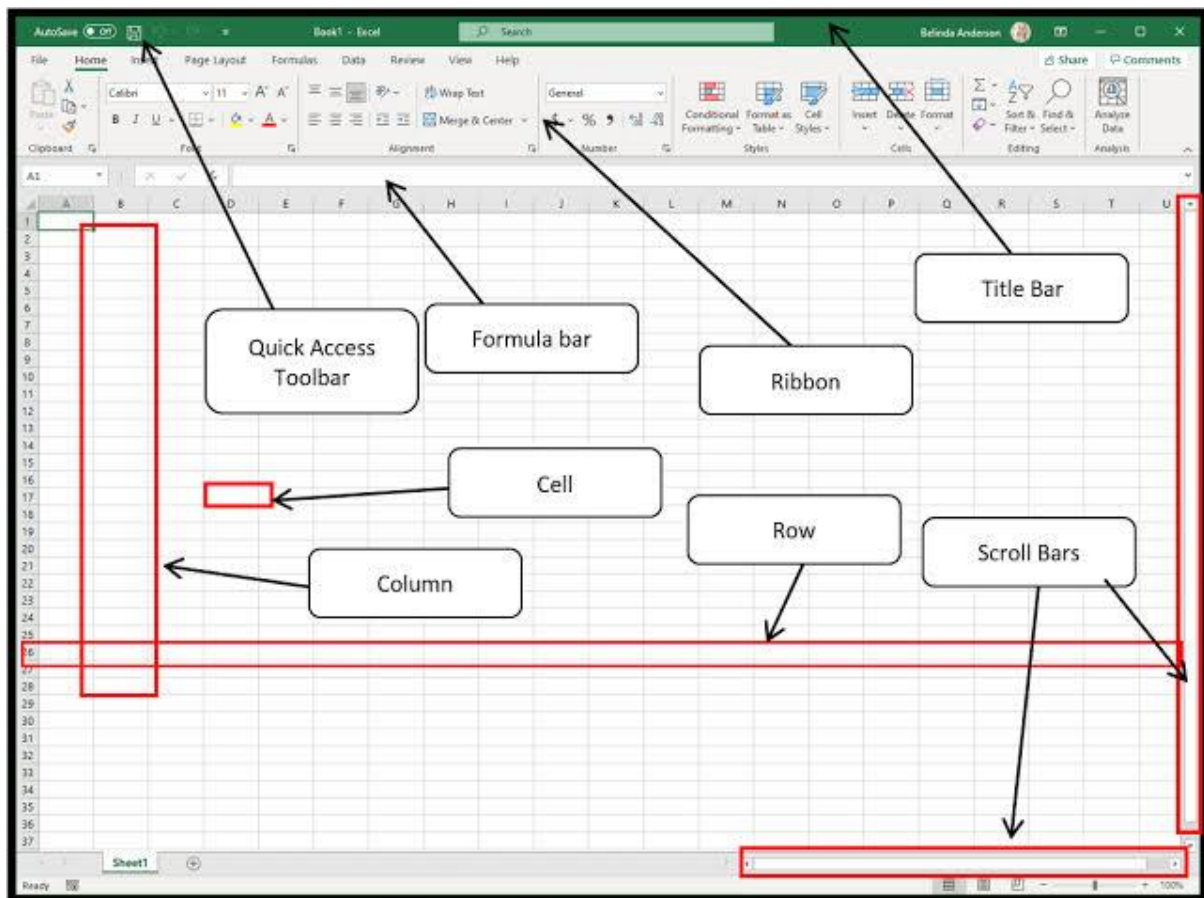


Unit 1: Introduction to Excel & Basics Formatting

1.1 Introduction to Spreadsheet Software

A **spreadsheet** is an interactive computer application for the organization, analysis, and storage of data in tabular form (rows and columns).

1.1.1 Features & Interface of MS Excel



Core Structural Elements:

- **Workbook:** The entire Excel file (saved as .xlsx). It acts as a binder containing one or more worksheets.
- **Worksheet:** A single page or grid within a workbook where data is entered (e.g., Sheet1).
- **Rows:** Horizontal lines identified by **numbers** (1, 2, 3... up to \$1,048,576\$).

- **Columns:** Vertical lines identified by **letters** (A, B, C... up to XFD or \$16,384\$ columns).
- **Cell:** The intersection of a row and a column. Each cell has a unique address (e.g., C5 means Column C, Row 5).

Primary Interface Components:

1. **Ribbon:** The top toolbar containing action icons.
2. **Tabs:** Category headers on the Ribbon (e.g., *Home, Insert, Page Layout, Formulas*).
3. **Groups:** Related commands bundled together within a tab (e.g., *Font, Alignment, Number* on the Home tab).
4. **Formula Bar:** Located above the worksheet grid; displays the actual formula or raw entry of the selected active cell.
5. **Name Box:** Displays the address of the currently active cell (e.g., A1).

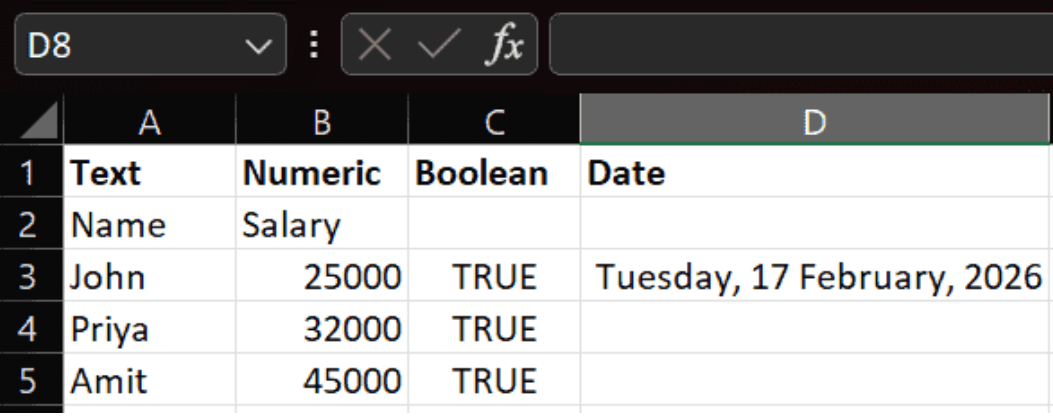
1.2 Data Types (Text, Number, Date)

Excel automatically recognizes and classifies the type of data entered into a cell.

Excel works with four primary data types: Numbers, Text, Dates & Times, and Boolean values. Understanding these data types is essential because they determine how data is stored, processed, and analyzed using formulas and functions.

Best Practices When Working with Data Types:

- Always verify imported data types
- Use proper cell formatting before entering data
- Avoid mixing numbers and text in calculation columns
- Validate data using Data Validation tools



	A	B	C	D
1	Text	Numeric	Boolean	Date
2	Name	Salary		
3	John	25000	TRUE	Tuesday, 17 February, 2026
4	Priya	32000	TRUE	
5	Amit	45000	TRUE	

1. Text (String) Data Type

The Text data type refers to any non-numeric information. This includes names, addresses, descriptions, or any character-based information.

Examples:

Names: John Doe

Employee IDs: EID12345

Job Roles: Software Engineer

Product Descriptions: Wireless Mouse

2. Numeric Data Type

The Numeric data type is used for values that can participate in mathematical calculations.

Examples:

Salaries: 23000

Product Prices: 500

Quantities: 100

Percentages: 25%

Currency: ₹15,000

Decimal Values: 45.75

3. Date and Time Data Type

Date and Time data types allow tracking of time-based events and calculations.

Examples:

Date: 01/01/2025

Time: 10:30 AM

Date & Time: 01/01/2025 10:30 AM

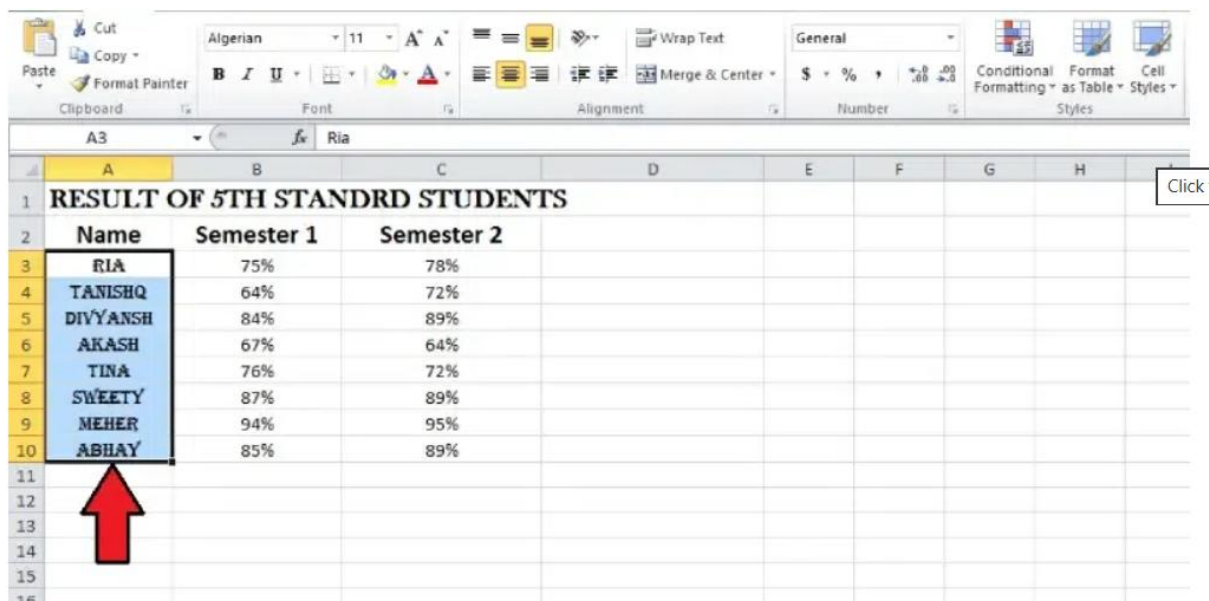
Pro Tip: Dates are stored internally by Excel as sequential numbers (serial numbers). For instance, January 1, 1900 is stored as 1, making mathematical date differences possible!

1.3 Basic Formatting (Font, Alignment, Borders)

How to Change the Font?

Step 1: Select the cell

Click on the cell or drag to select multiple cells where you want to change the font.

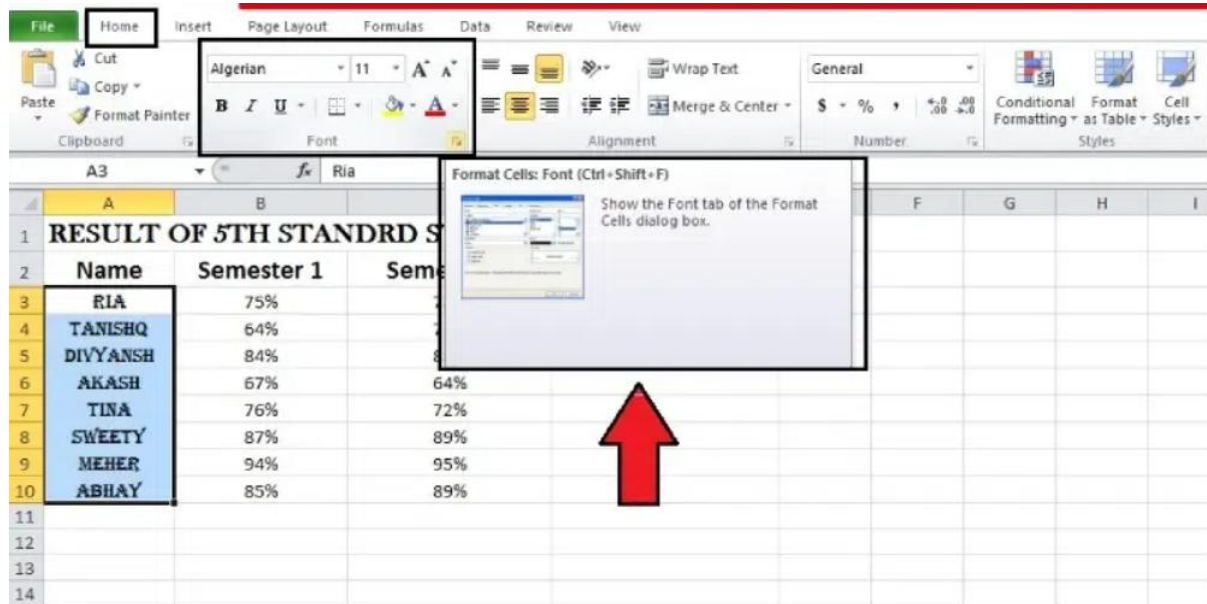


Select the cell

Step 2: Click the Font dropdown arrow

To access the Font menu, go to the Home tab and click the arrow near the dropdown.

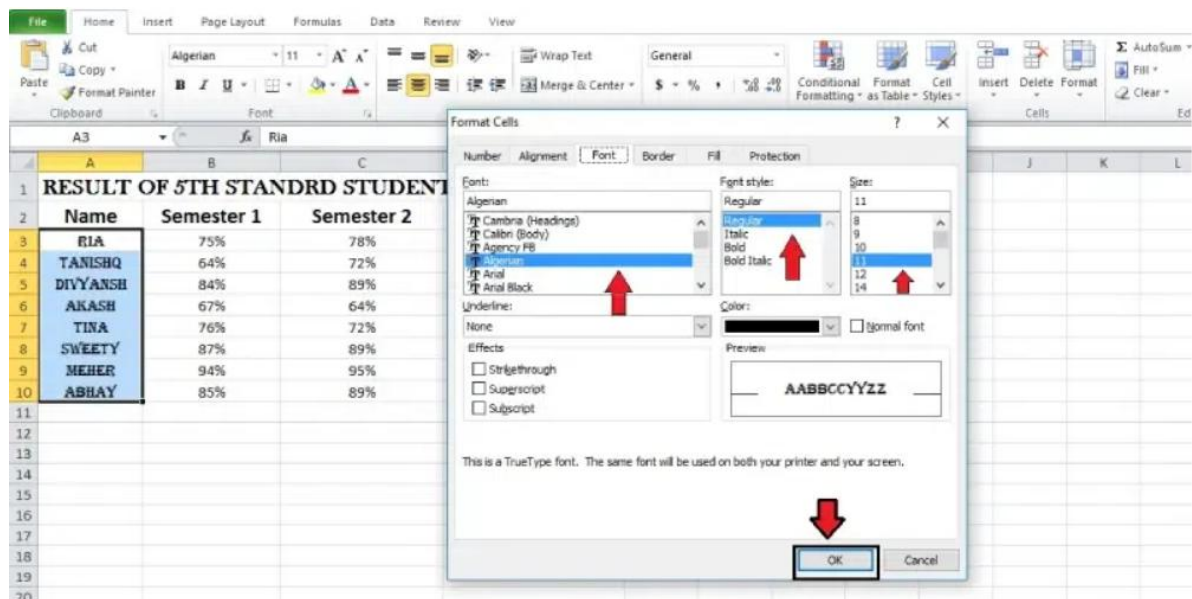
106-SEC_MASTERING WORKSHEET



Click the Font dropdown arrow

Step 3: Select the desired font

You can pick one from the list of available fonts.



