What is Excel and the uses of excel?

It is one of the most powerful spreadsheet software that uses rows and columns to organize the data.

We use excel for multiple purposes like data cleaning, calculations, data analysis, and data visualization.

Relative Referencing Vs Absolute Referencing:

Relative Reference:

These are cell references that change when we copy and paste the formula that has the references.

To give you a simple example, if you put **=A10** in cell A1, and then you copy cell A1 and paste it in cell A2, the reference would change to **A11**. This happens as this is a relative cell reference and it changes relative to the cell it's copied from.

Ex- suppose there are two columns which have values 10, 20 & 1,2. Now I want to create a new column which is the sum of these two numbers. What i will do is I will select one value from the first column plus the first value from the second column then will get 11 as a sum. Now when I drag this result cell I will get 22 for the second row based on that row's values. SO this is a relative reference.

Absolute Reference:

These are the references that remain the same and don't change copy and paste the formula that has the references. For example, if you put **=$A$10** in cell **A1** and then copy cell **A1** and paste it into cell **A2,** the reference would still remain **$A$10.** The **$** sign before the column alphabet and the row number makes it absolute.

Formatting:

Different data formats in Excel:

The following formats are available in Excel.

1] Text Format
In Text format we can do many things like alignment change, changing font and color of the text.

2] Number Format
There are different formats for Numbers like we can convert them into a decimal fractions.
No matter what format has been applied, you can use numbers in calculations such as addition, subtraction, division, and multiplication.

3] Date Format.
We can apply many date formattings like show only month and year(MM/yyyy) , show day name and there are other also we have.

In excel dates are stored as numbers.
For example, 01-01-2019 would be saved as 43466 in Excel, which is the number for the given date

In Excel, you can show dates in different formats such as long date (01 January 2019), short date (01-01-2019), etc.

4] Currency Format
We can use currency formatting to apply particular country currencies to the prices.

5] Percent format

This we use to convert numbers into percentages or give percent symbol.
For example, you can make 0.1 to show up as 10% when you apply the percentage format to it.

Wrap Text:

Wrapping text in Excel allows us to avoid any text overflowing out of the cell. By applying the the wrap text option, we can make sure all the text fits nicely in one single cell (which may change it's height though).

To wrap text, select the cell, go to the **Home tab** and click on the **Wrap text option** in the **Alignment group.** Note that this is a toggle button, which means that if you click on it again, it will unwrap the text.
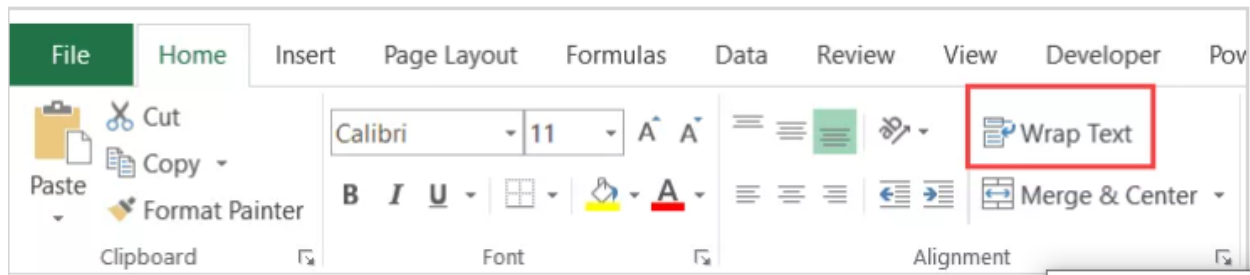
Merge the cell & Center:
Merge joins multiple cells and combines them in one cell and presents them in a center.

Note: While using 'Merge and Center' gets the job done, it is not the most efficient way to do it. The problem with using 'Merge and Center' is that the resulting cells wouldn't sort properly. The right way to merge cells is by using the 'Center Across Selection option.
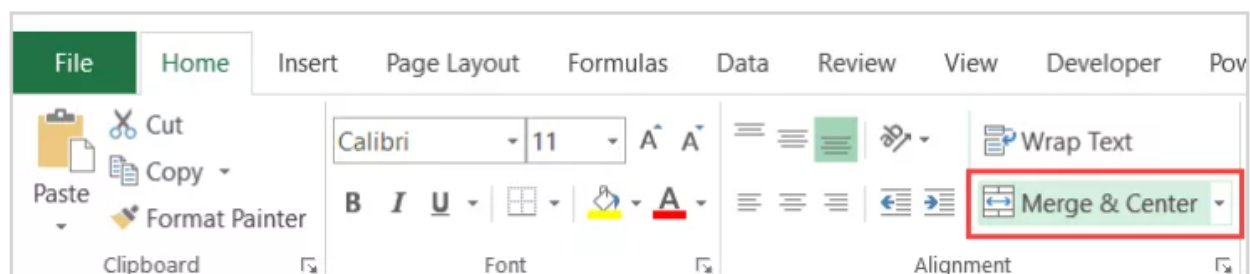
Center across formatting is always better than merge center formatting.

