MODULE 8

ARRAY FORMULA

TOPICS

RULES OF ARRAY FORMULA (PROS AND CONS)

VERTICAL / HORIZONTAL

DEMOS

ARRAY FUNCTIONS

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

RULES

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

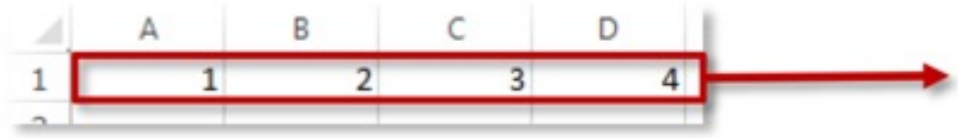
PROS AND CONS

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:

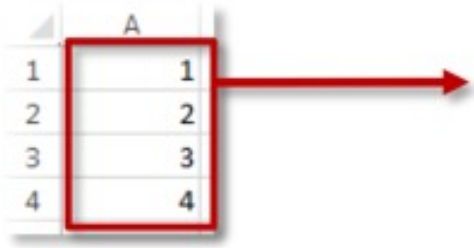
PROS	CONS
-Condenses multiple calculations into one formula, often reducing file size	-Can be very difficult to modify or delete existing array formulas
-Can perform some complex functions that non-array formulas cannot	***-Limited visibility into the formula's function,*** especially for users who are not familiar with arrays
-Reduces the risk of human error such as accidentally deleting parts of arrays or mistyping formulas	-Eliminates the option to modify cells contained within arrays
	-May reduce processing speed if multiple array functions are used

ARRAY CONSTANT

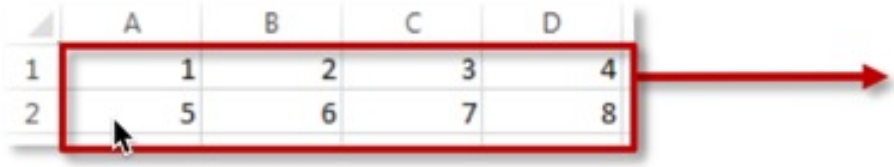
Array constants are created by manually entering a list of items directly into the formula bar and manually surrounding the list with brackets ({ })



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)**



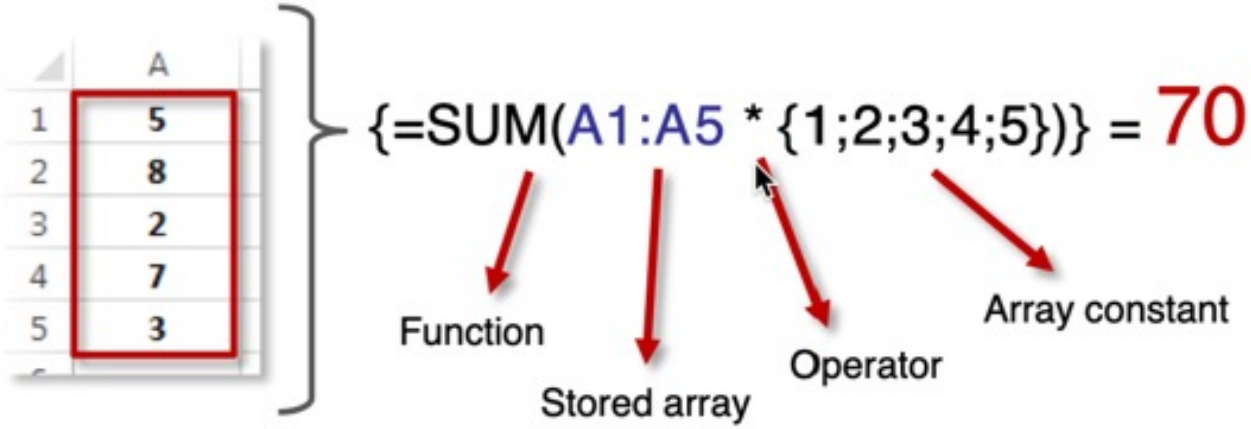
Vertical array constants create an array contained within a single column, and are delimited by semicolons (i.e. Select A1:A4, **type "={1;2;3;4}" then** hit C-S-E)



