

University of Basra
College Computer Science and Information Technology
Computer Information Systems Dep.



Computer Applications in Business

Computer Information System Dep.

Lecture

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Learning Outcomes

Upon successful completion of this course students will be able to:

- Plan, create, modify, and present spreadsheets
- Organize, edit and enhance data in spreadsheets to achieve business standards
- Use formulas and built-in functions appropriately and correctly to solve problems and critically assess the results
- Design efficient spreadsheets capable of answering "what-if" questions to solve business problems
- Plan, organize, create and present spreadsheet data in graphic form
- Plan, create and present a custom Excel application using complex functions and macros
- Use built-in financial, logical, and lookup functions appropriately and correctly to solve problems and critically assess the results

Topics

- ☒ Principles of electronic spreadsheets using features available with currently popular spreadsheet software:
- ☒ Worksheet creation and formatting;
- ☒ entering of data
- ☒ editing and printing
- ☒ formulas
- ☒ functions
 - Logical functions
 - Math and trig functions
 - Statistical functions
 - Lookup and reference functions
 - Text functions
 - date and time functions

✘ basic charting

✘ Advanced Tools

- Conditional format
- Tables
- Data validation
- pivot tables

Textbook

- Microsoft Excel 2010: Comprehensive By: Gary B. Shelly, Jeffrey J. Quasney, Steven M. Freund, Raymond E. Enger, and Mali B. Jones. 2012 Course Technology, Cengage Learning .
- Excel 2007 for project managers : Comprehensive By: Kim Heldman ,William Heldman ,Wiley Publishing, Inc.,2007 .
- Excel® 2010 Formulas: Comprehensive By: John Walkenbach , Published by Wiley Publishing, Inc., Indianapolis, Indiana,2010

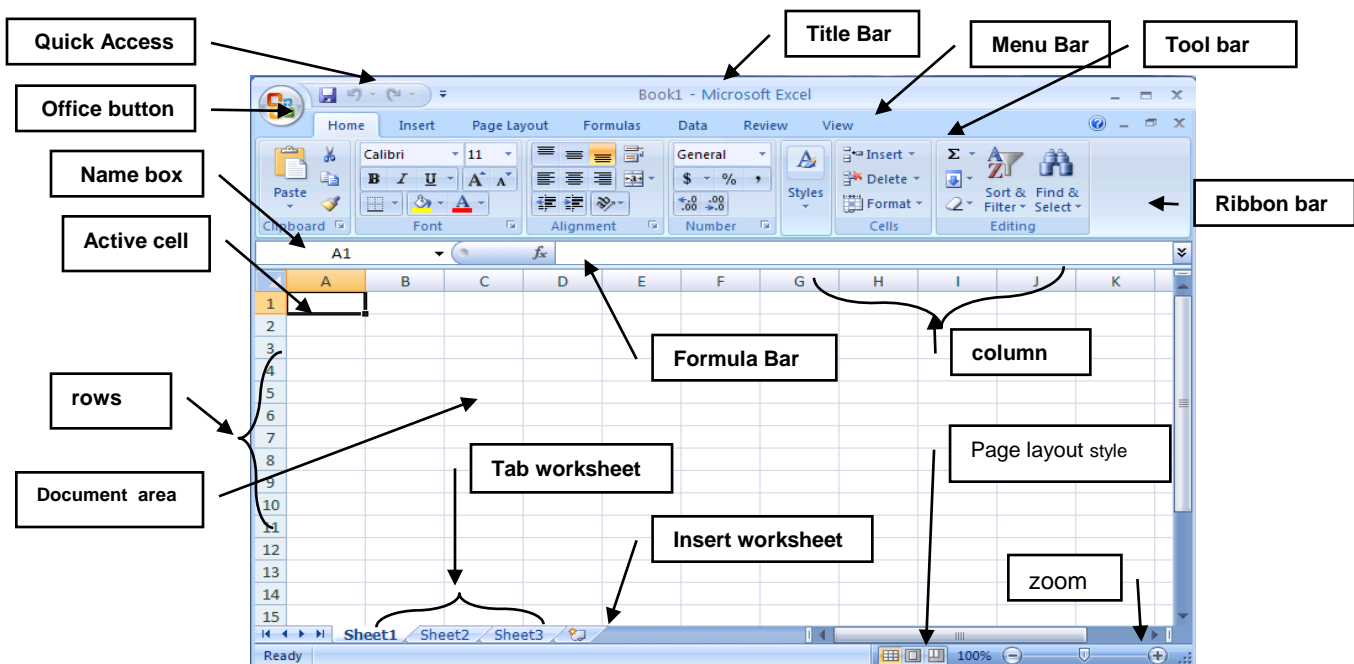
✘ What is Excel?

Software developed and manufactured by Microsoft Corporation that allows users to organize, format, and calculate data with formulas using a spreadsheet system broken up by rows and columns.

Microsoft Excel usually comes bundled with Microsoft Office and is compatible with other applications offered in the suite of products. The first software program similar to Excel was released in 1982 and was called Multiplan.

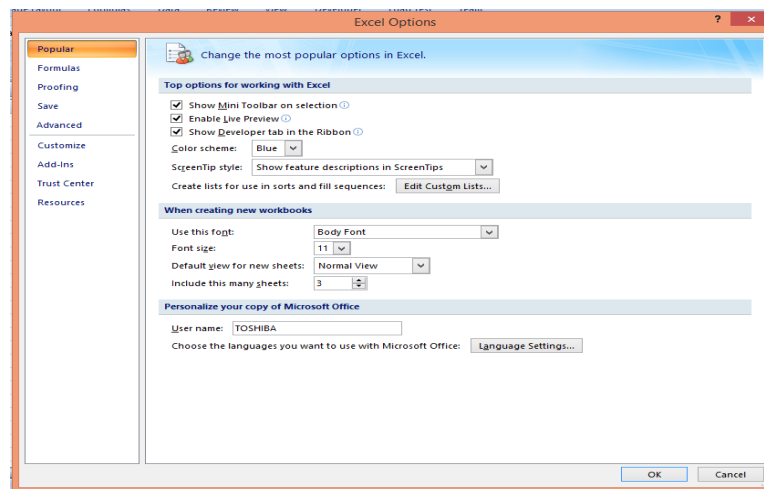
✘ Principles of electronic spreadsheets .

- As we saw in the following figure excel files named as book1, book2, ... and so on .
- Every workbook contains from numbers of rows that intersection with numbers of columns which gives the cells that represent the sheet.
- Every workbook have three sheet at first and you can expanded it to 255 sheets by Press **shift +f11** or click insert worksheet button.
- Every sheet have 256 columns and 65536 rows ,
- Then every workbook file have (cells) = 256 columns,
- That mean $65536 * 256$ cell in each sheet.

