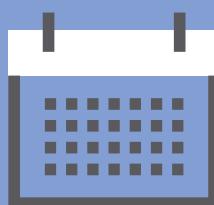
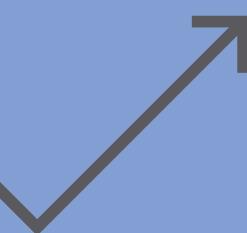
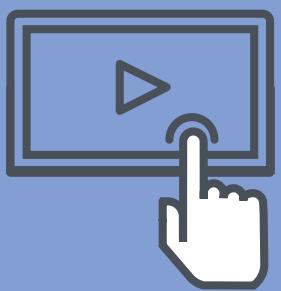


EXCELJET



101 EXCEL FUNCTIONS

You Should Know



PDF GUIDE





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101 Excel Functions

Excel has over 480 built-in functions, and more are still being added. That is a huge number of functions to think about, even for advanced users. Thankfully, you don't need to learn all of these functions to be productive in Excel. If you have a basic understanding of about a hundred key functions, you'll be far ahead of the average user.

This document contains a brief overview of about 100 important Excel functions you should know, with links to detailed examples. It is based on a more complete list of Excel functions [here](#).

Excel Function List

Excel functions by category. Optional arguments in white. Click any function for a detailed description with formula examples. Also see [500 Formulas](#) and [101 Functions](#).

Search for functions here		Filter	Show all
Logical			
AND Test multiple conditions with AND			
FALSE	Generate the logical value FALSE	logical	logical2 ...
IF	Test for a specific condition	logical_test	value_if_true value_if_false
IFERROR	Trap and handle errors	value	value_if_error
IFNA	Trap and handle #N/A errors	value	value_if_na
IFS	Test multiple conditions, return first true	test1 value1	test2,value2 ...
NOT	Reverse arguments or results	logical	
OR	Test multiple conditions with OR	logical1	logical2 ...
SWITCH	Match multiple values, return first match	expression	val1/result1 val2/result2 ... default
TRUE	Generate the logical value TRUE	logical	
XOR	Perform exclusive OR	logical1	logical2 ...

Excel Function List

We also have a [large list of example formulas](#) and [video training](#). If you are new to Excel formulas and how functions are used, [see this introduction](#).

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Date and Time Functions

Excel provides many functions to work with [dates](#) and [times](#).

NOW and TODAY

You can get the current date with the [TODAY function](#) and the current date and time with the [NOW Function](#). Technically, the NOW function returns the current date and time, but you can format as time only, as seen below:

```

C4 : =TODAY()
A   B   C   D   E   F   G
1
2
3
4 TODAY 15-Nov-2018
5
6 NOW 1:37 PM
7
8
  
```

TODAY() // returns current date
NOW() // returns current time

Note: these are [volatile functions](#) and will recalculate with every worksheet change. If you want a static value, use [date](#) and [time](#) shortcuts.

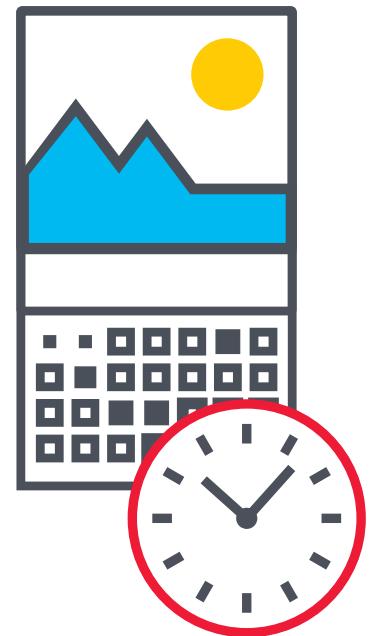
DATE SHORTCUT: This shortcut will insert the current date as a fixed value; it will not change.

Windows shortcut	Mac shortcut
Ctrl ;	^ ;

TIME SHORCUT: This shortcut will insert the current time as a fixed value; it will not change. [Note: In Mac 2016, Control Shift : stopped working to insert a time. Command ; now seems to work.]

Windows shortcut	Mac shortcut
Ctrl Shift :	⌘ ;

[More excel shortcuts.](#)



Easily add Date and Time to your Excel files using these functions

DAY, MONTH, YEAR, and DATE

You can use the [DAY](#), [MONTH](#), and [YEAR](#) functions to disassemble any date into its raw components, and the [DATE function](#) to put things back together again.

A screenshot of Microsoft Excel demonstrating the breakdown and reconstruction of dates. The spreadsheet shows four rows of dates in column A (D5:D8) and their corresponding year, month, and day values in columns B, C, and D respectively. Column E contains the formula =DATE(B5,C5,D5) which reconstructs the original date from the components.

```
=DAY("14-Nov-2018") // returns 14
=MONTH("14-Nov-2018") // returns 11
=YEAR("14-Nov-2018") // returns 2018
=DATE(2018,11,14) // returns 14-Nov-2018
```

HOUR, MINUTE, SECOND, and TIME

Excel provides a set of parallel functions for times. You can use the [HOUR](#), [MINUTE](#), and [SECOND](#) functions to extract pieces of a time, and you can assemble a [TIME](#) from individual components with the [TIME function](#).

A screenshot of Microsoft Excel demonstrating the breakdown and reconstruction of times. The spreadsheet shows four rows of times in column A (D5:D8) and their corresponding hour, minute, and second values in columns B, C, and D respectively. Column E contains the formula =TIME(B5,C5,D5) which reconstructs the original time from the components.

```
=HOUR("10:30") // returns 10
=MINUTE("10:30") // returns 30
=SECOND("10:30") // returns 0
=TIME(10,30,0) // returns 10:30
```

Did you know?

Excel dates are serial numbers that start in the year 1900.

Excel times are fractions of the number 1.

Both [dates](#) and [times](#) are numbers that can be used in math operations.





DATEDIF and YEARFRAC

You can use the [DATEDIF function](#) to get time between dates in years, months, or days. DATEDIF can also be configured to get total time in “normalized” denominations, i.e. “2 years and 5 months and 27 days”.

Time between dates		total by unit			normalized		
Date 1	Date 2	Years	Months	Days	Years	Months	Days
14-Nov-18	10-Jun-21	2	30	939	2	6	27
23-Apr-12	17-Oct-13	1	17	542	1	5	24
20-Feb-00	11-May-08	8	98	3003	8	2	21
4-Oct-95	1-Mar-12	16	196	5993	16	4	26

The DATEDIF function is a good way to calculate age from a birthday. See [this example formula](#).

Use [YEARFRAC](#) to get fractional years:

Fractional years between dates		YEARFRAC
Date 1	Date 2	
14-Nov-18	10-Jun-21	2.6
23-Apr-12	17-Oct-13	1.5
20-Feb-00	11-May-08	8.2
4-Oct-95	1-Mar-12	16.4

= YEARFRAC("14-Nov-2018","10-Jun-2021") // returns 2.57

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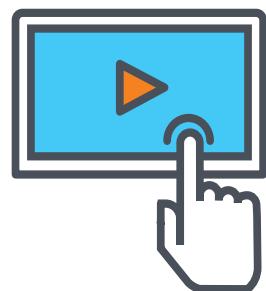


EDATE and EOMONTH

A common task with dates is to shift a date forward (or backward) by a given number of months. You can use the [EDATE](#) and [EOMONTH](#) functions for this. EDATE moves by month and retains the day. EOMONTH works the same way, but always returns the last day of the month.