Because if we use merge center formatting then it will be problematic when we deal with formulas or when try to calculate any value from the column using formulas. Because it selects a formatted row instead of a single cell
We can access center across formatting using right click then go to alignment and then from the horizontal drop-down menu select center across the option. Or
We directly access using CTRl + 1.

Format painter:

'Format Painter' allows us to copy the format from a cell and apply it to another cell (or range of cells).

Clear Format:

Sometimes, we may want to remove all the formatting (colors, borders, font styling, etc.) and just have plain simple data. We can do that by clearing all the formatting in Excel.

To do this, we need to use the 'Clear Formats' option, which can be found in the Home tab in the Editing group. It becomes visible when you click on the 'Clear' drop down.
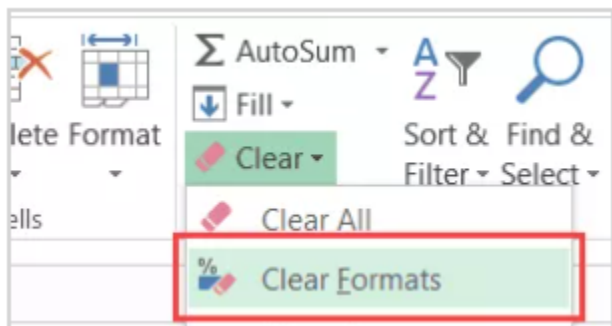
Note there are other options as well – such as clear content, clear comments, and clear Hyperlinks. In case you want to clear everything – use the 'Clear All' option.

Conditional Formatting:

Conditional Formatting allows you to format a cell based on its value in it. For example, if we want to highlight all the cells where the value is less than 30 with a red color, we can do that with Conditional Formatting.
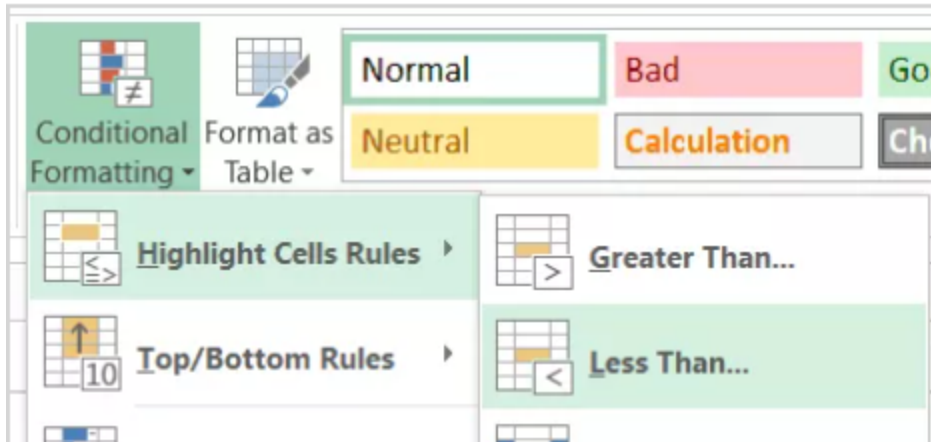
How to format the cell which has negative values?
Step 1: Select the cell or table which has negative values
Step 2: In the conditional formatting, option select Highlight cell rules and then select less than an option.
Step 3: In less than dialog box put 0 value.
SO these steps color the cell which has less than 0 value. nothing but Negative values.

How to Highlight the cell with duplicates values.?

Step 1: Select the data in which you want to highlight duplicate cells.
Step 2: Go to the Home tab and click on the Conditional Formatting option.
Step 3: Go to Highlight Cell Rules and click on the 'Duplicate Values' option.
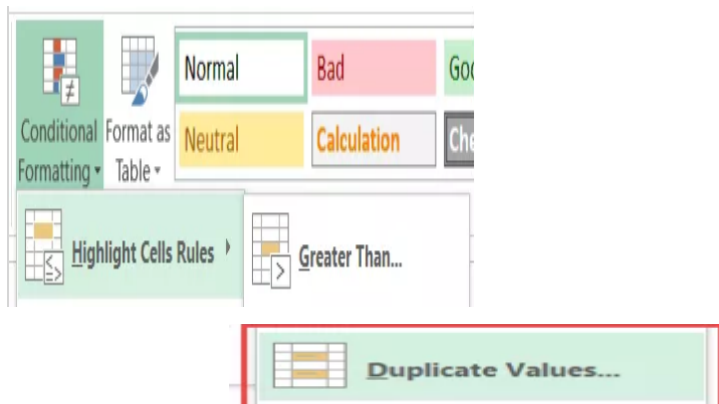
How to make cells invisible:
There are multiple ways to do this.

