

Excel Math 4: vLookup Statements



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1.5 hour

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VLOOKUP Worksheet Function

From Office Help

Description

You can use the **VLOOKUP** function to search the first column of a range of cells, and then return a value from any cell on the same row of the range. For example, suppose that you have a list of employees contained in the range A2:C10. The employees' ID numbers are stored in the first column of the range, as shown in the following illustration.

	A	B	C
1	Employee ID	Department	Full Name
2	35	Sales	Yossi Banai
3	36	Production	Nicole Bousseau
4	37	Sales	Aik Chen
5	38	Operations	Axel Delgado
6	39	Sales	Suroor Fatima
7	40	Production	Gerhard Goeschl
8	41	Sales	Andreas Hauser
9	42	Operations	Nattorn Jayanama
10	43	Production	Jim Kim

If you know the employee's ID number, you can use the **VLOOKUP** function to return either the department or the name of that employee. To obtain the name of employee number 38, you can use the formula **=VLOOKUP(38, A2:C10, 3, FALSE)**. This formula searches for the value 38 in the first column of the range A2:C10, and then returns the value that is contained in the third column of the range and on the same row as the lookup value ("Axel Delgado").

The V in **VLOOKUP** stands for vertical. Use **VLOOKUP** instead of **HLOOKUP** when your comparison values are located in a column to the left of the data that you want to find.

Remarks

- When searching text values in the first column of **table_array**, ensure that the data in the first column of **table_array** does not contain leading spaces, trailing spaces, inconsistent use of straight (' or ") and curly (' or “) quotation marks, or nonprinting characters. In these cases, **VLOOKUP** might return an incorrect or unexpected value. You may be able to use the **CLEAN** and/or **TRIM** function to reformat your data.
- When searching number or date values, ensure that the data in the first column of **table_array** is not stored as text values. In this case, **VLOOKUP** might return an incorrect or unexpected value.
- If range_lookup is FALSE and **lookup_value** is text, you can use the wildcard characters — the question mark (?) and asterisk (*) — in **lookup_value**. A question mark matches any single character; an asterisk matches any sequence of characters. If you want to find an actual question mark or asterisk, type a tilde (~) preceding the character.

Syntax: VLOOKUP()

VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

The **VLOOKUP** function syntax has the following arguments:

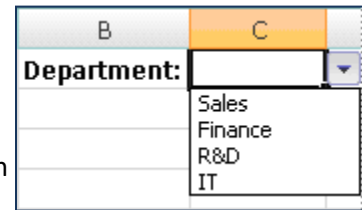
- **lookup_value** Required. The value to search in the first column of the table or range. The **lookup_value** argument can be a value or a reference. If the value you supply for the **lookup_value** argument is smaller than the smallest value in the first column of the **table_array** argument, **VLOOKUP** returns the #N/A error value.
- **table_array** Required. The range of cells that contains the data. You can use a reference to a range (for example, A2:D8), or a range name. The values in the first column of **table_array** are the values searched by **lookup_value**. These values can be text, numbers, or logical values. Uppercase and lowercase texts are equivalent.
- **col_index_num** Required. The column number in the **table_array** argument from which the matching value must be returned. A **col_index_num** argument of 1 returns the value in the first column in **table_array**; a **col_index_num** of 2 returns the value in the second column in **table_array**, and so on.
 - If the **col_index_num** is less than 1, **VLOOKUP** returns the #VALUE! error value.
 - If the **col_index_num** is greater than the number of columns in **table_array**, **VLOOKUP** returns the #REF! error value.
- **range_lookup** Optional. A logical value that specifies whether you want **VLOOKUP** to find an exact match or an approximate match:
 - If **range_lookup** is either TRUE or is omitted, an exact or approximate match is returned. If an exact match is not found, the next largest value that is less than **lookup_value** is returned.
 - If **range_lookup** is either TRUE or is omitted, the values in the first column of **table_array** must be placed in ascending sort order; otherwise, **VLOOKUP** might not return the correct value.
 - If **range_lookup** is FALSE, the values in the first column of **table_array** do not need to be sorted.
 - If the **range_lookup** argument is FALSE, **VLOOKUP** will find only an exact match. If there are two or more values in the first column of **table_array** that match the **lookup_value**, the first value found is used. If an exact match is not found, the error value #N/A is returned.

	VLOOKUP()	=VLOOKUP(B11, Items, 2, FALSE)
Find	Item from cell B11	B11
Look in	Range "Items"	Items
Return	column 2	2
Find closest #?	No, find exact	False

Data Validation: Insert or delete a drop-down list

From Office Help

To make data entry easier in Excel, or to limit entries to certain items that you define, you can create a drop-down list of valid entries that is compiled from cells elsewhere in the workbook. When you create a drop-down list for a cell, it displays an arrow in that cell. To enter information in that cell, click the arrow, and then click the entry that you want.