Start	Months	EDATE	EOMONTH
20-Mar-2010	6	20-Sep-2010	30-Sep-2010
11-Aug-2013	-6	11-Feb-2013	28-Feb-2013
30-Nov-2015	12	30-Nov-2016	30-Nov-2016
10-Jan-2017	0	10-Jan-2017	31-Jan-2017
7-May-2018	9	7-Feb-2019	28-Feb-2019
19-Jul-2020	24	19-Jul-2022	31-Jul-2022

EDATE(date,6) // 6 months forward
EOMONTH(date,6) // 6 months forward (end of month)



VIDEO

[How to highlight expiration dates](#)



Shift dates Forward (or Backward) using EDATE



WORKDAY and NETWORKDAYS

To figure out a date n working days in the future, you can use the WORKDAY function. To calculate the number of [workdays](#) between two dates, you can use [NETWORKDAYS](#).

	A	B	C
1			
2	Get a date n workdays in future or past		
3			
4	Start	Days	
5	Mon, 6-May-2019	5	--> Mon, 13-May-2019
6	Mon, 6-May-2019	10	--> Mon, 20-May-2019
7	Sat, 1-Jun-2019	30	--> Mon, 15-Jul-2019
8	Fri, 10-May-2019	15	--> Mon, 3-Jun-2019
9	Fri, 10-May-2019	-5	--> Fri, 3-May-2019
10			
11			
12			

holidays = G5:G6

EXCELJET

```
WORKDAY(start,n,holidays) // date n workdays in future
```

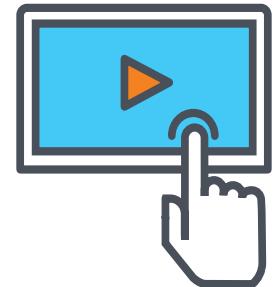
	A	B	C
1			
2	Get number of workdays between dates		
3			
4	Start	Finish	Workdays
5	Mon, 6-May-2019	Mon, 13-May-2019	--> 6
6	Mon, 6-May-2019	Mon, 20-May-2019	--> 11
7	Sat, 1-Jun-2019	Mon, 15-Jul-2019	--> 30
8	Fri, 10-May-2019	Mon, 3-Jun-2019	--> 16
9	Fri, 10-May-2019	Fri, 3-May-2019	--> -6
10			
11			
12			

holidays = E5:E6

EXCELJET

```
NETWORKDAYS(start,end,holidays) // number of workdays between dates
```

Note: Both functions automatically skip weekends (Saturday and Sunday) and will also skip holidays, if provided. If you need more flexibility on what days are considered weekends, see the [WORKDAY.INTL](#) function and [NETWORKDAYS.INTL](#) function.



VIDEO

[How to calculate due dates with WORKDAY](#)

[Practice worksheets included with online Video Training](#)





WEEKDAY and WEEKNUM

To figure out the day of week from a date, Excel provides the [WEEKDAY function](#). WEEKDAY returns a number between 1-7 that indicates Sunday, Monday, Tuesday, etc. Use the [WEEKNUM function](#) to get the week number in a given year.

```
=WEEKDAY(date) // returns a number 1-7
=WEEKNUM(date) // returns week number in year
```

See [this formula](#) to calculate sales per weekday.



MONDAY



TUESDAY



WEDNESDAY



THURSDAY



FRIDAY



SATURDAY

FORMULA

[Get the monday of the week](#)



Engineering

CONVERT

Most Engineering functions are pretty technical... you'll find a lot of functions for complex numbers in this section. However, the [CONVERT](#) function is quite useful for everyday unit conversions. You can use CONVERT to change units for distance, weight, temperature, and much more.

Input	From	To	Output
72	F	C	22.2
10	km	mi	6.2
175	lbm	kg	79.4
75	in	m	1.9
1	gal	l	3.8

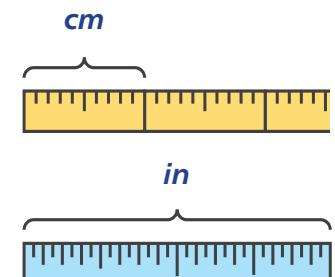
```
= CONVERT(72, "F", "C") // returns 22.2
```

See [this formula](#) to calculate the BMI of an individual where the CONVERT function is used to convert between the metric and imperial unit systems.

Using the Versatile Convert Function



1 Gallon = 3.8 Litres



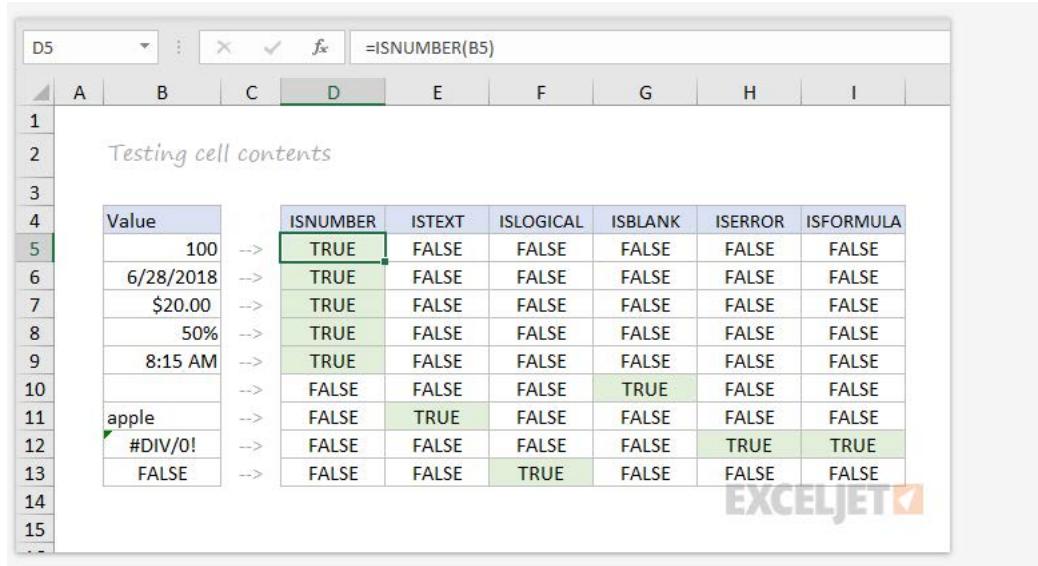
1 in = 2.54 cm



Information Functions

ISBLANK, ISERROR, ISNUMBER, and ISFORMULA

Excel provides many functions for checking the value in a cell, including [ISNUMBER](#), [ISTEXT](#), [ISLOGICAL](#), [ISBLANK](#), [ISERROR](#), and [ISFORMULA](#). These functions are sometimes called the “IS” functions, and they all return TRUE or FALSE based on a cell’s contents.



The screenshot shows a portion of an Excel spreadsheet titled "Testing cell contents". Column A contains sample values: 100, 6/28/2018, \$20.00, 50%, 8:15 AM, apple, #DIV/0!, and FALSE. Column B contains the formula =ISNUMBER(B5) applied to each row. Columns C through I show the results of other information functions: ISNUMBER, ISTEXT, ISLOGICAL, ISBLANK, ISERROR, and ISFORMULA. The results are color-coded: TRUE is green, FALSE is grey, and errors like #DIV/0! are red. Row 5 is highlighted in light blue.

	D5							
1								
2		Testing cell contents						
3								
4								
5	Value	ISNUMBER	ISTEXT	ISLOGICAL	ISBLANK	ISERROR	ISFORMULA	
6	100	--> TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	
7	6/28/2018	--> TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	
8	\$20.00	--> TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	
9	50%	--> TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	
10	8:15 AM	--> TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	
11	apple	--> FALSE	FALSE	FALSE	TRUE	FALSE	FALSE	
12	#DIV/0!	--> FALSE	TRUE	FALSE	FALSE	FALSE	FALSE	
13	FALSE	--> FALSE	FALSE	TRUE	FALSE	FALSE	FALSE	
14								
15								



True or False results using Information Functions

Excel also has [ISODD](#) and [ISEVEN](#) functions will test a number to see if it's even or odd.

By the way, the green fill in the screenshot above is applied automatically with a [conditional formatting](#) formula.

Logical Functions

Excel's logical functions are a key building block of many advanced formulas. Logical functions return the boolean values TRUE or FALSE. If you need a primer on logical formulas, [this video goes through many examples](#).

