


Microsoft
Excel
Advanced



LOOKUP & REFERENCE

Help you to work with arrays of data.

They are particularly useful when you need to cross reference between different data sets.

SEMINAR

- GETPIVOTTABLE
- HLOOKUP
- INDEX
- LOOKUP
- MATCH
- VLOOKUP

1.	GETPIVOTDATA	2
2.	HLOOKUP	3
3.	INDEX	5
4.	LOOKUP	7
5.	MATCH	9
6.	VLOOKUP	11

EXCELSIBLE ©

1 GETPIVOTDATA

The **GETPIVOTDATA** function in Excel is used to extract data from a pivot table.

	A	B	C	D	E	F	G	H	I	J
1	Category	Fruit								
2										
3	Sum of Amount		Column Labels							
4	Row Labels	Apple	Banana	Mango	Orange	Grand Total				
5	Australia	20634	52721	9186	8680	91221				
6	Canada	24867	33775	3767	19929	82338				
7	France	80193	36094	7388	2256	125931				
8	Germany	9082	39686	8775	8887	66430				
9	New Zealand	10332	40050		12010	62392				
10	United Kingdom	17534	42908	5600	21744	87786				
11	United States	28615	95061	22363	30932	176971				
12	Grand Total	191257	340295	57079	104438	693069				
13										
14										
15	Product	Apple								
16	Amount	191257								
17										
18	Country	Canada								
19	Amount	82338								
20										
21	Product	Apple								
22	Country	Canada								
23	Amount	24867								
24										
25										
26										
27										

1. Get the Total Amount for Apple.
 =GETPIVOTDATA("Amount", \$A\$3, "Product", B15)

2. Get the Total Amount in Canada.
 =GETPIVOTDATA("Amount", \$A\$3, "Country", B18)

3. Get the Total Amount for Apple in Canada.
 =GETPIVOTDATA("Amount", \$A\$3, "Product", B21, "Country", B22)

Note: The GETPIVOTDATA function can only return data that is visible.

1. Select Category "Vegetables"
2. Select Country "Australia"

FUNCTION 1

In this function, **GETPIVOTDATA** will retrieve the "Amount" data for the "Product" specified in cell **B15** from the pivot table located in cell **A3**.

FUNCTION 2

In this function, **GETPIVOTDATA** will retrieve the "Amount" data for the "Country" specified in cell **B18** from the pivot table located in cell **A3**.

FUNCTION 3

In this function, **GETPIVOTDATA** will retrieve the "Amount" data for the "Product" specified in cell **B21** and the "Country" specified in cell **B22** from the pivot table located in cell **A3**.

2 HLOOKUP

The **HLOOKUP** function in Excel is a way to search for a value in the top row of a table and return a value from a specified row in the table.

	A	B	C	D	E	F	G	H	I	J	K	L
1	NAME	SCORE	LEVEL	BONUS		SCORE	5	10	15	1		
2	Peter	17	C	7%		LEVEL	A	B	C	2		
3	George	20	C	7%		BONUS	3%	5%	7%	3		
4	Helen	1	B	5%		table array						
5	Taylor	1	B	5%								
6	Maria	9	A	3%								
7	Steven	12	B	5%								
8												
9												
10												
11												
12												
13												

↑
lookup values

↑
=HLOOKUP(B7,\$G\$1:\$I\$3,3,1)
Find closest bonus based on Score

↑
=HLOOKUP(B7,\$G\$1:\$I\$3,2,1)
Find closest level based on Score

1: Returns the largest value that is less than what we are looking for
0: Tries to find the exact value

FUNCTION 1

In this function, **HLOOKUP** will search the top row of the table (**\$G\$1:\$I\$3**) for the value in cell **B2**, and return the value from the **2nd row** of the table. If the value in **B2** is not found in the top row of the table, the function will return an error.

