

Excel – Basics

Reading Material



Introduction to Excel

- **What is Excel?**

Excel is a spreadsheet program developed by Microsoft that comes as part of the Office Suite, alongside other applications like Word and PowerPoint. It organizes data into columns and rows, enabling users to perform mathematical functions, create charts, and manage data efficiently. Excel is compatible with various platforms, including Windows, Mac OS X, Android, and iOS. While it's often used for processing complex data, Excel's user-friendly features make it accessible for anyone,

- **Basic interface overview (ribbon, worksheets, cells, columns, rows)**

Ribbon:

The Ribbon is the control center of Excel, located at the top of the window. It consists of multiple tabs (e.g., Home, Insert, Page Layout) that contain various tools and features organized into groups. Each tab contains buttons for specific actions, such as formatting cells, inserting charts, or managing data.

Key components of the Ribbon include:

1. **Tabs:** Each tab corresponds to a category of tasks (e.g., Home for formatting, Data for managing data).
2. **Groups:** Related commands are grouped together within each tab (e.g., the Font group on the Home tab contains font formatting options).
3. **Quick Access Toolbar:** A customizable toolbar above the Ribbon that allows quick access to frequently used commands.

Worksheets:

1. A worksheet is a single page in an Excel workbook where you can enter and manipulate data. Each workbook can contain multiple worksheets (tabs at the bottom), allowing you to organize data into different categories or sections.
2. Each worksheet consists of a grid of cells arranged in rows and columns.

Cells:

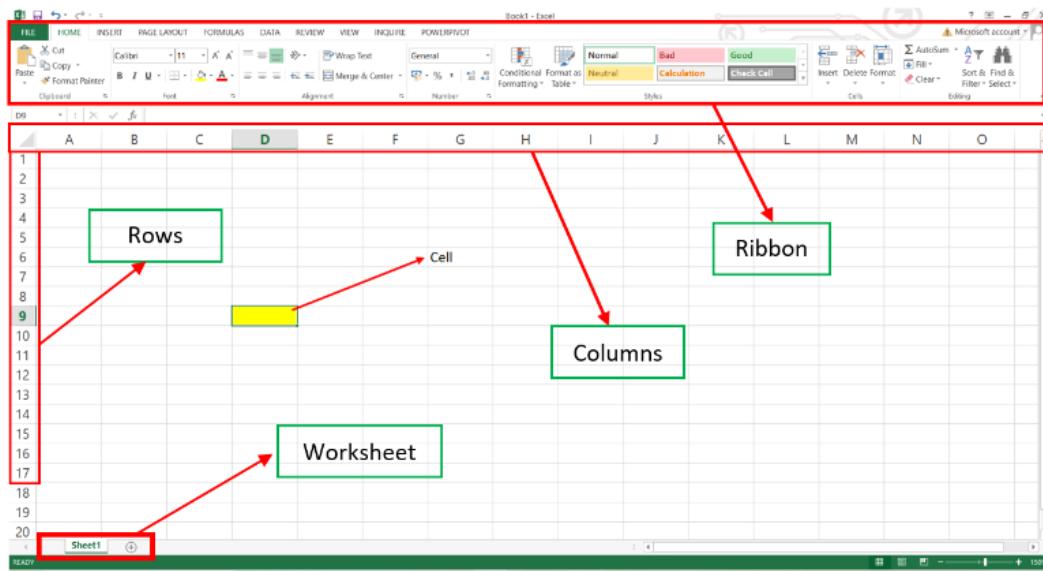
1. A cell is the basic unit of a worksheet where data is entered. Each cell can hold text, numbers, formulas, or functions. Cells are identified by their unique address, which is a combination of the column letter and row number (e.g., A1 refers to the cell in column A and row 1).
2. You can select a cell by clicking on it and enter data directly into it or through the formula bar located above the worksheet.

Columns:

1. Columns are vertical sections of a worksheet, labeled with letters (A, B, C, etc.). Each column can contain a different type of data or information. Columns extend downwards and can hold an unlimited number of rows.
2. You can resize, hide, or format columns to improve the organization and appearance of your data.