AND, OR and NOT

The core of Excel's logical functions are the [AND function](#), the [OR function](#), and the [NOT function](#). In the screen below, each of these function is used to run a simple test on the values in column B:

	A	B	C	D	E	F	G	H
1				=AND(B5>3,B5<9)				
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								

Testing with AND, OR, and NOT

Value	AND	OR	NOT
2	FALSE	FALSE	TRUE
4	TRUE	FALSE	TRUE
3	FALSE	TRUE	TRUE
2	FALSE	FALSE	FALSE
7	TRUE	FALSE	TRUE
9	FALSE	TRUE	TRUE

= AND(B5 > 3, B5 < 9)
= OR(B5 = 3, B5 = 9)
= NOT(B5 = 2)

IF and IFS functions

The [IF function](#) is one of the most used functions in Excel. In the screen below, IF checks test scores and assigns "pass" or "fail":

	A	B	C	D	E	F	G	H	I
1				=IF(C5>=70,"Pass","Fail")					
2									
3									
4									
5									
6									
7									
8									
9									
10									

IF function to assign Pass or Fail

Name	Score	Result
Anderson	92	Pass
Bautista	85	Pass
Block	65	Fail
Burrows	79	Pass
Chandler	69	Fail
Colby	95	Pass

Passing score: 70

The logical functions above can be combined with the IF function to create more complex logical tests. Alternatively, multiple IF functions [can be nested together](#) to return more than two values as a result.

Is it Green?

	TRUE	FALSE

VIDEO

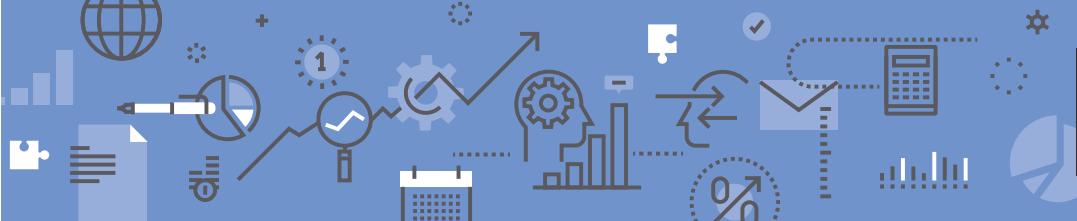
[How to build logical formulas](#)

GUIDE

[50 examples of formula criteria](#)

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1.1



New in Excel 2019 and Office 365, the [IFS function](#) can run multiple logical tests without [nesting IFs](#).

Assigning grades with the IFS function

Name	Score	Grade
Hannah	81.8	B
Edward	82.8	B
Miranda	91.3	A
William	76	C
Joanna	71.2	C
Collin	80.6	B
Mallory	85	B
Oscar	79.2	C

Score	Grade
0	F
60	D
70	C
80	B
90	A

= IFS(C5 < 60, "F", C5 < 70, "D", C5 < 80, "C", C5 < 90, "B", C5 >= 90, "A")

IFERROR and IFNA

The [IFERROR function](#) and [IFNA function](#) can be used as a simple way to trap and handle errors. In the screen below, [VLOOKUP](#) is used to retrieve cost from a menu item. Column F contains just a [VLOOKUP function](#), with no error handling. Column G shows how to use IFNA with VLOOKUP to display a custom message when an unrecognized item is entered.

Trapping VLOOKUP errors with IFNA

Item	Cost
Pizza	\$3.25
Hot Dog	\$1.75
Chicken	\$3.50
Sushi	\$5.00
Hamburger	\$3.25

Item	Cost	IFNA
Pizza	\$3.25	\$3.25
Sushi	\$5.00	\$5.00
Ice cream	#N/A	Not found

menu = B5:C9

= VLOOKUP(E5,menu,2,0) // no error trapping
= IFNA(VLOOKUP(E5,menu,2,0),"Not found") // catch errors

Whereas IFNA only catches an #N/A error, the [IFERROR function](#) will catch any formula error.

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Lookup and Reference Functions

VLOOKUP and HLOOKUP

Excel offers a number of functions to lookup and retrieve data. Most famous of all is [VLOOKUP](#):

A screenshot of Microsoft Excel demonstrating a vertical lookup. The formula `=VLOOKUP(C5,F5:G7,2,TRUE)` is entered in cell D5. The data range is \$F\$5:\$G\$7, which contains two columns: Sales and Commission. The lookup value is C5, which contains 'Ferris'. The result is 3%, located in cell G5. The formula bar at the top shows the full formula. The text 'Basic lookup with VLOOKUP' is displayed above the table.

More: [23 things to know about VLOOKUP](#).

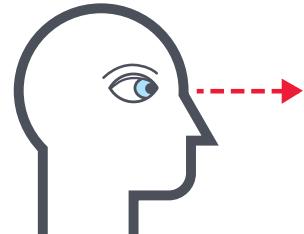
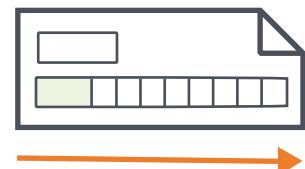
[HLOOKUP](#) works like [VLOOKUP](#), but expects data arranged horizontally:

A screenshot of Microsoft Excel demonstrating a horizontal lookup. The formula `=HLOOKUP(C5,G4:I5,2,TRUE)` is entered in cell D5. The data range is \$G\$4:\$I\$5, which contains three columns: Sales, \$50,000, \$75,000, \$100,000; Commission, 3%, 4%, 5%. The lookup value is C5, which contains 'Ferris'. The result is 3%, located in cell I5. The formula bar at the top shows the full formula. The text 'Horizontal lookup with HLOOKUP' is displayed above the table.

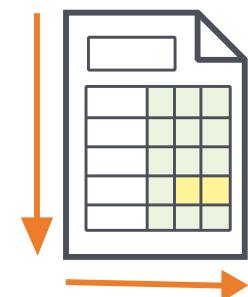
VLOOKUP is for vertical data



HLOOKUP is for horizontal data



VLOOKUP only looks to the Right





INDEX and MATCH

For more complicated lookups, [INDEX](#) and [MATCH](#) offers more flexibility and power:

```
= INDEX(C5:E12, MATCH(H4, B5:B12, 0), MATCH(H5, C4:E4, 0))
```

Both the [INDEX function](#) and the [MATCH function](#) are powerhouse functions that turn up in all kinds of formulas.

LOOKUP

The [LOOKUP function](#) has default behaviors that make it useful when solving certain problems. LOOKUP assumes values are sorted in ascending order and always performs an approximate match. When LOOKUP can't find a match, it will match the next smallest value. In the example below we are using LOOKUP to find the last entry in a column:

[This page](#) explains this LOOKUP example in more depth.



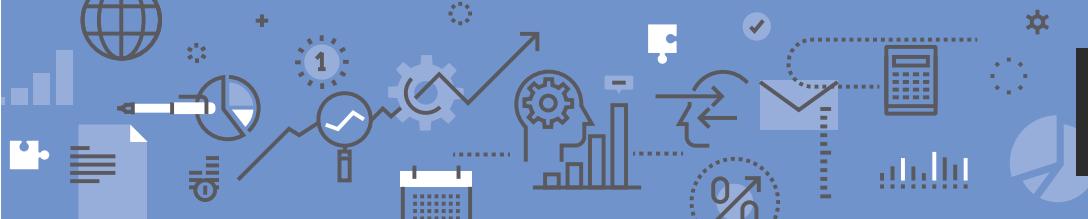
The *MATCH* function is designed to find the position of an item in a range.