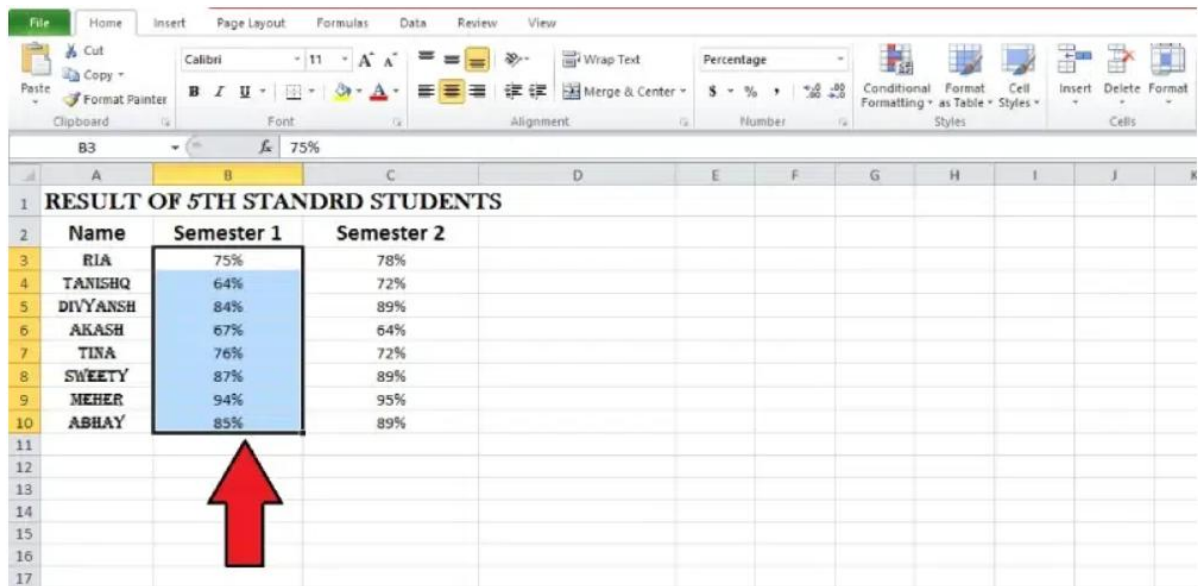
Select the desired font

Step 4: The font will change

The text in the chosen cells will immediately change to reflect the new font style after you've picked a font.

How to Change the Font Size? Step 1: Select the cells
Select the cell to change the font size of it.

106-SEC_MASTERING WORKSHEET



	A	B	C	D	E	F	G	H	I	J	K
1	RESULT OF 5TH STANDRD STUDENTS										
2	Name	Semester 1	Semester 2								
3	RIA	75%	78%								
4	TANISHQ	64%	72%								
5	DIVYANSH	84%	89%								
6	AKASH	67%	64%								
7	TINA	76%	72%								
8	SWEETY	87%	89%								
9	MEHER	94%	95%								
10	ABHAY	85%	89%								
11											
12											
13											
14											
15											
16											
17											

Select the cells

Step 2: Open Font Size dropdown

Click the dropdown arrow next to the Font Size command on the Home tab.

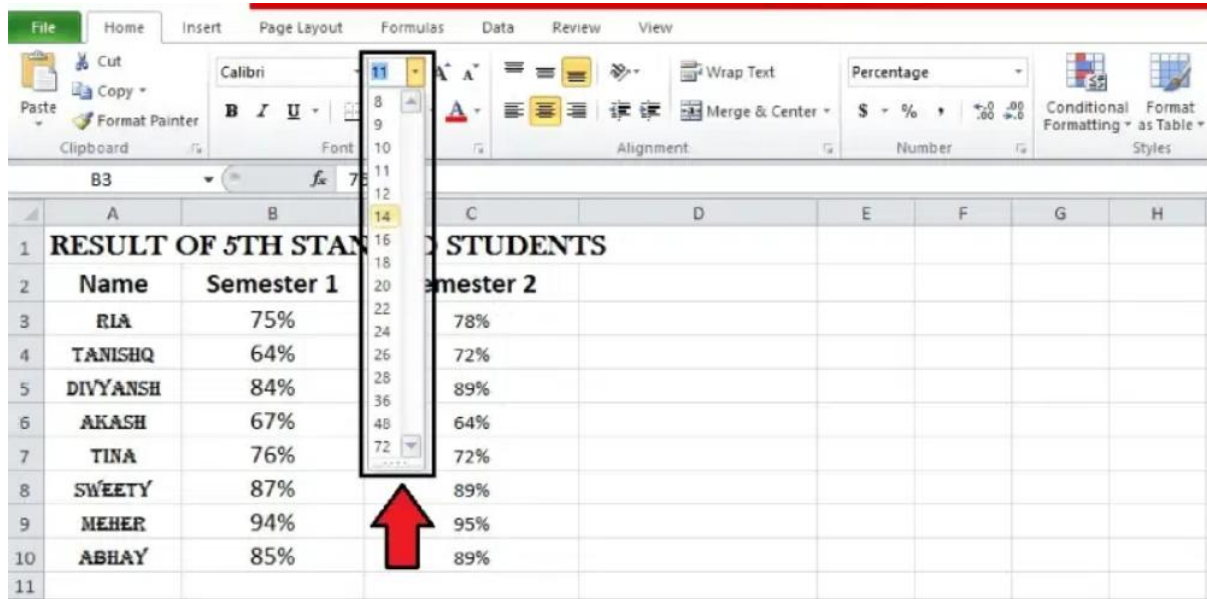
File		Home	Insert	Page Layout	Formulas	Data	Review	View			
Paste		Cut	Copy	Format Painter	Clipboard	Font	Alignment	Percentage	Conditional Formatting	Format as Table	Cell Styles
						Calibri	11	A			
						B	I	U			
										</	

Open Font Size dropdown

Step 3: Select the font size

Select a font size from the list of available options.

106-SEC_MASTERING WORKSHEET



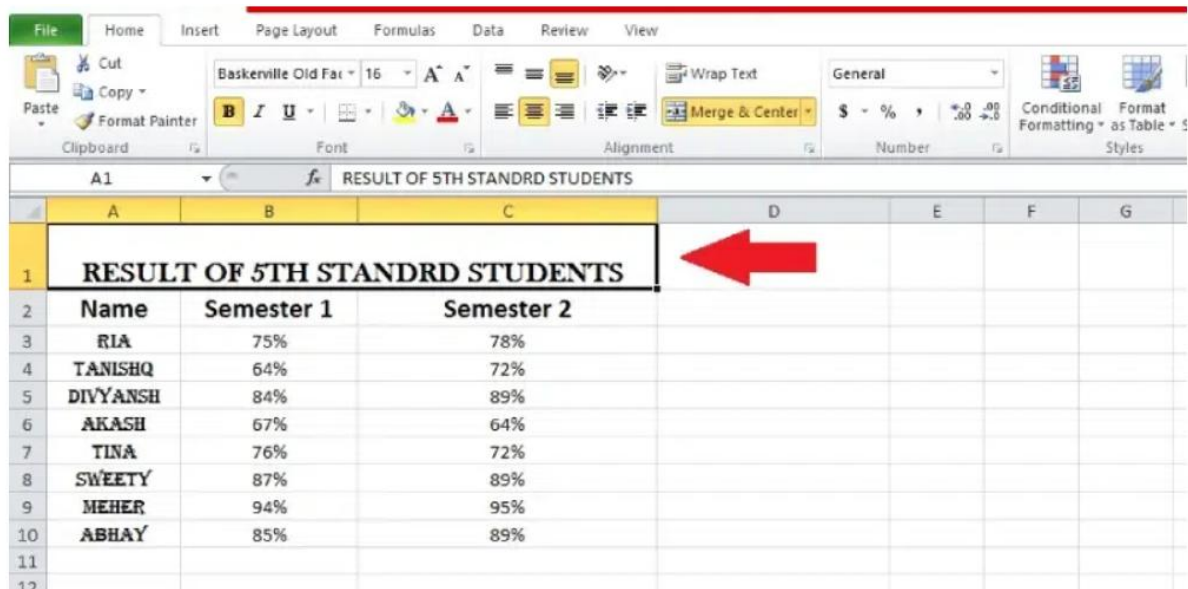
Select the font size

Step 4: Once applied, the text in the selected cells will be resized to match the font size.

How to Change the Font Color?

Step 1: Select the cells

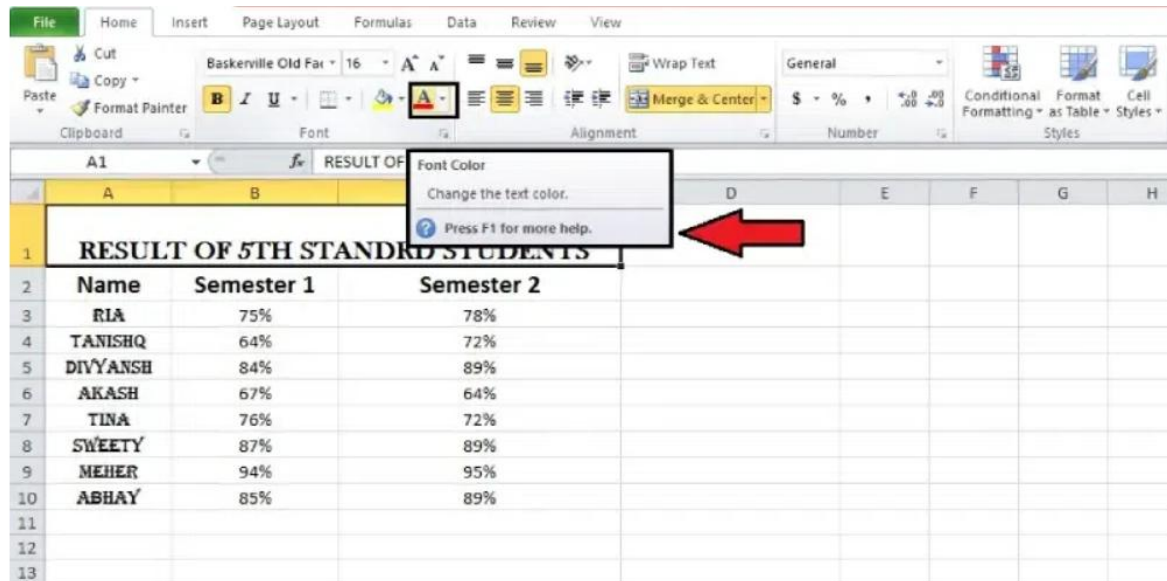
Click on one cell or drag to select multiple cells.



106-SEC_MASTERING WORKSHEET

Step 2: Open the Font Color dropdown on Home

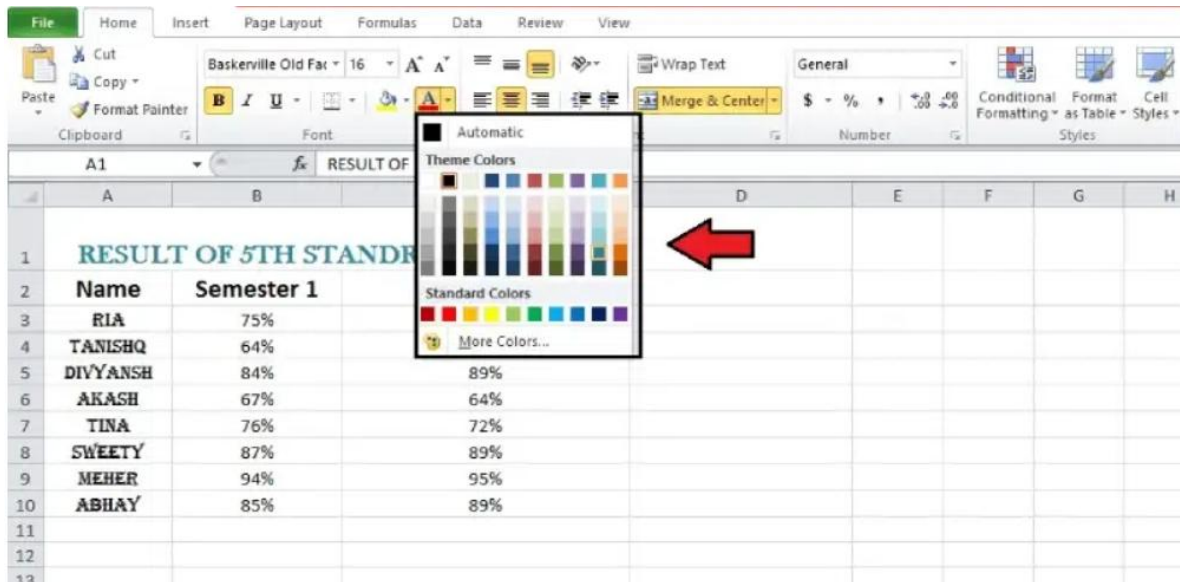
Simply click the down arrow next to Font Colour on the Home to change the font colour.



Open the Font Color dropdown on Home

Step 3: Select the font color

Pick a colour from the spectrum that works for you.



Select the font color

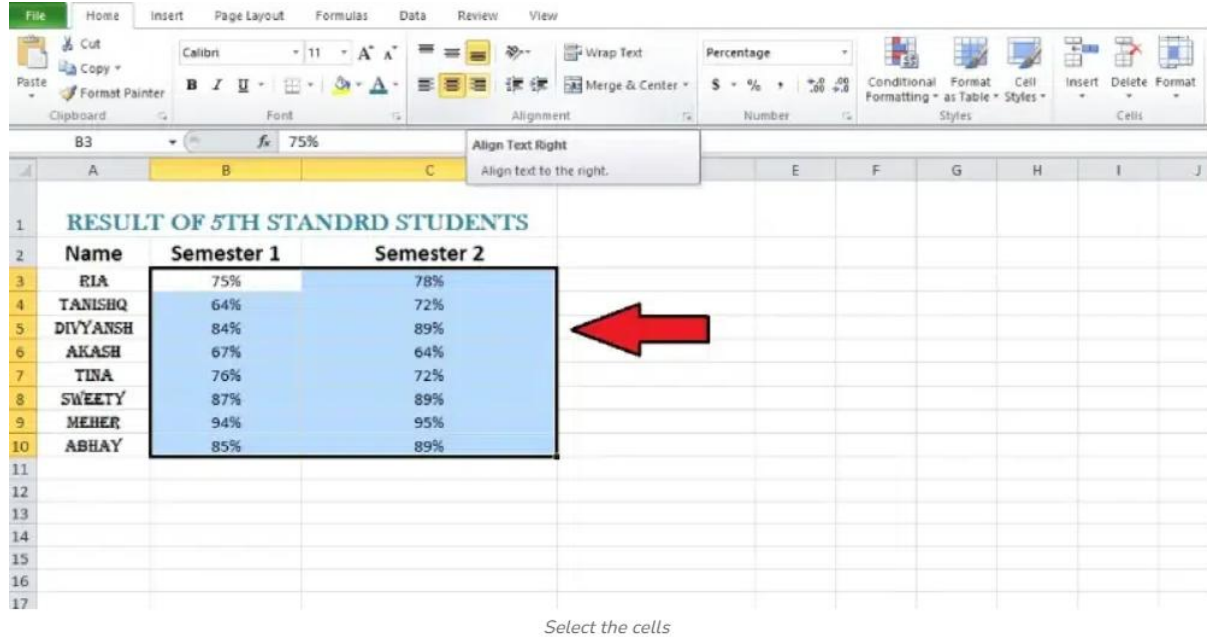
Step 4: The selected font colour will changed

How to use Text Alignment?

