

**Class:** MSc

**Subject :** Application of IT- Basics and Advance Excel

**Chapter:** Unit 1 Chapter 6

**Chapter Name:** Writing Formula (Lookup Functions)

# Conditional Summerring Based on Single Factor

*With a conditional sum, values in a range that meet one or more conditions are included in the sum.*

*The SUMIF function is useful for single-criterion sum formulas. The SUMIF function takes three arguments*

- range: The range containing the values that determine whether to include a particular cell in the sum.*
- criteria: An expression that determines whether to include a particular cell in the sum.*
- sum\_range: Optional. The range that contains the cells you want to sum. If you omit this argument, the function uses the range specified in the first argument.*

# Conditional Summaring Based on Single Factor

## SumIf Function

Evaluates based on criteria

### Arguments

1. Range
2. Criteria
3. Sum Range  
(Optional)

SumIf Function							
A2							
	A	B	C	D	E	F	G
1						Item	Stock
2	Grapes	1,416				Apples	768
3	Apples					Bananas	468
4	Bananas					Mangoes	132
5	Grapes					Pineapples	936
6	Mangoes					Grapes	360
7	Pineapples					Mangoes	528
8						Pineapples	888
9						Bananas	492
10						Mangoes	876
11						Pineapples	396
12						Grapes	96
13						Mangoes	996

**=SUMIF(F1:G31,A2,G1:G31)**

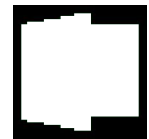
# Conditional Summaring Based on Single Factor

## Sumifs Function Evaluates based on Multiple Criteria

### Arguments

1. Sum Range
2. Criterial Range1
3. Criteria1
4. Criteria Range2
5. Criteria2
6. Criteria Range3
7. Criteria3
- ...up to 125

Sumifs Function					
	A	B	C	D	E
1					Item
2	Bananas	456			Apple
3		=SUMIFS(\$H \$1:\$H\$31,\$F \$1:\$F\$31,A2,			Bana
4					Mang
5					Pinea
6					Grap
7					Mang
8					Pinea
9					Bana
10					Mang
11					Pinea
12					Grap
13	Sep 10, 2017	<<Date omitted			Mang
14	Bananas	1,332			Apple
15		=SUMIFS(\$H: \$H,\$F:\$F,A14			Bana
16					Mang
17					Pinea
18					Grap
19					Mang



Sumifs

*The criteria can take multiple operators in between double quotes*

# Lookup Functions

*A lookup function is a referencing function which refers and calls out data from a database based on "Criteria" and/or "Multiple Criteria"*

*In this workshop, we will look at the following functions and understand how they work by themselves and how they become more powerful when nested within each other*

- Lookup
- Vlookup
- Hlookup
- Dget

- Index & Match
- Address
- Choose

- Column & Row
- Columns & Rows
- Indirect
- Offset

# ***Conditional Summaring Based on Single Factor***

- Lookup functions enable you to look up values from worksheet ranges.*
- Vertical lookup, the lookup operation starts in the first column of a worksheet range.*
- Horizontal lookup, the operation starts in the first row of a worksheet range.*

# Lookup Functions

## Vlookup Function

Returns the value from the same row where criteria matches

### Arguments

1. Lookup Value or Criteria
2. Table Array or Database
3. Column Index Number (from where Vlookup needs to return data)
4. Range Lookup (Optional)

### Note:

All arguments can use a value or a reference to a cell or a formula

Vlookup Function							
	A	B	C	D	E	F	G
1						Name	Score
2						Sachin	64
3	Sachin	64				Dhoni	67
4						Virat	79
5						Yuvraj	65
6						Kaif	60
7						Sachin	89
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							

=VLOOKUP(A3,\$F\$1:\$G\$7,2,0)

Returns value only  
for 1st reference  
found



Vlookup

*The result column has to be on the right of the criteria column*

# Lookup Functions

## Hlookup Function

Returns the value from the same column where criteria matches

### Arguments

1. Lookup Value or Criteria
2. Table Array or Database
3. Column Index Number (from where Vlookup needs to return data)
4. Range Lookup (Optional)

### Note:

All arguments can use a value or a reference to a cell or a formula

Hlookup Function									
	A	B	C	D	E	F	G	H	I
1									
2									
3	Name	Sachin	Dhoni	Saurav	Yuvraj	Sachin			
4	Score	31	65	78	29	27			
5	Age	24	18	22	16	20			
6									
7									
8	Sachin	31							
9									
10									
11									
12									
13									
14									

Returns value only for 1st reference found

=HLOOKUP(A8,\$A\$3:\$F\$5,2,0)

*The result row has to be below the criteria column*

# Lookup Functions

## DGet Function

***Gets a single value from a given field in a record that matches criteria. The database argument is a range of cells that includes field headers, field is the name or index of the field to get a max value from, and criteria is a range of cells with headers that match those in database.***

