Inside Microsoft Office

▶ **Session 07**

Formulas, Functions, Charts, and Additional Features in Excel 2019

Objectives

▶ Describe functions and formulas in Excel 2019

▶ Explain charts in Excel 2019

▶ List other new features and enhancements in Excel 2019

Formulas and Functions in Excel

▶ Most worksheets are created to provide solutions to specific questions.

▶ All Excel formulas have the same basic structure: An '=' sign followed by one or more 'operands' which can be values, ranges, or cell references separated by one or more 'operators'.

▶ Operators can be Addition (+), Subtraction (-), Division (/), Multiplication (*), and so on.

Entering Formulas

Entering a new formula in the Excel sheet includes the following steps:

▶ Step 1 – Select the cell in which the formula needs to be entered.

▶ Step 2 – Type an '=' sign to let Excel know that a formula is about to be entered.

▶ Step 3 – Type the formula's operands and operators.

▶ Step 4 – Press Enter to confirm the formula.

▶ Step 5 – After the formula has been entered, if any changes are required to be done, press F2 or double-click the formula cell.

Using Range Names

▶ One way to use range names in a formula is to type the name in the Formula bar.

▶ MS Excel has several features to enable the user to select the name from the list and paste it right into the formula.
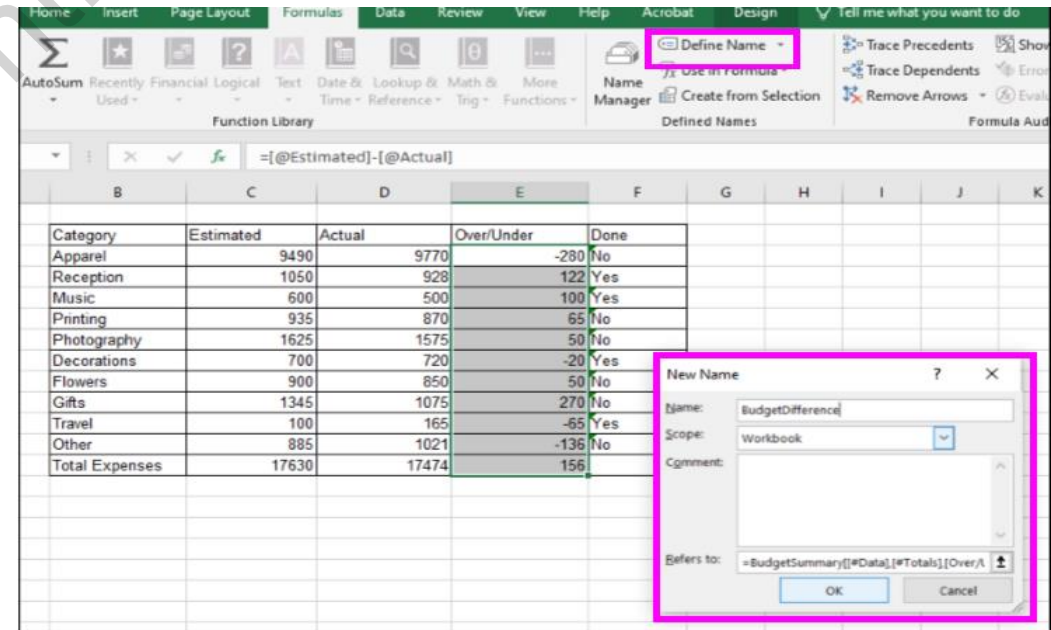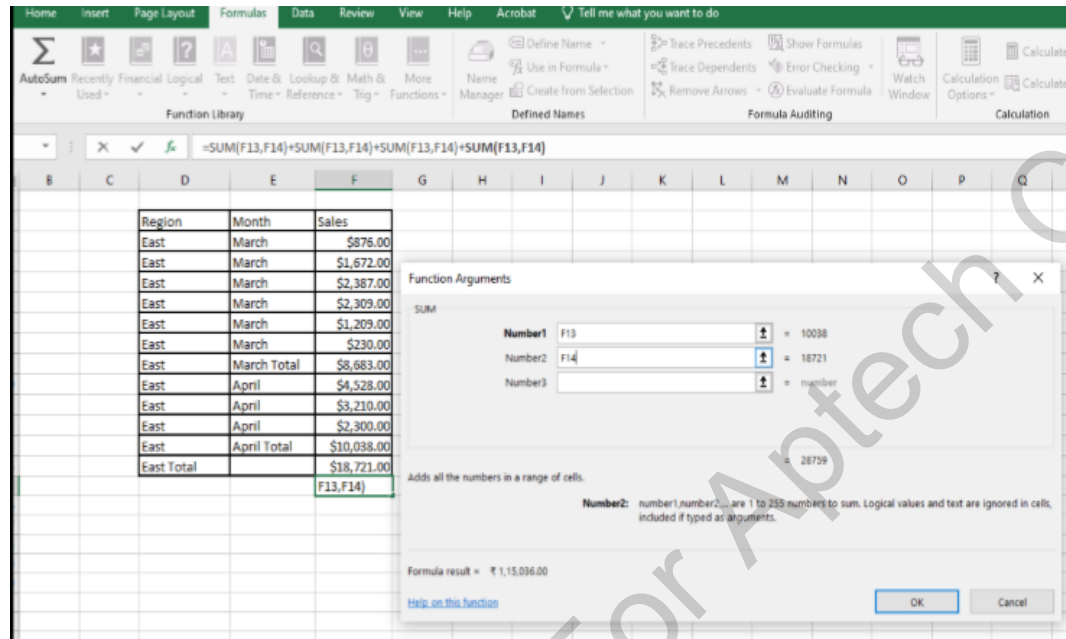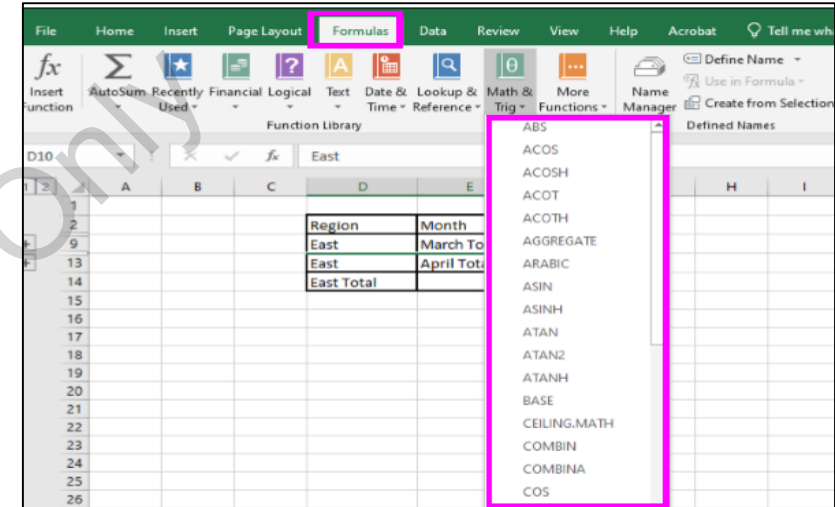
Building Basic Formula [1-2]

