

# Using IF with AND, OR and NOT functions

The IF function allows you to make a logical comparison between a value and what you expect by testing for a condition and returning a result if that condition is True or False.

- =IF(Something is True, then do something, otherwise do something else)

But what if you need to test multiple conditions, where let's say all conditions need to be True or False (**AND**), or only one condition needs to be True or False (**OR**), or if you want to check if a condition does **NOT** meet your criteria? All 3 functions can be used on their own, but it's much more common to see them paired with IF functions.

Here are overviews of how to structure [AND](#), [OR](#) and [NOT](#) functions individually. When you combine each one of them with an IF statement, they read like this:

- **AND** – =IF(AND(Something is True, Something else is True), Value if True, Value if False)
- **OR** – =IF(OR(Something is True, Something else is True), Value if True, Value if False)
- **NOT** – =IF(NOT(Something is True), Value if True, Value if False)

## Examples

Following are examples of some common nested IF(AND()), IF(OR()) and IF(NOT()) statements. The AND and OR functions can support up to 255 individual conditions, but it's not good practice to use more than a few because complex, nested formulas can get very difficult to build, test and maintain. The NOT function only takes one condition.

	A	B	C	D
1	Value 1	Value 2	IF/AND/OR/NOT	Formula
2	25	75	TRUE	=IF(AND(A2>0,B2<100),TRUE, FALSE)
3	Blue	Green	FALSE	=IF(AND(A3="Red",B3="Green"),TRUE,FALSE)
4	25	75	TRUE	=IF(OR(A4>0,B4<50),TRUE, FALSE)
5	Blue	Green	TRUE	=IF(OR(A5="Red",B5="Green"),TRUE,FALSE)
6	25		TRUE	=IF(NOT(A6>50),TRUE,FALSE)
7	Blue		TRUE	=IF(NOT(A7="Red"),TRUE,FALSE)

Here are the formulas spelled out according to their logic:

Formula	Description
=IF(AND(A2>0,B2<100),TRUE, FALSE)	IF A2 (25) is greater than 0, AND B2 (75) is less than 100, then return TRUE, otherwise return FALSE. In this case both conditions are true, so TRUE is

Formula	Description
=IF(AND(A3="Red",B3="Green"),TRUE,FALSE)	returned. If A3 ("Blue") = "Red", AND B3 ("Green") equals "Green" then return TRUE, otherwise return FALSE. In this case only the first condition is true, so FALSE is returned.
=IF(OR(A4>0,B4<50),TRUE, FALSE)	IF A4 (25) is greater than 0, OR B4 (75) is less than 50, then return TRUE, otherwise return FALSE. In this case, only the first condition is TRUE, but since OR only requires one argument to be true the formula returns TRUE.
=IF(OR(A5="Red",B5="Green"),TRUE,FALSE)	IF A5 ("Blue") equals "Red", OR B5 ("Green") equals "Green" then return TRUE, otherwise return FALSE. In this case, the second argument is True, so the formula returns TRUE.
=IF(NOT(A6>50),TRUE,FALSE)	IF A6 (25) is NOT greater than 50, then return TRUE, otherwise return FALSE. In this case 25 is not greater than 50, so the formula returns TRUE.
=IF(NOT(A7="Red"),TRUE,FALSE)	IF A7 ("Blue") is NOT equal to "Red", then return TRUE, otherwise return FALSE.

Note that all of the examples have a closing parenthesis after their respective conditions are entered. The remaining True/False arguments are then left as part of the outer IF statement. You can also substitute Text or Numeric values for the TRUE/FALSE values to be returned in the examples.

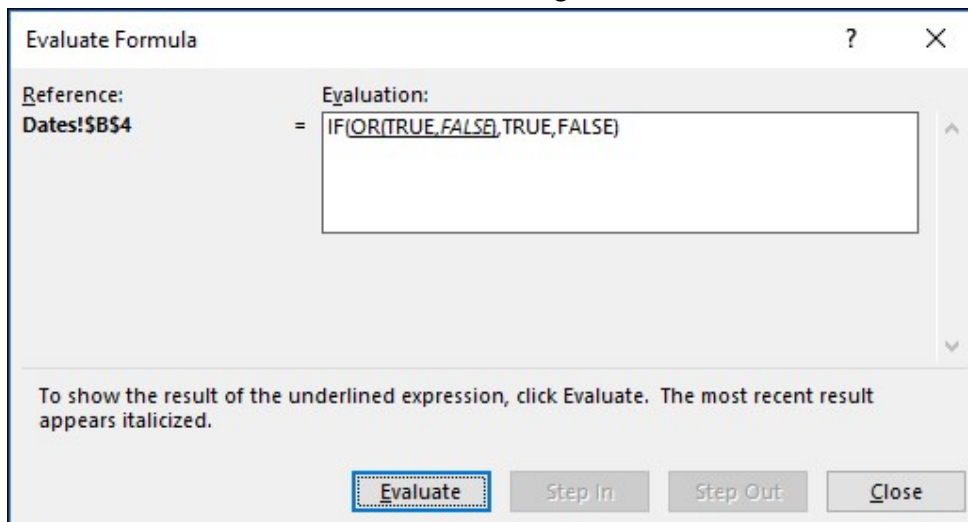
Here are some examples of using AND, OR and NOT to evaluate dates.