Method1: You can simply make the font white and it will appear as if it's invisible.
Method2: Using custom formatting we can make cells invisible
Select the cell, and press Control + 1 . This will open the Format Cells dialog box. In the Custom option, type ;;; in the custom options field. This will make the text invisible (but it will still be there).

How to Highlight the cells which have errors:?

In Excel, there can be different types of errors – such as #N/A, #DIV/0!, #VALUE!, #REF!, #NAME, and #NUM.
You can highlight all the cells that contain any of these errors using conditional formatting.

Step 1: Select the data in which you want to highlight the cells with errors.
**Step 2:** Go to the Home tab and click on the Conditional Formatting option.
Step 3: Click on 'New Rule'.
Step 4: In the New Formatting Rule dialog box, select the 'Use a formula to determine which cells to format option.
Step 5: In the formula field, enter =ISERROR(A1), where A1 is the active cell in the selection.
Click on the Format button and specify the color in which you want to highlight the cells.
Click OK.
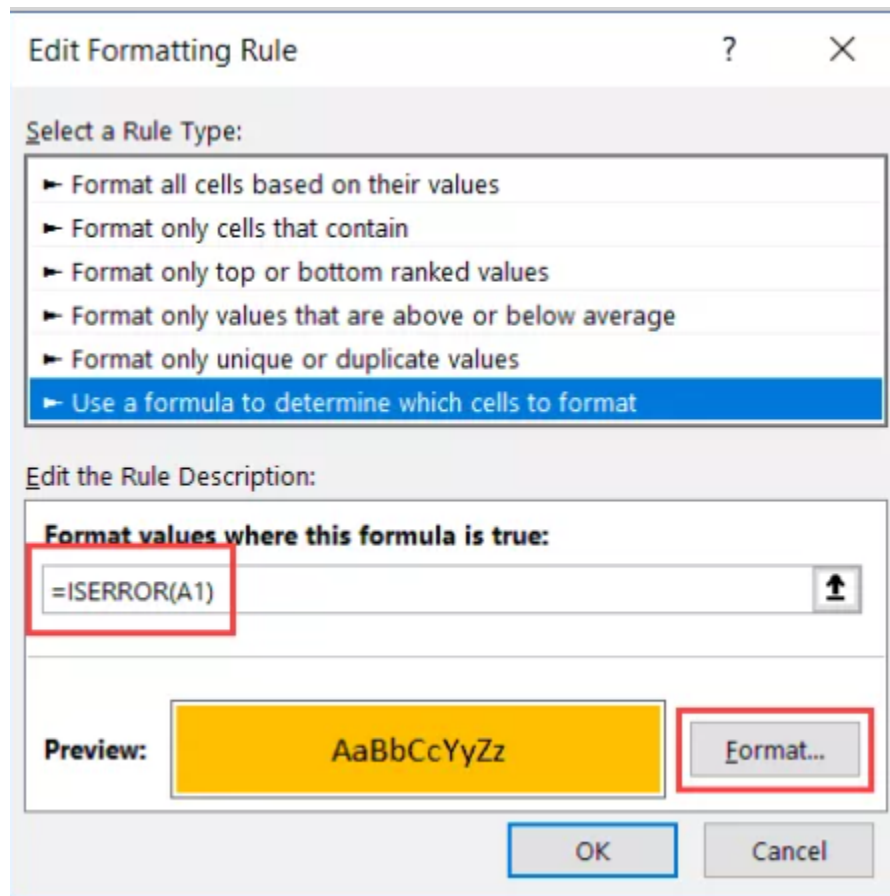
Formulas:

Order of operation excel: (PEMDAS order)

1] Parenthesis(Brackets)
2] Exponentiation (^)
3] Multiplication/division: Both have equal preferences whichever comes first evaluated.
4] Addition or Subtraction. Both have equal preferences whichever comes first evaluated

Function Vs Formula:

A formula is a user-defined expression that calculates a value.
A function is a pre-defined built-in operation that can take the specified number of arguments.

A user can create formulas that can be complex and can have multiple functions in them.

For example, =A1+A2 is a formula and =SUM(A1:A10) is a function.

Different types of Errors:

#N/A Error: This is called the 'Value Not Available' error. You will see this when you use a lookup formula and it can't find the value (hence Not Available).

