

Statistical Functions

This chapter gives an overview of some very useful statistical functions in Excel.

Average

To calculate the average of a range of cells, use the AVERAGE function.

A3	}	Ŧ	:	\times	\checkmark	f_{x}	=A	VERAG	GE(A1:	01)						
	А	в	С	D	E	F	G	н	I.	J	К	L	М	N	0	Ρ
1	0	7	8	6	5	9	8	7	4	8	0	3	5	6	8	
2																
3	5.6															
4																

Averageif

To average cells based on one criteria, use the AVERAGEIF function. For example, to calculate the average excluding zeros.

A3	}	Ŧ	:	\times	~	$f_{\mathcal{K}}$	=A	VERAG	GEIF(A	1:01,'	'<>0")					
	А	В	С	D	E	F	G	н	1	J	к	L	М	Ν	0	Р
1	0	7	8	6	5	9	8	7	4	8	0	3	5	6	8	
2																
3	6.46															
4																

Note: <> means not equal to. The AVERAGEIF function is similar to the <u>SUMIF</u> function.

Median

To find the median (or middle number), use the MEDIAN function.



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A 3		Ŧ	:	\times	\checkmark	$f_{\mathcal{K}}$	=M	IEDIAN	N(A1:C	01)						
	А	в	С	D	E	F	G	н	I.	J	к	L	М	N	0	Р
1	0	7	8	6	5	9	8	7	4	8	0	3	5	6	8	
2																
3	6															
4																

Check:

	Α	В	С	D	Е	F	G	Н	1	J	K	L	М	Ν	0	Ρ
1	0	0	3	4	5	5	6	6	7	7	8	8	8	8	9	

Mode

To find the most frequently occurring number, use the MODE function.

A3	}	Ŧ	:	×	~	$f_{\mathcal{K}}$	=M	IODE(/	A1:01)						
	А	в	С	D	Е	F	G	н	I.	J	к	L	м	N	0	Р
1	0	7	8	6	5	9	8	7	4	8	0	3	5	6	8	
2																
3	8															
4																

Standard Deviation

To calculate the standard deviation, use the STEDV function.

		_		~		£			41.01	`						
A3	5	•				Jx	=5	IDEV(A1:01)						
	А	В	С	D	Е	F	G	Н	I.	J	К	L	М	N	0	Ρ
1	0	7	8	6	5	9	8	7	4	8	0	3	5	6	8	
2																
3	2.82															
4																

Min

To find the minimum value, use the MIN function.





age

A3	}	-		×	\checkmark	f_{x}	=N	IIN(A1	:01)							
	А	в	С	D	E	F	G	н	I.	J	к	L	м	N	0	Р
1	0	7	8	6	5	9	8	7	4	8	0	3	5	6	8	
2																
3	0															
4																

Max

To find the maximum value, use the MAX function.

A 3		-	:	×	~	f_{x}	=M	AX(A:	l:01)							
	А	В	С	D	Е	F	G	Н	T	J	К	L	М	N	0	Р
1	0	7	8	6	5	9	8	7	4	8	0	3	5	6	8	
2																
3	9															
4																

-

Large

To find the third largest number, use the following LARGE function.

A3	}	Ŧ	:	\times	~	$f_{\mathcal{K}}$	=L/	ARGE(A1:01	,3)						
	А	В	С	D	Е	F	G	Н	I.	J	К	L	м	N	0	Р
1	0	7	8	6	5	9	8	7	4	8	0	3	5	6	8	
2																
3	8															
4																

Check:

	Α	В	С	D	Е	F	G	Н	1	J	K	L	М	Ν	0	Ρ
1	0	0	3	4	5	5	6	6	7	7	8	8	8	8	9	

Small

To find the second smallest number, use the following SMALL function.

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										Н	ardw	are &	& Sof 3d. By	twore Hary	e I <mark>nst</mark> i ana C	tute
A3		-		\times	\checkmark	$f_{\mathcal{K}}$	=SI	MALL(A1:01	.,2)						
	А	в	С	D	E	F	G	н	I.	J	к	L	м	N	0	Р
1	0	7	8	6	5	9	8	7	4	8	0	3	5	6	8	
2																
3	0															
4																

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Negative Numbers to Zero

A clever **Excel** trick to change **negative numbers to zero** but leave positive numbers unchanged.

Below you can find two columns with numbers. To subtract the numbers in column B from the numbers in column A, execute the following steps.

- 1. Select cell C1.
- 2. Enter the formula =A1-B1
- 3. Click the lower right corner of cell C1 and drag the formula down.

C1		• : D	×	<i>f</i> _* =A1	L-B1	
	А	в	С	D	E	F
1	20	12	8			
2	15	12				
3	18	7				
4	17	8				
5	15	7				
6	11	13				
7	11	15				
8	11	8				
9	14	10				
10	19	6				
11	13	15				
12	12	13				
13	15	7				
14						

Result:



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C1		- : :	×	$f_{x} = A$	1-B1	
	Α	В	С	D	E	F
1	20	12	8			
2	15	12	3			
3	18	7	11			
4	17	8	9			
5	15	7	8			
6	11	13	-2			
7	11	15	-4			
8	11	8	3			
9	14	10	4			
10	19	6	13			
11	13	15	-2			
12	12	13	-1			
13	15	7	8			
14						
15						

4. To change the negative numbers to zero but leave the positive numbers unchanged, instead of =A1-B1, use =MAX(0,A1-B1) and drag the function down.

Result:

C6		▼ : 2	× ~	<i>f</i> _* =M	AX(0,A6-B	6)	
	А	в	С	D	E	F	
1	20	12	8				
2	15	12	3				
3	18	7	11				
4	17	8	9				
5	15	7	8				
6	11	13	0				
7	11	15	0				
8	11	8	3				A
9	14	10	4				
10	19	6	13				
11	13	15	0				
12	12	13	0				
13	15	7	8				
14							
15							

Random Numbers

Excel has two useful functions when it comes to generating **random numbers**. The **RAND** and **RANDBETWEEN** function.

Rand

The RAND function generates a random decimal number between 0 and 1.

1. Select cell A1.





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2. Type RAND() and press Enter. The RAND function takes no arguments.

A1	L	•	× ✓	<i>f</i> _{sc} =R∕	AND()				
	А	В	с	D	E	F	G	Н	I.
1	0.63404								
2									

3. To generate a list of random numbers, select cell A1, click on the lower right corner of cell A1 and drag it down.

A1	A1 • : × ✓ fx =RAND()										
	А	в	С	D	E	F	G	н	I.		
1	0.895814										
2	0.025902										
3	0.979004										
4	0.328873										
5	0.074517										
6	0.821652										
7	0.989476										
8											
9											

Note that cell A1 has changed. That is because random numbers change every time a cell on the sheet is calculated.

4. If you don't want this, simply copy the random numbers and paste them as values.





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		• :	× 🗸 J	f _x					
	Α	в	с	D	E	F	G	н	I
1	0.895814		0.895814						
2	0.025902		0.025902						
3	0.979004		0.97 9004						
4	0.328873		0.328873 F	Paste Options	:				
5	0.074517		0.074511	b 🗋 🕏	. 🛱 P	🎭 💼 🔄			
6	0.821652		0.821652			A I L CO			
7	0.989476		0.9 89476	Values (V)					
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									

5. Select cell C1 and look at the formula bar. This cell holds a value now and not the RAND function.

C1	C1 • : × ✓ f _x 0.895813858170649											
	А	В	С	D	E	F	G	н	I.			
1	0.619427		0.895814									
2	0.159024		0.025902									
3	0.431186		0.979004									
4	0.960913		0.328873									
5	0.773529		0.074517									
6	0.149059		0.821652									
7	0.012517		0.989476									
8												

Randbetween

The RANDBETWEEN function generates a random whole number between two boundaries.

1. Select cell A1.





2. Type RANDBETWEEN(50,75) and press Enter.

A1		•	× v	f_x	=RANDBETWEEN(50,75)					
	А	В	С		D	E	F	G	Н	I
1	59									
2										

3. If you want to generate random decimal numbers between 50 and 75, modify the RAND function as follows:



Rank

The **RANK function** returns the rank of a number in a list of numbers.

1. If the third argument is omitted (or 0), **Excel** ranks the largest number first, second largest number second, etc.

B1		▼ E ⊃	× 🗸	<i>f</i> _{sc} =R∕	NK(A1,\$A	\$1:\$A\$9)			
	Α	В	С	D	E	F	G	Н	1
1	1455	6							
2	1534	5							
3	1108	9							
4	2109	3							
5	2109	3							
6	2917	1							
7	1427	7							
8	1220	8							
9	2298	2							
10									

Note: when we drag the RANK function down, the <u>absolute reference</u> (\$A\$1:\$A\$9) stays the same, while the relative reference (A1) changes to A2, A3, A4, etc.



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2. If the third argument is 1, Excel ranks the smallest number first, second smallest number second, etc.

B1	B1 ▼ : × ✓ <i>f</i> * =RANK(A1,\$A\$1:\$A\$9,1)									
	А	В	С	D	Е	F	G	н	1	
1	1455	4								
2	1534	5								
3	1108	1								
4	2109	6								
5	2109	6								
6	2917	9								
7	1427	3								
8	1220	2								
9	2298	8								
10										

3. Use the RANK.AVG function to return the average rank if more than one number has the same rank.

B1		• : :	A1,\$A\$1:\$A	\$9,1)					
	А	В	с	D	E	F	G	н	1
1	1455	4							
2	1534	5							
3	1108	1							
4	2109	6.5							
5	2109	6.5							
6	2917	9							
7	1427	3							
8	1220	2							
9	2298	8							
10									

MaxIfs and MinIfs

Use the MAXIFS and MINIFS function in Excel 2016 to find the maximum and minimum value based on one criteria or multiple criteria.

1. For example, the **MAXIFS function** below finds the highest female score.





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F2	2	•	$\times \checkmark f_x$	=MAX	KIFS(D2:D1	L2,B2:B12,"	Female")		
	А	В	С	D	Е	F	G	н	1
1	Name	Gender	Country	Score					
2	Richard	Male	United States	74		96			
3	Jennifer	Female	United Kingdom	92					
4	James	Male	United States	65					
5	Lisa	Female	Canada	82					
6	Sharon	Female	Australia	50					
7	Elizabeth	Female	Canada	91					
8	Carol	Female	United States	96					
9	Mark	Male	United States	58					
10	John	Male	Canada	67					
11	Susan	Female	United Kingdom	54					
12	David	Male	United States	83					
13									

Note: the first argument (D2:D12 in this example) is always the range in which the maximum or minimum will be determined. This MAXIFS function has 1 range/criteria pair (B2:B12/Female).

2. The **MINIFS function** below finds the lowest female score.

		["				
F2		* : L	$\times \checkmark J_X$	=MINIFS(D2:D12,B2:B12,"Female")						
	А	В	С	D	E	F	G	н	I.	
1	Name	Gender	Country	Score						
2	Richard	Male	United States	74		50				
3	Jennifer	Female	United Kingdom	92						
4	James	Male	United States	65						
5	Lisa	Female	Canada	82						
6	Sharon	Female	Australia	50						
7	Elizabeth	Female	Canada	91						
8	Carol	Female	United States	96						
9	Mark	Male	United States	58						
10	John	Male	Canada	67						
11	Susan	Female	United Kingdom	54						
12	David	Male	United States	83						
13										

3. For example, the MAXIFS function below finds the highest female score in Canada.

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F2	1	•	\times \checkmark f_x	=MAXIFS(D2:D12,B2:B12,"Female",C2:C12,"Canada")					
	А	в	с	D	Е	F	G	Н	I.
1	Name	Gender	Country	Score					
2	Richard	Male	United States	74		91			
3	Jennifer	Female	United Kingdom	92					
4	James	Male	United States	65					
5	Lisa	Female	Canada	82					
6	Sharon	Female	Australia	50					
7	Elizabeth	Female	Canada	91					
8	Carol	Female	United States	96					
9	Mark	Male	United States	58					
10	John	Male	Canada	67					
11	Susan	Female	United Kingdom	54					
12	David	Male	United States	83					
13									

Note: this MAXIFS function has 2 range/criteria pairs (B2:B12/Female and C2:C12/Canada). The MAXIFS and MINIFS function can handle up to 126 range/criteria pairs.

4. The MAXIFS function below finds the highest score below 60.

F2	2	'<60")							
	А	В	С	D	E	F	G	Н	I.
1	Name	Gender	Country	Score					
2	Richard	Male	United States	74		58			
3	Jennifer	Female	United Kingdom	92					
4	James	Male	United States	65					
5	Lisa	Female	Canada	82					
6	Sharon	Female	Australia	50					
7	Elizabeth	Female	Canada	91					
8	Carol	Female	United States	96					
9	Mark	Male	United States	58					
10	John	Male	Canada	67					
11	Susan	Female	United Kingdom	54					
12	David	Male	United States	83					
13									

Note: this MAXIFS function only uses the range D2:D12.