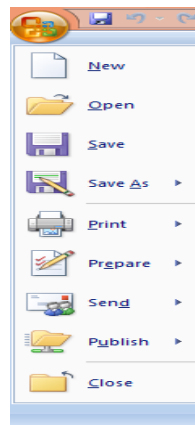


- Press **Enter** button to move cross the column and Press **Tab** button to move cross the Row .
- Press **Alt +Enter** to write multiple line in same cell.
- As default menu bar contain seven submenu (**Home , Insert, Page layout, Formulas ,Data , Review and View**).
- We can expanded the menu bar sub menu by adding new submenu like (**Developer , load test and Team**) , which use in macro programming and many of advanced tool by click to

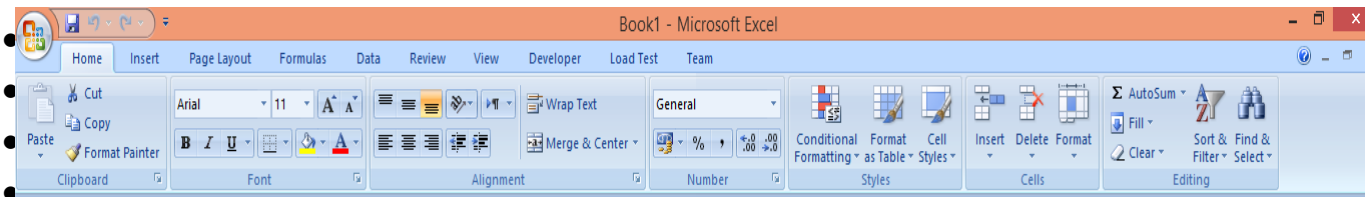
Office button → Excel Options → click **Show Developer in The ribbon** under *Top options for working with Excel* title .



- In Excel options window we can change the most popular options in Excel as shown in the figure above.
- Note:** We will give brief information for every items in **menu bar** , the extended information we will talking about in the course Lab.
- **Office button** : this submenu deal with the operation with books file like , new , open , save , save as , and so on as shown in the next figure .



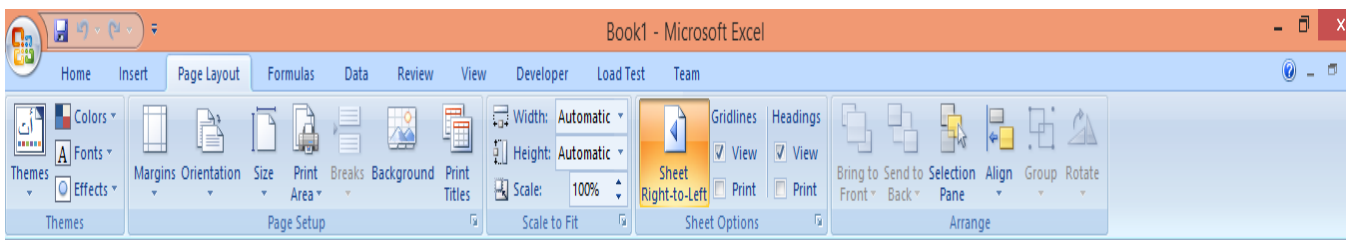
- **Home:** This submenu deals with basic sheet options like (clipboard ,font ,alignment , number ,style ,cells and editing) as shown in the next figure.



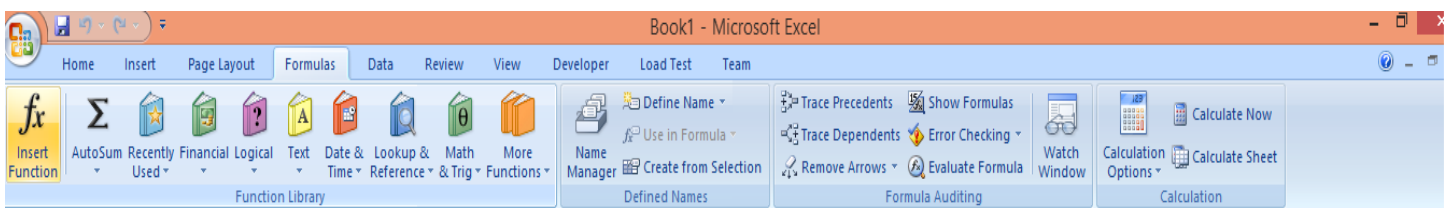
- **Insert :** This submenu deals with basic object that we can inserted inside the sheet like (Pages , Tables , Illustrations ,Links , Header & Footer , Text and Symbols) as shown in the next figure.



- **Page Layout:** This submenu deals with layout options of sheet like (Themes , Page Setup, Scale to Fit, Sheet Options and Selection Pane and Align) , as shown in figure above .

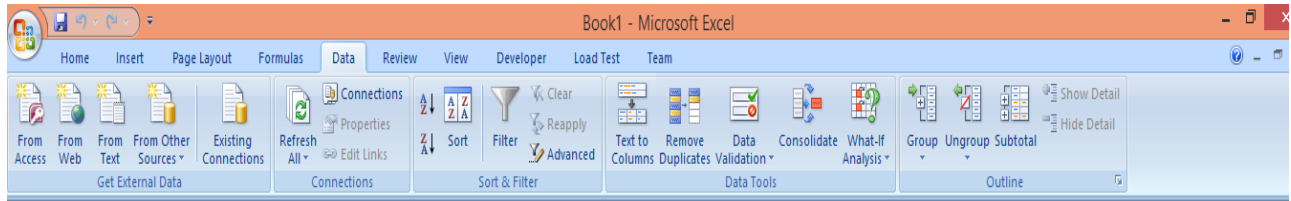


- **Formulas :** This submenu deals with formulas options and types that we can used in sheet like (insert function , function Library , Defined Names , Formula Auditing and Calculation) , as shown in figure bellow.



- **Data:** This submenu deals with sheet Data options ,sources ,operation and tool like (Get External Data , Connections , Sort & Filter , Data Tools and Outline) , as shown in figure bellow.

