

Excel provides many functions to work with dates and times.

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:

TODAY() // returns current date

NOW() // returns current time

- **DAY, MONTH, YEAR, and DATE**

Take dates apart and put them back together again

Date	YEAR	MONTH	DAY	DATE
14-Nov-18	2018	11	14	14-Nov-18
23-Apr-12	2012	4	23	23-Apr-12
20-Feb-00	2000	2	20	20-Feb-00
4-Oct-95	1995	10	4	4-Oct-95

=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.

Date	HOUR	MINUTE	SECOND	TIME
10:00 AM	10	0	0	10:00 AM
11:30 AM	11	30	0	11:30 AM
3:05:02	3	5	2	3:05:02
5:15 PM	17	15	0	5:15 PM

=HOUR("10:30") // returns 10

=MINUTE("10:30") // returns 30

=SECOND("10:30") // returns 0

=TIME(10,30,0) // returns 10:30

- **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 6 months and 27 days".

E5	=DATEDIF(B5,C5,"y")													
	A	B	C	D	E	F	G	H	I	J	K	L		
1														
2		Time between dates			total by unit			normalized						
3														
4		Date 1	Date 2		Years	Months	Days		Years	Months	Days			
5		14-Nov-18	10-Jun-21	-->	2	30	939		2	6	27			
6		23-Apr-12	17-Oct-13	-->	1	17	542		1	5	24			
7		20-Feb-00	11-May-08	-->	8	98	3003		8	2	21			
8		4-Oct-95	1-Mar-12	-->	16	196	5993		16	4	26			
9														
10														
11														

Use YEARFRAC to get fractional years:

E5	=YEARFRAC(B5,C5)													
	A	B	C	D	E	F	G	H						
1														
2		Fractional years between dates												
3														
4		Date 1	Date 2		YEARFRAC									
5		14-Nov-18	10-Jun-21		2.6									
6		23-Apr-12	17-Oct-13		1.5									
7		20-Feb-00	11-May-08		8.2									
8		4-Oct-95	1-Mar-12		16.4									
9														
10														
11														

=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.

E5

<

EDATE(date,6) // 6 months forward

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

- **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.

E5

✕

✓

f_x

=WORKDAY(B5,C5,holidays)

A

B

C

D

E

F

G

H

1

2

3

4

5

6

7

8

9

10

11

12

13

Get a date n workdays in future or past

Start	Days		WORKDAY
Mon, 6-May-2019	5	-->	Mon, 13-May-2019
Mon, 6-May-2019	10	-->	Mon, 20-May-2019
Sat, 1-Jun-2019	30	-->	Mon, 15-Jul-2019
Fri, 10-May-2019	15	-->	Mon, 3-Jun-2019
Fri, 10-May-2019	-5	-->	Fri, 3-May-2019

Holidays
27-May-2019
4-Jul-2019

holidays = G5:G6

holidays = G5:G6

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

E5							
	A	B	C	D	E	F	G
1							
2		<i>Get number of workdays between dates</i>					
3							
4		Start	Finish		Workdays		Holidays
5		Mon, 6-May-2019	Mon, 13-May-2019	-->	6		27-May-2019
6		Mon, 6-May-2019	Mon, 20-May-2019	-->	11		4-Jul-2019
7		Sat, 1-Jun-2019	Mon, 15-Jul-2019	-->	30		
8		Fri, 10-May-2019	Mon, 3-Jun-2019	-->	16		<i>holidays = E5:E6</i>
9		Fri, 10-May-2019	Fri, 3-May-2019	-->	-6		
10							
11							
12							

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.

- **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.

D5							
	A	B	C	D	E	F	G
1							
2		<i>Figuring out the week # and day-of-week</i>					
3							
4		Date		WEEKDAY	WEEKNUM		
5		Sun, 11-Nov-2018	-->	1	46		
6		Mon, 12-Nov-2018	-->	2	46		
7		Tue, 1-Jan-2019	-->	3	1		
8		Fri, 1-Feb-2019	-->	6	5		
9							
10							
11							

=WEEKDAY(date) // returns a number 1-7

=WEEKNUM(date) // returns week number in year

Engineering Function

- **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.