### Arguments

1. Database
2. Field
3. Criteria

### Note:

Can also use “And” or “Or” to define non-consecutive ranges

DGet Function									
	A	B	C	D	E	F	G	H	
1						Player	Game Date	Score	
2	Player	Game Date	Score			Sachin	Oct 10, 2002	96	
3	Dhoni	Dec 08, 2002	102			Dhoni	Dec 08, 2002	102	
4						Sachin	Sep 08, 2003	125	
5						Yuvraj	Aug 14, 2003	133	
6						Yuvraj	Aug 14, 2003	193	
7						Shewag	Feb 01, 2004	121	
8						Sachin	Mar 01, 2004	129	
9						Dhoni	Mar 01, 2004	77	
10						Saurav	May 01, 2004	123	
11						Sachin	May 02, 2005	101	
12						Dhoni	Jun 14, 2006	136	
13									
14									
15									
16									

**=DGET(\$F:\$H,C2,\$A\$2:\$B\$3)**

Returns value based on two levels of criteria

*Gives an output based on multiple criteria*

# Lookup Functions

## Index & Match

When used in combination, works like Vlookup and gets data from an intersecting cell as defined

### Index Function

1. Reference
2. Row Number
3. Column Number

Row Number & Column Number are defined by using match function

### Row Function

1. Lookup Value
2. Lookup Array
3. Match Type

Index & Match								
	A	B	C	D	E	F	G	H
1						Name	Age	Salary
2		Age				Sachin	32	20,200.00
3	Yuvraj	27				Dhoni	25	33,800.00
4						Yuvraj	27	21,200.00
5						Saurav	19	20,400.00
6						Sewhag	31	25,500.00
7								
8								
9								
10								
11								

=INDEX(\$F\$1:\$H\$6,MATCH(\$A3,\$F\$1:\$F\$6,0),MATCH(B\$2,\$F\$1:\$H\$1,0))



Index & Match

# Lookup Functions

## Address Function

Returns the address for a cell based on a given row and column number

1. Row Number
2. Column Number
3. Abs Number
4. A1
5. Sheet Text

Address Function								
	A	B	C	D	E	F	G	H
1								
2		B1	=ADDRESS(1,2,4,1)					
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								



Address

- Row Number: 1
- Column Number: 2
- Type of output: (Absolute [\$B\$1], R\_Absolute & C\_Relative [B\$1], R\_Relative & C\_Absolute [\$B1], Relative [B1])
- Type of output: RC type or A1 type
- Sheet Text: If you need to add name of workbook

# Lookup Functions

## Choose Function

Returns a value from a list using a given position or index

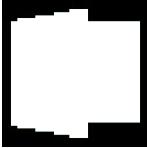
### Arguments

1. Index Number
  2. Value1
  3. Value2 (Optional)
  4. Value3 (Optional)
- ...up to value 254

Choose Function

	A	B	C	D	E
1					
2					
3					
4	Current	Next			
5	Red	Orange			
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

=CHOOSE(IF(A5="Red",1,IF(A5="Orange",2,IF(A5="Green",3))), "Orange", "Green", "Red")



Choose

*The values provided can include references*

# Lookup Functions

## Column Function

Returns the column number of a cell reference.

Arguments

1. Reference (Optional)

## Row Function

Returns the row number of a cell reference.

Arguments

1. Reference (Optional)

*If no arguments provided, it will return a value based on the cell the formula is entered in*

Column & Row Function				
	A	B	C	
1				
2				
3				
4	Column	Row		
5	1	1		
6		=ROW(A1)		
7				
8				

# Lookup Functions

## Columns

Returns the number of columns in a given range

Arguments

1. Array (range)

## Rows

Returns the number of Rows in a given range

Arguments

1. Array (range)

Columns & Rows Function				
	A	B	C	D
1				
2				
3				
4	Columns	Rows		
5	4	5		
6		=ROWS(A1:A5)		
7				
8				

**You can fix the start point with the \$ sign and drag to increment the number at every move**

# Lookup Functions

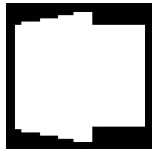
## Indirect Function

Returns the value from the cell of a given reference

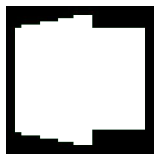
Data I2

1. Reference Text
2. Type of reference (Optional)

Indirect Function				
	A	B	C	D
1	50	48	48	42
2				
3				
4	Ref	Result		
5	R1C1	50		
6		=INDIRECT(A5,0)		
7				
8				