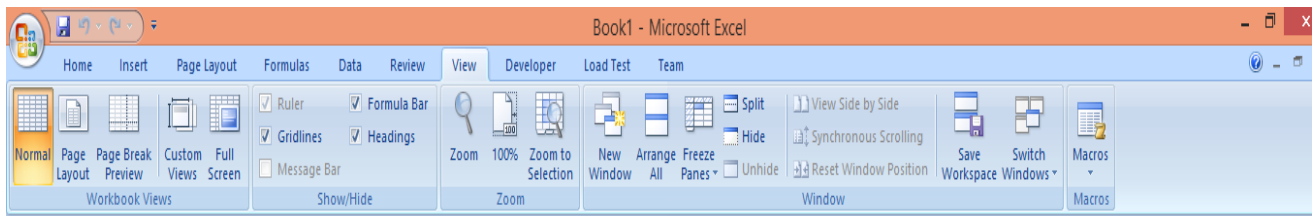
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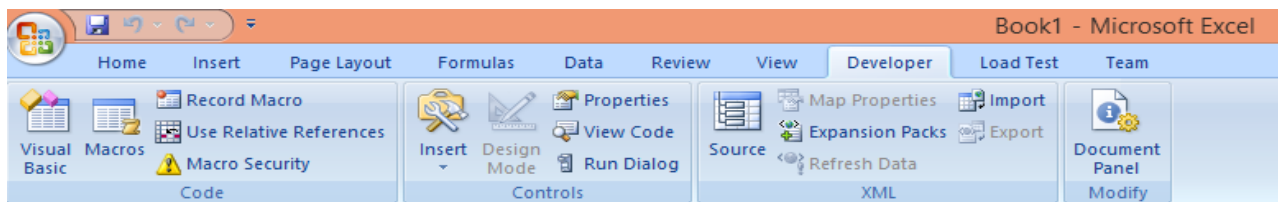
- **Review:** This submenu deals with the basic sheet review like (**Proofing , Comments and Changes**), as shown in figure bellow.



- **View:** This submenu deals with the options of workbook view like (**Workbook Views , Show/Hide , Zoom , Window and Macros**), as shown in figure bellow.



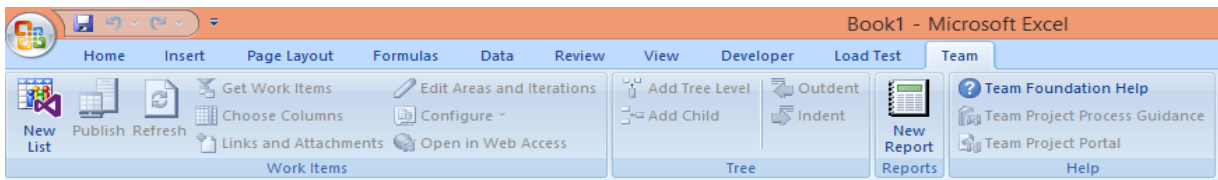
- **Developer:** This submenu its added to the menu bar when needed to work with advanced tools like (**Code , Controls , XML and Modify**), as shown in figure bellow.



- **Load test:** This submenu deals with sheet load test options like **Report** , as shown in figure bellow.



- **Team:** This submenu deals with sheet Team option like (**Work item , Tree , new Report and help**), as shown in figure bellow.



✘ Worksheet creation and formatting.

✓ General Guidelines

While creating an Excel worksheet, you need to make several decisions that will determine the appearance and characteristics of the finished worksheet. As you create the worksheet you should follow these general guidelines:

1. Select titles and subtitles for the worksheet.
2. Determine the contents for rows and columns.
3. Determine the calculations that are needed.
4. Determine where to save the workbook.
5. Identify how to format various elements of the worksheet.
6. Decide on the type of chart needed.
7. Establish where to position and how to format the chart.
8. Choose a name for the worksheet.
9. Determine the best method for distributing the workbook.

✓ Worksheet creation

We can create new worksheet by click office button → new , will open new worksheet .

✓ Worksheet formatting













we can change cell format by tools in **home** submenu or sheet format in **page Layout** submenu.

✘ Entering of data.

we can entering data in the sheet by select the cell or the range of cells that you want to entering data in it , we can use **Enter** button to move over sheet column or press **TAB** button to move cross sheet Rows .

✓ Cells propriety

- The cell it's the building unit of excel sheets m each sheet contain $65536 * 255$ cell .
- Each cell may have one of the **Eleven data type** that supported by excel , the **General** data type it's the default data type for each cell .

Data types	Description
 General 123 No specific format	The cell in this data type may hold numbers values or text values Exp: 565 or Ali
 Number 12	The cell in this data type holds numbers values only Exp:12 or 12.454
 Currency	The cell in this data type holds currency number values Note : the currency sign like \$, £ or € inserted automatically when change the cell data type to currency, do not type it manually , that cause change the cell data type to text , that mean you just enter the number value the sign appear in the cell automatically Exp : 23 \$, 12.444 £
 Accounting	The cell in this data type holds accounting number values Exp: 123.444 \$
 Short Date	The cell in this data type holds short date values Exp : 23/2/2019
 Long Date	The cell in this data type holds long date values Exp: 23/02/2019 22:11 pm
 Time	The cell in this data type holds time values Exp : 10:12 PM
 Percentage	The cell in this data type holds percentage values Note: don't type the % sign in cell , the sign inserted automatically if you change the cell data type to percentage type Exp: when we type the value 0.5 in cell percentage data type automatically changed to 50.0% value in the same cell .
 Fraction	The cell in this data type holds number in fraction format Exp : when enter value have fraction part like 12.5 converted to 12 ½ or 23.6 converted to 23 3/5
 Scientific 10 ²	The cell in this data type holds scientific number values Exp: 2.00E+00
 Text ABC	The cell in this data type holds text values Exp: Zain Hazeim
 More Number Formats...	The cell in this data type holds custom user define data

■ Absolute Cell Reference

Absolute cell references can be very important when copying and pasting formulas. By default, when you copy and paste a formula it will use a relative cell reference. When the formula is pasted it will automatically change to a cell range, within the range of where the formula is being pasted. In some cases that is fine, but not when you want to reference the same cell range in the original formula.

Absolute cell references need to be used if you want to reference the same cell in a copied formula. To reference an absolute cell put a dollar sign (\$) in front of the reference that should be absolute. Cell references can be a mix of absolute and relative. Example of cell reference combinations, using cell C2:

1. **\$C\$2** – This is an example of an absolute cell reference that would always reference the value in cell C2.
2. **\$C2** – This is an example using absolute and relative cell references. This cell reference would always reference column C, but the cell row would change.
3. **C\$2** – This is an example using absolute and relative cell references. This cell reference would always reference row 2, but the column would change.
4. **C2** – This is an example of a relative cell reference that would change when the formula is copied. The cells would change in reference to where the formula is pasted.

Note: The F4 key can be used to toggle between the cell reference options, or the dollar sign can be typed in front of the cells that should be absolute cell references. To use the F4 option, click in the formula next to the cell reference and push the F4 key to toggle through the above cell reference options.

Absolute Cell Reference Example

Example -1 :Convert currency

In a worksheet, currency has to be converted from dollars (column B) to euros (column C). The rate of exchange from dollars to euros is placed in cell C1; here we use 0.8021.