F5 ✕ ✓ f_x =CONVERT(B5,C5,D5)								
	A	B	C	D	E	F	G	H
1								
2		<i>Convert from one unit of measure to another</i>						
3								
4		Input	From	To		Output		
5		72	F	C	-->	22.2		
6		10	km	mi	-->	6.2		
7		175	lbm	kg	-->	79.4		
8		75	in	m	-->	1.9		
9		1	gal	l	-->	3.8		
10								
11								
12								
13								

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

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.

=AND(B5>3,B5<9)

=OR(B5=3,B5=9)

=NOT(B5=2)

- **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.

G5		=IFNA(VLOOKUP(E5,menu,2,0),"Not found")						
A	B	C	D	E	F	G	H	
1								
2	Trapping VLOOKUP errors with IFNA							
3								
4	Item	Cost						
5	Pizza	\$3.25	Item	Cost	IFNA			
6	Hot Dog	\$1.75	Pizza	\$3.25	\$3.25			
7	Chicken	\$3.50	Sushi	\$5.00	\$5.00			
8	Sushi	\$5.00	Ice cream	#N/A	Not found			
9	Hamburger	\$3.25	menu = B5:C9					
10								
11								
12								
13								

=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.

- **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":

D5									
	A	B	C	D	E	F	G	H	I
1									
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

Multiple IF functions can be nested together to perform more complex logical tests.

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

D5										
	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

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")

Lookup and Reference Functions

- **VLOOKUP and HLOOKUP**

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

D5								
	A	B	C	D	E	F	G	H
1								
2		<i>Basic lookup with VLOOKUP</i>						
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

Name	Sales	Commission
Ferris	\$71,900	3%
Bueller	\$93,500	4%
Chung	\$151,200	5%
Tanaka	\$124,600	5%
Irwin	\$82,500	4%
McNulty	\$60,400	3%

Sales	Commission
\$50,000	3%
\$75,000	4%
\$100,000	5%

=VLOOKUP(C5,\$F\$5:\$G\$7,2,TRUE)

HLOOKUP works like VLOOKUP, but expects data arranged horizontally:

D5									
	A	B	C	D	E	F	G	H	I
1									
2		<i>Horizontal lookup with HLOOKUP</i>							
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

Name	Sales	Commission
Ferris	\$71,900	3%
Bueller	\$93,500	4%
Chung	\$151,200	5%
Tanaka	\$124,600	5%
Irwin	\$82,500	4%
McNulty	\$60,400	3%

Sales	\$50,000	\$75,000	\$100,000
Commission	3%	4%	5%

=HLOOKUP(C5,\$G\$4:\$I\$5,2,TRUE)

- **INDEX and MATCH**

For more complicated lookups, INDEX and MATCH offers more flexibility and power:

F5								
	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

Figuring out row and column numbers

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".

G6								
	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								

ROWS and COLUMNS of a table

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

Rows	9
Columns	3

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:

D5						
	A	B	C	D	E	F
1						
2		Building links with the HYPERLINK function				
3						
4		Name	Target	Hyperlink		
5		Exceljet	https://exceljet.net	Exceljet		
6		Google	https://www.google.com	Google		
7		Sheet2	#Sheet2!A1	Sheet2		
8		worksheet	worksheet.xlsx	worksheet		
9						
10						

=HYPERLINK(C5,B5)

- **GETPIVOTDATA**

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

I8										
	A	B	C	D	E	F	G	H	I	J
1										
2		Extracting information with GETPIVOTDATA								
3										
4		Sales	Region							
5		Product	East	Midwest	West	Total				
6		Extra Dark	\$12,798	\$6,615	\$9,495	\$28,908		Region	Midwest	
7		Hazelnut	\$35,735	\$9,829	\$16,893	\$62,456		Product	Hazelnut	
8		Almond	\$12,864	\$1,546	\$8,099	\$22,509		Sales	\$9,829	
9		Chilli Fire	\$8,220	\$3,790	\$3,890	\$15,900				
10		Pistachio	\$2,513	\$768	\$2,604	\$5,885				
11		Bacon	\$2,114	\$292	\$538	\$2,944				
12		Total	\$74,244	\$22,840	\$41,519	\$138,603				
13										

=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:

C5									
	A	B	C	D	E	F	G	H	
1									
2									
3									
4									
5									
6									
7									
8									

Simple lookups with the CHOOSE function

Input	Output
1	red
2	blue
3	green

=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.