Count Text Occurrences

This example teaches you how to count the number of occurrences of text in a range.

1. For example, to count the number of cells that contain exactly star.

A	A9 ▼ : × ✓ <i>f</i> _x =COUNTIF(A1:A7,"star")										
	А		в	С	D	E	F	G	н	I.	
1	star										
2	moon										
3	stars										
4		9									
5	star										
6	star										
7	star12										
8											
9		2									
10											

2. For example, to count the number of cells that contain exactly star + 1 character. A question mark (?) matches exactly one character.

_										
A	9	-	1 2	X 🗸	<i>f</i> _x =co	UNTIF(A1:	A7, "star?")		
						_				
	A		В	C	D	E	F	G	н	
1	star									
2	moon									
3	stars									
4		9								
5	star									
6	star									
7	star12									
8										
9		1								
10										

3. For example, to count the number of cells that contain exactly star + a series of zero or more characters. An asterisk (*) matches a series of zero or more characters.

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A	•		- :	\times	~	f _x =CC	DUNTIF(A1	A7,"star*")		
	А		в		c	D	Е	F	G	н	1
1	star										
2	moon										
3	stars										
4		9									
5	star										
6	star										
7	star12										
8											
9		4									
10											

4. For example, to count the number of cells that contain star in any way. No matter what is before or after star, this function finds all the cells that contain star in any way.

A	A9 • : × ✓ f* =COUNTIF(A1:A7,"*star*")											
	А		в	с	D	E	F	G	н	1		
1	star											
2	moon											
3	stars											
4		9										
5	star											
6	star											
7	star12											
8												
9		5										
10												

5. For example, to count the number of cells that contain text.

A)	▼ ∃ ⊃	× 🗸	<i>f</i> _x =cc	DUNTIF(A1	:A7,"*")			
	Δ	в	с	D	F	F	G	н	
1	star								
2	moon								
3	stars								
4	9								
5	star								
6	star								
7	star12								
8									
9	6								
10									

Count Logical Values

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Excel.

1. For example, to count the number of cells that contain TRUE.

AS	A9 ▼ : × ✓ f =COUNTIF(A1:A7,TRUE)										
	А	в	С	D	Е	F	G	н	1		
1	5										
2	TRUE										
3	sun										
4	FALSE										
5	TRUE										
6											
7	moon										
8											
9	2										
10											

2. For example, to count the number of cells that contain FALSE.

A	A9 \checkmark : \checkmark f_x =COUNTIF(A1:A7,FALSE)										
	А	в	С	D	E	F	G	н	I		
1	5										
2	TRUE										
3	sun										
4	FALSE										
5	TRUE										
6											
7	moon										
8											
9	1										
10											

3. For example, to count the number of cells that contain TRUE or FALSE.



									1
				Ĩ	he Hi- Hard	Tech ware & S (Regd.	Comp Softwore By Harya	uters Institute na Govt.)	
	• : :	× ✓	<i>f</i> _x =cc	DUNTIF(A1:	:A7,TRUE)+	COUNTIF(A1:A7,FALS	SE)	
А	В	С	D	Е	F	G	н	I.	
5									
TRUE									
ın									
FALSE									
TRUE									

Count Blank/Nonblank Cells

A9

1
2

3 sun

4

5

6 7

8 9

10

moon

3

This example shows you how to count the number of **blank** and **nonblank** cells in **Excel**.

1. The COUNTBLANK function counts the number of blank cells.

AS	A9 • : × ✓ f* =COUNTBLANK(A1:A7)											
	А	В	С	D	E	F	G	н	1			
1	2											
2	sun											
3	moon											
4	TRUE											
5												
6	7											
7	5											
8												
9	1											
10												

2. The COUNTA function counts the number of nonblank cells. COUNTA stands for count all.





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AS	A9 • \therefore : \times \checkmark f_x =COUNTA(A1:A7)									
	А	в	с	D		Е	F	G	н	I.
1	2									
2	sun									
3	moon									
4	TRUE									
5										
6	7									
7	5									
8										
9	6									
10										

Sumproduct

To calculate the sum of the products of corresponding numbers in one or more ranges, use **Excel's powerful SUMPRODUCT function**.

1. For example, the SUMPRODUCT function below calculates the total amount spent.

C7	, .	>		f _x =SU	MPRODUC	T(B2:B5,C2	:C5)		
	А	В	С	D	Е	F	G	н	1
1	Product	Quantity	Price						
2	Computer	2	1000						
3	Keyboard	4	250						
4	Mouse	4	100						
5	Printer	2	50						
6									
7		Total	3500						
8									

Note: the SUMPRODUCT function performs this calculation: (2 * 1000) + (4 * 250) + (4 * 100) + (2 * 50) = 3500.

2. The ranges must have the same dimensions or Excel will display the #VALUE! error.





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С	DUNTIF	•	\times	< ✓ .	f _x	=SU	MPRODU	CT(B2:B5,C	:2:C4)		
	А	В		С		D	E	F	G	н	I.
1	Product	Quanti	ty	Price							
2	Computer		2	1000							
3	Keyboard		4	250							
4	Mouse		4	100							
5	Printer		2	50							
6											
7		Tota 🜗		#VALUE!							
8											

3. The SUMPRODUCT function treats any entries that are not numeric as if they were zeros.

C7	, .	- : >	< 🗸 .	f _x =SU	MPRODUC	T(B2:B5,C2	:C5)		
	А	в	С	D	E	F	G	н	I
1	Product	Quantity	Price						
2	Computer	2	1000						
3	Keyboard	4	hi						
4	Mouse	4	there						
5	Printer	2	50						
6									
7		Total	2100						
8									

Logical Functions

Learn how to use Excel's logical functions such as the IF, AND and OR function.

If Function

The **IF function** checks whether a condition is met, and returns one value if TRUE and another value if FALSE.

1. Select cell C1 and enter the following function.



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C1		· = 🗙	$\checkmark f_x$	=IF(A1>1	=IF(A1>10,"Correct", "Incorrect")						
	А	в	С	D E F G H							
1	12	3	Correct								
2											

The IF function returns Correct because the value in cell A1 is higher than 10.

And Function

The **AND Function** returns TRUE if all conditions are true and returns FALSE if any of the conditions are false.

1. Select cell D1 and enter the following formula.

D1		· ÷ ×	$\checkmark f_x$	=IF(AND(A1>10,B1>5),"Correct", "Incorrect")						
	А	В	С	D	E	F	G	н		
1	12	3	Correct	Incorrect						
2										

The AND function returns FALSE because the value in cell B1 is not higher than 5. As a result the IF function returns Incorrect.

Or Function

The **OR function** returns TRUE if any of the conditions are TRUE and returns FALSE if all conditions are false.

1. Select cell E1 and enter the following formula.

E1		· : ×	$\checkmark f_X$	=IF(OR(A1>10,B1>5),"Correct", "Incorrect")						
	А	в	с	D E F G H						
1	12	3	Correct	Incorrect	Correct					
2										

The OR function returns TRUE because the value in cell A1 is higher than 10. As a result the IF function returns Correct.

General note: the AND and OR function can check up to 255 conditions.

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Nested If

1

2

3 Excellent

The **IF function** in **Excel** can be **nested**, when you have multiple conditions to meet. The FALSE value is being replaced by another IF function to make a further test.

Note: if you have Excel 2016, simply use the IFS function.

1a. If cell A1 equals 1, the formula returns Bad.

B1		• : :	=IF(A1=1,"B	ad",IF(A1=	2,"Good",I	F(A1=3,"Ex	cellent","	No Valid So	ore")))
	А	В	с	D	E	F	G	Н	I.
1	1	Bad	<u> </u>						
2 1b. If	cell A1	equals 2, t	he form <mark>ula</mark>	ı returns G	iood.				
B1		• : :	=IF(A1=1,"B	ad",IF(A1=	:2,"Good",I	F(A1=3,"Ex	cellent","	No Valid So	ore")))
1 2	A 2	B Good	с	D	E	F	G	Н	T
1c. If	cell A1	equals 3, th	he formula	returns E	xcellent.				
B1		• : :	=IF(A1=1,"B	ad",IF(A1=	2,"Good",I	F(A1=3,"Ex	cellent","	No Valid So	ore")))
				_	_	_			

1d. If cell A1 equals another value, the formula returns No Valid Score.

B1		-	=IF(A1=	=1,"Bad",II	F(A1=2,"Go	od",IF(A1:	=3,"Excelle	nt","No Va	alid Score")))
	А		В	С	D	Е	F	G	н	T
1	5	5 No Vali	d Score							
2										

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Page 2 (

Here's another example.

2

2a. If cell A1 is less or equal to 10, the formula returns 350.

B1		* : =	: =IF(A1<=10,350,IF(A1<=20,700,IF(A1<=30,1400, 2000)))									
	А	В	С	D	E	F	G	н	I.			
1	6	350										
2												

1000

2b. If cell A1 is greater than 10 and less or equal to 20, the formula returns 700.

B1		▼ : =	IF(A1<=10,	,350,IF(A1<	=20,700,IF(A1<=30,14	00, 2000)))		
	А	В	С	D	E	F	G	Н	I.
1	12	700							
2									
B1		× : =	IF(A1<=10,	350,IF(A1<	=20,700,IF(A1<=30,14	00, 2000)))		
B1	А	▼ : = B	IF(A1<=10, C	.350,IF(A1<	=20,700,IF(E	A1<=30,14 F	00, 2000))) G	н	I

2c. If cell A1 is greater than 20 and less or equal to 30, the formula returns 1400.

B1		▼ ÷ =	=IF(A1<=10	F(A1<=10,350,IF(A1<=20,700,IF(A1<=30,1400, 2000)))								
	А	В	с	D	Е	F	G	Н	I.			
1	27	1400										
2												

2d. If cell A1 is greater than 30, the formula returns 2000.

B1		▼ : =	=IF(A1<=10,350,IF(A1<=20,700,IF(A1<=30,1400, 2000)))									
	A B C D E F G H I											
1	54	2000										
2												

Note: to slightly change the boundaries, you might want to use "<" instead of "<=" in your own formula.

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Ifs

Use the **IFS function** in **Excel 2016** when you have multiple conditions to meet. The IFS function returns a value corresponding to the first TRUE condition.

Note: if you don't have Excel 2016, you can <u>nest</u> the IF function.

1a. If cell A1 equals 1, the IFS function returns Bad.

B1		• : :	=IFS(A1=1,"	Bad",A1=2	,"Good",A:	L=3,"Excell	ent",TRUE,	,"No Valid	Score")
	А	В	с	D	E	F	G	Н	I.
1	1	Bad							
2									

1b. If cell A1 equals 2, the IFS function returns Good.

B1		• : =	=IFS(A1=1,"	FS(A1=1,"Bad",A1=2,"Good",A1=3,"Excellent",TRUE,"No Valid Score")										
	А	В	C D E F G H I											
1	2	Good												
2														

1c. If cell A1 equals 3, the IFS function returns Excellent.

B1		▼ : =	IFS(A1=1,"Bad",A1=2,"Good",A1=3,"Excellent",TRUE,"No Valid Score")											
	А	В	C D E F G H I											
1	3	Excellent												
2														

1d. If cell A1 equals another value, the IFS function returns No Valid Score.

B1		▼ : =IF	FS(A1=1,"Bad",	A1=2,"Goo	od",A1=3,"E	Excellent",	TRUE,"No	Valid Score	è")
	А	В	с	D	Е	F	G	н	I.
1	5	No Valid Sco	ore						
2									

Note: instead of TRUE, you can also use 1=1 or something else that is always TRUE.

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Here's another example.

2a. If cell A1 is less or equal to 10, the IFS function returns 350.

B1		• : =	IFS(A2<=1	0,350,A2<=	20,700,A2<	=30,1400,A	2>30,2000)					
	А	В	с	D	E	F	G	Н	I				
1	6	350											
2													

2b. If cell A1 is greater than 10 and less or equal to 20, the IFS function returns 700.

B1	B1 • : =IFS(A2<=10,350,A2<=20,700,A2<=30,1400,A2>30,2000)												
	А	В	с	D	E	F	G	Н	I.				
1	12	700											
2													
B1		• : :	=IFS(A2<=1	0,350,A2<=	20,700,A2<	=30,1400,A	2>30,2000)					
	А	В	с	D	E	F	G	Н	I.				
1	20	700											
2													

2c. If cell A1 is greater than 20 and less or equal to 30, the IFS function returns 1400.

B1		• : =	IFS(A2<=1	FS(A2<=10,350,A2<=20,700,A2<=30,1400,A2>30,2000)										
	А	В	с	D	Е	F	G	Н	I.					
1	27	1400												
2														

2d. If cell A1 is greater than 30, the IFS function returns 2000.

