101 Excel Functions You Should Know
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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

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](#).
**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:

![Screenshot of Excel showing TODAY and NOW functions](image)

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.

**TIME SHORTCUT:** 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.]

More excel shortcuts.
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.

= 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.

= 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”.

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

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

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

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

**VIDEO**

*How to highlight expiration dates*
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.

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.
**WEEKDAY and WEEKNUM**

To figure out the day of week from a date, Excel provides the [WEEKDAY function](https://support.office.com/en-us/article/wEEKDAY-function-f2319e98-7fdd-4070-adbc-f9dea3e5116a). WEEKDAY returns a number between 1-7 that indicates Sunday, Monday, Tuesday, etc. Use the [WEEKNUM function](https://support.office.com/en-us/article/wEEKNUM-function-f2cdaa5e-3f7b-411a-93d6-686657d31a1e) 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](https://support.office.com/en-us/article/get-the-mondays-of-the-week-69e52f72-414f-4b1b-ac8e-1d832f0494f1) to calculate sales per weekday.
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.

Using the Versatile Convert Function

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.

\[
1 \text{ in} = 2.54 \text{ cm}
\]

\[
1 \text{ Gallon} = 3.8 \text{ Litres}
\]
**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.

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:

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”:

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

### 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.

Whereas IFNA only catches an #N/A error, the IFERROR function will catch any formula error.
Lookup and Reference Functions

VLOOKUP and HLOOKUP

Excel offers a number of functions to lookup and retrieve data. Most famous of all is **VLOOKUP**:

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

**HLOOKUP** works like **VLOOKUP**, but expects data arranged horizontally:

---

### 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:

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.
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:

![Excel Table with ROW and COLUMN function examples](image)

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”.

![Excel Table with ROWS and COLUMNS function examples](image)

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**.
**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:

```excel
=HYPERLINK(C5,B5)
```

**GETPIVOTDATA**

The **GETPIVOTDATA function** is useful for retrieving information from existing pivot tables.

```excel
=GETPIVOTDATA("Sales","BS4","Region","I6","Product","I7")
```
**CHOOSE**

The **CHOOSE function** is handy any time you need to make a choice based on a number:

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

**TRANSPOSE**

The **TRANSPOSE function** gives you an easy way to transpose vertical data to horizontal, and vice versa.

Note: TRANSPOSE is a formula and is therefore dynamic. If you just need to do a one-time transpose operation, use **Paste Special** instead.
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 be 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:

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.

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.
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.

COUNTIF and COUNTIFS
For conditional counts, the COUNTIF function can apply one criteria. The COUNTIFS function can apply multiple criteria at the same time:

- COUNT(B5:P5) // count numbers
- COUNTA(B5:P5) // count numbers and text
- COUNTIF(B5:P5,"") // count blanks

- COUNTIF(C5:C12,"red") // count red
- COUNTIFS(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
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.

```
=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**.

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

Find LARGEST and SMALLEST values

VIDEO
How to find the nth smallest or largest value
MINIFS, MAXIFS

The MINIFS and MAXIFS. These functions let you find minimum and maximum values with conditions:

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:

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

To rank values largest to smallest, or smallest to largest, use the RANK function:

See this formula which demonstrates how to use the RANK function to calculate race results.
**MATH Functions**

**ABS**
To change negative values to positive use the **ABS function**.

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

**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.

**ABS — Negative to Positive**

```
$100.00
```

**To generate a random dice roll**

**RANDBETWEEN(1,6)**

```
=RAND() // between zero and 1
=RANDBETWEEN(1,100) // between 1 and 100
```
### ROUND, ROUNDP, ROUNDDOWN, INT

To round values up or down, use the **ROUND function**. To force rounding up to a given number of digits, use **ROUNDP**. To force rounding down, use **ROUNDDOWN**. To discard the decimal part of a number altogether, use the **INT** function.

![Basic rounding functions](image)

- \( \text{ROUND}(11.777, 1) \) // returns 11.8
- \( \text{ROUNDP}(11.777) \) // returns 11.8
- \( \text{ROUNDDOWN}(11.777, 1) \) // returns 11.7
- \( \text{INT}(11.777) \) // 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](image)

- \( \text{MROUND}(13.85, .25) \) // returns 13.75
- \( \text{CEILING}(13.85, .25) \) // returns 14
- \( \text{FLOOR}(13.85, .25) \) // returns 13.75
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:

![MOD Example](image)

SUMPRODUCT

The **SUMPRODUCT function** is a powerful and versatile tool when dealing with all kinds of 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.

![SUMPRODUCT Example](image)

*The MOD function returns the remainder*

*Sunglasses sold in July*

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