FUNCTION 2

In this function, **HLOOKUP** will search the top row of the table (**\$G\$1:\$I\$3**) for the value in cell **B2**, and return the value from the **3rd row** of the table. If the value in **B2** is not found in the top row of the table, the function will return an error.

	A	B	C	D	E	F	G	H	I
17	CUSTOMERS	YR 2018	YR 2019	YR 2020	GR TOTAL				
18	UNIC	€ 66,663	€ 164,248	€ 43,216	€ 274,127				
19	Logicom	€ 113,799	€ 13,964	€ 106,826	€ 234,589				
20	IBM	€ 80,369	€ 77,384	€ 41,632	€ 199,385				
21	European	€ 67,320	€ 108,285	€ 14,659	€ 190,264				
22	Cyta	€ 129,462	€ 68,797	€ 94,378	€ 292,637				
23	Cycom	€ 85,030	€ 25,263	€ 113,918	€ 224,211				
24	AHK	€ 66,826	€ 49,562	€ 75,088	€ 191,476				
25	ABC Education	€ 53,522	€ 31,176	€ 85,607	€ 170,305				
26									
27									

Find IBM's sales for Year 2020

CUSTOMER	IBM
SALES YEAR	YR 2020
RESULT	41632

=HLOOKUP(H19,A17:E25,4,FALSE)

↑
=SUM(B18:D18)

FUNCTION 3

In this function, **HLOOKUP** will search the top row of the table (**A17:E25**) for the value in cell **H19**, and return the value from the **4th row** of the table. If the value in **H19** is not found in the top row of the table, the function will return the value from the **largest value** in the top row that is **less than the search value**. If the search value is smaller than the smallest value in the top row, the function will return an error.

	A	B	C	D	E	F	G	H	I
31		ID	Product						
32		104	Printer	=HLOOKUP(B32,\$F\$36:\$I\$38, 3, FALSE)					
33		103	Tablet						
34		104	Printer						
35		101	Laptop						
36		102	Mouse						
37		103	Tablet						
38		101	Laptop						
39		102	Mouse						

Find the Product based on ID.				
ID	101	102	103	104
Brand	Dell	Logitech	Apple	HP
Product	Laptop	Mouse	Tablet	Printer

FUNCTION 4

In this function, **HLOOKUP** will search the top row of the table (**\$F\$36:\$I\$38**) for the value in cell **B32**, and return the value from the **3rd** row of the table. If the value in **B32** is not found in the top row of the table, the function will return an error.

EXCELSIBLE ©

3 INDEX

The **INDEX** function in Excel is used to retrieve a value from a range of cells based on a specified row and column number.

	A	B	C	D	E	F	G	H	I	J
1	ID	NAME	SURNAME	EMAIL	Course					
2	610	Jane	Farley	j.farley@gmail.com	Computer					
3	798	Steven	Batista	a.batista@gmail.com	Psychology					
4	841	Evelyn	Monet	e.monet@gmail.com	Biology					
5	886	Marilyn	Bradley	m.bradley@gmail.com	Computer					
6	622	Jonathan	Adder	j.adder@gmail.com	Biology					
7	601	Adrian	Birt	a.birt@gmail.com	Maths					

Find the Course based on Row/Column 2/5

RESULT
Psychology

=INDEX(A2:E7,2,5)

FUNCTION 1

In this function, the array is **A2:E7**, the row_num is **2**, and the column_num is **5**. The function would return the value from the **2nd row** and **5th column** of the range **A2:E7**.

	A	B	C	D	E	F	G
11	Planet	Position	Satellites	Diameter			
12	Mercury	1	0	4,879			
13	Venus	2	0	12,104			
14	Earth	3	1	12,756			
15	Mars	4	2	6,792			
16	Jupiter	5	64	142,984			
17	Saturn	6	200	120,536			
18	Uranus	7	27	51,118			
19	Neptune	8	13	49,528			
20	Pluto	9	5	2,306			

Find Jupiter's diameter

RESULT
142984

=INDEX(A12:D20,5,4)

FUNCTION 2

In this function, the array is **A12:D20**, the row_num is **5**, and the column_num is **4**. This formula would return the value from the **5th row** and **4th column** of the range **A12:D20**.