Rows:

1. Rows are horizontal sections of a worksheet, numbered from 1 onwards (1, 2, 3, etc.). Each row can contain different types of data related to a single entry or record. Rows extend across the worksheet and can hold an unlimited number of columns.
2. Similar to columns, you can resize, hide, or format rows for better data management.



- **Opening, saving, and closing workbooks**

Opening a Workbook

Users can open existing workbooks by navigating to the "File" tab and selecting "Open." This allows them to browse their computer or cloud storage for the desired Excel file. Excel also offers options to open recently used workbooks for quick access.

Steps:

- Click the "File" tab.
- Choose "Open".
- Navigate to the location of your workbook.
- Select the file and click "Open".

Saving a Workbook

To save changes made to a workbook, users can click the "Save" button in the Quick Access Toolbar or use the keyboard shortcut Ctrl + S. If the workbook is new, the "Save As" dialog will appear, prompting users to choose a file name and location. Excel allows saving in various formats, including .xlsx, .xls, and .csv.

Steps:

- Click the "File" tab.
- Choose "Save" to save with the same name.
- Choose "Save As" to save with a different name or location.

Closing a Workbook

Users can close a workbook by clicking the "Close" button (X) in the top right corner of the window or by selecting "Close" from the "File" tab. If there are unsaved changes, Excel will prompt users to save their work before closing to prevent data loss.

Steps:

- Click the "File" tab.
- Choose "Close".
- Or, use the "Close" button on the workbook's tab.

Basic Formulas and Functions

Basic formulas and functions in Excel allow users to perform calculations and analyze data efficiently, with formulas starting with an equal sign (=) to express calculations, while functions like SUM, AVERAGE, COUNT, and IF provide pre-defined operations for tasks such as totaling numbers, calculating averages, counting entries, and performing logical tests. Users can employ arithmetic operators such as addition, subtraction, multiplication, and division within formulas, and they can use relative, absolute, and mixed cell references to control how references adjust when copying formulas. The formula bar displays the content of the selected cell, enabling easy editing and viewing of formulas and functions, making them essential tools for effective data management in Excel.

- **Introduction to formulas (equal sign, cell references)**

In Excel, formulas are essential for performing calculations and manipulating data within worksheets. Every formula begins with an equal sign (=), signaling to Excel that a calculation or operation is to follow.

The equal sign is the first character in any formula, indicating that the cell contains a formula rather than static text or numbers. For example, entering =A1 + A2 in a cell tells Excel to add the values in cells A1 and A2.

Formulas often use cell references to refer to the values in other cells. This allows users to perform calculations dynamically, where changes in the referenced cells automatically update the result of the formula. Cell references can be relative (e.g., A1) or absolute (e.g., \$A\$1), with relative references changing when the formula is copied to another cell, while absolute references remain constant. For example, A1 refers to the cell at the intersection of column A and row 1.

- **Basic arithmetic operators (+, -, *, /)**

In Excel, basic arithmetic operators are used to perform fundamental mathematical calculations within formulas. Here are the four primary operators:

- 1. Addition (+):** This operator is used to add two or more numbers together. For example, the formula =A1 + A2 adds the values in cells A1 and A2.
- 2. Subtraction (-):** This operator is used to subtract one number from another. For instance, =A1 - A2 calculates the difference between the values in cells A1 and A2.
- 3. Multiplication (*):** This operator is used to multiply two or more numbers. For example, =A1 * A2 multiplies the values in cells A1 and A2.
- 4. Division (/):** This operator is used to divide one number by another. For example, =A1 / A2 divides the value in cell A1 by the value in cell A2.

These operators can be combined within a single formula to perform more complex calculations. For instance, the formula =(A1 + A2) * A3 first adds the values in A1 and A2 and then multiplies the result by the value in A3. Excel follows the order of operations (parentheses, exponents, multiplication and division, addition and subtraction) to evaluate formulas accurately, ensuring users obtain the correct results in their calculations.

- **Commonly used functions (SUM, AVERAGE, COUNT, MAX, MIN)**

In Excel, commonly used functions are essential for performing calculations and analyzing data quickly.