Numbers will be aligned to the bottom-right of a cell and text to the bottom-left of a cell in your worksheet by default. You may arrange cell information to make it simpler to read.

Step 1: Select the cells

Click or drag to select multiple cells to change text alignment.



Select the cells

Step 2: Go to the Home, find alignment options

To access the Home tab in Excel, go to the ribbon. Various alignment choices may be found in the "Alignment" category.

Step 3: Choose from left, centre, or right alignment options

Choose one of the three horizontal alignment commands from the Home tab: left, centre, or right.

106-SEC_MASTERING WORKSHEET

	A	B	C	D	E	F	G
1	RESULT OF 5TH STANDRD STUDENTS						
2	Name	Semester 1	Semester 2				
3	RIA	75%	78%				
4	TANISHQ	64%	72%				
5	DIVYANSH	84%	89%				
6	AKASH	67%	64%				
7	TINA	76%	72%				
8	SWEETY	87%	89%				
9	MEHER	94%	95%				
10	ABHAY	85%	89%				
11							

Go to the Home, find alignment options

Step 4: The text will realign

Text in the selected cells will be aligned after you make your selection.

How To Add a Border in Excel?

Step 1: Select the cells

To add a border, click on the cell or groups of cells that you want to border.

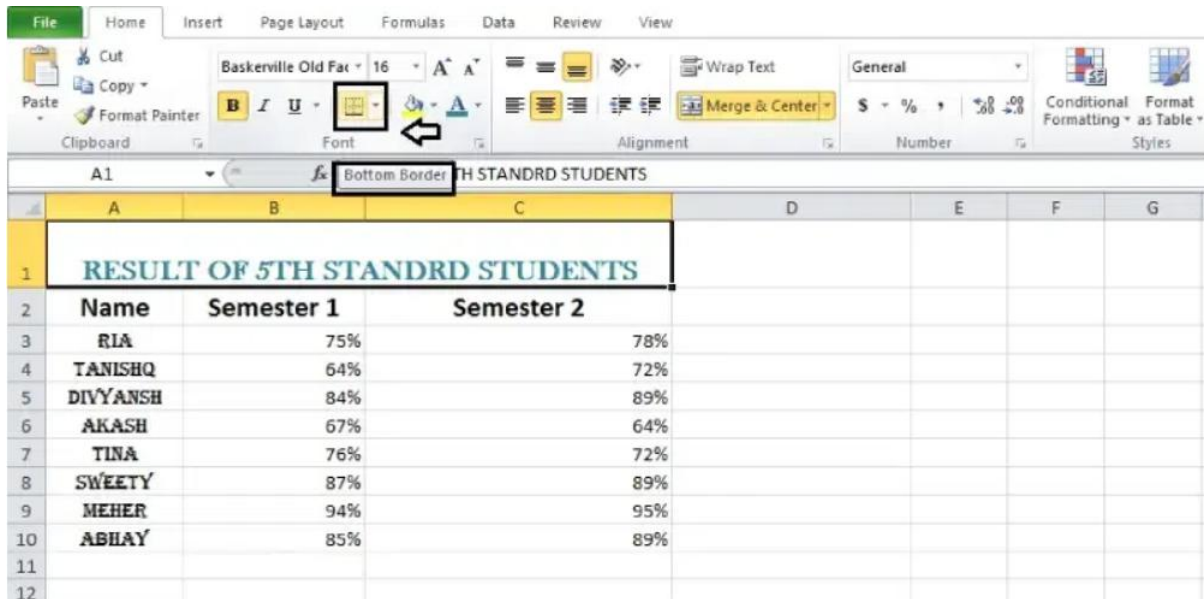
	A	B	C	D	E	F	G	H
1	RESULT OF 5TH STANDRD STUDENTS							
2	Name	Semester 1	Semester 2					
3	RIA	75%	78%					
4	TANISHQ	64%	72%					
5	DIVYANSH	84%	89%					
6	AKASH	67%	64%					
7	TINA	76%	72%					
8	SWEETY	87%	89%					
9	MEHER	94%	95%					
10	ABHAY	85%	89%					
11								
12								
13								

Select the cells

106-SEC_MASTERING WORKSHEET

Step 2: Click the Borders on the Home

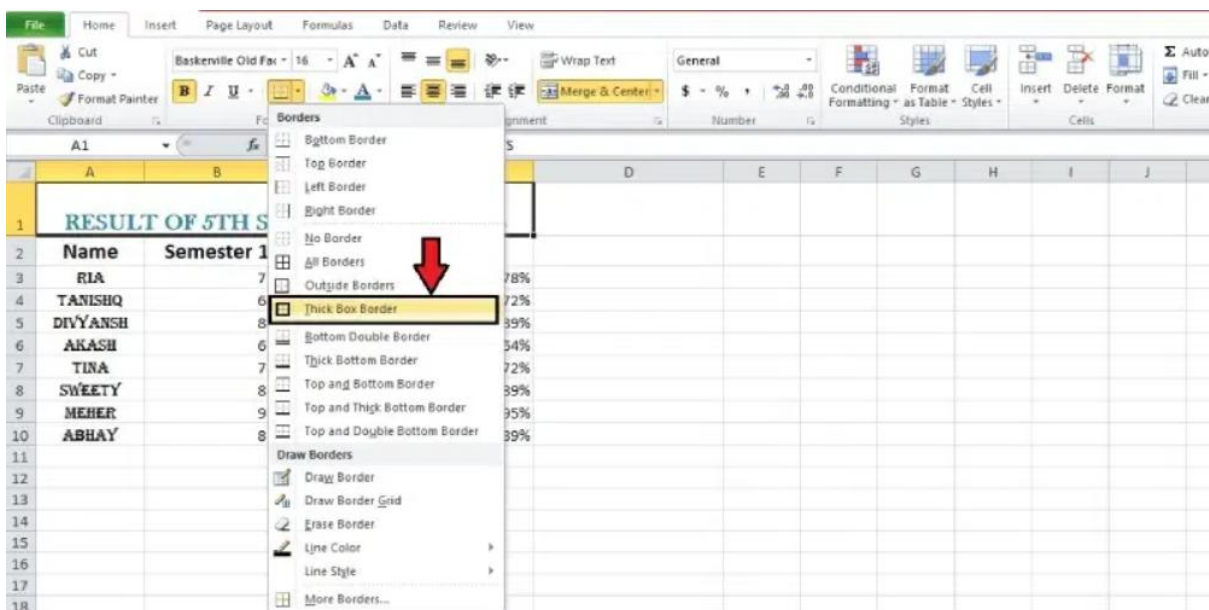
On the Excel menu, go to the Home tab. The "Borders" button is in the "Font" group. It looks like a grid with borders.



Click the Borders on the Home

Step 3: Select the border style

From the dropdown box, pick the border style you want to use. Some options are: There are no borders, all borders, outside borders, thick box borders, and more borders.



Select the border style

Step 4: Apply Border

Click on the border style option to apply it to the selected cells.

1.3.1 Basic Formatting & Navigation

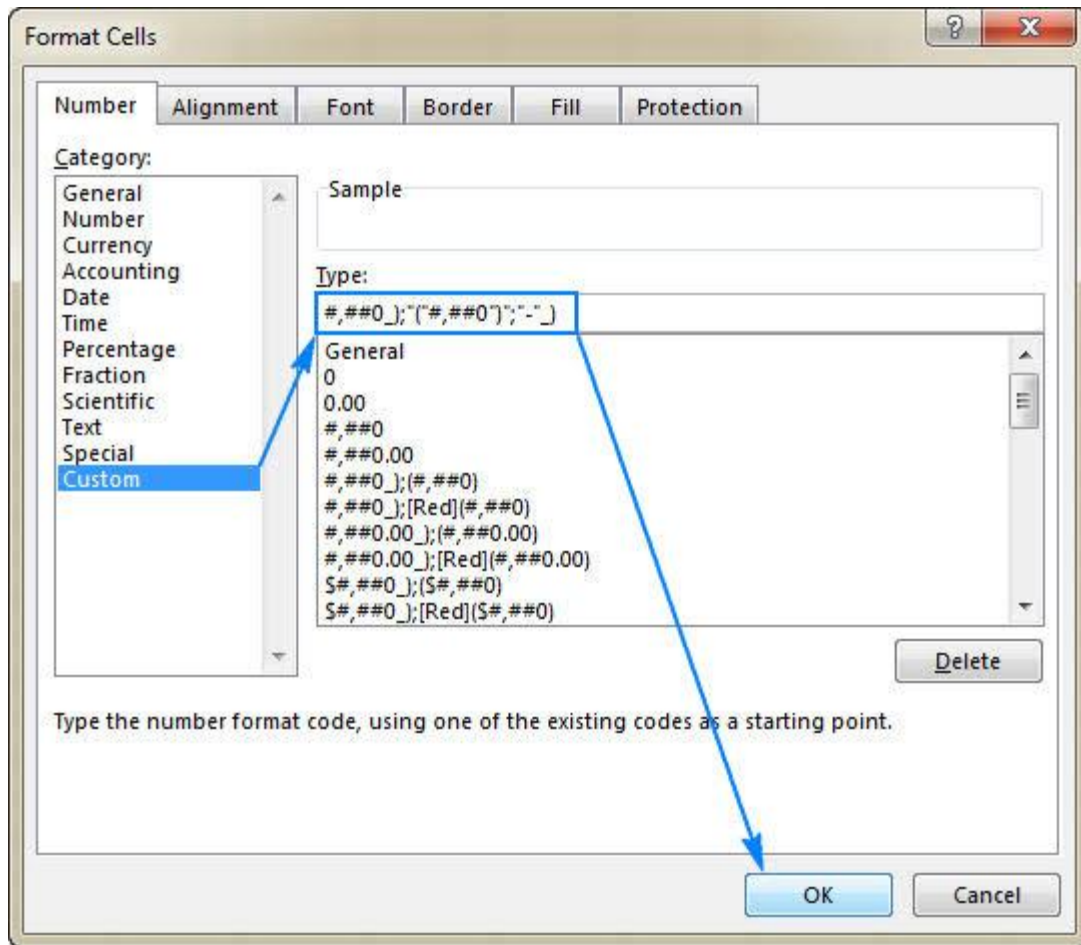
Formatting changes how data *looks* without altering its underlying *value*.

Essential Controls (Home Tab):

- **Font Group:** Change font family, size, color, fill (background) color, or apply **Bold (Ctrl+B)**, *Italic*, or Underline.
- **Alignment Group:** Adjust vertical/horizontal alignment, wrap text inside a single cell, or **Merge & Center** across cells.
- **Borders:** Add grid lines or bottom borders to separate table totals from raw rows.

1.3.1 Custom Number Formatting

Custom number formats let you append units or control decimal places while maintaining the number's mathematical usability.



- **Shortcut to Open:** Select cells -> Press Ctrl + 1 -> Go to **Number** tab -> Click **Custom**.

Common Custom Syntax Examples:

Desired Display Output	Custom Format Code	Input Value
\$1,250.00	<code>\$#,##0.00</code>	1250
12 Units	<code>0" Units"</code>	12
+45 / -45	<code>+#;-#;0</code>	45

Desired Display Output	Custom Format Code	Input Value
Hidden Text/Numbers	;;;	<i>Any value</i>

1.4 Format as Table

Converting a basic cell range into an official Excel Table adds dynamic database features.

- **Excel Path:** Select Data -> Press Ctrl + T (or Home -> Format as Table).

Advantages of Excel Tables:

- **Auto-Filtering:** Adds dropdown arrows to headers automatically.
- **Banded Rows:** Alternating light/dark shading for clear visual reading.
- **Dynamic Range:** Charts and formulas connected to the table expand automatically when you add new rows.
- **Total Row:** Right-click inside the table-> Table -> check **Total Row** to add dynamic SUBTOTAL functions at the bottom.

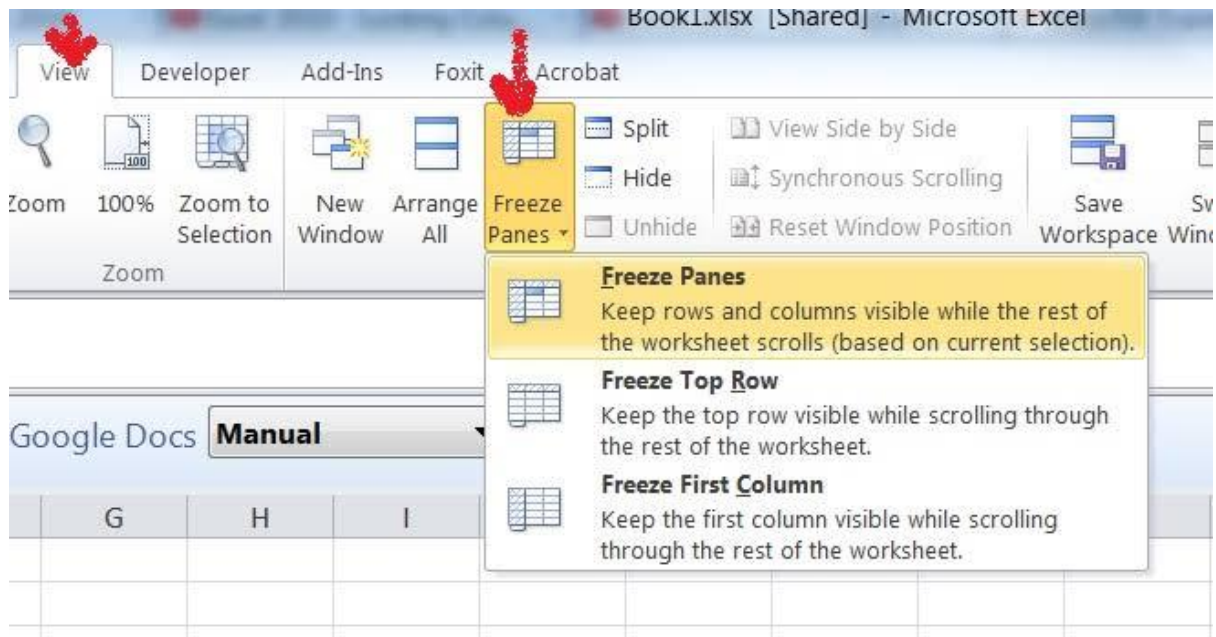
1.4.1 Layout, Viewing & Page Setup

1. Cell Styles & Themes

- **Themes (Page Layout -> Themes):** Changes fonts, colors, and effects across the entire workbook.
- **Cell Styles (Home -> Cell Styles):** Quickly applies pre-built header or status designs (e.g., *Good, Bad, Neutral, Heading 1*).

2. Freeze Panes & Split Window

Keep headers visible while scrolling through thousands of rows.



- **Excel Path:** Go to the **View** tab Click **Freeze Panes**.
 - **Freeze Top Row:** Keeps Row 1 visible as you scroll down.
 - **Freeze First Column:** Keeps Column A visible as you scroll right.
 - **Freeze Panes:** Locks all rows above and columns to the left of your *currently selected cell*.