▶ When in Point mode, Excel may use any of the standard range selection techniques.

▶ Excel returns to Enter mode as soon as an operator or any character is typed.

▶ Upon pressing F2, Excel enters the Edit mode, which enables to make changes in the formula.

Using Arithmetic Formulas: Arithmetic formulas are the simplest formulas that can combine numbers, cell addresses, and result in mathematical calculations.
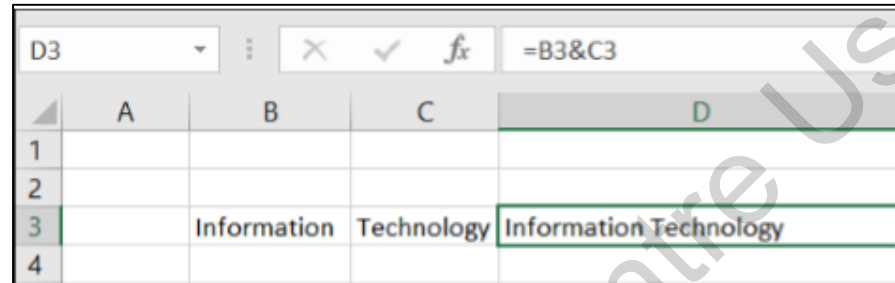
Operator	Name	Example	Result
+	Addition	=10+5	15
-	Subtraction	=10-5	5
/	Division	=10/5	2
*	Multiplication	=10*5	50
%	Percentage	=10%	0.1

Using Comparison Formulas: A comparison formula compares two or more numbers, text strings, cell contents, or function results.

