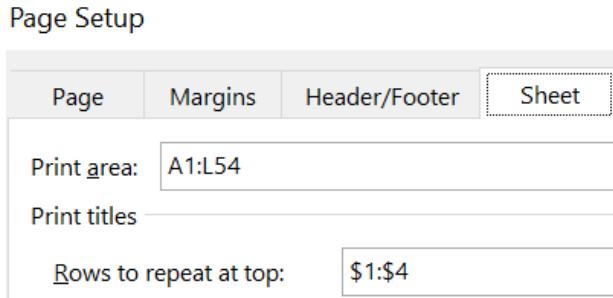


Task: Make the header rows (i.e. Rows 1-4) repeat on every page

Action:

On the same “Page Setup” window, under Print titles, go to the Sheet tab

Under the Print Titles alert, set the “Rows to Repeat at Top” field to the rows containing the column labels (e.g., rows 1–4).



Subtask Result: This will ensure the headers are visible on all pages.

Overall Task Result: With that, we've successfully reduced the workbook from five pages to two, added headers and footers, and repeated header rows for clarity.

Task: Insert a page break to balance the content so that each page prints exactly 25 rows.

Solution:

Select either the entire Row 30 or just cell A30.

Go to the ‘Page Layout’ (tab) -> click ‘Breaks’ -> Select ‘Insert Page Break’

Congratulations—you’ve completed this exercise!

Chapter 7 - Sorting, Filtering, Grouping & Subtotaling Data

Microsoft Excel can sort, filter, and subtotal data, which helps users organize and understand data better. A lot of the material in this chapter will carry over to our future chapter on Pivot Tables since we can sort and filter data in a pivot table just like we do with regular data; the commands might look a little different, but the end point is the same which is to organize your data.

Sorting

Situation: Open the file: C:\....\R - Employee Log.xlsx

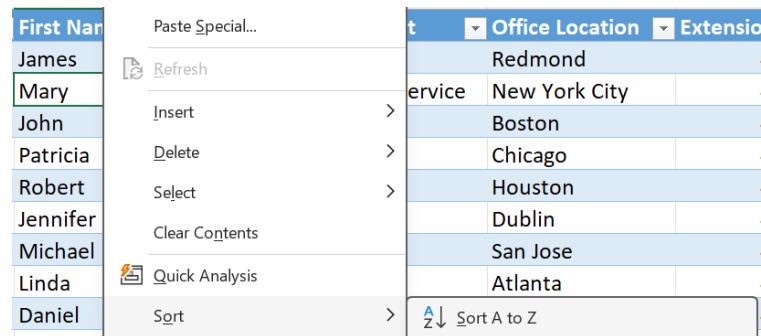
Scenario:

In this spreadsheet, each record represents an employee working in different departments and offices, with details such as hire dates and extensions. Notice that the list is unorganized; the list isn't sorted alphabetically e.g. by first or last name. That's where sorting helps since it rearranges your data to make it organized. For instance, you can sort a column:

- alphabetically (A to Z),
- reverse alphabetically (Z to A),
- by date (oldest to newest or newest to oldest),
- or by extension (smallest to largest or largest to smallest).

Task: Let's suppose we want to sort by first name. The easiest way to sort is by:

- Clicking on any single cell in the column you want to sort (You don't need to select the whole range.)
- Right click on that cell and on the context menu, hover over "Sort"
- Pick your sorting option. In this case, we'll select 'Sort A-Z' from the context menu



Keep in mind: Since Excel treats the first row as a header, it will be excluded from sorting.

Since data stays consistent in MS Excel, sorting by one column will affect the other columns. Sorting by a different column afterward means then that the current sort overrides the previous sort.

Task: Sort the data by last name.

Note: The data is no longer sorted by first name. In other words, we can only sort one column at a time.

Excel also recognizes data types. If we were to sort a column that contains date values, it will offer sorting options like "oldest to newest" or "newest to oldest" instead of alphabetical sorts.

Task: Sort by hire date.

Task: Sort by Extension number

Task: Sort by color

Note #1: If a column contains a blank cell, sorting will place that blank cell at the bottom, regardless of sort order.

Note #2: Be careful of blank/empty rows when sorting data. If there's a blank row within a data set, Excel will stop sorting at that row since it thinks the data ends there. This disrupts the sort order as it leads to a partially sorted dataset, which can be misleading because rows further down remain unsorted. This usually happens in large datasets when rows are cleared of content but not deleted.

Multilevel Sort

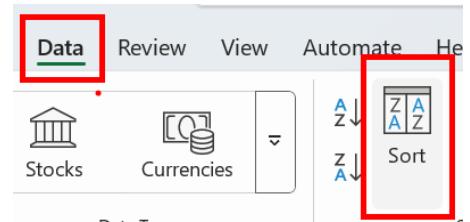
In Excel, we can't sort two columns independently at the same time. For example, we can't sort by **First Name A-Z** and **Last Name Z-A** simultaneously. However, we can perform a multi-level sort where Excel sorts by one column first, and then within each resulting group (or subsort), sorts by the second column. That way, you're sorting the data in a hierarchical order.

Task: Use the Sort tool to first sort employees by department, & then sort by their first name within each department.

1. Go to the 'Data' tab and click 'Sort'

The Sort dialog box opens where you can add multiple levels of sorting.