3. Page Layout & Print Settings

To make a multi-column report fit neatly onto a printed page:

1. **Set Print Area:** Select data range -> Page Layout -> Print Area -> Set Print Area.
2. **Fit to Page:** Go to Page Layout -> Scale to Fit group -> Set **Width** to 1 Page and **Height** to Automatic (or 1 Page).
3. **Orientation:** Choose between **Portrait** (tall) or **Landscape** (wide).

1.4.2 Headers & Footers

Add repeating metadata (like page numbers, file names, or dates) to the top or bottom of every printed page.

- **Excel Path:** Go to Insert -> Header & Footer (switches to **Page Layout View**).
- **Dynamic Codes:**

- Page -> Inserts Current Page Number
- Pages -> Inserts Total Number of Pages
- File -> Inserts Workbook File Name

1.5 Essential Excel Shortcuts (Productivity Tips)

Mastering keyboard shortcuts reduces reliance on mouse clicks and boosts editing speed.

Category	Shortcut	Action / Function
Navigation	Ctrl + Arrow Key	Jump to the edge of data region in that direction
Navigation	Ctrl + Home	Jump back to Cell A1
Selection	Ctrl + Shift + Arrow Key	Select all cells to the edge of the data region
Selection	Ctrl + Space	Select the entire active Column
Selection	Shift + Space	Select the entire active Row
Editing	F2	Edit the active cell directly
Editing	F4	Repeat last action OR toggle absolute/relative cell references (\$A\$1)
Formatting	Ctrl + 1	Open the Format Cells dialog box

Category	Shortcut	Action / Function
Formatting	Ctrl + Shift + \$	Apply Currency format (\$#,##0.00)
Formatting	Ctrl + Shift + %	Apply Percentage format (0%)
Operations	Alt + =	Insert AutoSum formula automatically
Table	Ctrl + T	Convert selected range into an Excel Table

Unit 2: Advance Formulas, function, chart and Data Analysis

2.1 What is a Cell Reference in Excel

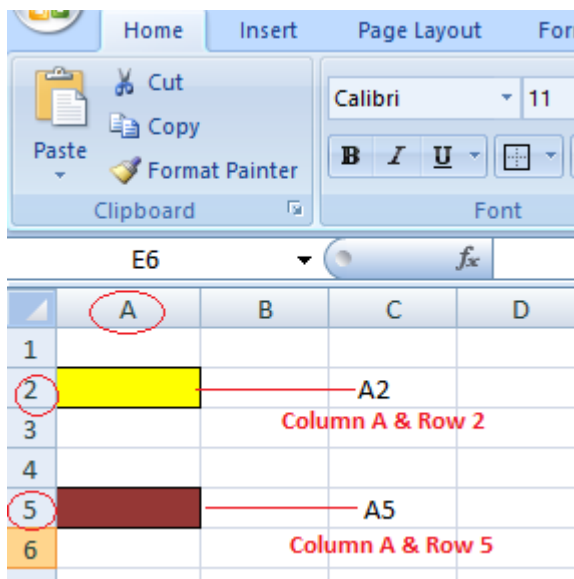
A **cell reference** (or **cell address**) is a combination of a column letter and a row number that identifies a specific cell in a worksheet. These references are essential for formulas and functions, allowing you to retrieve, calculate, or manipulate data.

For example:

- A2 refers to the cell in column A and row 2.
- B5 refers to the cell in column B and row 5.

These cell addresses can be used in formulas like `=A2+B5` to calculate or copy values between cells.

For example:



Types of Cell Reference in Excel

Understanding various cell references primarily makes it easier for us to use Excel formulas and avoid unexpected formula errors.

When copying and pasting Excel formulas, this is quite useful. Based on various use situations, Excel offers three main types of cell references, including:

- ***Relative Cell Reference***
- ***Absolute Cell Reference***
- ***Mixed Cell Reference***

1. Relative Cell Reference

Relative cell references are the default in Excel. They change automatically when a formula is copied to another cell, maintaining the relative position between cells. There is *no dollar (\$) sign* in the relative reference for the cell.

How to Use Relative Cell References in Excel (With Examples)

Let's see how to use the Relative Cell references through examples,

Example 1:

If you refer to cell B1 from cell E1, actually you would be referring to a cell that is 3 columns to the left ($E-B = 3$) within the same row number 1.

When it is copied to other locations present in a worksheet, the relative reference for that location will be changed automatically. (because relative cell reference describes offset to another cell rather than a fixed address as In our example, offset is : 3 columns left in the same row).

referred to a cell that is 3 columns to the left (E-B = 3) within the same row number 2.

referred to a cell that is 3 columns to the left (E-B = 3) within the same row number 3.

referred to a cell that is 3 columns to the left (E-B = 3) within the same row number 4.

referred to a cell that is 3 columns to the left (E-B = 3) within the same row number 5.

Example 2:

If you copy the formula = C2 / A2 from the cell "E2" to "E3", the formula in E3 will automatically become =C3/A3.

E2 copied to E3
As E2 = C2/A2
Therefore, E3 will become : E3 = C3/A3

When to Use Relative Cell References in Excel

When you need to develop a formula for a set of cells and the formula needs to make a reference to a relative cell reference, relative cell references come in handy.

When this occurs, you can create the formula in one cell and copy it before pasting it into every other cell.

2. Absolute Cell Reference

When copying or using AutoFill, there are times when the cell reference must stay the same. A column and/or row reference is kept constant using dollar signs. So, to get an absolute reference from a relative, we can use the dollar sign (\$) characters.

To refer to an actual fixed location on a worksheet whenever copying is done, we use absolute reference. The reference here is locked such that rows and columns do not shift when copied.

How to Use Absolute Cell References in Excel

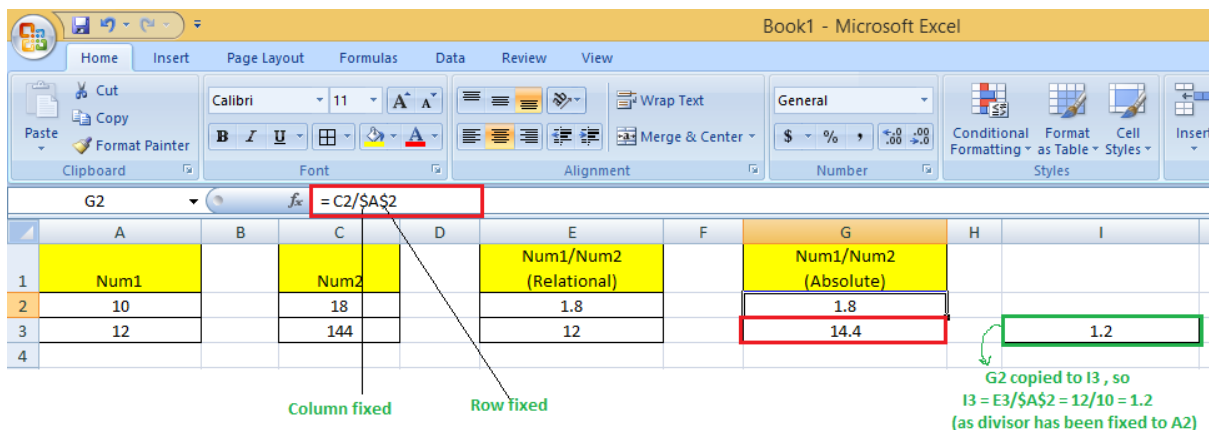
Below is an example depicting how to use Absolute Cell References in Excel.

Example:

To lock the reference A2, use \$A\$2 in a formula like =C2/\$A\$2. When copied to other cells, \$A\$2 will remain fixed.

G2 = C2/\$A\$2, when copied to G3, G3 becomes = C3/\$A\$2

Note: C3 is 4 columns left to G3 in the same row.



Here, original cell reference A2 is maintained whenever we copy G2 to any of the cells. So I3 = E3/\$A\$2 because E3 comes from the relative reference (4 columns left to the current one) & /\$A\$2 comes from the absolute reference.

Therefore, ***I3 = E3/\$A\$2 = 12/10 = 1.2***

What Does the Dollar (\$) Sign Do

When the row and column numbers are preceded by the dollar symbol (\$), it becomes absolute (i.e., stops the row and column number from changing when copied to other cells). Dollar (\$) before the row fixes the row & before the column fixes the column.

Practical Use Cases for Absolute References in Excel

When you need a fixed value in formulas, such as tax rates, constants, or specific cell addresses. You can also use Absolute Cell Reference Keyboard Shortcut F4.

3. Mixed Cell Reference

Mixed references combine relative and absolute references. You can lock either the row or the column, depending on your needs.

Here, the Dollar (\$) before the row number fixes/locks the row & before the column name fixes/locks the column.

Example:

When we fix the only row: If we have $G2 = C2/A\$2$ then :

We used \$ before the row number, so we are locking the only row here. When G2 is copied to G3, $G3 = C3/A\$2$ (not $C3/A3$) because the row has been fixed already.

Excel Spreadsheet Data:

	A	B	C	D	E	F	G	H	I
1	Num1		Num2		Num1/Num2 (Relational)		Num1/Num2 (Absolute)		
2	10		18		1.8		1.8		
3	12		144		12		14.4		0.66666667
4									
5									
6									
7									

Annotations:

- Formula Bar:** G2 shows $C2/A\$2$.
- Cell G2:** Contains $C2/A\$2$ and value 1.8.
- Cell G3:** Contains $C3/A\$2$ and value 14.4. Annotation: "G2 is copied to G3 So, $G3 = C3/A\$2$ (Absolute Reference)".
- Cell I3:** Contains $E3/C\$2$ and value 0.66666667. Annotation: "G2 is copied to I3 So $I3 = E3/C\$2$ (Absolute Reference)".
- Cell E3:** Contains 12. Annotation: "E2 copied to E3 So, $E3 = C3/A2$ (Relational Reference)".
- Cell E2:** Contains 1.8. Annotation: "E3 will also refer to the division of element in C column divided by element in Column A of the same row".
- Cell A2:** Contains 10. Annotation: "Dollar before 2 shows that we fixed row 2".
- Cell I3:** Contains 0.66666667. Annotation: "Here, for divisor the row has been fixed & is 2 as we copied absolute reference. Divident = E3 (4 column left) in same row Divisor = C2 (6 column left) having Fixed row 2".

Here, whenever we copy G2 to any other cell, always the divisor will refer to a fixed row 2 (column vary according to the concept of relative reference)

So, when G2 is copied to I3, I3 = E3/C\$2 because E3 comes from the relative reference (4 columns left to the current one) & C\$2 comes from the absolute reference for row & relative reference for Column (6 Columns left to the current one)

Other Useful Ways to Use Cell References and Addresses

Now that we are familiar with the basics of using Cell References in Excel, let's see some other ways of using cell references.

Relative and Absolute References for Dates

We can use relative and absolute cell references to calculate dates.

- Relative Reference Example: =Order Date + Days to Deliver
- Absolute Reference Example: =Today() - Age in Days

Example: To Calculate the Date of Delivery online from the given date of the order placed & no of days it will take to deliver :

	A	B	C	D
1	Product Name	Date of Order Placing	No of Days to Deliver	Delivery Date
2	Lays Chips	01-05-21	12	13-05-21
3	Bedsheet	07-05-21	8	17-05-21
4	Apple	03-05-21	11	16-05-21
5	Oranges	10-05-21	17	18-05-21
6				

Here, We calculate the Date of Delivery by = Order Date + No of days to deliver. We used Relative cell reference so that individual product delivery dates can be calculated.

Absolute cell references for calculating dates :

Example:

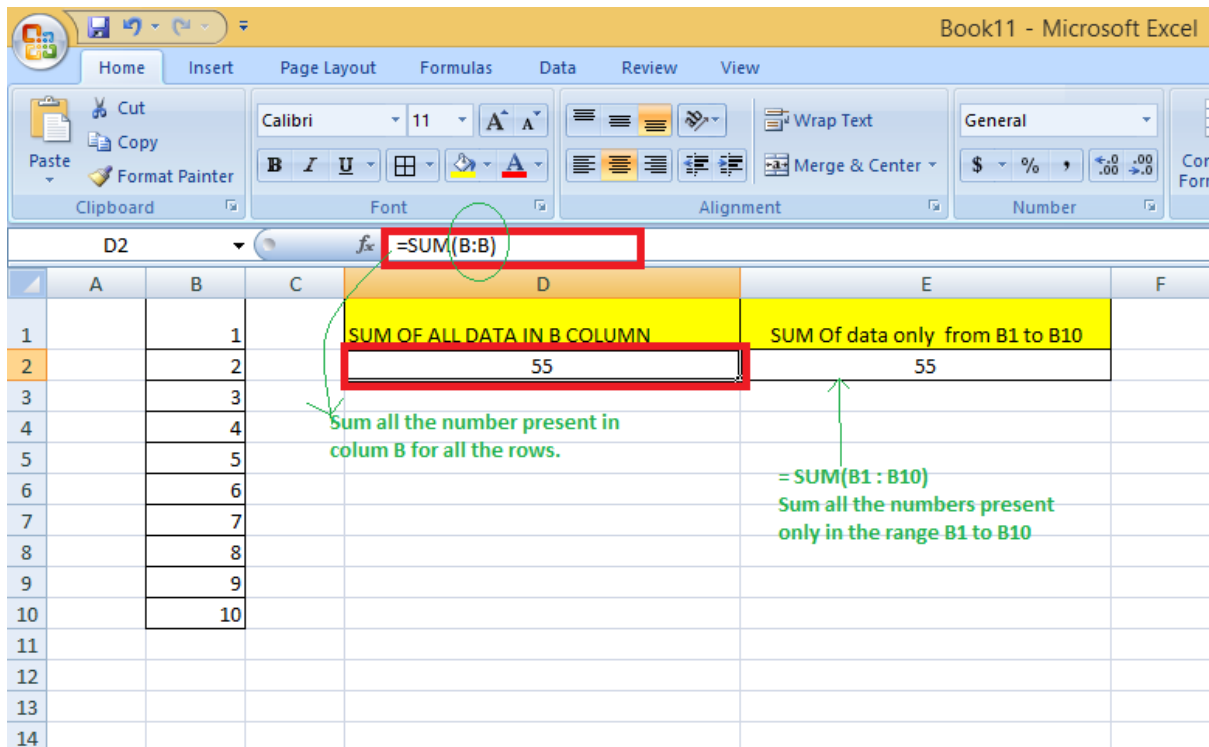
To Calculate the Date of Birth When the age is known is a number of days using Current date can be done by making use of absolute reference.

	A	B	C	D	E
1	Person Name	Birth Date	Age in Days		Today Date
2	Sia	23-02-13	3000		12-05-21
3	Ria	13-03-02	7000		
4	Sam	20-11-08	4556		
5	John	25-12-93	10000		
6					
7					

Here, We calculate DOB by = Current Date - Age in days. The Current date is contained in the cell E2 & in subtraction, we fixed that date to subtract from the days.

Whole Column Reference

To refer to all cells in a specific column in Excel, use the column letter twice with a colon in between, like B:B for column B. For example, to find the sum of all values in column B, type =SUM(B:B). Unlike a range like B1:B10, this approach automatically includes any new data added to the column, saving you the need to update the range manually.