#DIV/0! Error: You're likely to see this error when a number is divided by 0. This is called the division error.
#VALUE! Error: The value error occurs when you use an incorrect data type in a formula.

#REF!Error: This is called the reference error and you will see this when the reference in the formula is no longer valid. This could be the case when the formula refers to a cell reference and that cell reference does not exist (happens when you delete a row/column or worksheet that was referred in the formula).

#Name Error: This error is likely to be a result of a misspelled function.

#NUM ERROR: A number error can occur if you try and calculate a very large value in Excel. For example, =194^643 will return a number error.

Lookups: Most Important Functions of Excel:

1] VLOOKUP() - (https://trumpexcel.com/excel-vlookup-function/#Syntax)
Vlookup function us used to find data/value associated with lookup value. For example Based on customer_id find the customer name.

VLOOKUP function is best suited for situations when you are looking for a matching data point in a column, and when the matching data point is found, you go to the right in that row and fetch a value from a cell which is a specified number of columns to the right.

Here is how vlookup works:

1] For example in school you go up to the notice board and start looking for your name or enrolment number (running your finger from top to bottom in the list).

2] As soon as you spot your name, you move your eyes to the right of the name/enrolment number to see your scores.
And that is exactly what the Excel VLOOKUP function does for you.

VLOOKUP function looks for a specified value in a column (in the above example, it was your name) and when it finds the specified match, it returns a value in the same row (the marks you obtained).

Imp Note: To use vlookup function lookup_value column should always be first left column. If lookup_value column is not at left of the table then we can't use vlookup function.

VLOOKUP()

What it Does:

Looks for a given value in a vertical list, and once it has spotted that value, it would use that row and return the value from the specified column number

Syntax:
=VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

Lookup value: This is the value we are looking.

Table array: This is the table in which we are looking the value.

Col_index: This is the column in which the required value is present.This is column in which we are looking for a value. This is the column index number from which you want to fetch the matching value.

range_lookup: here you specify whether you want an exact match or an approximate match. It defaults to TRUE or 1 – approximate match. For exact match put 0 or False.**.**

Ex- In the VLOOKUP example below, I have a list wth student names in the left-most column and marks in different subjects in columns B to E.

	A	B	C	D	E
1			*Subject*		
2	*Name*	Math	Physics	Chemistry	Biology
3	Matt	38	58	66	49
4	Bob	88	92	74	90
5	Tom	57	77	91	91
6	Brad	82	56	45	95

Now let's get to work and use the VLOOKUP function for what it does best. From the above data, I need to know how much Brad scored in Math.

From the above data, I need to know how much Brad scored in Math.

Here is the VLOOKUP formula that will return Brad's Math score:

=VLOOKUP("Brad",$A$3:$E$10,2,0)

1] **"Brad:** – this is the lookup value.

2] **$A$3:$E$10** – this is the range of cells in which we are looking. Remember that Excel looks for the lookup value in the left-most column. In this example, it would look for the name Brad in A3:A10 (which is the left-most column of the specified array).

3] **2** – Once the function spots Brad's name, it will go to the second column of the array, and return the value in the same row as that of Brad. The value 2 here indicated that we are looking for the score from the second column of the specified array.

4] **0** – this tells the VLOOKUP function to only look for exact matches.

Limitations of Vlookup:

1] It can not be used when the lookup value is on the right. For VLOOKUP to work, the lookup value should always be in the left-most column.

2] VLOOKUP would give a wrong result if you add/delete a new column in your data (as the column number value now refers to the wrong column).

3] When used on large data sets, it can make your workbook slow.

2] INDEX & MATCH function:

1] MATCH() - match

This function take the value and returns row number of the value which we specified, from the data.

Ex - MATCH(lookup_value, lookup_array, [match_type])

Lookup_value - This is the value's ow number we are looking for.

Lookup array: This is column or table in which we looking for the value.

Match type(optional): 0 - Exact Match ,

1 – this finds the largest value that is less than or equal to the lookup value. For this to work, your data range needs to be sorted in ascending order.

-1 – this finds the smallest value that is greater than or equal to the lookup value. For this to work, your data range needs to be sorted in descending order.

2] INDEX()

This function takes row no and col no and return the value from the table.

Ex- INDEX(array,row_num,col_num) - INDEX(A1:I9,9,5)

	A	B	C	D	E	F	G	H	I
1	70	33	72	91	67	42	54	68	74
2	90	25	57	44	20	29	90	47	54
3	77	32	92	88	70	30	23	8	59
4	19	57	86	8	94	83	21	26	95
5	39	73	8	13	92	53	77	42	4
6	73	80	18	92	1	80	19	27	84
7	31	88	12	93	88	Row 9, Column 5			77
8	49	44	94	37	43	55	17	94	16
9	96	30	79	78	99	18	55	68	70

INDEX&MATCH combined:

Index and match togather is combination of alternative for vlookup.
Index and match perform better than vlookup and it can look the value both side left and right.