To convert currency:

1. In a worksheet, enter your own data or the data shown in next Figure .
2. Select cells C4:C8.
3. Enter the following formula: **=B4*\$C\$1**.
4. Press **<Ctrl+Enter>**.
5. From the Format menu, select **Cells**.
6. Select the Number tab and then select **Currency** from the Category list.
7. Choose **Euro**.
8. Click **OK**

	A	B	C
1	Calculation with currency		0.8021
2			
3	product name	price \$	price €
4	M11	30.00	24.06
5	M12	40.00	32.08
6	M13	50.00	40.11
7	M14	90.00	72.19
8	M15	120.00	96.25
9			

Note: To convert euros back to dollars, use the following formula: **=C4/\$C\$1**.

Example-2 : Calculate a price reduction

All prices in a price list have to be reduced by a certain percentage. The amount of the price reduction is 15% and is entered in cell C1 To reduce all prices by a certain percentage:

1. In a worksheet, enter your own data or the data shown in the next Figure
2. Select cell C1 and type **-15%**.
3. Select cells C4:C8.
4. Enter the following formula: **=B4+(B4*\$C\$1)**.
5. Press **<Ctrl+Enter>**.

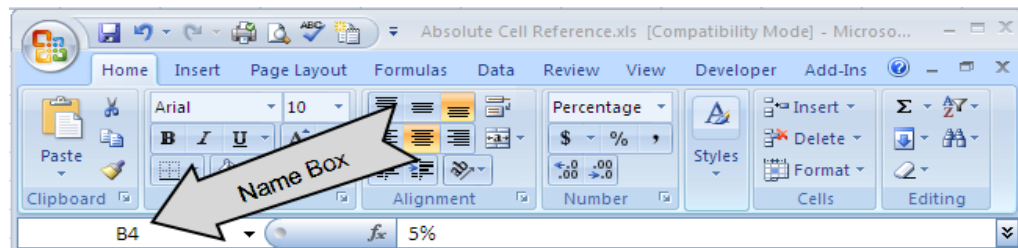
C4		fx =B4+(B4*\$C\$1)	
	A	B	C
1	pricelist	price reduction	-15%
2			
3	product name	old price	new price
4	M11	11.45	9.73
5	M12	14.00	11.90
6	M13	18.90	16.07
7	M14	34.67	29.47
8	M15	131.99	112.19
9			

Note: Please note that the formula must have an absolute reference to cell C1. Also, columns B and C are formatted with the Currency style, which is available by clicking on the \$ button on the Formatting toolbar.

■ Naming a Cell or Range of Cells

A named cell or range of cells can be used in formula references. Naming a cell or range of cells is a good time saver when writing formulas that are calculating between multiple sheets. Named cells or ranges can also be used in place of absolute cell references.

1. Select the cell or range of cells to be named
2. To the left of the formula bar is the name box, as shown in the picture to the right. By default, the name box will reference a cell that is selected.
4. Type in a name for the selected cell or range of cells
5. Press the enter key



Note: If a cell or range of cells has been named, the cell or range will need to be selected for the name to appear in the name box.

✓ Using Names in Formulas

Names can be used in formulas by referencing the name instead of the cell reference. For example: I want to use a formula that figures a discount of 5%. Cell B4 has the value of 5%. I have named the cell "Five".

If I wanted to multiply a cell by the value in B4 (5%), I can simply reference the cell name no matter where I am in the workbook.

Example of formula with cell name: = G8*Five, this would take the value in cell G8 and multiply it by the cell named "Five", which is 5%.

Note: When using more advanced formulas it is much easier to reference a named cell or range of cells than having to select a whole table.

	A	B	C	D	E	F	G	H
1	Absolute Cell Reference							
2								
3		Customer	Vendor	Wholesale				
4	Discounts	5%	10%	15%				
5								
6	Joe's Emporium							
7		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Specials	Total	Discount
8	sporting goods	12.30	41.32	31.11	3910.11	301.00	\$4,853.84	=G8*Five
9	Shoes	94.42	293.43	3.11	32.67	96.52	\$1,460.15	
10	electronics	54.33	45.88	92.22	876.30	11.25	\$1,079.98	
11	bed and bath	580.00	12.32	55.28	91.00	62.85	\$801.45	

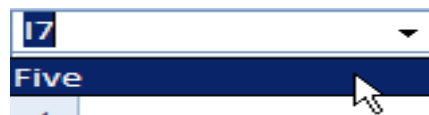
✓ Finding a Named Cell or Range

By using the name box it is easy to find a named cell or range of cells.

1. Click the drop-down arrow next to the name box

Note: The name box will reference the cell that is currently selected.

2. The drop-down menu will show a list of named cells or ranges
3. Select the name. The cursor will select that cell or range of cells



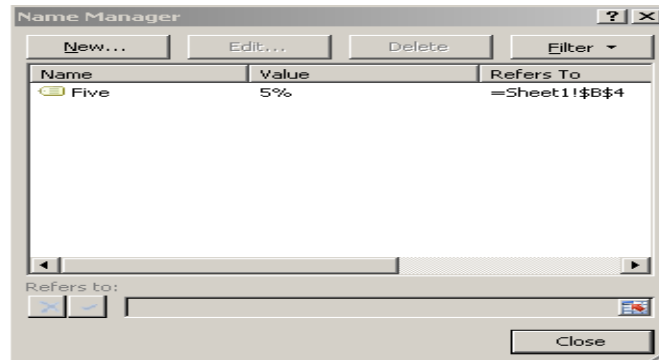
✓ Editing a Named Cell or Range

A named cell or range of cells can be changed by using the name manager.

1. Select the **formulas** tab
2. Under the **defined names** group, select the **name manager** button
3. Select the name to be changed
4. Click the edit button to change the name or cell range

Note: A new named range can also be created by using the New... button in the name manager window. The filter button can be used to search specific areas for defined names.

5. Click **close** when finished with the name manager dialog box



Using Name in Formulas examples

Example-1: Calculate taxes

In this exercise, tax on an item has to be calculated. We can also find the original price given the tax rate and the final price by using names.

To calculate the price with tax:

1. Select cell A2 and type **8%** and type tax_1 in name box then press **<Enter>**.
2. Select cell B2 and type **120** and type net_1 in name box then press **<Enter>**.
3. Select cell C2 and type the following formula: **=net_1+net_1*tax_1**.

To calculate the original price:

1. Select cell A4 and type **8%** tax_2 in name box then press **<Enter>**.
2. Select cell C4 and type **129.60** gross_2 in name box then press **<Enter>** ..
3. Select cell B4 and type the following formula: **=gross_2/(1+tax_2)**.

