EXCEL FORMULAS

Excel Formulas and Functions

There are plenty of Excel formulas and functions depending on what kind of operation you want to perform on the dataset. We will look into the formulas and functions on mathematical operations, character-text functions, data and time, sumif-countif, and few lookup functions.

Let's now look at the top 25 Excel formulas you must know. In this article, we have categorized 25 Excel formulas based on their operations. Let's start with the first Excel formula on our list.

1. SUM

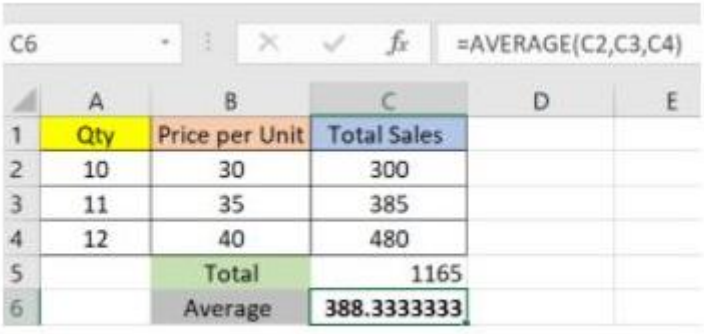
The SUM() function, as the name suggests, gives the total of the selected range of cell values. It performs the mathematical operation which is addition. Here's an example of it below :

	A	B	C	D
1	Qty	Price per Unit	Total Sales	
2	10	30	300	
3	11	35	385	
4	12	40	480	
5		Total	1165	

As you can see above, to find the total amount of sales for every unit, we had to simply type in the function "=SUM(C2:C4)". This automatically adds up 300, 385, and 480. The result is stored in C5.

2. AVERAGE

The AVERAGE() function focuses on calculating the average of the selected range of cell values. As seen from the below example, to find the avg of the total sales, you have to simply type in "AVERAGE(C2, C3, C4)".



	A	B	C	D	E
1	Qty	Price per Unit	Total Sales		
2	10	30	300		
3	11	35	385		
4	12	40	480		
5		Total	1165		
6		Average	388.3333333		

3. COUNT

The function COUNT() counts the total number of cells in a range that contains a number. It does not include the cell, which is blank, and the ones that hold data in any other format apart from numeric.

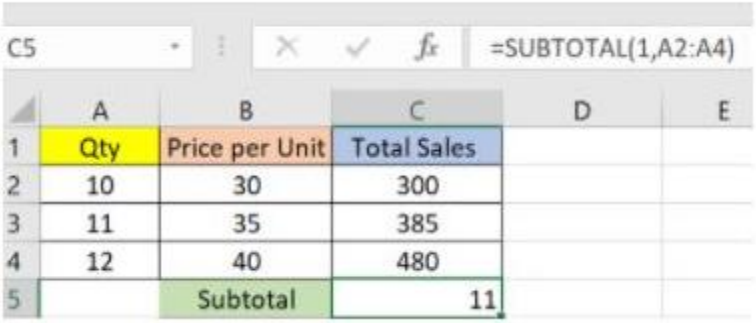
	A	B	C	D
1	Qty	Price per Unit	Total Sales	
2	10	30	300	
3	11	35	385	
4	12	40	480	
5		Count	3	

As seen above, here, we are counting from C1 to C4, ideally four cells. But since the COUNT function takes only the cells with numerical values into consideration, the answer is 3 as the cell containing "Total Sales" is omitted here.

If you are required to count all the cells with numerical values, text, and any other data format, you must use the function 'COUNTA()'. However, COUNTA() does not count any blank cells.
To count the number of blank cells present in a range of cells, COUNTBLANK() is used.

4. SUBTOTAL

Moving ahead, let's now understand how the subtotal function works. The SUBTOTAL() function returns the subtotal in a database. Depending on what you want, you can select either average, count, sum, min, max, min, and others. Let's have a look at two such examples.



	A	B	C	D	E
1	Qty	Price per Unit	Total Sales		
2	10	30	300		
3	11	35	385		
4	12	40	480		
5		Subtotal	11		

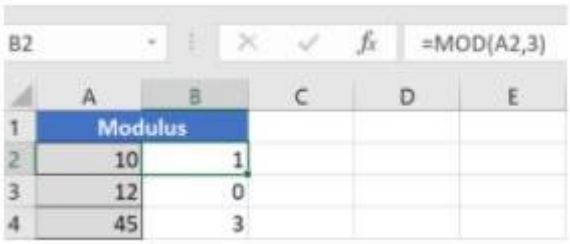
In the example above, we have performed the subtotal calculation on cells ranging from A2 to A4. As you can see, the function used is "=SUBTOTAL(1, A2: A4), in the subtotal list "1" refers to average. Hence, the above function will give the average of A2: A4 and the answer to it is 11, which is stored in C5.

Similarly, "=SUBTOTAL(4, A2: A4)" selects the cell with the maximum value from A2 to A4, which is 12. Incorporating "4" in the function provides the maximum result.

5. MODULUS

The MOD() function works on returning the remainder when a particular number is divided by a divisor. Let's now have a look at the examples below for better understanding.

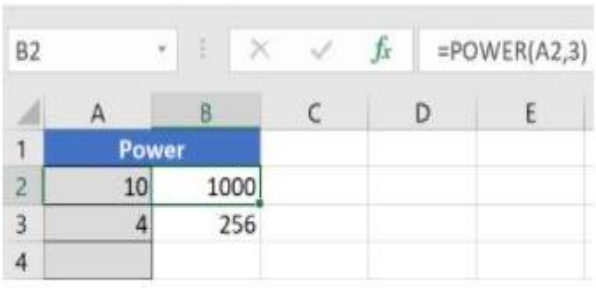
In the first example, we have divided 10 by 3. The remainder is calculated using the function "=MOD(A2,3)". The result is stored in B2. We can also directly type "=MOD(10,3)" as it will give the same answer.