2. Add a sort level for 'Department'.
3. Add a second sort level for 'First Name'
4. Apply the sort.



Result: We sorted the large dataset by multiple columns: first by department, then alphabetically by employee name. This allows data to be organized more precisely.

Sorting can be automated, but it usually requires a macro. Excel doesn't automatically sort data as you type, so to make that happen, you'd need to add a bit of code.

Sorting and filtering usually go hand in hand together, so it's only natural to next discuss about filtering. Sorting and filtering are essential tools when working with datasets. Filters can be encountered on various websites such as YouTube, Amazon or eBay where you narrow down results by price, rating, or brand. Excel's filters work in a similar fashion.

Filtering

Filtering helps you narrow down data to just the information you want to see. Think of it as casting a net; you're targeting only specific departments, locations, or criteria within your dataset. By focusing only on specific categories or values, filtering helps reduce the amount of data you're looking at.

To display filters:

1. Make sure you're clicked somewhere inside your data set.
2. Go to the Data (tab) -> Click on Filter.

⚠️ Important: If you're clicked on a random cell outside of the data set, the filter won't apply properly.

Once filtering is enabled, you'll see drop-down arrows appear in the column headers. This doesn't imply that filtering has occurred, because all rows are still shown.

Task: Enable/Apply Filters by department.

Click the drop-down in the Department column and uncheck everything except "HR," "IT," and "Engineering."

Now your table only shows people from those departments.

Additional filters in other columns can further refine the data (e.g., only show people in office "CC1").

When you're done, click Clear to remove all applied filters and return to the full dataset.

Task: Filter out blank cells in Excel:

- Ensure a filter is applied by checking if the filter arrows are visible on the header row.
- Click the filter arrow on the desired column.
- Uncheck (Blanks) in the dropdown.
- Click OK.

We can also find and remove blank rows using Excel's "Go To Special" feature. Here's how:

- Select your entire dataset. Be sure to include any blank rows!
- Go to the Home tab, find the Editing group, click Find & Select, and then choose "Go to Special".
- In the pop-up box, select "Blanks" and click OK.
- Excel will highlight all blank cells. To delete the blank rows, right-click one of the selected row numbers and choose Delete.

Custom Auto Filters

Custom AutoFilters in Excel let you filter datasets according to specific criteria. Filter options change according to the column's data type; click the filter arrow in the header and select Text, Number, or Date Filters to see more options.

Below are the most common custom AutoFilter options in Excel:

Text Filter

Text Filters help find data based on specific words or phrases (**Note:** This option works only with text columns).

Task: Find people whose names start with "R". To do that:

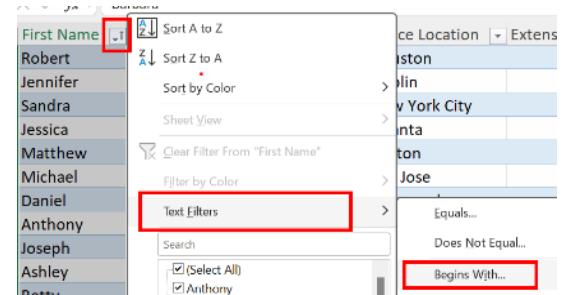
- Click the drop-down on the 'First Name' column.
- Go to Text Filters > Begins With.
- Type "R".

Custom Autofilter

Show rows where:

First Name

begins with



✓ As a result, only names beginning with 'R' will appear.

Additionally, we can also use the filter search bar and type "R" to show names that contain "R" anywhere, not just at the beginning. To show word that begin with the letter "R", type in "R*" in the filter search box. The asterisk (*) is a wildcard that matches any characters after "R" such as how wildcards work in SQL.

The screenshot shows the 'Text Filters' dropdown menu from the ribbon. The search bar contains 'A*'. The 'Text Filters' section is expanded, showing the search results: '(Select All Search Results)', 'Add current selection to filter', 'Anthony', and 'Ashley', all of which are checked.

Filtering by Date

We can apply Date Filters for columns with date values to focus on specific time periods. After selecting Date Filters, we can see a wide range of time-based filters such as:

- ‘Before, After, or Between’ option to show dates in a specific range.

Task: Filter a date range to show only hires after January 1, 2000

- Click the drop-down on the Hire Date column.
- Choose Date Filters > After.
- Enter the date.

- ‘All Dates in the Period’ option lets you group dates by year, quarter, or month.

For instance, if you want to see employees hired in specific years like 2011, 2013, or 2015, you can select those from the drop-down or if you want to see everyone hired in August, we use the filter to select only that month.

These filters are helpful when managing timelines, tracking dates, checking overdue tasks or reviewing trends over time. For example, you can use a filter to view only sales made in the last quarter.

Filtering by Numbers

Number Filters can be used to find data based on specific numbers or ranges.

Task: Only show people whose extension numbers fall between 4200 and 4500:

- Go to the Extension column.
- Choose Number Filters > Between.
- Enter the range.
- As a result, we’re only viewing those records that fall within that range.

Remember: When we sort data, we typically also apply filters to narrow it down.

A few important points to remember and watch out for:

For example, if you filter the data to show only the “HR” department and then use **Ctrl + F** to search for “IT,” Excel will say no results found. That’s because the “IT” rows are hidden by the filter even though they still exist in the sheet!

One common issue is when a filter is active without you knowing. For example, if someone filters the data without telling you, your search results might appear incomplete. This is similar to how printing with a filter only includes visible rows, searching for a term that’s been filtered out won’t return any results.