- The **SUM** function calculates the total of a range of numbers, such as **=SUM(A1:A5)**, which adds all values from cells A1 to A5.
- The **AVERAGE** function computes the mean of a set of values, for instance, **=AVERAGE(B1:B5)**, which finds the average of the values in cells B1 to B5.
- The **COUNT** function counts the number of cells containing numeric values in a specified range, like **=COUNT(C1:C5)**, which returns the count of numeric entries in cells C1 to C5.
- The **MAX** function identifies the highest value in a range, such as **=MAX(D1:D5)**, which returns the largest number from cells D1 to D5.
- The **MIN** function determines the smallest value in a specified range, for example, **=MIN(E1:E5)**, which provides the lowest number from cells E1 to E5.

These functions enhance productivity by simplifying data analysis and providing quick insights into datasets.

SUM: Adds all numbers in a range of cells.

Syntax: =SUM(number1, [number2], ...)

Example: =SUM(A1:A10) adds all numbers from A1 to A10.

AVERAGE: Returns the average (arithmetic mean) of its arguments.

Syntax: =AVERAGE(number1, [number2], ...)

Example: =AVERAGE(B1:B5) calculates the average of values in B1 to B5.

COUNT: Counts the number of cells that contain numbers.

Syntax: =COUNT(value1, [value2], ...)

Example: =COUNT(C1:C20) counts the number of cells with numbers in C1 to C20.

MAX: Returns the largest number in a set of values.

Syntax: =MAX(number1, [number2], ...)

Example: =MAX(D1:D15) finds the largest value in D1 to D15.

MIN: Returns the smallest number in a set of values.

Syntax: =MIN(number1, [number2], ...)

Example: =MIN(E1:E25) finds the smallest value in E1 to E25.

- **Order of operations**

In Excel, the order of operations determines the sequence in which mathematical calculations are performed within a formula, ensuring accurate results. Excel follows the standard mathematical rules, often remembered by the acronym PEMDAS:

Parentheses: Calculations enclosed in parentheses are performed first. For example, in the formula =(A1 + A2) * A3, the addition inside the parentheses is calculated before multiplying by A3.

Exponents: If present, exponentiation is performed next. For instance, =A1^2 + A2 would calculate the square of A1 before adding A2.

Multiplication and Division: These operations are performed from left to right. For example, in the formula =A1 * A2 / A3, the multiplication of A1 and A2 is done first, followed by the division of the result by A3.

Addition and Subtraction: Finally, addition and subtraction are performed from left to right. For example, in the formula =A1 + A2 - A3, the addition of A1 and A2 occurs first, followed by the subtraction of A3.

Example:

=2+3*4 will result in 14, not 20, because multiplication is performed before addition.

Understanding the order of operations is crucial for constructing accurate formulas in Excel, as it directly affects the outcome of calculations. By properly using parentheses and following the order of operations, users can ensure their formulas yield the expected results.

Basic Data Management

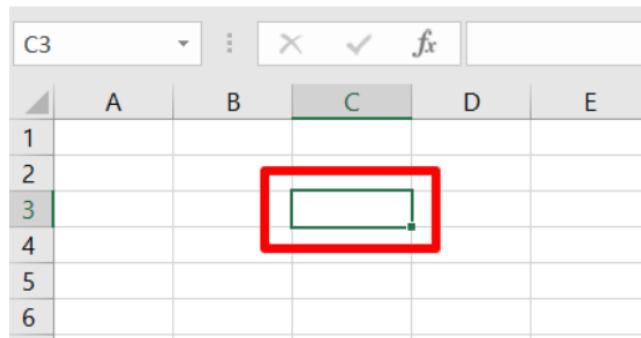
Basic data management in Excel involves efficiently entering and formatting data, using features like sorting and filtering to organize information, creating tables for structured data handling, implementing data validation to maintain integrity, applying formulas and functions for calculations, analyzing data through PivotTables and charts, and saving and sharing files for collaboration.

- **Entering data into cells**

Click on the desired cell.

Type the data (text, numbers, or dates) into the cell.

Press Enter to confirm the entry.



C3	A	B	C	D	E
1					
2					
3			C3	D3	E3
4					
5					
6					

- **Data types (numbers, text, dates)**

Excel recognizes three primary data types:

Numbers: Used for numerical values (e.g., 123, 3.14, -5).

Text: Used for any non-numerical characters (e.g., names, addresses, descriptions).

Dates: Used to represent specific dates and times (e.g., 01/01/2024, 12:30 PM).

