

Excel: Introduction to Formulas

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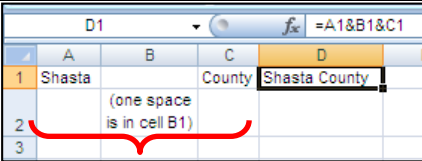
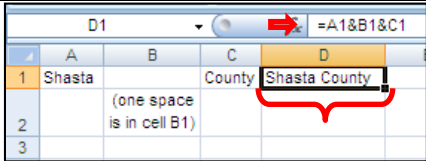
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Formulas

Arithmetic & Comparison Operators

Arithmetic & Comparison Operators			
Operator	Meaning	Example	Result
+	Addition	A1+B1	Numeric Value
-	Subtraction or Negative	A1-B1	Numeric Value
*	Multiplication	A1*B1	Numeric Value
/	Division	A1/B1	Numeric Value
=	Equal to	A1=B1	Logical Value (TRUE or FALSE)
>	Greater than	A1>B1	Logical Value (TRUE or FALSE)
<	Less than	A1<B1	Logical Value (TRUE or FALSE)
>=	Greater than or equal to	A1>=B1	Logical Value (TRUE or FALSE)
<=	Less than or equal to	A1<=B1	Logical Value (TRUE or FALSE)
<>	Not equal to	A1<>B1	Logical Value (TRUE or FALSE)

Text Concatenation Operators

Text Concatenation Operators			
Operator	Meaning	Example	Result
&	Connects, or concatenates, multiple values to produce one continuous text value	 <p>Want to combine the values in columns A-C. I added a space, via the space bar, so the words would have a space between them.</p>	 <p>The → shows what the formula in D1 looks like. You can see the value in D1 has the two words combined nicely.</p>

Operator Precedence

If you combine several operators in a single formula, Excel performs the operations in a specific order, described below. If operators within the same formula share the same precedence Excel then defaults

from left to right. The user may change the order by which calculations are performed by using parentheses.

The following is an example of why the precedence needs to be understood and why it is important:

Formula	Result	Calculation
=5+2*3	11	(2 times 3) plus 5
=(5+2)*3	21	(5 plus 2) times 3

Operator Precedence	
Operator	Meaning
* and /	Multiplication and Division
+ and -	Addition and Subtraction
&	Text Concatenation
=	Equal to
<>	Not equal to
<=	Less than or equal to
>=	Greater than or equal to

UPPER, LOWER, PROPER, and TRIM

These formulas all work with text. After using one of these functions it is good practice to *paste special\values* so that they will remain in their desired formatting.

	A	B	C
1	Shasta County	SHASTA COUNTY	=UPPER(A1)
2	Shasta County	shasta county	=LOWER(A1)
3	SHASTA COUNTY	Shasta County	=PROPER(A1)
4	Shasta County	Shasta County	=TRIM(A1)
5	<div style="display: flex; justify-content: space-around; align-items: center;"> 1 2 3 </div>		

UPPER, LOWER, PROPER, and TRIM	
Formula	Description
=UPPER	Converts all text to upper case
=LOWER	Converts all text to lower case
=PROPER	Capitalizes the first letter in a text string and any other letters in text that follow any character other than a letter, i.e. a space. Converts all other letters to lowercase
=TRIM	Removes all blank, unnecessary spaces at the start and end of a string including extra spaces, tabs, and other characters that don't print.

& (Ampersand)

The & connects, or concatenates, multiple values to produce one continuous text value. After using this function it is good practice to *paste special\values* so that they will remain in their desired formatting.

The finished product I want is to have Shasta County in one cell which I can accomplish with the & function. By combining the values in columns A and B I have accomplished my desired task, but quite literally. Note there is no space between the two words in cell C1.

	A	B	C	D
1	Shasta	County	ShastaCounty	
2				
3				
4				

By adding a column to the right of column A and pressing the space bar once, creating a single space , and modifying my formula to now include columns A – C, I now have a more readable result.