This begs the question: [How Can We Tell a Filter Is Applied?](#)

Note: Seeing the dropdown icons or the sort and filter button (on the ribbon) lighting up don’t mean filters are applied; the icons remain visible whether or not a filter is applied.

Lucky for us, there are a few ways to check:

- Funnel icon: The drop-down arrows in the headers turn into a funnel symbol on columns that are filtered.
- Clear option available: If the Clear button is active, it means a filter is in place.
- Missing row numbers: You’ll notice some row numbers are skipped on the left.
- Status bar: At the very bottom of the Excel window, the status bar will say something like “11 of 30 records found”. This one is easy to miss but very useful.

Copying Filtered Data

On prior versions of MS Excel, copying and pasting filtered data might paste all the data. If this does occur, after selecting the data, make sure to instead use the "Select Visible Cells Only" under the "Go To Special" menu. Otherwise, hidden rows might be copied along with the visible ones. Using an Excel Table format can also avoid this.

NOTE:

Now keep in mind that having a header row in your dataset is important when applying filters, as it allows Excel to organize the data properly and improves clarity. So for instance if your data looks like the following:

John	Smith
Jane	Doe
Ali	Mirza

If the top row is "Jon Smith," Excel will treat "Jon" and "Smith" as column headers when you apply a filter. This means:

- We can't filter or sort the "Jon Smith" row because Excel thinks it's the header.
- Filter dropdowns will show up in the first row, and only the rows below it will be filtered.

To fix this, we can add a header row like so:

First Name	Last Name
John	Smith
Jane	Doe
Ali	Mirza

Grouping (again)

As you might recall from Part One, we can group columns to collapse or expand sections for easier viewing:

1. Select the columns to group (e.g., D:F).
2. Go to Data (Tab) -> Outline (Group) -> Group (Command)
3. A small plus/minus icon appears to expand or collapse the group.

You can do the same for rows. This is especially helpful for spreadsheets with many columns, allowing users to focus only on the data they need.

To ungroup, select grouped columns or rows and from the ribbon, click 'Ungroup' to return them to normal.

Subtotals

Subtotals in Excel are used to quickly group and summarize data. Instead of summarizing columns, subtotals calculate conditional sums, averages, counts, etc. for each group within a single sorted column. Subtotals operate *vertically*, creating summaries from groups within a single column.

Subtotals are useful when you want to:

- Calculate totals by group (i.e. conditional sums), like sales per product or quarter, without using PivotTables.
- Collapse or expand groups for cleaner, more organized analysis

Final Note: To use Subtotals correctly, **ensure your data is sorted by the column you want to group by**. If it's not sorted, Excel will produce inaccurate or meaningless results so in short: always sort your data first - this is key.

Situation: Go to the 2018 Sales worksheet. (You should all still have it open).

In this worksheet, we're looking at quarterly sales data for different products, quantities, prices, and total sales (which are listed in column F). Column A is already sorted by quarter, so as you scroll down column A, you'll notice that each record's values are limited to one of four values: Q1, Q2, Q3, or Q4, which essentially represent categories.

Task: Find the answer to the question: "What are the total sales for each quarter?"

Note: We could find the answer by using a PivotTable (which we'll cover later), or by using Subtotals.

Action:

1. On the 2018 Sales Worksheet, **ensure column A (Quarter)** is sorted.
 2. Click on any cell in your dataset (for example, A1).
 3. Go to the Data tab and in the Outline group, click Subtotal.
 - a. If you don't see "Outline," check your screen size because some icons may be grouped together.
- The result of this step is that the Subtotal dialog box will appear.
This box lets you specify how Excel should group and summarize your data.
4. In the Subtotal dialog box, Select the following:
 - a. At each change in: Quarter
 - b. Use function: Sum
 - c. Add subtotal to: Total Sales (usually Column F)

In plain terms, it is saying: "At each change in [column], use [function] on [column]."

In this example, it is saying "At each change in Quarter, Use the SUM function On Total Sales"

Note: This works similarly to SQL's GROUP BY clause.

Press OK to finish the subtotal.

Result: After clicking OK, Excel automatically inserts subtotal rows. Scrolling down will reveal rows added that display the totals for Q1, Q2, Q3, and Q4.

Additionally, small, numbered buttons (1, 2, 3) on the worksheet's left side represent outline levels, showing grouped views that you can expand or collapse.

Level 3: Shows all details.

Level 2: Shows subtotals only.

Level 1: Displays the grand total.

This feature lets you quickly expand or collapse grouped data using the numbered buttons on the worksheet's left side to change views.

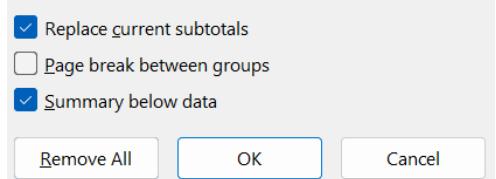
Copying Subtotaled Data

If you want to copy only the visible subtotaled results (and not hidden rows):

1. Select your data.
2. On the Home tab, Go to Find & Select -> Go To Special.
3. Choose Visible cells only, then click OK.
4. Result: Now you can copy and paste just the visible subtotal rows.

To remove all subtotals:

1. Go back to Subtotal Alert via Data (Tab) -> Subtotal.
2. Click Remove All.
3. Result: This clears the subtotal groupings.