Indirect



Indirect

# Lookup Functions

## Offset Function

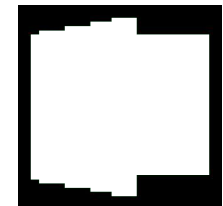
Returns a cell or range of cells that is a specified number of rows and columns from a cell or range of cells

### Arguments

1. Reference
2. Rows
3. Columns
4. Height or number of rows in a range (Optional)
5. Width or number of columns in a range (Optional)

Offset Function				
	A	B	C	D
1	Header1	Header2	Header3	
2		Header2		
3				
4				
5				
6				
7				
8				
9				
10				

```
=OFFSET($A$1,0
,0,COUNTA($A:$
A),COUNTA($1:$
1))
```



Offset




*Most useful when creating dynamic ranges*

# ***SUMPRODUCT Functions***

The **SUMPRODUCT** function returns the sum of the products of corresponding ranges or arrays. The default operation is multiplication, but addition, subtraction, and division are also possible.

In this example, we'll use SUMPRODUCT to return the total sales for a given item and size:

SUMPRODUCT matches all instances of Item Y/Size M and sums them, so for this example 21 plus 41 equals 62.

D10	  	<b>=SUMPRODUCT((B2:B7=B10)*(C2:C7=C10)*D2:D7)</b>				
	A	B	C	D	E	F
1		<b>Item</b>	<b>Size</b>	<b>Sold</b>		
2		X	S	45		
3		Y	M	21		
4		Z	L	25		
5		X	L	20		
6		Y	M	41		
7		Z	S	19		
8						
9		<b>Item</b>	<b>Size</b>	<b>Total</b>		
10		Y	M	62		
11						

# AND Functions

Use the **AND** function, one of the logical functions, to determine if all conditions in a test are TRUE.

Here is a fairly common scenario where we need to calculate if salespeople qualify for a bonus using **IF** and **AND**.

`=IF(AND(B14>=$B$7,C14>=$B$5),B14*$B$8,0)` – **IF** Total Sales are greater than or equal ( $\geq$ ) to the Sales Goal, **AND** Accounts are greater than or equal to ( $\geq$ ) the Account Goal, then multiply Total Sales by the Bonus %, otherwise return 0.

E14					=IF(AND(B14>=\$B\$7,C14>=\$B\$5),B14*\$B\$8,0)
	A	B	C	D	E
1	Goals				
3	Criteria	Amount			
4	Sales Goal:	\$8,500			
5	Account Goal:	5			
6	Commission Rate:	2.0%			
7	Bonus Goal:	\$12,500			
8	Bonus %:	1.5%			
9					
10	Commisison Calculations with Conditions				
12	Salesperson	Total Sales	Accounts	Commission	Bonus
13	Millicent Shelton	\$10,260	9	\$205	
14	Miguel Ferrari	\$15,700	7	\$314	\$236
15	Claire Fox	\$13,275	5	\$266	\$199
16	Rosemarie Cobb	\$9,100	3	\$182	
17	Lorie Chen	\$7,480	4		
18					

- Sales people need to exceed either Sales **OR** Account Goals to earn Commission
- Sales people need to exceed both Sales **AND** Account Goals to earn Bonus

# OR Function

Use the **OR** function, one of the logical functions, to determine if any conditions in a test are TRUE.

Here is a fairly common scenario where we need to calculate if salespeople qualify for a commission using **IF** and **OR**.

$=IF(OR(B14>= \$B\$4, C14>= \$B\$5), B14* \$B\$6, 0)$  - If Total Sales are greater than or equal to ( $\geq$ ) the Sales Goal, **OR** Accounts are greater than or equal to ( $\geq$ ) the Account Goal, then multiply Total Sales by the Commission %, otherwise return 0.

D14					=IF(OR(B14>= \$B\$4, C14>= \$B\$5), B14* \$B\$6, 0)
	A	B	C	D	E
1	<b>Goals</b>				
3	<b>Criteria</b>	<b>Amount</b>			
4	Sales Goal:	\$8,500			
5	Account Goal:	5			
6	Commission Rate:	2.0%			
7	Bonus Goal:	\$12,500			
8	Bonus %:	1.5%			
9					
10	<b>Commisison Calculations with Conditions</b>				
12	<b>Salesperson</b>	<b>Total Sales</b>	<b>Accounts</b>	<b>Commission</b>	<b>Bonus</b>
13	Millicent Shelton	\$10,260	9	\$205	
14	Miguel Ferrari	\$15,700	7	\$314	\$236
15	Claire Fox	\$13,275	5	\$266	\$199
16	Rosemarie Cobb	\$9,100	3	\$182	
17	Lorie Chen	\$7,480	4		
18					

- Sales people need to exceed either Sales **OR** Account Goals to earn Commission
- Sales people need to exceed both Sales **AND** Account Goals to earn Bonus