To create a drop-down list from a range of cells, use the **Data Validation** command in the **Data Tools** group on the **Data** tab.

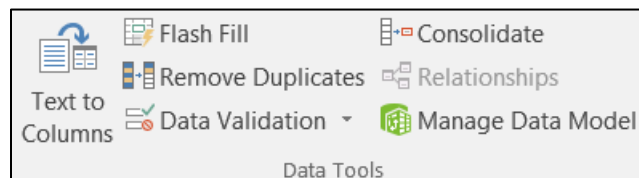
1. To create a list of valid entries for the drop-down list, type the entries in a single column or row without blank cells.

For example:

	A
1	Sales
2	Finance
3	R&D

NOTE: You may want to sort the data in the order that you want it to appear in the drop-down list.

2. If you want to use another worksheet, type the list on that worksheet, and then define a name for the list.
3. Select the cell where you want the drop-down list.
4. On the **Data** tab, in the **Data Tools** group, click **Data Validation**.



5. In the **Data Validation** dialog box, click the **Settings** tab.
6. In the **Allow** box, click **List**.
7. To specify the location of the list of valid entries, do one of the following:
 - If the list is in the current worksheet, enter a reference to your list in the **Source** box.
 - If the list is on a different worksheet, enter the name that you defined for your list in the **Source** box.

In both cases, make sure that the reference or name is preceded with an equal sign (=). For example, enter **=ValidDepts**.

8. Make sure that the **In-cell dropdown** check box is selected.
9. To specify whether the cell can be left blank, select or clear the **Ignore blank** check box.

IF Worksheet Function

From Office Help

Specifies a logical test to perform

Syntax: IF ()

IF(logical_test, value_if_true, value_if_false)

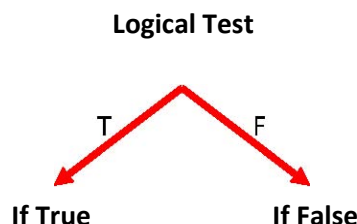
- *Logical_test* is any value or expression that can be evaluated to TRUE or FALSE. For example, A10=100 is a logical expression; if the value in cell A10 is equal to 100, the expression evaluates to TRUE. Otherwise, the expression evaluates to FALSE. This argument can use any comparison calculation operator.
- *Value_if_true* is the value that is returned if logical_test is TRUE. For example, if this argument is the text string "Within budget" and the logical_test argument evaluates to TRUE, then the IF function displays the text "Within budget". If logical_test is TRUE and value_if_true is blank, this argument returns 0 (zero). To display the word TRUE, use the logical value TRUE for this argument. Value_if_true can be another formula.
- *Value_if_false* is the value that is returned if logical_test is FALSE. For example, if this argument is the text string "Over budget" and the logical_test argument evaluates to FALSE, then the IF function displays the text "Over budget". If logical_test is FALSE and value_if_false is omitted, (that is, after value_if_true, there is no comma), then the logical value FALSE is returned. If logical_test is FALSE and value_if_false is blank (that is, after value_if_true, there is a comma followed by the closing parenthesis), then the value 0 (zero) is returned. Value_if_false can be another formula.

Remarks

- Up to seven IF functions can be nested as value_if_true and value_if_false arguments to construct more elaborate tests.
- When the value_if_true and value_if_false arguments are evaluated, IF returns the value returned by those statements.

=IF(A10<=100, "Within budget", "Over budget")
=IF(A10=100, SUM(B5:B15), "")
=IF(B2>C2, "Over Budget", "OK")
=IF(B3>C3, "Over Budget", "OK")

Logic Tree



IS Worksheet Functions

From Office Help

Description

Each of these functions, referred to collectively as the **IS** functions, checks the specified value and returns TRUE or FALSE depending on the outcome. For example, the **ISBLANK** function returns the logical value TRUE if the value argument is a reference to an empty cell; otherwise it returns FALSE.

You can use an **IS** function to get information about a value before performing a calculation or other action with it. For example, you can use the **ISERROR** function in conjunction with the **IF** function to perform a different action if an error occurs:

=IF(ISERROR(A1), "An error occurred.", A1 * 2)

This formula checks to see if an error condition exists in A1. If so, the **IF** function returns the message "An error occurred." If no error exists, the **IF** function performs the calculation A1*2.

Syntax: IS()

The **IS** function syntax has the following argument:

- **Value** -Required. The value that you want tested. The value argument can be a blank (empty cell), error, logical value, text, number, or reference value, or a name referring to any of these.