	A	B	C	D	E
1	Modulus				
2	10	1			
3	12	0			
4	45	3			

6. POWER

The function "Power()" returns the result of a number raised to a certain power. Let's have a look at the examples shown below:



	A	B	C	D	E
1	Power				
2	10	1000			
3	4	256			
4					

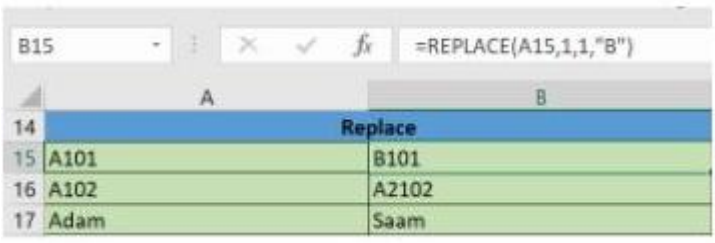
7. CEILING

Next, we have the ceiling function. The CEILING() function rounds a number up to its nearest multiple of significance.

8. REPLACE

As the name suggests, the REPLACE() function works on replacing the part of a text string with a different text string.

The syntax is "=REPLACE(old_text, start_num, num_chars, new_text)". Here, start_num refers to the index position you want to start replacing the characters with. Next, num_chars indicate the number of characters you want to replace.



	A	B
14	Replace	
15	A101	B101
16	A102	A2102
17	Adam	Saam

Let's have a look at the ways we can use this function.
Here, we are replacing A101 with B101 by typing "=REPLACE(A15,1,1,"B")".

Logical functions

Note: Version markers indicate the version of Excel a function was introduced. These functions aren't available in earlier versions. For example, a version marker of 2013 indicates that this function is available in Excel 2013 and all later versions.

Function	Description
AND function	Returns TRUE if all of its arguments are TRUE
FALSE function	Returns the logical value FALSE
IF function	Specifies a logical test to perform
IFERROR function	Returns a value you specify if a formula evaluates to an error; otherwise, returns the result of the formula
IFNA function	Returns the value you specify if the expression resolves to #N/A, otherwise returns the result of the expression
IFS function	Checks whether one or more conditions are met and returns a value that corresponds to the first TRUE condition.
NOT function	Reverses the logic of its argument
OR function	Returns TRUE if any argument is TRUE
SWITCH function	Evaluates an expression against a list of values and returns the result corresponding to the first matching value. If there is no match, an optional default value may be returned.
TRUE function	Returns the logical value TRUE
XOR function	Returns a logical exclusive OR of all arguments

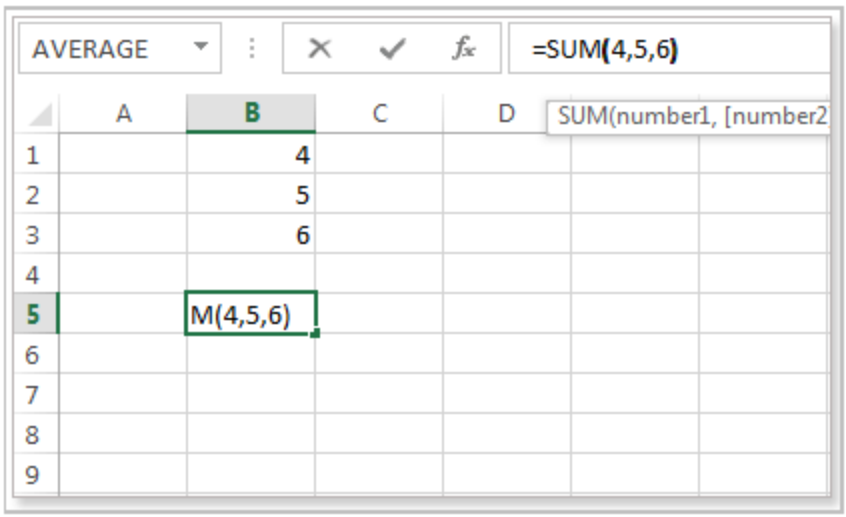
Math Formulas in Excel

A very important feature in Excel is the formula. It is used to calculate values based on what is in cells, perform operations on a cell content, fetch values after an operation based on your search criteria and much more.
Mathematical Formulas in Excel are used to perform various arithmetic operations like sum, average, count, max, min etc. Here is a list of most frequently used mathematical formulas in excel.

SUM():

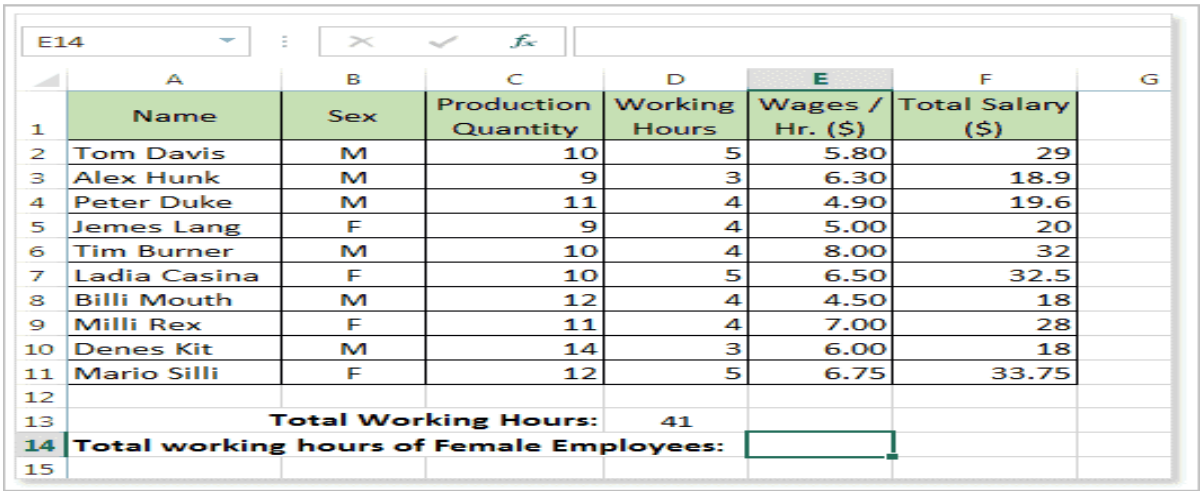
This function is used to adds all the values within a cell range

