Statistical Functions at a glance

Function	Syntax	Description
COUNT	=COUNT(Range)	Counts the number of cell in a range that contain numbers
COUNTA	=COUNTA(Range)	Counts the number of cells which contain any value including text
COUNTBLANK	=COUNTBLANK (Range)	Counts the number of empty cell in the given range
COUNTIF	=COUNTIF (Range,Criteria)	Counts the number of cells within a given range that meet the given criteria

2.6.3 Logical functions

Logical functions are used to compare two values or statements. The commonly used logical functions are IF, AND and OR. All logical functions returns either logical True or logical False when their functions are evaluated.

- **IF**

When we need to test a condition, whether it is true or false, then usually IF function is used. This function will analyse a logical test that you define and give a certain result based on the given condition. You are also able to determine exactly what happens if logical test is true or if the logical test is false.

Syntax : =IF(Test, Then_Value, Otherwise_Value)

Where,

Test is any value or expression that can be TRUE or FALSE. This requires the use of a logical operator such as =, >, <, >=, <=, <>.

Then_Value is the value that is returned if the logical test is TRUE.

Otherwise_Value is the value that is returned if the logical test is FALSE.

Example : =IF(C2>=40,"PASSED","FAILED")

Here, if the value given in C2 is greater than or equal to 40, the function gives the result "PASSED", Otherwise returns the reult "FAILED".

Consider the following example:

Names and scores of few students in an examination are given in Fig 2.25. Insert your argument as students who scored above 40 as "PASS" and otherwise "FAIL". You can enter the formula as:

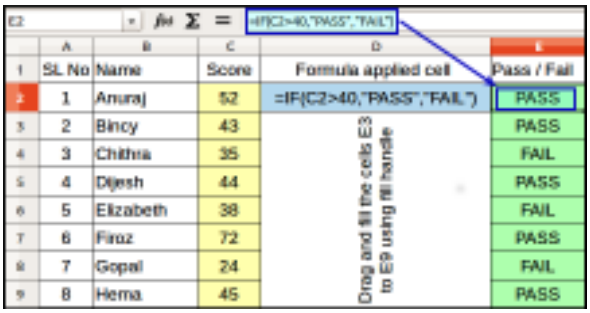


Fig. 2. 25 - Using IF functions

=IF(C2>40,"PASS", "FAIL"), press enter key and copy the formula to other cells.

The results are also shown in the figure 2.25

The procedure for using 'IF function' with the help of function wizard is as follows.

1. Activate the cell where the function is to be used (E2)
2. Select Function from the Insert menu
3. Select "Logical" from the category option followed with IF function from the left pane of the wizard
4. Then enter C2>40 in the Test field, followed by "PASS" and "FAIL" in the next two fields, as shown in Fig. 2.26. The Formula will show up in the column provided as

   =IF (C2>40, "PASS","FAIL")
5. Click on OK tab and the result will be displayed in cell E2. Copy the function from E3 to E9.

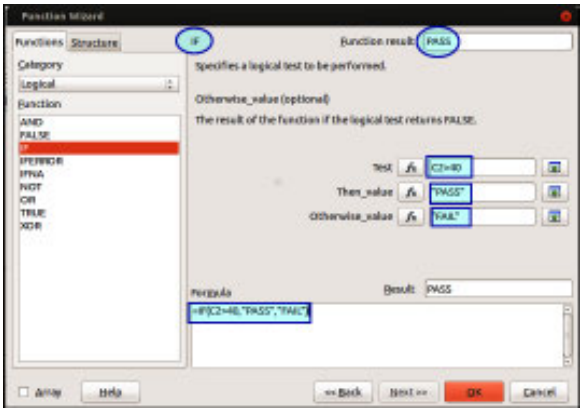


Fig. 2. 26 Using IF function through Wizard

• Nested IF

From the above discussion you might have understood that, IF function which tests single criteria is very simple and straight forward. But, what is to be done if your data requires more logical tests with multiple conditions?

In such a situation you can include several IF conditions in one formula, and these multiple IF statements are called 'NESTED IF'. The biggest advantage here is that you can test more than one condition and return different values in a single formula.

Syntax :

=IF(Test_1, ThenValue_1,IF(Test_2,ThenValue_2,IF(.....)))

Let us explain the concept with the help of the following example.

The name and scores obtained by some students are given. You are required to ascertain their grades on the basis of the criteria specified.

Grade Criteria : A+ (90- 100); A (80-89); B+(70-79); B(60-69);C+(50-59); C(40-49); D+ (30 -39); D - below 30.

Try this given formula in D2. In this case, if the first condition tested is FALSE, the application will test the next condition and so on. (See figure 2.27)

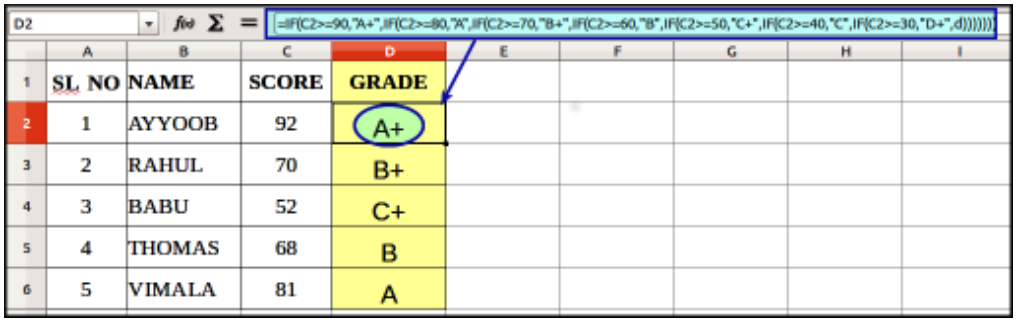
F7

	A	B	C	D
1	SL NO	NAME	SCORE	GRADE
2	1	AYYOOB	92	
3	2	RAHUL	70	
4	3	BABU	52	
5	4	THOMAS	68	
6	5	VIMALA	81	

=IF(C2>=90,"A+",IF(C2>=80,"A",IF(C2>=70,"B+",IF(C2>=60,"B",

IF(C2>=50,"C+",IF(C2>=40,"C",IF(C2>=30,"D+","D")))))))

(Note that in a formula brackets should be used in pairs)



	A	B	C	D	E	F	G	H	I
1	SL NO	NAME	SCORE	GRADE					
2	1	AYYOOB	92	A+					
3	2	RAHUL	70	B+					
4	3	BABU	52	C+					
5	4	THOMAS	68	B					
6	5	VIMALA	81	A					

Fig. 2. 27 - Nested IF

- **AND**

AND function is used to determine whether the output will be TRUE or FALSE. It comes in handy when all the conditions are to be tested and made sure that all are met. It returns TRUE if all the arguments evaluated are TRUE. If any argument is FALSE, this function returns the FALSE value.

Syntax : =AND(LogicalValue1, LogicalValue2, ...LogicalValue30)

The outcomes of AND function in various cases

Formula	Description	Result
=AND(10<13,14>12,7>6)	All arguments are true	TRUE
=AND(10>13,14>12,7>6)	One Argument is false	FALSE
=AND(10>13,14=12,7<6)	All Arguments are false	FALSE
=AND(2+2=4,5+3=8)	All arguments are true	TRUE
=AND(2+2=5,5+3=8)	One Argument is false	FALSE
=AND(2+2=5,4+3=8)	All Arguments are false	FALSE

AND function in combination with other functions, provides enormous possibilities to a worksheet.

Consider the given example:

The scores of students in two subjects Accountancy and Business Studies are given below. Find the students who satisfy the arguments given in the last column using AND function.

Score sheet of students

Name	Scores		Argument
	Accountancy	Business studies	
Reshmi	50	45	Accountancy score more than 50 and business studies score more than 40
Manohar	35	60	
Preeja	72	39	
Latheef	46	38	
Stephen	60	85	Accountancy score more than 50 and Business Studies score more than 80 will be “SELECTED” else “REJECTED”
Elizabeth	75	79	

Let us see the formula that was given to satisfy the given argument using AND function in the Fig 2.28.

E12 $f_{(x)}$ Σ =

	A	B	C	D	E
1	Name	Scores		Result	Formula Used
2		Accountancy	Business studies		
3	Reshmi	50	45	TRUE	=AND(B3>=50,C3>=40)
4	Manohar	35	60	FALSE	=AND(B4>=50,C4>=40)
5	Preeja	72	39	FALSE	=AND(B3>=50,C3>=40)
6	Latheef	46	38	FALSE	=AND(B6>=50,C6>=40)
7	Stephen	60	85	SELECTED	=IF(AND(B7>50,C7>80),"SELECTED","REJECTED")
8	Elizabeth	75	79	REJECTED	=IF(AND(B8>50,C8>80),"SELECTED","REJECTED")

Fig. 2. 28 Example of AND and IF function

- **OR**

OR function is used to compare two values or statements. The difference between OR and AND is that OR will return ‘TRUE’ if at least one argument is correct and 'FALSE' if all the arguments are wrong. But in AND all the arguments must be correct for giving a 'TRUE' value.

Syntax : =OR(LogicalValue1,LogicalValue2, ...LogicalValue30)

Consider the given example:

The scores of students in two subjects Accountancy and Business Studies are listed below. Ascertain how the arguments given are met or not using OR function.

