

Logical Functions



You can use the IF function to evaluate a condition. The **IF** function returns different values depending on whether the condition is true or false. The syntax for the IF function is:

IF(logical_test, [Value_if_true], [Value_if_false])

The first argument is the condition that you want the function to evaluate. The second argument is the value to be returned if the condition is true and the third argument is the value to be returned if the condition is false. Second and third parameters are optional.

Nested IF

A Nested IF function is when a second IF function is placed inside the first in order to test additional conditions.

The syntax for the Nested IF function is:

IF(logical_test, [Value_if_true], IF(logical_test, [Value_if_true], [Value_if_false]))

Examples:

You can use nested IF functions to evaluate complex conditions. For example, if the Salary < 5000 then tax is 5%, if salary between 5000 and 10000 then it is 10% else 15%.

Since we have already given name range to salary column as sal so one can also use sal instead of h2

=if(sal<5000,salary*.05,if(sal<10000,salary*.10,sal*.15))

Suppose you want to assign letter grades to numbers referenced by the name Average Score. See the following table.

If Average Score is	Then return
Greater than 89	A
From 80 to 89	B
From 70 to 79	C
From 60 to 69	D
Less than 60	F

You can use the following nested IF function:

`IF(AverageScore>89,"A",IF(AverageScore>79,"B",IF(AverageScore>69,"C",IF(AverageScore>59,"D","F"))`

`)))`

Tips: You can nest up to sixty four levels of If functions in a single formula.

IF with AND

AND is a logical function in excel which returns the combined truth value of two arguments or conditions. It returns false only when all the conditions listed are false.

Syntax

AND(logical1, logical2...)

If there is a scenario where we have two conditions whose combined truth value would decide the output of an IF function, we can use AND with IF.

Syntax using AND with If

If(and(Condition1, condition2....), True, False)

Example:

If we need to give 10% of his basic salary as incentive to every one working in "Sales" department "North" region, we would use the following formula.

=IF (AND (Department="sales", Region="north"), 10%*Basic Salary, 0)

IF with OR

OR is a logical function in excel which returns False if any one of the arguments returns false.

Syntax

OR(logical1, logical2...)

If there is a scenario where we have two conditions of which any one of the conditions is false, the if should return the value in the false argument, we may use OR with IF.

Syntax using OR with If

If(OR(Condition1, condition2,...), True, False)

Example:

If the employee is in Sales, Mktg or Hrd, then hra is 50% of Basic salary otherwise, it is 30% of Basic salary. **if(or(Department ="Mktg",Department ="Sales",Department="Hrd"),Basic salary*.5,Basic salary*.3)**

IF with NOT

Not is a logical function used to negate an argument.

Syntax

NOT(logical)

If we have a condition which when not satisfied we need to apply the formula, we may use **NOT** with

IF.

Syntax using NOT with If

If(NOT(Condition), True, False)

Example:

If we need to give an incentive to everyone but people working in the "Marketing" department we may use the following formula.

IF(NOT(Department="Mktg"),10%*salary,0)

Tips: There can be maximum 255 conditions which can be passed to AND/OR function and we can pass only one condition to NOT.

We may also use multiple not inside if.

Example

If you need to give an incentive to everyone but people from the sales ad admin department, you may use the following function.

If(and(not(department="Sales"),not(department="admin")),10%*salary,0)

Lookup Functions

Sometimes, we need to search for a value in a database based on a lookup value. For example, given Employee Id, how can I look up the incentive value from some other sheet or some other file? In such scenarios, depending on the source database, we may use one of the following lookup functions.

- 1) V-lookup (If the database is vertical as in **Figure 3.6**)
- 2) H-lookup (If the database is horizontal as in **Figure 3.7**)

S/N	FUNCTION	CATEGORY	DESCRIPTION	USAGE
01	AND	Logical	Checks multiple conditions and returns true if they all the conditions evaluate to true.	=AND(1 > 0, ISNUMBER(1)) The above function returns TRUE because both Condition is True.
02	FALSE	Logical	Returns the logical value FALSE. It is used to compare the results of a condition or function that either returns true or false	FALSE()
03	IF	Logical	Verifies whether a condition is met or not. If the condition is met, it returns true. If the condition is not met, it returns false. =IF(logical_test,[value_if_true],[value_if_false])	=IF(ISNUMBER(22), "Yes", "No") 22 is Number so that it return Yes.
04	IFERROR	Logical	Returns the expression value if no error occurs. If an error occurs, it returns the error value	=IFERROR(5/0, "Divide by zero error")
05	IFNA	Logical	Returns value if #N/A error does not occur. If #N/A error occurs, it returns NA value. #N/A error means a value if not available to a formula or function.	=IFNA(D6*E6, 0) N.B the above formula returns zero if both or either D6 or E6 is/are empty
06	NOT	Logical	Returns true if the condition is false and returns false if condition is true	=NOT(ISTEXT(0)) N.B. the above function returns true. This is because ISTEXT(0) returns

				false and NOT function converts false to TRUE
07	OR	Logical	Used when evaluating multiple conditions. Returns true if any or all of the conditions are true. Returns false if all of the conditions are false	=OR(D8="admin", E8="cashier") N.B. the above function returns true if either or both D8 and E8 admin or cashier
08	TRUE	Logical	Returns the logical value TRUE. It is used to compare the results of a condition or function that either returns true or false	TRUE()

	A	B	C	D	E	F	G	H
1	Empcode	First Name	Last Name	Dept	Region	Branch	Hiredate	Salary
2	75	Suraj	Saksena	Admin	east	Calcutta	25-Oct-88	17500
3	65	Timsi	Desai	CCD	east	Calcutta	26-Oct-88	17500
4	13	Meera	Lalwani	Finance	east	Calcutta	11-Dec-84	19250
5	70	Reeta	Naik	Mktg	east	Calcutta	4-Mar-95	14000
6	42	Pooja	Gokhale	R&D	east	Calcutta	29-Sep-91	13300
7	84	Pinky	Robert	R&D	east	Calcutta	3-Mar-99	7000
8	91	Niki	Digaria	Sales	east	Calcutta	13-Nov-79	22750
9	17	Aalok	Trivedi	Admin	east	Cuttack	11-Mar-83	15750
10	44	Shaheen	Khan	Personnel	east	Cuttack	17-Nov-90	13825
11	82	Kalpna	Shirishkar	R&D	east	Cuttack	1-Nov-88	17500
12	26	Bharat	Shetty	Sales	east	Cuttack	1-Oct-82	19250
13	2	Suman	Shinde	Sales	east	Cuttack	1-Jan-77	17500
14	41	Kirtikar	Sardesai	Admin	east	Darjeeling	14-Jun-97	7875
15	10	Andre	Fernandes	Mktg	east	Darjeeling	20-Jul-77	15750

Figure 3.6

	A	B	C	D	E	F	G	H
1	Empcode	75	65	13	70	42	84	91
2	First Name	Suraj	Timsi	Meera	Reeta	Pooja	Pinky	Niki
3	Last Name	Saksena	Desai	Lalwani	Naik	Gokhale	Robert	Digaria
4	Dept	Admin	CCD	Finance	Mktg	R&D	R&D	Sales
5	Region	east	east	east	east	east	east	east
6	Branch	Calcutta	Calcutta	Calcutta	Calcutta	Calcutta	Calcutta	Calcutta
7	Hiredate	25-Oct-88	26-Oct-88	11-Dec-84	4-Mar-95	29-Sep-91	3-Mar-99	13-Nov-79
8	Salary	17500	17500	19250	14000	13300	7000	22750

Figure 3.7