Example: sum(4,5,6)=15



SUMIF():

Here in the example below, we will create a basic function to calculate the sum of working hours generates in a day only for female employees.



E14

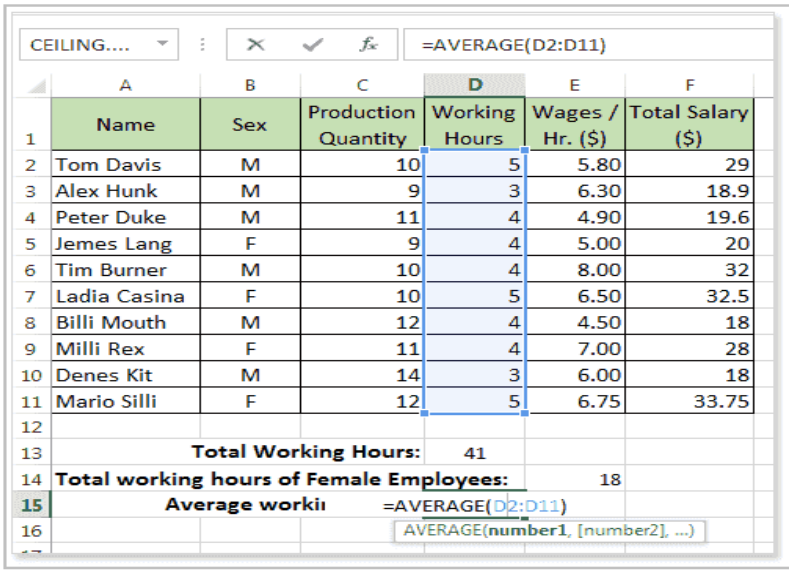
	A	B	C	D	E	F	G
1	Name	Sex	Production Quantity	Working Hours	Wages / Hr. ($)	Total Salary ($)	
2	Tom Davis	M	10	5	5.80	29	
3	Alex Hunk	M	9	3	6.30	18.9	
4	Peter Duke	M	11	4	4.90	19.6	
5	Jemes Lang	F	9	4	5.00	20	
6	Tim Burner	M	10	4	8.00	32	
7	Ladia Casina	F	10	5	6.50	32.5	
8	Billi Mouth	M	12	4	4.50	18	
9	Milli Rex	F	11	4	7.00	28	
10	Denes Kit	M	14	3	6.00	18	
11	Mario Silli	F	12	5	6.75	33.75	
12							
13			Total Working Hours:	41			
14	Total working hours of Female Employees:						
15							

AVERAGE():

Here in the example below, we will create a basic function to calculate the average working hours of each employee.

Press Enter key and see the result.

You can use the AVERAGEIF() and AVERAGEIFS() function in a similar way as SUMIF() function, to average cells based on one or multiple criteria.

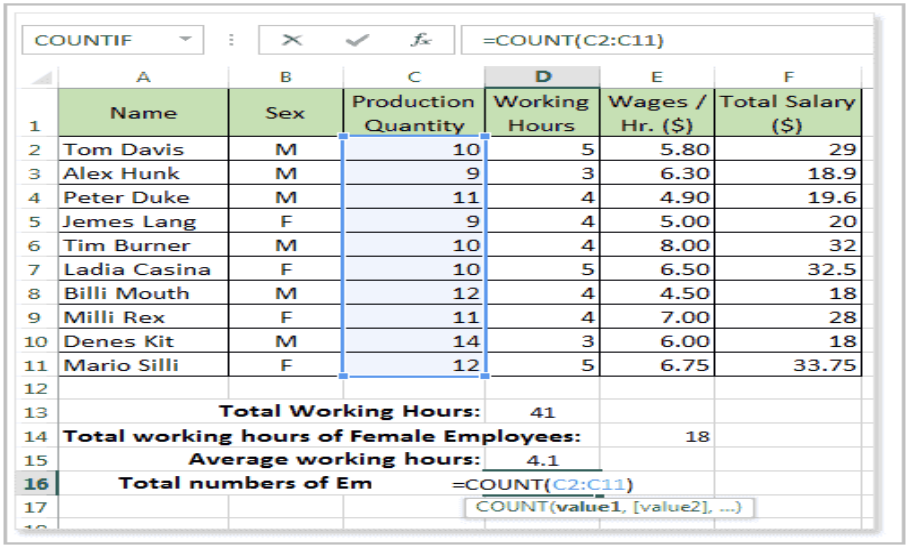


CEILING.... =AVERAGE(D2:D11)

	A	B	C	D	E	F
1	Name	Sex	Production Quantity	Working Hours	Wages / Hr. ($)	Total Salary ($)
2	Tom Davis	M	10	5	5.80	29
3	Alex Hunk	M	9	3	6.30	18.9
4	Peter Duke	M	11	4	4.90	19.6
5	Jemes Lang	F	9	4	5.00	20
6	Tim Burner	M	10	4	8.00	32
7	Ladia Casina	F	10	5	6.50	32.5
8	Billi Mouth	M	12	4	4.50	18
9	Milli Rex	F	11	4	7.00	28
10	Denes Kit	M	14	3	6.00	18
11	Mario Silli	F	12	5	6.75	33.75
12						
13			Total Working Hours:	41		
14	Total working hours of Female Employees:				18	
15	Average worki			=AVERAGE(D2:D11)		
16				AVERAGE(number1, [number2], ...)		