Score sheet of students

Name	Scores		Argument
	Accountancy	Business studies	
Priya	50	45	Accountancy score more than 50 OR Business Studies score more than 40
Smitha	35	60	
Preeja	72	39	
Lijiya	46	38	
Reena	60	85	Accountancy score more than 80 OR Business Studies score more than 80 will be "SELECTED" else "REJECTED"
Shyma	87	57	
Vineetha	82	81	
Elizabeth	75	79	

Observe the table given to see the formula used and the output generated:

Name	Scores		Result	Formula Used	Argument TRUE or FALSE
	Accountancy	Business studies			
Priya	50	45	TRUE	=OR(B3>=50,C3>=40)	All arguments are True
Smitha	35	60	TRUE	=OR(B4>=50,C4>=40)	One Argument is True
Preeja	72	39	TRUE	=OR(B3>=50,C3>=40)	One Argument is True
Lijiya	46	38	FALSE	=OR(B6>=50,C6>=40)	All arguments are False
Reena	60	85	SELECTED	=IF(OR(B7>80,C7>80),"SELECTED","REJECTED")	One Argument is True
Shyma	87	57	SELECTED	=IF(OR(B8>80,C8>80),"SELECTED","REJECTED")	One Argument is True
Vineetha	82	81	SELECTED	=IF(OR(B9>80,C9>80),"SELECTED","REJECTED")	All arguments are True
Elizabeth	75	79	REJECTED	=IF(OR(B10>80,C10>80),"SELECTED","REJECTED")	All arguments are False

2.6.4 Mathematical functions

Calc provides several mathematical functions which help us to expedite analysis. Here you will get a chance to practice using some of these functions more commonly needed in spreadsheets for business applications. They are SUM and ROUND.

- **SUM**

This function is used to get the sum of the given numbers, cells or range of cells. This was already discussed in the beginning of this unit.

Syntax: =SUM(number1, number2,.....)

=SUM(cell1, cell2,.....)

=SUM(Range1,Range2,.....)

• SUMIF

This function is little different from the SUM function. It only sums its values when a particular condition or criteria is met. That is, SUMIF will add only those figures from a particular range which satisfies the conditions.

Syntax: **=SUMIF(range,"criteria", sum_range)**

Where,

Range means the range of cells to which the criteria are to be applied.

Criteria are the condition to be fulfilled for totalling cells.

Sum-range means the range of cells considered for totalling which matches the given criteria. If this parameter is not indicated, the values found in the range are summed.

Let us see an example:

The table given shows the values of Assets owned by M/s. Santhi Associates and its depreciation for the year ending 31st December 2017.

Compute the following by using SUMIF Function.

	A	B	C
1	Name of Asset	Value of Asset ₹	Depreciation ₹
2	Land	750000	90000
3	Buildings	300000	45000
4	Plant	500000	60000
5	Machinery	250000	30000
6	Furniture	100000	20000

(a) Total depreciation of those assets which is more than ₹4,00,000

(b) Total depreciation of those assets which is less than ₹3,50,000

(c) Total depreciation of those assets which is exactly ₹3,00,000

(d) Total value of Assets which is less than or equal to ₹3,00,000

(e) Total value of Assets which is more than or equal to ₹5,00,000

The following table will help you to understand how the formula will work in different situations.

	A	B	C	D	E	F
1	Name of Asset	Value of Asset ₹	Depreciation ₹	Cases	RESULT	Function Used
2	Land	750000	90000	Total depreciation of assets which is more than Rs 4,00,000	150000	=SUMIF(B2:B6,">400000",C2:C6)
3	Buildings	300000	45000	Total depreciation of assets which is less than Rs 3,50,000	95000	=SUMIF(B2:B6,"<350000",C2:C6)
4	Plant	500000	60000	Total depreciation of assets which is exactly Rs 3,00,000	45000	=SUMIF(B2:B6,"=300000",C2:C6)
5	Machinery	250000	30000	Total value of Assets which is less than or equal to Rs 3,00,000	650000	=SUMIF(B2:B6,"<=300000")
6	Furniture	100000	20000	Total value of Assets which is more than or equal to Rs 5,00,000	1250000	=SUMIF(B2:B6,">=500000")

- **ROUND**

Often while carrying out division of numbers, calculating interest, preparing pay roll etc., the end result may be in fraction. Calc provides 'ROUND' function to round-off a number to a certain number of decimal places.

Syntax: =ROUND(Number,Count)

Where;

Number - Number to round to specified number of digits

Count - It specifies the number of digits to round the number

Suppose, number 128.758 is given and is asked to round it to 2 decimal places, doing this manually is very easy. But if huge volume of data is given and you need to round off some digits then this spreadsheet application comes in handy. Let us see how this can be done:

=ROUND(128.758,2) and the result will be 128.76

In the above example the 'Count' is given as 2. So the given number is rounded to the second decimal place. The table will give you an idea about the effect on the results, if the count is changed to 0,1, -1, -2 etc.

Examples of Round Function

FORMULA	DESCRIPTION	RESULT
=ROUND(25431.2572,2)	Rounds 25431.2572 to 2 decimal place	25431.26
=ROUND(25431.2572,1)	Rounds 25431.2572 to 1 decimal place	25431.3
=ROUND(45431.725,0)	Rounds 45431.725 to 0 decimal place to nearest integer	45432
=ROUND(25431.2572,-1)	Rounds 25431.2572 to nearest 10 (left of the decimal)	25430
=ROUND(25431.2572,-2)	Rounds 25431.2572 to nearest 100 (left of the decimal)	25400

- If count is greater than zero, then number is rounded to the specified number of decimal places.
- If count is zero, then number is rounded to the nearest integer.
- If count is less than zero, then number is rounded to the left of the decimal point.

- **ROUNDUP**

This function is similar to ROUND function. This function rounds a number up away from zero, without considering the value next to the rounding digit.

Syntax: =ROUNDUP(number,count)

The following example given in the table put you in better position to understand the ROUNDUP function.

Examples of Roundup function

FORMULA	DESCRIPTION	RESULT
=ROUNDUP(45321.7354,2)	Rounds 45321.7354 UP to 2 decimal place	45321.74
=ROUNDUP(45321.7354,1)	Rounds 45321.7354 UP to 1 decimal place	45321.8
=ROUNDUP(45321.7354,0)	Rounds 45321.7354 UP to 0 decimal place	45322
=ROUNDUP(45321.7354,-1)	Rounds 45321.7354 UP to 1 decimal place to the left of the decimal (Rounds UP to the next 10)	45330
=ROUNDUP(45321.7354,-2)	Rounds 45321.7354 UP to 2 decimal place to the left of the decimal (Rounds UP to the next 100)	45400

- **ROUNDDOWN**

This function does the opposite of ROUNDUP. It rounds a number down towards zero.

Syntax: =ROUNDDOWN(Number,Count)

The listed examples generate an idea on ROUNDDOWN function.

Examples of Rounddown function

FORMULA	DESCRIPTION	RESULT
=ROUNDDOWN(45321.7354,2)	Rounds 45321.7354 down to 2 decimal place	45321.73
=ROUNDDOWN(45321.7354,1)	Rounds 45321.7354 down to 1 decimal place	45321.7
=ROUNDDOWN(45321.7354,0)	Rounds 45321.7354 down to 0 decimal place	45321
=ROUNDDOWN(45321.7354,-1)	Rounds 45321.7354 down to 1 decimal place to the left of the decimal (Rounds down to the next 10)	45320
=ROUNDDOWN(45321.7354,-2)	Rounds 45321.7354 down to 2 decimal place to the left of the decimal (Rounds down to the next 100)	45300

2.6.5 Text Functions

Text functions are used for creating or modifying the data entered in cells to a required text format to same cell or another cell. Commonly used text functions are TEXT and CONCATENATE.

- **TEXT**

You have already learnt about different types of data to be inserted in a cell. This can be number or text. Is it possible for us to convert a number into a text format in Calc?

TEXT converts a number or numerical value into text according to a user given format. This function is useful in situations where we want to display numbers in a more readable format, or want to combine numbers with text or symbols.

Syntax : TEXT(Number,Format)

Where,

Number - numerical value to be converted.

Format - is the text, which defines the format.

Consider the given example :

Cell A2 contains the number 123.45. How can we format this number by adding currency symbol " ₹ " and convert using TEXT function. (See Fig.2.29)

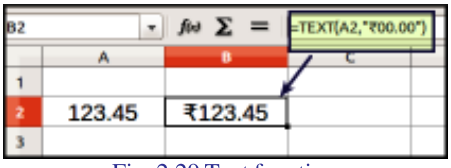


Fig. 2.29 Text function

Examples of TEXT Function on various occasions are given in the following table:

Sl No	Values	Text Function	Result
1	123.45	=TEXT(A1,"?000.00")	₹123.45
2	123.34567	=TEXT(B24,"?###.##")	₹123.35
3	1122017	=TEXT(B25,"00-00-0000")	01/12/2017
4		=TEXT(TODAY(),"DD/MM/YYYY")	27/11/2017
5		=TEXT(TODAY(),"DD")	27
6		=TEXT(TODAY(),"DDDD")	Monday
7		=TEXT(TODAY(),"MM")	11
8		=TEXT(TODAY(),"MMMM")	November
9		=TEXT(TODAY(),"YYYY")	2017
10		=TEXT(NOW(),"H:MM AM/PM")	9:40PM
11	0.285	=TEXT(A3,"0.0%")	28.5%
12	4567549812	=TEXT(A4,"00 00 00 00 00")	45 67 54 98 12

- **CONCATENATE**

This function combines several text strings of different cells into one string. A maximum of 30 passages can be combined into one string. The text items can be text strings, numbers, or single-cell references. Space between strings are given in inverted comma (“”).