- **Formatting cells (number formats, alignment, fonts)**

Formatting cells in Excel enhances data presentation and readability by allowing users to apply various number formats, such as currency, percentage, and date, to display information appropriately; adjust alignment settings for horizontal and vertical positioning of text; and customize font styles, sizes, colors, and text effects to emphasize important data, all of which can be easily managed through the Ribbon interface.

Select the range of cells you want to format.

Click the "Home" tab on the ribbon.

Use the options in the "Number", "Alignment", and "Font" groups to modify the cell appearance.

Number Formats: Control how numbers are displayed (e.g., currency, percentage, date, time).

Alignment: Adjusts the position of text within cells (e.g., left, right, center).

Fonts: Changes the font style, size, color, and other text attributes.

- **Autofill and fill handle**

Autofill is a feature that allows you to quickly enter data or copy cell formats into adjacent cells.

Enter data in the first few cells.

Hover your mouse over the small square (fill handle) at the bottom right corner of the selected cell.

Drag the fill handle down or across to copy the data or format to other cells.

Basic Charts and Graphs

Basic charts and graphs in Excel are essential tools for visually representing data, making it easier to identify trends and insights.

- **Types of charts (column, line, pie, bar)**

Column Chart

- **Description:** A column chart displays data using vertical bars, with each bar representing a category and the height of the bar indicating the value of that category.
- **Uses:** Ideal for comparing discrete data points across categories, such as sales figures for different products or monthly expenses.
- **Variations:**
 - **Clustered Column Chart:** Displays multiple data series side by side for comparison.
 - **Stacked Column Chart:** Shows the total value of categories while breaking down the values into sub-categories stacked on top of each other.
- **Strengths:** Clearly illustrates comparisons between categories and allows easy visualization of trends.

Line Chart

- **Description:** A line chart connects data points with a continuous line, showing changes in data values over time.
- **Uses:** Best for displaying trends, such as stock prices over a period or temperature changes throughout a month.
- **Variations:**
 - **Basic Line Chart:** Displays a single data series with a simple line.
 - **Multi-Series Line Chart:** Shows multiple lines on the same chart, allowing comparison between different data series.
 - **Stacked Line Chart:** Similar to stacked column charts but with lines instead of bars, emphasizing the cumulative value.
- **Strengths:** Effectively visualizes trends and patterns over time, making it easy to identify increases or decreases in data.

Pie Chart

- **Description:** A pie chart represents data as slices of a circular pie, with each slice corresponding to a category's proportion of the whole.
- **Uses:** Ideal for showing percentage breakdowns of a single dataset, such as market share distribution or budget allocation.
- **Variations:**
 - **2D Pie Chart:** The standard version with flat slices.
 - **3D Pie Chart:** Adds depth to the chart, creating a three-dimensional effect.
 - **Doughnut Chart:** Similar to pie charts but with a hole in the center, allowing for multiple data series.
- **Strengths:** Provides a clear visual representation of proportions and is useful for quickly conveying the relative size of parts to a whole.