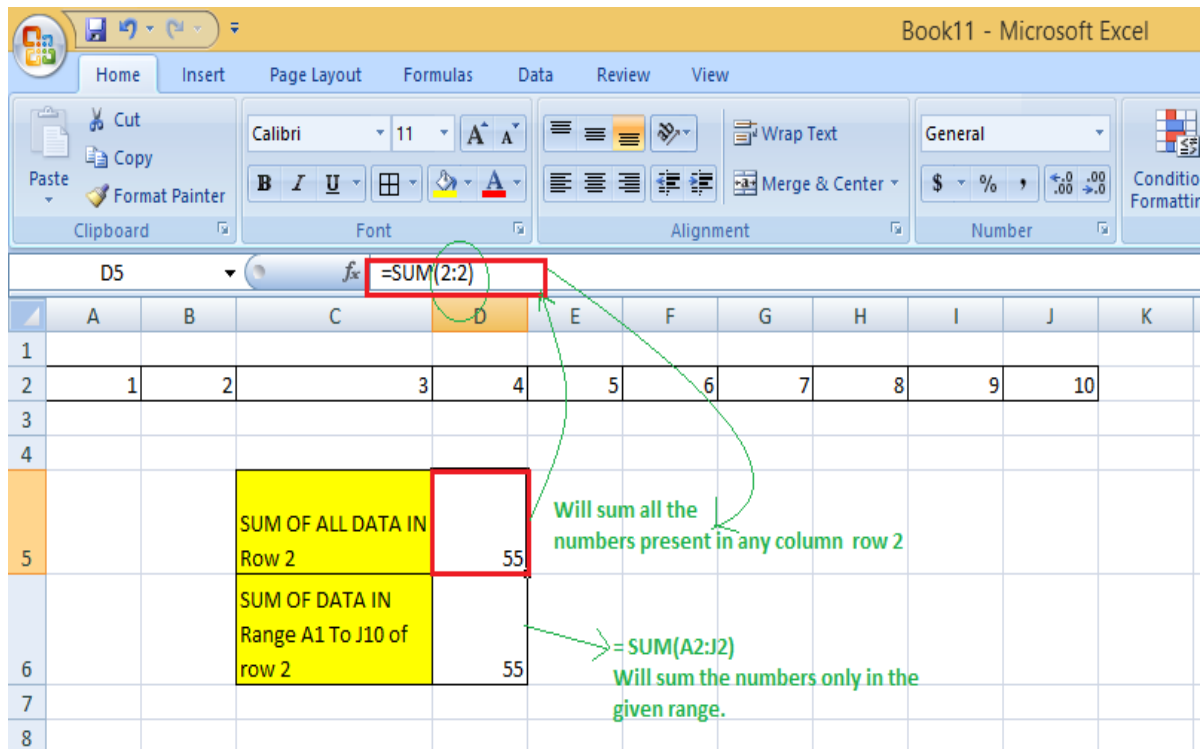
Whole Row Reference

You will want to refer to all the cells inside a particular row when operating with an Excel worksheet with any number of columns. Simply type a row number twice with a colon in between to refer to the entire row, for example, **2:2**.

Example:

You may want to find the sum of a row of data in certain cases. While you can do this with a regular cell range, such as `=SUM(A2 : J2)`, you will need to change the cell range if your spreadsheet grows in size.

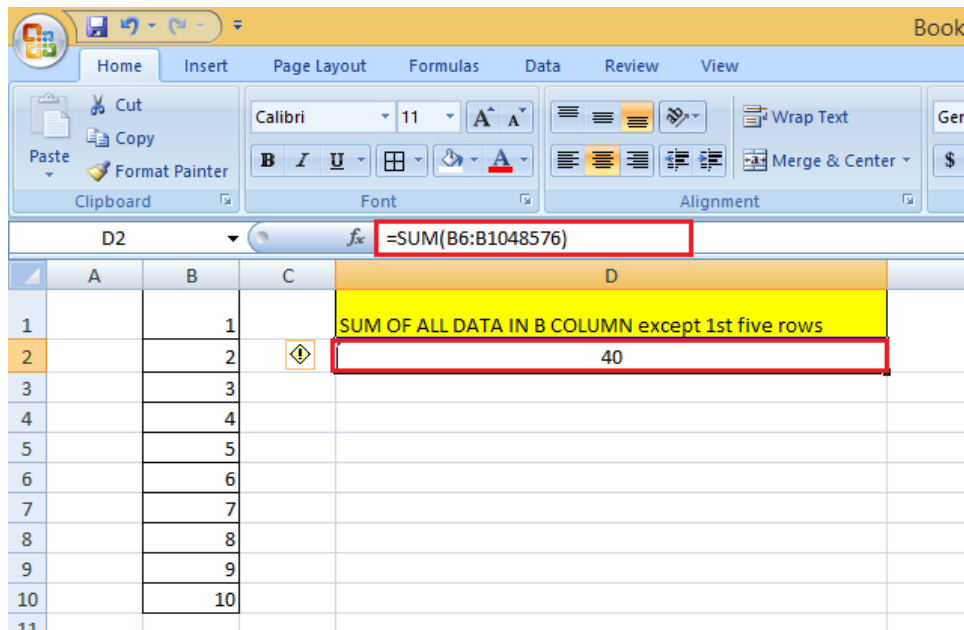
Excel, on the other hand, has a cell range that does not require the column letter and takes all the cells in the row in action. If you wanted to find the sum of all the values in row 2, for example, you would type `=SUM(2:2)`. You can add as much data as you want to your spreadsheet without having to change your cell ranges if you use this type of cell range.



Refer to an Entire Column, Excluding the First Few Rows

To refer to the entire column excluding the first few rows, you need to specify the range as we give in a normal fashion. We know that the Excel worksheets can have only 1,048,576 rows. (To check this, go to an empty cell & press: Ctrl + Down arrow Key)

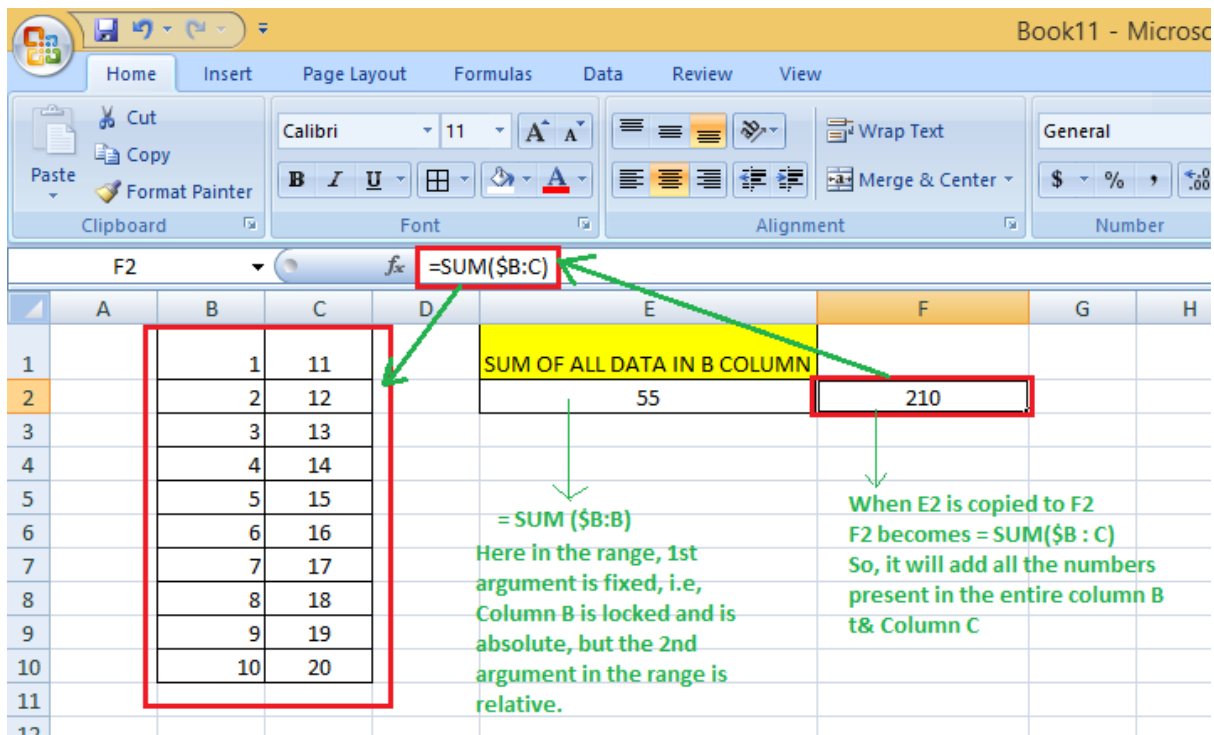
So, we can do the sum of the entire column B except for the first 5 rows by `=SUM(B6:B1048576)`.



Using a Mixed Entire Column Reference in Excel

You can also create a mixed entire-column reference, say for example `$B:B`. But, practically, it is difficult to find a situation where it would be used.

Example:



How to Switch between Different Cell References

The \$ sign can be manually typed in an Excel formula to adjust a relative cell relation to absolute or mixed. You can also speed things up by pressing the F4 key. You must be in formula edit mode to use the F4 shortcut. The steps are :

Firstly, choose the cell that contains the formula. Then, by pressing the F2 key or double-clicking the cell, you can enter Edit mode. Select the cell reference in which you want to make changes. Then, switch between four-cell reference forms by pressing F4.

Example:

When you select a cell having only relative reference (i.e., no \$ sign), say = B2:

- The first time when you press F4, it becomes =\$B\$2
- The second time when you press F4, it becomes =B\$2
- The third time when you press F4, it becomes=\$B2
- The fourth time when you press F4, it becomes back to the relative reference=B2

B2 --Press F4--> =\$B\$2 --Press F4--> =B\$2 --Press F4--> = \$B2 --Press F4--> =B2

So, using F4, you do not require to manually type the \$ symbol.

Cell References Across Worksheets

Cell reference in Excel are not limited to just the current worksheet. Excel allows you to reference cells from other worksheets in the same workbook. Follow the below steps to learn Cell References Across Worksheets:

- Type = in a cell on the current worksheet.
- Switch to another sheet and click the desired cell.
- Press **Enter** to complete the reference.

Example: =Sheet2!A1 references cell A1 on "Sheet2".

2.2 Basic Functions:

2.2.1 SUM, AVERAGE, COUNT, MAX, MIN

1. SUM()

The **SUM()** function adds numbers in selected cells or a range.

=SUM(number1, number2, ...)

=SUM(B2:B4)

2. AVERAGE()

The **AVERAGE()** function calculates the arithmetic mean of numbers.

=AVERAGE(number1, number2, ...)

=AVERAGE(B2:B4)

3. COUNT()

COUNT() counts the number of cells containing **numbers**.

=COUNT(B2:B10)

4. MAX()

MAX() returns the largest number in a range.

=MAX(B2:B10)

5. MIN()

MIN() returns the smallest number in a range.

=MIN(B2:B10)

2.2.2 Logical Functions

Logical functions evaluate conditions and return results such as **TRUE, FALSE, or a specified result**.

1. IF()

The **IF()** function checks a condition and returns one value if the condition is TRUE and another if it is FALSE.

Syntax:

=IF(logical_test, value_if_true, value_if_false)

=IF(B2>=40,"Pass","Fail")

2. AND()

AND() returns TRUE only when **all conditions** are TRUE.

=AND(B2>=40,C2>=40)

=IF(AND(B2>=40,C2>=40),"Pass","Fail")

3. OR()

OR() returns TRUE when **at least one condition** is TRUE.

=OR(B2>=40,C2>=40)

=IF(OR(B2>=40,C2>=40),"Eligible","Not Eligible")

4. NOT()

NOT() reverses a logical result.

=NOT(B2>50)

5. TRUE()

Returns the logical value **TRUE**.

=TRUE()

6. FALSE()

Returns the logical value **FALSE**.

=FALSE()

2.2.3 Text Functions

Text functions are used to extract, combine, count, and manipulate text.

1. LEFT()

LEFT() extracts characters from the **left side** of a text string.

Syntax:

=LEFT(text, num_chars)

Example:

A2 = COMMERCE

=LEFT(A2,4)

Result: COMM

2. RIGHT()

RIGHT() extracts characters from the **right side**.

=RIGHT(A2,4)

If A2 = COMMERCE

Result: ERCE

3. MID()

MID() extracts characters from the middle of a text string.

Syntax:

=MID(text, start_num, num_chars)

Example:

A2 = COMMERCE

=MID(A2,3,4)

Result: MMER

4. CONCAT()

CONCAT() combines text from multiple cells or text strings.

Example:

A	B
Yakshita Tandel	

=CONCAT(A2," ",B2)

Result:

Yakshita Tandel

5. LEN()

LEN() counts the number of characters in a text string, including spaces.

=LEN("Excel")

Result: 5

Example:

=LEN(A2)

2.2.4 IFERROR()

IFERROR() displays a specified value when a formula produces an error.

Syntax:

=IFERROR(value, value_if_error)

Example

Suppose:

A	B	C
---	---	---

100	10	10
-----	----	----

50	0	#DIV/0!
----	---	---------

Formula:

=A3/B3

produces an error because division by zero is not possible.

Instead use:

=IFERROR(A3/B3,"Not Available")

Result: Not Available

Advantage

IFERROR makes reports cleaner by replacing errors such as:

- #DIV/0!
- #N/A
- #VALUE!
- #REF!

2.2.5 Lookup Functions

Lookup functions are used to **search for information in a table and return a related value.**

1. VLOOKUP()

VLOOKUP (Vertical Lookup) searches for a value in the first column of a table and returns information from another column.

Syntax:

=VLOOKUP(lookup_value, table_array, col_index_num, FALSE)

Example

Product ID	Product	Price
P101	Laptop	50000
P102	Mouse	800
P103	Keyboard	1500

To find the price of P102:

=VLOOKUP("P102",A2:C4,3,FALSE)

Result: 800

FALSE means we want an **exact match**.

2. HLOOKUP()

HLOOKUP (Horizontal Lookup) searches for a value in the **top row** and returns information from another row.

Example:

	Jan	Feb	Mar
Sales	10000	15000	18000

Formula:

=HLOOKUP("Feb",B1:D2,2,FALSE)

Result: 15000

VLOOKUP vs HLOOKUP

VLOOKUP	HLOOKUP
Searches vertically	Searches horizontally
Searches first column	Searches top row
Returns value from another column	Returns value from another row

3. XLOOKUP()

XLOOKUP() is a modern lookup function that can search in one range and return a corresponding value from another range.

Syntax:

=XLOOKUP(lookup_value, lookup_array, return_array)

Example:

Product ID	Product	Price
P101	Laptop	50000
P102	Mouse	800
P103	Keyboard	1500

Formula:

=XLOOKUP("P102",A2:A4,C2:C4)

Result: 800

Advantages of XLOOKUP

- Can search left or right.
- Does not require a column number.
- Supports exact matching easily.
- More flexible than traditional VLOOKUP.

2.2.6 Financial Functions

1. PMT()

PMT() calculates the periodic payment for a loan based on a constant interest rate and number of payments.

Syntax:

=PMT(rate, nper, pv)

Where:

- **rate** = interest rate per period
- **nper** = total number of payment periods
- **pv** = present value or loan amount

Example

Loan = ₹5,00,000

Annual interest = 10%

Period = 5 years

Monthly payments = 60

Formula:

=PMT(10%/12,5*12,500000)

Excel returns approximately **-₹10,624 per month**. The negative sign indicates a cash payment.