Practice Exercise #1: Using Subtotals, determine which product generated the most sales and which product generated the least sales?

(Tip: This should be done regardless of region — we're looking at total product performance overall.)

Solution:

0. Before running the subtotal, make sure to sort your data by Product Name (A → Z). This step is crucial since if you skip sorting, your results will be inaccurate.
1. Sort by Product Name.
2. Go to Data → Subtotal.
3. In "At each change in," choose Product (not Quarter).
4. Use the SUM function for Total Sales.
5. Click OK.

Switch to Level 2 view to see each product's subtotal. After doing this, you should find:

Printers had the lowest sales.

Laptops had the highest sales.

Practice Exercise #2: Using Subtotals, determine which region generated the most sales.

Common Mistakes

- When removing a subtotal, do not click Ungroup since that doesn't properly work.
 - Instead, always use Data (Tab) -> Subtotal (Group) -> Remove All to get rid of them.
- Always sort the column you're grouping first. If you don't, the results will be misleading.

In short, subtotals are a quick and simple alternative to PivotTables for summarizing data. They can organize and summarize data by calculating totals, averages, or counts for each category.

Chapter 8 - Creating Tables

In Microsoft Excel, a table is essentially a structured container for a dataset. It organizes data neatly and provides structure, which helps with:

- Improving robustness
- Using formulas like XLOOKUP
- Exporting data to other programs.

Situation: Open “Phone Sales Log.xlsx”.

This spreadsheet shows the number of smartphones sold, their prices, and total sales for four phone products

Task: Create a table

Action: There are two ways to create a table:

Shortcut Method:

Select a cell in your data set (e.g. A1) and press ‘Ctrl + T’ (easy way to remember: “Ctrl + T(able)”). A popup will appear asking you to confirm your table range and whether your data has headers.

Menu Method:

(1) Select a cell in your data range. (2) Go to the Insert tab and (3) click on Table. (4) The same popup that the shortcut method uses will appear, asking you to confirm your table range and if your data has headers.

As a result, your data is now in a table, making it more robust.

Table Design Tab

When one or more cells in a table are selected, the Table Design tab appears on the ribbon in the top-right corner. This contextual tab only shows up when the table is selected. If you click outside the table, the tab disappears. Click back inside the table, and the tab returns.

In short, the presence of the Table Design tab confirms that data is in a table. This means that we can only design a table when the table is selected!

Trouble shooting Tip: If you do not see the contextual tab, ask yourself:

1. Do I first have a table?
2. Have I clicked on the table?

From the Table Design tab, we can:

Rename the table (e.g., change it from "Table1" to "Sales")

Change the table's color/style

Quick Tip: If you remove the style/colors from a table, it's still a table. If the Table Design tab shows up when selected, it's active.

Apply banded rows or banded columns (alternating shading for better readability)

Highlight the first and last columns

Benefits of using tables:

Table Expansion

One advantage of using tables is that they automatically expand to include new data. When we insert new rows or columns, Excel resizes the table by default. As covered later on, this is especially helpful when using functions like VLOOKUP, since the formulas update automatically when the data range changes.

Headers Replace the Column Letters

If the active cell is in a table and the user scrolls down, Excel shows table headers instead of column letters to keep the header row visible, so there's no need to freeze the top row manually.

Warning: Click inside the table to keep headers visible; click outside to show column letters.

The image contains two side-by-side screenshots of Excel tables. The left screenshot shows a table with columns A and B, and rows 1 through 6. The first row has headers 'fname' and 'lname'. The second row contains 'John' and 'Smith'. The third row contains 'Jane' and 'Doe'. The fourth row contains 'Aqsa' and 'Hussain'. The fifth row contains 'Salman' and 'Naqvi'. The sixth row contains 'Alizeh' and 'Hussain'. The right screenshot shows the same table after a new row has been inserted. The new row is labeled '4' and contains 'Aqsa' and 'Hussain'. The original data rows (2-6) have shifted down to rows 5-7 respectively. The headers 'fname' and 'lname' remain at the top of the table.

	A	B
1	fname	lname
2	John	Smith
3	Jane	Doe
4	Aqsa	Hussain
5	Salman	Naqvi
6	Alizeh	Hussain

	A	B
4	Aqsa	Hussain
5	Salman	Naqvi
6	Alizeh	Hussain

Pressing the shortcut “Ctrl” + “.” will navigate to each corner of your table, no matter how many rows or columns it has.

Total Row

The Total Row feature adds a row at the bottom to calculate totals, averages, and other functions for a column.

Task: Enable the total row

Action:

1. Click on a cell within the table and click on the Table Design Tab.
2. Click on the “Total Row” in the ‘Table Styles Options Group’.
3. As a result, the total row is added. We can use the dropdown in each column to change the summary type if needed.

This feature works well with filters. If we filter a table by a product (e.g., “Laptops”), the total row will show the total for the filtered results. This works like a SUMIF function but saves time because no function is needed!

Troubleshooting: If the Total Row is not showing or if the command is greyed out, try either:

Saving, closing, and reopening your spreadsheet.

Checking that your table contains valid numeric data.

As a last resort, convert the table back to a normal range, then recreate it.