Bar Chart

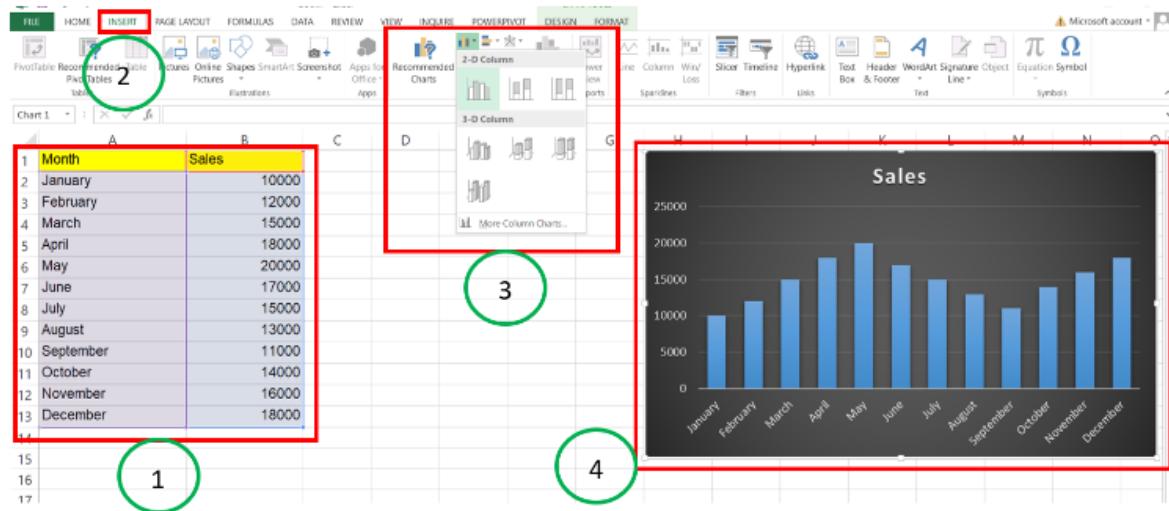
- **Description:** A bar chart displays data using horizontal bars, with each bar representing a category and the length of the bar indicating the value.
- **Uses:** Effective for comparing categories with longer names or for displaying data with a large number of categories.
- **Variations:**
 - **Clustered Bar Chart:** Shows multiple data series side by side for comparison.
 - **Stacked Bar Chart:** Similar to stacked column charts but uses horizontal bars to represent total values broken down into sub-categories.
- **Strengths:** Makes it easy to read category labels and compare values, especially when dealing with lengthy names.

- **Creating basic charts**

Select the data you want to visualize.

Go to the **Insert** tab on the ribbon.

Click the desired chart type (column, line, pie, or bar) to create the chart.



- **Customizing charts (titles, labels, legends)**

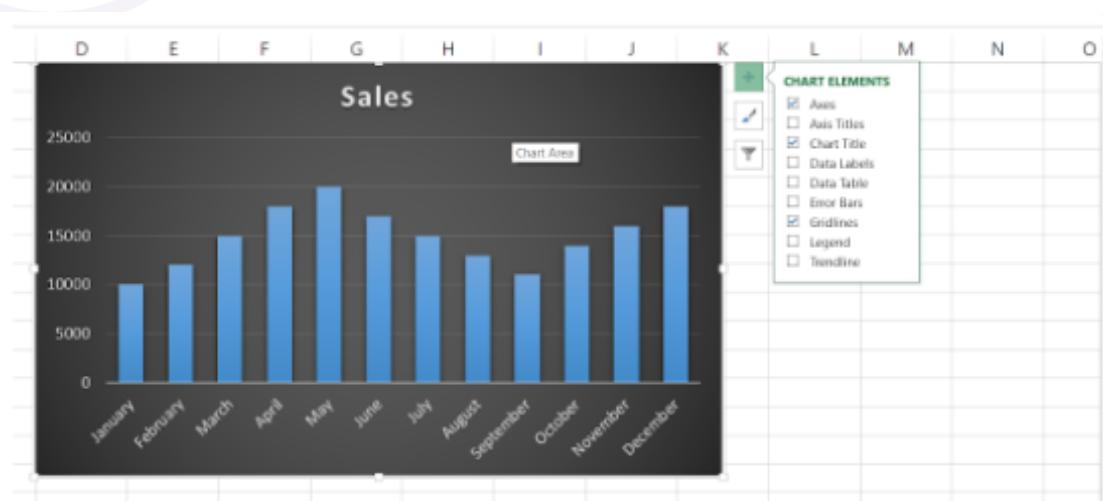
Add a Title: Click on the chart, then click the + icon to add a chart title.

Add Data Labels: Click on the chart, then click the + icon to add data labels.

Add Legend: Click on the chart, then click the + icon to add a legend.

Format Chart Elements: Right-click on a chart element (title, axis, data labels) to access formatting options.

Change Chart Type: Right-click on the chart, select "Change Chart Type" to switch to a different chart type.



Basic Text Functions

Basic text functions in Excel are essential for manipulating and managing text data, allowing users to perform various operations such as combining text strings using the CONCATENATE (or CONCAT) function, extracting specific portions of text with the LEFT, MID, and RIGHT functions, and determining the length of a string using the LEN function. The UPPER, LOWER, and PROPER functions enable users to change the case of text, while the TRIM function removes unnecessary spaces from text strings. Additionally, the FIND and SEARCH functions help locate specific characters or substrings within a text string, making it easier to analyze and format textual data effectively. These functions play a crucial role in enhancing data organization and ensuring accuracy in text handling within Excel.