E4											
	A	B	C	D	E	F	G	H	I	J	K
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

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.

- 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:

I5										
	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4		Region	Q1	Q2	Q3	Q4		Quarter	3	
5		East	8	4	3	8		Sum	18	
6		West	8	6	10	7				
7		South	9	7	4	4				
8		North	3	10	1	7				
9										

=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.

C5										
	A	B	C	D	E	F	G	H		
1										
2										
3										
4		Sheet	Value							
5		Sheet1	100							
6		Sheet2	200							
7		Sheet3	300							
8		Sheet4	400							
9		Sheet5	500							
10										

=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.

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.

H5												
	A	B	C	D	E	F	G	H	I	J	K	
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												

Counting numbers and text with COUNT and COUNTA

	1	2	3	4	5		COUNT	COUNTA	Empty
	25	50	75	100	125	-->	5	5	0
	apple	pear	orange	peach	kiwi	-->	0	5	0
	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar	-->	5	5	0
	apple	10	peach	12		-->	2	4	1
	5%	10%	15%			-->	3	3	2

=COUNT(B5:F5) // count numbers

=COUNTA(B5:F5) // count numbers and text

=COUNTIF(B5:F5,"") // count blanks

- **COUNTIF and COUNTIFS**

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

I4												
	A	B	C	D	E	F	G	H	I	J		
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												

Conditional counting with COUNTIF and COUNTIFS

Date	Color	State	Qty	Total	
9-Jan	Red	TX	1	\$18.00	Red
23-Jan	Blue	CO	2	\$34.00	> 50
3-Feb	Red	NM	2	\$36.00	Red and TX
18-Feb	Blue	TX	1	\$17.00	Blue > 50
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	

=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

- **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.

The screenshot shows an Excel spreadsheet with the following data:

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

=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.

I5										
	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										

Averaging with AVERAGE, AVERAGEIF, and AVERAGEIFS

Date	Color	State	Qty	Total		
9-Jan	Red	TX	1	\$18.00	All	\$35.13
23-Jan	Blue	CO	2	\$34.00	Red	\$35.80
3-Feb	Red	NM	2	\$36.00	Red and TX	\$27.00
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		

=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.

F8										
	A	B	C	D	E	F	G	H	I	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										

Biggest or smallest with MAX, MIN, LARGE and SMALL

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

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

=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

- **MINIFS, MAXIFS**

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

G5 X ✓ f =MAXIFS(D5:D15,C5:C15,"female")

MINIFS and MAXIFS for min and max values with criteria

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

- **MODE**

The MODE function returns the most commonly occurring number in a range:

E5 **f_x** =RANK(D5,\$D\$5:\$D\$12)

	A	B	C	D	E	F	G	H
1								
2	<i>Assigning rank with the RANK function</i>							
3								
4	City	State	Population	Rank				
5	Houston	TX	2,100,263	4				
6	Phoenix	AZ	1,445,632	6				
7	New York	NY	8,175,133	1				
8	Philadelphia	PE	1,526,006	5				
9	Los Angeles	CA	3,792,621	2				
10	San Antonio	TX	1,327,407	7				
11	San Diego	CA	1,307,402	8				
12	Chicago	IL	2,695,598	3				
13								

C5								
	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

=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.

D5								
	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								

=RAND() // between zero and 1

=RANDBETWEEN(1,100) // between 1 and 100

- 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.

E5									
	A	B	C	D	E	F	G	H	I
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									

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 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.

E5									
	A	B	C	D	E	F	G	H	I
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									

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

- **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

- **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.