	A	B	C	D	E	F	G	H	I	J	K
24	Dept	2015	2016	2017							
25	Sales	252	245	151							
26	HR	325	436	475							
27	Operation	176	665	629							
28	Marketing	136	630	127							
29	Finance	242	237	681							
30											
31		Dept	2015	2016							
32		Security	325	436							
33		Payroll	176	665							
34		Procurement	136	630							
35											
36		Dept	2015	2016							
37		Developer	252	245							
38		Admin	325	436							
39		Tax	176	665							
40		Audit	136	630							

RESULT
665

Reference Form With Multiple Two-Dimensional Arrays

=INDEX((A25:D29,C32:E34,B37:D40),2,3,2)

FUNCTION 3

In this function, the array is **(A25:D29, C32:E34, B37:D40)**, the row_num is **2**, the column_num is **3**, and the area_num is **2**. This formula would return the value from the **2nd row** and **3rd column** of the **second area in the array**.

The array in this formula is made up of three ranges: **A25:D29, C32:E34, and B37:D40**. The **second area** in the array is **C32:E34**.

EXCELSIBLE ©

4 LOOKUP

The **LOOKUP** function in Excel allows you to search for a value in a range of cells and return a corresponding value from a different range of cells.

	A	B	C	D	E	G	H	I	J	K
1	NAME	SALES		TARGET	3125					
2	Peter	1000		SALES	3000			Value matched in Sales	=LOOKUP(E1,B2:B6)	
3	George	2000		NAME	Helen			Corresponding value in Name	=LOOKUP(E1,B2:B6,A2:A6)	
4	Helen	3000								
5	Taylor	4000								
6	Maria	5000								

FUNCTION 1

If cell **E1** contains the value **3125**, and the range **B2:B6** contains the values **1000, 2000, 3000, 4000, 5000**, then the formula **=LOOKUP(E1,B2:B6)** would return the value **3000** because it is found in the **1st column** of the range **B2:B6**.

FUNCTION 2

If cell **E1** contains the value **3125**, and the range **B2:B6** contains the values **1000, 2000, 3000, 4000, 5000**, and the range **A2:A6** contains the values **Peter, George, Helen, Taylor, Maria** then the formula **=LOOKUP(E1,B2:B6,A2:A6)** would return the value **Helen** because it corresponds to the value **3000** in the range **B2:B6**.

	A	B	C	D	E	F	G	H	I	J
11	NAME	SALES	PRICE							
12	Hat	15-Jan	€ 12.00							
13	Sandals	16-Jan	€ 16.00							
14	Hoodie	17-Jan	€ 18.00							
15	Sandals	22-Jan	€ 17.00							
16	Hoodie	23-Jan	€ 15.00							
17	Hat	23-Jan	€ 11.00							
18	Sandals	24-Jan	€ 15.00							
19	Hoodie	25-Jan	€ 19.00							

Item	Latest Price
Sandals	€ 15.00

Look up the latest price in data sorted in ascending order by date

=LOOKUP(2,1/(Item=E14),Price)

Item = A12:A19
Price = C12:C19

FUNCTION 3

LOOKUP is searching for the value **2** in the range **1/(Item=E14)** and returning the corresponding value from the range **Price**.

The **1/(Item=E14)** part of the formula is known as an **array formula**. It creates an array of values that consist of either **1 or 0**, depending on whether the value in the corresponding cell in the range **Item** is equal to the value in cell **E14**. If the value in the cell is equal to **E14**, the formula returns a value of **1**. If the value is not equal, the formula returns a value of **0**.

If the range **Item** consists of the following values: "Hat", "Sandals" etc. and the value in cell **E14** is "Sandals", then the array formula **1/(Item=E14)** would return the following array of values: **{0,1,0,1,0,0,1,0}**.