- **Text functions (CONCATENATE, LEFT, RIGHT, MID, LEN)**

Text functions in Excel are designed to manipulate and analyze text strings, enabling users to perform a variety of operations on text data.

CONCATENATE: Combines multiple text strings into one string. For example, =CONCATENATE(A1, " ", B1) joins the contents of cells A1 and B1 with a space in between.

- **Syntax:** =CONCATENATE(text1, text2, ...)

- **Example:** =CONCATENATE("Hello", " ", "World") results in "Hello World"

LEFT: Extracts a specified number of characters from the beginning of a text string.

- **Syntax:** =LEFT(text, num_chars)

- **Example:** =LEFT("Excel Tutorial", 5) returns "Excel"

RIGHT: Extracts a specified number of characters from the end of a text string.

- **Syntax:** =RIGHT(text, num_chars)

- **Example:** =RIGHT("Excel Tutorial", 7) returns "Tutorial"

MID: Extracts a substring from a text string, starting at a specified position and for a specified length.

- **Syntax:** =MID(text, start_num, num_chars)

- **Example:** =MID("Excel Tutorial", 2, 4) returns "xcel"

LEN: Returns the number of characters in a text string.

- **Syntax:** =LEN(text)

- **Example:** =LEN("Excel Tutorial") returns 13

Some more Text Functions:

UPPER: Converts all characters in a text string to uppercase. For example, =UPPER(A1) transforms the text in cell A1 to uppercase.

LOWER: Converts all characters in a text string to lowercase. For instance, =LOWER(A1) changes the text in cell A1 to lowercase.

PROPER: Capitalizes the first letter of each word in a text string while converting all other letters to lowercase. For example, =PROPER(A1) formats the text in cell A1 in proper case.

TRIM: Removes extra spaces from a text string, leaving only single spaces between words. For instance, =TRIM(A1) cleans up the text in cell A1 by eliminating unnecessary spaces.

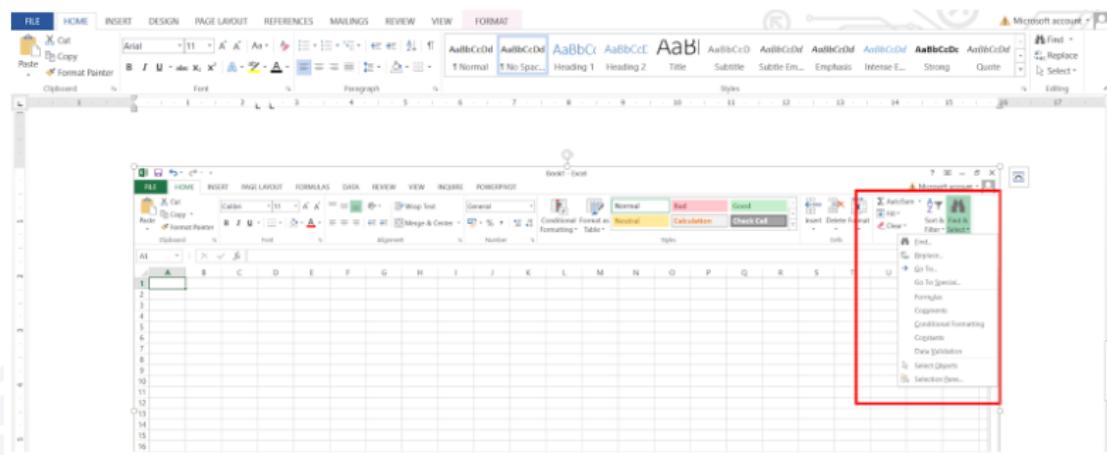
PROPER: Capitalizes the first letter of each word in a text string while converting all other letters to lowercase. For example, =PROPER(A1) formats the text in cell A1 in proper case.

TRIM: Removes extra spaces from a text string, leaving only single spaces between words. For instance, =TRIM(A1) cleans up the text in cell A1 by eliminating unnecessary spaces.