	A	B	C	D	E
				IF/AND/ OR/NOT	Formula
1	Start Date	Date 1	Date 2	TRUE	=IF(A2>B2,TRUE,FALSE)
2	03/12/14	01/01/14	12/31/14	TRUE	=IF(AND(A3>B2,A3<C2),TRUE,FALSE)
3	03/12/14			TRUE	=IF(OR(A4>B2,A4<B2+60),TRUE,FALSE)
4	03/12/14			FALSE	=IF(NOT(A5>B2),TRUE,FALSE)
5	03/12/14				

Here are the formulas spelled out according to their logic:

Formula	Description
=IF(A2>B2,TRUE,FALSE)	IF A2 is greater than B2, return TRUE, otherwise return FALSE. 03/12/14 is greater than 01/01/14, so the formula returns TRUE.

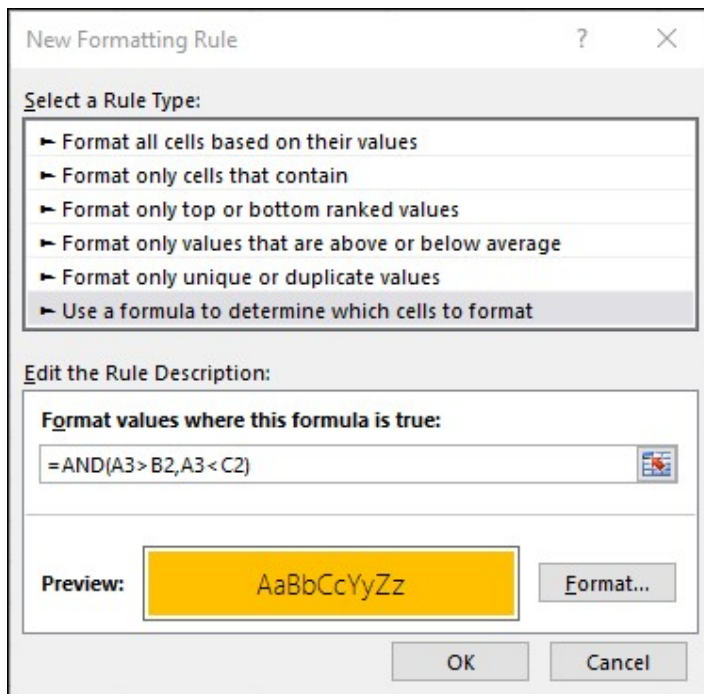
Formula	Description
=IF(AND(A3>B2,A3<C2),TRUE,FALSE)	IF A3 is greater than B2 AND A3 is less than C2, return TRUE, otherwise return FALSE. In this case both arguments are true, so the formula returns TRUE.
=IF(OR(A4>B2,A4<B2+60),TRUE,FALSE)	IF A4 is greater than B2 OR A4 is less than B2 + 60, return TRUE, otherwise return FALSE. In this case the first argument is true, but the second is false. Since OR only needs one of the arguments to be true, the formula returns TRUE. If you use the Evaluate Formula Wizard from the Formula tab you'll see how Excel evaluates the formula.
=IF(NOT(A5>B2),TRUE,FALSE)	IF A5 is not greater than B2, then return TRUE, otherwise return FALSE. In this case, A5 is greater than B2, so the formula returns FALSE.



## Using AND, OR and NOT with Conditional Formatting

You can also use AND, OR and NOT to set Conditional Formatting criteria with the formula option. When you do this you can omit the IF function and use AND, OR and NOT on their own.

From the **Home** tab, click **Conditional Formatting > New Rule**. Next, select the “**Use a formula to determine which cells to format**” option, enter your formula and apply the format of your choice.



Using the earlier Dates example, here is what the formulas would be.

	A	B	C	D
1	Start Date	Date 1	Date 2	Formula
2	03/12/14	01/01/14	12/31/14	=A2>B2
3	03/12/14			=AND(A3>B2,A3<C2)
4	03/12/14			=OR(A4>B2,A4<B2+60)
5	03/12/14			=NOT(A5>B2)
6	03/12/14			=NOT(B2>A5)

Formula	Description
=A2>B2	If A2 is greater than B2, format the cell, otherwise do nothing.
=AND(A3>B2,A3<C2)	If A3 is greater than B2 AND A3 is less than C2, format the cell, otherwise do nothing.
=OR(A4>B2,A4<B2+60)	If A4 is greater than B2 OR A4 is less than B2 plus 60 (days), then format the cell, otherwise do nothing.
=NOT(A5>B2)	If A5 is NOT greater than B2, format the cell, otherwise do nothing. In this case A5 is greater than B2, so the result will return FALSE. If you were to change the formula to =NOT(B2>A5) it would return TRUE and the cell would be formatted.