COUNT()

Here in the example below, we will create a basic function to calculate the number of employees.

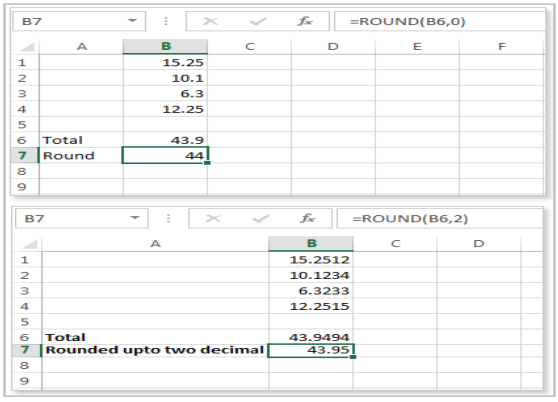


COUNTIF =COUNT(C2:C11)

	A	B	C	D	E	F
1	Name	Sex	Production Quantity	Working Hours	Wages / Hr. ($)	Total Salary ($)
2	Tom Davis	M	10	5	5.80	29
3	Alex Hunk	M	9	3	6.30	18.9
4	Peter Duke	M	11	4	4.90	19.6
5	Jemes Lang	F	9	4	5.00	20
6	Tim Burner	M	10	4	8.00	32
7	Ladia Casina	F	10	5	6.50	32.5
8	Billi Mouth	M	12	4	4.50	18
9	Milli Rex	F	11	4	7.00	28
10	Denes Kit	M	14	3	6.00	18
11	Mario Silli	F	12	5	6.75	33.75
12						
13			Total Working Hours:	41		
14	Total working hours of Female Employees:				18	
15			Average working hours:	4.1		
16	Total numbers of Em			=COUNT(C2:C11)		
17				COUNT(value1, [value2], ...)		

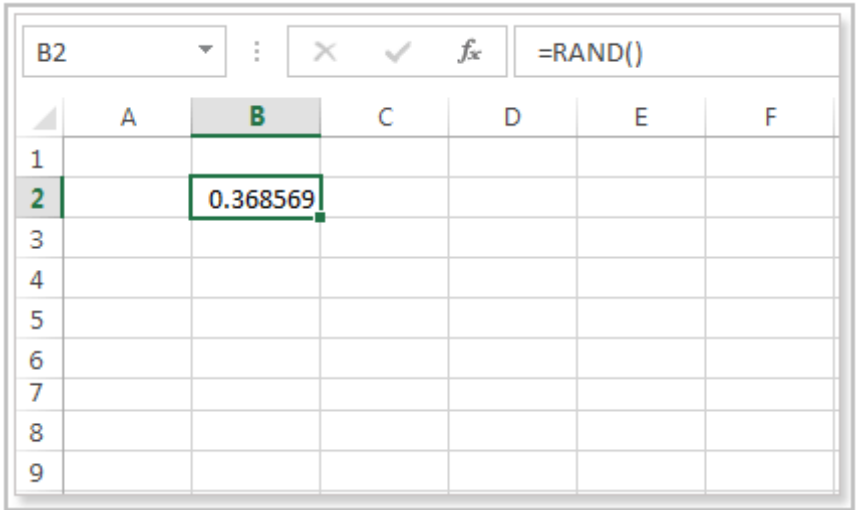
ROUND():

The round function is used to round a number to a specified number of digits.



RAND():

This function is used to returns a random number greater than or equal to 0 and less than 1.



Basic Statistical Functions in Excel

MS Excel provides an array of useful statistical functions. Let us begin with some of the basic yet extremely powerful functions. Honestly, you'll find that you're using the basic statistical functions 90% of the time and the rest 10% of your time is taken by intermediate and advanced functions.

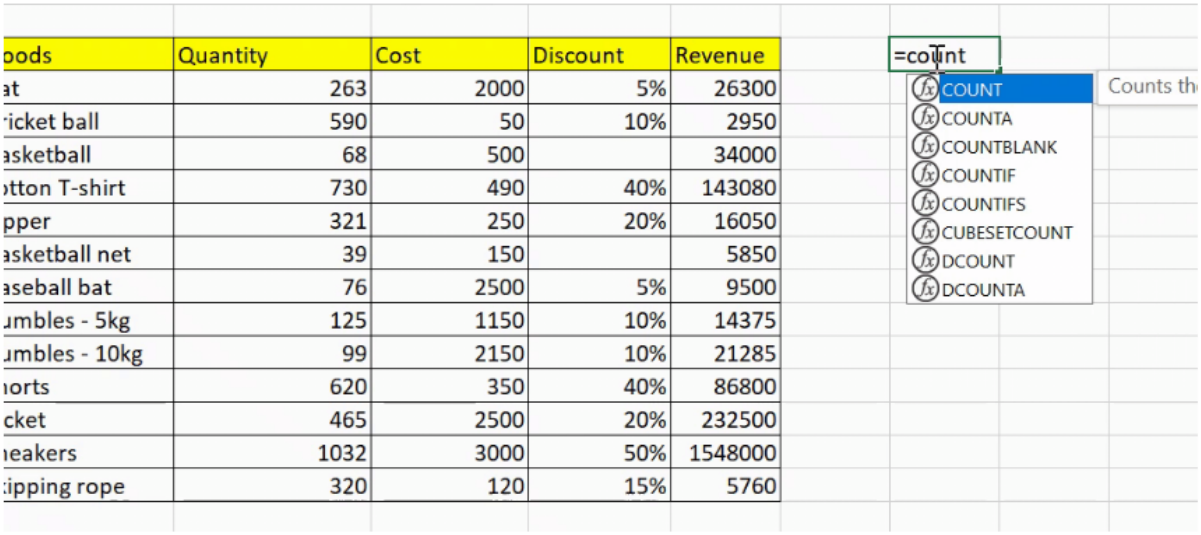
We will be talking majorly about the different kinds of count functions here. These are very similar to other functions such as sum, max, min, average.