Ex-
=INDEX($A$2:$B$11,MATCH("Jim",$A$2:$A$11,0),2)

D3   fx   =INDEX($A$2:$B$11,MATCH("Jim",$A$2:$A$11,0),2)

	A	B	C	D	E
1	**Name**	**Marks**			
2	John	93		Jim's Marks	
3	Jenny	88		65	
4	Mark	47			
5	Jim	65			

HLOOKUP: Horizontal lookup

This function also looks for value horizontally or in a row and returns the associated value.

Excel HLOOKUP function is best suited for situations when you are looking for a matching data point in a row, and when the matching data point is found, you go down that column and fetch a value from a cell which is a specified number of rows below the top row.

Note: Horizontal means lookup values are placed horizontally in a row, not in a column.

HLOOKUP()

What it Does:

Looks for value in the top row of a table. Column of the matching cell is used to return a value based on the row number specified

Syntax:

=HLOOKUP(lookup_value, table_array, row_index_num, [range_lookup])

lookup_value – this is the look-up value that you are looking for in the first row of the table. It could be a value, a cell reference, or a text string.

table_array – this is the table in which you are looking for the value. This could be a reference to a range of cells or a named range.

row_index – this is the row number from which you want to fetch the matching value. If row_index is 1, the function would return the lookup value (as it is in the 1st row). If row_index is 2, the function would return the value from the row just below the lookup value.

[range_lookup] – (Optional) here you specify whether you want an exact match or an approximate match. If omitted, it defaults to TRUE – approximate match (see additional notes below).

	A	B	C	D
1	Data Used in Formula			
2	Fruit	Apple	Banana	Orange
3	Quantity	10	12	5
4	Quantity	$5	$1.20	$2.10
5				

Formula	Result	Commentary
=HLOOKUP("Apple",B2:D3,2,FALSE)	10	Returns the quantity of Apple by spotting position of Apple in the list and returning the value from the second row. Note that range_lookup value is FALSE indicating exact match

XLOOKUP:(https://trumpexcel.com/xlookup-function/)

XLOOKUP is a function that allows you to quickly look for a value in a dataset (vertical or horizontal) and return the corresponding value in some other row/column.

It does everything VLOOKUP used to do, and much more.

For example, if you've got the scores for students in an exam, you can use XLOOKUP to quickly check how much a student has scored using the name of the student.

```
=XLOOKUP(lookup_value, lookup_array, return_array, [if_not_found], [match_mode],
[search_mode])
```

XLOOKUP function can take 6 arguments (3 mandatory and 3 optional):

1] lookup_value – the value that you're looking for
2] lookup_array – the array in which you're looking for the lookup value
3] return_array – the array from which you want to fetch and return the value (corresponding to the position where the lookup value is found)
4] [if_not_found] – the value to return in case the lookup value is not found. In case you don't specify this argument, a #N/A error would be returned
5] [match_mode] – Here you can specify the type of match you want:
   0 – Exact match, where the lookup_value should exactly match the value in the lookup_array. This is the default option.
-1 – Looks for the exact match, but if it's found, returns the next smaller item/value
1 – Looks for the exact match, but if it's found, returns the next larger item/value
2 – To do partial matching using wildcards (* or ~)

6] [search_mode] – Here you specify how the XLOOKUP function should search the lookup_array
1 – This is the default option where the function starts looking for the lookup_value from the top (first item) to the bottom (last item) in the lookup_array
-1 – Does the search from bottom to top. Useful when you want to find the last matching value in the lookup_array
2 – Performs a binary search where the data needs to be sorted in ascending order. If not sorted, this can give errors or wrong results
-2 – Performs a binary search where the data needs to be sorted in descending order. If not sorted, this can give errors or wrong results

Ex - Suppose you have the following dataset and you want to fetch the math score for Greg (the lookup value).

	A	B	C	D	E	F	G
1	Name	Math	Physics	Chemistry		Name	Math
2	Mark	87	91	66		Greg	
3	Ned	67	71	52			
4	Hans	16	32	7			
5	Martha	68	82	39			
6	Greg	21	94	81			
7	Scott	72	38	18			
8	Jenny	19	40	78			

Formula:

=XLOOKUP(F2,A2:A15,B2:B15)

Result:

G2		:	✕	✓	fx	=XLOOKUP(F2,A2:A15,B2:B15)	

	A	B	C	D	E	F	G
1	Name	Math	Physics	Chemistry		Name	Math
2	Mark	87	91	66		Greg	21
3	Ned	67	71	52			

Note: The benefit of XLOOKUP is that it doesn't matter whether the lookup column is left side or right side because here we are not passing a table array, we are passing the lookup value column and return or result value column from which we want the result.