**Note:** A common error is to enter your formula into Conditional Formatting without the equals sign (=). If you do this you'll see that the Conditional Formatting dialog will add the equals sign and quotes to the formula - ="OR(A4>B2,A4<B2+60)", so you'll need to remove the quotes before the formula will respond properly.

# Excel logical functions - overview

Microsoft Excel provides 4 logical functions to work with the logical values. The functions are AND, OR, XOR and NOT. You use these functions when you want to carry out more than one comparison in your formula or test multiple conditions instead of just one. As well as logical operators, Excel logical functions return either TRUE or FALSE when their arguments are evaluated.

The following table provides a short summary of what each logical function does to help you choose the right formula for a specific task.

Function	Description	Formula Example	Formula Description
AND	Returns TRUE if all of the arguments evaluate to TRUE.	=AND (A2>=10, B2<5)	The formula returns TRUE if a value in cell A2 is greater than or equal to 10, and a value in B2 is less than 5, FALSE otherwise.
OR	Returns TRUE if any argument evaluates to TRUE.	=OR (A2>=10, B2<5)	The formula returns TRUE if A2 is greater than or equal to 10 or B2 is less than 5, or both conditions are met. If neither of the conditions it met, the formula returns FALSE.
XOR	Returns a logical Exclusive Or of all arguments.	=XOR (A2>=10, B2<5)	The formula returns TRUE if either A2 is greater than or equal to 10 or B2 is less than 5. If neither of the conditions is met or both conditions are met, the formula returns FALSE.
NOT	Returns the reversed logical value of its argument. I.e. If the argument is FALSE, then TRUE is returned and vice versa.	=NOT (A2>=10)	The formula returns FALSE if a value in cell A1 is greater than or equal to 10; TRUE otherwise.

In additions to the four logical functions outlined above, Microsoft Excel provides 3 "conditional" functions - IF, IFERROR and IFNA.

## Excel logical functions - facts and figures

1. In arguments of the logical functions, you can use cell references, numeric and text values, Boolean values, comparison operators, and other Excel functions. However, all arguments must evaluate to the Boolean values of TRUE or FALSE, or references or arrays containing logical values.
2. If an argument of a logical function contains any **empty cells**, such values are ignored. If all of the arguments are empty cells, the formula returns #VALUE! error.
3. If an argument of a logical function contains numbers, then zero evaluates to FALSE, and all other numbers including negative numbers evaluate to TRUE. For example, if cells A1:A5 contain numbers, the formula =AND(A1:A5) will return TRUE if none of the cells contains 0, FALSE otherwise.
4. A logical function returns the #VALUE! error if none of the arguments evaluate to logical values.
5. A logical function returns the #NAME? error if you've misspell the function's name or attempted to use the function in an earlier Excel version that does not support it. For example, the XOR function can be used in Excel 2016 and 2013 only.
6. In Excel 2007 and higher, you can include up to 255 arguments in a logical function, provided that the total length of the formula does not exceed 8,192 characters. In Excel 2003 and lower, you can supply up to 30 arguments and the total length of your formula shall not exceed 1,024 characters.

## Using the AND function in Excel

The AND function is the most popular member of the logic functions family. It comes in handy when you have to test several conditions and make sure that all of them are met. Technically, the AND function tests the conditions you specify and returns TRUE if all of the conditions evaluate to TRUE, FALSE otherwise.

The syntax for the Excel AND function is as follows:

AND(logical1, [logical2], ...)

Where logical is the condition you want to test that can evaluate to either TRUE or FALSE. The first condition (logical1) is required, subsequent conditions are optional.

And now, let's look at some formula examples that demonstrate how to use the AND functions in Excel formulas.

Formula	Description
=AND (A2="Bananas" , B2>C2)	Returns TRUE if A2 contains "Bananas" and B2 is greater than C2, FALSE otherwise.
=AND (B2>20, B2=C2)	Returns TRUE if B2 is greater than 20 and B2 is equal to C2, FALSE otherwise.
=AND (A2="Bananas" ,	Returns TRUE if A2 contains "Bananas", B2 is greater than or

Formula

Description

$B2 \geq 30, B2 > C2$ )

equal to 30 and B2 is greater than C2, FALSE otherwise.

	A	B	C	D	E	F
1	Product	In Stock	Sold	Formula 1	Formula 2	Formula 3
2				=AND(A2="Bananas", B2>C1)	=AND(B2>20, B2=C2)	=AND(A2="Bananas", B2>=30, B2>C2)
3	Bananas	30	20	TRUE	FALSE	TRUE
4	Oranges	40	40	FALSE	TRUE	FALSE
5	Bananas	20	20	FALSE	FALSE	FALSE
6	Oranges	40	10	FALSE	FALSE	FALSE

### Excel AND function - common uses

By itself, the Excel AND function is not very exciting and has narrow usefulness. But in combination with other Excel functions, AND can significantly extend the capabilities of your worksheets.