Syntax : =CONCATENATE("Text1","Text2", ..."Text30")

Example : The address slip of an employee from his personal details by using concatenate function is narrated below.

	A	B	C	D
1	**Name**	**House Name**	**Post Office**	**District**
2	DILEEP.S	Rose Villa	Cheriyanad	Alappuzha

The function to join the different text items of different cells into one cell is as follows.

=CONCATENATE(A2," ",B2," ",C2," ",D2). See figure 2.30.

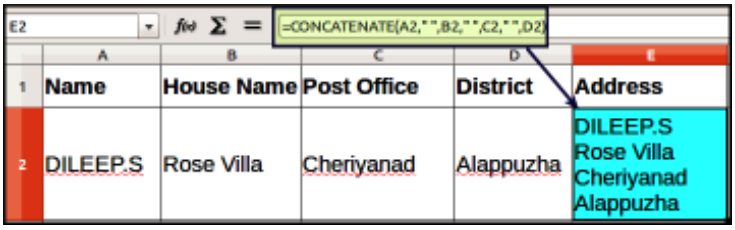


Fig. 2.30 - Concatenate function

Let's assess

1. *=COUNT(45,24,Ab,55,72,Ab,47) returns _____*
2. *COUNTBLANK function count the number of _____ cells in the given range.*
3. *The function used to combine several text strings in different cells into one string is _____.*
4. *Assume cell contains values - A1 = 10000, A2 =15000, A3 = 12000, A4 = 14000. What is the result of*
   SUMIF statement: =SUMIF (A1:A4, "<14000")
   a. 15000 b. 24000 c. 27000 d. 22000
5. *What is the result of the following? =ROUNDUP(45321.4354,0)*
   a. 45322 b. 45321 c. 45321.4 d. 45320
6. *The function which counts the number of cells of any value.*
   a. COUNT b. COUNTA c. COUNTBLANK d. COUNTIF

2.6.6 Spreadsheet Functions

Calc also provides the following functions -

- **LOOKUP**

Suppose a list containing the names and basic pay of 100 employees of a firm is given in a worksheet. Can you find out the basic pay of a particular employee with in a flash?

LOOKUP function is used for searching certain values from a particular table. It is used when we need to look in a single row or column range (known as a vector or from an array) and find a value from the same position in a second row or column.

If LOOKUP cannot find the search criterion, it matches the largest value in the search vector that is less than or equal to the search criterion.

Lookup function has two syntax forms. They are :

i) Vector form and ii) Array form.

• LOOKUP (Vector form)

Syntax

= LOOKUP (SearchCriterion, SearchVector, ResultVector)

Where,

Search Criterion : The value to be searched for; entered either directly or as a reference. Search criterion can be a number, text or a logical value.

Search Vector : The single-row or single-column area to be searched. The search vector for the LOOKUP must be sorted in ascending order for getting proper results.

Result Vector : The single-row or single-column range from which the result of the function is taken.

Go through the example given below :

Details of employees and their basic pay are given in the following table.

(a) Find the name of employee with employee code 2004

(b) Find the basic pay of employee with employee code 2008

(c) Look up the name of employee with employee code 2010

(d) Look up the name of employee with employee code 2000

Employee Number	Employee Name	Basic Pay
2001	Stephen	45000
2002	Vivek	64000
2003	Deepa	43000
2004	Vincent	56000
2005	Hameed	51500
2006	Anupama	43000
2007	Haridas	53000
2008	Krishnapriya	62500

The excerpts of worksheet, details the LOOKUP function.

Employee Number	Employee Name	Basic Pay	Lookup result	Function	Q No.
2001	Stephen	45000	Vincent	=LOOKUP(2004,A2:A9,B2:B9)	(a)
2002	Vivek	64000	62500	=LOOKUP(2008,A2:A9,C2:C9)	(b)
2003	Deepa	43000	Krishnapriya	=LOOKUP(2010,A2:A9,B2:B9)	(c)
2004	Vincent	56000	#N/A	= LOOKUP(2000,A2:A9,B2:B9)	(d)
2005	Hameed	51500			
2006	Anupama	43000			
2007	Haridas	53000			
2008	Krishnapriya	62500			

(Looks up 2000 in column A and finds it is less than the smallest value in column A and the result generated is #N/A)

• LOOKUP (Array form)

Syntax :

=LOOKUP(lookup_value, array)

Example:

Name of the students, their scores and grades are given.

Name	Scores	Grade
Priya	52	C+
Smitha	35	D+
Preeja	72	B+
Lijiya	46	C
Reena	61	B
Shyma	91	A+
Vineetha	82	A
Elizabeth	75	B+

Let's know more ...

What is an Array?
An array is a linked range of cells on a spreadsheet containing values. A square range of 3 rows and 3 columns is a 3×3 array:

	A	*B*	*C*
1	*43*	*12*	*32*
2	*51*	*62*	*75*
3	*47*	*81*	*39*

The smallest possible array is a 1×2 or 2×1 array with two adjacent cells.

(a) Find the grade of Preeja using LOOKUP function.

(b) Find the score of Vineetha using LOOKUP function

(c) Find the Grade of Score 91 using LOOKUP function

You can arrive at the result shown below using the LOOKUP function. (See Fig. 2.31)

	A	B	C	D	E
1	Name	Scores	Grade	Result	Function Used
2	Priya	52	C+	B+	LOOKUP("Preeja",A2:C9)
3	Smitha	35	D+		
4	Preeja	72	B+	82	LOOKUP("Vineetha",A2:B9)
5	Lijiya	46	C		
6	Reena	61	B	A+	LOOKUP(B7,A2:C9)
7	Shyma	91	A+		
8	Vineetha	82	A		
9	Elizabeth	75	B+		

Fig. 2.31 Result of Lookup function

Alternatively, we can arrive at the same result with the help of function wizard.

Select the category as 'Spreadsheet' and function as 'LOOKUP' from the left pane of the wizard.

Enter the values in the following fields.

a. Search Criterion - "Preeja"
b. Search Vector - A2:C9

Here Array A2:C9 has 3 columns and 9 rows. Automatically formula will be displayed in the formula field and its function result will come up in the result field. See Fig.2.32.

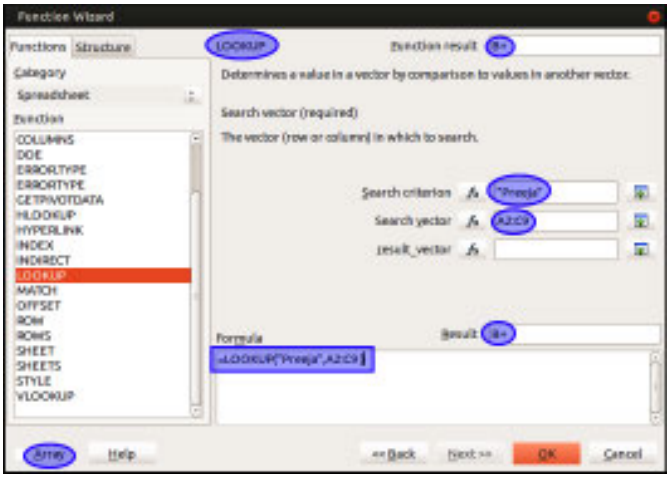


Fig. 2.32 Lookup Function Wizard

The array form of LOOKUP is very similar to the HLOOKUP and VLOOKUP functions. The difference is that HLOOKUP searches for the value of lookup_value in the first row, VLOOKUP searches in the first column, and LOOKUP searches according to the Dimensions of array.

- **VLOOKUP**

VLOOKUP stands for Vertical LOOKUP. This will simply look for something in a range of cells and returns something that is in the same row.

VLOOKUP searches the first column (leftmost column) of a block of data and return the value from another column in the same row. The column containing search criterion must be in ascending order.

SYNTAX : =VLOOKUP(SearchCriterion,Array,Index,SortOrder)

Where,

SearchCriterion - The value you are looking for.

Array - Where you are looking.

Index - The column number in the table (array) from which matching value to be returned. (Index no.1 for column A, 2 for Column B, 3 for Column C and so on...)

Sort order - Precise or approximate values will be returned. Give '0' for Precise value and '1' stands for approximate value.

Enter the Boolean value FALSE or 0 (Zero) if the first column is not sorted in ascending order. In unsorted lists, the search value must be matched exactly. Otherwise the function will return this message:
#N/A (Error: Value Not Available).

Enter the Boolean value TRUE or 1 (One) if the first column is sorted in ascending order. Sorted columns can be searched much faster and the function always returns a value, even if the search value was not matched exactly, if it is between the lowest and highest value of the sorted list.