Structured References/Table Notation

When you make an Excel table, Excel gives a name to the table and to each column header. These table and column names can then be used in formulas and functions

Instead of using explicit cell references

=Sum(C2:C7)

Excel uses table and column names

=SUM(DeptSales[Amount])

Table taken from MS Website: <https://support.microsoft.com/en-us/office/using-structured-references-with-excel-tables-f5ed2452-2337-4f71-bed3-c8ae6d2b276e>

Structured references, or table notation, let you refer to columns by name instead of cell ranges, making formulas easier to read and automatically adjusting when rows are added or removed. This is helpful because functions like VLOOKUP or XLOOKUP don't need to be updated when rows are added to the main data set.

Get Sum of Total:

= SUM(E:E)
= SUM(Sales[Total Sales])

Note: and often appear as suggestions thanks to 'Formula AutoComplete'.

Summary

That wraps up our section on tables. They're structured, dynamic, and easy to style. Tables work seamlessly with

formulas and filters,
automatically expand with your data,
and offer a Total Row which is a powerful alternative to some common functions.

When we move on to pivot tables, you'll see that Excel will ask for a data source to which tables can be used for. For example, we can make a PivotTable from "Table4" or whatever your table is named.

Tables aren't too bad once you get the hang of them, especially since there's a good chance you've used them before!

Chapter 9 - Creating Charts

We will end this guide in style by talking about charts! Charts are visual representations of our data; upper management **loves** chart since charts are visuals that help tell a story better than raw data ever could. This chapter is straightforward as we'll focus on effort and style in our visuals, capturing the theme:

"It's an art, not a science."

We can't go "wrong" with charts unless we overcomplicate them or make it hard to read!

Situation: Open up "Raza - Total Phone Sales.xlsx"

Task: Create a chart a clustered column chart.

Action:

1. Select our data in cells A1 to E5. We do not include row 6 since that will not be a part of the chart.
2. Insert a chart by going to the Insert (tab) -> Charts (Group) -> Recommended Charts
The result of this step will show an alert pop up viewing a variety of charts.
Note: If the Insert tab doesn't work (as shown in some cases), use the Quick Analysis Tool (Ctrl + Q)
3. On the alert pop up, click "All Charts" to view all the different types of charts we can make.
Note: If you've used other Microsoft products like Power BI, you'll recognize many of them!
4. Feel free to browse through the selection. We will select the "Clustered column chart" option.
Pro Tip: Choose a chart type that best communicates your message.

Result: We'll have our chart created. Once created, we can move and resize the visual.

In some Excel versions, we can right-click on the chart to save it as a picture. If that option isn't available, we can take a screenshot via pressing Windows + Shift + S.

Note: Charts are dynamic since charts update as the data changes. For instance, accidentally deleting a cell value or adding an extra zero to a number value can significantly exaggerate the charts results. Because of that, it's always important to double-check for typos since your chart is only as accurate as your data is.

Chart Tools Overview

When you select a chart in Excel, three buttons appear in the top-right corner, giving quick access to common formatting and editing options:

1. Filter (funnel icon)

Filter data (e.g., chart series and chart categories) to show only what's necessary

2. Chart Styles (paintbrush icon)

Change layout and color. Try to avoid monochromatic colors since they can be hard to distinguish when projected on a projector. Instead, it's recommended to use clear, distinguishable colors.

3. Chart Elements (+ icon)

Add and modify chart elements like data labels, titles, and legends.

Rule: Chart elements should support the chart's purpose and message.

Clicking on a chart shows two contextual tabs on the ribbon: Chart Design and Chart Format.

Similar to the contextual tabs for tables, these contextual tabs provide tools to help you work with charts and disappear when you click outside the chart.

Chart Design Tab

Many of the options you see under the Chart Design tab are also the icons we've seen in the last Chart Tools section.

This tab allows you to:

- Add or modify chart layouts
- Change colors
- Use Switch Row/Column to flip your axis/legend focus
(e.g., switch from showing devices per quarter to quarters per device)

Chart Formatting Tab

Before we discuss chart formatting, it helps to understand how to format text boxes. Text boxes are objects in Microsoft Office applications that allow users to add text freely anywhere in the file. Understanding how to create and format a text box, which is a single element, will help demonstrate how to format charts that consist of multiple elements.

Task: Create a Text Box.

Insert (Tab) -> Text (Group) -> Text Box

Upon seeing the cursor will change in the worksheet, we can then click and drag to create a text box

Once the text box has been created, click inside the box and type or paste the following text:

Quote of the day:

"By time, humanity is at a loss except those who do good deeds, encourage truth, and recommend patience."

We can now format it with borders, fills, shadows, etc. It acts like a shape, and can be customized freely.

Task: Format a Text Box

Click on the textbox, on the Drawing Tools Format (tab):

- Choose **Shape Fill** to pick a color
- Choose **Shape Outline**, select **Weight**, and pick a line thickness.

Now that we are more familiar with text boxes, we can go back to Chart Formatting.

We can use the Format tab to first select and style different parts (title, axis, legend, etc.) but we can also format a chart using the Format Task Pane, which appears when you double-click the chart. Options vary depending on the selected element (chart area vs. plot area, etc.). Always check which element you're formatting to avoid mistakes. Properties like fill, outline, shadow, and glow can be toggled as needed.

Overall, many of these tools apply to pivot charts as well, which will be covered later. Everything you're learning now will carry over when the discussion of PivotTables arises.