	A	B	C
1	Tax	net amount	gross amount
2	8%	120.00	129.60
3			
4	8%	120.00	129.60

☒ Formulas

✓ Formula Structure

- To write complex formulas you will need to know basic formula structure. There are multiple ways to write formulas. Choose the best one that fits your needs for each scenario.
- Formulas are made up of three basic parts, the equals sign, a function or operator, and arguments. There are two main ways to write Excel formulas, with an operator or with a function. Functions can be used as a short cut to create commonly used formulas.
- Lastly are the arguments. Arguments are the numbers or cell references that will be used to figure a formula.
- **Example using operator:** = B1+B2+B3+B4+B5+B6+B7. The operator in this formula is the + sign.
- **Example using function:** =SUM(B1:B7). The function in this formula is SUM (which is for adding values).
- Formulas using functions have a different format than formulas using operators.
- Formulas that use function also start with an equals sign, but instead of a mixture of arguments and operators, the function is entered right after the equal sign with the arguments following in parentheses.

✓ How to write a formula using a function

1- Individual Arguments

Individual arguments can be used to reference specific cells within a spreadsheet. Commas can be used to separate individual arguments. **Example**

= Function (Argument1; Argument 3)

2- Through Arguments

A colon can be used to reference arguments that are in consecutive order. **Example**

= Function(Argument 1:Argument 3).

✓ Calculating Across Worksheets

Calculating across worksheets will allow you to pull values from multiple worksheets to create a desired formula. When calculating across worksheets you will need to reference sheet names.

The symbol to reference a sheet is an exclamation point (!). The exclamation point will need to be added to the end of the sheet name.

▪ **Referencing Multiple Worksheets**

When referencing a different sheet than the one the formula will appear on, the formula will need to include an exclamation point after the sheet name. For example I have a worksheet with the name Library, to reference that sheet name I would type Library! Within the parenthesis of the argument area. The cell reference will follow the sheet name.

▪ **Sheet Separators**

If you will be referencing sheets that are in a consecutive row, use the symbol for through, which is a colon (:).

If you will be referencing only specific sheets use a comma(, or ;) between the sheet names.

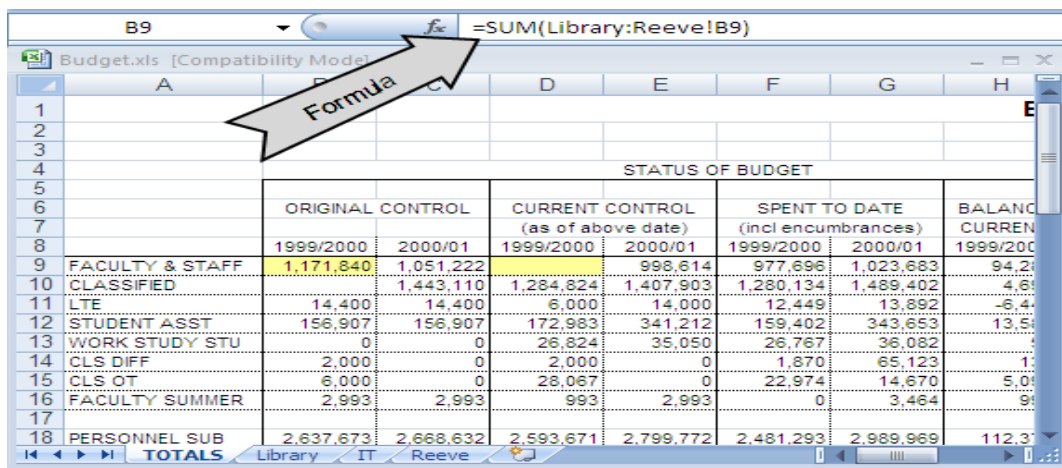
✓ **3-D Cell References**

Three-dimensional cell references are used when referencing the same cell across multiple worksheets. An example of a 3-dimensional reference is shown below.

Using formulas for sheets in consecutive order:

The example below shows how to create a formula with consecutive worksheets.

=SUM(Library:Reeve!B9)



■ **How Can I Create Named Ranges?**

There are three ways to create named ranges:

1- **Using the Name Box to Create a Range Name**

In previous sections we explain the methods of give name to single cell. **Now: Suppose you want to assign a rectangular range of cells** (such as A1:B4) the name *Data*. Simply select the cell range A1:B4, type **Data** in the Name box, and press Enter. Now a formula such as `=AVERAGE(Data)` would average the contents of cells A1:B4. As shown in the next figure .

data			
	A	B	C
1	1	2	
2	3	2	
3	1	1	
4	2	-1	
5			1.375
6		cell C5	
7		contains	
8		=AVERAGE(data)	

Note1 :Sometimes you want to name a range of cells made up of several noncontiguous rectangular ranges. For example, in the next Figure we might want to assign the name *Noncontig* to the range consisting of cells B3:C4, E6:G7, and B10:C10. To assign this name, select any one of the three rectangles making up the range (I chose B3:C4). **Hold down the Ctrl key, and then select the other two ranges** (E6:G7 and B10:C10).

Now release the **Ctrl key**, type the name **Noncontig** in the Name box, and press Enter. Using *Noncontig* in any formula will now refer to the contents of cells B3:C4, E6:G7, and B10:C10. For example, entering the formula `=AVERAGE(Noncontig)` in cell E10 yields 4.75 (because the 12 numbers in our range add up to 57 and $57/12=4.75$).

	A	B	C	D	E	F	G
1							
2							
3		1	2				
4		3	4				
5							
6					6	7	10
7					8	9	1
8							
9							
10		2	4				
11					4.75		
12					Cell E11 contains formula		
13					=AVERAGE(noncontig)		

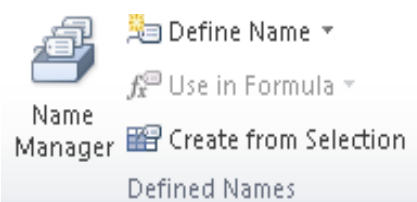
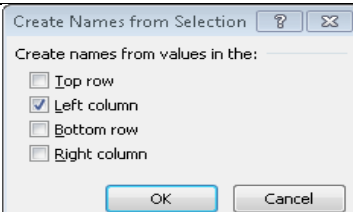
2- Creating Named Ranges by Using the Create From Selection Option

The worksheet in the next figure contains sales during March for each of the 50 U. S. states. Figure 2-1 show a subset of this data. We would like to name each cell in the range B6:B55 with the correct state abbreviation. To do this, select the range A6:B55, and click Create From Selection in the Defined Names group on the Formulas tab (see Figure 2-2). Then select the Left Column check box, as indicated in Figure 2-3.

	A	B
5	State	March Sales
6	AL	\$ 915.00
7	AK	\$ 741.00
8	AZ	\$ 566.00
9	AR	\$ 754.00
10	CA	\$ 687.00
11	CO	\$ 757.00
12	CT	\$ 786.00
13	DE	\$ 795.00
14	FL	\$ 944.00
15	GA	\$ 624.00
16	HI	\$ 663.00
17	ID	\$ 895.00
18	IL	\$ 963.00

Figure 2-3.

FIGURE 2-1 By naming the cells that contain state sales with state abbreviations, you can use the abbreviation rather than the cell's column letter and row number when you refer to the cell.