One of the most common uses of the Excel AND function is found in the logical\_test argument of the IF function to test several conditions instead of just one. For example, you can nest any of the AND functions above inside the IF function and get a result similar to this:

=IF(AND(A2="Bananas", B2>C2), "Good", "Bad")

	A	B	C	D
1	Product	In Stock	Sold	IF formula
2	Bananas	30	20	Good
3	Oranges	40	40	Bad
4	Bananas	20	20	Bad
5	Oranges	40	10	Bad

For more IF / AND formula examples, please check out his tutorial: Excel IF function with multiple AND conditions.

### An Excel formula for the BETWEEN condition

If you need to create a between formula in Excel that picks all values between the given two values, a common approach is to use the IF function with AND in the logical test.

For example, you have 3 values in columns A, B and C and you want to know if a value in column A falls between B and C values. To make such a formula, all it takes is the IF function with nested AND and a couple of comparison operators:



Formula to check if X is between Y and Z, inclusive:

```
=IF(AND(A2>=B2,A2<=C2),"Yes","No")
```

Formula to check if X is between Y and Z, not inclusive:

```
=IF(AND(A2>B2,A2<C2),"Yes","No")
```

Is between Values 2 and 3?      Lower-bound value      Upper-bound value

	A	B	C	D
1	Value 1	Value 2	Value 3	Is Value 1 between Value 2 & Value 3?
2				=IF(AND(A2>=B2,A2<=C2),"Yes","No")
3	5	1	10	Yes
4	10	6	8	No
5	4	2	5	Yes
6	12	15	3	No
7	7-Oct	5-Oct	27-Oct	Yes
8	24-Nov	26-Dec	21-Oct	No
9	13-Oct	13-Oct	17-Oct	Yes
10	Bananas	Apples	Cherries	Yes
11	Apples	Apricot	Bananas	No

As demonstrated in the screenshot above, the formula works perfectly for all data types - numbers, dates and text values. When comparing text values, the formula checks them character-by-character in the alphabetic order. For example, it states that *Apples* is not between *Apricot* and *Bananas* because the second "p" in *Apples* comes before "r" in *Apricot*. Please see Using Excel comparison operators with text values for more details.

As you see, the IF /AND formula is simple, fast and almost universal. I say "almost" because it does not cover one scenario. The above formula implies that a value in column B is smaller than in column C, i.e. column B always contains the lower bound value and C - the upper bound value. This is the reason why the formula returns "No" for row 6, where A6 has 12, B6 - 15 and C6 - 3 as well as for row 8 where A8 is 24-Nov, B8 is 26-Dec and C8 is 21-Oct.

But what if you want your between formula to work correctly regardless of where the lower-bound and upper-bound values reside? In this case, use the Excel MEDIAN function that returns the median of the given numbers (i.e. the number in the middle of a set of numbers).

So, if you replace AND in the logical test of the IF function with MEDIAN, the formula will go like:

```
=IF(A2=MEDIAN(A2:C2),"Yes","No")
```



And you will get the following results:

	A	B	C	D
1	Value 1	Value 2	Value 3	Is Value 1 between Value 2 & Value 3?
2				=IF(A2=MEDIAN(A2:C2),"Yes","No")
3	5	1	10	Yes
4	10	6	8	No
5	4	2	5	Yes
6	12	15	3	Yes
7	7-Oct	5-Oct	27-Oct	Yes
8	24-Nov	26-Dec	21-Oct	Yes
9	13-Oct	13-Oct	17-Oct	Yes
10	Bananas	Apples	Cherries	#NUM!
11	Apples	Apricot	Bananas	#NUM!

As you see, the MEDIAN function works perfectly for numbers and dates, but returns the #NUM! error for text values. Alas, no one is perfect : )

If you want a perfect Between formula that works for text values as well as for numbers and dates, then you will have to construct a more complex logical text using the AND / OR functions, like this:

=IF(OR(AND(A2>B2, A2<C2), AND(A2<B2, A2>C2)), "Yes", "No")

	A	B	C	D	E
1	Value 1	Value 2	Value 3	Is Value 1 between Value 2 and Value 3?	
2	5	1	10	Yes	
3	5-Oct	6-Oct	5-Sep	Yes	
4	Bananas	Apples	Cherries	Yes	
5	Apples	Apricot	Bananas	No	

## Using the OR function in Excel

As well as AND, the Excel OR function is a basic logical function that is used to compare two values or statements. The difference is that the OR function returns TRUE if at least one of the arguments evaluates to TRUE, and returns FALSE if all arguments are FALSE. The OR function is available in all versions of Excel 2016 - 2000.

The syntax of the Excel OR function is very similar to AND:

OR(logical1, [logical2], ...)

Where logical is something you want to test that can be either TRUE or FALSE. The first logical is required, additional conditions (up to 255 in modern Excel versions) are optional.

And now, let's write down a few formulas for you to get a feel how the OR function in Excel works.