❖ Best Practices for Chart Design

- Less is more - Too many elements can overcrowd the visual
- Use color effectively - make sure that light text goes with dark backgrounds and vice versa. Choose contrasting colors
- Make text that text is legible; Don't use font sizes that are too small or hard to see
- You can create multiple charts if needed. Try different types like pie charts to compare how data is represented.
- Use data labels to support your message, but avoid relying on them too much as they may just repeat the data and not provide visualization.
- Try to avoid some visuals like pie charts, because they contain elements that are hard to distinguish from one another. Information should be presented as clear as possible so that the audience doesn't guess which element is bigger.
- Finally, always prioritize clarity, accuracy, and your audience's needs when building a chart.

Sparkline

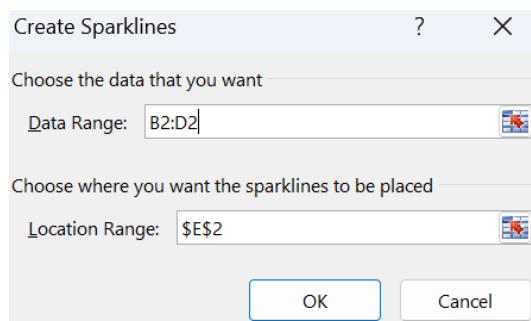
Unlike charts that can be moved and formatted independently of a cell, a Sparkline is a cute miniature chart within a cell that visually represents data. These charts help visualize trends and numbers and gives an idea of how the data is mapped out. They sit neatly alongside your data, allowing you to compare values quickly at a glance.

Situation: Open up “Bonus” Worksheet.

Task: Set the Sparkline.

Action:

1. Select the cell where you want the graph to appear. In this case, choose a blank cell at the end of the row of data in cell ‘F2’.
2. Go to Insert (Tab) -> Sparkline (Group) -> Line
3. Data Range should be from B2:D2. There’s no need to choose the location range since the cell was already selected at the start.



Result: A Sparkline has been added on cell E2. Adjusting the font size, the row height or column width will change the sparklines size.

Task: We can then drag the autofill handle down to create a Sparkline for each row.

Note: Sparklines could be replaced with a line chart, but the point of sparklines is to avoid cluttering your worksheet with extra, full-sized charts.

It's important to note that Sparklines have contextual tabs.

As with all the other contextual tabs for tables and charts, make sure that a Sparkline has been selected to view the tab.

Task: Change the Sparkline color and the width

Action:

To change the Sparklines thickness, go to Sparklines (Tab) -> Styles (Group) -> Sparkline Color (Dropdown).

Here we can change both the color and the line weight.

We can also add markers to our data to emphasize specific values in the Sparkline.

Task: Add high and low points to the Sparkline

Task: Add first and last points to the Sparkline

Task: Change the color of the marker color via Style (group) -> Marker color

By default, sparklines are grouped so changing one cell will affect the entire group. To change them individually, go to Sparkline (Tab) -> Group (Group) -> Ungroup (Command) and then apply the effects.

When it comes to deleting Sparklines, we can't remove it via normal means of selecting the cells and then pressing "Del". We must completely remove the group.

Task: Delete a Sparkline

Select cells with Sparklines

Right click on the cells -> Sparklines -> Clear Selected Sparklines or GROUPS to do it all at once.

OR

Sparklines Tab (Group) Group - Eraser Icon -> Clear Group

Chapter 10 – Locking & Protecting Worksheets & Workbooks

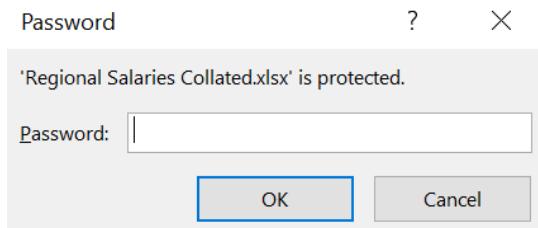
Protecting and locking cells in Excel can help prevent users from accidentally deleting or modifying data. The more people who have access to an Excel file, the greater the security risks, so protecting the data is essential. Microsoft Excel provides features to prevent unauthorized access or modifications and preserve data integrity.

Situation: Open “Ice Cream Sales”. Suppose the day has ended and we want to finalize sales

Task 10.1: Protect the entire workbook so that no one can make changes.

Action:

1. Go to File -> Info -> Protect Workbook -> Encrypt with Password
2. Make sure you save and exit the changes.
3. Upon re-opening the notebook, we will be prompted to enter a password.



Locking a workbook is like setting a password on your phone. The workbook stays locked, so you must enter the password each time you open it. To remove the password, you simply go back into the settings and erase it, just like you would on a phone.

Task 10.2: Remove the password protection from an Excel file

1. Make sure the workbook is open and that the password has been entered in the Password box.
2. Go to File -> Info -> Protect Workbook -> Encrypt with Password.
3. Clear out the values of the Password box, click OK, and then save the file again.

Previously we were able to lock the entire file. If we wanted to, we can also:

- Protect 1 worksheet so that part of the workbook is locked.
 - When a worksheet is locked, users can't enter values and many ribbon commands are disabled.
- Protect the structure of the Workbook so that people can't add or delete sheets.

Task 10.3: Protect an individual worksheet

Right click on a sheet -> Protect Sheet OR go to Review (Tab) -> Protect the Sheet

We can assign a test password of '123' as a password.

Result: The worksheet has been protected. This specific worksheet cannot be edited because the entire sheet is locked, however, the user is able to edit other worksheets.