The **LOOKUP** function will then **search** this array for the value **2**. Since **2** is not present in the array, the function will return the **next smallest value** that is present, which is **1**. It will then

return the **corresponding value** from the range **Price**, which is the value in the **same position** as the **1** in the array.

	A	B	C	D	E	F	G	H	I	J
23	Score	Grade		Score	Grade	Look up the Grade based on Score (using data left)				
24	0	F		91	A	=LOOKUP(D24,A24:B28)				
25	60	D		85	B	=LOOKUP(D25,B30:F31)				
26	70	C				Look up the Grade based on Score (using data below)				
27	80	B								
28	90	A								
29										
30	Score	0	60	70	80	90				
31	Grade	F	D	C	B	A				
32										

FUNCTION 4

The **LOOKUP** function will search the range **A24 : B28** for the value in cell **D24**.

If the value in cell **D24** was not found in the range, the function would return the next smallest value that is present.

If the value in cell **D24** is "91", then the **LOOKUP** function would return the value "A" because it is the **next smallest value** in column A after "90".

5 MATCH

The **MATCH** function in Excel is used to find the relative position of an item in an array that matches a specific value.

	A	B	C	D	E	F	G
1	NAME						
2	Peter	1					
3	George	2					
4	Helen	3					
5	Taylor	4					
6	Maria	5					

Get the position of an item in array	
LOOKUP	RESULT
Helen	3
Helen	Helen

1 → (points to Helen in LOOKUP)
 2 → (points to Helen in RESULT)

=MATCH(D4,A2:A6)
=LOOKUP(D4,A2:A6)

FUNCTION 1

If **D4** contains the value "Helen" and the values in **A2:A6** are "Peter", "George", "Helen", "Taylor", "Maria", the **MATCH** function would return **3**, since "Helen" is the **first** value in the lookup array that matches "Helen".

If the lookup_value is not found in the lookup_array, the **MATCH** function will return an #N/A error.

FUNCTION 2

If **D4** contains the value "Helen" and the values in **A2:A6** are "Peter", "George", "Helen", "Taylor", "Maria", the **LOOKUP** function would return "Helen", since "Helen" is the value in the lookup_vector that matches the lookup_value.

	A	B	C	D	E	F	G	H
11	PLANET							
12	Mercury	1						
13	Venus	2						
14	Earth	3						
15	Mars	4						
16	Jupiter	5						
17	Saturn	6						
18	Uranus	7						
19	Neptune	8						
20	Pluto	9						

Get the position of an exact item in array	
Planet	Mars
Position	4

3 → (points to Mars in Planet)

=MATCH(E13, A12:A20,0)

↑
0 = exact match
not case sensitive

FUNCTION 3

If the value "Mars" appears in the cell **E13**, and **MATCH** function searches for "Mars" in the range **A12:A20**, the function will return **4**, because "Mars" is the **4th** value in the range.

	A	B	C	D	E	F	G	H	I	J		
24	VALUES			Get the position of an approximately item in array							VALUES	
25	100	1								900	1	
26	200	2								800	2	
27	300	3								700	3	
28	400	4								600	4	
29	500	5								500	5	
30	600	6								400	6	
31	700	7								300	7	
32	800	8								200	8	
33	900	9								100	9	
34												
35												
36												

Planet	575
Position	5

=MATCH(E26, A25:A33,1)

↑

1 = approximately match
values should be in ascending order

4

Planet	575
Position	4

=MATCH(E32, J25:J33,-1)