B1		• : =	IFS(A2<=10,350,A2<=20,700,A2<=30,1400,A2>30,2000)											
	А	В	с	D	Е	F	G	н	I.					
1	54	2000												
2														

Note: to slightly change the boundaries, you might want to use "<" instead of "<=" in your own function.

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Switch

This example teaches you how to use the **SWITCH function** in **Excel 2016** instead of the IFS function.

=	IFS(RIGHT	(A2,2)="UT'	',"Utah",RI	GHT(A2,2)=	"TX","Tex	as",RIGHT(А2,2)="ОН	","Ohio",T	RUE,"?")
		-	_	-	_	_	-		
	A	В	C	D	E	F	G	н	
1	Code	State							
2	85-UT	Utah							
3	192-TX	Texas							
4	6-OH	Ohio							
5	74-TX	Texas							
6	18-UT	Utah							
7	23-OH	Ohio							
8	125-TX	Texas							
9	480-OH	Ohio							
10	91-XR	?							
11	37-TX	Texas							
12									

1a. For example, the IFS function below finds the correct states.

Explanation: cell A2 contains the string 85-UT. The RIGHT function extracts the 2 rightmost characters from this string (UT). As a result, the IFS function returns the correct state (Utah). If the 2 rightmost characters are not equal to UT, TX or OH, the IFS function returns a question mark. Instead of TRUE, you can also use 1=1 or something else that is always TRUE.

1b. The SWITCH function below produces the exact same result but is much easier to read.



						ĩ	he Hi- Harc	Tech ware & S (Regd.	Comp Softwore By Harya	uters Institute na Govt.)
B2	2	•	=SWIT	CH(RI	GHT(A2,2)	,"UT","Uta	h","TX","T	exas","OH	',"Ohio","?	")
	А	В	C	:	D	E	F	G	Н	I.
1	Code	State								
2	85-UT	Utah	l							
3	192-TX	Texas	Ī							
4	6-OH	Ohio								
5	74-TX	Texas								
6	18-UT	Utah								
7	23-OH	Ohio								
8	125-TX	Texas								
9	480-OH	Ohio								
10	91-XR	?								
11	37-TX	Texas								
12										

Explanation: if the first argument (RIGHT(A2,2) in this example) equals UT, the SWITCH function returns Utah. If TX, Texas. If OH, Ohio. The last argument (a question mark in this example) is always the default value (if there's no match).

2. Why not always use the SWITCH function in Excel? There are many examples where you cannot use the SWITCH function instead of the IFS function.

B1		• : =	IFS(A2<=10,350,A2<=20,700,A2<=30,1400,A2>30,2000)										
	А	В	С	D	E	F	G	н	I.				
1	6	350											
2													

Explanation: because we use"<=" and ">" symbols in this <u>IFS</u> function, we cannot use the SWITCH function.

Roll the Dice

This example teaches you how to simulate the **roll of two dice in Excel**. If you are in a hurry, simply download the Excel file.

Note: the instructions below do not teach you how to format the worksheet. We assume that you know how to change font sizes, font styles, insert rows and columns, add borders, change background colors, etc.

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1. At the moment, each cell contains the letter l (as in lion). With a Wingdings font style, these l's look like dots.



2. Enter the RANDBETWEEN function in cell C2.



3. Enter the formula shown below into the yellow cells. If we roll 2, 3, 4, 5 or 6, these cells should contain a dot.





4. Enter the formula shown below into the red cells. If we roll 4, 5 or 6, these cells should contain a dot.

C5			-		×	~	$f_{\mathcal{K}}$	=IF	=IF(OR(C2=4,C2=5,C2=6),"I","")					
	Α	в	С	D	E	F	G	н	1	J	к	L	м	N
1														
2			6		_									
з														
4			\bullet	•	\bullet									
5														
6														
7														
8					Roll	the [Dice							
9														
10														

5. Enter the formula shown below into the blue cells. If we roll 6, these cells should contain a dot.







6. Enter the formula shown below into the gray cell. If we roll 1, 3 or 5, this cell should contain a dot.

D4		-	-	\times	~	$f_{\mathcal{H}}$	=IF(OR(C2=1,C2=3,C2=5),"I","")						
A 1	в	с	D	Е	F	G	н	1	J	к	L	м	N
2		6			_								
з													
4													
5													
6													
7													
8				Roll	the (Dice							
9									J				
10													

- 7. Copy the range C2:E5 and paste it to the range G2:I5.
- 8. Change the font color of cell C2 and cell G2 to green (so the numbers are not visible).
- 9. Click the command button on the sheet (or press F9).

Result.





Cell References

Cell references in **Excel** are very important. Understand the difference between relative, absolute and mixed reference, and you are on your way to success.

Relative Reference

By default, Excel uses **relative reference**. See the formula in cell D2 below. Cell D2 references (points to) cell B2 and cell C2. Both references are relative.

С	COUNTIF \checkmark : \checkmark \checkmark $f_{\rm x}$ =B2*C2											
	А	В	С	D	E	F	G	Н	I.			
1	Product	Quantity	Price	Amount								
2	bread	2	1.5	=B2*C2								
3	butter	1	1.2									
4	cheese	3	2									
5	ham	3	1.8									
6												

1. Select cell D2, click on the lower right corner of cell D2 and <u>drag</u> it down to cell D5.





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C	DUNTIF	▼ : 2	× 🗸	<i>f</i> _* =B5	*C5				
	А	В	с	D	Е	F	G	Н	i.
1	Product	Quantity	Price	Amount					
2	bread	2	1.5	3					
3	butter	1	1.2	1.2					
4	cheese	3	2	6					
5	ham	3	1.8	=B5*C5					
6									

Cell D3 references cell B3 and cell C3. Cell D4 references cell B4 and cell C4. Cell D5 references cell B5 and cell C5. In other words: each cell references its two neighbors on the left.

Absolute Reference

See the formula in cell E3 below.

1. To create an **absolute reference** to cell H3, place a \$ symbol in front of the column letter and row number of cell H3 (\$H\$3) in the formula of cell E3.

CC	DUNTI	F 🔻 E	\times \checkmark	$f_{\mathcal{K}}$	=B3*\$H\$3				
	A	В	C	D	E	F	G	Н	1
1									
2		Length (cm)	Width (cm)		Length (inch)	Width (inch)		Conversion rate	
3		1	10		=B3*\$H\$3			0.3937008	
4		5	10						
5		4	8						
6		2	10						
7									

2. Now we can quickly drag this formula to the other cells.



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СС	DUNTI	F Ŧ	1	\times	\checkmark	$f_{\mathcal{K}}$	=C6*\$H\$3				
	А	В			с	D	E	F	G	Н	1
1											
2		Length (cm)	Widt	h (cm)		Length (inch)	Width (inch)		Conversion rate	
3			1		10		0.3937008	3.937008		0.3937008	
4			5		10		1.968504	3.937008			
5			4		8		1.5748032	3.1496064			
6			2		10		0.7874016	=C6*\$H\$3			
7											

The reference to cell H3 is fixed (when we drag the formula down and across). As a result, the correct lengths and widths in inches are calculated.

Mixed Reference

Sometimes we need a combination of relative and absolute reference (mixed reference).

1. See the formula in cell F2 below.

С	COUNTIF ▼ : × ✓ fx =B2*(1-B6)										
	А	В	С	D	E	F	G	н			
1	Product	Price			Prices / Month	Jan	Feb	Mar			
2	Jeans	80			Jeans	=B2*(1-B6)					
3	Shirts	30			Shirts						
4											
5	Month	Jan	Feb	Mar							
6	Reduction	20%	40%	80%							
7											

2. We want to copy this formula to the other cells quickly. Drag cell F2 across one cell, and look at the formula in cell G2.



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C	DUNTIF	•	× v	f_{x}	=C2*(1-C6)			
	А	в	С	D	E	F	G	н
1	Product	Price			Prices / Month	Jan	Feb	Mar
2	Jeans	80			Jeans	64	=C2*(1-C6)	
3	Shirts	30			Shirts			
4								
5	Month	Jan	Feb	Mar				
6	Reduction	20%	40%	80%				
7								

Do you see what happens? The reference to the price should be a <u>fixed</u> reference to column <u>B</u>. Solution: place a \$ symbol in front of the column letter of cell B2 (\$B2) in the formula of cell F2. In a similar way, when we drag cell F2 down, the reference to the reduction should be a <u>fixed</u> reference to row <u>6</u>. Solution: place a \$ symbol in front of the row number of cell B6 (B\$6) in the formula of cell F2.

Result:

С	COUNTIF ▼ : × ✓ fx =\$B2*(1-B\$6)										
	А	В	С	D	E	F	G	н			
1	Product	Price			Prices / Month	Jan	Feb	Mar			
2	Jeans	80			Jeans	=\$B2*(1-B\$6)					
3	Shirts	30			Shirts						
4											
5	Month	Jan	Feb	Mar							
6	Reduction	20%	40%	80%							
7											

Note: we don't place a \$ symbol in front of the row number of B2 (this way we allow the reference to change from B2 (Jeans) to B3 (Shirts) when we drag the formula down). In a similar way, we don't place a \$ symbol in front of the column letter of B6 (this way we allow the reference to change from B6 (Jan) to C6 (Feb) and D6 (Mar) when we drag the formula across).

3. Now we can quickly drag this formula to the other cells.



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C	DUNTIF	•	X 🗸	f_{x}	=\$B3*(1-D\$6)			
	А	В	С	D	E	F	G	Н
1	Product	Price			Prices / Month	Jan	Feb	Mar
2	Jeans	80			Jeans	64	48	16
3	Shirts	30			Shirts	24	18	=\$B3*(1-D\$6)
4								
5	Month	Jan	Feb	Mar				
6	Reduction	20%	40%	80%				
7								

The references to column B and row 6 are fixed.

3D-reference

A **3D-reference** in **Excel** refers to the same cell or range on multiple worksheets. First, we'll look at the alternative.

1. On the Company sheet, select cell B2 and type an equal sign =

С	COUNTIF \checkmark : $\times \checkmark f_{\kappa}$ =												
	А		В	С	D	Е	F	G	н	1			
1			Quarter 1	Quarter 2	Quarter 3	Quarter 4							
2	Coffee		=										
3	Теа												
4	Milk												
5													
	✓ ► North Mid South Company (+)												

2. Go to the North sheet, select cell B2 and type a +



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B2	2 .	- : ×	🗸 f;	=Nort	th!B2+						
	А	в	с	D	Е	F	G	н	I.		
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4						
2	Coffee	\$2,128	\$3,486	\$5,904	\$9,400						
3	Теа	\$4,939	\$2,148	\$3,918	\$5,921						
4	Milk	\$1,423	\$4,234	\$5,336	\$1,535						
5											
	North Mid South Company										

3. Repeat step 2 for the Mid and South sheet.

Result.

B2	B2 \checkmark : $\times \checkmark f_x$ =North!B2+Mid!B2+South!B2											
	А	В	С	D	E	F	G	н	1			
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4							
2	Coffee	\$6,624	4									
3	Теа											
4	Milk											
5												
	✓ ► North Mid South Company ⊕											

4. This is quite a lot of work. Instead of doing this, use the following 3D-reference: North:South!B2 as the argument for the SUM function.

B2	B2 \checkmark : $\times \checkmark f_{sc}$ =SUM(North:South!B2)									
	А		В	с	D	E	F	G	н	I.
1			Quarter 1	Quarter 2	Quarter 3	Quarter 4				
2	Coffee		\$6,624							
3	Теа									
4	Milk									
5										
	North Mid South Company 🕀									

5. If you add worksheets between North and South, this worksheet is automatically included in the formula in cell B2.

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B2	2	Ŧ	: ×	√ f:	=SUN	I(North:So	uth!B2)			
	А		В	с	D	Е	F	G	н	I.
1			Quarter 1	Quarter 2	Quarter 3	Quarter 4				
2	Coffee		\$8,752							
3	Теа									
4	Milk									
5										
	4 - F		North	North (2)	Mid	South	Company	+		

External References

An **external reference** in **Excel** is a reference to a cell or range of cells in another workbook. Below you can find the workbooks of three divisions (North, Mid and South).

x]			N	orth - Excel				_		×	<
B2	2	• : [×	√ j	× 2128							۲
	А	В		с	D	E	F	G	H	H	1	
1		Quart	er 1	Quarter 2	Quarter 3	Quarter 4						
2	Coffee	\$2,	,128	\$3,486	\$5,904	\$9,400						
3	Теа	\$4,	,939	\$2,148	\$3,918	\$5,921						
4	Milk	\$1,	,423	\$4,234	\$5,336	\$1,535						
5												Ŧ
	4 →	Shee	et1	+			•				Þ	

x]				_		×	(
B2	2	Ŧ	: ×	√ fs	2016							~
	А		В	с	D	E	F	G		н	I.	
1			Quarter 1	Quarter 2	Quarter 3	Quarter 4						\square
2	Coffee		\$2,016	\$3,546	\$7,019	\$8,761						
3	Теа		\$1,398	\$5,209	\$6,738	\$1,816						
4	Milk		\$8,528	\$3,837	\$9,605	\$2,559						
5												-
	< →		Sheet1	+			•				Þ	

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X]			So		_	\times			
B2	2	Ŧ	: ×	√ f:	2480					~
	А		В	С	D	E	F	G	н	1
1			Quarter 1	Quarter 2	Quarter 3	Quarter 4				
2	Coffee		\$2,480	\$4,478	\$7,156	\$9,037				
3	Теа		\$6,002	\$9,787	\$1,230	\$6,529				
4	Milk		\$8,674	\$1,707	\$2,505	\$7,144				
5										-
	<		Sheet1	+			•			Þ

Create External Reference

To create an external reference, execute the following steps.