Let us do some practice. The details of some employees in an organisation are given in the following table.

Employee No	Name	Date of Birth	Designation	Basic Pay
1001	Priyanka	14-02-1988	Manager	50000
1002	Suhail	15-08-1986	Asst. Manager	38000
1003	Preeja	16-04-1979	Cashier	25000
1004	Malavika	25-07-1984	Accountant	46000
1006	Midhun	18-02-1983	Clerk	18000
1007	Shyma	19-02-1990	Clerk	20000
1008	Vineetha	20-02-1987	Clerk	16000
1010	Elizabeth	21-02-1988	Peon	14000

You are required to search the following :

(a) Name of employee having employee code 1007
(b) Date of birth of employee whose code is 1004
(c) Basic pay of employee number 1009 if data is not in ascending order.
(d) Basic pay of employee number 1009 if data is given in ascending order.
(e) Basic pay of employee number 1001.
(f) Name of employee number 1000.
(g) Name of employee number 1001.
(h) Designation of employee number 1001.

The following steps are required for getting the lookup values

1. Enter the given data in the same format from cell A1 to E9 as shown below.
2. Select Cells where the result is required and enter VLOOKUP Function.
   Relevant formulae are given in column F (See figure 2.33)

	A	B	C	D	E	F	G
1	Employee No	Name	Date of Birth	Designation	Basic	Function Used	Result
2	1001	Priyanka	14/02/1988	Manager	50000	=VLOOKUP(1007,A2:E9,2,0)	Shyma
3	1002	Suhail	15/08/1986	Asst. Manager	38000	=VLOOKUP(1004,A2:E9,3,0)	25/07/1984
4	1003	Preeja	16/04/1979	Cashier	25000	=VLOOKUP(1009,A2:E9,5,0)	#N/A
5	1004	Malavika	25/07/1984	Accountant	46000	=VLOOKUP(1009,A2:E9,5,1)	16000
6	1006	Midhun	18/02/1983	Clerk	18000	=VLOOKUP(1001,A2:E9,5)	50000
7	1007	Shyma	19/02/1990	Clerk	20000	=VLOOKUP(1000,A2:E9,2,0)	#N/A
8	1008	Vineetha	20/02/1987	Clerk	16000	=VLOOKUP(1001,A2:E9,2,0)	Priyanka
9	1010	Elizabeth	21/02/1988	Peon	14000	=VLOOKUP(1001,A2:E9,4,0)	Manager

Fig. 2.33 Results of VLOOKUP function

Try Yourself

The details of books available in a school library are given below :

Book No	Name	Author	Category	Price
1001	Veenapoovu	Kumaranasan	Poem	50
1007	Randamoozham	M.T Vasudevan Nair	Novel	250
1004	My Experiments with Truth	M K Gandhi	Autobiography	100
1008	Uppu	ONV Kurup	Poem	120
1005	Othello	Shakespeare	Drama	200

Arrange them in book number order and use VLOOKUP function to:

(a) Search the name of book number 1004.

(b) Search the author of book number 1007.

(c) Search the category of book number 1005.

(d) Search the price of the book number 1008.

- **HLOOKUP**

HLOOKUP stands for horizontal lookup. It searches for values from top to bottom horizontally. This function searches for a value in the first row of an array and returns the corresponding value in a row of the array, named in the Index, in the same column. HLOOKUP supports the same form and arguments as VLOOKUP.

Syntax : HLOOKUP (SearchCriterion,Array,Index,Sorted)

Where,

SearchCriterion - Value searched for in the first row of the array.

Array - The range or range name containing the table of data

Index - The row number in a table_array from which you return corresponding matching value. (Index 1 for Row 1, 2 for Row 2, 3 for Row 3 and so on...)

Sorted - Indicates whether to find an exact match. True or 1 gives closest match and False or 0 returns exact match.

Example:

The number of units of each home appliances sold by Marvel Trade Links during the last four years are given:

Products	2014	2015	2016	2017
Smart TV	513	675	674	715
Smart Phones	1567	1659	1589	2004
Washing Machine	420	365	312	345
Fridges	640	574	543	366
Electric Oven	215	317	239	284

You are required to find the following by using HLOOKUP function.

(a) Number of smart TV sold during the year 2014

(b) Number of Fridges sold during the year 2015

(c) Name of the product in the fourth row.

The table given below shows how to deal with HLOOKUP (See figure 2.34).

	A	B	C	D	E	F	G
1	Products	2014	2015	2016	2017	Formula Used	Result
2	Smart TV	513	675	674	715	=HLOOKUP(B1,A1:E6,2)	513
3	Smart Phones	1567	1659	1589	2004	=HLOOKUP(2015,A1:E6,5)	574
4	Washing Machine	420	365	312	345	=HLOOKUP(A1,A1:E6,4)	Washing Machine
5	Fridges	640	574	543	366		
6	Electric Oven	215	317	239	284		

Fig. 2.34 Result of HLOOKUP function

- **ROWS**

The function returns the row number of a reference or array. It also gives back the number of rows when this function is used on a range of cells.

Syntax : =ROWS(Array)

'Array' - is the reference or named area whose total number of rows is to be determined

Example - =ROWS(C1:H4). See Fig.2.35.

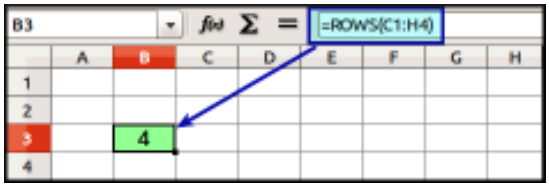


Fig. 2.35 - Example of ROWS function

- **COLUMNS**

This function returns the number of columns in an array or reference

Syntax : =COLUMNS(array)

'array' is the reference to a cell range whose total number of columns is to be found.

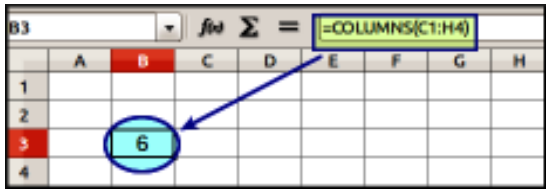


Fig. 2.36 - Example of COLUMNS function

Example : =COLUMNS(C1:H4). See Fig.2.36.

Let's assess

1. *IF function comes under .....*
   (a) Logical (b) Statistical (c) Text Manipulation (d) Spreadsheet
2. *AND function return True if ..... (all / any) arguments are true.*
3. *A function inside another function is called _____*
   (a) Nested Function (b) Round function
   (c) Sum function (d) Text function
4. *Which function is used while combining more than one test condition and the result will be true if any of the condition is True?*
5. *Which function returns True if all the conditions are true?*
6. *Find the Odd one out - (a) AND (b) OR (c) IF (d) SUM.*
7. *The function which returns the number of rows in a reference or array is _____*

2.6.7 Financial Functions

Imagine that you need some cash urgently and approach a bank for a loan of ₹2,00,000. The bank provides the loan for 3 years with a fixed rate of interest @ 10% per annum.

- How much do you have to pay back per month?
- Suppose, if the bank enhances the interest rate to 12%, what increase will have to be made in the EMI?

Such calculations are quite difficult to be carried out manually. Calc offers lot of financial functions to deal with such situations easily. Spreadsheet helps to perform many common financial calculations for finding out accrued interest, monthly payment of an annuity etc. very easily. Let us discuss some of the common financial functions.

• ACCRINT

You know what accrued interest is. Here the spreadsheet has a built-in function - ACCRINT to calculate interest accrued on securities and bonds which carries periodic interest.

ACCRINT is the abbreviation used for accrued interest.

Accrued interest is interest due but not received / paid. Companies may pay interest on debentures or bonds periodically (quarterly, half yearly or yearly). If holder of a security sells it before the next interest due date, the buyer has to pay its market value plus interest earned up to the settlement date. In such cases the calculation of interest is very difficult. Spreadsheet helps to calculate such interest easily.

Syntax : =ACCRINT(Issue, First interest, Settlement, Rate, Par, Frequency, Basis)

Where,

Issue - The date on which security was issued.

First Interest - The date that the first interest will be paid.

Settlement - The settlement date of the security. (ie. sold or purchased)

Rate - Annual interest rate of security (coupon interest rate)

Par - Par value of the security.

Frequency - Number of interest payments per year (1 for annual , 2 for half-yearly and 4 for quarterly).

Basis - (optional) The type of day count. (If basis not given it is automatically counted as 0)

Basis	Calculation (Type of day count)
0 or missing	US method (NASD), 12 months of 30 days each
1	Exact number of days in months, exact number of days in year
2	Exact number of days in month, year has 360 days
3	Exact number of days in month, year has 365 days
4	European method, 12 months of 30 days each

Consider the following example:

Mr. Anoop is holding 10% Debentures of M/s Hi- Tech Ltd worth ₹ 1,00,000 issued on 01/04/2016. The interest due every half-year and first interest due on 30/09/2016. Anoop sold this debentures to Mr. Shafeek on 01/07/2016. Calculate the amount of interest accrued using ACCRINT function.