ARTICLE

[How to use INDEX and MATCH](#)





ROW and COLUMN

You can use the [ROW function](#) and [COLUMN function](#) to find row and column numbers on a worksheet. Notice both ROW and COLUMN return values for the current cell if no reference is supplied:

ROW	Formula
5	=ROW()
100	=ROW(Z100)
11	=ROW(D11:D16)
2	=ROW(Q2)

COLUMN	Formula
6	=COLUMN()
26	=COLUMN(Z100)
4	=COLUMN(D11:D16)
17	=COLUMN(Q2)

The row function also shows up often in advanced formulas that process data with [relative row numbers](#).

ROWS and COLUMNS

The [ROWS function](#) and [COLUMNS function](#) provide a count of rows in a reference. In the screen below, we are counting rows and columns in an [Excel Table](#) named “Table1”.

Planet	Diameter (km)	Satellites
Mercury	4,879	0
Venus	12,104	0
Earth	12,756	1
Mars	6,792	2
Jupiter	142,984	67
Saturn	120,536	200
Uranus	51,118	27
Neptune	49,528	13
Pluto	2,306	5

Note ROWS returns a count of data rows in a table, excluding the header row. By the way, here are [23 things to know about Excel Tables](#).

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HYPERLINK

You can use the [HYPERLINK function](#) to construct a link with a formula. Note HYPERLINK lets you build both external links and internal links:

Name	Target	Hyperlink
Exceljet	https://exceljet.net	Exceljet
Google	https://www.google.com	Google
Sheet2	#Sheet2!A1	Sheet2
worksheet	worksheet.xlsx	worksheet

= HYPERLINK(C5,B5)

Build External and Internal Hyperlinks



GETPIVOTDATA

The [GETPIVOTDATA function](#) is useful for retrieving information from existing pivot tables.

Sales	Region	Product	East	Midwest	West	Total
Extra Dark	Region	Product	\$12,798	\$6,615	\$9,495	\$28,908
Hazelnut	Region	Product	\$35,735	\$9,829	\$16,893	\$62,456
Almond	Region	Product	\$12,864	\$1,546	\$8,099	\$22,509
Chilli Fire	Region	Product	\$8,220	\$3,790	\$3,890	\$15,900
Pistachio	Region	Product	\$2,513	\$768	\$2,604	\$5,885
Bacon	Region	Product	\$2,114	\$292	\$538	\$2,944
Total	Region	Product	\$74,244	\$22,840	\$41,519	\$138,603

= GETPIVOTDATA("Sales",\$B\$4,"Region",I6,"Product",I7)





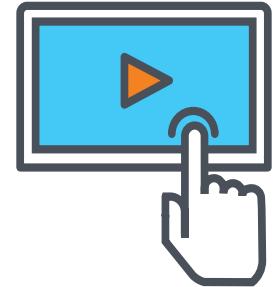
CHOOSE

The [CHOOSE function](#) is handy any time you need to make a choice based on a number:

Simple lookups with the CHOOSE function

Input	Output
1	red
2	blue
3	green

```
=CHOOSE(2,"red","blue","green") // returns "blue"
```



VIDEO

[How to use the CHOOSE function](#)

TRANSPOSE

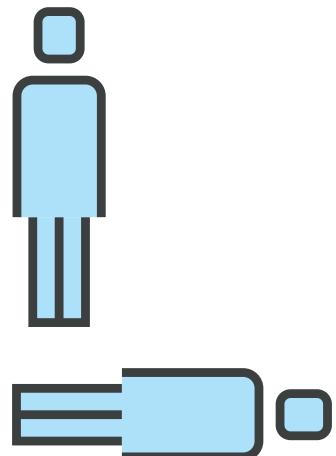
The [TRANSPOSE function](#) gives you an easy way to transpose vertical data to horizontal, and vice versa.

Vertical to horizontal with the TRANSPOSE function

Item	Cost
Pizza	\$3.25
Hot Dog	\$1.75
Chicken	\$3.50
Sushi	\$5.00
Falafel	\$3.25

Item	Pizza	Hot Dog	Chicken	Sushi	Falafel
Cost	\$3.25	\$1.75	\$3.50	\$5.00	\$3.25

```
{ =TRANSPOSE(B4:C9) }
```



Note: TRANSPOSE is a formula and is therefore dynamic. If you just need to do a one-time transpose operation, use [Paste Special](#) instead.

Transpose Vertical Data to Horizontal





OFFSET

The [OFFSET function](#) is useful for all kinds of dynamic ranges. From a starting location, it lets you specify row and column offsets, and also the final row and column size. The result is a range that can respond dynamically to changing conditions and inputs. You can feed this range to other functions, as in the screen below, where OFFSET builds a range that is fed to the SUM function:

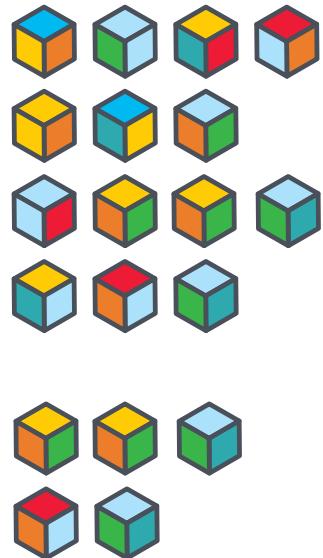
```
= SUM(OFFSET(B4,1,I4,4,1)) // sum of Q3
```

INDIRECT

The [INDIRECT function](#) allows you to build references as text. This concept is a bit tricky to understand at first, but it can be useful in many situations. Below, we are using INDIRECT to get values from cell A1 in 5 different worksheets. Each reference is dynamic. If a sheet name changes, the reference will update.

```
= INDIRECT(B5 & "!"A1") // =Sheet1!A1
```

The INDIRECT function is also used to “lock” references so they won’t change, when rows or columns are added or deleted. For more details, see linked examples at the bottom of the [INDIRECT function page](#).



The main purpose of OFFSET is to allow formulas to dynamically adjust to available data or to user input.

Caution: Both *OFFSET* and *INDIRECT* are volatile functions and can slow down large or complicated spreadsheets.





STATISTICAL Functions

COUNT and COUNTA

You can count numbers with the [COUNT function](#) and non-empty cells with [COUNTA](#). You can count blank cells with [COUNTBLANK](#), but in the screen below we are counting blank cells with [COUNTIF](#), which is more generally useful.

	COUNT	COUNTA	Empty
-->	5	5	0
-->	0	5	0
-->	5	5	0
-->	2	4	1
-->	3	3	2

```
=COUNT(B5:F5) // count numbers
=COUNTA(B5:F5) // count numbers and text
=COUNTIF(B5:F5,"") // count blanks
```



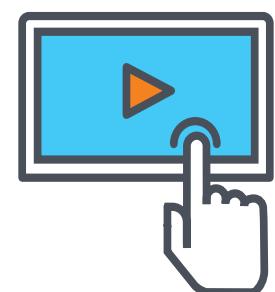
How Many?

COUNTIF and COUNTIFS

For conditional counts, the [COUNTIF function](#) can apply one criteria. The [COUNTIFS function](#) can apply multiple criteria at the same time:

	Red	> 50	Red and TX	Blue > 50
	5	2	2	1

```
=COUNTIF(C5:C12,"red") // count red
=COUNTIF(F5:F12,>50) // count total > 50
=COUNTIFS(C5:C12,"red",D5:D12,"TX") // red and tx
=COUNTIFS(C5:C12,"blue",F5:F12,>50) // blue > 50
```



VIDEO

[How to use the COUNTIF Function](#)





SUM, SUMIF, SUMIFS

To sum everything, use the [SUM function](#). To sum conditionally, use SUMIF or SUMIFS. Following the same pattern as the counting functions, the [SUMIF function](#) can apply only one criteria while the [SUMIFS function](#) can apply multiple criteria.