2. NPV()

NPV (Net Present Value) calculates the present value of future cash flows using a discount rate.

Syntax:

=NPV(rate, value1, value2, ...)

Example

Initial investment = ₹1,00,000

Future cash flows:

Year Cash Flow

1 ₹40,000

2 ₹45,000

3 ₹50,000

If the discount rate is 10%:

=NPV(10%,40000,45000,50000)-100000

The initial investment is subtracted separately because the Excel NPV function treats the supplied cash flows as occurring at the **end of the periods**.

Interpretation:

- Positive NPV → potentially financially attractive.
- Negative NPV → potentially financially unattractive.
- Zero NPV → approximately breaks even at the selected discount rate.

2.2.7 Date & Time Functions

1. TODAY()

TODAY() returns the current date according to the computer's date settings.

=TODAY()

Example result:

17-Aug-2026

The result automatically changes when the date changes.

2. NOW()

NOW() returns the current date **and time**.

=NOW()

Example:

17-Aug-2026 11:30 AM

The exact displayed time depends on when Excel recalculates and the computer's date/time settings.

3. DATEDIF()

DATEDIF() calculates the difference between two dates in years, months, or days.

Syntax:

=DATEDIF(start_date,end_date,unit)

Common units:

Unit	Meaning
"Y"	Complete years
"M"	Complete months
"D"	Total days
"YM"	Remaining months after complete years
"MD"	Remaining days after complete months

Example

Suppose:

A	B
Start Date	01-Jan-2020
End Date	17-Aug-2026

Complete years:

=DATEDIF(A2,B2,"Y")

Result: 6

Complete months:

=DATEDIF(A2,B2,"M")

Complete days:

=DATEDIF(A2,B2,"D")

2.3 Data

2.3.1 Sorting & Filtering

- **Sorting:** Reorders data alphabetically (A–Z), numerically (smallest to largest), or by date.
- **Filtering:** Temporarily hides rows that do not meet specified criteria.

How to use:

1. Select your table range.
2. Go to the **Data** tab.
3. Click **Sort** for multi-level sorting or **Filter** to toggle drop-down arrows on headers.

E3

</

2.3.2 Data Validation (Drop-down List)

Data Validation restricts input options in a cell to ensure data consistency (e.g., forcing a user to select from a predefined list).

How to create a drop-down list:

1. Select the target cell(s).
2. Go to **Data > Data Validation**.
3. Under *Allow*, select **List**.
4. In the *Source* field, type list items separated by commas (e.g., North, South, East, West) or select a range containing the options.
5. Click **OK**.

	A	B	C	D	E
1	Dependent Drop-down List: Tabular dataset				
2					
3	Division	App		Unique Drop-down for Divison	
4	Productivity	WenCaL			
5	Productivity	Blend			
6	Productivity	Voltage			
7	Game	Twistr			
8	Productivity	Inkly			
9	Productivity	Sleeps			
10	Utility	Misty Wash			
11	Productivity	Kind Ape			
12	Productivity	Pet Feed			
13	Productivity	Right App			
14	Productivity	Mirr			
15	Productivity	Halotot			
16	Productivity	Flowrr			
17	Productivity	Silvrr			
18	Utility	Commuta			
19	Productivity	Rehire			
20	Productivity	Didactic			

2.3.3 Conditional Formatting (Color Scale, Icon Sets)

Automatically changes cell appearance (fill color, text color, icons) based on cell value.

- **Color Scales:** Applies a gradient fill (e.g., green for high values, yellow for medium, red for low).
- **Icon Sets:** Adds visual indicators like arrows, traffic lights, or checkmarks based on numerical ranges.

How to apply:

1. Select the numeric range.
2. Go to **Home > Conditional Formatting**.
3. Choose **Color Scales** or **Icon Sets** and select a preset.

2.3.4 Remove Duplicates

Scans designated columns and permanently deletes duplicate rows, keeping only the first instance.

How to use:

1. Select the data range.
2. Go to **Data > Remove Duplicates**.
3. Select which columns to check for duplicate values.
4. Click **OK**.

2.3.5 Pivot Tables

Summarizes large datasets instantly without writing complex formulas. Useful for calculating sums, averages, and counts grouped by categories.

How to create:

1. Click anywhere inside your data range.
2. Go to **Insert > PivotTable**.
3. Choose destination (New Worksheet or Existing Worksheet).
4. Drag fields into **Rows**, **Columns**, **Values**, or **Filters** panels.

2.3.6 Subtotal Feature

Calculates intermediate totals for grouped data. Automatically adds sum/count rows and outline levels for collapsing/expanding details.

How to use:

1. **Sort** your data by the grouping column (e.g., Region).
2. Go to **Data > Subtotal**.
3. In *At each change in*, pick your sorted column.
4. Select the function (e.g., Sum) and check the columns to calculate.
5. Click **OK**.

	A	B	C	D	E	F	G	H	I
1	Date	Size	Color	Type	Revenue				
2	1/1/2017	Red	M	Shirt	4.00				
4	1/2/2017	Blue	S	Shirt	3.00				
7	1/3/2017	Red	M	Shirt	4.00				
8	1/3/2017	Red	S	Shirt	3.00				
9	1/3/2017	Red	S	Shirt	3.00				
10									
11				Revenue Metrics					
12				Sum:	17.00				
13				Average:	3.40				
14				Count:	5.00				
15				CountA:	=SUBTOTAL(103, \$E\$2:\$E\$9)				
16				Min:	3.00				
17				Max:	4.00				
18				Product:	432.00				
19				STD.S:	0.55				
20				STD.P:	0.49				

The SUBTOTAL Function
Calculate Various Metrics
on a **Filtered Range** to see
results for the **Visible Cells**
Only.

2.3.7 Slicers & Timeline

Visual interactive buttons that make filtering Pivot Tables or Excel Tables fast and user-friendly.

- **Slicers:** Clickable buttons to filter categorical data (e.g., Category, Region).
- **Timeline:** Interactive slider specifically designed for filtering date ranges (Year, Quarter, Month, Day).

How to insert:

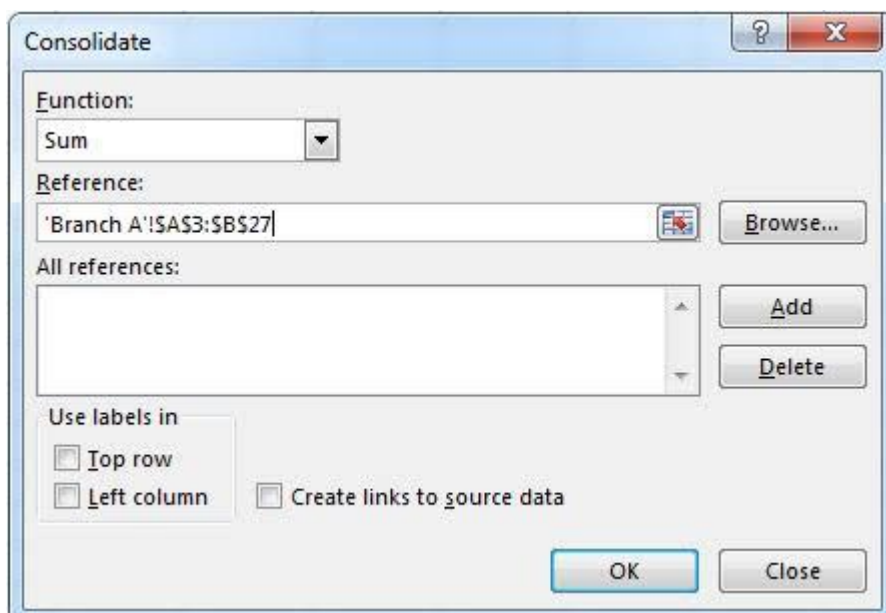
1. Select your PivotTable or Excel Table.
2. Go to **PivotTable Analyze** (or **Insert** tab).
3. Click **Insert Slicer** or **Insert Timeline**.
4. Select the fields you want to control.

2.3.8 Data Consolidation

Combines values from multiple separate ranges or worksheets into a single summary table using a specified function (e.g., Sum, Average).

How to consolidate:

1. Click the top-left cell of the destination area.
2. Go to **Data > Consolidate**.
3. Select the summary function (e.g., Sum).
4. Click into *Reference*, select the first range, and click **Add**.
5. Repeat for each dataset range across different sheets.
6. Check **Top row** / **Left column** if labels need to align automatically, then click **OK**.



2.3.9 Flash Fill

Automatically detects pattern recognition from your manual entry and fills the remaining cells in a column.

- **Shortcut:** Ctrl + E
- **Common Use Cases:** Splitting full names into First/Last, extracting domain names from emails, reformatting phone numbers.

How to use:

1. Type the desired pattern output in the adjacent column next to your source data.
2. Press Enter to move to the next cell.
3. Press **Ctrl + E** (or go to **Data > Flash Fill**). Excel auto-populates the rest.

2.4 Basic Types of Charts

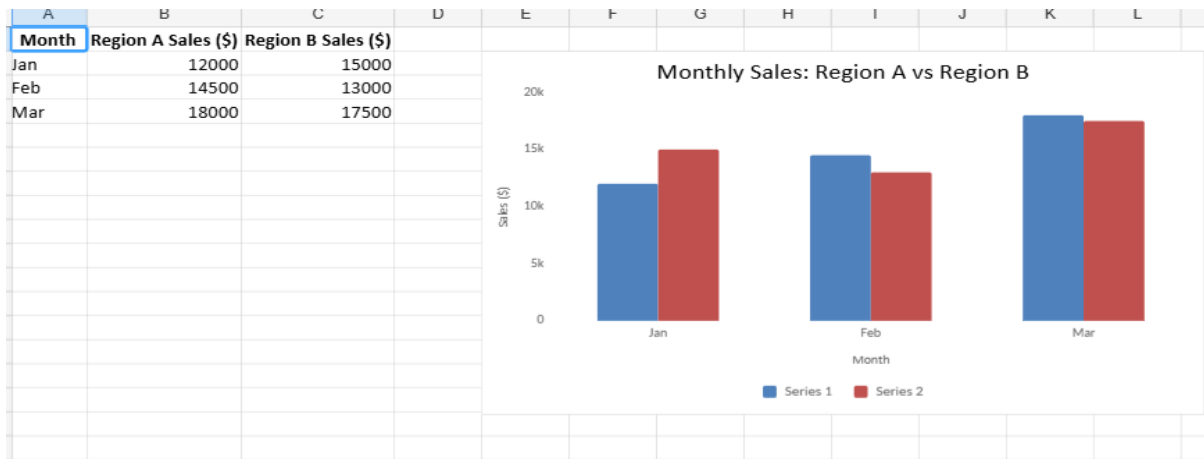
Charts transform raw numbers into visual stories. Selecting the right chart type depends on what you want to communicate: comparison, trend, composition, or relationship.

1. Column Chart

- **Best Used For:** Comparing discrete categories or tracking values over short time periods.
- **Excel Path:** Insert > Charts > Insert Column or Bar Chart > Clustered Column.

Sample Excel Dataset:

Month	Region A Sales (\$)	Region B Sales (\$)
Jan	12,000	15,000
Feb	14,500	13,000
Mar	18,000	17,500

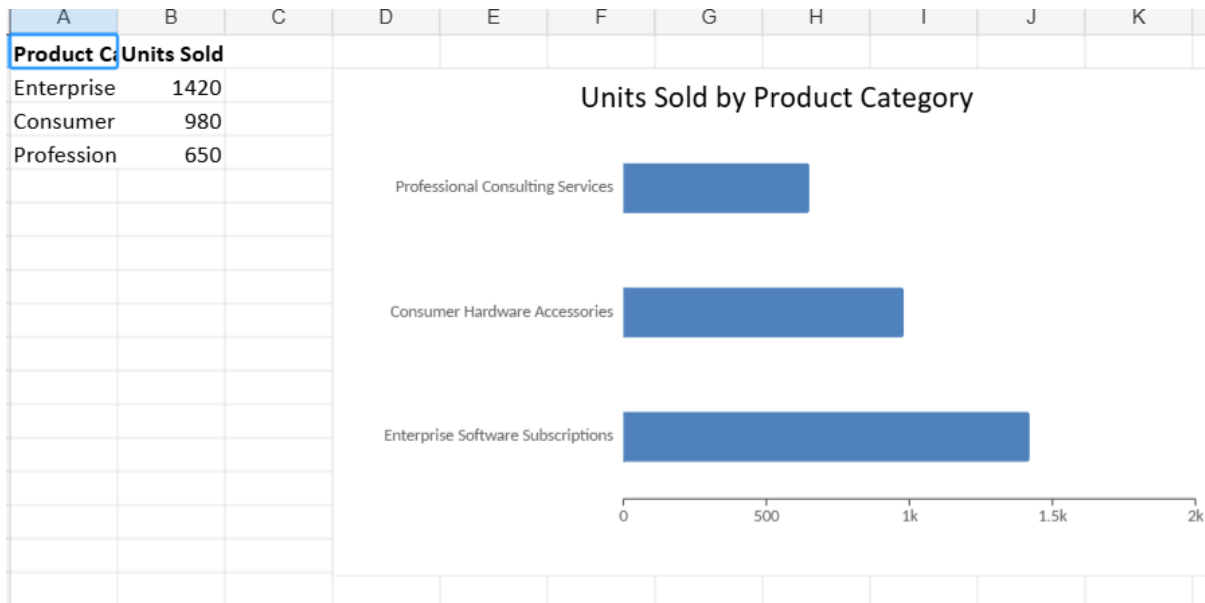


2. Bar Chart

- **Best Used For:** Comparing items when category names are long, or when ranking items across categories.
- **Excel Path:** Insert > Charts > Insert Column or Bar Chart > 2-D Bar.

Sample Excel Dataset:

Product Category	Units Sold
Enterprise Software Subscriptions	1,420
Consumer Hardware Accessories	980
Professional Consulting Services	650

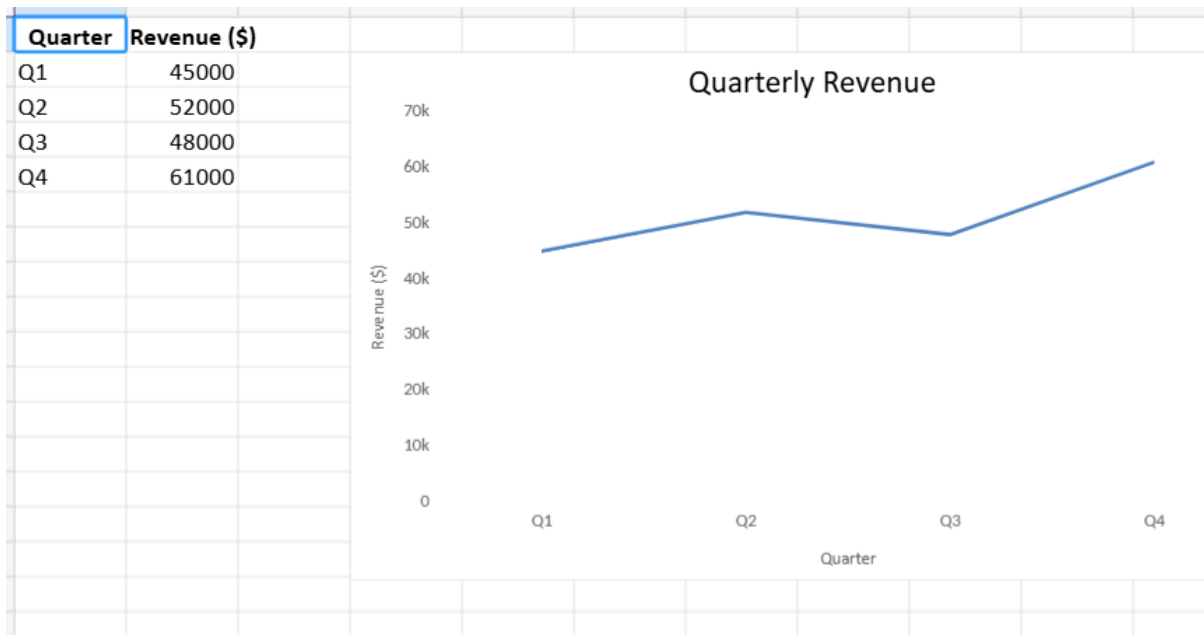


3. Line Chart

- **Best Used For:** Showing continuous trends over time (e.g., daily stock prices, monthly revenues).
- **Excel Path:** Insert > Charts > Insert Line or Area Chart > Line with Markers.