- 1. Open all workbooks.
- 2. In the Company workbook, select cell B2 and type the equal sign =

x]			Com	ipany - Excel				_	\times
С	DUNTIF	Ŧ	: ×	✓ f:	e =					*
	А		В	с	D	E	F	G	Н	1
1			Quarter 1	Quarter 2	Quarter 3	Quarter 4				
2	Coffee		=							
3	Теа									
4	Milk									
5										-
	<		Sheet1	(\cdot)						Þ

3. On the View tab, in the Window group, click Switch Windows.



4. Click North.



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5. In the North workbook, select cell B2.

x	North - Excel —										
B	2 •	· : ×	🗸 fs	=[Nor	th.xlsx]She	eet1!\$B\$2					*
	А	В	С	D	Е	F	G	н		- T [4
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4						
2	Coffee	\$2,128	\$3,486	\$5,904	\$9,400						
3	Tea	\$4,939	\$2,148	\$3,918	\$5,921						
4	Milk	\$1,423	\$4,234	\$5,336	\$1,535						
5										[Ŧ
	$\leftarrow \rightarrow$	Sheet1	(+)			•				Þ	
6. T	ype a +										
7. R	epeat steps	3 to 6 for t	he Mid wo	orkbook.							
ם ס	anaat stans	2 to 5 for t	he Couth y	u and the old							
о. к	epear steps	5 10 5 101 1	ne South v	VOIKDOOK.							
9. R	emove the \$	symbols	in the form	ula of cell	B2.						
		~									
Res	ult:										
x			Com	pany - Excel				_		\times	
		_									_
B	2 *	· · · =[1	North.xlsx]	Sheet1!B2-	+[Mid.xlsx]	Sheet1!B	2+[South.	xlsx]Sh	eet1	!B2	~
	А	В	с	D	E	F	G	н		11	*
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4	-					
2	Coffee	\$6,624		-	-					I	
3	Теа							_			
4	Milk										
5											-
		Sheet1	(+)			•	1			•	

10. <u>Copy the formula</u> to the other cells.

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Alert

Close all workbooks. Change a number in the workbook of a division. Close all workbooks again. Open the Company workbook.

A. To update all links, click Enable Content.

B. To not update the links, click the X.

x]		Com	pany - Excel				- 0	\times			
1	SECURITY V	WARNING	Automatic u	pdate of link	s has been di	sabled	Enable C	ontent	×			
A2 • : × ✓ fx Coffee												
	А	в	С	D	E	F	G	Н	1 🔺			
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4							
2	Coffee	\$6,624	\$11,510	\$20,079	\$27,198							
3	Теа	\$12,339	\$17,144	\$11,886	\$14,266							
4	Milk	\$18,625	\$9,778	\$17,446	\$11,238							
5	5											
	▲ Sheet1 ⊕ ⋮ ↓											

Note: if you see another alert, click Update or Don't Update.

Edit Links

On the Data tab, in the Connections group, click Edit Links to launch the Edit Links dialog box.



1. If you didn't update the links, you can still update the links here. Select a workbook and click Update Values to update the links to this workbook. Note how the Status changes to OK.



				The H	li-Tech ardware 8 (Reg	Con Softword. By H	nputers ore Institute aryana Govt.)
dit Links					?	×	alan 🕶 dalarah 🤇 🥬 nini ya 199
Source	Туре	Update	Status		<u>U</u> pdate V	alues	
Mid.xlsx	Worksheet	A	ОК		Change So	urce	
North.xlsx	Worksheet	А	Unknown				
South.xlsx	Worksheet	A	Unknown		Open So	urce	
					<u>B</u> reak L	ink	
<				>	<u>C</u> heck St	atus	
cation: C:\	test			,			
em:							

2. If you don't want to display the alert and update the links automatically, Click Startup Prompt, select the third option, and click OK.

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Source	Туре	Update	Status			<u>U</u> pdate V	alues		
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South.xlsx	Worksheet Worksheet	A	Unkno	own own		<u>O</u> pen So	urce		
						<u>B</u> reak Li	ink		
<				>		<u>C</u> heck St	atus		
Location: C:\	test								
Update: 🔘	<u>A</u> utomatic 🔘	Manual		Startup Prompt				?	\times
<u>S</u> tartup Pron	npt			When this workbook is update links to other w <u>L</u> et users choose <u>D</u> on't display the <u>Do</u> n't display the	oper orkb to di e aler e aler	ned, Excel (ooks. isplay the a t and don' t and upda	can ask wi alert or no t update a ate links	hether o ht automati	r not to c links
							ок 🔓	Ca	ncel

Hyperlinks

To create a hyperlink in Excel, execute the following steps.

1. On the Insert tab, in the Links group, click Hyperlink.



Page



The 'Insert Hyperlink' dialog box appears.

Existing File or Web Page

To create a link to an existing file or web page, execute the following steps.

1a. To create a link to an existing Excel file, select a file (use the Look in drop-down list, if necessary).

Insert Hyperlin	k				?	×
Link to:	<u>T</u> ext to displ	ay: C:\test\count-logical-values.xlsx			ScreenT	i <u>p</u>
Existing File	<u>L</u> ook in:	test	~ 🎦	€		
or Web Page	Current	3d-reference		^	B <u>o</u> okma	rk
E	Folder	copy-exact-formula				
Pl <u>a</u> ce in This Document	Browsed	count-logical-values				
	Pages	count-text-occurrences	45			
Create New	Recent	nested-if				
Document	Files	paste-options		_		
	Addr <u>e</u> ss:	C:\test\count-logical-values.xlsx		~		
E- <u>m</u> ail Address				ОК	Can	cel

1b. To create a link to a web page, type the Text to display, the Address, and click OK.





								(
				Th	e Hi-T Hardwo	ech C are & Sof (Regd. By	ompt ftwore I / Haryan	nstitute		
Insert Hyperlin	k						?	×		
Link to:	<u>T</u> ext to displa	y: www.excel	-easy.com				Scree	enTi <u>p</u>		
E <u>x</u> isting File	Look in:	est test			× 🎦	🔞 🚄				
or Web Page	Current Folder Image: Solution of the second seco									
Place in This Document Browsed Pages count-logical-values in Count-logical-values in Count-text-occurrences in dynamic-named-range										
Create <u>N</u> ew Document	Re <u>c</u> ent Files	nested-if paste-op	tions change	-		~				
E-mail	Addr <u>e</u> ss:	http://www.e	xcel-easy.co	m		\sim]			
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Result:	Result:									
A1	• : ×	√ fs	www	.excel-eas	y.com					
	А	В	С	D	E	F	G	н		
1 www.exc 2 3	http://www follow. Click	v.excel-easy.	com/ - Click select this	conce to cell.						
4										

Note: if you want to change the text that appears when you hover over the link, click ScreenTip.

Place in This Document

To create a link to a place in this document, execute the following steps.

- 1. Click 'Place in This Document' under Link to.
- 2. Type the Text to display, the cell reference, and click OK.







Note: if you want to change the text that appears when you hover over the link, click ScreenTip.

Date & Time Functions

To enter a **date** in **Excel**, use the "/" or "-" characters. To enter a **time**, use the ":" (colon). You can also enter a date and a time in one cell.

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Note: Dates are in US Format. Months first, Days second. This type of format depends on your windows regional settings. Learn more about Date and Time formats.

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Year, Month, Day

To get the year of a date, use the YEAR function.

B 1	L	• = >	√ f _x	=YEAR(A	1)	
	Α	В	с	D	E	
1	6/23/2016	2016				
2						

Note: use the MONTH and DAY function to get the month and day of a date.

Date Function

1. To add a number of days to a date, use the following simple formula.

B1	L	• :	×	~	f_X	=A1+5		
	А	В		(2	D	E	
1	6/23/2016	6/28/2	016					
2								

2. To add a number of years, months and/or days, use the DATE function.

B1	L ,	• : ×	$\sqrt{f_x}$	=DATE(YEAR(A1)+4,MONTH(A1)+2,DAY(A1)+9)					
	А	В	с	D	Е	F	G	н	I.
1	6/23/2016	9/1/2020							
2									

Note: the DATE function accepts three arguments: year, month and day. Excel knows that 6 +2 = 8 = August has 31 days and rolls over to the next month (23 August +9 days = 1September).

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Current Date & Time

To get the current **date** and **time**, use the NOW function.

A	1 -	:	×	\checkmark	f _x	=NOW()	
	А		в		с	D	E
1	2/23/2017 10:	43					
2							

Note: use the TODAY function to get the current date only. Use NOW()-TODAY() to get the current time only (and apply a <u>Time format</u>).

Hour, Minute, Second

To return the hour, use the HOUR function.

B1	•	×v	f _x	=HOUR(A1)	
	А	В	С	D	E	
1	6:45:17	6				
2						

Note: use the MINUTE and SECOND function to return the minute and second.

Time Function

To add a number of hours, minutes and/or seconds, use the TIME function.

B1	. - +	×v	f_x	=TIME(HOUR(A1)+2,MINUTE(A1)+10,SECOND(A1)+70)					
	А	В	С	D	Е	F	G	н	I.
1	6:45:17	8:56:27							
2									

Note: Excel adds 2 hours, 10 + 1 = 11 minutes and 70 - 60 = 10 seconds.

DateDif

To get the number of days, weeks or years between two dates in **Excel**, use the **DATEDIF function**. The DATEDIF function has three arguments.

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1. Fill in "d" for the third argument to get the number of days between two dates.

A4	ب ا	- : ×	 V 	f _x =DA	fx =DATEDIF(A1,A2,"d")			
	А	в	С	D	E	F		
1	4/18/2009							
2	6/23/2016							
3								
4	2623							
5								

Note: =A2-A1 produces the exact same result!

2. Fill in "m" for the third argument to get the number of months between two dates.

A 4	A4 🔻 :		~	f _x =DA	=DATEDIF(A1,A2,"m")			
	А	в	С	D	E	F		
1	4/18/2009							
2	6/23/2016							
3								
4	86							
5								

3. Fill in "y" for the third argument to get the number of years between two dates.

A4	L 7	r i X	< 🗸 .	f _x =DA	TEDIF(A1,A	2,"y")
	А	в	С	D	E	F
1	4/18/2009					
2	6/23/2016					
3						
4	7					
5						

4. Fill in "yd" for the third argument to ignore years and get the number of days between two dates.







A	t r	>	< 🗸 -	f _x =DA	TEDIF(A1,A	2,"yd")
	А	В	С	D	Е	F
1	4/18/2009					
2	6/23/2016					
3						
4	66					
5						

5. Fill in "md" for the third argument to ignore months and get the number of days between two dates.

-	· : >	< 🗸 .	f _x =DA	TEDIF(A1,A	2,"md")	
А	в	С	D	Е	F	
4/18/2009						
6/23/2016						
5						
4	A 4/18/2009 5/23/2016 5	A B 4/18/2009 5/23/2016 5	A B C 4/18/2009 5/23/2016 5	A B C D 4/18/2009 5/23/2016 5	A B C D E 4/18/2009 5/23/2016 5	A B C D E F 4/18/2009 5/23/2016 5 6 5

6. Fill in "ym" for the third argument to ignore years and get the number of months between two dates.

A 4	L .	· : ×	< 🗸 .	<i>f</i> _∞ =DA	TEDIF(A1,A	\2,"ym")	
	А	в	С	D	Е	F	
1	4/18/2009						
2	6/23/2016						
3							
4	2						
5							

Important note: the DATEDIF function returns the number of complete days, months or years. This may give unexpected results when the day/month number of the second date is lower than the day/month number of the first date. See the example below.





A4	Ļ ,	>	< 🗸 .	f _x =DA	TEDIF(A1,A	(2,"y")
	А	В	с	D	E	F
1	4/18/2009					
2	4/17/2016					
3						
4	6					
5						

The difference is 6 years. Almost 7 years! Use the following formula to return 7 years.