```
=SUBTOTAL(3,D5: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.

```
=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:

<table>
<thead>
<tr>
<th>Text</th>
<th>LEFT</th>
<th>MID</th>
<th>RIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC-1234-RED</td>
<td>ABC</td>
<td>1234</td>
<td>RED</td>
</tr>
<tr>
<td>DEF-6549-GRN</td>
<td>DEF</td>
<td>6549</td>
<td>GRN</td>
</tr>
<tr>
<td>SIU-9264-BLK</td>
<td>SIU</td>
<td>9264</td>
<td>BLK</td>
</tr>
<tr>
<td>ZRT-6278-BLU</td>
<td>ZRT</td>
<td>6278</td>
<td>BLU</td>
</tr>
</tbody>
</table>

=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.

COUNTING CHARACTERS WITH LEN

<table>
<thead>
<tr>
<th>Text</th>
<th>LEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>We drove that car as far as we could</td>
<td>36</td>
</tr>
<tr>
<td>Better the devil you know</td>
<td>95</td>
</tr>
<tr>
<td>Perfect is the enemy of the good</td>
<td>32</td>
</tr>
<tr>
<td>This is not my beautiful wife</td>
<td>29</td>
</tr>
<tr>
<td>Holly came from Miami, F.L.A.</td>
<td>29</td>
</tr>
</tbody>
</table>
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).

= 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 "".

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

<table>
<thead>
<tr>
<th>Input</th>
<th>CODE</th>
<th>CHAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>97</td>
<td>a</td>
</tr>
<tr>
<td>b</td>
<td>98</td>
<td>b</td>
</tr>
<tr>
<td>c</td>
<td>99</td>
<td>c</td>
</tr>
<tr>
<td>X</td>
<td>88</td>
<td>X</td>
</tr>
<tr>
<td>Y</td>
<td>89</td>
<td>Y</td>
</tr>
<tr>
<td>Z</td>
<td>90</td>
<td>Z</td>
</tr>
</tbody>
</table>

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

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.

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

Excel also provides the CONCATENATE function, but it doesn’t offer special features. I wouldn’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.
**UPPER, LOWER, PROPER**

To change the case of text, use the **UPPER**, **LOWER**, and **PROPER** function.

![Example of using UPPER, LOWER, and PROPER functions](image)

**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]”.

![Example of using the TEXT function](image)

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

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FILTER</td>
<td>Filter data and return matching records</td>
</tr>
<tr>
<td>RANDARRAY</td>
<td>Generate array of random numbers</td>
</tr>
<tr>
<td>SEQUENCE</td>
<td>Generate array of sequential numbers</td>
</tr>
<tr>
<td>SORT</td>
<td>Sort range by column</td>
</tr>
<tr>
<td>SORTBY</td>
<td>Sort range by another range or array</td>
</tr>
<tr>
<td>UNIQUE</td>
<td>Extract unique values from a list or range</td>
</tr>
<tr>
<td>XLOOKUP</td>
<td>Modern replacement for VLOOKUP</td>
</tr>
<tr>
<td>XMATCH</td>
<td>Modern replacement for the MATCH function</td>
</tr>
</tbody>
</table>

**VIDEO**

*New dynamic array functions in Excel (about 3 minutes).*
More Resources

See also the full list of Excel functions and collection of Excel Formulas on our website for reference.

Excel Training

In addition to the free resources on the site, we also provide high quality video training. Our videos are quick, clean, and to the point, so you can learn Excel in less time, and easily review key topics when needed. Each video comes with its own practice worksheet. Read more...