Sample Excel Dataset:

Q1	Q2	Q3	Q4
45,000	52,000	48,000	61,000

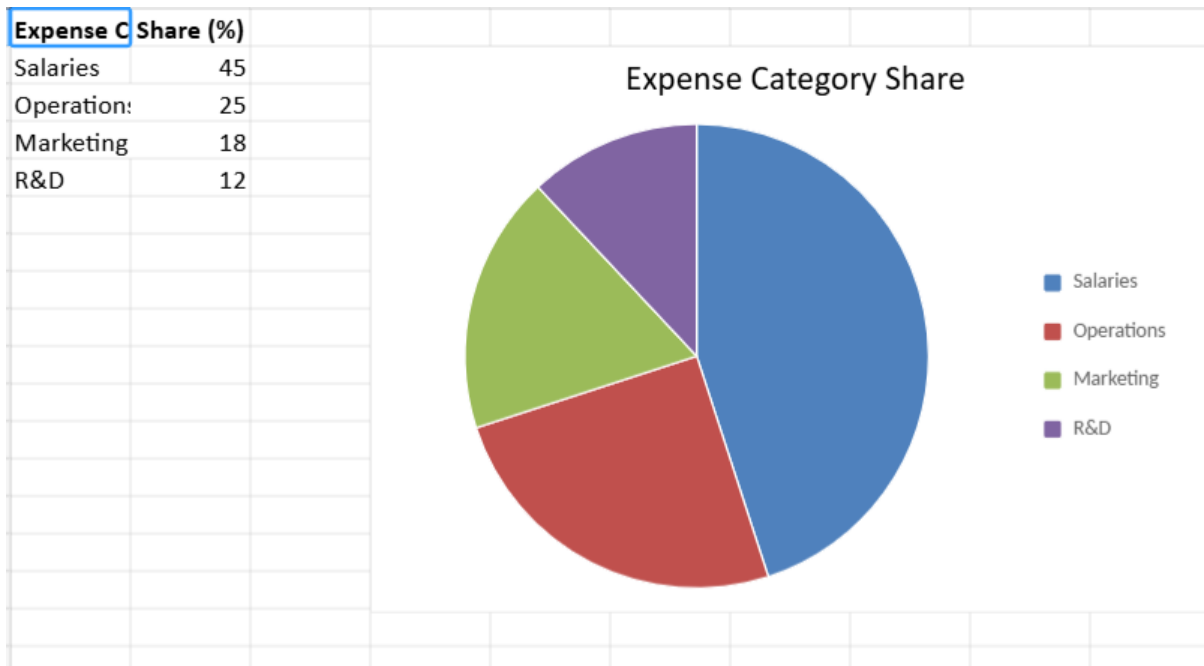


4. Pie Chart

- **Best Used For:** Displaying relative proportions or percentages of a single data series that sum to 100%. (*Limit to 5–7 slices maximum for clarity*).
- **Excel Path:** Insert > Charts > Insert Pie or Doughnut Chart > 2-D Pie.

Sample Excel Dataset:

Expense Category	Share (%)
Salaries	45%
Operations	25%
Marketing	18%
R&D	12%



2.4.1 Advanced Chart Types

1. Combo Chart (Combination Chart)

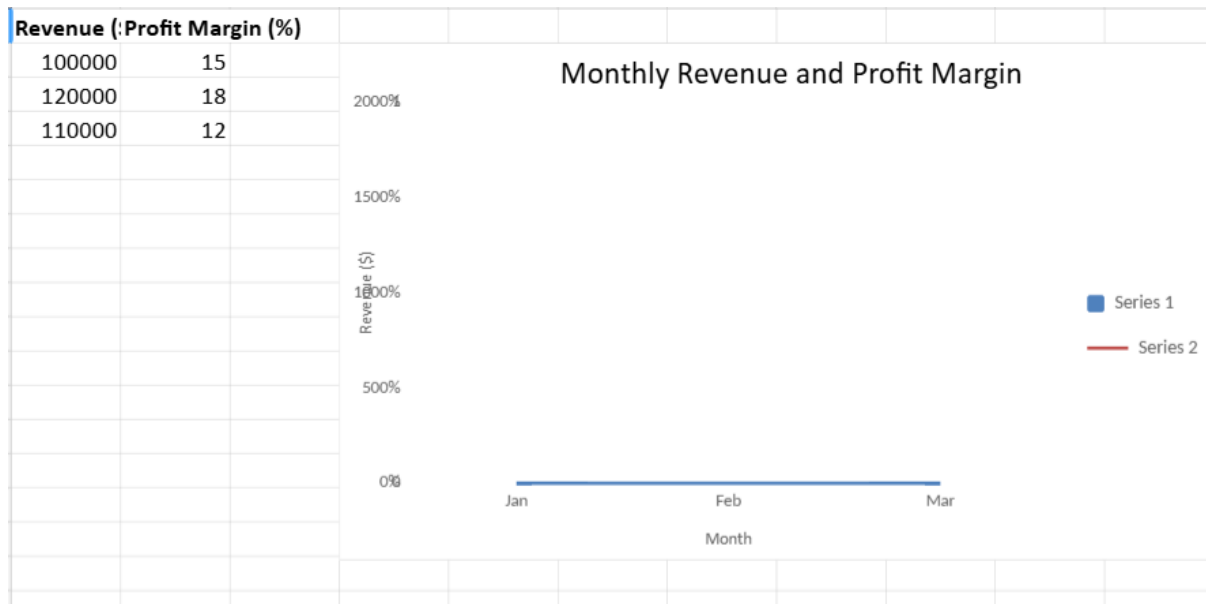
Combines two different chart types (e.g., Column + Line) on the same visualization, often utilizing a secondary axis to compare different scales.

- **When to Use:** Comparing total revenue (bars) against profit margin % (line).
- **Excel Path:** Insert > Charts > Insert Combo Chart > Clustered Column - Line on Secondary Axis.

Sample Excel Dataset:

Month	Revenue (\$)	Profit Margin (%)
Jan	\$100,000	15%
Feb	\$120,000	18%

Month	Revenue (\$)	Profit Margin (%)
Mar	\$110,000	12%



2. Waterfall Chart

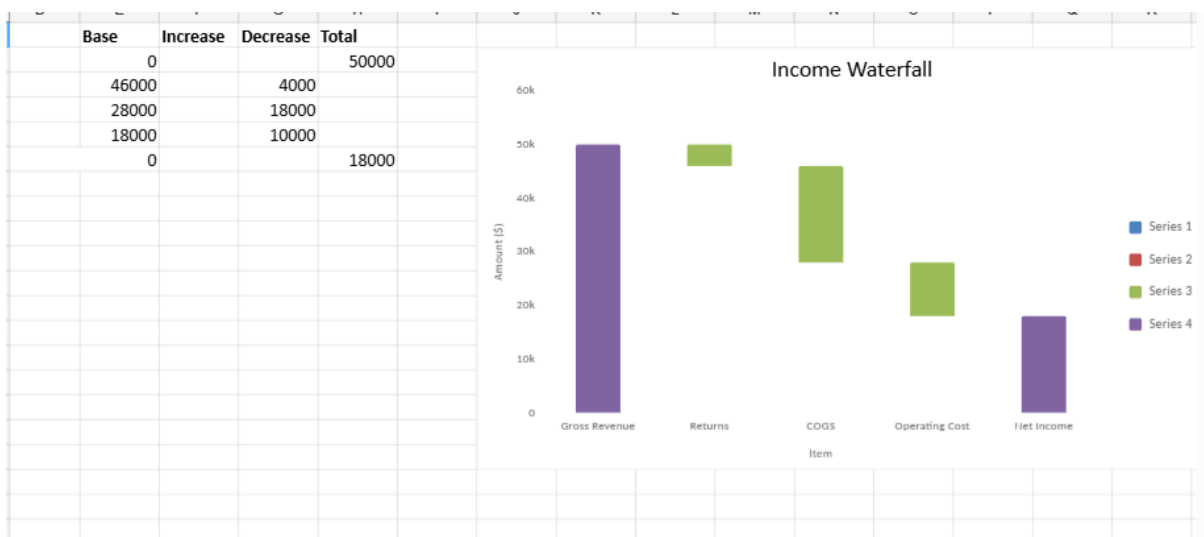
Displays a running total as values are added or subtracted. It illustrates how an initial value is affected by a series of positive and negative intermediate values.

- **When to Use:** Financial statements, income statements (Gross Sales -> Discounts -> Expenses -> Net Income).
- **Excel Path:** Insert > Charts > Insert Waterfall, Funnel, Stock, Surface, or Radar Chart > Waterfall.

Sample Excel Dataset:

Item	Amount (\$)	Note
Gross Revenue	50,000	Starting total

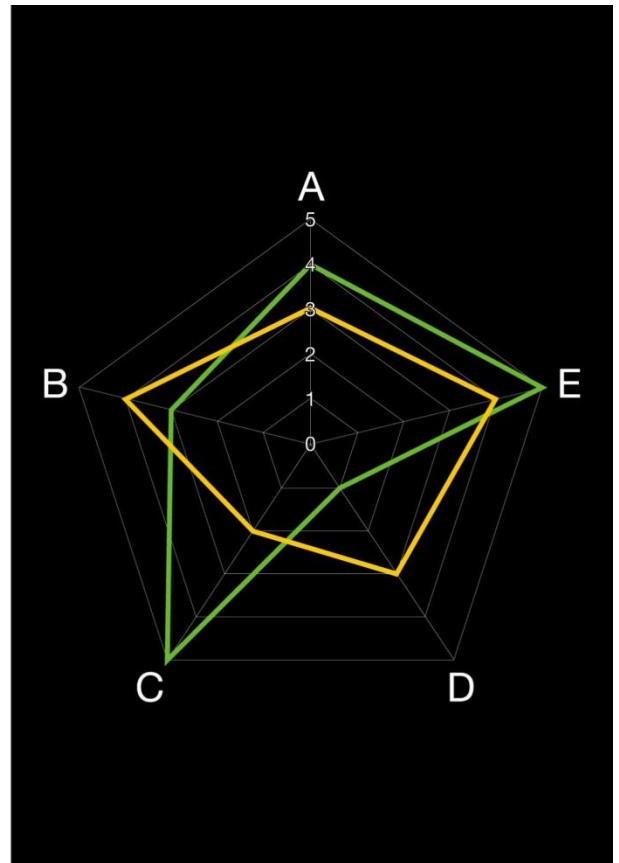
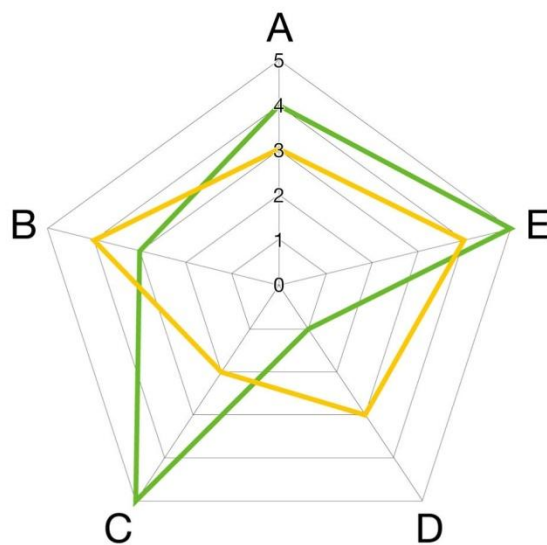
Item	Amount (\$)	Note
Returns	-4,000	Negative step
COGS	-18,000	Negative step
Operating Cost	-10,000	Negative step
Net Income	18,000	Final Total (Set as Subtotal in Excel)



3. Radar Chart (Spider Chart)

Compares the aggregate values of multiple data series across several dimensions radiating from a central point.

- **When to Use:** Performance appraisals, product feature comparisons, skill matrix evaluations.
- **Excel Path:** Insert > Charts > Insert Waterfall, Funnel, Stock, Surface, or Radar Chart > Radar.



2.4.2 Formatting Charts

Proper formatting removes visual clutter and highlights key insights.

Essential Formatting Steps:

1. **Chart Elements Menu (+ icon next to chart):** Toggle Titles, Data Labels, Gridlines, and Legends.
2. **Format Data Series (Ctrl + 1):**
 - Adjust **Gap Width** (reduces space between columns, recommended 50%–80%).
 - Adjust **Series Overlap** for stacked series.
3. **Color & Hierarchy:** Use muted neutral tones (grays) for baseline data and a single vibrant highlight color (e.g., blue or orange) to draw attention to important data points.

2.5 Creating Interactive Dashboards

An interactive Excel dashboard aggregates key metrics into a single screen, updating dynamically based on user controls.



Core Architecture of an Interactive Dashboard:

1. **Raw Data Sheet:** Contains the structured transaction/source table.
2. **Calculation Sheet:** Uses PivotTables or formulas (SUMIFS, COUNTIFS, XLOOKUP) to aggregate metrics.
3. **Dashboard Interface:** The clean view containing visual cards, charts, and interactive controls.

How to Add Interactive Controls (Slicers):

1. Convert your dataset into an official Excel Table (Ctrl + T) or create a **PivotTable**.

2. Go to PivotTable Analyze > Insert Slicer.
3. Select fields to filter by (e.g., *Region, Year, Category*).
4. Right-click the Slicer > Report Connections > Check all PivotTables/Charts you want this slicer to control simultaneously.

2.5.1 KPI (Key Performance Indicator) Reports

KPI cards give executives an instant snapshot of critical metrics compared against targets.

Example

KPI	Target	Actual	Achievement
Sales Revenue	₹10,00,000	₹12,00,000	120%
Customer Satisfaction	90%	86%	95.6%
New Customers	500	450	90%

Building a Dynamic KPI Card in Excel:

1. **Summary Cell:** Calculate target variance: $\text{=(Actual - Target) / Target}$.
2. **Conditional Formatting Rule:**
 - Highlight cell > Conditional Formatting > Icon Sets (Green Up Arrow, Red Down Arrow).
3. **Text Formatting Rule:** Format values as currency (\$#,##0) or percentage (0.0%).