	A	B	C	D
1	Shasta		County	Shasta County
2		(one space is in cell B1)	Notice there is no space between the two words.	
3				

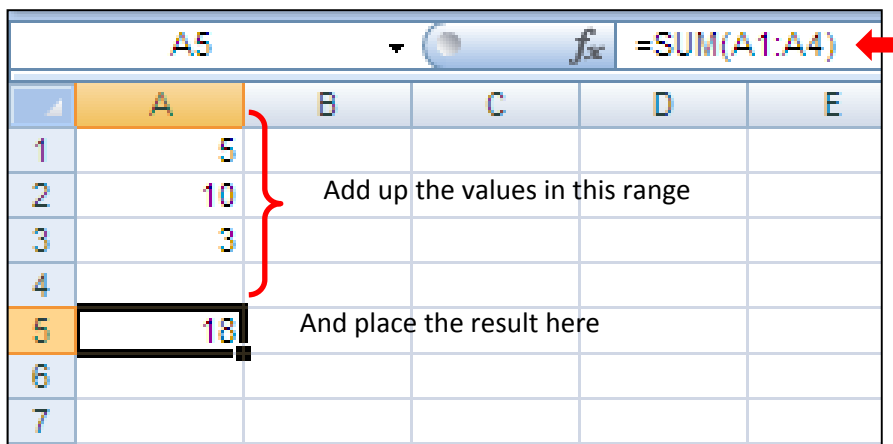
Note if your data consists of several rows you would need to copy the blank space in B1 all the way to the last row.

SUM

The SUM function is the singularly most used function within Excel. It is used to total values in your worksheets. These values may be continuous, noncontinuous, from different worksheets, etc, or a variety thereof.

The syntax is `=SUM(number1,[number2],[...])`

An example of the formula is `=SUM(A1:A4)`. The English translation is add up all of the values found in the range of between A1 and A4, inclusive, and displays the result.



	A5				
	A	B	C	D	E
1	5				
2	10				
3	3				
4					
5	18				
6					
7					

Notice that I have one extra line within my formula. I do that on all of my formulas as a best practice. If I need to add any additional rows, by doing so above the blank row, I am ensured my formula will properly be modified automatically.

There are many variations to this formula, this is just one example.

ROUND

The ROUND function rounds a number to a specified number of digits. This should not be confused with formatting to a specified decimal places.

The syntax is `=ROUND(number, num_digits)`

Expanding our previous SUM formula from above, the formula is `=ROUND(SUM(A1:A4),2)`. The English translation is add up all of the values found in the range of between A1 and A4, inclusive, round the result to two decimal places, and display the result .

It is important not to confuse rounding to a specific number of decimals and formatting your cell to a specific number of decimals. For example, if cell A5 below contains 18.44978. If we were to format the cell to two decimal places, 18.45 will be displayed. However, Excel still sees it as 18.44978 (Before picture). If I

want Excel to see, and use in subsequent calculations, 18.45 I would need to have the following rounding formula in A5: =ROUND(SUM(A1:A4),2) (After picture)

Without ROUND Formula						With ROUND Formula					
A5 fx =SUM(A1:A4)						A5 fx =ROUND(SUM(A1:A4),2)					
	A	B	C	D	E		A	B	C	D	E
1	5.00000					1	5.00000				
2	10.20000					2	10.20000				
3	3.24978					3	3.24978				
4						4					
5	18.44978					5	18.45000				
6						6					
7						7					

COUNT

The COUNT function counts the number of cells that contain numbers and counts numbers within the list of arguments.

The syntax is COUNT(value1, value2, ...)

Continuing on with our SUM formula from above, let's not only add up the values of the range A1:A4, but let's count how many numbers are included within the range, i.e. how many cells within the range has a value in it.

The formula is =COUNT(A1:A4). The English translation is count how many cells within the range has a value in it and display the result.

A7 fx =COUNT(A1:A4)					
	A	B	C	D	E
1	5.00000				
2	10.20000				
3	3.24978				
4					
5	18.45000				
6					
7	3				
8					

Notice that the range is exactly the same as our SUM, A1:A4, which includes four rows. The value returned in cell A7 is three, because only three of the four rows have values in them.