A4 ~		• = ×	· .	f _x =YEA	=YEAR(A2)-YEAR(A1)			
	А	в	С	D	Е	F		
1	4/18/2009							
2	4/17/2016							
3								
4	7							
5								

Weekdays

Learn how to get the **day of the week** of a date in **Excel** and how to get the number of **weekdays/working** days between two dates.

Weekday Function

1. The WEEKDAY function in Excel returns a number from 1 (Sunday) to 7 (Saturday) representing the day of the week of a date. Apparently, 12/18/2017 falls on a Monday.

B1	. •	:	×	√ fx	=WEEK	DAY(A1)				
	А	[В	с	D	E	F	G	Н	1
1	12/18/2017		2							
2										

2. You can also use the TEXT function to display the day of the week.





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B1	L T	: ×	√ f _x	=TEXT(A1,"dddd")					
	А	В	С	D	E	F	G	н	I.
1	12/18/2017	Monday							
2									

3. Create a <u>custom date format</u> (dddd) to display the day of the week.

A1	. *	: ×	$\checkmark f_x$	12/18/	12/18/2017					
	А	В	с	D	E	F	G	Н	1	
1	Monday									
2										

Networkdays Function

1. The NETWORKDAYS function returns the number of weekdays (weekends excluded) between two dates.

C1	. •	: ×	 ✓ f_x 	=NETW	/ORKDAYS(A	1,81)			
	А	В	С	D	E	F	G	н	Т
1	12/18/2017	12/29/2017	10						
2									

2. If you supply a list of holidays, the NETWORKDAYS function returns the number of workdays (weekends and holidays excluded) between two dates.

C1	. · · ·	:	×	~	$f_{\mathcal{K}}$	=NETW	=NETWORKDAYS(A1,B1,E1:E2)						
	А	В		С		D	E	F	G	Н	I.		
1	12/18/2017	12/29/2	2017		8		12/25/2017						
2							12/26/2017						
3													

The calendar below helps you understand the NETWORKDAYS function.









3. Dates are stored as numbers in Excel and count the number of days since January 0, 1900. Instead of supplying a list, supply an array constant of the numbers that represent these dates. To achieve this, select E1:E2 in the formula and press F9.

C1	L *	: [×	$\sqrt{-f_X}$	=NETW	/ORKDAYS(A	1,B1,{4309	4;43095})		
	А	В		С	D	E	F	G	Н	Т
1	12/18/2017	12/29/	/2017	8						
2										

Workday Function

The WORKDAY function is (almost) the opposite of the NETWORKDAYS function. It returns the date before or after a specified number of weekdays (weekends excluded).

C1	L –	:	×	$\checkmark f_x$	=WORKDAY(A1,B1)							
	А	I	в	С	D	E	F	G	н	I.		
1	12/18/2017		10	1/1/2018								
2												

Note: the WORKDAY function returns the serial number of the date. Apply a <u>Date format</u> to display the date.

The calendar below helps you understand the WORKDAY function.









Again, if you supply a list of holidays, the WORKDAY function returns the date before or after a specified number of workdays (weekends and holidays excluded).

Days until Birthday

To calculate the number of **days until** your **birthday** in **Excel**, execute the following steps.

- 1. Select a cell and enter your date of birth.
- 2. Select the cell next to it and enter the TODAY function to return today's date.

B2	· · ·	: =TODA	Y()				
					1		
	А	В	С	D	E	F	G
1	Date of Birth	Today					
2	4/21/1980	5/30/2017					
3							

3. The most difficult part in order to get the number of days until your birthday is to find your next birthday. The formula below does the trick.

C2	=DATE(YEAR(A2)+DATEDIF(A2,B2,"y")+1,MONTH(A2),DAY(A2))											
	А	В	С	D	Е	F	G					
1	Date of Birth	Today	Next Birthday									
2	4/21/1980	5/30/2017	4/21/2018									
3												

Explanation: The DATE function accepts three arguments: year, month and day. We used the <u>DATEDIF</u> function to find the number of complete years ("y") between Date of Birth and Today. DATEDIF(A2,B2,"y") equals 37. If 37 complete years have passed since your date of birth (in other words, you have already celebrated your 37st birthday), your next birthday will be 37 + 1 = 38 years after your date of birth.



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4. Next, we use the DATEDIF function to find the number of days ("d") between Today and Next Birthday.

D2	2 • EDATEDIF(B2,C2,"d")										
	А	В	С	D	Е	F	G				
1	Date of Birth	Today	Next Birthday	Days until Birthday							
2	4/21/1980	5/30/2017	4/21/2018	326							
3											

Time Sheet

This example teaches you how to create a simple **timesheet** calculator in **Excel**. Cells that contain formulas are colored light yellow. If you are in a hurry, simply download the Excel file.

1. To automatically calculate the next 4 days and dates when you enter a start date, use the formulas below.

0	19	× ± >	< 🗸 fs	c								
	Α	В	С	D	E	F	G	н	1 - E	J	к	L
1												
2		Start Date	11/21/2016									
3												
4					Time In	Time Out		Time In	Time Out		Hours	
5		Monday	11/21/2016		8:00	12:30		13:00	16:30		8:00	
6	<	=TEXT(C6,"dddd")	=C5+1	Þ	7:00	11:00		12:00	17:00		9:00	
7		Wednesday	11/23/2016		9:00	10:30		11:30	17:00		7:00	
8		Thursday	11/24/2016		8:00	13:00		14:00	17:00		8:00	
9		Friday 🔻 🔻	11/25/2016		8:00	12:00		13:00	18:00		9:00	
10												
11												
12									Total Hou	rs	41:00:00	
13									Regular H	ours	40:00:00	
14									Overtime	Hours	1:00:00	
15												

2. Select the cells containing the times.





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K5	5 \checkmark : \times \checkmark f_{x}				=(F5-E	5)+(15-H5)						
	А	в	с	D	E	F	G	н	1	J	к	L
1												
2		Start Date	11/21/2016	i								
3												
4					Time In	Time Out		Time In	Time Out		Hours	
5		Monday	11/21/2016		8:00	12:30		13:00	16:30		8:00	
6		Tuesday	11/22/2016		7:00	11:00		12:00	17:00		9:00	
7		Wednesday	11/23/2016		9:00	10:30		11:30	17:00		7:00	
8		Thursday	11/24/2016		8:00	13:00		14:00	17:00		8:00	
9		Friday	11/25/2016	6	8:00	12:00		13:00	18:00		9:00	
10											J.	
11												
12									Total Hours	5	41:00:00	
13									Regular Ho	urs	40:00:00	
14									Overtime H	lours	1:00:00	
15												

3. Right click, click Format Cells, and select the right Time format. Use the circled format for cell K12, K13, K14.

Number	Alignment	Font	Border	Fill	Protection	ו		
ategory: General Number Currency Accounting Date Time Percentage Fraction Scientific Text Special Custom	2	Sample 8:00 Iype: *1:30:55 P 1:30 PM 1:30 PM 1:30:55 P 30:55.2 37:30:55 P Locale (loc English (L	M ation): Jnited Sta	ates)				~
Time format an asterisk operating s	s display dat (*) respond t ystem. Forma	te and time s o changes i ats without a	serial nun n regiona an asteris	nbers as d I date and k are not	ate values. I time settin affected by	Time format: gs that are s operating sy	s that begir pecified fo /stem settin	n with r the igs.

4. To automatically calculate the hours worked each day, the total hours and the overtime hours, use the formulas below.



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01	.9 👻	:	\sim	~	f _x						
	АВ		с	C	Е	F	e	н	1	J	K L
1											
2	Start Date	11/	21/2016								
3											
4					Time In	Time Out		Time In	Time Out		Hours
5	Monday	11/	21/2016		8:00	12:30		13:00	16:30	<	=(F5-E5)+(I5-H5)
6	Tuesday	11/	22/2016		7:00	11:00		12:00	17:00		9:00
7	Wednesday	11/	23/2016		9:00	10:30		11:30	17:00		7:00
8	Thursday	11/	24/2016		8:00	13:00		14:00	17:00		8:00
9	Friday	11/	25/2016		8:00	12:00		13:00	18:00		9:00
10											
11											
12									Total Hou	r	=SUM(K5:K9)
13									Regular H	o	40:00:00
14									Overtime	ł	=IF(K12>K13, K12-K13,0)
15											

Last Day of the Month

To get the date of the **last day of the month** in **Excel**, use the EOMONTH (End of Month) function.

1. For example, get the date of the last day of the current month.

B1	L	•	×	 ✓ f 	s =EON	/ONTH(A1	.,0)			
	A B				D	E	F	G	Н	I.
1	6/23/2016	6/30/	2016							
2										

Note: the EOMONTH function returns the serial number of the date. Apply a <u>Date format</u> to display the date.

2. For example, get the date of the last day of the next month.

B1	L ·	• : ×	√f;	=EON	=EOMONTH(A1,1)								
	А	В	с	D	E	F	G	Н	I.				
1	6/23/2016	7/31/2016											
2													

3. For example, get the date of the last day of the current month - 8 months = 6 - 8 = -2 = 0 Cotober (-2+12=10), 2015!

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B1	L ·	• : ×	√ f;	=EON	=EOMONTH(A1,-8)									
	А	В	С	D	Е	F	G	н	I.					
1	6/23/2016	10/31/2015												
2														

Holidays

This example teaches you how to get the date of a **holiday** for any year (2017, 2018, etc). If you are in a hurry, simply download the **Excel** file.

Before you start: the <u>CHOOSE</u> function returns a value from a list of values, based on a position number. For example, =CHOOSE(3,"Car","Train","Boat","Plane") returns Boat. The <u>WEEKDAY</u> function returns a number from 1 (Sunday) to 7 (Saturday) representing the day of the week of a date.

1. This is what the spreadsheet looks like. If you enter a year into cell C2, Excel returns all the holidays for that year. Of course, New Year's Day, Independence Day, Veteran's Day and Christmas Day are easy.

C	5 * E × 4	<i>f</i> _x =DATE(C2,1,1)			
	٨	P	C	D	E
1	A	5		0	L.
1		Voor	2020		
2		fear	2020		
3		-			
4	Holiday	When	Date		
5	New Year's Day	January 1	1/1/2020		
6	Martin Luther King Jr. Day	The 3rd Monday in January	1/20/2020		
7	President's Day	The 3rd Monday in February	2/17/2020		
8	Memorial Day	The last Monday in May	5/25/2020		
9	Independence Day	July 4	7/4/2020		
10	Labor Day	The 1st Monday in September	9/7/2020		
11	Columbus Day	The 2nd Monday in October	10/12/2020		
12	Veteran's Day	November 11	11/11/2020		
13	Thanksgiving Day	The 4th Thursday in November	11/26/2020		
14	Christmas Day	December 25	12/25/2020		
15					

2. All other holidays can be described in a similar way: the xth day in a month (except Memorial day which is slightly different). Let's take a look at Thanksgiving Day. If you

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understand Thanksgiving Day, you understand all holidays. Thanksgiving is celebrated the 4th Thursday in November.

C1	.3 🔻 : =DATE((C2,11,1)+21+CHOOSE(WEEKDAY(DATE(C2,11,1	1)),4,3,2,1,0	,6,5)
	А	В	С	D	E
1					
2		Year	2020		
3					
4	Holiday	When	Date		
13	Thanksgiving Day	The 4th Thursday in November	11/26/2020		
15					

The calendar below helps you understand Thanksgiving Day 2020.

•	N	love	mbe	r 202	0	►	
SU	мо	τU	WE	TH	FR	SA	
25	26	27	28	29	30	31	1
1	2	3	4	5	6	7	
8	9	10	11	12	13	14	
15	16	17	18	19	20	21	
22	23	24	25	26	27	28	
29	30	1	2	3	4	5	

Explanation: DATE(C2,11,1) reduces to 11/1/2020. WEEKDAY(DATE(C2,11,1)) reduces to 1 (Sunday). Now the formula reduces to 11/1/2020 + 21 + CHOOSE(1,4,3,2,1,0,6,5) = 11/1/2020 + 21 + 4 = 11/26/2020. We needed the 4 extra days because it takes 4 days until the first Thursday in November. From there, it takes another 21 days (3 weeks) until the 4rd Thursday in November. It doesn't matter on which day November 1 falls, the CHOOSE function correctly adds the number of days until the first Thursday in November of days until the first Thursday in November (notice the pattern in the list of values). From there, it always takes another 21 days until the 4rd Thursday in November. Therefore, this formula works for every year.