Formula	Description
<code>=OR (A2="Bananas", A2="Oranges")</code>	Returns TRUE if A2 contains "Bananas" or "Oranges", FALSE otherwise.
<code>=OR (B2&gt;=40, C2&gt;=20)</code>	Returns TRUE if B2 is greater than or equal to 40 or C2 is greater than or equal to 20, FALSE otherwise.
<code>=OR (B2=" ", C2="")</code>	Returns TRUE if either B2 or C2 is blank or both, FALSE otherwise.

	A	B	C	D	E	F
1	Product	In Stock	Sold	Formula 1	Formula 2	Formula 3
2				<code>=OR(A2="Bananas", A2="Oranges")</code>	<code>=OR(B2&gt;=40, C2&gt;=20)</code>	<code>=OR(B2="", C2="")</code>
3	Bananas	30	10	TRUE	FALSE	FALSE
4	Oranges		20	TRUE	TRUE	TRUE
5	Cherries	20		FALSE	FALSE	TRUE
6	Oranges	30	10	TRUE	FALSE	FALSE
7	Cherries			FALSE	FALSE	TRUE

As well as Excel AND function, OR is widely used to expand the usefulness of other Excel functions that perform logical tests, e.g. the IF function. Here are just a couple of examples:

### IF function with nested OR

`=IF (OR (B2>30, C2>20), "Good", "Bad")`

The formula returns "Good" if a number in cell B3 is greater than 30 or the number in C2 is greater than 20, "Bad" otherwise.

### Excel AND / OR functions in one formula

Naturally, nothing prevents you from using both functions, AND & OR, in a single formula if your business logic requires this. There can be infinite variations of such formulas that boil down to the following basic patterns:

`=AND (OR (Cond1, Cond2), Cond3)`

`=AND (OR (Cond1, Cond2), OR (Cond3, Cond4))`

`=OR (AND (Cond1, Cond2), Cond3)`

`=OR (AND (Cond1, Cond2), AND (Cond3, Cond4))`

For example, if you wanted to know what consignments of bananas and oranges are sold out, i.e. "In stock" number (column B) is equal to the "Sold" number (column C), the following OR/AND formula could quickly show this to you:

`=OR(AND(A2="bananas", B2=C2), AND(A2="oranges", B2=C2))`

	A	B	C	D	E	F
1	Product	In Stock	Sold	Supplier	Bananas & oranges sold out	
2	Apples	40	30	Peter	FALSE	
3	Bananas	30	20	Josh	FALSE	
4	Oranges	40	40	Peter	TRUE	
5	Bananas	30	20	Peter	FALSE	
6	Oranges	40	10	Josh	FALSE	
7	Bananas	50	50	Josh	TRUE	

### OR function in Excel conditional formatting

`=OR($B2="", $C2="")`

The rule with the above OR formula highlights rows that contain an empty cell either in column B or C, or in both.

	A	B	C	D	E	F	G	H	I	J
1	Product	In Stock	Sold							
2	Bananas	30	20							
3	Apples	40	40							
4	Bananas		20							
5	Cherries	40	30							
6	Lemons	50								

Conditional Formatting Rules Manager

Show formatting rules for: This Worksheet

New Rule... Edit Rule... Delete Rule

Rule (applied in order shown)	Format	Applies to	Stop If True
Formula: =OR(\$B2="", \$C2="")	AaBbCcYyZz	=A\$2:\$C\$6	<input type="checkbox"/>

OK Close Apply

For more information about conditional formatting formulas, please see the following articles:

- Excel conditional formatting formulas
- Changing the row color based on a cell's value
- Changing a cell's color based on another cell value
- How to highlight every other row in Excel

## Using the XOR function in Excel

In Excel 2013, Microsoft introduced the XOR function, which is a logical **Exclusive OR** function. This term is definitely familiar to those of you who have some knowledge of any programming language or computer science in general. For those who don't, the concept of 'Exclusive Or' may be a bit difficult to grasp at first, but hopefully the below explanation illustrated with formula examples will help.

The syntax of the XOR function is identical to OR's :

XOR(logical1, [logical2],...)

The first logical statement (Logical 1) is required, additional logical values are optional. You can test up to 254 conditions in one formula, and these can be logical values, arrays, or references that evaluate to either TRUE or FALSE.

In the simplest version, an XOR formula contains just 2 logical statements and returns:

- TRUE if either argument evaluates to TRUE.
- FALSE if both arguments are TRUE or neither is TRUE.

This might be easier to understand from the formula examples:

Formula	Result	Description
=XOR (1>0, 2<1)	TRUE	Returns TRUE because the 1st argument is TRUE and the 2 <sup>nd</sup> argument is FALSE.
=XOR (1<0, 2<1)	FALSE	Returns FALSE because both arguments are FALSE.
=XOR (1>0, 2>1)	FALSE	Returns FALSE because both arguments are TRUE.

When more logical statements are added, the XOR function in Excel results in:

- TRUE if an odd number of the arguments evaluate to TRUE;
- FALSE if is the total number of TRUE statements is even, or if all statements are FALSE.