Date	Color	State	Qty	Total
9-Jan	Red	TX	1	\$18.00
23-Jan	Blue	CO	2	\$34.00
3-Feb	Red	NM	2	\$36.00
18-Feb	Blue	TX	1	\$17.00
2-Mar	Blue	AZ	3	\$51.00
15-Mar	Red	AZ	1	\$17.00
25-Mar	Red	TX	2	\$36.00
2-Apr	Red	CO	4	\$72.00

	Total
Total	\$281.00
Red	\$179.00
> 50	\$123.00
Red and TX	\$54.00
Blue > 50	\$51.00

EXCELJET

```
=SUM(F5:F12) // everything
=SUMIF(C5:C12,"red",F5:F12) // red only
=SUMIF(F5:F12,>50) // over 50
=SUMIFS(F5:F12,C5:C12,"red",D5:D12,"tx") // red & tx
=SUMIFS(F5:F12,C5:C12,"blue",F5:F12,>50) // blue & >50
```

AVERAGE, AVERAGEIF, and AVERAGEIFS

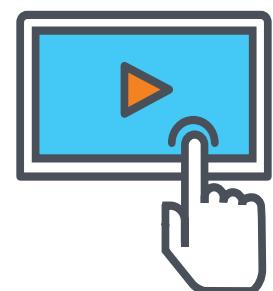
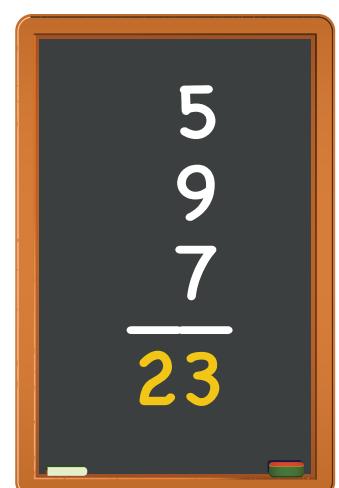
Following the same pattern, you can calculate an average with [AVERAGE](#), [AVERAGEIF](#), and [AVERAGEIFS](#).

Date	Color	State	Qty	Total
9-Jan	Red	TX	1	\$18.00
23-Jan	Blue	CO	2	\$34.00
3-Feb	Red	NM	2	\$36.00
18-Feb	Blue	TX	1	\$17.00
2-Mar	Blue	AZ	3	\$51.00
15-Mar	Red	AZ	1	\$17.00
25-Mar	Red	TX	2	\$36.00
2-Apr	Red	CO	4	\$72.00

	All
All	\$35.13
Red	\$35.80
Red and TX	\$27.00

EXCELJET

```
=AVERAGE(F5:F12) // all
=AVERAGEIF(C5:C12,"red",F5:F12) // red only
=AVERAGEIFS(F5:F12,C5:C12,"red",D5:D12,"tx") // red and tx
```



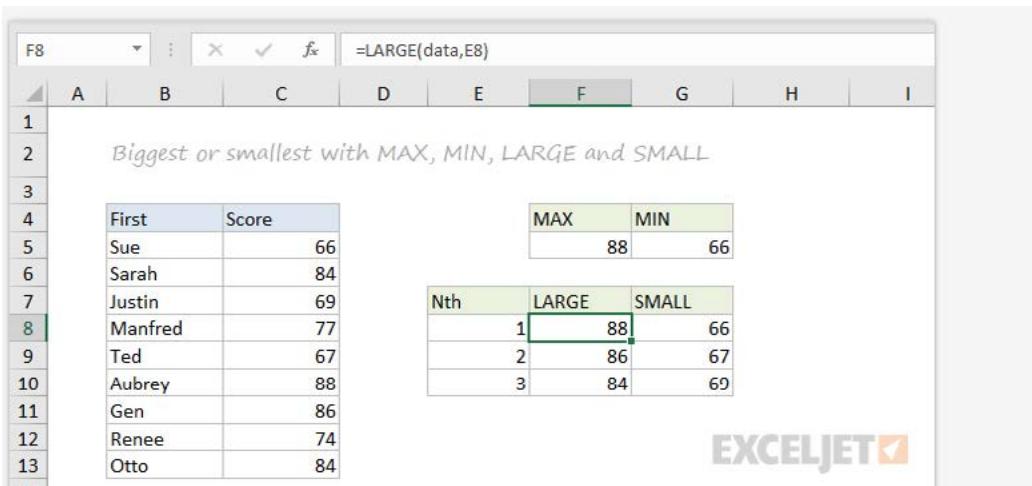
VIDEO

[How to use the SUMIF function](#)



MIN, MAX, LARGE, SMALL

You can find largest and smallest values with [MAX](#) and [MIN](#), and nth largest and smallest values with [LARGE](#) and [SMALL](#). In the screen below, “data” is the named range C5:C13, used in all formulas.



First	Score
Sue	66
Sarah	84
Justin	69
Manfred	77
Ted	67
Aubrey	88
Gen	86
Renee	74
Otto	84

	MAX	MIN
	88	66

Nth	LARGE	SMALL
1	88	66
2	86	67
3	84	69

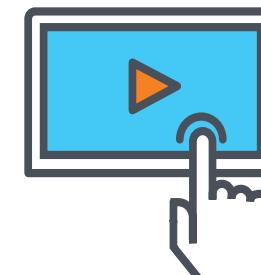
EXCELJET

```

=MAX(data) // largest
=MIN(data) // smallest
=LARGE(data,1) // 1st largest
=LARGE(data,2) // 2nd largest
=LARGE(data,3) // 3rd largest
=SMALL(data,1) // 1st smallest
=SMALL(data,2) // 2nd smallest
=SMALL(data,3) // 3rd smallest

```

Find LARGEST and SMALLEST values



VIDEO

[How to find the nth smallest or largest value](#)

101 EXCEL FUNCTIONS

21 ABN ASIA.ORG

MINIFS, MAXIFS

The [MINIFS](#) and [MAXIFS](#). These functions let you find minimum and maximum values with conditions:

Name	Gender	Score
Hannah	Female	93
Edward	Male	79
Miranda	Female	85
William	Male	64
Joanna	Female	81
Collin	Male	83
Oscar	Male	64
Arturo	Male	76
Annie	Female	72
Weston	Male	64
Cassidy	Female	83

Gender	MAXIF	MINIF
Female	93	72
Male	83	64

```
= MAXIFS(D5:D15,C5:C15,"female") // highest female
= MAXIFS(D5:D15,C5:C15,"male") // highest male
= MINIFS(D5:D15,C5:C15,"female") // lowest female
= MINIFS(D5:D15,C5:C15,"male") // lowest male
```

Note: MINIFS and MAXIFS are new in Excel via Office 365 and Excel 2019.

MODE

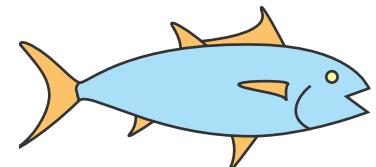
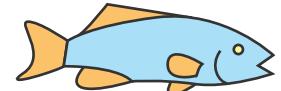
The [MODE function](#) returns the most commonly occurring number in a range:

	1	2	3	4	5	6
1	2	2	1	1	2	
5	10	15	15	10	5	
69	70	70	71	71	70	
95	115	125	115	95	115	

MODE
1
5
70
115

```
= MODE(B5:G5) // returns 1
```

Find the smallest blue fish



Most commonly occurring dog color



RANK

To rank values largest to smallest, or smallest to largest, use the [RANK function](#):

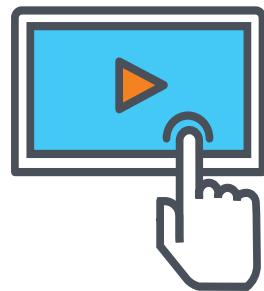
The screenshot shows an Excel spreadsheet with the following data:

City	State	Population	Rank
Houston	TX	2,100,263	4
Phoenix	AZ	1,445,632	6
New York	NY	8,175,133	1
Philadelphia	PA	1,526,006	5
Los Angeles	CA	3,792,621	2
San Antonio	TX	1,327,407	7
San Diego	CA	1,307,402	8
Chicago	IL	2,695,598	3

The formula `=RANK(D5,D5:D12)` is entered in cell E5. The cell containing the value "4" in the Rank column is highlighted with a green border.