3. Let's take a look at Martin Luther King Jr. Day. This formula is almost the same. Martin Luther King Jr. Day is celebrated the 3rd Monday in January. The first DATE function reduces to the first of January this time. The base position (0) in the list of values for the CHOOSE function is located at the second spot now (we are looking for a Monday)





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C	5 - : =	DATE(C2,1,1)+14+CHOOSE(WEEKDAY(D	ATE(C2,1,1))	,1,0,6,5,4,3	,2)
	А		В	С	D	E
1						
2			Year	2020		
3						
4	Holiday		When	Date		
6	Martin Luther King Jr.	. Day	The 3rd Monday in January	1/20/2020		
15						

The calendar below helps you understand Martin Luther King Jr. Day 2020.

l	►		2020	uary (Janu		۰.
	SA	FR	TH	WE	τu	мо	SU
	4	3	2	1	31	30	29
	11	10	9	8	7	6	5
	18	17	16	15	14	13	12
	25	24	23	22	21	20	19
	1	31	30	29	28	27	26
	8	7	6	5	4	3	2

Explanation: DATE(C2,1,1) reduces to 1/1/2020. WEEKDAY(DATE(C2,1,1)) reduces to 4 (Wednesday). Now the formula reduces to 1/1/2020 + 14 + CHOOSE(4,1,0,6,5,4,3,2) = 1/1/2020 + 14 + 5 = 1/20/2020. We needed the 5 extra days because it takes 5 days until the first Monday in January.

Quarter

An easy formula that returns the **quarter** for a given date. There's no built-in function in **Excel** that can do this.

1. Enter the formula shown below.

B1	L ·	• = >	K 🗸	<i>f</i> _∞ =RC	=ROUNDUP(MONTH(A1)/3,0)					
	A B C D E F G H						I.			
1	5/29/2016	2								
2										

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Explanation: ROUNDUP(x,0) always rounds x up to the nearest integer. The MONTH function returns the month number of a date. In this example, the formula reduces to =ROUNDUP(5/3,0), =ROUNDUP(1.666667,0), 2. May is in Quarter 2.

2. Let's see if this formula works for all months.

B1		• : >	< 🗸	<i>f</i> _x =A1	/3				
	А	В	С	D	E	F	G	н	I.
1	1	0.333333							
2	2	0.666667							
3	3	1							
4	4	1.333333							
5	5	1.666667							
6	6	2							
7	7	2.333333							
8	8	2.666667							
9	9	3							
10	10	3.333333							
11	11	3.666667							
12	12	4							
13		_							

Explanation: now it's not difficult to see that the first three values (months) in column B are rounded up to 1 (Quarter 1), the next three values (months) in column B are rounded up to 2 (Quarter 2), etc.

Day of the Year

An easy formula that returns the **day of the year** for a given date. There's no built-in function in **Excel** that can do this.

1. Enter the formula shown below.

B1		•	× ✓	<i>f</i> _x =A1	=A1-DATE(YEAR(A1),1,1)+1				
	А	В	с	D	E	F	G	н	I.
1	6/23/2016	17	5						
2									
3									

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Explanation: Dates and times are stored as numbers in Excel and count the number of days since January 0, 1900. June 23, 2016 is the same as 42544. The DATE function accepts three arguments: year, month and day. DATE(YEAR(A1),1,1) or 1-jan-2016 is the same as 42370. Subtracting these numbers (42544 - 42370 = 174) and adding 1 gives the day of the year.

Text Functions

Excel has many functions to offer when it comes to manipulating text strings.

Join Strings

To join strings, use the & operator.

D1	D1 • : × ✓ fx =A1 & " " & B1								
	А	В	С	D	E	F	G	н	1
1	Hi	Tim		Hi Tim					
2									

Note: to insert a space, use " "

Left

To extract the leftmost characters from a string, use the LEFT function.

D	D1 • : × ✓ f _x =LEFT(A1, 4)								
	А	в	С	D	E	F	G	н	I.
1	example text			exam					
2									

Right

To extract the rightmost characters from a string, use the RIGHT function.

D1	L	: ×	$\sqrt{-f_s}$	=RIGH	=RIGHT(A1, 2)				
	А	В	с	D	E	F	G	Н	I.
1	example text			xt					
2									

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Mid

To extract a substring, starting in the middle of a string, use the MID function.

D1	L	: ×	$\checkmark f_x$	=MID(=MID(A1, 5, 3)					
	А	В	с	D	E	F	G	Н	T	
1	example text			ple						
2										

Note: started at position 5 (p) with length 3.

Len

To get the length of a string, use the LEN function.

D1	L –	: ×	$\checkmark f_x$	=LEN(=LEN(A1)						
	А	В	С	D	Е	F	G	Н	I.		
1	example text			12							
2											

Note: space (position 8) included!

Find

To find the position of a substring in a string, use the FIND function.

D1	L –	: ×	$\checkmark f_x$	=FIND	=FIND("am", A1)						
	А	в	с	D	E	F	G	н	I.		
1	example text			3							
2											

Note: string "am" found at position 3.

Substitute

To replace existing text with new text in a string, use the SUBSTITUTE function.



(Regd. By Haryana Govt.) $f_{\mathcal{K}}$ =SUBSTITUTE(A1, "Tim", "John") D1 Ŧ \times c D Е F G 1 В н Δ Hi Tim Hi John 1 2

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Separate Strings

This example teaches you how to separate strings in Excel.

B2	2	\times \checkmark	f_{x}					
	А	В	с	D	Е	F	G	н
1	Full Name	First Name	Last Name					
2	Smith, Mike							
3	Johnson, Matthew							
4	Williams, Janet							
5	Brown, Sandra							
6	Jones, Lisa							
7	Millar, Peter							
8								

The problem we are dealing with is that we need to tell Excel where we want to separate the string. In case of Smith, Mike the comma is at position 6 while in case of Williams, Janet the comma is at position 9.

1. To get the first name, use the formula below.

B2	2 -	× ✓ f _* =RIGHT(A2,LEN(A2)-FIND(",",A2)-1)							
	А	В	с	D	E	F	G	н	
1	Full Name	First Name	Last Name						
2	Smith, Mike	Mike							
3	Johnson, Matthew								
4	Williams, Janet								
5	Brown, Sandra								
6	Jones, Lisa								
7	Millar, Peter								
8									



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Explanation: to find the position of the comma, use the FIND function (position 6). To get the length of a string, use the LEN function (11 characters). =RIGHT(A2,LEN(A2)-FIND(",",A2)-1) reduces to =RIGHT(A2,11-6-1). =RIGHT(A2,4) extracts the 4 rightmost characters and gives the desired result (Mike).

2. To get the last name, use the following formula.

C	2	× ✓	<i>f_x</i> =LEFT	(A2,FIND(",", A2)-1)			
	А	В	С	D	E	F	G	н
1	Full Name	First Name	Last Name					
2	Smith, Mike	Mike	Smith					
3	Johnson, Matthew							
4	Williams, Janet							
5	Brown, Sandra							
6	Jones, Lisa							
7	Millar, Peter							
8								

Explanation: to find the position of the comma, use the FIND function (position 6). =LEFT(A2,FIND(",", A2)-1) reduces to =LEFT(A2,6-1). =LEFT(A2,5) extracts the 5 leftmost characters and gives the desired result (Smith).

3. Select the range B2:C2 and drag it down.

B2	2 🔻 🗄	× 🗸	<i>f</i> ≈ =RIGH	HT(A2,LEN	(A2)-FIND	(",",A2)-1)		
	А	В	С	D	Е	F	G	н
1	Full Name	First Name	Last Name					
2	Smith, Mike	Mike	Smith					
3	Johnson, Matthew	Matthew	Johnson					
4	Williams, Janet	Janet	Williams					
5	Brown, Sandra	Sandra	Brown					
6	Jones, Lisa	Lisa	Jones					
7	Millar, Peter	Peter	Millar					
8				 +				
9								

Number of Instances

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This example describes how to count the number of instances of text (or a number) in a cell.

1. Use the LEN functon to get the length of the string (25 characters, including spaces).

C1	Ψ.	\checkmark : \times \checkmark f_x =LEN(A1)							
	A			В	С	D	E	F	G
1	1 dog, cat, dog dog cat dog		dog	dog	25				
2									

2. The SUBSTITUTE function replaces existing text with new text in a string. LEN(SUBSTITUTE(A1,B1,"")) equals 13 (the length of the string without the words dog). If we subtract this number from 25, we get the length of the dog instances (25-13=12).

C1	. .	:	×	√ f _x	=(LEN(A1)-LEN(SUBSTITUTE(A1,B1,"")))						
A B					С	D	E	F	G		
1	1 dog, cat, dog dog cat dog			dog	12						
2											

3. Dividing this number by the length of the word dog (3), gives us the dog instances (12/3=4).

C1		fx =(LEN(A1)-LEN(SUBSTITUTE(A1,B1,"")))/LEN(B1)								
	А	в	С	D	Е	F	G			
1	dog, cat, dog dog cat dog	dog	4							
2										

Number of Words

This example describes how to count the number of words in a cell.

1a. The TRIM function returns a string with extra spaces, starting spaces and ending spaces removed.





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B1		•	× < .	f _x =TRI	M(A1)				
	А		В	с	D	E	F	G	н
1	how are	you?	how are you?						
2									

1b. To get the length of the string with normal spaces, we combine the LEN and TRIM function.

B1	• : $\times \checkmark f_x$ =LEN(TRIM(A1))								
	А		В	с	D	E	F	G	Н
1	how are yo	ou?	12						
2									

2a. The SUBSTITUTE function replaces existing text with new text in a text string. We use the SUBSTITUTE function to get the string without spaces.

B1		•	×	f₅ =SU	=SUBSTITUTE(A1," ","")						
	А		В	с	D	E	F	G	н		
1	how are	you?	howareyou?								
2											

2b. To get the length of the string without spaces, we combine the LEN and SUBSTITUTE function.

B1		: ×	 J 	f _x =LEN	=LEN(SUBSTITUTE(A1," ",""))							
	А		В	с	D	E	F	G	Н			
1	how are you	?	10									
2												

3. Now comes the simple trick. To get the number of words, we subtract the length of the string without spaces (10) from the length of the string with normal spaces (12) and add 1.

B1	Ψ.	:	×	<	f≈ =LEN	=LEN(TRIM(A1))-LEN(SUBSTITUTE(A1," ",""))+1					
	А			В	с	D	E	F	G	Н	
1	how are y	ou?		3							
2											

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Text to Columns

To separate the contents of one **Excel cell** into **separate columns**, you can use the 'Convert Text to Columns Wizard'. For example, when you want to separate a list of full names into last and first names.

1. Select the range with full names.

10)R x 1C 🔻 🗄	X 🗸	<i>f</i> _∞ Bra	ady, Tom				
	А	В	с	D	E	F	G	н
1	Brady, Tom							
2	Manning, Peyton							
3	Peterson, Adrian							
4	Lewis, Ray							
5	Reed, Ed							
6	Polamalu, Troy							
7	Johnson, Andre							
8	Revis, Darrelle							
9	Brees, Drew							
10	Peppers, Julius 🗘							
11								

2. On the Data tab, in the Data Tools group, click Text to Columns.



The following dialog box appears.

3. Choose Delimited and click Next.





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Convert Text to Columns Wizard - Step 1 of 3	3	?	×
The Text Wizard has determined that your data f this is correct, choose Next, or choose the d Original data type	a is Delimited. ata type that best describe	s your data.	
Choose the file type that best describes you	r data: mmas or tabs separate eacl olumns with spaces betwe	n field. en each field.	
Preview of selected data: 1 Brady, Tom 2 Manning, Peyton 3 Peterson, Adrian 4 Lewis, Ray 5 Reed, Ed			^
< Cancel	< Back <u>N</u> ex	t > <u>F</u> ir	> lish

- 4. Clear all the check boxes under Delimiters except for the Comma and Space check box.
- 5. Click Finish.



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Convert Text to Columns Wizard - Step 2 of 3	?	×
This screen lets you set the delimiters your data contains. You can see in the preview below.	how your text is affe	ected
Delimiters Iab Semicolon Comma Space Other:		
Data <u>p</u> review		
Brady Tom Manning Peyton Peterson Adrian Lewis Ray Reed Ed		^
<	>	
Cancel < <u>B</u> ack <u>N</u>	ext > <u>F</u> inis	h

Note: This example has commas and spaces as delimiters. You may have other delimiters in your data. Experiment by checking and unchecking the different check boxes. You get a live preview of how your data will be separated.

Result:

A	L • E	× ✓	<i>f</i> ∞ Bra	ady				
	А	в	С	D	E	F	G	н
1	Brady	Tom						
2	Manning	Peyton						
3	Peterson	Adrian						
4	Lewis	Ray						
5	Reed	Ed						
6	Polamalu	Troy						
7	Johnson	Andre						
8	Revis	Darrelle						
9	Brees	Drew						
10	Peppers	Julius						
11								





Lower/Upper Case

This example teaches you how to convert a text string to lower, upper or proper case in **Excel**.