	
<p>FIGURE 2-2 Select Create From Selection.</p>	<p>FIGURE 2-3 Select the Left Column check box</p>

3- Creating Range Names by Using the Name Manager Option

If you click Name Manager on the Formulas tab and then choose New, the New Name dialog box shown in Figure 2-4 opens.

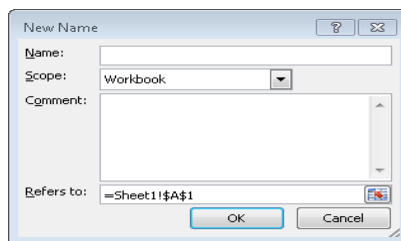


FIGURE 2-4 The New Name dialog box before creating any range names.

If you click the Scope arrow, you can select the option Workbook or any worksheet in your workbook. I'll discuss this decision later, so for now just choose the default scope of Workbook. You can also add comments for any of your range names.

✓ A Name's Scope

it's important to understand that all names have a scope. A name's **scope** defines where you can use the name. Names are scoped at either of two levels:

- **Workbook-level names:** Can be used in any worksheet. This is the , default type of range name . like = sale1 , where sale1 cell name.
- **Worksheet-level names:** Can be used only in the worksheet in which they are defined, unless they are preceded with the worksheet's name. A workbook may contain multiple worksheet-level names that are identical. like , sheet1!sale1 .

Note1: If your worksheet name contains a space, enclose the worksheet name in single quotes when referring to a name defined on that sheet:
 ='My Sheet'!My_Name

Note2: Only the worksheet-level names on the current sheet appear in the Name box. Similarly, only worksheet-level names on the current sheet appear in the list under Formulas → Defined Names → Use in Formulas.

✓ Referencing names from another workbook

The same rules apply when using names defined in another workbook.

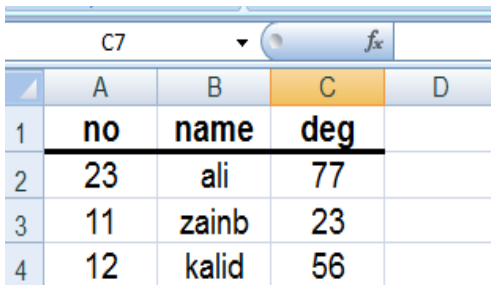
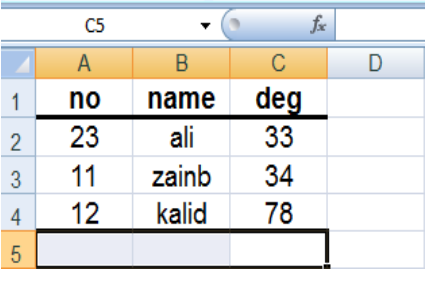
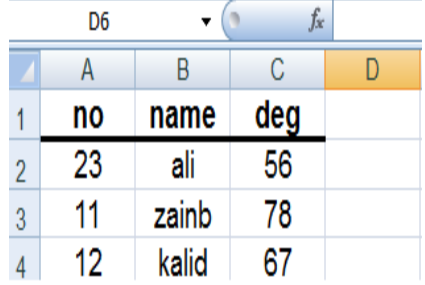
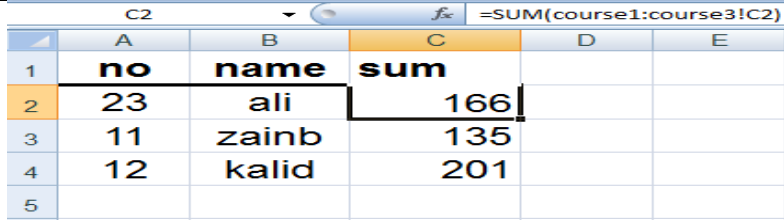
Note1: For example, the following formula uses a range named *MonthlySales*, defined in a workbook named Budget.xlsx (which is assumed to be open):
 =AVERAGE(Budget.xlsx!MonthlySales)

Note2: If the name *MonthlySales* is a worksheet-level name on Sheet1, the formula looks like this: =AVERAGE([Budget.xlsx]Sheet1!MonthlySales)

Calculating Across Worksheets Examples

Example -1: find total summation Across consecutive orders

Assume you enter the data of three student in three different courses in three consecutive sheet in the same worksheet (course1, course2, course3) as shown in the following figures.

			
Course1-sheet	Course2-sheet	Course3-sheet	
<p>To calculate the total sum in total sheet :</p> <p>1-Select cells c2:c4 and type the formula <code>:=sum(course1:course3!c2)</code></p> <p>2-Press <Ctrl +Enter></p>			

✓ Rules for naming names

we can summarize the rules for naming names as follows :

- ❑ Excel does not allow you to use the letters *r* and *c* as range names.
- ❑ If you use Create From Selection to create a range name and your name contains spaces, Excel inserts an underscore (*_*) to fill in the spaces. For example, the name *Product 1* is created as *Product_1*.
- ❑ Range names cannot begin with numbers or look like a cell reference. For example, *3Q* and *A4* are not allowed as range names. Because Excel 2010 has over 16,000 columns,
- ❑ a range name such as *cat1* is not permitted because there is a cell *CAT1*. If you try and name a cell *CAT1*, Excel tells you the name is invalid. Probably your best alternative is to name the cell *cat1_*.
- ❑ The only symbols allowed in range names are periods (*.*) and underscores (*_*).

❏ Functions

✓ What Is a Function?

A **worksheet function** is a built-in tool that you use in a formula. Worksheet functions allow you to perform calculations or operations that would otherwise be impossible. You'll find functions useful because they

- Simplify your formulas
- Permit formulas to perform otherwise impossible calculations
- Speed up some editing tasks

- Allow *conditional* execution of formulas — giving them rudimentary decision-making capability

✓ Function Argument Types

. The information within the parentheses is the function's *arguments*. Functions vary in how they use arguments. A function may use

- No arguments
- One argument
- A fixed number of arguments
- An indeterminate number of arguments
- Optional arguments

❖ Names as arguments

To calculate the sum of the values in A1:A20, you can use `=SUM(A1:A20)`. And, not surprisingly, if you've defined a name for A1:A20 (such as *Sales*), you can use the name in place of the reference: `=SUM(Sales)`

❖ Full-column or full-row as arguments

For example, the following formula sums all values in column B: `=SUM(B:B)` Using full-column and full-row references is particularly useful if the range that you're summing changes. **If you do use an entire row or column, just make sure that the row or column doesn't contain extraneous information that you don't want to include in the sum.**

❖ Literal values as arguments

A *literal argument* refers to a value or text string that you enter directly. For example, the `SQRT` function, which calculates the square root of a number, takes one argument. In the following example, the formula uses a literal value for the function's argument: `=SQRT(225)`