See [this formula](#) which demonstrates how to use the RANK function to calculate race results.

Rank Largest to Smallest



Video

[How to rank values with the RANK function](#)



MATH Functions

ABS

To change negative values to positive use the [ABS function](#).

Input	Output
-134.50	\$134.50
500.00	500
5.13	5.125
-0.13	\$0.13
-43.00	\$43.00

```
= ABS( -134.50 ) // returns 134.50
```

ABS — Negative to Positive

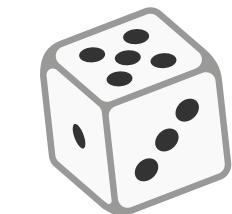
-100.00
↓
\$100.00

RAND and RANDBETWEEN

Both the [RAND function](#) and [RANDBETWEEN function](#) can generate random numbers on the fly. RAND creates long decimal numbers between zero and 1. RANDBETWEEN generates random integers between two given numbers.

RAND	RANDBETWEEN
0.351613613	58
0.301564961	22
0.683756914	4
0.673618677	66
0.749792539	27
0.770318131	58

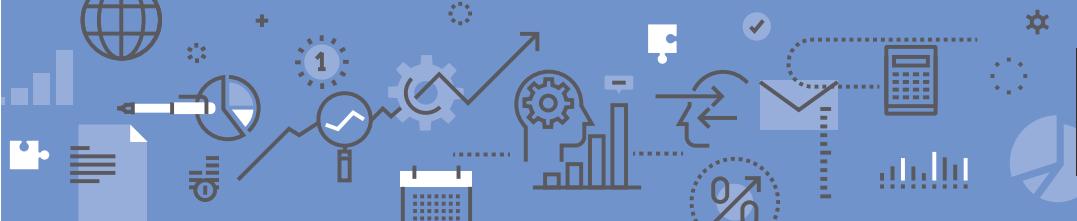
```
= RAND() // between zero and 1
= RANDBETWEEN(1,100) // between 1 and 100
```



To generate a random dice roll

RANDBETWEEN(1,6)





ROUND, ROUNDUP, ROUNDDOWN, INT

To round values up or down, use the [ROUND function](#). To force rounding up to a given number of digits, use [ROUNDUP](#). To force rounding down, use [ROUNDDOWN](#). To discard the decimal part of a number altogether, use the [INT function](#).

Basic rounding functions

Number	Digits	ROUND	ROUNDUP	ROUNDDOWN	INT
11.777	1	11.8	11.8	11.7	11
15.11	1	15.1	15.2	15.1	15
13.85	1	13.9	13.9	13.8	13
9.91	1	9.9	10	9.9	9

```
=ROUND(11.777,1) // returns 11.8
=ROUNDUP(11.777) // returns 11.8
=ROUNDDOWN(11.777,1) // returns 11.7
=INT(11.777) // returns 11
```

MROUND, CEILING, FLOOR

To round values to a the nearest multiple use the [MROUND function](#). The [FLOOR function](#) and [CEILING function](#) also round to a given multiple. FLOOR forces rounding down, and CEILING forces rounding up.

Rounding by a given multiple

Number	Multiple	MROUND	CEILING	FLOOR
11.777	0.25	11.75	12	11.75
15.49	0.25	15.5	15.5	15.25
13.85	0.25	13.75	14	13.75
10.05	0.25	10	10.25	10

```
=MROUND(13.85,.25) // returns 13.75
=CEILING(13.85,.25) // returns 14
=FLOOR(13.85,.25) // returns 13.75
```

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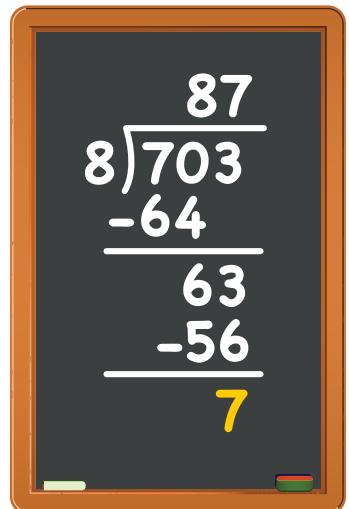
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MOD

The [MOD function](#) returns the remainder after division. This sounds boring and geeky, but MOD turns up in all kinds of formulas, especially formulas that need to do something “every nth time”. In the screen below, you can see how MOD returns zero every third number when the divisor is 3:

Number	Divisor	MOD
1	3	1
2	3	2
3	3	0
4	3	1
5	3	2
6	3	0
7	3	1
8	3	2
9	3	0



The [MOD function](#) returns the remainder

SUMPRODUCT

The [SUMPRODUCT](#) function is powerful and versatile tool when dealing with all kinds data. You can use SUMPRODUCT to easily count and sum based on criteria, and you can use it in elegant ways that just don't work with COUNTIFS and SUMIFS. In the screen below, we are using SUMPRODUCT to count and sum orders in March. See the [SUMPRODUCT page](#) for details and links to many examples.

Date	Sales
10-Jan	75
25-Jan	100
3-Feb	125
17-Feb	125
25-Feb	150
5-Mar	125
12-Mar	200
19-Mar	175

Count March	Sum March
3	500

```
=SUMPRODUCT(--(MONTH(B5:B12)=3)) // count March
=SUMPRODUCT(--(MONTH(B5:B12)=3),C5:C12) // sum March
```



Sunglasses sold in July

Sumproduct is a powerful and versatile tool that is easy to use.



SUBTOTAL

The [SUBTOTAL function](#) is an “aggregate function” that can perform a number of operations on a set of data. The key feature of SUBTOTAL is that it will ignore rows that have been “filtered out” of an [Excel Table](#), and, optionally, rows that have been manually hidden. In the screen below, SUBTOTAL is used to count and sum only the 7 visible rows in the table:

Working with hidden and filtered rows with SUBTOTAL

Item	Category	Qty	Price	Total
apples	Fruit	12	\$0.15	\$1.80
pears	Fruit	6	\$0.35	\$2.10
oranges	Fruit	10	\$0.22	\$2.20
plums	Fruit	4	\$0.26	\$1.04
banannas	Fruit	6	\$0.12	\$0.72
lemons	Fruit	3	\$0.16	\$0.48
limes	Fruit	6	\$0.20	\$1.20

Visible: 7
Total: \$9.54

```
=SUBTOTAL(3,B5:B14) // returns 7
=SUBTOTAL(9,F5:F14) // returns 9.54
```

AGGREGATE

Like SUBTOTAL, the [AGGREGATE function](#) can run a number of aggregate operations on a set of data and can optionally ignore hidden rows. The key differences are that AGGREGATE can run more operations and can also ignore errors.

Operations that ignore errors and/or hidden rows

Values	MAX	MIN
98	100	75
95		
87		
95		
#N/A		
75		
90		
100		
80		

MAX: 100
MIN: 75

LARGE	SMALL
100	75
98	80
95	87

LARGE: 100
SMALL: 75

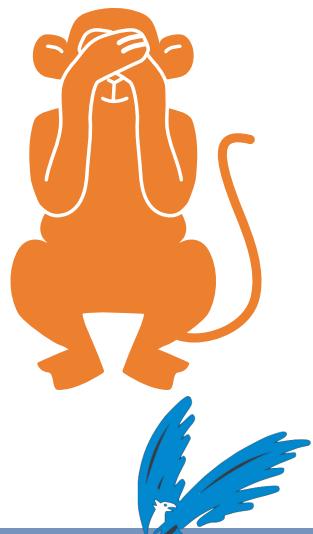
values = B5:B13

```
=AGGREGATE(4,6,values) // MAX ignore errors, returns 100
=AGGREGATE(5,6,values) // MIN ignore errors, returns 75
```

Above, AGGREGATE is used to perform MIN, MAX, LARGE and SMALL operations while ignoring errors. Normally, the error in cell B9 would prevent these functions from returning a result.