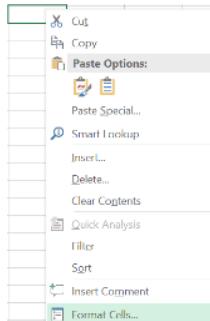
If you realized that you still need to do work on a protected worksheet:

Unprotect it, do work, and then protect it again.

We can make specific sections of a sheet editable while keeping the rest locked.

Task 10.4: Protect a sheet while still letting certain cells be edited, which is useful for timesheets/forms:

1. Select the cells you want employees to edit (e.g., A1:O28 or C1:C6).
 2. Right-click and choose ‘Format Cells’.



3. From the pop up, go to ‘Protection’ tab. Uncheck “Locked” and then click “OK”
 4. Right-click the sheet tab and select **Protect Sheet** or go to Review Tab -> Protect the sheet
Add a password if desired.
 5. Now, employees can type in the unlocked cells but cannot edit or unhide the rest.

Tip: It's often best to hide unused columns first, then protect the sheet. This keeps the sheet clean while still allowing input in the intended areas.

Task 10.5: Protect the structure of the Workbook so that people can't add or delete sheets.

•

Task 10.6: Apply an option to not show formulas

Prerequisite: Assure that the worksheet is unprotected.

1. Select B2:B6
 2. Right click on the cells -> Format cells
 3. Go to Protection Tab & Circle the [x] Hidden option
 4. **When you exit out of pop up, nothing will happen until you protect the sheet so now do Task 10.2 to protect the worksheet

Result: Makes it hidden so now notice now that the formula in the formula bar is gone!

Chapter 11 – Data Validation

Excel's Data Validation feature sets up rules to control what users can enter in cells, such as lists, number or date ranges, or text length limits. It offers input messages to tell users what to enter and error alerts to prevent wrong entries. At its core, it automatically checks for errors and restricts user entries to ensure data is correct.

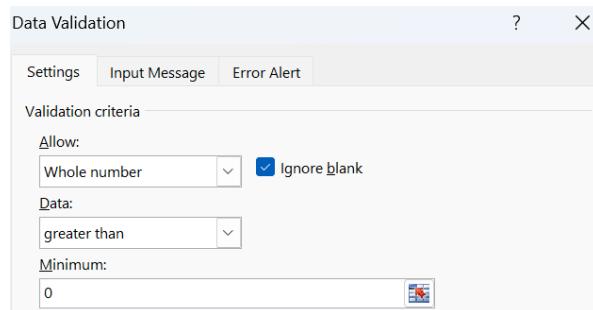
As Murphy's Law reminds us, anything that can go wrong will go wrong. Excel's Data Validation helps 'baby-proof' cells by preventing errors before they happen and is designed to prevent accidental errors, not intentional tampering. Keep in mind that data validation applies only to manually entered data and does not work on data that is:

- copied and pasted into a cell
- dragged into a cell
- already in a cell if it violates the rules

Situation: Suppose we want to ensure all entries in our expense report are positive (not negative) using data validation.

Task 11.1: Set up and customize data validation settings.

- a) Select the range where people will enter data.
- b) Select Data (Tab) -> Data Tools (Group) -> Data Validation.
- c) In the Data Validation dialog box, on the Settings tab and in the Allow drop-down list, select Decimal.
- d) Under the newly shown Data drop-down list, select "Greater than" and set the Minimum field to 0



Task 11.2: Set up a data validation input messages (In Excel, input messages provide instructions on what data can be entered and appear when a user selects a validated cell))

From the previous task, in the same Data Validation dialog box, select the Input Message tab.

Select the Title field and type "Please note:"

In the Input message field, type "Only numbers greater than 0 are allowed".

Task 11.3: Set up the data validation error alert (In Excel, error alerts are used to warn or prevent invalid data entries with three distinct levels: Information, Warning, or Stop, which determine whether users can continue)

1. Next, select the Error Alert Tab.
2. Assure that the "Style" drop-down arrow is selected to "Warning".
3. Select the 'Title' field and type "Error: Invalid Expense"
4. Select the 'Error message' field and type "Please try again; Enter a value greater than 0."
5. Finally, select 'OK' to finish setting the validation.

Task 11.4: Test the data validation

Select a cell that has validation. Type in ‘-5’ and press Enter to verify that the error alert Invalid Expense appears.

Task 11.5: Create a drop-down list for “Small, Medium, & Large”

- a) Click the cell for which the drop-down list should appear.
- b) Select Data (tab) -> Data Tools -> Data Validation.
- c) In the Data Validation dialog box, on the Settings tab, in the Allow drop-down box, select ‘List’.
- d) Select in the Source box, then type “Small, Medium, High”
- e) Press Ok and Test your drop-down list to ensure it works.

Task 11.6: Create a drop-down list for cells in another spreadsheet.

- a) Click the cell for which the drop-down list should appear.
- b) Select Data (tab) -> Data Tools -> Data Validation.
- c) In the Data Validation dialog box, on the Settings tab, in the Allow drop-down box, select ‘List’.
- d) Select in the Source box, then select your list range.
- e) Test your drop-down list to ensure it works.

Task 11.7: Test the data validation we’ve set it.

Find the cell with the drop-down list, then click the arrow on its right.

Select a value and press enter.

Note: You can type in a value, but it must be spelled correctly to match a list item exactly for Excel to accept it.