If you are trying to count text, use the COUNTA formula which counts the non-blank cells.

IF

The formula makes a statement/question, if the answer is true then one response is obtained. If the answer is false, then another answer is obtained.

The syntax is =IF(logical_test,value_if_true,value_if_false)

Continuing on with our SUM formula from above, let's add some verbiage to emphasize whether the result is greater or less than twenty.

The formula is =if(A5<20,"Amount is less than twenty","Amount is more than twenty"). The English translation is if the value found in A5 is less than twenty THEN display the comment 'Amount is less than twenty' ELSE display the comment 'Amount is more than twenty'.

	A	B	C	D	E	F	G	H	I	J
1	5.00000									
2	10.20000									
3	3.24978									
4										
5	18.45000		Amount is less than twenty							
6										
7		3								
8										

Anchoring Rows and Columns With \$ Sign

As formulas are copied either the column reference increases or the row number depending on the direction of the copy. If copying to the right through the spreadsheet, the column reference will increase; if copying down through the spreadsheet, the row references will increase.

In order to overrule the automatic increment, place a dollar sign in front of the reference that you don't want to change, the column, row, or both.

Anchoring Rows and Columns With \$ Sign			
Source Formula	Action	Destination Formula	Effect
=SUM(A1:A4)	Copy formula one cell to the right	=SUM(B1:B4)	Column references increased from A to B and A to B
=SUM(\$A1:A4)	Copy formula one cell to the right	=SUM(\$A1:B4)	Column references A stayed constant at A and increased from A to B
=SUM(A1:A4)	Copy formula one cell down	=SUM(A2:A5)	Row references increased from 1 to 2 and 4 to 5

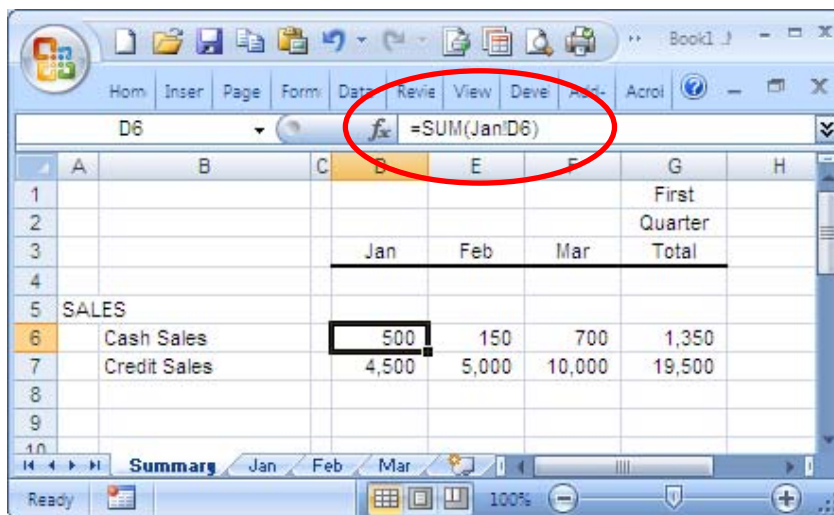
=SUM(A\$1:A4)	Copy formula one cell down	=SUM(A\$1:A5)	Row references 1 stayed constant at 1 and increased from 2 to 5
=SUM(\$A\$1:\$A\$4)	Copy formula anywhere within the spreadsheet	=SUM(\$A\$1:\$A\$4)	Neither column nor row references changed

Combining Formulas Between Multiple Worksheets

Data can be pulled from other worksheets and utilized on others. This function can be used for both numerical and text data. The formulas can combine one to many worksheets are ranges.

For Example, this is extremely handy when one worksheet acts as a summary and recaps information from the detail worksheets. Our example below recaps sales on one sheet, while the monthly detail is maintained on other sheets.