SUBTOTAL can perform 11 operations, including **SUM**, **AVERAGE**, **COUNT**, **MAX**, **MIN**, etc. (see [This Page](#) for the full list)

AGGREGATE can perform 19 operations and can also ignore errors. See [this page](#) for a full list of operations.



TEXT Functions

LEFT, RIGHT, MID

To extract characters from the left, right, or middle of text, use [LEFT](#), [RIGHT](#), and [MID](#) functions:

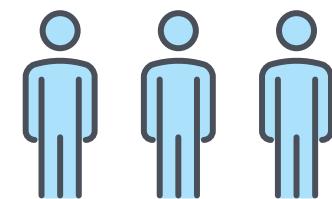
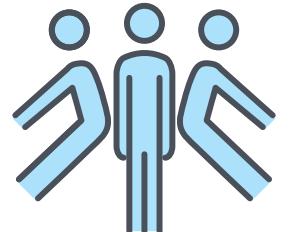
The screenshot shows a Microsoft Excel spreadsheet with data in columns A, B, C, and D. Column A contains a header 'Text' and four rows of text strings: 'ABC-1234-RED', 'BEF-6549-GRN', 'SIU-9264-BLK', and 'ZRT-6278-BLU'. Column D contains formulas: =LEFT(B5,3) for row 5, =MID(B5,5,4) for row 5, and =RIGHT(B5,3) for row 5. The results are 'ABC', '1234', and 'RED' respectively. The EXCELJET logo is visible in the bottom right corner.

```
=LEFT("ABC-1234-RED",3) // returns "ABC"
=MID("ABC-1234-RED",5,4) // returns "1234"
=RIGHT("ABC-1234-RED",3) // returns "RED"
```

LEN

The [LEN function](#) will return the length of a text string. LEN shows up in a lot of formulas that count words or [characters](#).

The screenshot shows a Microsoft Excel spreadsheet with data in columns A, B, and D. Column A contains a header 'Text' and five rows of text strings. Column D contains formulas =LEN(B5) for each row. The results are 36, 25, 32, 29, and 29 respectively. The EXCELJET logo is visible in the bottom right corner.



[Separate text into columns](#)

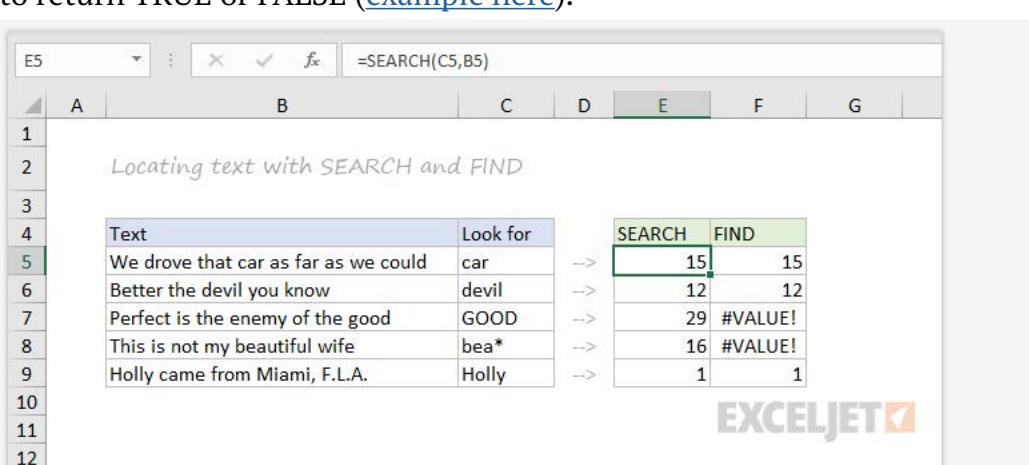
FORMULA

[Get first name from full name](#)



FIND, SEARCH

To look for specific text in a cell, use the [FIND function](#) or [SEARCH function](#). These functions return the numeric position of matching text, but SEARCH allows wildcards and FIND is case-sensitive. Both functions will throw an error when text is not found, so wrap in the [ISNUMBER function](#) to return TRUE or FALSE ([example here](#)).



Text	Look for
We drove that car as far as we could	car
Better the devil you know	devil
Perfect is the enemy of the good	GOOD
This is not my beautiful wife	bea*
Holly came from Miami, F.L.A.	Holly

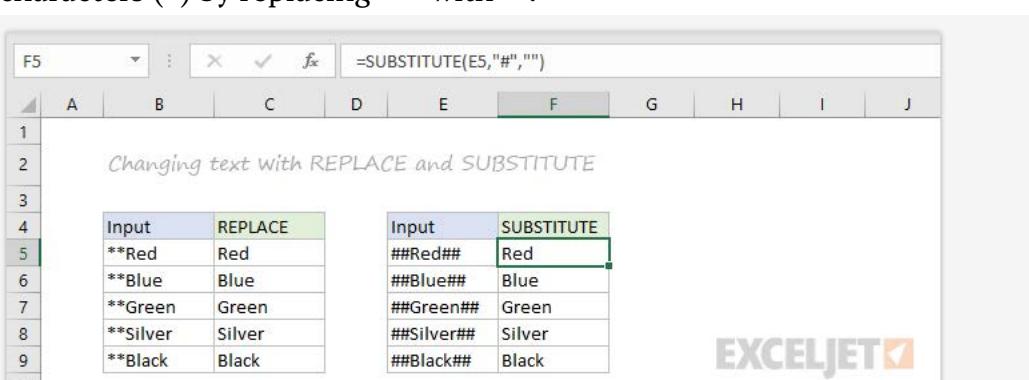
SEARCH	FIND
15	15
12	12
29	#VALUE!
16	#VALUE!
1	1

Text Functions — Find, Replace and Substitute

```
= FIND("Better the devil you know","devil") // returns 12
= SEARCH("This is not my beautiful wife","bea*") // returns 12
```

REPLACE, SUBSTITUTE

To replace text by position, use the [REPLACE function](#). To replace text by matching, use the [SUBSTITUTE function](#). In the first example, REPLACE removes the two asterisks (**) by replacing the first two characters with an empty string (""). In the second example, SUBSTITUTE removes all hash characters (#) by replacing "#" with "".



Input	REPLACE
**Red	Red
**Blue	Blue
**Green	Green
**Silver	Silver
**Black	Black

Input	SUBSTITUTE
##Red##	Red
##Blue##	Blue
##Green##	Green
##Silver##	Silver
##Black##	Black

FORMULA

[Cell contains one of many things](#)

```
= REPLACE("**Red",1,2,"") // returns "Red"
= SUBSTITUTE("##Red##","#","") // returns "Red"
```

101 EXCEL FUNCTIONS



29

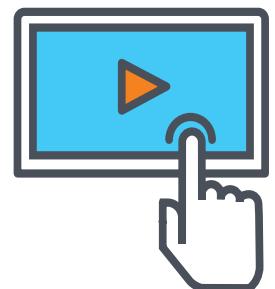


CODE, CHAR

To figure out the numeric code for a character, use the [CODE function](#). To translate the numeric code back to a character, use the [CHAR function](#). In the example below, CODE translates each character in column B to its corresponding code. In column F, CHAR translates the code back to a character.

	A	B	C	D	E	F	G	H	I
1									
2									
3									
4									
5	Input	a	CODE	97	-->	CHAR	a		
6		b	-->	98	-->		b		
7		c	-->	99	-->		c		
8		X	-->	88	-->		X		
9		Y	-->	89	-->		Y		
10		Z	-->	90	-->		Z		
11									

```
= CODE("a") // returns 97
= CHAR(97) // returns "a"
```



VIDEO

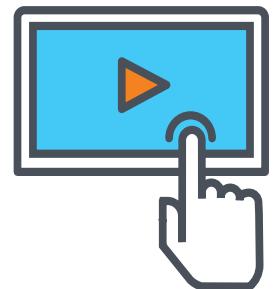
[How to use the CODE and CHAR functions](#)

TRIM, CLEAN

To get rid of extra space in text, use the [TRIM function](#). To remove line breaks and other non-printing characters, use [CLEAN](#).