Chapter 12 – Macros

We as people regularly perform mundane, repetitive tasks in both our work and personal lives. The goal of automation is to use technology to perform these boring tasks on our behalf so that human input is minimized. For instance, a real-life example of this is Amazon Alexa. When we ask Alexa, “Hey Alexa, time for bed”, we can program it so that it:

- turn off lights
- turn on fan
- play relaxing music

Automation isn't preventing you from doing any of these things yourself manually but rather it makes our lives easier by letting the computer do the work for us. Machines are great for repetitive tasks since they:

- make fewer mistakes
- produce results more quickly (for example, mass-producing potato chips versus making them by hand at home)
- require fewer resources (e.g. people).

A macro in Microsoft Excel is a computer script or a sequential set of actions that saves time and reduces the chance of errors. In essence, an Excel macro is a shortcut; it consists of a recorded set of steps that you can run to do a task automatically. For example, we might use a macro to:

- Clean up downloaded data from a web portal or database,
- Generate a report, or
- Create a copy or backup

Macros are recorded in VBA (VBA stands for Visual Basic for Applications and is a programming language used to help write applications on the Windows Operating System). You will not need extensive knowledge of VBA to make a macro, however knowing VBA is beneficial for troubleshooting and editing a macro.

NOTE: Save your work before running a macro since running a macro clears the Undo history, so it's impossible to undo a macro via the Ctrl + Z command. Workarounds for this:

- you can always close the file without saving if macro messes up
- best to make a copy & run macro on that copy

Scenario 12.1: Open the File: C:\....\R - Modifying Worksheets.xlsx

This file includes a dataset of ice cream sales across four quarterly periods within one year. Each row corresponds to a single flavor, and the dataset includes additional columns that detail each flavor, including its total annual sales, average quarterly sales, and unique product ID.

Situation: Workbook: Regional Expenses Worksheet; Australia .

Sally knows that scripting helps automate most of her routine tasks. She knows that this is optional & that she can get by without using it, but she wants to be called “Sally the Scripter”

Group Task: Let's record a Macro!

View -> Macros -> Macros drop-down arrow -> Record Macro

(Alternative Method): Developer -> Code -> Record Macro

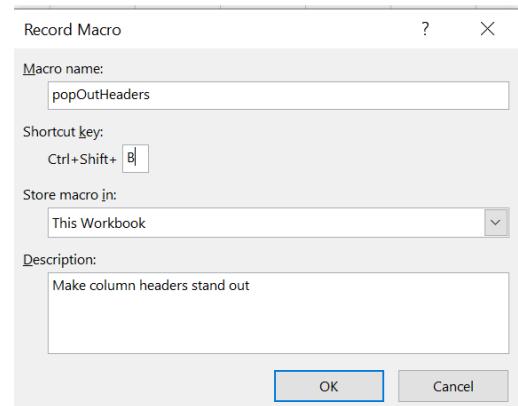
Requirements:

Macros must have a name! Use CamelCase (UpperLower)
or_underscore

Feel free to give a shortcut.

In this example, Ctrl + Shift + B is the shortcut. [Remember: The shortcut key can not be a number!]

Click "Ok"



After last step, you have now started recording

[Confirm]: In the bottom left you have a square. Hovering over little square tells me that it is being recorded

To stop recording, press on little square (don't do it now)

When recording a new macro note that it doesn't matter how long we take, it will just recognize inputs.

Via this tool, we can now:

perform an action (like some style changes)

have it recorded,

then use that macro later.

Don't worry about making mistakes. Again: Doesn't matter how long you take to record actions! It's the actions performed i.e. it's what you do that matters. Just update them as you go! Do EASY stuff such as:

Remove all styles

Wrap text for A1

Make A1 Bold

Increase font of A1 a bit

Give it a nice background color

Make A5:E5 bold, centered, & underlined

End Macro by Stop the recording by pressing the stop icon at bottom left hand corner.

If macros work, go to another sheet & run it with your command!

REMEMBER: run macros with the shortcut you've defined for instance via Ctrl + Shift + M

Feel free to run your macros on other sheets too!

QUESTIONS?

How to edit/undo your macro??

EDIT THE MACRO

MAKE THE CHANGE (I'd recommend playing around with font sizes)

Ctrl + S

Click yes to that annoying pop up.

Once saved, exit back out by going to File -> Close & Return to Excel

Note: best to apply macros when sheets look identical to one another

styling will happen to each cell

Chapter 13 – Bibliography

Bendig, Gary. "Geese Leaving." *Unsplash*, free to use under the Unsplash License,
<https://unsplash.com/photos/gray-and-black-mallard-ducks-flying-during-day-time-WPmPsdX2ySw>

"Keyboard Shortcuts in Excel." *Microsoft Support*, Microsoft
<https://support.microsoft.com/en-us/office/keyboard-shortcuts-in-excel-1798d9d5-842a-42b8-9c99-9b7213f0040f>

"Select cell contents in Excel." *Microsoft Support*, Microsoft,
<https://support.microsoft.com/en-us/office/select-cell-contents-in-excel-23f64223-2b6b-453a-8688-248355f10fa9>

"Print rows with column headers on top of every page." *Microsoft Support*, Microsoft,
<https://support.microsoft.com/en-us/office/print-rows-with-column-headers-on-top-of-every-page-d3550133-f6a1-4c72-ad70-5309a2e8fe8c>

Chapter 14 – The End

Congratulations on making it to the end!