Operator	Name	Example	Result
=	Equal to	=10=5	FALSE
>	Greater than	=10>5	TRUE
<	Less than	=10<5	FALSE
>=	Greater than or Equal to	=10>=10	TRUE
<=	Less than or Equal to	=10<=9	FALSE

Building Basic Formula [2-2]

Using Text Formulas: A text formula returns text as the value or result. Text formulas use the & operator to work with text cells, or text strings within 'quotations', or text function results.

**Using Reference Formulas:** References formulas combine two cell references to create a joint reference.

Operator	Name	Description
: (colon)	Range	This produces a range from two cell references
(space)	Intersection	This produces a range that is an intersection of two ranges
, (comma)	Union	This produces a range that is the union of two ranges

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Creating Advanced Formulas [1-2]

▶ Advanced features of Microsoft Excel 2019 are designed to impart skills necessary to audit and analyze worksheet data, utilize data tools, collaborate with others, and create and manage macros.

▶ This includes several aspects of Excel such as creating Pivot Tables, converting text and validation of data, import and export data, and so on.

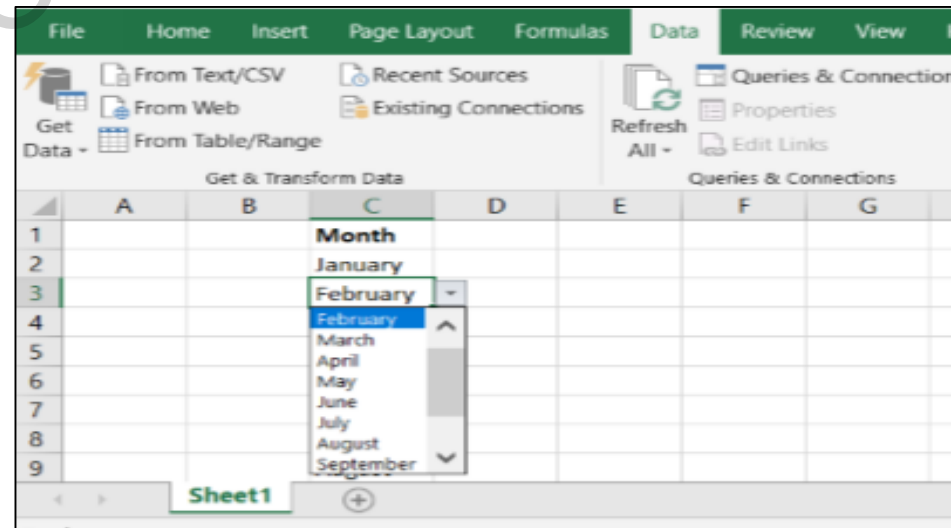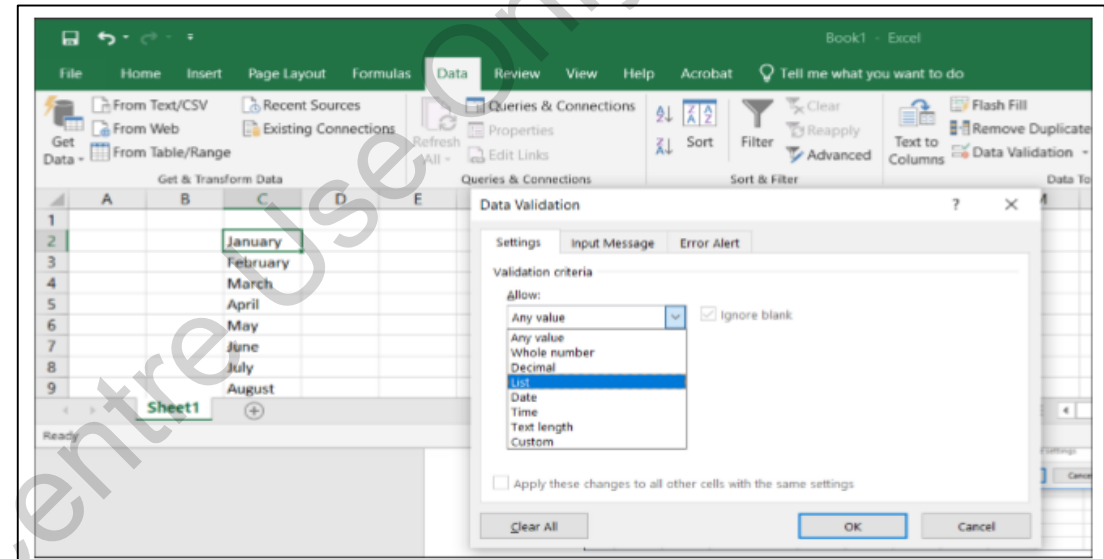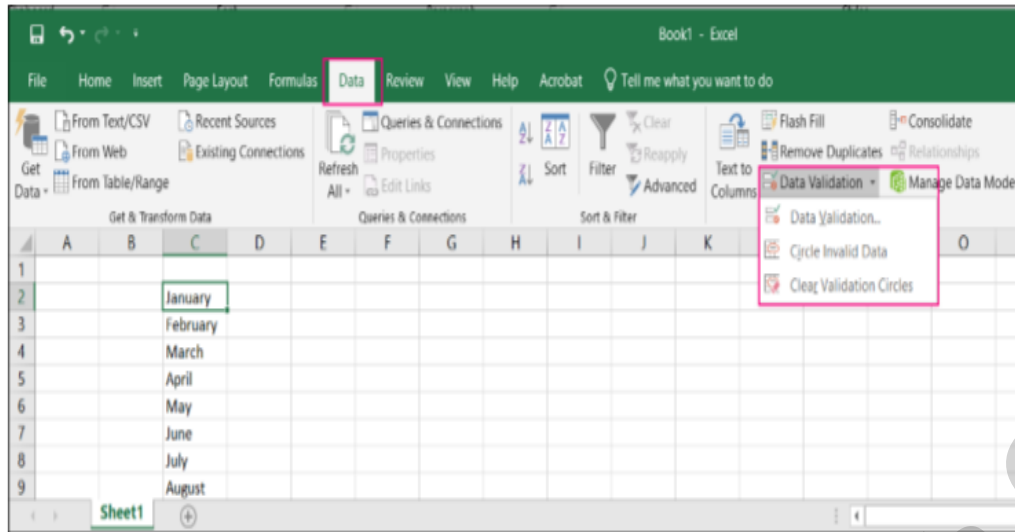**Converting Numbers:** Numbers that are stored as text can cause unexpected problems. Numbers that are left-aligned are actually text.
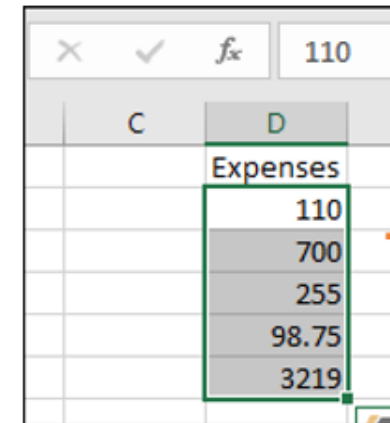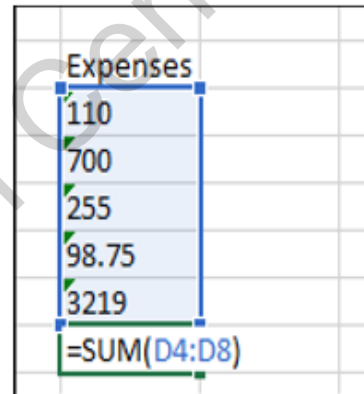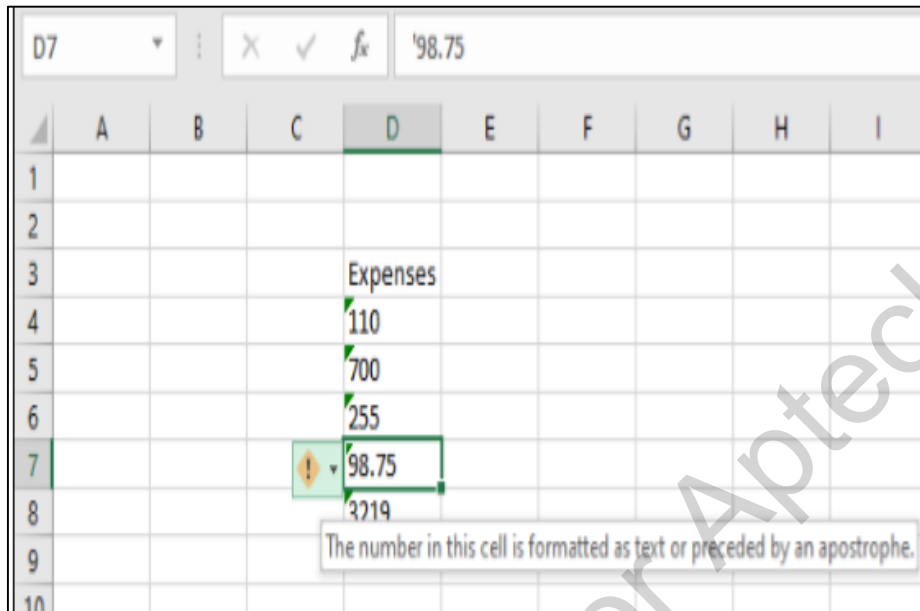
Creating Advanced Formulas [2-2]
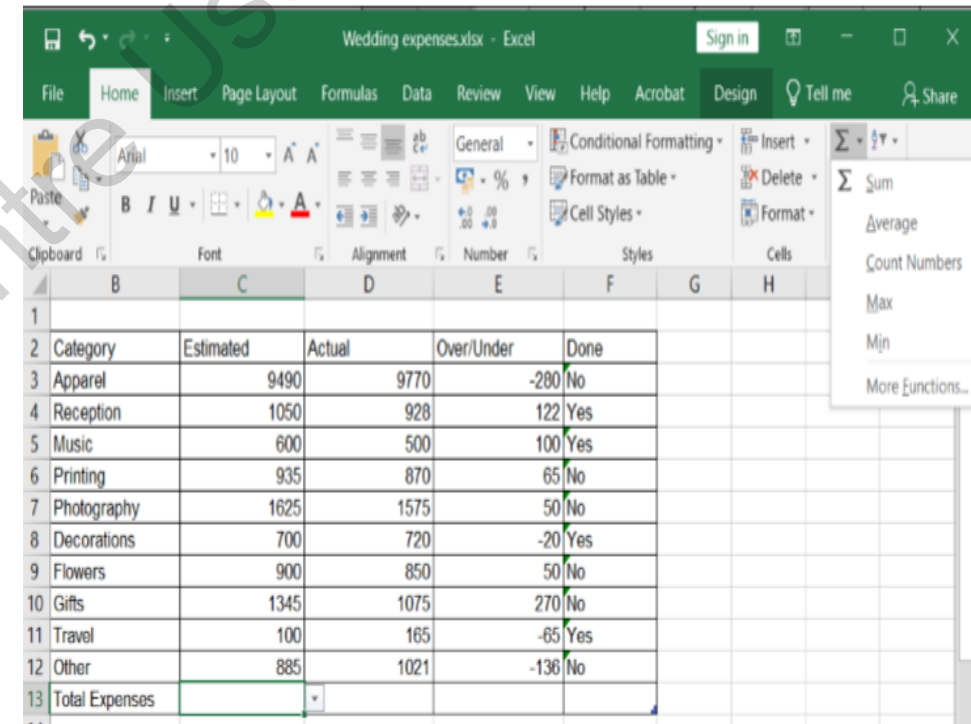
Validation of Data: Data validation is used to restrict the type of data or the values that the user enters into a cell. One of the most common data validation users is to create a drop-down list.