The screenshot below illustrates the point:

The screenshot shows the Excel formula bar with the formula `=XOR(A1:E1)` entered. Below it is a table with columns A through F and rows 1 through 6. The results of the XOR function are shown in column F.

	A	B	C	D	E	F
1	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
2	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE
3	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE
4	FALSE	FALSE	FALSE	TRUE	TRUE	FALSE
5	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE
6	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE

If you are not sure how the Excel XOR function can be applied to a real-life scenario, consider the following example. Suppose you have a table of contestants and their results for the first 2 games. You want to know which of the payers shall play the 3<sup>rd</sup> game based on the following conditions:

- Contestants who won Game 1 and Game 2 advance to the next round automatically and don't have to play Game 3.
- Contestants who lost both first games are knocked out and don't play Game 3 either.
- Contestants who won either Game 1 or Game 2 shall play Game 3 to determine who goes into the next round and who doesn't.

A simple XOR formula works exactly as we want:

`=XOR(B2="Won", C2="Won")`

The screenshot shows the Excel formula bar with the formula `=XOR(B2="Won", C2="Won")` entered. Below it is a table with columns A through D and rows 1 through 5. The results of the XOR function are shown in column D.

	A	B	C	D
1	Contestant	Game 1	Game 2	Play Game 3?
2	Andrew	Won	Won	FALSE
3	Billy	Won	Lost	TRUE
4	Erik	Lost	Won	TRUE
5	Josh	Lost	Lost	FALSE

And if you nest this XOR function into the logical test of the IF formula, you will get even more sensible results:

`=IF(XOR(B2="Won", C2="Won"), "Yes", "No")`

The screenshot shows the Excel formula bar with the formula `=IF(XOR(B2="Won", C2="Won"), "Yes", "No")` entered. Below it is a table with columns A through E and rows 1 through 5. The results of the nested IF and XOR function are shown in column D.

	A	B	C	D	E
1	Contestant	Game 1	Game 2	Play Game 3?	
2	Andrew	Won	Won	No	
3	Billy	Won	Lost	Yes	
4	Erik	Lost	Won	Yes	
5	Josh	Lost	Lost	No	

## Using the NOT function in Excel

The NOT function is one of the simplest Excel functions in terms of syntax:

NOT(logical)

You use the NOT function in Excel to reverse a value of its argument. In other words, if logical evaluates to FALSE, the NOT function returns TRUE and vice versa. For example, both of the below formulas return FALSE:

=NOT (TRUE)

=NOT (2\*2=4)

Why would one want to get such ridiculous results? In some cases, you might be more interested to know when a certain condition isn't met than when it is. For example, when reviewing a list of attire, you may want to exclude some color that does not suit you. I'm not particularly fond of black, so I go ahead with this formula:

=NOT (C2="black")

	A	B	C	D	E
1	Item	Description	Color	Price	Any color but black
2	113456	Coat	White	\$980	TRUE
3	113457	Coat	Black	\$1,090	FALSE
4	113458	Jacket	Brown	\$780	TRUE
5	113459	Fur coat	White	\$1,000	TRUE
6	113460	Fur coat	Ivory	\$1,035	TRUE
7	113461	Jacket	Black	\$760	FALSE
8	113462	Coat	White	\$800	TRUE

As usual, in Microsoft Excel there is more than one way to do something, and you can achieve the same result by using the Not equal to operator: =C2<>"black".

If you want to test several conditions in a single formula, you can use NOT in conjunctions with the AND or OR function. For example, if you wanted to exclude black and white colors, the formula would go like:

=NOT (OR (C2="black", C2="white"))

And if you'd rather not have a black coat, while a black jacket or a black fur coat may be considered, you should use NOT in combination with the Excel AND function:

=NOT (AND (C2="black", B2="coat"))

Another common use of the NOT function in Excel is to reverse the behavior of some other function. For instance, you can combine NOT and ISBLANK functions to create the ISNOTBLANK formula that Microsoft Excel lacks.

As you know, the formula =ISBLANK(A2) returns TRUE if the cell A2 is blank. The NOT function can reverse this result to FALSE: =NOT(ISBLANK(A2))

And then, you can take a step further and create a nested IF statement with the NOT / ISBLANK functions for a real-life task:

=IF(NOT(ISBLANK(C2)), C2\*0.15, "No bonus :(")

	A	B	C	D	E
1	Salesman	Primary sales	Extra sales	Bonus	
2	Andrew	\$1,860	\$169	\$25	
3	Billy	\$910	\$145	\$22	
4	Erik	\$1,020		No bonus :(	
5	Josh	\$1,070	\$185	\$28	
6	Mike	\$1,100		No bonus :(	
7	Steve	\$1,020	\$180	\$27	

Translated into plain English, the formula tells Excel to do the following. If the cell C2 is not empty, multiply the number in C2 by 0.15, which gives the 15% bonus to each salesman who has made any extra sales. If C2 is blank, the text "No bonus :( " appears.



# USING VLOOKUP WITH IF

## **Vlookup with If statement: return True/False, Yes/No, etc.**

One of the most common scenarios when you combine If and Vlookup together is to compare the value returned by Vlookup with a sample value and return *Yes / No* or *True / False* as the result.