↑

-1 = approximately match
values should be in descending order

5

FUNCTION 4

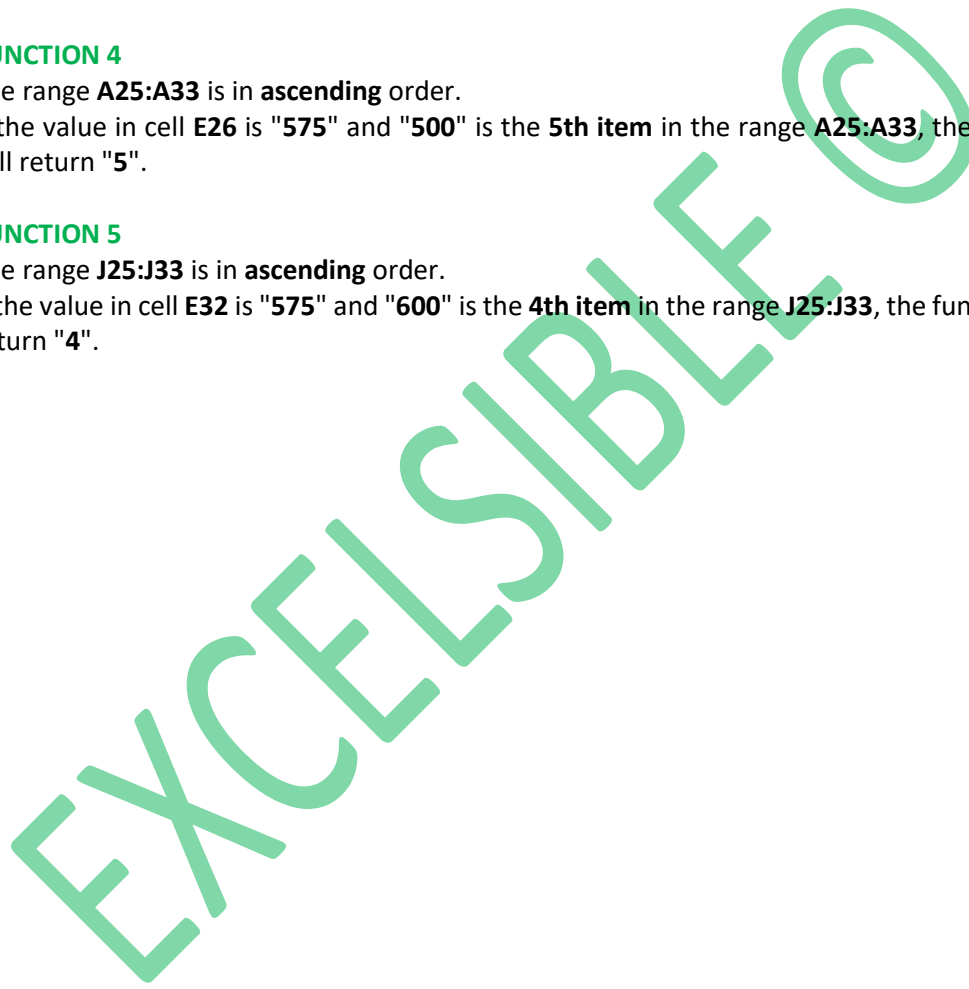
The range **A25:A33** is in **ascending** order.

If the value in cell **E26** is "575" and "500" is the **5th item** in the range **A25:A33**, the function will return "5".

FUNCTION 5

The range **J25:J33** is in **ascending** order.

If the value in cell **E32** is "575" and "600" is the **4th item** in the range **J25:J33**, the function will return "4".



6 VLOOKUP

The **VLOOKUP** function in Excel is used to search for a specific value in a table and return a corresponding value from a different column in the same row.