FUNCTION	RETURNS TRUE IF
ISBLANK	Value refers to an empty cell.
ISERR	Value refers to any error value except #N/A.
ISERROR	Value refers to any error value (#N/A, #VALUE!, #REF!, #DIV/0!, #NUM!, #NAME?, or #NULL!).
ISLOGICAL	Value refers to a logical value.
ISNA	Value refers to the #N/A (value not available) error value.
ISNONTEXT	Value refers to any item that is not text. (Note that this function returns TRUE if the value refers to a blank cell.)
ISNUMBER	Value refers to a number.
ISREF	Value refers to a reference.
ISTEXT	Value refers to text.

Remarks

- The value arguments of the **IS** functions are not converted. Any numeric values that are enclosed in double quotation marks are treated as text. For example, in most other functions where a number is required, the text value "19" is converted to the number 19. However, in the formula **ISNUMBER("19")**, "19" is not converted from a text value to a number value, and the **ISNUMBER** function returns FALSE.
- The **IS** functions are useful in formulas for testing the outcome of a calculation. When combined with the **IF** function, these functions provide a method for locating errors in formulas.

IFNA Worksheet Function

From Office Help

Description

The IFNA function returns the value you specify if a formula returns the #N/A error value; otherwise it returns the result of the formula.

Note from Pandora

This function will not work in Excel 2010 and earlier, so if you are using an older version of Excel you can use the IF(ISNA(), T, F) option to get the same result.

IF(ISNA(VLOOKUP(B3, Data, 3, FALSE)), "", VLOOKUP(B3, Data, 3, FALSE))

IFNA(VLOOKUP(B3, Data, 3, FALSE), "")

Syntax IFNA

IFNA(value, value_if_na)

The IFNA function syntax has the following arguments.

Argument	Description
Value <i>Required</i>	The argument that is checked for the #N/A error value.
value_if_na <i>Required</i>	The value to return if the formula evaluates to the #N/A error value.

Remarks

If value or value_if_na is an empty cell, IFNA treats it as an empty string value ("").

If value is an array formula, IFNA returns an array of results for each pcell in the range specified in value.

IFERROR Worksheet Function

From Office Help

Description

You can use the IFERROR function to trap and handle errors in a formula. IFERROR returns a value you specify if a formula evaluates to an error; otherwise, it returns the result of the formula.

Syntax

IFERROR(value, value_if_error)

The IFERROR function syntax has the following arguments:

Argument	Description
Value <i>Required</i>	The argument that is checked for an error.
value_if_error <i>Required</i>	The value to return if the formula evaluates to an error. The following error types are valuated: #N/A, #VALUE!, #REF!, #DIV/0!, #NUM!, #NAME?, or #NULL!.

Remarks

If value or value_if_error is an empty cell, IFERROR treats it as an empty string value ("").

If value is an array formula, IFERROR returns an array of results for each cell in the range specified in value. See the second example below.

Class Exercises

Phone Lookup (vLookup)

	A	B	C	D
1	Original Data			
2	Name	Employee ID	Title	Phone #
3	Scrooge McDuck	2134-6113	Captain	(352) 555-2060
4	Donald Duck	3291-5756	First Mate	(352) 555-6108
5	Daisy Duck	9949-3960	Quartermaster	(352) 555-6615
6	Gunner 1	6670 2	Gunner 3	(352) 555-5387 4
7	Huey Duck	5602-6973	Cabin Boy	(352) 555-5025
8	Louie Duck	7362-1089	Cabin Boy	(352) 555-8546
9	Dewey Duck	1910-3921	Cabin Boy	(352) 555-6756

VLOOKUP(**lookup_value**, **table_array**, **col_index_num**, **[range_lookup]**)

VLOOKUP(**Find this value**, **in this dataset**, **return data from column #**, **FALSE** (*exact match*))

	F	G
1	Phone Lookup	
2	Name	Phone #
3	Daisy Duck	=VLOOKUP(F3 , A3:D9 , 4 , FALSE)
4	Dewey Duck	

Lock the Range

Cell addresses in an equation are relative to their location. When we use the fill handle or copy and paste feature the addresses move to the new location. When we fill the equation above to the next row, the formula will become:

=VLOOKUP(**F4**, **A4:D10**, **4**, **FALSE**)

We want the first value to change, so we're now looking for "Dewey Duck", but we need the data range to stay the same. The two options we learn in the Basic 2: Math class are locking the cell addresses and naming the range.

To **Lock** a range, you can type in the dollar signs (little handcuffs), or you can press function key **F4** as soon as you select the range and Excel will add the dollar signs for you. **F4**- Force!