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	3
Sum March	500

=SUMPRODUCT(--(MONTH(B5:B12)=3)) // count March

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

- **SUBTOTAL**

The SUBTOTAL function is an "aggregate function" that can perform a number of operations on a set of data. All told, SUBTOTAL can perform 11 operations, including SUM, AVERAGE, COUNT, MAX, MIN, etc. (see this page for the full list). 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 also 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 (19 total) and can also ignore errors.

In the screen below, 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. See this page for a full list of operations AGGREGATE can perform.

D5				=AGGREGATE(4,6,values)				
	A	B	C	D	E	F	G	H
1								
2	Operations that ignore errors and/or hidden rows							
3								
4		Values		MAX	MIN			
5		98		100	75			
6		95						
7		87		LARGE	SMALL			
8		95		100	75			
9		#N/A		98	80			
10		75		95	87			
11		90						
12		100						
13		80						
14								

values = B5:B13

=AGGREGATE(4,6,values) // MAX ignore errors, returns 100

=AGGREGATE(5,6,values) // MIN ignore errors, returns 75

TEXT Functions

- **LEFT, RIGHT, MID**

To extract characters from the left, right, or middle of text, use LEFT, RIGHT, and MID functions:

D5

=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.

D5							
	A	B	C	D	E	F	G
1							
2		Counting characters with LEN					
3							
4		Text		LEN			
5		We drove that car as far as we could	-->	36			
6		Better the devil you know	-->	25			
7		Perfect is the enemy of the good	-->	32			
8		This is not my beautiful wife	-->	29			
9		Holly came from Miami, F.L.A.	-->	29			
10							

- **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).

E5							
	A	B	C	D	E	F	G
1							
2		Locating text with SEARCH and FIND					
3							
4		Text	Look for		SEARCH	FIND	
5		We drove that car as far as we could	car	-->	15	15	
6		Better the devil you know	devil	-->	12	12	
7		Perfect is the enemy of the good	GOOD	-->	29	#VALUE!	
8		This is not my beautiful wife	bea*	-->	16	#VALUE!	
9		Holly came from Miami, F.L.A.	Holly	-->	1	1	
10							
11							
12							

=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 "".

F5										
	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Changing text with REPLACE and SUBSTITUTE

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

=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.

D5									
	A	B	C	D	E	F	G	H	I
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									

Translate characters to codes and codes to characters

Input		CODE		CHAR
a	-->	97	-->	a
b	-->	98	-->	b
c	-->	99	-->	c
X	-->	88	-->	X
Y	-->	89	-->	Y
Z	-->	90	-->	Z

=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.

D5		: ✕ ✓ <i>fx</i>		=TRIM(B5)			
	A	B	C	D	E	F	G
1							
2	Remove extra spaces and line breaks with TRIM and CLEAN						
3							
4	Input			TRIM		CLEAN	
5	Toy Story		-->	Toy Story	-->	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

- **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.

J4		✕ ✓ <i>fx</i>		=TEXTJOIN(" ", TRUE, B4:H4)							
▲	A	B	C	D	E	F	G	H	I	J	K
1											
2	Joining values with CONCAT and TEXTJOIN										
3											
4	<div>red</div> <div>blue</div> <div>green</div> <div>pink</div> <div></div> <div></div> <div>black</div>						-->	<div>red, blue, green, pink, black</div>			
5											
6											
7	<div>8</div> <div>6</div> <div>7</div> <div>5</div> <div>3</div> <div>0</div> <div>9</div>						-->	<div>8675309</div>			
8											
9											
10											

=TEXTJOIN(" ", TRUE, B4:H4) // returns "red,blue,green,pink,black"

=CONCAT(B7:H7) // returns "8675309"

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.

Text 1	Text 2	EXACT
Apple	Apple	TRUE
Orange	Orange	TRUE
Pear	PEAR	FALSE
Kiwi	Kiwi	TRUE
Peach	peach	FALSE

- **UPPER, LOWER, PROPER**

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

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]".

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")