Functions to handle Error:

1] IFERROR() - if error
This helps us return other values when an error occurs.
Ex - IFERROR(SUM(A1:A5),'Null')

2] ISERROR() - is error
This function just returns True when there is an error in the cell or column otherwise false.
We can use formulas inside these functions when iserror() output is True.

3] IFNA() - if na

Mathematical Functions:
1] SUM() & AVERAGE():
Ex- SUM(array_range) or AVERAGE(A1+A2) AVERAGE(array_range) or AVERAGE(A1+A2)

1]COUNT(): Counts the number of cells that contain numbers
2] COUNTA(): Counts the number of cells that are not empty
3] COUNTBLANK(): Counts the number of empty cells in a range of cells

2] SUMIF() & AVERAGEIF() & COUNTIF()
These functions are used to calculate the values based on one condition.

Ex- SUMIF(range,criteria,sum_range):
Range: This is the criteria range or column in which criteria is present.
Criteria: This is a single value or criteria
Sum_range: This is the column we want to calculate the sum.

3] SUMIFS() & AVERAGEIFS() & COUNTIFS():
These functions are used to calculate the values based on more than one condition.

Ex- SUMIFS(sum_range,criteria_range1,criteria1,criteria_range2,criteria2):
=AVERAGEIFS(D5:D167,A5:A167,H16,B5:B167,H17,D5:D167,">"&0)

sum_range: This is the range of the column we want to calculate the sum.
criteria_range1: This is the criteria range or column in which criteria is present.
criteria1: This is a single value or criteria
criteria_range2: This is the second criteria range or column in which criteria is present.
criteria2: This is a second value or criteria

Date Functions:(https://www.excel-easy.com/examples/calculate-age.html)

Note: Remember that dates and times are stored as numbers in Excel. So you can perform operations such as addition/subtraction with these dates.

1] TODAY() – This function takes no argument and would return the current date value.

2] NOW() – This function takes no argument and would return the current date and time value.

3] YEAR() & MONTH() & DAY() & HOUR() & MINUTE() & SECOND() & WEEKDAY():
Above all functions are self-explanatory.

Add no of Days in a date:

1. To add a number of days to a date, use the following simple formula.

B1	▾	⋮	✕	✓	*fx*	=A1+5		
	A	B		C	D	E		
1	6/23/2016	6/28/2016						
2								

Add no of Hours or minutes to existing time:
To add a number of hours, minutes and/or seconds, use the TIME function.

B1	▾	⋮	✕	✓	*fx*	=TIME(HOUR(A1)+2,MINUTE(A1)+10,SECOND(A1)+70)					
	A	B	C	D	E	F	G	H	I		
1	6:45:17	8:56:27									
2											

DATEDIF()
This function we can use to calculate the difference between the dates.
Ex- DATEDIF(date1,date2,'y') last argument could be year-'y',Month-'m',Days-'d'

3. The DATEDIF function below calculates the age of a person.

C2	▾	⋮	✕	✓	*fx*	=DATEDIF(A2,B2,"y")					
	A	B	C	D	E	F	G	H	I		
1	Date of Birth	Today	Age								
2	4/21/1980	10/18/2018	38								
3											

EOMONTH():
This function is used to get the last day of the month.

EX- EOMONTH(date,0) the second argument 0 - current month last day.1-next month last day , 2- two months last day.

1. The EOMONTH function below returns the last day of the month.

B1		⋮	×	✓	*fx*	=EOMONTH(A1,0)		
	A	B	C	D	E	F	G	H	I
1	6/23/2016	6/30/2016							
2									

Text Functions:
The great thing about text functions is we are not limited to using text functions only for text data but we can use text functions for numerical data, and alphanumeric data also.

Another thing is text in a cell is shown at the left alignment and the number is shown at the right alignment.

Ex- len("ram")=3 len(4567)=4 & concat("ram","Kali")=ramKali , concat(12,34)=1234, len("ram5")=4, concat(t12,34)=t1234,
We can also use LEFT, and RIGHT functions for the above examples.

1] CONCAT():
This function is used to combine text from two columns or more than two column;
Ex- CONCAT(A1,B1) - CONCAT(FirstName,LastName) = FullName
       'Ram'&'Kali' = RamKali

2] TEXTJOIN():
This is also used to combine text from two columns. This is a new function.