1. Use the LOWER function to convert all letters in a text string to lowercase.

B1	. .	:	×	√ _ f:	e E	=LOWER(A1)				
	A				В	с	D	E	F	
1	1 Hi THERE, how are You?			hi there, how are you?						
2										

2. Use the **UPPER function** to convert all letters in a text string to **uppercase**.

B1		:	×	~	f_{x}	=UPPER(A1)				
	,	Д				В	С	D	E	F
1	1 Hi THERE, how are You? HI THERE,			HERE, H	IOW ARE YOU?					
2										

3. Use the **PROPER function** to convert a text string to **proper case**. That is, the first letter in each word in uppercase, and all other letters in lowercase.

B1	. – –	:	×	\checkmark	f_{x}	=PROPER(A1)				
	4	4				В	с	D	E	F
1	1 Hi THERE, how are You? Hi There, H				ow Are You?					
2										

Remove Unwanted Characters

The TRIM function returns a string with extra **spaces**, starting spaces and ending spaces removed. The CLEAN function **removes nonprintable characters** from a string.

1. For example, cell A1 below contains the string " Excel Easy "

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B1	. .	: ×	$\sqrt{-f_x}$	=TRIM	=TRIM(A1)					
	А	В	С	D	Е	F	G	н	T	
1	Excel Easy	Excel Easy								
2										

Note: the TRIM function returns the string "Excel Easy".

2. For example, cell A1 below contains a nonprintable character.

B1	. .	: ×	$\checkmark = f_x$	=CLEA	N(A1)				
	А	В	с	D	E	F	G	Н	I.
1	[Excel Easy	Excel Easy							
2									

Note: the CLEAN function removes this nonprintable character. Text imported from other applications may contain nonprintable characters.

Compare Text

This example shows two ways to **compare text** in **Excel**. One is case-sensitive and one is case-insensitive.

1. Use the EXACT function (case-sensitive).

C1		< √ <i>f</i> _x =EX/	ACT(A1,B1)				
	А	В	С	D	E	F	G
1	Pie Chart	Pie chart	FALSE				
2	Gantt Chart	Gantt Chart	TRUE				
3	Pareto Chart	Parto Chart	FALSE				
4	Thermometer Chart	Thermometer Chart	TRUE				
5	Trendline	Trendline	TRUE				
6	Sparklines	Sparklines	TRUE				
7							

2. Use the formula =A1=B1 (case-insensitive).



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C1	L 🔻 E 🗦	\checkmark : \times \checkmark f_x =A1					
	А	В	С	D	Е	F	G
1	Pie Chart	Pie chart	TRUE				
2	Gantt Chart	Gantt Chart	TRUE				
3	Pareto Chart	Parto Chart	FALSE				
4	Thermometer Chart	Thermometer Chart	TRUE				
5	Trendline	Trendline	TRUE				
6	Sparklines	Sparklines	TRUE				
7							

Find vs Search

The **FIND function** and the **SEARCH function** are very similar to each other. This example shows the difference.

1. To find the position of a substring in a string, use the FIND function. FIND is casesensitive.

B1	B1 ▼ : × ✓ <i>f</i> _x =FIND("excel",A1)								
	А	В	с	D	E	F	G	Н	
1	Microsoft Excel 2016	#VALUE!							
2									

2. To find the position of a substring in a string, use the SEARCH function. SEARCH is case-insensitive.

B1	L	< ✓ .	<pre>fx =SEARCH("excel",A1)</pre>							
	А	В	с	D	E	F	G	н		
1	Microsoft Excel 2016	11								
2										

Note: string "excel" found at position 11. Even though it's actually the string "Excel"

3. The SEARCH function is more versatile. You can use wildcard characters when you use this function.



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B1		:	\times	< .	fx =SEA	=SEARCH("soft*2016",A1)						
	А			В	С	D	Е	F	G	н		
1	Microsoft Exc	cel 201	.6	6								
2												

B1		+ >	< 🗸 .	fx =SEA	=SEARCH("soft*2016",A1)					
	А		В	С	D	Е	F	G	н	
1	Microsoft Wo	rd 2016	6							
2										

Note: A question mark (?) matches exactly one character. An asterisk (*) matches a series of zero or more characters.

4. One other interesting point to mention about the FIND and the SEARCH function is that they have a 3rd optional argument. You can use this argument to indicate the position, counting from the left, at which you want to start searching.

B1	>	< 🗸 ;	f _x =FIN	ID("o",A1)				
	А	В	с	D	E	F	G	Н
1 Micro	soft Excel 2016	5						
2								

Note: string "o" found at position 5.

B1	• : ×	< 🗸 .	f _x =FIN	ID("o",A1,	6)			
	А	В	с	D	E	F	G	н
1 N	/icrosoft Excel 2016	7						
2								

Note: string "o" found at position 7 (started searching at position 6).

Substitute vs Replace

This example shows the difference between the **SUBSTITUTE function** and the **REPLACE function**.

1a. If you know the text to be replaced, use the SUBSTITUTE function.



Hardware & Software Institute (Regd. By Haryana Govt.) =SUBSTITUTE(A1,"2013","2016") $f_{\mathcal{K}}$ B1 Ŧ В С D Е F Excel 2013 and Word 2013 Excel 2016 and Word 2016

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1b. The SUBSTITUTE function has a 4th optional argument. You can use this argument to indicate which occurrence you want to substitute.

B1	• • ×	$\checkmark f_{x}$	<i>f</i> _≪ =SUBSTITUTE(A1,"2013","2016",2)					
	А		В	С	D	Е	F	
1	Excel 2013 and Word 20	.3 Excel 20	13 and Word 2016					
2								

2. If you know the position of the text to be replaced, use the REPLACE function.

B1	B1 ▼ : × ✓ <i>f</i> x =REPLACE(A1,1,3,"C")								
	А	В	с	D	E	F	G	н	I.
1	QZX560	C560							
2	LHR214	C214							
3	EBM905	C905							
4	KPN117	C117							
5	WXA450	C450							
6									

Note: started at position 1 with length 3.

1

1 2

Concatenate Strings

This example illustrates four different ways to concatenate (join) strings in Excel.

1. Simply use the & operator to join strings.

E2	E2 🔻 : 🗙 🗸 f_{*} =A2 & "" & B2 & "" & C2 & "" & D2									
			_		_	_				
	A	В	C	D	E	F	G	Н		
1	Title	First Name	Middle Name	Last Name	Full Name					
2	Dr.	Tom	F.	Brady	Dr. Tom F. Brady					
3										
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Note: to insert a space, use " "

2. The **CONCATENATE function** produces the exact same result.

E2		* :	× 🗸 j	fx =CON	=CONCATENATE(A2,"",B2,"",C2,"",D2)				
	А	В	с	D	E	F	G	н	
1	Title	First Name	Middle Name	Last Name	Full Name				
2	Dr.	Tom	F.	Brady	Dr. Tom F. Brady				
3									

3a. The CONCAT function in Excel 2016 produces the exact same result.

E2	2	•	× 🗸 j	د د =CON	=CONCAT(A2," ",B2," ",C2," ",D2)						
	А	в	с	D	E	F	G	н			
1	Title	First Name	Middle Name	Last Name	Full Name						
2	Dr.	Tom	F.	Brady	Dr. Tom F. Brady						
3											

3b. The CONCAT function can also join a range of strings. If you don't need a delimiter (space, comma, dash, etc.) this can be useful.

F1	F1 *		- : >	< <	f _x =co	=CONCAT(A1:E1)					
	Α	в	С	D	E	F	G	Н	I		
1	+	1	415	648	5703	+14156485703					
2											

4a. The CONCAT function cannot ignore empty cells. Take a look at all the extra spaces in column E below if you drag the function in cell E2 down to cell E11.



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E2		• :	$\times \checkmark $	f≈ =CON	CAT(A2," ",B2," ",C2,"	' ",D2)		
	А	в	С	D	E	F	G	н
1	Title	First Name	Middle Name	Last Name	Full Name			
2	Dr.	Tom	F.	Brady	Dr. Tom F. Brady			
3		Peyton		Manning	Peyton Manning			
4		Adrian	D.	Peterson	Adrian D. Peterson			
5	Mr.	Ray		Lewis	Mr. Ray Lewis			
6		Ed		Reed	Ed Reed			
7		Troy	Ε.	Polamalu	Troy E. Polamalu			
8		Andre		Johnson	Andre Johnson			
9		Darrelle		Revis	Darrelle Revis			
10	Dr.	Drew	Q.	Brees	Dr. Drew Q. Brees			
11		Julius		Peppers	Julius Peppers			
12								

4b. The beauty of the TEXTJOIN function in Excel 2016 is that it can ignore empty cells (if the second argument is set to TRUE).

E2 • : × ✓ fx =TEXTJOIN(" ",TRUE,A2:D2)								
	А	В	C D		E	F	G	н
1	Title	First Name	Middle Name	Last Name	Full Name			
2	Dr.	Tom	F.	Brady	Dr. Tom F. Brady			
3		Peyton		Manning	Peyton Manning			
4		Adrian	D.	Peterson	Adrian D. Peterson			
5	Mr.	Ray		Lewis	Mr. Ray Lewis			
6		Ed		Reed	Ed Reed			
7		Troy	Ε.	Polamalu	Troy E. Polamalu			
8		Andre		Johnson	Andre Johnson			
9		Darrelle		Revis	Darrelle Revis			
10	Dr.	Drew	Q.	Brees	Dr. Drew Q. Brees			
11		Julius		Peppers	Julius Peppers			
12								

Note: the TEXTJOIN function joins a range of strings using a delimiter (first argument).




Lookup & Reference Functions

VLookup | HLookup | Match | Index | Choose

Learn all about **Excel's lookup & reference functions** such as the **VLOOKUP**, HLOOKUP, MATCH, INDEX and CHOOSE function.

VLookup

The VLOOKUP (Vertical lookup) function looks for a value in the leftmost column of a table, and then returns a value in the same row from another column you specify.

1. Insert the VLOOKUP function shown below.

B2	2	• :)	× v	<i>f</i> _x =V	LOOKUP(A	2,\$E\$4:\$G\$	7,3,FALSE)		
	А	В	С	D	E	F	G	н	1
1	ID	Product							
2	104	Printer							
3	103				ID	Brand	Product		
4	104				101	Dell	Computer		
5	101				102	Logitech	Keyboard		
6	102				103	Logitech	Mouse		
7	103				104	HP	Printer		
8	101								
9	104								
10	101								
11	102								
12									

Explanation: the VLOOKUP function looks for the ID (104) in the leftmost column of the range $E^{4:}G^{7}$ and returns the value in the same row from the third column (third argument is set to 3). The fourth argument is set to FALSE to return an exact match or a #N/A error if not found.

2. Drag the VLOOKUP function in cell B2 down to cell B11.





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B2	2	▼ E ⊃	< 🗸	<i>f</i> _x =V	LOOKUP(A	2,\$E\$4:\$G\$	7,3,FALSE)		
	А	В	С	D	E	F	G	н	I.
1	ID	Product							
2	104	Printer							
3	103	Mouse			ID	Brand	Product		
4	104	Printer			101	Dell	Computer		
5	101	Computer			102	Logitech	Keyboard		
6	102	Keyboard			103	Logitech	Mouse		
7	103	Mouse			104	HP	Printer		
8	101	Computer							
9	104	Printer							
10	101	Computer							
11	102	Keyboard							
12									
13									

Note: when we drag the VLOOKUP function down, the <u>absolute reference</u> (\$E\$4:\$G\$7) stays the same, while the relative reference (A2) changes to A3, A4, A5, etc.

HLookup

In a similar way, you can use the HLOOKUP (Horizontal lookup) function.

B2		▼ E _ 2	× 🗸	$f_{\mathcal{K}} = H$	LOOKUP(A	2,\$E\$4:\$H\$6	5,3,FALSE)		
	А	В	с	D	E	F	G	н	
1	ID	Product	_	_	_		_		
2	104	Printer							
3	103	Mouse							
4	104	Printer		ID	101	102	103	104	
5	101	Computer		Brand	Dell	Logitech	Logitech	HP	
6	102	Keyboard		Product	Computer	Keyboard	Mouse	Printer	
7	103	Mouse							
8	101	Computer							
9	104	Printer							
10	101	Computer							
11	102	Keyboard							
12									

Match

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The MATCH function returns the position of a value in a given range.

B2	2	• E 🗆	< 🗸	<i>f</i> _x =N	ИАТСН(А2,В	E4:E7,0)			
	А	В	С	D	E	F	G	н	I.
1									
2	Yellow	3							
3									
4					Green				
5					Blue				
6					Yellow				
7					White				
8									

Explanation: Yellow found at position 3 in the range E4:E7. The third argument is optional. Set this argument to 0 to return the position of the value that is exactly equal to lookup_value (A2) or a #N/A error if not found.