In this case,

Issue (issue date of the security.) - 01/04/2016

First Interest (first interest date of the security) - 30/09/2016

Settlement date on which the security is traded - 01/07/2016

Rate (annual interest rate) - 10%

Par (par value of the security) - 1,00,000

Frequency (number of interest payments per year) - 2

Basis (type of day count) - 0

This can be worked out in two methods.

Method 1 : Select Cell A1 and enter the ACCRINT function in that cell

=ACCRINT("01/04/2016","30/09/2016","01/07/2016", 10%,100000,2,0) gives a result of ₹2500.

The amount of interest payable by Shafeek to Anoop along with the value of debentures is ₹2,500.

(ie, $1,00,000 \times \frac{10}{100} \times \frac{3}{12} = 2,500$)

Method 2 : Enter the above values from Cell B1 to B7 in the order shown in syntax.

Select Cell B8 and use function wizard to enter the formula =ACCRINT(B1,B2,B3,B4,B5,B6,B7) (See Fig. 2.37)

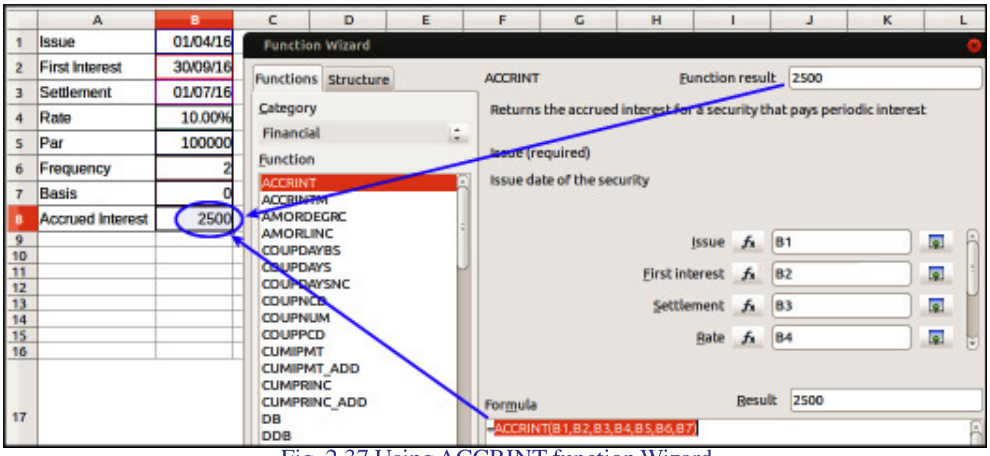


Fig. 2.37 Using ACCRINT function Wizard

- **RATE**

Think that you have taken the risk of investing ₹5,00,000 and will receive ₹5,000 per month for the next 10 years . What is the rate of return for the above investment?

The RATE function is primarily used to evaluate the rate of return on investment. It help us to calculate the rate of interest on a loan taken form bank or other financial institution or the rate of return on an investment, over a given period of time.

Syntax : =RATE(NPer,Pmt,PV,FV,Type,Guess)

Where,

NPer - Total number of payment periods in an annuity. (payment period).

Pmt - Fixed amount paid during each period. Given as minus figure
- (PMT includes principal and interest but no other fees or taxes. If Pmt is omitted then include the fv as argument.)

PV - Present value of loan/investment

FV - (optional) Future value of the loan / investment at the end of Nper payments. If omitted, FV takes on the default value being 0 (Zero)

Type - (optional) is the due date of the periodic payment, either at the beginning or at the end of a period.

The type argument can have the value 0 or 1 . Zero is used when the payment is made at the end of the period and '1' is used if the payment is made at the beginning of the period.

Guess - (optional) determines the estimated value of the interest with iterative calculation.

In the LibreOffice Calc functions, parameters marked as "optional" can be left out only when no parameter follows. For example, in a function with four parameters, and last two parameters are marked as "optional". Here we can leave out parameter 3 and 4. Parameter 4 can also be omitted but we cannot leave out parameter 3 alone.

Consider the following example:

Sukanya traders took a loan of ₹5,00,000 from Canara Bank for a period of 5 years and agreed to repay ₹11,500 at the end of each month.

(a) Compute the rate of interest using RATE function. Also calculate the Annual interest.

(b) Calculate the rate of interest if the repayment is made at the beginning of each month.

In this case,

(a) Nper = 60 (5 x 12)
Pmt = -11500 (Minus is given to denote repayment)
PV = 5,00,000
FV = 0
Type = 0 (payment at the end of each month)
Guess = (Not required)

(b) As compared to option (a) above the only change lies in the parameter 'Type' to '1' since the payment is made at the beginning of each month.

Enter the values from cells C1 to C6 and D1 to D6 as shown in figure 2.38. Then type the formula in cell C7 as = RATE (C1, C2, C3, C4, C5, C6) to get the monthly interest rate. For getting the annual interest rate use the formula in C8 as = C7 * 12.

Copy and paste the formula from cells D7 to D8 for getting result of option (b). You can also use the function wizard for the RATE function.

	A	B	C	D
1	Nper	Period in months (5x12)	60	60
2	Pmt	Monthly repayment must by given as negative	-11500	-11500
3	PV	Present value of Loan	500000	500000
4	FV	future value of the loan	0	0
5	Type	Payment made at the end / beginning of the period	0	1
6	Guess	Not needed		
7		Rate of interest	1.12%	1.17%
8		Annual interest rate	13.48%	14.00%

=RATE(C1,C2,C3,C4,C5,C6)

=C7*12

Fig. 2.38 Result of Rate Function

To set the cell format to percent (if necessary): Select the Cells → Format → Cells → Numbers → Percent

Try Yourself

Alankar Ltd took a loan of ₹10,00,000 from SBI for a period of 10 years and agreed to repay ₹20,000 at the beginning of each month.

(a) Compute the rate of interest using RATE Function. Calculate the Annual interest also.

(b) Compute the rate of interest assuming that after the payment of ₹20,000 per month at the end of every month for a period of 10 years, the remaining balance will be ₹1,00,000.

- **CUMIPMT**

CUMIPMT function is used to calculate the cumulative interest payments. This function returns the cumulative interest on a loan or investment, based on a constant interest rate between start period and end period.

Syntax:=CUMIPMT(Rate,NPer,PV,S,E,Type)

Where,

Rate - Periodic interest rate. (if annual rate is given, find monthly rate)

NPer - Length of the loan in months (if given in years to be converted into months)

PV - Present value of loan/investment

S - Start period. (For 1st year -1, 2nd Year -13, 3rd year - 25, 4th year - 37 and so on ....)

E - Last period. (For 1st year -12, 2nd Year - 24, 3rd year - 36 4th year - 48 and so on ....)

Type - Due date of the payment, either at the beginning or at the end of a period. This can be 0 or 1. Zero is used when the payment is due at the end of the period. 1 is for payment due at beginning of the period.

Let us illustrate :

Mrs. Manju availed a loan of ₹ 50000 from Punjab National Bank for a period of 3 years at a yearly interest rate of 8.5%.

1. Compute the following assuming that the payment is made at the end of each period.
   (a) Total interest paid for the first year
   (b) Total interest paid for the second year
   (c) Total interest paid for the first 2 year
   (d) Total interest paid for the third year
   (e) Total interest paid for all the 3 years
2. Also compute the following assuming that the payment is made at the beginning of each period.
   (i) Total interest paid for the first six months
   (ii) Total interest paid for the last 30 months
   (iii) Total interest paid for the entire period of 36 months

The steps to calculate cumulative interest using CUMIPMT function is as follows:

Enter the data as shown in figure 2.39, from cell A2 to I8.

*Rate (8.5% per annum, hence monthly rate) =.007 (8.5%/12)

Select the cell B9 and enter the formula =CUMIPMT(B3,B4,B5,B6,B7,B8) to calculate the cumulative interest of 1st year. Apply the same function in respective cells to find the remaining year's cumulative interest as shown in Fig. 2.39.

	A	B	C	D	E	F	G	H	I
1		Year 1	Year 2	First 2 years	Year 3	All 3 years	First 6 Months	Next 30 months	All 36 Months
2	Annual Rate	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%
3	Rate (Annual rate /12)	.007	.007	.007	.007	.007	.007	.007	.007
4	Nper	36	36	36	36	36	36	36	36
5	PV	50000	50000	50000	50000	50000	50000	50000	50000
6	S	1	13	1	25	1	1	7	1
7	E	12	24	24	36	36	6	36	36
8	Type	0	0	0	0	0	1	1	1
9	Cumulative Interest paid	-₹3,663.95	-₹2,313.64	-₹5,977.59	-₹843.98	-₹6,821.57	-₹1,627.99	-₹4,793.92	-₹6,421.91

Payment at the end

Payment at the beginning

Total of 6 months + 30 months

Fig. 2.39 Result of CUMIPMT Function

Try Yourself

Mr. Jayaram took a loan of ₹5,00,000 from Vijaya Bank on 1st Jan 2017 for a period of 4 years at 8% interest per annum. As per agreement, the payment is given at the beginning of each month. Compute the cumulative interest payable at the end of each year and also the total interest of the entire loan period by using CUMIPMT function.

- **PV**

Suppose you win a prize and you are offered ₹50,000 or equal payments of ₹1000 per month for 5 years at an annual interest rate of 8% compounded annually. Which one would you choose?