	A	B	C	D	E	F
1	ID	NAME	SURNAME	EMAIL	Course	
2	610	Jane	Farley	j.farley@gmail.com	Computer	
3	798	Steven	Batista	a.batista@gmail.com	Psychology	
4	841	Evelyn	Monet	e.monet@gmail.com	Biology	
5	886	Marilyn	Bradley	m.bradley@gmail.com	Computer	
6	622	Jonathan	Adder	j.adder@gmail.com	Biology	
7	601	Adrian	Birt	a.birt@gmail.com	Maths	
8						
9	lookup			result		
10	column			column		
11						
12						
13			ID	EMAIL		
14			798	a.batista@gmail.com		
15			lookup	result		
16			values			

	ID	EMAIL
	798	a.batista@gmail.com

=VLOOKUP(C13,A2:E7,4,FALSE)
Find an email based on ID

FUNCTION 1

The function will search the table array **A2:E7** for the **value** in cell **C13**. If it finds a match, it will return the **value** from the **4th column** of the same row. If it doesn't find a match, it will return an **error**.

	A	B	C	D	E	F	G	H	I	J
19										
20	CUSTOMERS	YR 2018	YR 2019	YR 2020	GR TOTAL					
21	UNIC	€ 66,663	€ 164,248	€ 43,216	€ 274,127					
22	Logicom	€ 113,799	€ 13,964	€ 106,826	€ 234,589					
23	IBM	€ 80,369	€ 77,384	€ 41,632	€ 199,385					
24	European	€ 67,320	€ 108,285	€ 14,659	€ 190,264					
25	Cyta	€ 129,462	€ 68,797	€ 94,378	€ 292,637					
26	Cycom	€ 85,030	€ 25,263	€ 113,918	€ 224,211					
27	AHK	€ 66,826	€ 49,562	€ 75,088	€ 191,476					
28	ABC Education	€ 53,522	€ 31,176	€ 85,607	€ 170,305					
29										
30										
31										
32										
33										

CUSTOMER	Logicom
SALES YEAR	2020
RESULT	106826

=VLOOKUP(H20,A21:E28,4,FALSE)

Customer	GR TTL	VAT	GR TTL (+ VAT)
UNIC	€ 274,127	€ 52,084	€ 326,211
IBM	€ 199,385	€ 37,883	€ 237,268
AHK	€ 191,476	€ 36,380	€ 227,856
TOTAL	€ 791,336		

=VLOOKUP(G29,\$A\$21:\$E\$28,5,FALSE)

FUNCTION 2

The function will search the table array **A21:E28** for the value in cell **H20**. If it finds a match, it will return the **value** from the **4th column** of the same row. If it doesn't find a match, it will return an **error**.

FUNCTION 3

The function will search the table array **\$A\$21:\$E\$28** for the value in cell **G29**. If it finds a match, it will return the **value** from the **5th column** of the same row. If it doesn't find a match, it will return an **error**.

	A	B	C	D	E	F	G	H	I
40			Join Full Name and Departments data						
41			=A44&B44						
42									
43									
44	Full name	Department	Helper	Salary					
45	Andreas Andreou	Adm	Andreas AndreouAdm	€ 92,985.00					
46	Anna Lyn	IT	Anna LynIT	€ 75,144.00					
47	George Georgiou	Sales	George GeorgiouSales	€ 81,603.00					
48	Bob Simon	Marketing	Bob SimonMarketing	€ 65,237.00					
49	Bradley Stewart	IT	Bradley StewartIT	€ 64,717.00					
50	James Petrou	Adm	James PetrouAdm	€ 63,713.00					
51	Bryan Sloane	IT	Bryan SloaneIT	€ 74,243.00					
52	Caylie Menaniou	Adm	Caylie MenaniouAdm	€ 62,683.00					
53	Chatsworth Miller	Marketing	Chatsworth MillerMarketing	€ 71,358.00					
54	Chris Savva	Sales	Chris SavvaSales	€ 89,758.00					
55									

Salary	Criteria1	Criteria2
€ 81,603.00	George Georgiou	Sales

Find the Salary for George Georgiou in Sales Department

↓

=VLOOKUP(G46&H46,C:D,2,FALSE)

4

FUNCTION 4

This function will search the table array **C:D** for the value in cells **G46** and **H46** concatenated together. If it finds a match, it will return the **value** from the **2nd column** of the same row. If it doesn't find a match, it will return an **error**.