Using Functions

▶ A function is a pre-defined formula.

▶ MS Excel includes many pre-defined functions that can be used to quickly find out the sum, average, count, maximum value, and minimum value and so on for a range of cells.

SUM	AVERAGE	COUNT	MAX	MIN
Adds all values of cells in argument (cells to be used for adding)	Determines average of values of the cells in argument	Counts number of cells with numerical data or can be used to count the items in a range	Determines highest cell value out of all the cells included in the argument	Determines the smallest cell value out of all the cells included in the argument

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New Functions in Excel 2019 [1-2]

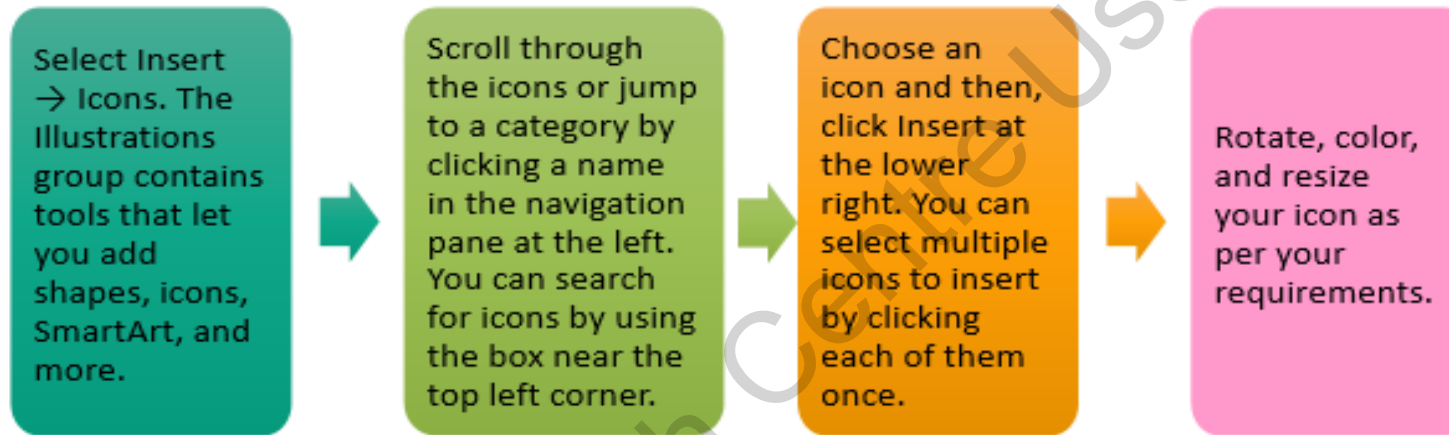| Function	Description	Syntax	Example
IFS	Tests conditions in the order specified. If passed, the result is returned. IFS can take the place of multiple nested IF statements, and is much easier to read with multiple conditions.	IFS(logical_test1, value_if_true1, [logical_test2, value_if_true2], [logical_test3, value_if_true3],…) Where, logical_test1 (required): Condition that evaluates to TRUE or FALSE. value_if_true1 (required): Result to be returned if logical_test1 evaluates to TRUE. Can be empty. logical_test2…logical_test127 (optional): Condition that evaluates to TRUE or FALSE. value_if_true2…value_if_true127 (optional): Result to be returned if logical_testN evaluates to TRUE. Each value_if_trueN corresponds with a condition logical_testN. Can be empty. IFS function allows you to test up to 127 different conditions hence, the variables can be named up to 127.	=IFS(A2>75,"Distinction", A2>60,"First Class", A2>35,"Second",A2=35,"Pass")
MAXIFS	Returns largest number in a range, that meets a single or multiple criteria.	MAXIFS(max_range, criteria_range1, criteria1, [criteria_range2, criteria2], …) Where, max_range (required): Actual range of cells in which maximum will be determined. criteria_range1 (required): Is the set of cells to evaluate with the criteria. criteria1 (required): Is the criteria in the form of a number, expression, or text that defines which cells will be evaluated as maximum. criteria_range2, criteria2, …(optional): Additional ranges and their associated criteria. You can enter up to 126 range/criteria pairs.	=MAXIFS(G2:G5,B3:B6,"a")
MINIFS	Returns the smallest number in a range, that meets a single or multiple criteria.	MINIFS(min_range, criteria_range1, criteria1, [criteria_range2, criteria2], …) Where, min_range (required): Actual range of cells in which the minimum value will be determined. criteria_range1 (required): Is the set of cells to evaluate with the criteria. criteria1 (required): Is the criteria in the form of a number, expression, or text that defines which cells will be evaluated as minimum. criteria_range2, criteria2, …(optional): Additional ranges and their associated criteria. You can enter up to 126 range/criteria pairs.	=MINIFS(G2:G7,B2:B7,1)

New Functions in Excel 2019 [2-2]

Function	Description	Syntax	Example
SWITCH	Evaluates an expression against a list of values in order and returns the first matching result. If no results match, the 'else' is returned.	SWITCH(Value to switch, Value to match1...[2-126], Value to return if match found 1...[2-126], Value to return if there's no match)	=SWITCH(H5,1,"Sunday",2,"Monday",3,"Tuesday")

CONCAT	Combines text from multiple ranges and/or strings, but it does not provide delimiter or IgnoreEmpty arguments.	CONCAT(text1, [text2],...)
		