The PV function can tell you whether you accept the money in lump sum or take this in 60 instalments.

PV function relates to Present Value. It is based on the concept that one rupee earned today is worth more than a rupee received on a future date. If we invest ₹100 today at 10% interest per annum, after one year ₹100 become ₹110 (₹100 principal + ₹10 interest)

Do you think that ₹100 received today is equal to ₹100 received after one year? Answer is evidently "No".

PV function returns the present value of an investment resulting from a series of regular payments. This function is used to calculate the amount of money needed to be invested at a fixed rate today, to receive a specific amount, over a specified number of periods.

Syntax : =PV(Rate,Nper,Pmt,FV,Type)

Where,

Rate - Periodic interest rate. (if annual rate is given, find monthly rate)

NPer - Total number of payment periods in months

Pmt - Fixed amount paid during each period. (Pmt should be given as negative as it is payment)

FV - (optional) Future value, or a cash balance to attain after the last payment is made.

Type - (optional) is the due date of the periodic payment, either at the beginning or at the end of a period.

(The type argument can have the value 0 or 1. '0' is used when the payment is made at the end of the period and '1' for the beginning of the period.)

Consider the following example:

Amit Gupta opened a Recurring Deposit Scheme paying ₹2500 per month for a period of 4 years with an interest rate of 8% per annum. Calculate the present value by using PV function if :

(a) the payments are made at the end of the month.

(b) the payments are made at the beginning of the month.

(c) amount to be invested to get a future value of ₹1,00,000.

Rate = 8% per annum and instalments are made monthly, hence, the interest rate per month is 8%/12.

Nper = 4 years, hence Nper in months is 48 (ie 4*12)

Pmt = -2500 (Pmt must be negative to get positive PV of future earnings)

Fv = Future value, or a cash balance to attain after the last payment is made. (if Fv is omitted, it is assumed to be 0)

Type = 1 means due at the beginning of a month and Type = 0 (default) means due at the end of the month.

Syntax for (a) =PV(8%/12,48,-2500,0,0) Returns ₹102404.78

Syntax for (b) =PV(8%/12,48,-2500,0,1) Returns ₹103087.48 (See Fig. 2.40)

Syntax for (c) =PV(8%/12,48,0,100000,0)

	A	B	C	D	E
1		Payment is made at the end	Payment is made at the beginning	PMT is omitted and Future value given	PMT is omitted and Future value given
2	Annual Rate	8.00%	8.00%	8.00%	8.00%
3	Rate (Annual rate /12)	.007	.007	.007	.007
4	Nper	48	48	48	48
5	PMT	-2500	-2500	0	0
6	FV	0	0	100000	100000
7	Type	0	1	0	1
8	PV	₹1,02,404.78	₹1,03,087.48	-₹72,692.06	-₹72,692.06

Fig. 2.40 - Result of PV function

• PMT

You want to borrow money to buy a car, and you know the principal amount, interest rate and the term of the loan or say you intend to borrow ₹2,00,000 at 10% interest and pay off this loan in 5 years, in such cases PMT function will easily calculate the monthly payment for you.

The PMT function calculates the periodic payment for an annuity assuming equal payments and a constant rate of interest.

PMT refers to payment which has to be paid periodically for a loan or investment. This function helps to calculate the instalment amount including part of principal amount and monthly interest. The amount of instalment is called EMI (Equated Monthly Instalment.). It can be calculated with the help of the PMT function.

Syntax =PMT(Rate,Nper,PV,FV,Type)

Where,

Rate - The periodic interest rate.
(If annual rate is given calculate monthly rate by dividing rate by 12)

NPer - The number of periods over which the loan or investment is to be paid

PV - The present value of loan or investment

FV - (optional) The desired value (future value) to be reached at the end of the periodic payments.

Type - (optional) The due date for the periodic payments.
(Type = 0 for due date at the end of each period
Type =1 for beginning of each period)

Consider the given example:

Calculate the Monthly payment for a Loan of ₹25,000 availed by Mr. Philip from Bank of Baroda @ 8% per annum for a period of 3 years, assuming that :

(a) payment is made at the end of each month.

(b) payment is made at the beginning of each month.

(c) Also calculate EMI, if the repayment is made at the end of each month for a period of 4 years

The following steps are to be followed.

1. Enter the values Rate,Nper,PV,FV and Type as shown in Fig. 2.41.
2. Enter the formula as shown below. (We can also use the function wizard to insert the PMT function in the cell where output is required.)

Syntax for (a) =PMT(8%/12,36,25000,0,0) or =PMT(B2, B3, B4, B5, B6)

Syntax for (b) =PMT(8%/12,36,25000,0,1) or =PMT(C2, C3, C4, C5, C6)

Syntax for (b) =PMT(8%/12,36,25000,0,0) or =PMT(D2, D3, D4, D5, D6)

The result is displayed in figure 2.41.

		(a)	(b)	(c)
	A	B	C	D
1	Annual Rate	8.00%	8.00%	8.00%
2	Rate (Annual rate /12)	.007	.007	.007
3	Nper	36	36	48
4	PV	25000	25000	25000
5	FV	0	0	0
6	Type	0	1	0
7	Monthly instalment	-₹783.41	-₹778.22	-₹610.32

=PMT(B2,B3,B4,B5,B6)

=PMT(C2,C3,C4,C5,C6)

Fig. 2.41 Result of PMT Function

Try Yourself

Mr. Rejith took a car loan of ₹4,50,000 form Dena Bank at 9 % interest per annum for a period of 7 years. The repayment should be made in equated monthly instalments, payable at the end of each month. Calculate the Monthly instalment using PMT function in LibreOffice Calc.

- **FV**

Suppose, ₹10,00,000 is invested for a period of 5 years at an interest rate of 8% per annum. How much would you get back at the end of the period?

To find an answer you can right away open a worksheet and look for FV function. This function calculates the future value of an investment based on a constant interest rate. You can use FV with either periodic constant payment or on single lump sum payment.

Syntax : =FV(Rate,Nper,Pmt,PV,Type)

Where,

Rate	-	Periodic interest rate.
NPer	-	Total number of periods (payment period).
Pmt	-	The annuity paid regularly per period.
PV	-	(optional) Present cash value of an investment.
Type	-	(optional) Defines whether the payment is due at the beginning or the end of a period.

Consider the given example:

Amit Gupta opened a Recurring Deposit Scheme paying ₹2500 per month for a period of 4 years with an interest rate of 8% per annum. Calculate the future value of RD by using FV function if :

(a) the payments are made at the end of the month.

(b) the payments are made at the beginning of the month.

(c) Find the future value if the amount invested is ₹ 72692.06 in lump sum instead of monthly instalments with the same interest rate for 4 years.

Figure 2.42 clearly explains the parameters to be given in different cells to arrive at the results:

1			(a)	(b)	(c)	
2		A	B	C	D	E
3	1		Payment is made at the end	Payment is made at the beginning	PMT is omitted and Present value given	PMT is omitted and present value given
4	2	Annual Rate	8.00%	8.00%	8.00%	8.00%
5	3	Rate (Annual rate /12)	.007	.007	.007	.007
6	4	Nper	48	48	48	48
7	5	PMT	-2500	2500	0	0
8	6	PV	0	0	-72692.06	72692.06
9	7	Type	0	1	0	1
10	8	FV	₹1,40,874.79	-₹1,41,813.95	₹1,00,000.00	-₹1,00,000.00

Fig. 2.42 Result of FV Function

Try Yourself

Mrs. Santhi has a postal life insurance policy, to which she deposits ₹ 750 per month for 5 years. The interest rate is 10% p.a. Calculate the amount she gets at the end using FV function in LibreOffice Calc if :

(a) the payments are made at the end of the month.

(b) the payments are made at the beginning of the month.

- **NPV**

Net present value (NPV) is the present value of an investment's expected cash inflows minus the costs of acquiring the investment.

NPV = (Present value of Cash inflows from investment) - (cash outflows or costs of investment or project).

NPV function returns the present value of a series of periodic cash inflows at a discount rate. To get the net present value, subtract the cost of the project (the initial cash outflow) from the present value of future cash inflows.

Syntax : = **NPV(Rate,Value1, Value2, Value3.....)**

Where,

Rate : The discount rate for a period.

Value1,Value2, Value3.... : Cash inflows (limited up to 30 values)

Consider the following example :

Calculate the present value of annual cash inflows of ₹10, ₹20 and ₹30 with a discount rate of 8.75%. If the initial investment is ₹40, what will be the net present value of future cash inflows:

=NPV(8.75%, 10,20,30) returns ₹49.43

The net present value is the returned value (₹49.43) minus the initial costs of ₹40. Therefore, the net present value is ₹9.43 as shown below:

	A	B	C	D	E	F	G
1	Initial investment / Cash outflow	Rate	Cash inflow year 1	Cash inflow year 2	Cash inflow year 3	Present value of future cash inflows	NPV
2	40	8.75%	10	20	30	₹49.43	₹9.43

Let us consider another example

Manav traders think of buying the business of Lavanya stores. It takes a careful look at Lavanya stores projections for the next 5 years. It discounts those projected cash inflows back to the present value using its weighted average cost of capital at 6%.

