

Array functions perform multiple calculations on one or more items in an array, and can take the form of either a *single-cell* formula (which exists within one cell) or a *multi-cell* formula (which can be applied to a number of cells and return multiple results)

You must press **CTRL-SHIFT-ENTER** to enter, edit, or delete an array formula; this automatically adds brackets “{ }” to indicate that the function applies to an array

	A	B	C	D
1	Name	Earnings	Units	
2	Tim	\$4,500	4	\$18,000
3	George	\$3,250	2	
4	Lisa	\$3,725	3	
5	Zach	\$4,150	5	



If you select D2:D5, type “=B2:B5*C2:C5” and hit ENTER, the formula will only be applied to cell D2

	A	B	C	D
1	Name	Earnings	Units	
2	Tim	\$4,500	4	\$18,000
3	George	\$3,250	2	\$6,500
4	Lisa	\$3,725	3	\$11,175
5	Zach	\$4,150	5	\$20,750



If you select D2:D5, type “=B2:B5 * C2:C5” and hit CTRL-SHIFT-ENTER, you have created an array formula applied to all cells in the range

When you work with **array functions**, you must obey the following rules:



1. You *must* press **CTRL-SHIFT-ENTER (C-S-E)** to edit or enter an array formula
2. For multi-cell array functions, you must select the range of cells *before* entering the formula
3. You cannot change the contents of any individual cell which is part an array formula
4. You can move or delete an *entire* array formula, but not a piece of it (so you often have to delete and rebuild)
5. You cannot insert blank cells into or delete cells from a multi-cell array formula

Array functions can be incredibly powerful, but also a total buzzkill to work with; here are some of the key pros and cons of using them:

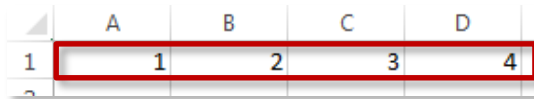
PROS

- Condenses multiple calculations into one formula, often reducing file size*
- Can perform some complex functions that non-array formulas cannot*
- Reduces the risk of human error such as accidentally deleting parts of arrays or mistyping formulas*

CONS

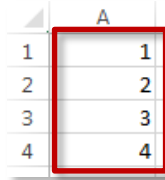
- Can be very difficult to modify or delete existing array formulas*
- Limited visibility into the formula's function, especially for users who are not familiar with arrays*
- Eliminates the option to modify cells contained within arrays*
- May reduce processing speed if multiple array functions are used*

Array constants are created by manually entering a list of items directly into the formula bar and manually surrounding the list with brackets ({ })



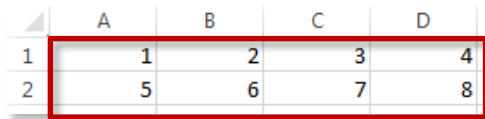
	A	B	C	D
1	1	2	3	4

Horizontal array constants create an array contained within a single row, and are delimited by commas (i.e. Select A1:D1, type “={1,2,3,4}” then hit C-S-E)



	A
1	1
2	2
3	3
4	4

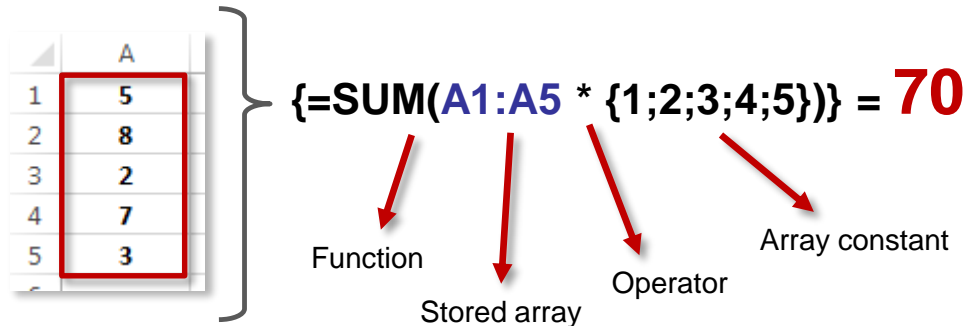
Vertical array constants create an array contained within a single column, and are delimited by semicolons (i.e. Select A1:A4, type “={1;2;3;4}” then hit C-S-E)