		Where,
		   text1: Text item to be joined. A string, or array of strings, such as a range of cells.
		   [text2, ...]: (optional)
		Additional text items to be joined. There can be a maximum of 253 text arguments for the text items. Each can be a string or array of strings, such as a range of cells.
			=CONCAT(B4," & ", C4)
			
			If cells B4 and C4 contain "James Rockwell" and "Partners" respectively, the output of the function will be James Rockwell & Partners

Inserting Icons and Charts in Excel 2019 [1-2]

► Using Excel 2019, you can insert 'free to use' icons and Scalable Vector Graphics (SVG) files into your workbooks, and manipulate them (such as rotating, coloring, and resizing them).

Inserting Icons

Select Insert → Icons. The Illustrations group contains tools that let you add shapes, icons, SmartArt, and more.	Scroll through the icons or jump to a category by clicking a name in the navigation pane at the left. You can search for icons by using the box near the top left corner.	Choose an icon and then, click Insert at the lower right. You can select multiple icons to insert by clicking each of them once.	Rotate, color, and resize your icon as per your requirements.

Inserting SVG Files: To insert an SVG file, drag and drop the file from File Explorer into your worksheet.

Inserting Charts: Charts provide visual aids to the data present in tables. They make data entries more comprehensible and clear.

Inserting Icons and Charts in Excel 2019 [2-2]

Chart Type	Description
Column	Compares the values across categories.
Line	Displays the graph over a period.
Pie	Displays the contribution of each value to the total. Pie charts are used only when there is one data series and all the values are positive.
Bar	Compares multiple values.
Area	Highlights the differences between numerous sets of data over a period.
Scatter	Compares pair of values. These charts are also known as XY charts.
Stock	Displays trends of the stock market.
Surface	Shows trends in values across two dimensions in a continuous curve.
Radar	Displays values relative to a center point.

In addition to these charts, there are newly introduced chart types in Excel 2019:

Map Charts

Allow users to compare values and show categories across geographical regions. They can be used when you have geographical regions in your data, such as countries/regions, states, and so on.

Funnel Charts

Show values across multiple stages in a process. For example, you could use a funnel chart to show the number of sales prospects at each stage in a sales pipeline.