	A	B	C	D	E	F	G
1							
2							
3							
4							
5	Input	Toy Story	TRIM	Toy Story	-->	CLEAN	Toy Story
6		The Lord of the Rings	-->	The Lord of the Rings	-->		The Lord of the Rings
7		The Sixth Sense	-->	The Sixth Sense	-->		The Sixth Sense
8							
9							
10							

```
= TRIM(A1) // remove extra space
= CLEAN(A1) // remove line breaks
```



VIDEO

[How to clean text with TRIM and CLEAN](#)

CONCAT, TEXTJOIN, CONCATENATE

New in Excel via Office 365 are CONCAT and TEXTJOIN. The [CONCAT function](#) lets you concatenate (join) multiple values, including a range of values without a delimiter. The [TEXTJOIN function](#) does the same thing, but allows you to specify a delimiter and can also ignore empty values.

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J	K
1											
2	Joining values with <i>CONCAT</i> and <i>TEXTJOIN</i>										
3	red	blue	green	pink		black	→	red, blue, green, pink, black			
4	8	6	7	5	3	0	9	→	8675309		
5											
6											
7											
8											
9											
10											

Below the table, the formula bar shows =TEXTJOIN(", ",TRUE,B4:H4) and =CONCAT(B7:H7). A callout box contains the code =TEXTJOIN(", ",TRUE,B4:H4) // returns "red,blue,green,pink,black" and =CONCAT(B7:H7) // returns "8675309".

Excel also provides the [CONCATENATE function](#), but it doesn't offer special features. I would't bother with it and would instead [concatenate](#) directly with the ampersand (&) character in a formula.

EXACT

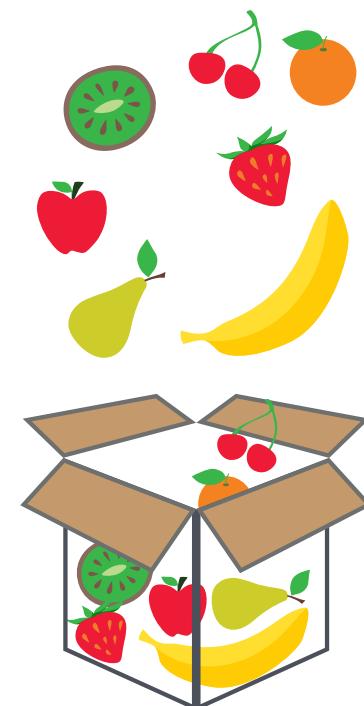
The [EXACT](#) function allows you to compare two text strings in a case-sensitive manner.

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J
1										
2	Compare text, case-sensitive, with EXACT									
3	Text 1	Text 2								
4	Apple	Apple	→	EXACT	TRUE					
5	Orange	Orange	→		TRUE					
6	Pear	PEAR	→		FALSE					
7	Kiwi	Kiwi	→		TRUE					
8	Peach	peach	→		FALSE					
9										
10										

Below the table, the formula bar shows =EXACT(B5,C5). A callout box contains the code =EXACT(B5,C5) // returns TRUE.

Join cells together





UPPER, LOWER, PROPER

To change the case of text, use the [UPPER](#), [LOWER](#), and [PROPER](#) function

Change case with UPPER, LOWER and PROPER

Name	UPPER	LOWER	PROPER
Sue BROWN	SUE BROWN	sue brown	Sue Brown
Sarah DUNCAN	SARAH DUNCAN	sarah duncan	Sarah Duncan
Justin GATT	JUSTIN GATT	justin gatt	Justin Gatt
Manfred HOLLIS	MANFRED HOLLIS	manfred hollis	Manfred Hollis
Troy JOHNSON	TROY JOHNSON	troy johnson	Troy Johnson
Aubrey SINCLAIR	AUBREY SINCLAIR	aubrey sinclair	Aubrey Sinclair
Gen TANAKA	GEN TANAKA	gen tanaka	Gen Tanaka
Renee ZWICK	RENEE ZWICK	renee zwick	Renee Zwick

```
= UPPER("Sue BROWN") // returns "SUE BROWN"
= LOWER("Sue BROWN") // returns "sue brown"
= PROPER("Sue BROWN") // returns "Sue Brown"
```

TEXT

Last but definitely not least is the [TEXT function](#). The text function lets you apply number formatting to numbers (including dates, times, etc.) as text. This is especially useful when you need to embed a formatted number in a message, like “Sale ends on [date]”.

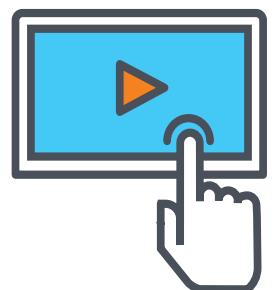
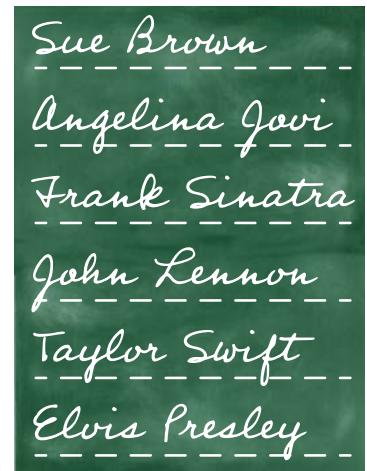
Formatting numbers as text with the TEXT function

Number	TEXT
1000	\$1,000.00
123	000123
15%	Save 15%
1-Dec-2018	Sale ends Dec. 1

```
= TEXT(B5, "$#,##0.00")
= TEXT(B6, "000000")
= "Save " & TEXT(B7, "0%")
= "Sale ends " & TEXT(B8, "mmm d")
```

More: [Detailed examples of custom number formatting](#)

Standardize a List of Names



VIDEO

[How to change case with formulas](#)





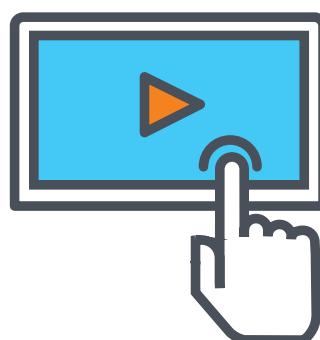
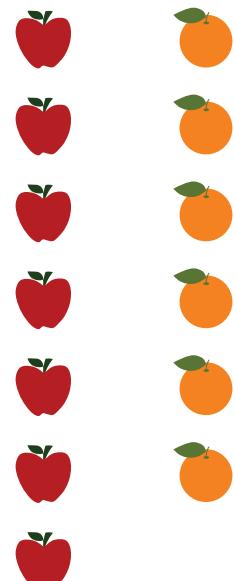
Dynamic Array Functions

[Dynamic arrays](#) are new in [Excel 365](#), and are a *major* upgrade to Excel's formula engine. As part of the dynamic array update, Excel includes new functions which directly leverage dynamic arrays to solve problems that are traditionally hard to solve with conventional formulas. If you are using Excel 365, make sure you are aware of these new functions:

FUNCTION PURPOSE

FILTER Filter data and return matching records
RANDARRAY Generate array of random numbers
SEQUENCE Generate array of sequential numbers
SORT Sort range by column
SORTBY Sort range by another range or array
UNIQUE Extract unique values from a list or range
XLOOKUP Modern replacement for VLOOKUP
XMATCH Modern replacement for the MATCH function

**FILTER and SORT
can be used in
many ways**



VIDEO

[New dynamic array functions in Excel](#)
[\(about 3 minutes\)](#).