Benefits of KPI Reports

1. Helps measure performance.
2. Makes comparison with targets easy.
3. Identifies areas requiring improvement.
4. Supports better decision-making.
5. Provides a quick overview of business performance.
6. Helps track progress over time.

Common KPIs

- Sales Revenue
 - Net Profit
-

- Customer Satisfaction
- Number of New Customers
- Employee Productivity
- Operating Expenses
- Conversion Rate
- Return on Investment (ROI)

2.5.2 Sparklines

Sparklines are tiny, cell-sized line or bar charts inserted directly inside a table cell. They show rapid trend context without taking up chart canvas space.

- **Types:** Line, Column, Win/Loss.
- **Excel Path:** Select target cell -> Insert > Sparklines > Line (or Column).



Practical Excel Setup:

Product	Jan	Feb	Mar	Apr	May	Jun	Trend (Sparkline)

Product	Jan	Feb	Mar	Apr	May	Jun	Trend (Sparkline)
Item A	12	15	18	14	22	25	[Embedded Line]
Item B	45	40	38	30	25	18	[Embedded Line]

How to Configure Sparklines:

1. Select an empty cell next to your row data (e.g., column H).
2. Go to Insert > Sparklines > Line.
3. Set **Data Range** to B2:G2 and **Location Range** to H2.
4. Click OK. Use the Sparkline tab to check **High Point** and **Low Point** markers for instant visual emphasis.

3.1 Macro Recording

A **Macro** is an automated sequence of actions stored as VBA (Visual Basic for Applications) code that you can execute whenever you need to perform repetitive formatting or data processing tasks.

Practical Example: Formatting a Weekly Report

Imagine you download a raw sales report every Monday that lacks formatting.

1. Go to **Developer Tab** -> Click **Record Macro**. *(If the Developer tab isn't visible, right-click the Ribbon -> Customize the Ribbon -> check **Developer**).*
2. In the dialog box, name it FormatSalesHeader, assign a shortcut like Ctrl + Shift + H, and click **OK**.
3. Select cells A1:D1 -> Apply **Bold**, Fill Color **Dark Blue**, Font Color **White**, and click **AutoFit Column Width**.
4. Click **Stop Recording** on the Developer tab or status bar.

Important Note: Always save workbooks containing recorded macros as an **Excel Macro-Enabled Workbook (.xlsm)**, or your macros will be deleted when the file closes.

3.2 Introduction to VBA Editor

The **VBE (Visual Basic Editor)** is the backend development window where macro code is stored, written, and edited.

- **How to Open:** Press Alt + F11 anywhere in Excel.
- **Key Windows inside VBE:**
 - **Project Explorer (Ctrl + R):** Lists all open workbooks, sheets, and code modules.
 - **Code Window:** The main workspace where code is written.
 - **Properties Window (F4):** Lists properties (like name or visibility) of the selected object.

3.2.1 Basic VBA Concepts

VBA works using **Objects** (Excel elements), **Properties** (characteristics), and **Methods** (actions).

- **Object Hierarchy:** Application -> Workbook -> Worksheet -> Range (Cell)
- **Syntax Structure:** Object.Property = Value or Object.Method

Example Code Snippet:

VBA

```
Sub HighlightHighSales()  
    ' Declarations  
    Dim SalesValue As Double  
  
    ' Assigning a value from cell B2  
    SalesValue = Range("B2").Value  
  
    ' Logical IF statement  
    If SalesValue > 10000 Then  
        ' Property change: set cell fill to Green  
        Range("B2").Interior.Color = RGB(144, 238, 144)  
    Else  
        ' Set cell fill to Red  
        Range("B2").Interior.Color = RGB(255, 182, 193)  
    End If  
End Sub
```

3.3 What-If Analysis

What-If Analysis allows you to experiment with different values in formulas to see how those changes alter the final outcomes.

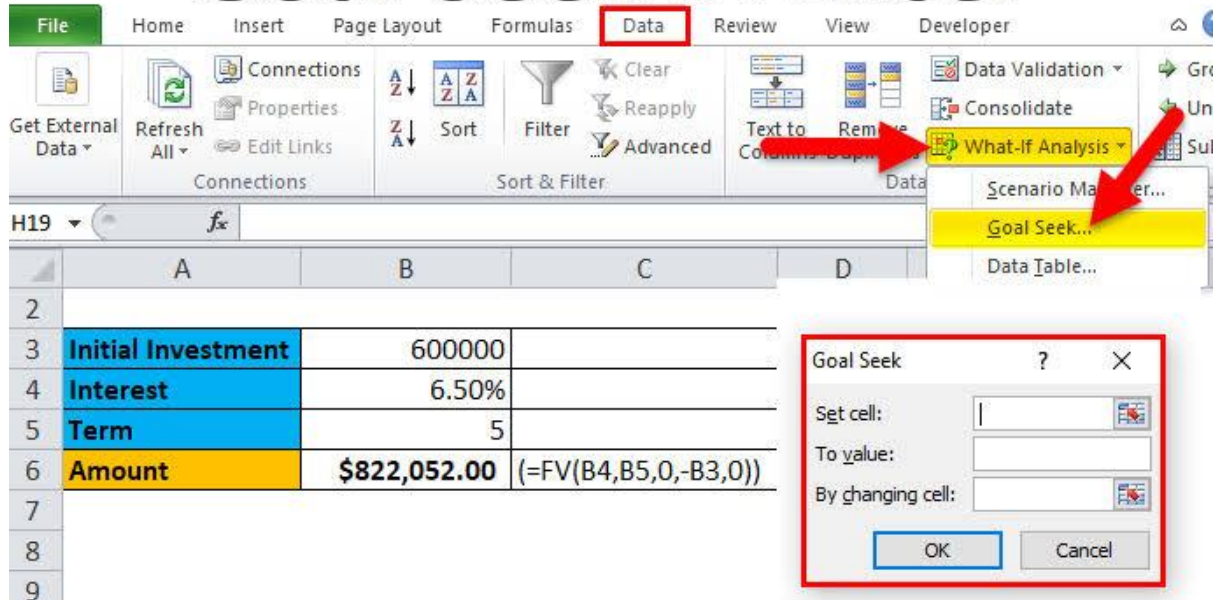
3.3.1 Goal Seek

Goal Seek works in reverse: when you know the **desired outcome** of a formula but don't know the **input value** needed to achieve it, Goal Seek calculates it for you.

Practical Example: Finding Required Sales

You want your Total Profit to reach **\$20,000**, but currently, it is **\$14,000**.

Goal Seek in Excel



Setup Data:

Cell	Description	Formula / Value
B1	Price per Unit	\$50
B2	Units Sold	400
B3	Total Profit	=B1*B2 (Current: \$20,000)

Steps:

1. Navigate to **Data** tab -> **What-If Analysis** -> **Goal Seek**.
2. **Set cell:** B3 (The cell with the formula)
3. **To value:** 25000 (Your goal)
4. **By changing cell:** B2 (The variable input)

- Click **OK**. Excel automatically increases Units Sold (B2) to **500**.

3.3.2 Scenario Manager

Scenario Manager lets you store and swap between multiple groups of input values (scenarios) to compare best-case, expected, and worst-case results.

Practical Example: Business Budgeting

Variable	Best Case	Baseline	Worst Case
Units Sold (B1)	1,000	500	250
Unit Price (B2)	\$60	\$50	\$40

Steps:

- Go to **Data -> What-If Analysis -> Scenario Manager**.
- Click **Add** -> Name it Best Case -> Set Changing Cells to B1:B2.
- Enter values: 1000 for B1 and 60 for B2.
- Repeat steps for Worst Case.
- Click **Summary...** -> Select your Total Profit cell to generate an automated **Scenario Summary Report** on a new worksheet.

3.3.3 Data Table

A Data Table allows you to view the results of various input combinations simultaneously in a grid layout.

1-Variable Data Table Example (Loan Interest Rates)

Calculate monthly loan payments across various interest rates using $\text{=PMT}(\text{rate}/12, \text{nper}, \text{pv})$.

- Loan Amount (B1):** \$100,000
 - Term in Months (B2):** 60
-

- **Monthly Payment Formula (B3):** =PMT(5%/12, B2, -B1) (Output: \$1,887.12)

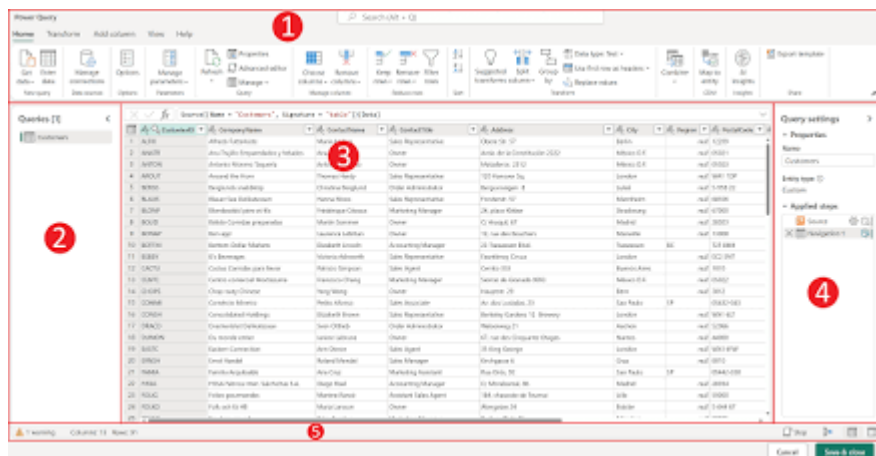
Setting up the Grid:

A	B (Payment)
1 Rate	=B3 <-- Reference Formula
2 4.0%	\$1,841.65
3 5.0%	\$1,887.12 (Calculated by Data Table)
4 6.0%	\$1,933.28

1. Select range A1:B4.
2. Go to **Data -> What-If Analysis -> Data Table**.
3. Leave **Row input cell** blank; set **Column input cell** to the original rate cell (5%).
4. Click **OK** to populate the payment grid.

3.4 Power Query (Introduction)

Power Query is Excel's built-in **ETL (Extract, Transform, Load)** engine. It connects to external files, cleans messy raw data, and loads structured tables without requiring manual copy-pasting.



Core Workflow:

1. **Extract (Get Data):** Go to **Data Tab -> Get Data -> From File / Database / Web**.

2. **Transform (Clean Data):** Opens the **Power Query Editor** window. Common steps include:
 - **Promote Headers:** Use first row as column titles.
 - **Unpivot Columns:** Convert wide cross-tab tables into tall normalized rows.
 - **Split Columns:** Split Full Name into First Name and Last Name by a delimiter.
3. **Load:** Click **Close & Load** to output the clean table directly onto an Excel sheet.

Key Feature: All cleanup actions are recorded sequentially under **Applied Steps**. When next month's raw file arrives, simply click **Refresh All**, and Power Query rerun the exact transformation steps automatically.

3.5 Power Pivot (Basic Concept)

While standard PivotTables are limited to analyzing single tables (or require VLOOKUP), **Power Pivot** allows you to build a **Data Model** linking millions of rows across multiple tables using relational keys.

Core Architecture:

- **Relationships:** Connect tables together using common fields (e.g., linking Sales Table[CustomerID] to Customers Table[CustomerID]).
- **xVelocity Engine:** High-performance in-memory engine capable of compressing massive datasets beyond Excel's 1-million-row worksheet limit.
- **DAX (Data Analysis Expressions):** A formula language used to write custom metrics and aggregations.

Example DAX Formula:

Code snippet

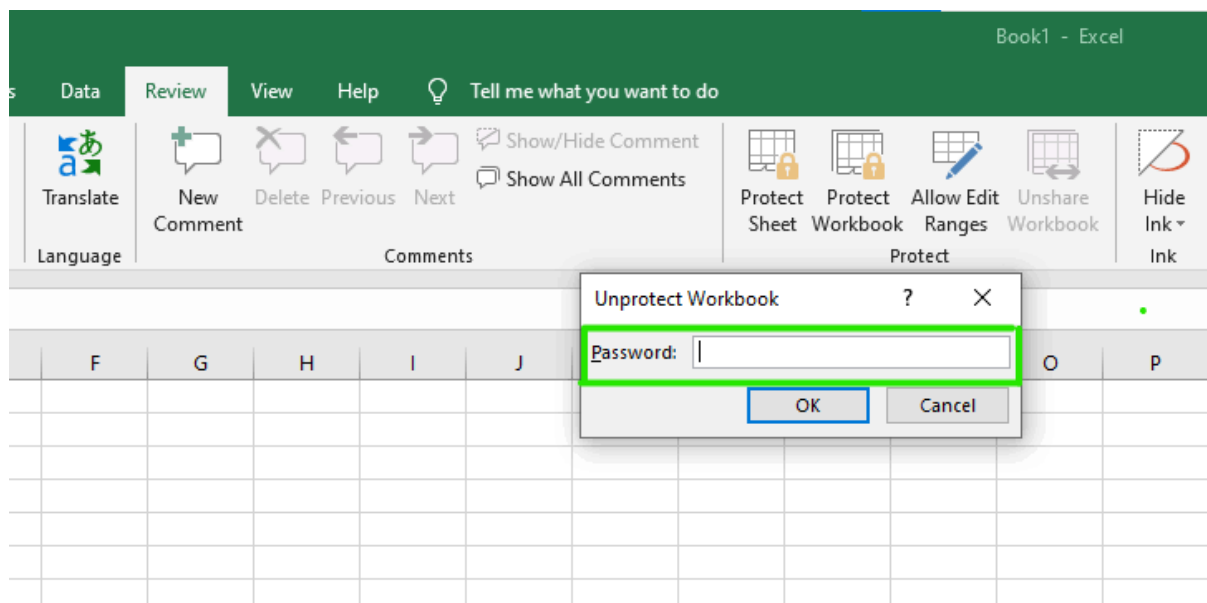
-- Creates a dynamic explicit measure for Year-Over-Year Sales Growth
Total Sales := SUM(Sales[Revenue])

Sales YOY Growth :=

```
VAR PreviousYear = CALCULATE([Total Sales],
SAMEPERIODLASTYEAR('Calendar'[Date]))
RETURN
DIVIDE([Total Sales] - PreviousYear, PreviousYear, 0)
```

3.6 Workbook Security & Protection

Excel provides multi-layer security to prevent unauthorized viewing, modifying, or structure changes.



Security Levels Summary:

Protection Level	Where to Find	What It Does
Encrypt with Password	File -> Info -> Protect Workbook	Prevents unauthorized users from opening the file entirely.
Protect Sheet	Review Tab -> Protect Sheet	Prevents users from editing locked cells, formulas, or formatting.
Protect	Review Tab ->	Prevents users from adding, deleting, renaming, or hiding

Protection Level	Where to Find	What It Does
Structure	Protect Workbook	worksheets.

Unlocking Specific Input Cells while Protecting the Sheet:

1. Select the cells users *should* be allowed to edit (e.g., input cells B1:B5).
2. Press Ctrl + 1 -> Go to the **Protection** tab -> **Uncheck "Locked"**.
3. Go to **Review Tab** -> Click **Protect Sheet** -> Set a password and click **OK**.
4. Result: Users can edit B1:B5, but all other cells and formulas remain write-protected.