In most cases, the following generic formula would work nicely:

```
IF(VLOOKUP(...) = value, TRUE, FALSE)
```

Translated in plain English, the formula instructs Excel to return *True* if Vlookup is true (i.e. equal to the specified value). If Vlookup is false (not equal to the specified value), the formula returns *False*.

Below you will find a few real-life uses of this IF Vlookup formula.

### *Example 1. Look up a specific value*

Let's say, you have a list of items in column A and quantity in column B. You are creating a dashboard for your users and need a formula that would check the quantity for an item in E1 and inform the user whether the item is in stock or sold out.

You pull the quantity with a regular Vlookup with exact match formula like this:

```
=VLOOKUP (E1, $A$2:$B$10, 2, FALSE)
```

Then, write an IF statement that compares Vlookup's result with zero, and returns "No" if it is equal to 0, "Yes" otherwise:

=IF (VLOOKUP (E1, \$A\$2:\$B\$10, 2, FALSE) = 0, "No", "Yes")

=IF(VLOOKUP(E1,\$A\$2:\$B\$10,2,FALSE)=0, "No", "Yes")

	A	B	C	D	E
1	<b>Product</b>	<b>Qty.</b>		<b>Product</b>	Lemons
2	Apples	120		<b>In stock?</b>	No
3	Apricots	115			
4	Bananas	0			
5	Cherries	110			
6	Kiwi	190			
7	Lemons	0			
8	Lime	220			
9	Oranges	130			
10	Peaches	170			

Instead of *Yes/No*, you can return *TRUE/FALSE* or *In Stock/Sold out* or any other two choices. For example:

=IF (VLOOKUP (E1, \$A\$2:\$B\$10, 2) = 0, "Sold out", "In stock")

You can also compare the value returned by Vlookup with sample **text**. In this case, be sure to enclose a text string in quotation marks, like this:

=IF (VLOOKUP (E1, \$A\$2:\$B\$10, 2) = "sample text", TRUE, FALSE)

**Example 2. Compare Vlookup result with another cell**

Another typical example of Vlookup with If condition in Excel is comparing the Vlookup output with a value in another cell. For example, we can check if it's greater than or equal to a number in cell G2:

=IF (VLOOKUP (E1, \$A\$2:\$B\$10, 2) >= G2, "Yes!", "No")

And here is our If formula with Vlookup in action:

E2 : =IF(VLOOKUP(E1,\$A\$2:\$B\$10,2, FALSE)>=G2, "Yes!", "No")

	A	B	C	D	E	F	G	H
1	<b>Product</b>	<b>Sales</b>		<b>Product</b>	Lime		<b>Max sales</b>	
2	Apples	\$120		<b>Max sales?</b>	Yes!		\$220	=MAX(\$B\$2:\$B\$10)
3	Apricots	\$115						
4	Bananas	\$0						
5	Cherries	\$110						
6	Kiwi	\$190						
7	Lemons	\$0						
8	Lime	\$220						
9	Oranges	\$130						
10	Peaches	\$170						

In a similar fashion, you can use any other logical operator together with a cell reference in your Excel If Vlookup formula.

### Example 3. Vlookup values in a shorter list

To compare each cell in the target column with another list and return *True* or *Yes* if a match is found, *False* or *No* otherwise, use this generic IF ISNA VLOOKUP formula:

IF(ISNA( VLOOKUP(...)),"No","Yes")

If Vlookup results in the #N/A error, the formula returns "No", meaning the lookup value is not found in the lookup list. If the match is found, "Yes" is returned. For example:

=IF (ISNA (VLOOKUP (A2, \$D\$2:\$D\$4, 1, FALSE) ), "No", "Yes")

**=IF(ISNA(VLOOKUP(A2,\$D\$2:\$D\$4,1,FALSE)), "No", "Yes")**

	A	B	C	D
1	Product	Is in the lookup list?		Lookup list
2	Apples	No		Bananas
3	Apricots	No		Lemons
4	Bananas	Yes		Oranges
5	Cherries	No		
6	Kiwi	No		
7	Lemons	Yes		
8	Lime	No		
9	Oranges	Yes		
10	Peaches	No		

If your business logic requires the opposite results, simply swap "Yes" and "No" to reverse the formula's logic:

=IF (ISNA (VLOOKUP (A2, \$D\$2:\$D\$4, 1, FALSE) ), "Yes", "No")

**=IF(ISNA(VLOOKUP(A2,\$D\$2:\$D\$4,1,FALSE)), "Yes", "No")**

	A	B	C	D	E
1	Product	In stock?		Sold out	
2	Apples	Yes		Bananas	
3	Apricots	Yes		Lemons	
4	Bananas	No		Oranges	
5	Cherries	Yes			
6	Kiwi	Yes			
7	Lemons	No			
8	Lime	Yes			
9	Oranges	No			
10	Peaches	Yes			