Cost of acquiring Lavanya Stores : ₹5,00,000

Cash inflows from Lavanya stores is

Year 1: ₹1,70,000; Year 2: ₹1,30,000; Year 3: ₹1,25,000;

Year 4: ₹1,00,000; Year 5: ₹75,000

(a) Calculate the present value of cash inflows and net present value of above proposal.

(b) Calculate NPV if cost capital is 8%.

(c) Calculate NPV if the initial investment is ₹5,50,000 and cost of capital is 6%

(d) Calculate NPV if the initial investment is ₹5,50,000 and cost of capital is 8%

(e) Evaluate the above proposals based on the calculated NPV.

Steps to calculate the present value of future cash inflows and NPV is illustrated below:

Step 1 : Enter the details from cell A3 to F9 as shown in figure 2.43

Step 2 : Enter the formula =NPV(C4,C5,C6,C7,C8,C9) in cell C10.

Step 3 : Enter the formula = NPV(C4,C5,C6,C7,C8,C9) -C3 in cell C11.

Step 4 : Select Cell C10 and drag and fill cells D10 to F10.

Step 5 : Select Cell C11 and drag and fill Cells D11 to F11.

The final output will be displayed as shown in figure 2.43.

1	A	B	C	D	E	F
2			(a)	(b)	(c)	(d)
3	Initial investment / Cash outflow		500000	500000	550000	550000
4	Cost of capital / Discount rate	Rate	6.00%	8.00%	6.00%	8.00%
5	Cash inflow - year 1	Value1	1,70,000	1,70,000	1,70,000	2,00,000
6	Cash inflow - year 2	Value2	130000	130000	130000	150000
7	Cash inflow – year 3	Value3	125000	125000	125000	135000
8	Cash inflow - year 4	Value4	100000	100000	100000	120000
9	Cash inflow - year 5	Value5	75000	75000	75000	75000
10	Present value of future cash inflows		₹5,16,283.04	₹4,92,637.21	₹5,16,283.04	₹5,60,200.68
11	NPV		₹16,283.04	-₹7,362.79	-₹33,716.96	₹10,200.68
12	(e) Proposals (a) and (d) are acceptable as they have positive NPV					

Fig. 2.43 Result of NPV Function

Try Yourself

Periyar Exporters invested ₹8,00,000 in a project . Cash inflows from the project will be ₹ 2,50,000, ₹200,000, ₹3,00,000, ₹1,50,000 and ₹220000 over the next 5years. Projects cost of capital is 3%

Calculate the Net present value and say whether the project is acceptable or not.

Let's assess

1. *The financial function used to calculate accrued interest of a security in the case of periodic payments is _____*
2. *The function which calculates the future value of an investment based on periodic, constant payment and a constant interest rate is called _____*
3. *Which function calculates the constant interest rate per period of an annuity?*
4. *NPV returns the _____ of an investment based on a series of periodic cash flows and a discount rate.*

Let's know more ...

Calculation of Present Value

The first thing to remember is that present value (PV) of a single amount is the exact opposite of future value (FV). Here is the formula:

$$PV = FV\ [1/(1 + I)t]$$

Consider this problem:

Let's say that you have been promised ₹1464 after 4 years from today at an interest of 10%. Here, t (term / period) is 4 years. We want to know what is the worth of ₹1464 today (ie., present value)

We can calculate the present value of ₹1464 if the interest rate is 10% at the end of 4 years using the formula:

$$PV = 1464\ [1/(1 + .10)]4 = 1,000$$

The process of calculating present value is called discounting.

2.7 Data Entry, Text Management and Cell Formatting

To generate useful information, data entered in a spreadsheet should be reliable, accurate and in proper format. This means that data should be validated, corrected and displayed in proper format. Thus, data entry, data validation and data formatting are three important concerns in spreadsheet data handling.

2.7. 1 Data Entry

If you are asked to collect details of students of your class which include Class number, Name of student, Date of birth, Fees remitted, Days present etc., how do you enter these data in a worksheet?

- Using key board is one option.
- Data fill option is another option.
- You can even import data from other software.

Let us discuss the above methods in detail.

(a) Direct data entry

More often, we use the keyboards to input the data. Labels, values and formulas can be entered using alphabets, numbers and special characters in the keyboard. By default the values are right aligned and labels are left aligned. The spreadsheet can distinguish between different types of values; recognise a date, a currency, a percentage etc. For example, if we type 20/10/1980 in a cell, spreadsheet will recognise it as a date and act accordingly. The spreadsheet also processes given formulas and generates the output; which should be in specific format. See the student details entered in the worksheet and the default alignment of each type of data (Fig 2.44).

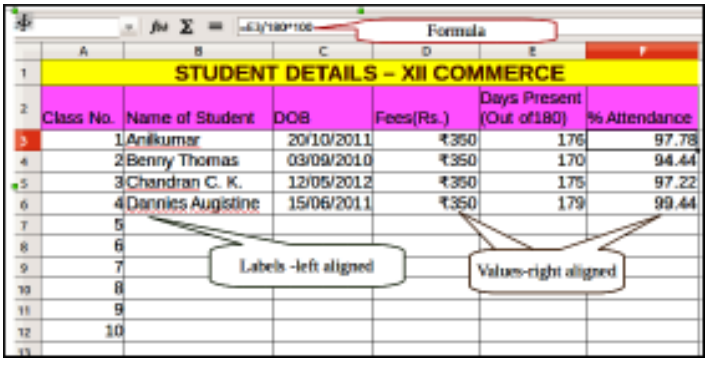


Fig. 2.44 Default alignment in cells

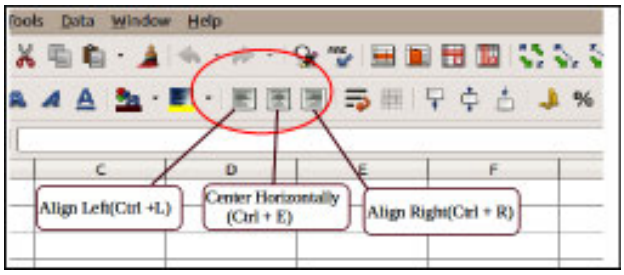


Fig. 2.45 Alignment icons in ribbon

You may change the default alignment to right or left or centre aligned by selecting the cells and click on appropriate icons in the formatting toolbar, as shown in figure 2.45.

(b) Data fill options

Suppose, if there are '60' students in your class and you need to enter the class number 1 to 60 continuously in the first column. Instead of entering all the 60 numbers one by one, this can be done very easily using a short cut method. You can automatically fill cells with data with the Auto Fill command or the Series command.

(i) Auto Fill

LibreOffice Calc provides an option for entering data automatically with a series of numbers, text and number combinations, dates, time periods, based on any pattern that we require.

Auto Fill automatically generates a data series based on a defined pattern. The steps to auto fill the data are:

- Enter the first number in a cell, and press enter.
- Move the cursor to the bottom right corner so that it will change to a small black cross which is called fill handle (+ symbol). Click on the mouse and by holding the button drag the fill handle of the cell across the cells that you want to fill, and release the mouse button. Then, all the cells are filled with the same data. But in case of numeric data, the cells are filled with consecutive numbers.
- If you select two or more adjacent cells that contain different numbers and drag, then the remaining cells are filled with the desired arithmetic pattern. For eg. Making a series of values 10,20,30,40,50 and so on, using fill handle is shown in fig 2.46.

Fig. 2.46 Filling series of numbers using fill handle

Try Yourself

- Fill days of week in first row-(Enter Monday in cell A1and try to fill till end of the week using fill handle)

- Fill name of months in column 'A' (Enter January into A1 and drag the fill handle down to A12 to get the twelve months)

(ii) Defined Series

We can also fill the active cell with the contents of an adjacent cell through the 'Fill Series Window'. This fill option is available in the Edit menu . The following steps are involved in filling a series.

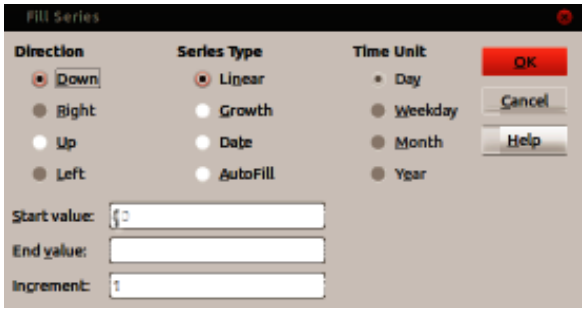


Fig. 2.47 Fill series window

- Enter the first value of the series in a cell
- Select the cell range in the sheet that you want to fill.
- Choose **Edit → Fill → Series**

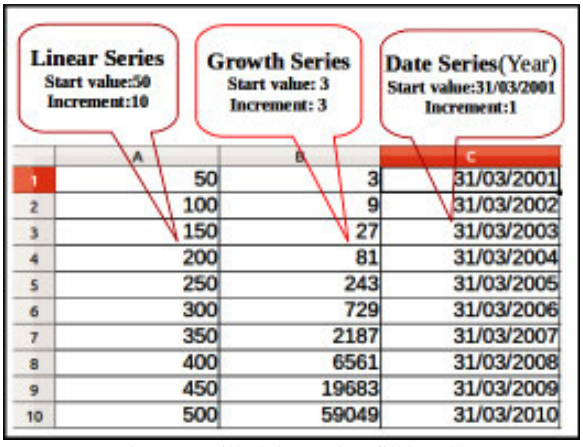
The Fill series window appears in the screen as shown in Fig 2.47.