Using a literal argument with a simple function like this one usually defeats the purpose of using a formula. This formula always returns the same value, so you could just as easily replace it with the value 15. You may want to make an exception to this rule in the interest of clarity. For example, you may want to make it perfectly clear that you are computing the square root of 225

Using literal arguments makes more sense with formulas that use more than one argument. For example, the `LEFT` function (which takes two arguments) returns characters from the beginning of its first argument; the second argument specifies the number of characters. If cell A1 contains the text *Budget*, the following formula returns the first letter, or B: `=LEFT(A1,1)`

❖ Expressions as arguments

Excel also enables you to use expressions as arguments. Think of an *expression* as a formula within a formula (but without the leading equal sign). When Excel encounters an expression as a function's argument, it evaluates the expression and then uses the result as the argument's value. Here's an example:

$$=SQRT((A1^2)+(A2^2))$$

This formula uses the SQRT function, and its single argument appears as the following expression: $(A1^2)+(A2^2)$

Note: When Excel evaluates the formula, it first evaluates the expression in the argument and then computes the square root of the result.

❖ Other functions as arguments

Because Excel can evaluate expressions as arguments, it shouldn't surprise you that these expressions can include other functions. Writing formulas that have functions within functions is sometimes known as *nesting functions*.

Excel starts by evaluating the most deeply nested expression and works its way out. Note this example of a nested function: $=SIN(RADIANS(B9))$

❖ Arrays as arguments

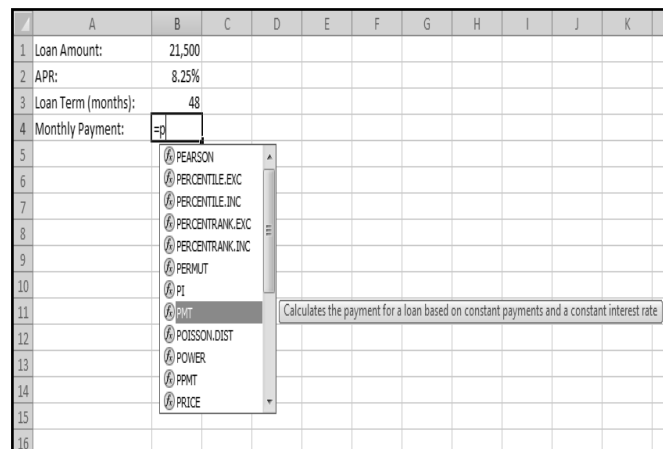
A function can also use an array as an argument. An *array* is a series of values separated by a comma and enclosed in brackets. The formula below uses the OR function with an array as an argument. The formula returns TRUE if cell A1 contains 1, 3, or 5. $=OR(A1=\{1,3,5\})$

✓ Ways to Enter a Function into a Formula

You can enter a function into a formula by typing it manually, by using the Function Library commands, or by using the Insert Function dialog box.

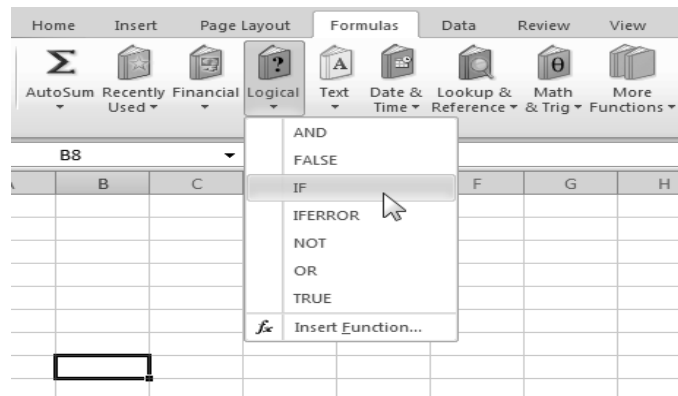
1-Entering a function manually

If you're familiar with a particular function — you know its correct spelling and the types of arguments that it takes — you may choose to simply type the function and its arguments into your formula. Often, this method is the most efficient. As shown in the next figure



2- Using the Function Library commands

Another way to insert a function into a formula is to use the icons in the Formulas → Function Library group. The next Figure shows these icons, each of which is a drop-down control.



3- Using the Insert Function dialog box

To insert a function, select the function from the Insert Function dialog box, as shown in the next Figure. You access this dialog box by Choosing

- **Formulas →Function**
- **Library→Insert Function Choosing**
- **Formulas→Function Library→AutoSum, and then clicking More Functions in the drop-down list**
- **Clicking the *fx* icon to the left of the Formula bar**
- **Pressing Shift+F3**

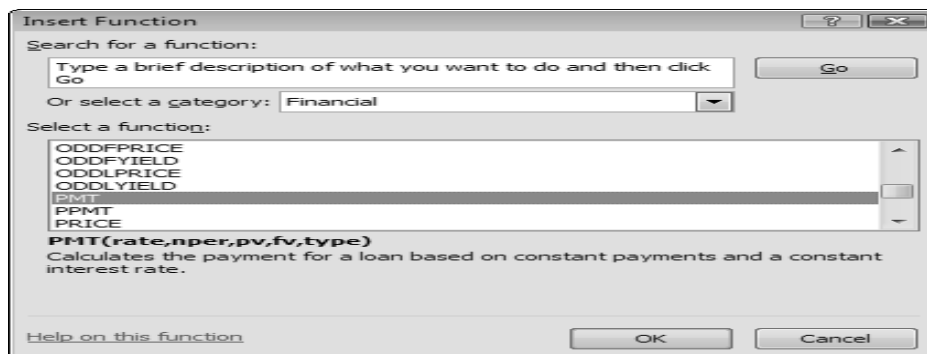


Figure: The Insert Function dialog box.

When you locate the function that you want to use, click OK. Excel's Function *Arguments dialog box* appears, as shown in the next Figure. Use the Function Arguments dialog box to specify the arguments for the function.

You can easily specify a *range argument* by clicking the Collapse Dialog button (the icon at the right edge of each argument field). Excel temporarily collapses the Function Arguments dialog box to a thin box, so that you can select a range in the worksheet.

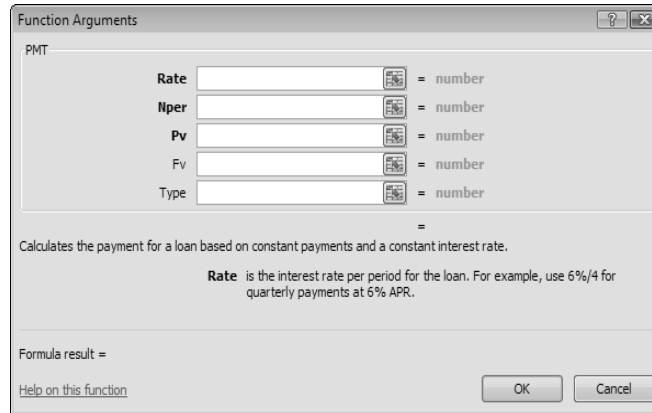


Figure : The Function Arguments dialog box.