1. Count Function

We use the count function when we need to count the number of cells containing a number. Remember **ONLY NUMBERS**! Let's see the function:

COUNT(value1, [value2], …)

So, let's try to find the answer to our first question – How many items were on discount?



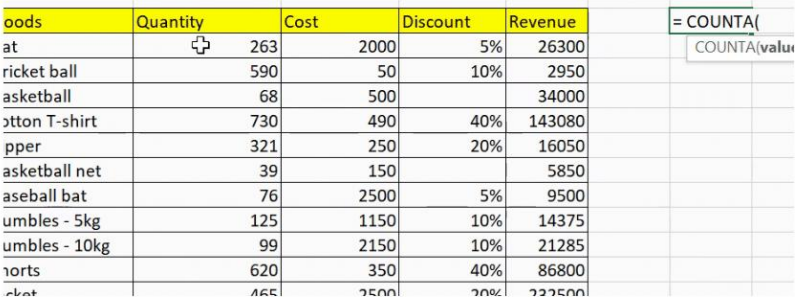
oods	Quantity	Cost	Discount	Revenue
at	263	2000	5%	26300
icket ball	590	50	10%	2950
asketball	68	500		34000
otton T-shirt	730	490	40%	143080
pper	321	250	20%	16050
asketball net	39	150		5850
aseball bat	76	2500	5%	9500
umbles - 5kg	125	1150	10%	14375
umbles - 10kg	99	2150	10%	21285
orts	620	350	40%	86800
cket	465	2500	20%	232500
eakers	1032	3000	50%	1548000
ipping rope	320	120	15%	5760

2. Counta Function

While the count function only counts the numeric values, the COUNTA function counts all the cells in a range that are not empty. The function is useful for counting cells containing any type of information, including error values and empty text.

COUNTA(value1, [value2], …)

We'll answer the second question using the counta function since it is able to count all the non-empty values – How many items/pieces of equipment are sold by the store?



oods	Quantity	Cost	Discount	Revenue
at	263	2000	5%	26300
ricket ball	590	50	10%	2950
asketball	68	500		34000
otton T-shirt	730	490	40%	143080
pper	321	250	20%	16050
asketball net	39	150		5850
aseball bat	76	2500	5%	9500
umbles - 5kg	125	1150	10%	14375
umbles - 10kg	99	2150	10%	21285
orts	620	350	40%	86800

3. Countblank

The ***COUNTBLANK*** function counts the number of empty cells in a range of cells. Cells with formulas that return empty text are also counted here but cells with zero values are not counted. This is a great function for summarizing empty cells while analyzing any data.

COUNTBLANK(range)

Summarizing empty cells is the requirement for our third question – What products are not in the discount section? Let's apply the function!

4. Countifs Function

Countifs are one of the most used statistical functions in Excel. The COUNTIFS function applies one or more conditions to the cells in the given range and returns only those cells that fulfill all of the conditions.

COUNTIFS(criteria_range1, criteria1, [criteria_range2, criteria2]…)

Note: Every new range must have the same number of rows and columns as the ***criteria_range1*** *argument. The ranges do not have to be adjacent to each other.*This function seems perfect to answer the fourth question – Are there any products sold having cost more than 2000 along with a discount rate greater than 50%?

oods	Quantity	Cost	Discount	Revenue
t	263	2000	5%	26300
icket ball	590	50	10%	2950
sketball	68	500		34000
tton T-shirt	730	490	40%	143080
pper	321	250	20%	16050
sketball net	39	150		5850
seball bat	76	2500	5%	9500
mbles - 5kg	125	1150	10%	14375
mbles - 10kg	99	2150	10%	21285
orts	620	350	40%	86800
cket	465	2500	20%	232500
eakers	1032	3000	50%	1548000
pping rope	320	120	15%	5760

=COUNTIFS(D4:D16,">2000", E4:E16,">20%")

COUNTIFS(criteria_range1, criteria1, [criteria_range

Text Formulas in Excel

Formula

=Text(Value, format_text)

Where: Value is the numerical value that we need to convert to text

Format_text is the format we want to apply

When is the Excel TEXT Function required?

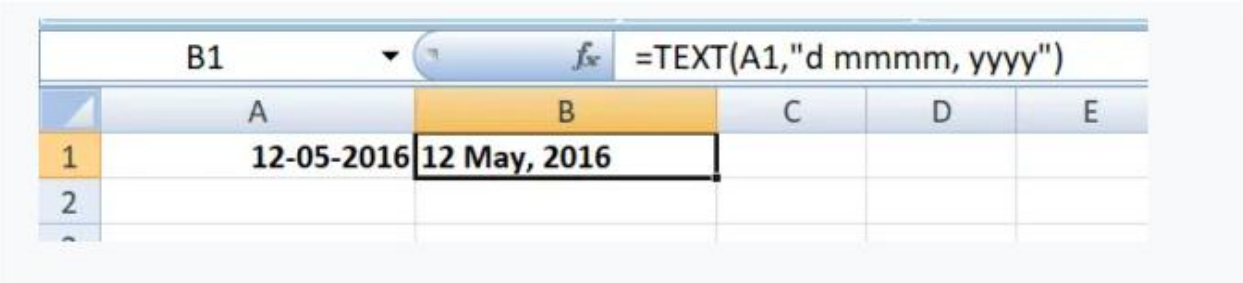
We use the TEXT function in the following circumstances:

- When we want to display dates in a specified format
- When we wish to display numbers in a specified format or in a more legible way
- When we wish to combine numbers with text or characters

Examples

1. Basic example – Excel Text Function

With the following data, I need to convert the data to "d mmmm, yyyy" format. When we insert the text function, the result would look as follows:



2. Using Excel TEXT with other functions

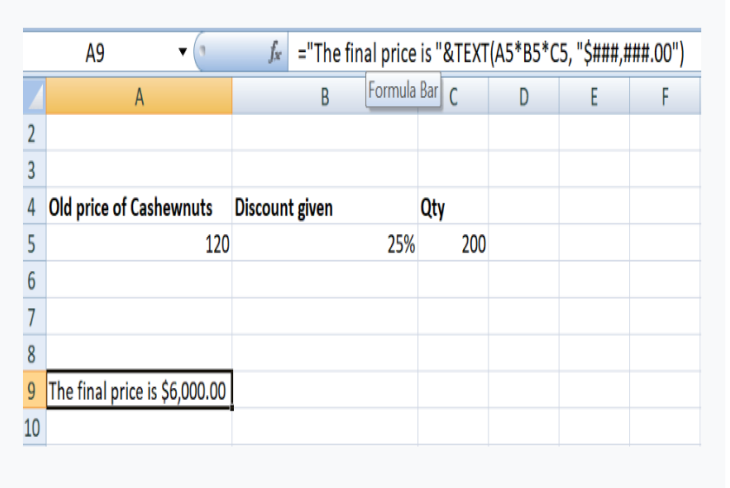
We use the old price and the discount given in cells A5 and B5. The quantity is given in C5. We wish to show some text along with the calculations. We wish to display the information as follows:

The final price is $xxx

Where xxx would be the price in $ terms.

For this, we can use the formula:

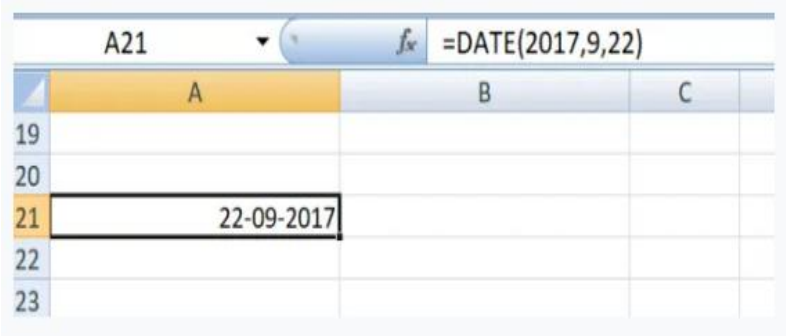
="The final price is "&TEXT(A5*B5*C5, "$###,###.00")



The other way to do it by using the CONCATENATE function as shown below:

3. Combining the text given with data using TEXT function

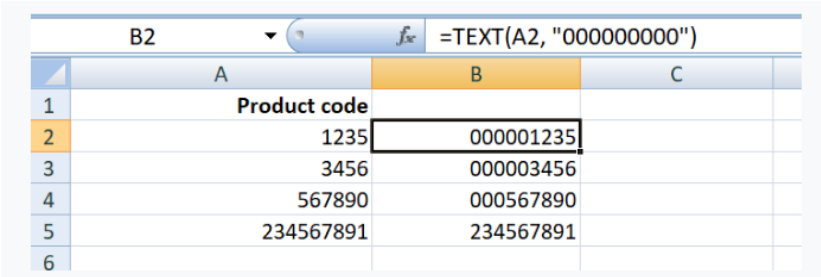
When I use the date formula, I would get the result below:



4. Adding zeros before numbers with variable lengths

We all know any zero's added before numbers are automatically removed by Excel. However, if we need to keep those zeros then the TEXT function comes handy. Let's see an example to understand how to use this function.

We are given a 9-digit product code, but Excel removed the zeros before it. We can use TEXT as shown below and convert the product code into a 9-digit number:

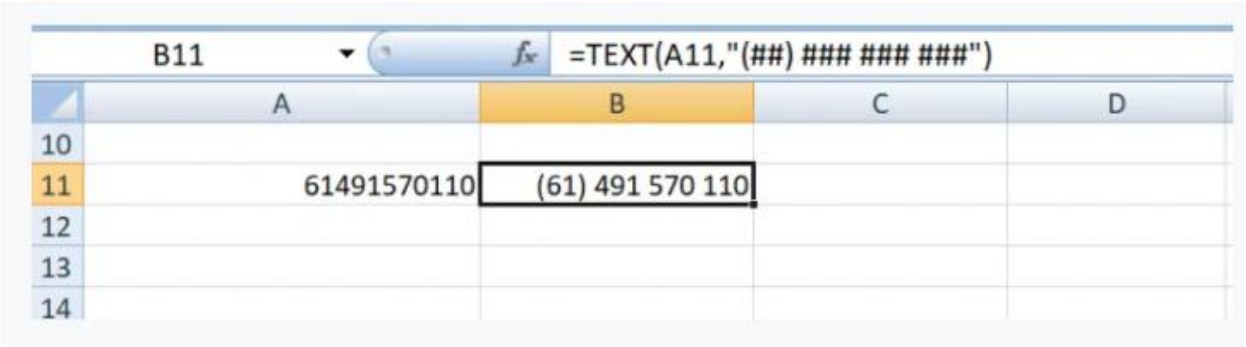


In the above formula, we are given the format code containing 9-digit zeros, where the number of zeros is equal to the number of digits we wish to display.