3] LEN() - length
This function is used to find the length of the string in the cell.
Ex- LEN(A1) - LEN("HOTEL") = 5

4]LEFT() & RIGHT():
These return the no of charter from left or right using the text and number we pass.

Text to column: This feature in the data tab is used to convert text to a new column by providing a separator.
Ex- Baliram Pinate - Baliram   Pinate

Value() & VALUETOTEXT() : These function take string and convert them to number.

Text to Number Conversion:
1] We can select the data which has text and then in formatting we can select general or number.
2] We can select the data which has text and then go to paste special by right-clicking on the data and selecting the multiply option.

Volatile functions recalculate value again and again when there is a change in the workbook. This slowdown the worksheet.
A very simple example of a volatile function is the **NOW()** function (to get the current date and time in a cell). Whenever you edit any cell in a worksheet, it gets recalculated.

Highly volatile: RAND(), NOW(), TODAY()

Almost volatile: OFFSET(), CELL(), INDIRECT(), INFO()

Pivot Tables:

A Pivot Table allows us to quickly summarize huge data sets (with a few clicks).

To give you an example, if you have 10,000 rows of sales data from four different regions, you can use a Pivot Table to instantly find what are the total sales in each region.

Different Section in Pivot Table:

Values Area: This is the area where the values are reported.
Rows Area: The headings to the left of the Values area makes the Rows area.
Columns Area: The headings at the top of the Values area makes the Columns area.
Filter Area: It is an optional filter that you can use to further drill down into the data set.

Slicers in Pivot Table:
A Pivot Table Slicer enables you to filter the data when you select one or more than one option in the Slicer box (as shown below).

Pivot Chart:

When you create a Pivot Table, you get the summary of your data. You can also plot this summary in a chart that is connected to the data.
This chart is called the Pivot Chart.
One big benefit of using a Pivot Chart is that it updates when you change the Pivot Table layout. For example, if you have the total sales by region, and you update the Pivot Table to show sales data for each product in the regions, the Pivot Chart would accordingly update.

What is the difference between Pivot Charts Vs Regular Charts?

While Pivot Charts are amazing and come with the ability to update when the Pivot Table updates, these are not as flexible as the regular charts.

In general, you can do a lot of customization in a regular Excel chart, but not in a Pivot chart. Also, if you customize a Pivot Chart, and then update the Pivot Table, you are likely to lose the customization.

Despite the limitations, Pivot Charts are useful and can help create quick views from a Pivot Table.

Note: To refresh a Pivot table, click on any cell in the Pivot Table, right-click and select Refresh.

Pivot Cache:
Pivot Cache is something that automatically gets generated when you create a Pivot Table. It is an object that holds a replica of the data source. While you can't see it, it is a part of the workbook and is connected to the Pivot Table.

When you make any changes in the Pivot Table, it does not use the data source, rather it uses the Pivot Cache. The reason a pivot cache gets generated is to optimize the pivot table functioning.

Even when you have thousands of rows of data, a pivot table is super fast in summarizing it. You can drag and drop items in the rows/columns/values/filters boxes and it will instantly update the results. Pivot Cache enables this fast functioning of a pivot table.

Can you make a Pivot Table from multiple tables?
Yes, you can create one Pivot Table from multiple different tables. However, there needs to be a connection in these tables.
For example, if you have two tables, one that has a date, Product ID, and sale value, and another which has Product ID and Product Name, then you can combine these as the common column in Product ID.
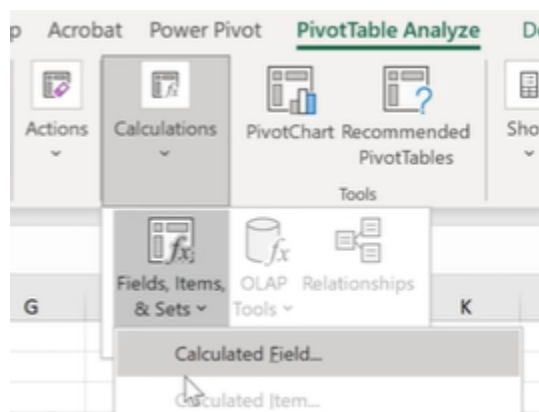Once you have connected these tables, you can create a Pivot table from them.

Calculated Fields in Pivot tables:
A calculated field allows you to add a column to the Pivot Table data where you can use the existing columns to do some calculations.

Suppose we have Pivot Table that summarizes the sales and profit values for the retailers.
Now, what if you also want to know what was the profit margin of these retailers (where the profit margin is 'Profit' divided by 'Sales').