Set the parameters for the series.

Select the direction to which data is to be flowed.

- If you select a linear series, the increment that you enter is added to each consecutive number in the series to create the next value. (Eg:50,100,150,200.....)
- If you select a growth series, the increment that you enter is multiplied by each consecutive number to create the next value. (Eg: 3,9,27,81,243.....)
- If you select a date series, the increment that you enter is added to the time unit that you specify.(Eg: 31/03/2001, 31/03/2002, 31/03/2003.....)

Give the Start value, End value and Increment. Click 'OK' to fill the series. Observe how this is filled in figure 2.48.



	A	B	C
1	50	3	31/03/2001
2	100	9	31/03/2002
3	150	27	31/03/2003
4	200	81	31/03/2004
5	250	243	31/03/2005
6	300	729	31/03/2006
7	350	2187	31/03/2007
8	400	6561	31/03/2008
9	450	19683	31/03/2009
10	500	59049	31/03/2010

Fig. 2.48 Filled data using fill handle

(c) Import Data from other sources

LibreOffice Calc permits transfer of data into required cells by importing an external file to a work sheet. These data files may be either in text files or non-text files format. Text files can be directly read using a text editor. These files often have extension '**.txt**'. They may also have other extensions like '**.csv**' (Comma Separated Values), and are easily transferred to a worksheet.

How to create a file Text Editor software ?

Create data file using Text Editor, by the following steps:-

- The path to get Text Editor software is:

  Applications → Accessories → Text Editor

- A comma-separated data values in one line of this text file is a row in a spreadsheet and each entry, separated by a comma, is a column entry for that row.
- In the first line give the titles of the columns needed in the spreadsheet.
- In the next line onwards, start entering the data separated by comma in the same order of the column headings. It may be noted that every data may not be of similar length but each data (even a blank data) should be separated by comma. See the example given below.
- Save the created text file in a convenient location in the computer.

Asset_Details ×

```
Name of asset,Date of purchase,Purchase price,Brokerage,Transportation,Installation charges, Scrap value,life in years
Machinery,01/01/2013,1200000,15000,0,2500,20000,8
Plant,31/03/2013,2500000,200000,12000,40000,500000,12
Motor car,01/08/2013,1400000,0,0,0,200000,7
Furniture,31/10/2013,85000,0,3000,0,5000,10
```

To import the data from a text file, following steps are to be initiated:-

Fig. 2.49 Text import window

1. Open a new LibreOffice Calc worksheet.
2. Click on 'Sheet from File' option from Insert menu. Select the text file with the help of dialogue box that appears and press 'Open' button.
3. Then, the 'Text Import' window appears as shown in Fig 2.49.
4. Click 'OK' in the Text Import window.
5. Then, the 'Insert Sheet' window appears in the screen,

Again click 'OK' on the Insert Sheet window. Then, the text data will be placed in the relevant columns of the spreadsheet. Save the worksheet by giving suitable name.

Let's know more ...

Alternative method to import file to LibreOffice Calc

Save the text file 'Asset_Details.txt, in 'csv' format in the desktop. Open the file by clicking on it. 'Text Insert' window appears in the screen, click on 'OK' button. The file will be automatically displayed in a spreadsheet. Since the file is in 'csv' format, importing is not necessary in Calc. Open the text file to display the data in columnar form.

2.7.2 Data Validation

Sometimes, it is possible that we may enter wrong data in a cell by mistake, due to negligence or ignorance in a spreadsheet. How can we prevent such mistakes?

During data entry, accuracy and validity of data are ensured in two ways:-

(a) Using validation option (b) Using Data form

- **Validation option**

Data validation guarantees that each data that you enter will be correct and accurate. By using this function, we can define entries to be valid for one or more cells. Thus, invalid entries to a cell will be rejected. This feature imposes restrictions on the type of data entered into a cell. A warning message for wrong data will be displayed in the cell. We can set a message to inform the users about the type of data to be entered in the cells. It is also possible to give instructions to correct errors by setting 'Error Alert' option in the validity window.

To validate data entry in a particular column, the following steps are to be initiated:-

1. Select the range in which the required data is to be entered.
2. Select 'Data' Menu and choose 'Validity' option, then, the Validity window appears as shown in figure. 2.50

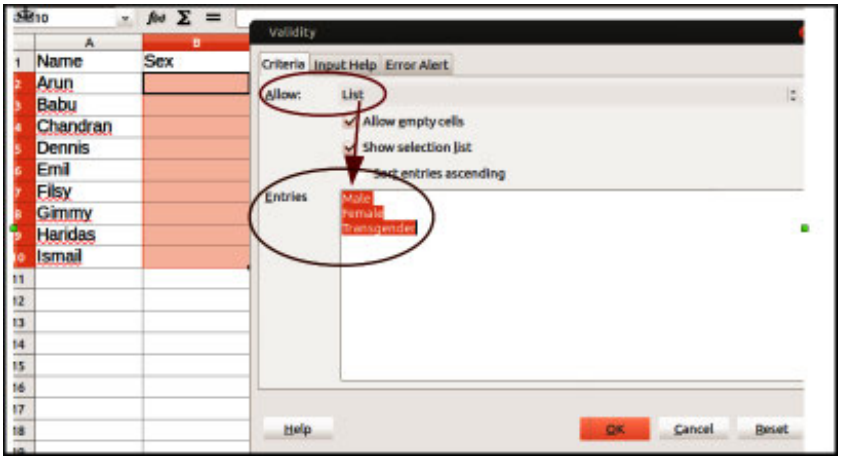


Fig. 2.50 List entries in Validity Window

3. Select the criteria to allow whole numbers, Decimal, Date, Time, Cell range, List etc.

- Select 'List', from the 'Allow' field. Now the 'entries' field appears. Here, enter the possible values one after another in separate line as shown in figure 2.50 and click 'OK'.
- In the field 'Allow', if we select 'Cell Range', the 'Source' option appears in the window. You can insert the specific sheet and provide range address and click

'OK'.(You may toggle between shrink and expand the validity window by clicking on the arrow icon right to source field). This criterion setting is shown in figure 2.51.

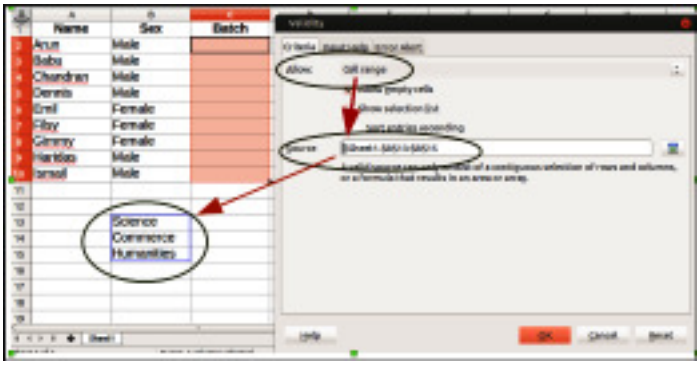


Fig. 2.51 Cell range entries in validity window

4. Set the 'Input Help' in the validity window. Give suitable 'title' and 'Input Help' message as shown in figure 2.52. This setting will display the given input help message at the time of data entry.

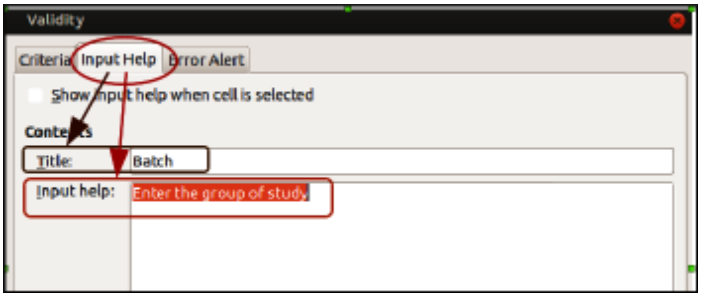


Fig. 2.52 Setting input help in validity window

5. Set 'Error Alert' in the validity window. The character of the field can be specified in the 'Action' field as 'Stop', 'Warning', 'Information' etc. Also give the 'Title' and the 'Error Message'. This settings will display the given Error message when an invalid value is entered in the column. The figure 2.53 depicts the stages of error alert setting.

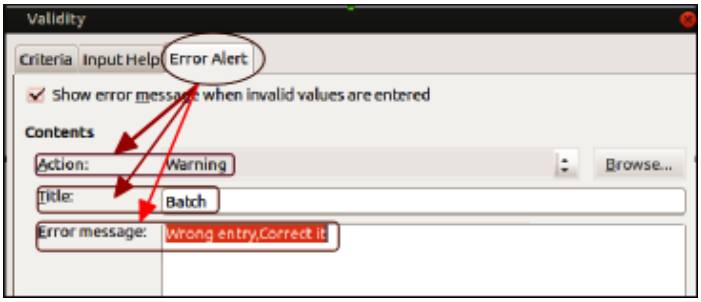


Fig. 2.53 Setting error alert in validity window