- **Finding and replacing text**

Find: Locates the position of one text string within another.
Use the "Find" function in the "Home" tab for basic searching.

Replace: Substitutes one text string with another within a range of cells.
Use the "Replace" function in the "Home" tab for basic replacements.



- **Text formatting**

Text formatting in Excel involves applying various styles and settings to enhance the appearance and readability of text within cells. Users can change font styles, sizes, and colors to emphasize specific data, while alignment options allow for adjusting the position of text within cells, including left, center, and right alignment. Additionally, users can apply number formats to text data, such as currency or percentage formats, to present information clearly and accurately. Excel also provides options for adding borders and fill colors to cells, which can help visually separate data and improve the overall layout. Furthermore, using features like bold, italic, and underline can draw attention to important text, making it easier for viewers to interpret and understand the data at a glance. Overall, effective text formatting plays a crucial role in enhancing the presentation and clarity of information in Excel spreadsheets.

Change Case: Converts text to uppercase, lowercase, or proper case.

- **UPPER(text):** Converts all characters in a text string to uppercase.
- **LOWER(text):** Converts all characters in a text string to lowercase.
- **PROPER(text):** Capitalizes the first letter of each word in a text string.

Example: If cell A1 contains "eXcel TuToRiAL", then:

- **=UPPER(A1)** would return "EXCEL TUTORIAL"
- **=LOWER(A1)** would return "excel tutorial"
- **=PROPER(A1)** would return "Excel Tutorial"

Number Formatting:

Direct Formatting:

Select the desired cell(s).

Go to the Home tab.

In the Number group, click the number format dropdown.

Choose the desired number format (Currency, Percentage, Date, Time, etc.).

Using Number Format Code:

While not directly a function, you can apply specific number formats using custom number codes. For example, to format a cell as currency with two decimal places, you would use the code "\$#,##0.00".

Alignment:

Direct Formatting:

Select the desired cell(s).

Go to the Home tab.

In the Alignment group, click the alignment buttons to adjust horizontal and vertical alignment.

Introduction to PivotTables

- **What is a PivotTable?**

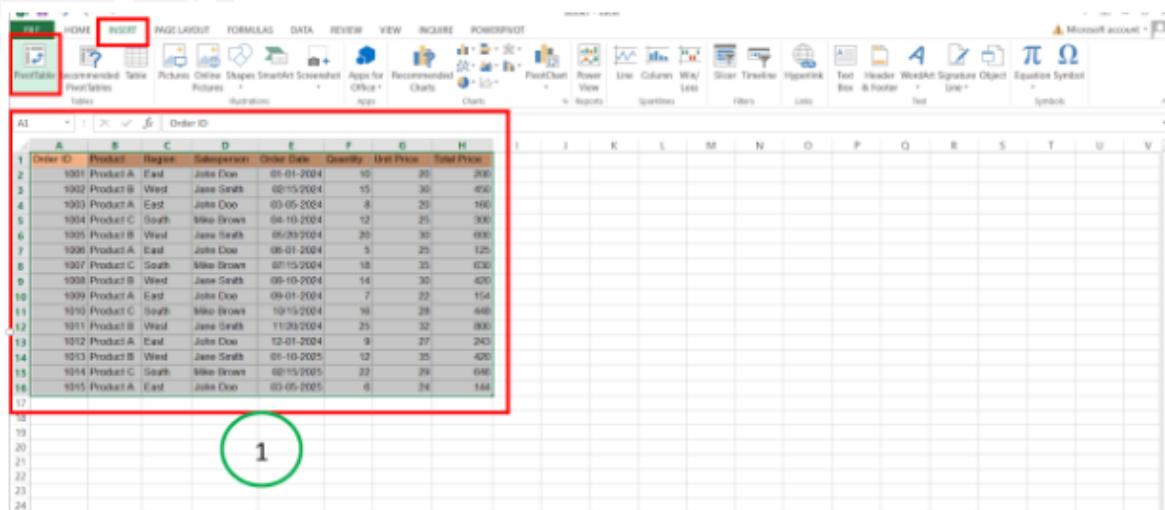
A PivotTable is a powerful data analysis tool in Excel that allows you to summarize, analyze, explore, and present your data in a meaningful way. It enables you to quickly reorganize and summarize large amounts of data to obtain answers to multi-dimensional questions.