=VLOOKUP(**F3**, **\$A\$3:\$D\$9**, **4**, **FALSE**)

You need to **Name** a range before you start your equation. Select the data range, click in the name box and type the name you want for that dataset and press **Enter** on the keyboard. I used the name **Data**.

=VLOOKUP(**F3**, **Data**, **4**, **FALSE**)

Title Lookup (vLookup)

	A	B
1	Title Lookup	
2	Name	Title
3	Daisy Duck	=VLOOKUP(A3, Data, 3, FALSE)
4	Dewey Duck	Cabin Boy
5	Donald Duck	First Mate
6	Gus Goose	Gunner

Use function key **F3** to open the name box while you're building an equation. **F3**- Find Me!

PayRate (when IF is better)

	A	B	C	D	E	F	G	H
	Shoes	Hours	Rate vLookup	Rate If			Item	Hourly Rate
2	Boots	3					Shoes	\$14
3	Flip Flop	3					Boots	\$16
4	Sandle	1						
5	Sandle	3						
6	Boots	1						
7	Boots	2						
8	Boots	3						
9	Sandle	3						
10	Flip Flop	3						
11	Sneaker	2						

Once you unlock the pattern of a vLookup, it might be tempting to use it all the time. This PayRate example that we used in the Math 3: Logic and Ifs class doesn't work well with a vLookup.

=VLOOKUP(A2, \$G\$2:\$H\$3, 2, FALSE)

VS.

=if(A2="Boots", 16, 14)

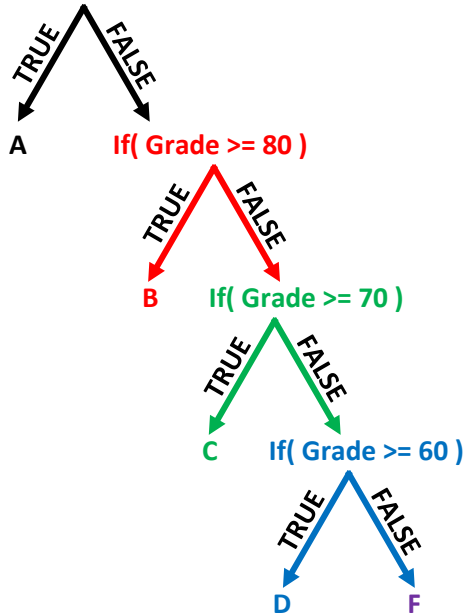
	A	B	C	D
1	Shoes	Hours	Rate vLookup	Rate If
2	Boots	3	\$ 16.00	\$ 16.00
3	Flip Flop	3	#N/A	\$ 14.00
4	Sandle	1	#N/A	\$ 14.00
5	Sandle	3	#N/A	\$ 14.00
6	Boots	1	\$ 16.00	\$ 16.00
7	Boots	2	\$ 16.00	\$ 16.00
8	Boots	3	\$ 16.00	\$ 16.00
9	Sandle	3	#N/A	\$ 14.00
10	Flip Flop	3	#N/A	\$ 14.00
11	Sneaker	2	#N/A	\$ 14.00

In this case the #N/A error occurs because the table in G:H does not contain the other shoes. No Flip Flops, no Sandals, no Sneakers. Use the IF statement or add the missing values to the table.

Letter Grade (TRUE, approximate match)

The IF statement we created in the Math 3: Logic and Ifs class became a little complicated.

If(Grade >= 90)



	A	B	C	D	E
		Letter Grade			
1	Grades				
2	71				
3	90			Grade	Letter
4	66			90	A
5	75			80	B
6	82			70	C
7	81			60	D
8	53			0	F
9	79				
10	94				
11					
12					

=IF(A2>=90, "A", IF(A2>=80, "B", IF(A2>=70, "C", IF(A2>=60, "D", "F"))))

Like the PayRate example I don't have every value listed, however this is based on numbers not text. And we can use the TRUE as the last value in our vLookup to find the closest value.

To Lookup the closest numbers, they must be in Ascending (lowest to highest) order. If Everyone is failing, resort your Grades.

