ONLINE DISTANCE LEARNING (ODL)

Using INDEX and MATCH in Microsoft Excel or Google Spreadsheet
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In the previous article, we have looked at VLOOKUP and how to use it to find and display the data we want. The main problem with VLOOKUP is that the lookup_value must always be in the left-most column of the lookup table. This, however, is not always possible (compare Figure 1 & 2).

Problem with VLOOKUP

Figure 1

In Figure 1, the name column is the left-most column. When we enter the formula =VLOOKUP($H$5, $A$2:$E$11, 5, FALSE) in cell H6, we get 19 i.e., the correct result.

In Figure 2, the name column is not the left-most column. It is the third column from the left. When we enter the formula =VLOOKUP($J$4, $A$2:$G$11, 7, FALSE) in cell J5, we get #N/A (an error) as the result. This is because the Name column is not the left-most column.

Figure 2

Solution

To overcome this problem, we can use a combination of INDEX and MATCH functions.

Let's go through each of these functions to understand what they can do.

The INDEX function

We can use this function to get the value at a given location in a table or range.

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There are two types of INDEX functions – the array form and the reference form. In this article, we will only look at the array form.

Let's start by looking at the syntax.

Syntax: =INDEX(**array**, **row_num**, **[column_num]**)

Syntax	Required	Information	Summary
array	Yes	This is a range of cells you want to return a value from.	This is your data range.
row_num	Yes	This is the row number in the array from which to return a value.	This is the row number of the value to return.
column_num	No	This is the column number in the array from which to return a value. If you omit **column_num**, the values of the whole row will be returned.	This is the column number of the value to return.

You can think of the INDEX formula as:

=INDEX(**where to search in**, **the row number of the value**, **the column number of the value**)

Now, let's look at how to use INDEX.

Supposed we have a table as shown in Figure 3. We can use the INDEX function to find and display the content of a cell.

Figure 3

The formula in cell J5 is =INDEX($A$2:$G$11, 3, 3).

Can you guess the formula in J6 to display the CBLT marks of Fahmi?

Yes, the formula is =INDEX($A$2:$G$11, 3, 7).

The MATCH function

The MATCH function is used to return the relative position of an item in a range.

Now, let's look at the syntax.

Syntax: =MATCH(**lookup_value**, **lookup_array**, **[match_type]**)

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Syntax	Required	Information	Summary
lookup_value	Yes	This is the value you want to match in the **lookup_array** (the range).	This is your search item.
lookup_array	Yes	This is the range of cells being searched.	This is your data range.
match_type	No	Determines how *Excel* matches the **lookup_value**. The default value is 1. If **match_type** = 1 or omitted, *Excel* searches for the largest value that is less than or equal to **lookup_value.** If **match_type** = 0, *Excel* searches for the value that is exactly equal to **lookup_value.** If **match_type** = -1 or omitted, *Excel* searches for the smallest value that is greater than or equal to **lookup_value.**	How you want Excel to match the searched item.

You can think of the MATCH formula as:

= MATCH (**what to match**, **where to search in**, **how should *Excel* match**)

Now, let's look at how to use MATCH.

Supposed we have a table as shown in Figure 4. We can use the MATCH function to return the relative position of an item in a range.

Figure 4

In K5, we have the formula =MATCH(J5, $C$2:$C$11, 0). Here, we are asking *Excel* to find the item in cell J5 and return its position (row) in the range (i.e., $C$2:$C$11). The result that we get is 3 because Fahmi is in row 3 of the given range.

Using the same formula, if we change the item in J5 to Laila, what is the result in K5?

Yes, we will get 8 as the result because Laila is the 8th item in the range.

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Using INDEX and MATCH functions together

=INDEX(**array**, **row_num**, **[column_num]**)

=MATCH(**lookup_value**, **lookup_array**, [match_type])

The INDEX function finds the lookup value by row and column, and the MATCH function provides the position (row) of an item. Putting both functions together we get:

=INDEX(**array**, MATCH(**lookup_value**, **lookup_array**, [match_type]), **[column_num]**)

> We have replaced the row_num of the INDEX formula with the MATCH formula

Let's put this new formula in J6 to find the CBLT mark of the name given in J5 (see Figure 5).

J6			fx	=INDEX($A$2:$G$11, MATCH(J5, $C$2:$C$11, 0), 7)					
	A	B	C	D	E	F	G	H	I	J
1	NO	UiTM NO	NAME	PRL 1 (10%)	PRL 2 (10%)	DO (2)	CBLT (20%)			
2	1	202165aaaa	Ali	6	8	17	17			
3	2	202184bbbb	Arleena	6	7	17	16			
4	3	202165cccc	Fahmi	6	6	17	19			
5	4	202184dddd	Hashim	5	6	17	17		Name	Fahmi
6	5	202165eeee	Jannatul	5	7	17	18		CBLT	19
7	6	202184ffff	Jasmin	2	4	15	18			
8	7	202165gggg	Khairul	4	6	16	12			
9	8	202184hhhh	Laila	4	5	15	12			
10	9	202165iiii	Rahmat	4	7	15	19			
11	10	202184jjjj	Wan	4	6	17	12			
12										

Figure 5

The formula in J6 is =INDEX(**$A$2:$G$11**, **MATCH(J5, $C$2:$C$11, 0)**, **7**)

> The range to search

> In the MATCH formula, *Excel* provides the row number of the name in J5

> The column number in the array from which to return a value

With this formula, when the name in J5 changes, the corresponding CBLT mark will be displayed.

To display the marks for other components, just change the **column_num** (in this case, 7) to the corresponding number i.e., 4 for PRL 1, 5 for PRL 2, and 6 for DO.

Using this formula combination, we would be able to address the weakness of the VLOOKUP function, and we do not have to worry whether the search item is in the left-most column.

That's all for now. Until we meet again, take care, stay safe and have fun with *Excel/Google Spreadsheet.*

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