Creating and Modifying Charts
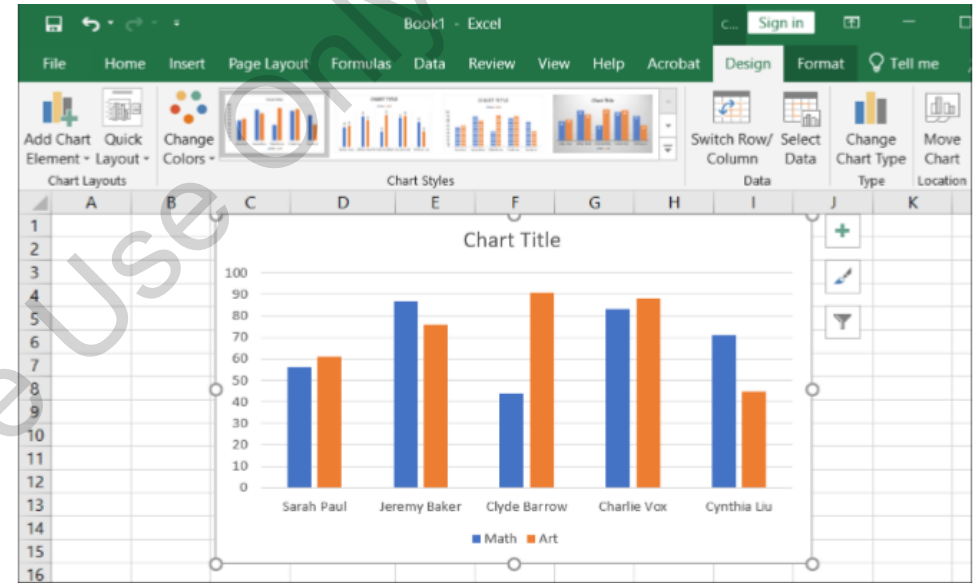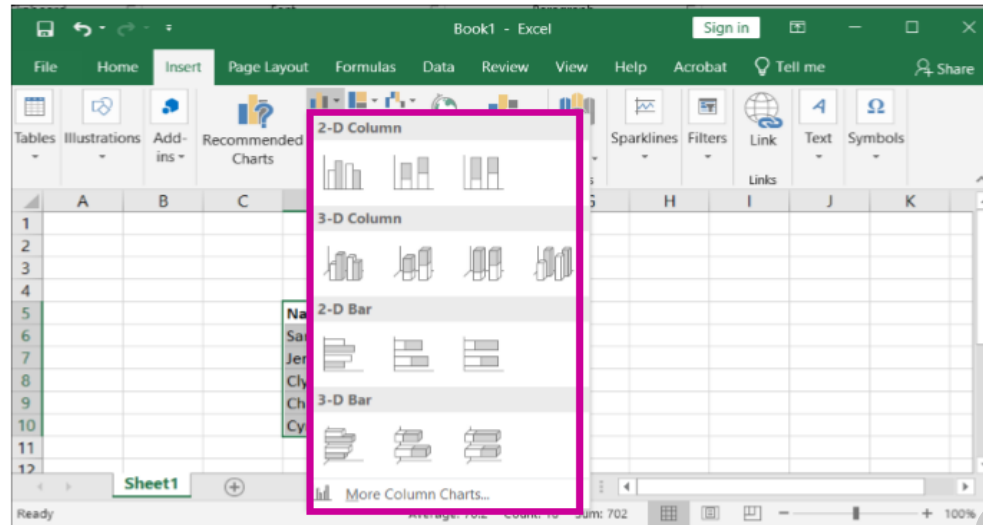
Element	Description
Axis Titles	Provides name to horizontal and vertical axis of the chart and enables to select its position.
Chart Title	Specifies a title to the chart generated and enables to select its position.
Data Labels	Displays details of each data series on the chart and enables to select the position of the values.
Data Table	Provide details of each data series below the chart.
Legend	States what each of the data series stands for. The placing of the legend needs to be chosen from the Legend option in Chart Labels.

Other New Features and Enhancements in Excel 2019

Feature/Enhancements	Description
Improved accessibility features with Accessibility Checker	Accessibility Checker helps you check Accessibility, so that users of your worksheet who may have disabilities will not encounter any difficulty while viewing or working with it. It identifies most accessibility issues and explains why each might be a potential problem for users with a disability. It also offers suggestions on how to fix/resolve each issue.
Audio cues with sound effects	Accessibility can also be improved via sound effects for audio cues, such as emitting sounds when options on the current screen change.
Add links to recently used files	Using Excel 2019, you can easily add hyperlinks to recent cloud-based files or Websites and create meaningful display names for people using screen readers.
View and restore changes in workbooks that are shared	When several users share and collaborate on worksheets, it is helpful to be able to view and if required, restore changes made by others. This can be done in Excel 2019.
Quickly save to recent folders	By saving files quickly, you can improve productivity. Excel 2019 helps to save your work to the most recently used folders.
Use the Deselect Tool to unselect selected cells	Deselect Tool helps to unselect the selected cells.
Improved autocomplete	With the improved autocomplete, it is not necessary to remember exact spellings of functions. Autocomplete will intuitively search for words having similar spelling and locate the function you may require.
No warnings when saving a CSV file	Earlier, Excel used to display a warning, 'This file may contain features that are not compatible with CSV...' when saving a Comma Separated Values (CSV) file but in Excel 2019, this will not happen anymore.

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Summary

- Excel formulas have the same basic structure: An '=' sign followed by one or more 'operands' which can be values, ranges, or cell references separated by one or more 'operators'.

- Advanced formulas in Excel may involve converting text and validation of data, import and export data, and so on.

- MS Excel includes many pre-defined functions that can be used to quickly find out the sum, average, count, maximum value, minimum value and so on, for a range of cells.

- IFS, MAXIFS, MINIFS, SWITCH, and CONCAT are some of the newly introduced functions in Excel 2019.

- Data validation is used to restrict the type of data or the values that the user enters into a cell.

- You can insert icons and Scalable Vector Graphics (SVG) files and charts into your workbooks and manipulate them.

- Excel supports several chart types including two new types, map charts and funnel charts.