	A	B	C	D
1	1	2	3	4
2	5	6	7	8

Two-dimensional array constants create an array contained across multiple rows and columns (i.e. Select A1:D2, type “={1,2,3,4;5,6,7,8}” then hit C-S-E)

Array constants can contain values, text (surrounded by “ ”), logical values (TRUE, FALSE), or error values (#N/A), and can be used as part of an array formula



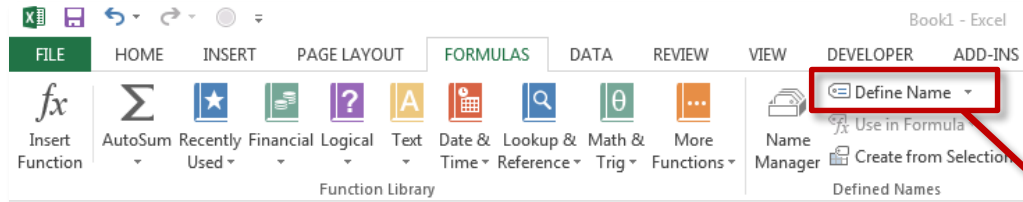
*This function takes each value in the array A1:A5 and multiplies it against the corresponding value in the array constant {1;2;3;4;5}, which essentially translates into the following formula: =SUM(A1*1, A2*2, A3*3, A4*4, A5*5)*



PRO TIP:

You manually add the brackets when you type array constants, but the additional brackets surrounding the entire formula are automatically added once you press C-S-E

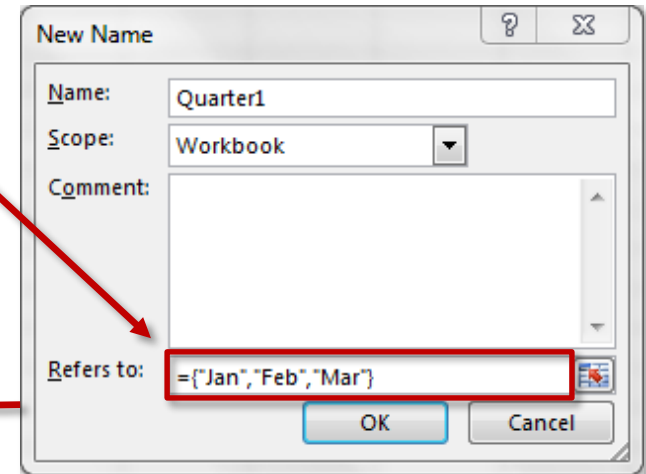
Just like normal cell ranges, **array constants** can be assigned a name using Excel's name manager, which can make them much easier to work with



Select "Define Name" (or Name Manager → New) from the **Formulas** tab

	A	B	C
1	Jan	Feb	Mar

Now if you select A1:C1, type "**=Quarter1**" and press **CTRL-SHIFT-ENTER**, the saved array will populate

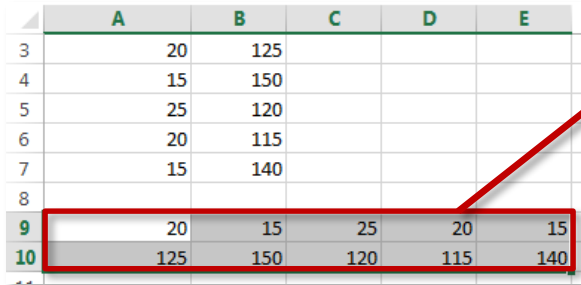


In the **New Name** dialog box, enter the array constant (remembering to manually include the brackets), give it a name, and select OK

The **TRANSPOSE** function allows you to change the orientation of a given data array (i.e. from 5 rows x 2 columns to 2 rows x 5 columns)

NOTE: The range in which you enter a **TRANSPOSE** function must be the exact *dimensions* of the transposed data

{=TRANSPOSE(array)}



	A	B	C	D	E
3	20	125			
4	15	150			
5	25	120			
6	20	115			
7	15	140			
8					
9	20	15	25	20	15
10	125	150	120	115	140

Select A9:E10, type “**=TRANSPOSE(A3:B7)**” and press **CTRL-SHIFT-ENTER** to copy the transposed data



PRO TIP:

To transpose a data set that you may want to later edit, just use Paste Special → Transpose (ALT-H-V-T)