5. Converting telephone numbers to a specific format

If we wish to do the same for telephone numbers, it would involve the use of dashes and parentheses in format codes.

Here, I want to ensure the country code comes in brackets (). Hence the formula used is (##) ### ### ###. The # is the number of digits we wish to use.



Create Named Ranges in Excel

Here are three ways to create Named Ranges in Excel:

Method #1 – Using Define Name

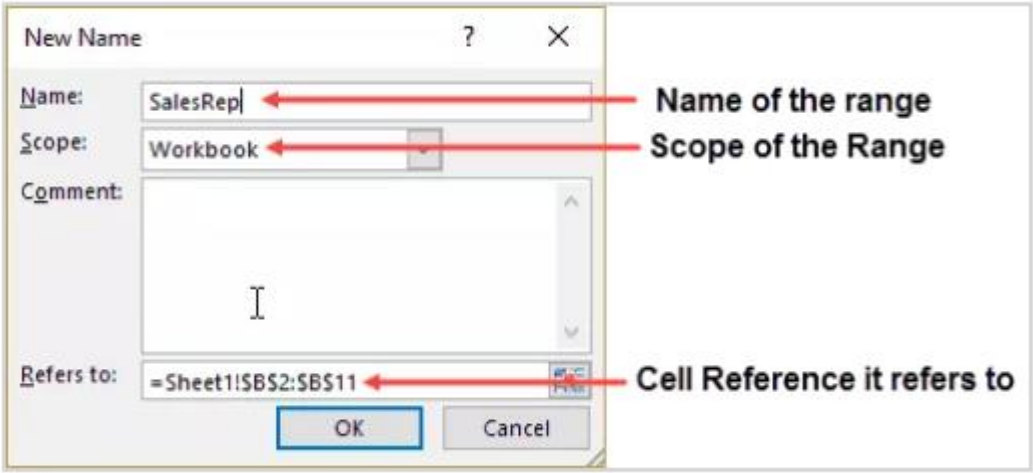
Here are the steps to create Named Ranges in Excel using Define Name:

Select the range for which you want to create a Named Range in Excel

	A	B	C
1	Date	Sales Rep	Sales
2	16/05/2018	Joe	899
3	29/12/2017	Tom	735
4	14/08/2017	Kim	572
5	21/02/2018	Marie	663
6	27/03/2018	Josh	638
7	07/09/2017	Martha	550
8	09/08/2017	Jessica	593
9	22/05/2018	Alvin	857
10	16/05/2018	Brad	684
11	11/06/2017	Mike	566

- Go to Formulas –> Define Name

- In the New Name dialogue box, type the Name you wish to assign to the selected data range. You can specify the scope as the entire workbook or a specific worksheet, If you select a particular sheet, the name would not be available on other sheets.



Method #2: Using the Name Box

- Select the range for which you want to create a name (do not select headers).
- Go to the Name Box on the left of Formula bar and Type the name of the with which you want to create the Named Range.

- Note that the Name created here will be available for the entire Workbook. If you wish to restrict it to a worksheet, use Method 1.

Method #3: Using Create From Selection Option

This is the recommended way when you have data in tabular form, and you want to create named range for each column/row.

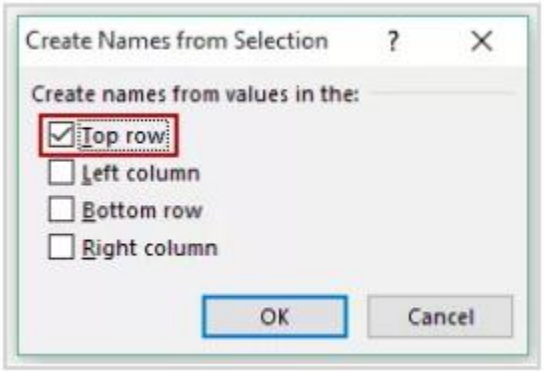
For example, in the dataset below, if you want to quickly create three named ranges (Date, Sales_Rep, and Sales), then you can use the method shown below.

	A	B	C
1	**Date**	**Sales Rep**	**Sales**
2	16/05/2018	Joe	899
3	29/12/2017	Tom	735
4	14/08/2017	Kim	572
5	21/02/2018	Marie	663
6	27/03/2018	Josh	638
7	07/09/2017	Martha	550
8	09/08/2017	Jessica	593
9	22/05/2018	Alvin	857
10	16/05/2018	Brad	684
11	11/06/2017	Mike	566

Here are the steps to quickly create named ranges from a dataset:

- Select the entire data set (including the headers).
- Go to Formulas –> Create from Selection (*Keyboard shortcut – Control + Shift + F3*). It will open the 'Create Names from Selection' dialogue box.

- In the Create Names from Selection dialogue box, check the options where you have the headers. In this case, we select top row only as the header is in the top row. If you have headers in both top row and left column, you can choose both. Similarly, if your data is arranged when the headers are in the left column only, then you only check the Left Column option.



Data Sorting and Filtering in Excel

There are many options for sorting data.
You can sort data on common attributes, such as:

- text (A to Z, or Z to A)
- numbers (low to high, or high to low)
- dates and times (newest to oldest, or oldest to newest)
- format (e.g. cell colour).

As well as sorting by individual properties, you can sort data over multiple columns or rows. For example, the following table is initially sorted by ID.

To sort data in Excel:

1. Select a cell in the column you want to sort.
2. In the **Data** tab, go to the **Sort & Filter** group. Then you have two options.
3. To sort values in ascending or descending order based on Excel's interpretation of the column, click the **Sort A to Z** or **Sort Z to A** icons.
4. For more sorting options, click the **Sort** button. You can then specify the **Column**, what to **Sort On**, and **Order**. With the **Add Level** option, you can perform a secondary level of sorting if needed.