# Using **nested IF** formula

Here's a typical example of Excel If with multiple conditions. Supposing you have a list of students in column A and their exam scores in column B, and you want to classify the scores with the following conditions:

- Excellent: Over 249
- Good: between 249 and 200, inclusive
- Satisfactory: between 199 and 150, inclusive
- Poor: Under 150

And now, let's write a nested IF function based on the above criteria. It's considered a good practice to begin with the most important condition and keep your functions as simple as possible. Our Excel nested IF formula goes as follows:

```
=IF(B2>249, "Excellent", IF(B2>=200, "Good", IF(B2>150, "Satisfactory", "Poor")))
```

And works exactly as it should:

	A	B	C	D	E	F
1	Student name	Score	Result		Scores	
2	Brian	274	Excellent		Excellent	Over 249
3	Christian	280	Excellent		Good	249 to 200
4	Colin	170	Satisfactory		Satisfactory	199 to 150
5	Laura	237	Good		Poor	Under 150
6	Melissa	210	Good			
7	Mike	186	Satisfactory			
8	Neal	240	Good			
9	Peter	146	Poor			
10	Rachel	287	Excellent			

## Understanding Excel nested IF logic

I've heard some people say that Excel multiple If is driving them crazy :) Try looking at it at a different angle:

```
=IF(B2>249, "Excellent",  
    IF(B2>=200, "Good",  
        IF(B2>150, "Satisfactory", "Poor")))
```

What the formula actually tells Excel to do is to evaluate the *logical\_test* of the first IF function and, if the condition is met, return the value supplied in the *value\_if\_true* argument. If the condition of the 1st If function is not met, then test the 2nd If statement, and so on.

IF(check if B2>=249, if true - return "Excellent", or else  
 IF(check if B2>=200, if true - return "Good", or else  
 IF(check if B2>150, if true - return "Satisfactory", if false -  
 return "Poor"))

## Example 2. Multiple If with arithmetic calculations

Here's another typical task: the unit price varies depending on the specified quantity, and your goal is to write a formula that calculates the total price for any amount of items input in a specific cell. In other words, your formula needs to check multiple conditions and perform different calculations depending on what amount range the specified quantity falls in:

Unit Quantity	Price per unit
1 to 10	\$20
11 to 19	\$18
20 to 49	\$16
50 to 100	\$13
Over 101	\$12

This task can also be accomplished by using multiple IF functions. The logic is the same as in the above example, the only difference is that you multiply the specified quantity by the value returned by nested IFs (i.e. the corresponding price per unit).

Assuming the user enters the quantity in cell B8, the formula is as follows:

```
=B8*IF(B8>=101, 12, IF(B8>=50, 13, IF(B8>=20, 16, IF( B8>=11, 18, IF(B8>=1, 20, ""))))))
```

And the result will look something similar to this:

=B8*IF(B8>=101, 12, IF(B8>=50, 13, IF(B8>=20, 16, IF( B8>=11, 18, IF(B8>=1, 20, ""))))))							
	A	B	C	D	E	F	G
1	<b>Unit Quantity</b>	<b>Price per unit</b>					
2	1 to 10	\$20					
3	11 to 19	\$18					
4	20 to 49	\$16					
5	50 to 100	\$13					
6	Over 101	\$12					
7							
8	<b>Qty.</b>	100					
9	<b>Total</b>	\$1,300					

As you understand, this example demonstrates only the general approach, and you can easily customize this nested If function depending on your particular task.

For example, instead of "hard-coding" the prices in the formula, you can reference the cells containing those values (cells B2 to B6). This will enable your users to edit the source data without having to update the formula:

```
=B8*IF(B8>=101,B6, IF(B8>=50, B5, IF(B8>=20, B4, IF( B8>=11, B3, IF(B8>=1, B2, ""))))))
```

	A	B	C	D	E	F	G
1	<b>Unit Quantity</b>	<b>Price per unit</b>					
2	1 to 10	\$20					
3	11 to 19	\$18					
4	20 to 49	\$16					
5	50 to 100	\$13					
6	Over 101	\$12					
7							
8	<b>Qty.</b>	100					
9	<b>Total</b>	=B8*IF(B8>=101,					

Or, you may want to include an additional IF function(s) that fixes an upper, lower or both bounds of the amount range. When the quantity is outside the range, the formula will display an "out of the range" message. For example:

```
=IF(OR(B8>200,B8<1), "Qty. out of range", B8*IF(B8>=101,12, IF(B8>=50, 13, IF(B8>=20, 16, IF( B8>=11, 18, IF(B8>=1, 20, ""))))))
```

	A	B	C	D	E
1	<b>Unit Quantity</b>	<b>Price per unit</b>			
2	1 to 10	\$20			
3	11 to 19	\$18			
4	20 to 49	\$16			
5	50 to 100	\$13			
6	101 to 200	\$12			
7					
8	<b>Qty.</b>	201			
9	<b>Total</b>	Qty. out of range			

The nested IF formulas described above work in all versions of Excel. In Excel 365 and Excel 2021, you can also use the [IFS function](#) for the same purpose.