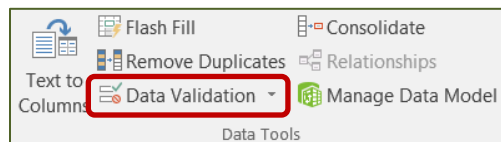
=VLOOKUP(A2, \$D\$4:\$E\$8, 2, TRUE)

	A	B	C	D	E
1	Grades				
2	71	=VLOOKUP(A2,\$D\$4:\$E\$8,2,TRUE)			
3	90	A		Grade	Letter
4	66	D		0	F
5	75	C		60	D
6	82	B		70	C
7	81	B		80	B
8	53	F		90	A
9	79	C			
10	94	A			

Choose Employee (validation lists)

	A	B
1	Choose Employee	
2		
3	Do they like cake?	Yes
4		
5	Employee:	Daisy Duck
6	Title:	=VLOOKUP(B5, Data, 3, FALSE)

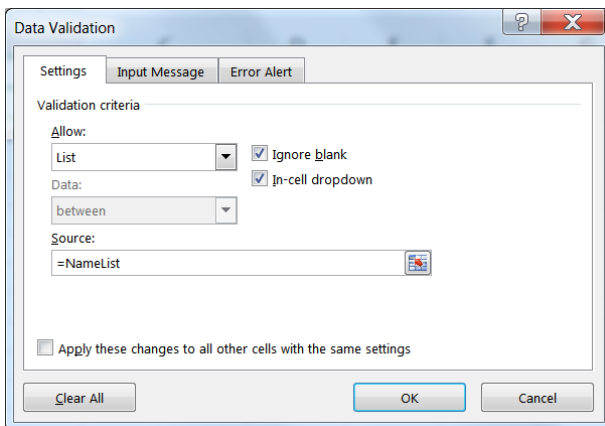
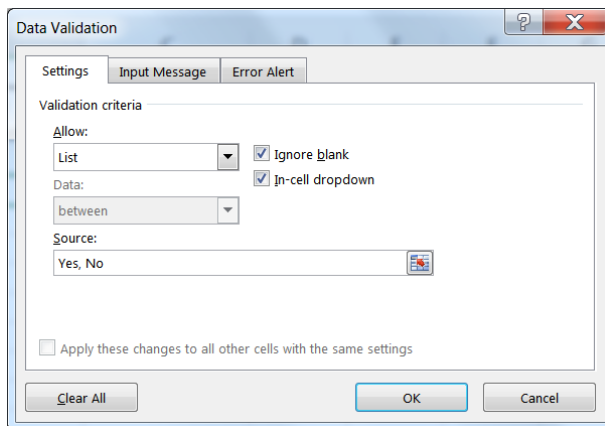
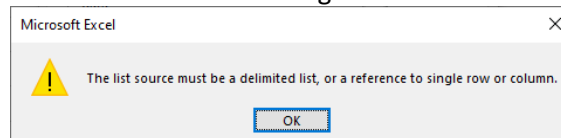
We can build a list within a cell using the **Data Validation** tool on the **Data** tab.



Change the **Allow** option to **List**, and type in the values, or =the named range, or select a single column of the values you want to appear on the list.

If you type in a defined name, such as NAMELIST, be sure to put the equal sign in the front. Remember you can use the function key F3 to choose from a list of names.

The named range or selection of cells must be for a single row or column of data.



Choose a name from cell B5 and build the vLookup in cell B6. Remember, we named the search table "Data" and Title was in the third column of "Data".

=VLOOKUP(B5, Data, 3, FALSE)

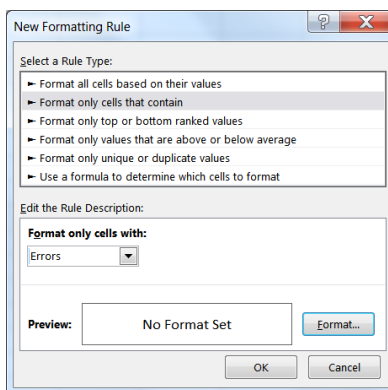
Fill in a Blank (ifna)

	A	B	C
1	Fill in a Blank		
2		Employee Name	Employee Title
3	#1:	Daisy Duck	=VLOOKUP(A3, Data, 3, FALSE)
4	#2:		#N/A
5	#3:	Louie Duck	Cabin Boy

Since there is no Employee 2 listed, we get the #N/A message saying the vLookup can't find that value.

There are a few choices to deal with this.

- 1) Ignore it. I often do, I know what it means. I can use it to filter all the unmatched data.
- 2) Use Conditional Formatting (on the Home tab) to make the text appear invisible by turning the font color white.



- 3) Use a nested formula with IF and ISNA.

Question: Does our vLookup return an N/A
If TRUE: If it's true, let's put a blank cell ""
If FALSE: show me what the vLookup returned

=IF(ISNA(VLOOKUP(A3, Data, 3, FALSE)), "", VLOOKUP(A3, Data, 3, FALSE))

- 4) Use the IFNA function

=IFNA(VLOOKUP(A3, Data, 3, FALSE), "")