✘ Editing and printing

✓ Formatting the Worksheet

Although the worksheet contains the appropriate data, formulas, and functions, the text and numbers need to be formatted to improve their appearance and readability. A worksheet that is formatted not only is easier to read but also looks more professional. By formatting the contents of the worksheet, you can improve its overall appearance. When formatting a worksheet, consider the following formatting suggestions:

- Increase the font size of cells
- Change the font color of cells
- Center the worksheet titles, subtitles, and column headings
- Modify column widths to best fit text in cells
- Change the font style of cells.

✓ Checking Spelling

- Excel includes a **spell checker** in **Review Submenu** you can use to check a worksheet for spelling errors.

✓ Preparing to Print the Worksheet

- Excel allows for a great deal of customization in how a worksheet appears when printed. For example, the margins on the page can be adjusted. A header or footer can be added to each printed page as well.
- Excel also has the capability to work on the worksheet in Page Layout view.

- **Page Layout view** allows you to create or modify a worksheet while viewing how it will look in printed format.
- The default view that you have worked in up until this point in the book is called **Normal view**.

 **Tips:** *Specify how the printed worksheet should appear.*

- Before printing a worksheet, you should consider how the worksheet will appear when printed.
- In order to fit as much information on the printed page as possible, the margins of the worksheet should be set to a reasonably small width and height.
- While the current version of a worksheet may print on one page, you may add more data in the future that causes the worksheet to extend to multiple pages. It is, therefore, a good idea to add a page header to the worksheet that prints in the top margin of each page.
- A header is common content that prints on every page of a worksheet. Landscape orientation is a good choice for large worksheets because the printed worksheet's width is greater than its length

***Important notes about Formula**

- **Using constants in formulas:** A constant is a value that is not calculated. For example, the date 10/9/2008, the number 210, and the text "Quarterly Earnings" are all constants. An expression, or a value resulting from an expression, is not a constant. If you use constant values in the formula instead of references to the cells (for example, =30+70+110), the result changes only if you modify the formula yourself.
- **Types of operators:** There are four different types of calculation operators: arithmetic, comparison, text concatenation, and reference.
 - ▣ **Arithmetic operators:** to perform basic mathematical operations such as addition, subtraction, or multiplication; combine numbers; and produce numeric results, use the following arithmetic operators.

Arithmetic operator	Meaning	Example
+ (plus sign)	Addition	3+3
- (minus sign)	Subtraction Negation	3-1 -1
* (asterisk)	Multiplication	3*3
/ (forward slash)	Division	3/3
% (percent sign)	Percent	20%
^ (caret)	Exponentiation)	3^2

- ▣ **Comparison operators:** You can compare two values with the following operators. When two values are compared by using these operators, the result is a logical value either TRUE or FALSE

Comparison operator	Meaning	Example
= (equal sign)	Equal to	A1=B1
> (greater than sign)	Greater than	A1>B1
< (less than sign)	Less than	A1<B1
>= (greater than or equal to sign)	Greater than or equal to	A1>=B1
<= (less than or equal to sign)	Less than or equal to	A1<=B1
<> (not equal to sign)	Not equal to	A1<>B1

- ▣ **Text concatenation operator:** Use the ampersand (&) to join, or concatenate, one or more text strings to produce a single piece of text.

Text operator	Meaning	Example
& (ampersand)	Connects, or concatenates, two values to produce one continuous text value	"North"&"wind"

- ▣ **Reference operators** : Combine ranges of cells for calculations with the following operators.

Reference operator	Meaning	Example
: (colon)	Range operator, which produces one reference to all the cells between two references, including the two references	B5:B15
, (comma) or ; (semicolon)	Union operator, which combines multiple references into one reference	SUM(B5:B15,D5:D15) SUM(B5:B15;D5:D15)
(space)	Intersection operator, which produces one reference to cells common to the two references	B7:D7 C6:C8

➤ Formulas error

- ▣ **##### Error** : This error occurs when a column is not wide enough, or a negative date or time is used.
- ▣ **#DIV/0! Error**: This error occurs when a number is divided by zero (0).
- ▣ **#N/A error**: This error occurs when a value is not available to a function or formula.
- ▣ **#NAME? Error** : This error occurs when Microsoft Office Excel doesn't recognize text in a formula
- ▣ **#NULL! Error**: This error occurs when you specify an intersection of two areas that do not intersect. The intersection operator is a space between references>
- ▣ **#NUM! Error**: This error occurs with invalid numeric values in a formula or function.
- ▣ **#REF! Error**: This error occurs when a cell reference is not valid
- ▣ **#VALUE! Error**: This error occurs when the wrong type of argument or operand is used.

Different Examples for Formulas in Excel

Example -1: Convert from hours to minutes

As a task, time in a timesheet has to be converted from hours minutes.

To convert time to minutes:

1. In a worksheet, enter your own data or the data shown in next Figure
2. Select cells B4:B8.
3. Enter the following formula: **=A4*24*60**.
4. Press **<Ctrl+Enter>**.
5. Format cells B4:B8 as general by selecting the Format menu and choosing **Cells** and **General** then clicking **OK**.

	A	B	C
1	Calculation with time		
2			
3	time	in minutes	
4	12:45	765	12:45
5	15:57	967	
6	5:13	313	
7	8:40	520	
8	2:44	164	
9			

Note: To convert minutes to hours and minutes format, use the formula **=b4/24/60**. Remember to format the cells with a time format, as shown in cell C4 in above Figure

Example-4: Incrementing row numbers

Standard row numbering in Excel is often used, but you can also create your own numbering system in a table, such as incrementing by 10 as described below.

To increment row numbers by 10:

1. Select cell A2 and type **0**.
2. Select cell A3 and type the following formula: **=A2+10**.
3. Select cells A3:A12.
4. From the Edit menu, select **Fill** and **Down**.

	A	B	C
1	number		
2	0		
3	10		
4	20		
5	30		
6	40		
7	50		
8	60		
9	70		
10	80		
11	90		
12	100		

Note: If the value of cell A2 is changed, the values in all other cells change too.

Example-5: Combine text and numbers

In this example, we want to combine text and numbers. Use the & operator to accomplish this.

To combine cells containing text and numbers:

1. Select cell B1 and type **computers**.
2. Select cell B2 and type **5**.
3. Select cell B4 and type the following formula:
= "You ordered "&B2&" "&B1&" today!".

	A	B	C	D	E
1	order	computers			
2	number	5			
3					
4		You ordered 5 computers today!			
5					
6					

Note: Each cell reference must be placed between & operators and additional text must be surrounded by quotation marks.