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 CONSTANT IN FORMULA

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



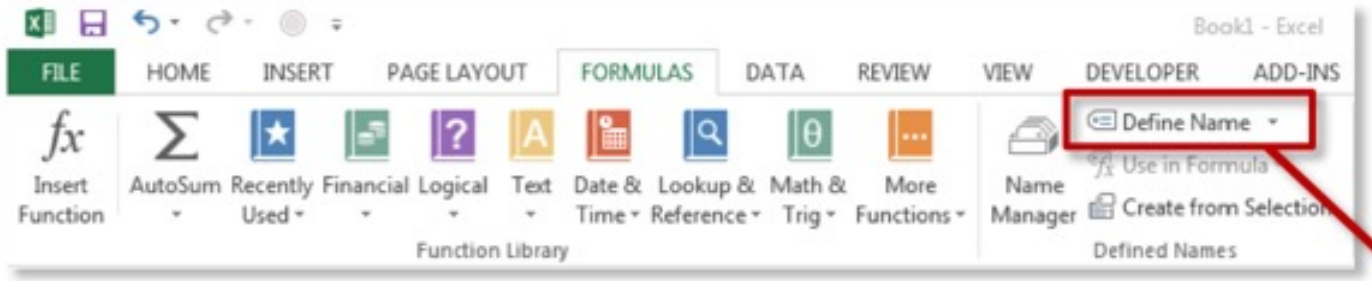
This function takes each value in the array A1:A5 and multiplies it against the corresponding value in the array constant {1;2;3;4;5}, which essentially translates into the following formula: =SUM(A1*1, A2*2, A3*3, A4*4, A5*5)

PRO TIP:

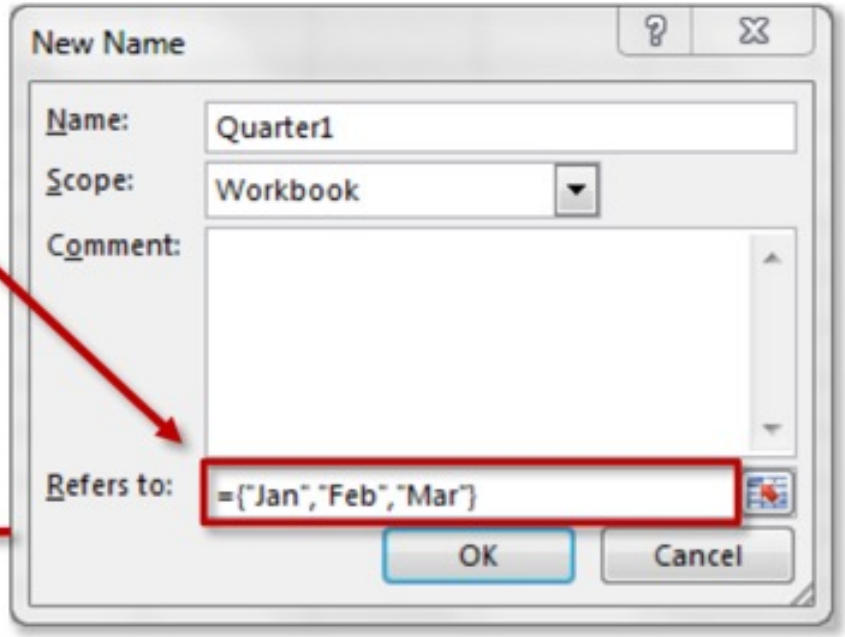
You manually add the brackets when you type array constants, but the additional brackets surrounding the entire formula are automatically added once you press C-S-E

NAMED ARRAY

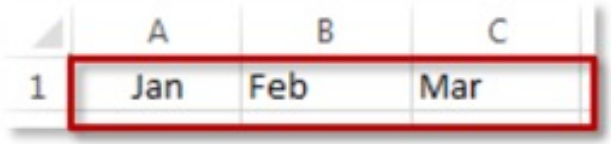
Just like normal cell ranges, array constants can be assigned a name using Excel's name manager, which can make them much easier to work with



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



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



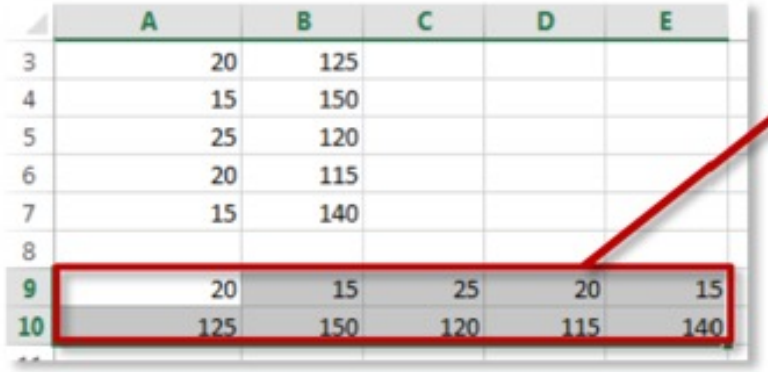
Now if you select **A1:C1**, *type "=Quarter1" and press* CTRL-SHIFT-ENTER, the saved array will populate

TRANSPOSE

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)