We have a couple of options:

We can go back to the original data set and add this new column. This is feasible but not the best solution as it alters the original data set and increases the file size.

We can do this calculation outside of the Pivot Table. This is alright if your Pivot Table is static, but if you update the table or change the layout, you'll need to do the calculations again.

We can add a calculated field.

Consider Calculated Field as a virtual column that you have added using the existing columns from the Pivot Table.

There are a lot of benefits of using a Pivot Table Calculated Field:

It doesn't require you to handle formulas or update source data.

It's scalable as it will automatically account for any new data that you may add to your Pivot Table. Once you add a Calculate Field, you can use it like any other field in your Pivot Table.

It is easy to update and manage. For example, if the metrics change or you need to change the calculation, you can easily do that from the Pivot Table itself.

Additional Things:

1] Show value as:

Using this option we can convert out number values into %.
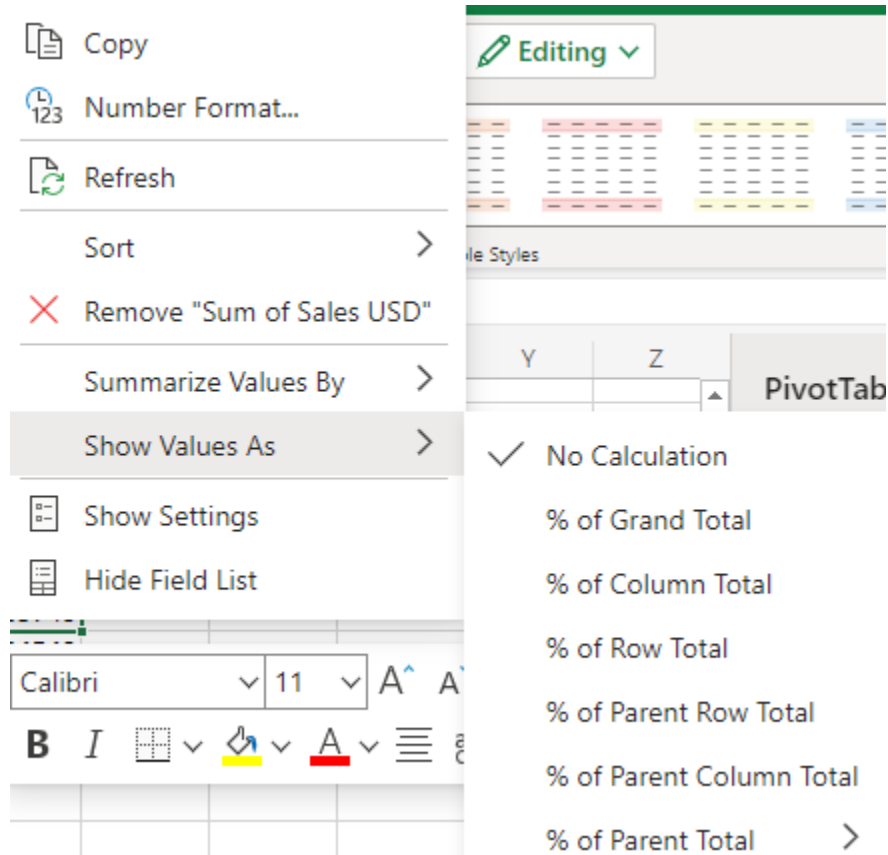
Ex- We have sales data for two divisions now if we want to see how sales data is distributed among these regions then I can show these sales values in the %column Total. For the below result we can either use % Grand Total or % Column total.

Region	Sum of Sales USD
America	85740
Europe	104540
Grand Total	190280

----- >

Region	Sum of Sales USD
America	45.06%
Europe	54.94%
Grand Total	100.00%

2] Grouping & Ungrouping in Pivot Tables:

These functionalities help us to group data and ungroup the data.

To group and ungroup we need right click on the pivot table and we will get a grouping dialog box from there we can choose Month, Year, Quarter, and Hours.
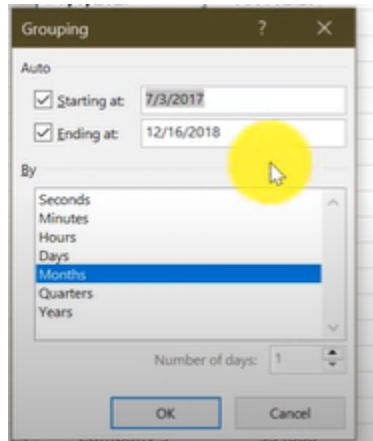
Ex- if we have sales region-wise and we also have a date column in the data. Now if you want to see the sales Monthly, and quarterly we can use group. If we want to see sales by date then use ungrouping. By default, it will show by groups only.