Note the worksheet names of Summary, Jan, Feb, & Mar. We are working within the Summary worksheet, denoted by the tab color. The cursor is in cell D6 which receives its information from the January worksheet.



PRACTICE SET

Using the data on the staff mileage data tab, perform the following steps:

1. Insert rows and add the header. Change the font size to 12. Make bold and italicize.
2. Bold, underline, word wrap, and center headers.
3. Sort employee data lines, skipping the budget row by employee name and date
4. Using the PROPER command clean up the employees names.
5. Using the SUM formula add totals to the adopted, revised, and actual columns.
6. Add the top and bottom border to the sums.
7. Add REMAINING BALANCE text and do a basic subtraction formula calculating the difference between the revised budget total and the actual to date.
8. Add 'NUMBER OF TRANSACTIONS TO DATE' caption. Using the COUNT formula count the number of transactions.
9. Add a new column entitled 'Remaining Balance (Revised vs Actual)'. Using basic subtraction calculate the remaining balance on a per line basis.
10. Your final product should look like this:

<i>Shasta County Office of Education</i>							
<i>Staff Mileage</i>							
<i>Vendor Name</i>	<i>JE#</i>	<i>Transaction Description</i>	<i>Effective</i>	<i>Adopted</i>	<i>Revised</i>	<i>Actual</i>	<i>Remaining Balance (Revised vs Actual)</i>
	BA12-00001	Model OB12-01 Fund 01	07/01/2011	2,000.00	2,000.00	.00	2,000.00
Gregory Behrens	EX12-14155	OCT11 MLGE GB-JA	11/16/2011	.00	.00	21.09	1,978.91
Gregory Behrens	EX12-17896	NOV11 MLGE GB-JA	12/15/2011	.00	.00	7.22	1,971.69
James W. Alspach	EX12-11734	SEP11 MLGE JA-DO	10/17/2011	.00	.00	13.43	1,958.26
Kendell L. Kilborn	EX12-08780	AUG11 MLGE KK-JA	09/19/2011	.00	.00	51.62	1,906.64
Kendell L. Kilborn	EX12-11680	SEP11 MLGE KK-JA	10/17/2011	.00	.00	8.88	1,897.76
Kendell L. Kilborn	EX12-20000	DEC11 MLGE KK-JA	01/18/2012	.00	.00	27.75	1,870.01
Robert K. Good	EX12-05441	JUL11 MLGE BG-JA	08/17/2011	.00	.00	11.16	1,858.85
Robert K. Good	EX12-08791	AUG11 MLGE BG-JA	09/19/2011	.00	.00	3.33	1,855.52
Robert K. Good	EX12-11825	SEP11 MLGE BG-JA	10/19/2011	.00	.00	42.46	1,813.06
Robert K. Good	EX12-14134	OCT11 MLGE RG-JA	11/16/2011	.00	.00	3.89	1,809.17
Robert K. Good	EX12-20010	DEC11 MLGE RG-JA	01/18/2012	.00	.00	3.89	1,805.28
Shannon I. Hetzel	EX12-08782	AUG11 MLGE SH-JA	09/19/2011	.00	.00	13.99	1,791.29
Shannon I. Hetzel	EX12-11687	SEP11 MLGE SH-JA	10/17/2011	.00	.00	14.76	1,776.53
Zachary D. Baker	EX12-08818	AUG11 MLGE ZB-JA	09/19/2011	.00	.00	20.42	1,756.11
Zachary D. Baker	EX12-11728	SEP11 MLGE ZB-JA	10/17/2011	.00	.00	42.85	1,713.26
Zachary D. Baker	EX12-17900	NOV11 MLGE ZB-DO	12/15/2011	.00	.00	32.08	1,681.18
Zachary D. Baker	EX12-20033	DEC11 MLGE ZA-JA	01/18/2012	.00	.00	29.03	1,652.15
		TOTAL		2,000.00	2,000.00	347.85	
		REMAINING BALANCE				1,652.15	
		NUMBER OF TRANSACTIONS TO DATE				17	