- **Creating a PivotTable**

Select the data you want to analyze.

Go to the Insert tab on the ribbon.

Click PivotTable.



Choose where you want to place the PivotTable (new worksheet or existing worksheet).

The screenshot shows a Microsoft Excel interface with the 'Create PivotTable' dialog box open. The dialog box is titled 'Create PivotTable' and contains several sections:

- Choose the data that you want to analyze:**
 - Select a table or range: **Table Range: Sheet2!\$A\$1:\$B\$16**
 - Use an external data source: **[Browse...]**
- Choose where you want the PivotTable report to be placed:**
 - New Worksheet
 - Existing Worksheet: **LOCATION: Sheet2!\$A\$20**
- Choose whether you want to analyze multiple tables:**
 - Add this data to the Data model

At the bottom right of the dialog box are 'OK' and 'Cancel' buttons.

- **Adding rows, columns, values, and filters**

Rows: Determine the categories that will be displayed as row labels.

Columns: Determine the categories that will be displayed as column headers.

Values: Specify the numerical data you want to summarize (e.g., sum, average, count).

Filters: Allow you to filter the data based on specific criteria.

You can drag and drop fields from the PivotTable Fields list to the corresponding areas (Rows, Columns, Values, Filters) to create the desired layout.

The screenshot shows a Microsoft Excel interface with a PivotTable in Sheet2. The PivotTable is located in the range A18:S37 and has the following structure:

Region	Sum of Quantity	Sum of Total Price
Product A	45	1026
Product B	86	2690
Product C	68	2024
Grand Total	199	5740

The 'PivotTable Fields' pane on the right lists the following fields:

- Order ID
- Product
- Region
- Salesperson
- Order Date
- Quantity
- Unit Price
- Total Price

The 'Filters' section shows 'Region' under 'ROWS' and 'Product' under 'VALUES'.

- **Analyzing data with PivotTables**

Analyzing data with PivotTables in Excel is a powerful method for summarizing and interpreting large datasets, allowing users to extract meaningful insights quickly and efficiently. A PivotTable enables users to organize data into rows and columns, making it easier to compare values and identify trends.

To create a PivotTable, users select their data range and choose the PivotTable option from the Insert tab, which opens a new worksheet where the analysis can be performed. Once the PivotTable is created, users can drag and drop fields into different areas—such as Rows, Columns, Values, and Filters—customizing the layout to suit their analytical needs.

The Rows and Columns areas allow users to categorize data, while the Values area is used for calculations, such as sums or averages, providing a quick overview of key metrics. Additionally, the Filter area enables users to focus on specific subsets of data, enhancing the analysis process by allowing for dynamic changes without altering the original dataset.

PivotTables also offer features such as grouping data, creating calculated fields, and applying various summary functions, which further enhance data analysis. The ability to refresh PivotTables ensures that the analysis reflects any updates made to the underlying data.

Overall, PivotTables are invaluable for conducting data analysis in Excel, offering flexibility, ease of use, and the capability to derive actionable insights from complex datasets.

Summarizing Data: PivotTables allow users to calculate sums, averages, counts, and other statistical measures efficiently. By dragging fields into the Values area, users can quickly obtain insights into their data, such as total sales, average scores, or the number of transactions.

Grouping Data: Users can group data by categories, such as dates, products, or regions, to analyze trends and patterns effectively. For example, grouping dates by month or year provides a clearer view of sales performance over time.

Filtering Data: PivotTables enable users to apply filters to focus on specific subsets of data. By using the Filter area, users can exclude certain values or select specific criteria, helping to narrow down the analysis to relevant data points.

Creating Calculated Fields: Users can create custom calculations within a PivotTable by adding calculated fields based on existing data. This feature allows for tailored metrics, such as profit margins or percentages, enhancing the analytical capabilities of the PivotTable.

Drilling Down: PivotTables allow users to explore data in more detail by expanding or collapsing levels of data. By double-clicking on summarized values, users can drill down to view the underlying data, providing deeper insights and a comprehensive understanding of the information presented.

Overall, these features make PivotTables a powerful tool for data analysis in Excel, enabling users to summarize, categorize, filter, calculate, and explore data efficiently.