Microsoft Support has further instructions and examples of sorting in Excel.

Filtering data in Excel

You can use filters to temporarily hide some of the data in a table, so you can focus on the data you want to see. When filtering, you can specify exact matches or comparisons ('more than', 'less than') or data that doesn't match specific criteria. The following comparison operators are available in Excel. You can compare two values by using the following operators. When you use these operators to compare two values, the result is a logical value—it's either TRUE or FALSE.

Comparison operator	Meaning	Example	Result (A1=1, B1=2)
=	Equal to	A1=B1	FALSE
>	Greater than	A1>B1	FALSE
<	Less than	A1<B1	TRUE
>=	Greater than or equal to	A1>=B1	FALSE
<=	Less than or equal to	A1<=B1	TRUE
<>	Not equal to	A1<>B1	TRUE

To create a filter in Excel:

1. Select the data you want to work with.
2. Select **Data > Filter** from the ribbon menu.
3. At the top of your selection, select the column header arrow (grey box with downwards arrow).
4. Select **Text Filters** or **Number Filters**, and then select a comparison, such as

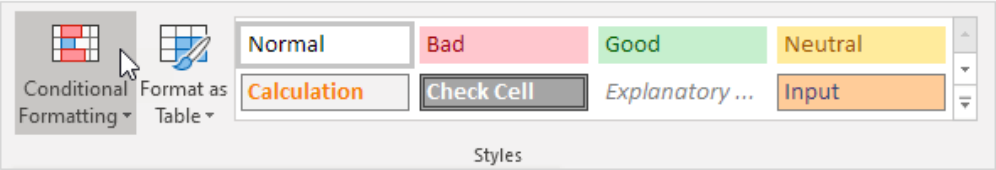
Conditional Formatting with Formulas

Take your Excel skills to the next level and use a formula to determine which cells to format. Formulas that apply conditional formatting must evaluate to TRUE or FALSE.

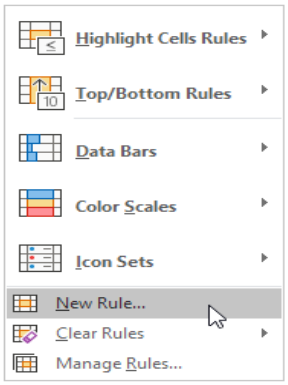
1. Select the range A1:E5.

	A	B	C	D	E	F
1	90	77	33	20	96	
2	59	66	20	61	44	
3	94	99	97	41	52	
4	36	43	70	13	54	
5	15	6	28	28	15	
6						

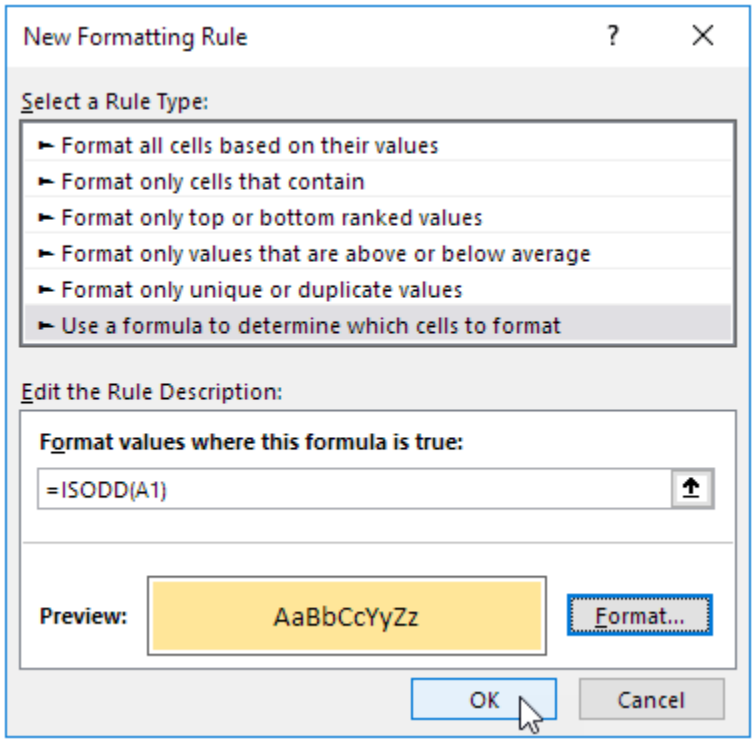
2. On the Home tab, in the Styles group, click Conditional Formatting.



3. Click New Rule.



4. Select 'Use a formula to determine which cells to format'.
5. Enter the formula =ISODD(A1)
6. Select a formatting style and click OK



Result. Excel highlights all odd numbers.

	A	B	C	D	E	F
1	90	77	33	20	96	
2	59	66	20	61	44	
3	94	99	97	41	52	
4	36	43	70	13	54	
5	15	6	28	28	15	
6						

Explanation: always write the formula for the upper-left cell in the selected range. Excel automatically copies the formula to the other cells. Thus, cell A2 contains the formula =ISODD(A2), cell A3 contains the formula =ISODD(A3), etc.

Here's another example.

7. Select the range A2:D7.

	A	B	C	D	E
1	**Last Name**	**Sales**	**Country**	**Quarter**	
2	Smith	$16,753.00	UK	Qtr 3	
3	Johnson	$14,808.00	USA	Qtr 4	
4	Williams	$10,644.00	UK	Qtr 2	
5	Jones	$1,390.00	USA	Qtr 3	
6	Brown	$4,865.00	USA	Qtr 4	
7	Williams	$12,438.00	UK	Qtr 1	
8					

8. Repeat steps 2-4 above.
9. Enter the formula =$C2="USA"
10. Select a formatting style and click OK.