Index

The INDEX function below returns a specific value in a two-dimensional range.

C2		• : :	× ✓	<i>f</i> _x =	NDEX(E4:F7	,A2,B2)			
	А	В	С	D	E	F	G	н	I.
1									
2	З	3 2	92						
3									
4					43	77			
5					77	35			
6					97	92			
7					21	54			
8									

Explanation: 92 found at the intersection of row 3 and column 2 in the range E4:F7.

The INDEX function below returns a specific value in a one-dimensional range.



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C2		-	\times \checkmark	fx =I	NDEX(E4:E7	,A2)			
	А	в	С	D	Е	F	G	н	I.
1									
2	3	3	97						
3									
4					43				
5					77				
6					97				
7					21				
8									

Explanation: 97 found at position 3 in the range E4:E7.

Choose

The CHOOSE function returns a value from a list of values, based on a position number.

B2		▼ ∃ ⊃	X V	<i>f</i> _x =0	=CHOOSE(A2,"Car","Train","Boat","Plane")					
	А	В	с	D	E	F	G	н	I.	
1										
2	3	Boat								
3										

Explanation: Boat found at position 3.

Tax Rates

Sometimes you are not looking for an exact match when you use the VLOOKUP function in **Excel**. For example, when you want to calculate the tax on an income.

The following **tax rates** apply to individuals who are residents of Australia.

Taxable income	Tax on this income
0 - \$18,200	Nil
\$18,201 - \$37,000	19c for each \$1 over \$18,200
\$37,001 - \$87,000	\$3,572 plus 32.5c for each \$1 over \$37,000
\$87,001 - \$180,000	\$19,822 plus 37c for each \$1 over \$87,000
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\$180,001 and over \$54,232 plus 45c for each \$1 over \$180,000

Example: if income is 39000, tax equals 3572 + 0.325 * (39000 - 37000) = 3572 + 650 = \$4222

	А	В	С	D	E	F	G
1	Taxable Income	Tax on this income					
2	\$39,000	\$4,222					
3							

To automatically calculate the tax on an income, execute the following steps.

1. On the second sheet, create the	following range and	name it Rates.
------------------------------------	---------------------	----------------

Ra	tes	• = >	< 🗸	f _x 0					
	А	В	С	D	E	F	G	н	1
1	0	0	0						
2	18200	0	0.19						
3	37000	3572	0.325						
4	87000	19822	0.37						
5	180000	54232	0.45						
6									
7									
	< ►	Sheet1	Sheet2	+					

2. We already know how the <u>VLOOKUP</u> function can return an exact match or a #N/A error if not found, by setting the fourth argument to FALSE. However, when you set this argument to TRUE, it returns an exact match or if not found, it returns the largest value smaller than lookup_value (A2). That's exactly what we want!

B2	· · ·	$\times \checkmark f_x$	=VLOOKUP	(A2,Rates,2	,TRUE)	=VLOOKUP(A2,Rates,2,TRUE)						
	А	В	с	D	E	F	G					
1	Taxable Income	Tax on this income										
2	\$39,000	\$3,572										
3												

Explanation: Excel cannot find 39000 in the first column of Rates. However, it can find 37000 (the largest value smaller than 39000). As a result, it returns 3572 (col_index_num, the third argument, is set to 2).

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3. Now, what's left is the remainder of the equation, +0.325 * (39000 - 37000). This is easy. We can return 0.325 by setting col_index_num to 3 and return 37000 by setting col_index_num to 1. The complete formula below does the trick.

=	=VLOOKUP(A2,Rates,2,TRUE)+VLOOKUP(A2,Rates,3,TRUE)*(A2-VLOOKUP(A2,Rates,1,TRUE))												
	A B C D E F G												
1	Taxable Income	Tax on this income											
2	\$39,000	\$4,222											
3	3												

Note: when you set the fourth argument of the VLOOKUP function to TRUE, the first column of the table must be sorted in ascending order.

Offset

The **OFFSET function** in **Excel** returns a cell or range of cells that is a specified number of rows and columns from a cell or range of cells.

1. The OFFSET function below returns the cell that is 3 rows below and 2 columns to the right of cell A2. The OFFSET function returns a cell because the height and width are both set to 1.



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COUNTIF ▼ : × ✓ <i>f</i> _x =OFFSET(A2,3,2,1,1										
	А	в	С		D	E	F	G	н	I.
1		Sales								
2	Month	East	West							
3	Jan	510	1010							
4	Feb	605	1467							
5	Mar	648	1034							
6	Apr	155	1030							
7	May	691	588							
8	Jun	861	694			=OFFSET(42,3,2,1,1			
9	Jul	379	1219			OFESET	(reference ro	ows cols [b	eight] (widt	b1)
10	Aug	317	610			OTISET	(rererence, n	7W3, COI3, [II	ciging, [wide	
11	Sep	928	1159							
12	Oct	340	746							
13	Nov	443	1213							
14	Dec	934	1209							
15										

Result:

E8	}	▼ ∃ ⇒	× 🗸	<i>f</i> _x =0	FFSET(A2,3	,2,1,1)			
	А	в	с	D	E	F	G	н	1
1		Sales							
2	Month	East	West						
3	Jan	510	1010						
4	Feb	605	1467						
5	Mar	648	1034						
6	Apr	155	1030						
7	May	691	588						
8	Jun	861	694		1034				
9	Jul	379	1219						
10	Aug	317	610						
11	Sep	928	1159						
12	Oct	340	746						
13	Nov	443	1213						
14	Dec	934	1209						
15									

2. The OFFSET function below returns the 1 x 2 range that is 8 rows below and 1 column to the right of cell A2. The SUM function calculates the sum of this range.

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3

C	COUNTIF 🝷 : 🗙 🗸			× 🗸	<i>f</i> _* =SUM(OFFSET(A2,8,1,1,2							
	А	В		С		D	E	F	G	н	I.	
1		Sales										
2	Month	East		West								
3	Jan	5	10	1010								
4	Feb	6	05	1467								
5	Mar	6	48	1034								
6	Apr	1	55	1030								
7	May	6	91	588								
8	Jun	8	61	694								
9	Jul	3	79	1219			=SUM(OF	FSET(A2,8,1	1,1,2			
10	Aug	3	17	610			OF	T ESET(referen	ce rows co	ls [height] [width])	
11	Sep	9	28	1159						is, [neight], [indeng/	
12	Oct	3	40	746								
13	Nov	4	43	1213								
14	Dec	9	34	1209								
15												

Result:

E9)	- : .	x v	f _x =SL	JM(OFFSET	(A2.8.1.1.)	2))		
						(**=/=/=/=/=/	-//		
	Α	В	С	D	E	F	G	Н	1
1		Sales							
2	Month	East	West						
3	Jan	510	1010						
4	Feb	605	1467						
5	Mar	648	1034						
6	Apr	155	1030						
7	May	691	588						
8	Jun	861	694						
9	Jul	379	1219		927				
10	Aug	317	610						
11	Sep	928	1159						
12	Oct	340	746						
13	Nov	443	1213						
14	Dec	934	1209						
15									

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Note: to return a range (without calculating the sum), select a range of the same size before you insert the OFFSET function. If you want to return a cell or range of cells that is a specified number of rows above or columns to the left, enter a negative number.

Left Lookup

A drawback of the **VLOOKUP function** is that it can only look up values in the leftmost column of a table. However, sometimes you need to look up a value in <u>any</u> column and return the corresponding value to the <u>left</u>. To achieve this, simply use the **INDEX** and the **MATCH** function.

1. The MATCH function returns the position of a value in a given range.

B2	B2 ▼ : × ✓ <i>f</i> _x =MATCH(A2,\$G\$4:\$G\$7,0)										
	А	В	с	D	E	F	G	Н	1		
1	ID	Product									
2	104	4									
3	103		Ī		Product	Brand	ID				
4	104				Computer	Dell	101				
5	101				Keyboard	Logitech	102				
6	102				Mouse	Logitech	103				
7	103				Printer	HP	104				
8	101										
9	104										
10	101										
11	102										
12											

Explanation: 104 found at position 4 in the range \$G\$4:\$G\$7.

2. Use this result and the INDEX function to return the 4th value in the range \$E\$4:\$E\$7.





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B2	2	•	\times	~	fx =INDEX(\$E\$4:\$E\$7,MATCH(A2,\$G\$4:\$G\$7,0))						
	А	В		С	D		E	F	G	н	I.
1	ID	Product									
2	104	Printer									
3	103						Product	Brand	ID		
4	104						Computer	Dell	101		
5	101						Keyboard	Logitech	102		
6	102						Mouse	Logitech	103		
7	103						Printer	HP	104		
8	101										
9	104										
10	101										
11	102										
12											

3. Drag the formula in cell B2 down to cell B11.

B2	2	▼ ∃ ⊃	X 🗸	<i>f</i> _x =1	NDEX(\$E\$4:	\$E\$7,MATC	H(A2,\$G\$4:	\$G\$7,0))	
	А	В	С	D	E	F	G	н	I.
1	ID	Product							
2	104	Printer							
3	103	Mouse			Product	Brand	ID		
4	104	Printer			Computer	Dell	101		
5	101	Computer			Keyboard	Logitech	102		
6	102	Keyboard			Mouse	Logitech	103		
7	103	Mouse			Printer	HP	104		
8	101	Computer							
9	104	Printer							
10	101	Computer							
11	102	Keyboard							
12			+						
13									

Note: when we drag this formula down, the <u>absolute references</u> (\$E\$4:\$E\$7 and \$G\$4:\$G\$7) stay the same, while the relative reference (A2) changes to A3, A4, A5, etc.

Two-way Lookup





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This example teaches you how to **lookup** a value in a **two-dimensional range**. We use the MATCH and INDEX function.

Below you can find the sales of different ice cream flavors in each month.

1. To find the position of Feb in the range A2:A13, use the MATCH function. The result is 2.

SL	MIF		× ✓	fx =M	ATCH(G	2,A2:A13,	,0		
	А	В	С	D	Е	F	G	Н	I.
1		Chocolate	Strawberry	Vanilla					
2	Jan	544	639	189		Month	Feb	=MATCH(G	2,A2:A13,0
3	Feb	217	719	679		Flavour	Chocolate		
4	Mar	810	178	810	MA	TCH(look	up_value, look	up_array, [ma	tch_type])
5	Apr	567	926	929		Sales			
6	May	745	230	364					
7	Jun	298	820	947					
8	Jul	457	522	832					
9	Aug	495	500	239					
10	Sep	871	391	529					
11	Oct	585	225	791					
12	Nov	478	262	540					
13	Dec	741	883	809					
14									

2. To find the position of Chocolate in the range B1:D1, use the MATCH function. The result is 1.



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SU	IMIF	•	× ✓	<i>f</i> _* =M	ATCH(G	3,B1:D1,0					
	А	В	с	D	E	F	G	Н	I.		
1		Chocolate	Strawberry	Vanilla							
2	Jan	544	639	189		Month	Feb	2			
3	Feb	217	7 719	679		Flavour	Chocolate	=MATCH(G	3,B1:D1,0		
4	Mar	810) 178	810	M	ATCH(look	up_value, look	up_array, [ma	tch_type])		
5	Apr	567	7 926	929		Sales					
6	May	74	5 230	364							
7	Jun	298	820	947							
8	Jul	45	7 522	832							
9	Aug	493	5 500	239							
10	Sep	87:	391	529							
11	Oct	583	5 225	791							
12	Nov	478	3 262	540							
13	Dec	74:	883	809							
14											

3. Use these results and the INDEX function to find the sales of Chocolate in February.

GS	5	-	×	f _x =IN	DEX(B2	:D13,H2,H	13)		
	А	В	с	D	Е	F	G	н	I.
1		Chocolate	Strawberry	Vanilla					
2	Jan	544	639	189		Month	Feb	2	
3	Feb	217	719	679		Flavour	Chocolate	1	
4	Mar	810	178	810					
5	Apr	567	926	929		Sales	217		
6	May	745	230	364					
7	Jun	298	820	947					
8	Jul	457	522	832					
9	Aug	495	500	239					
10	Sep	871	391	529					
11	Oct	585	225	791					
12	Nov	478	262	540					
13	Dec	741	883	809					
14									

Explanation: 217 found at the intersection of row 2 and column 1 in the range B2:D13.

4. Put it all together.





1

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GS	5	•	=INDEX(B2:	D13,MATC	H(G2,A2	2:A13,0),N	/ATCH(G3,B1	:D1,0))	
	А	в	с	D	Е	F	G	н	I.
1		Chocolate	Strawberry	Vanilla					
2	Jan	544	639	189		Month	Feb		
3	Feb	217	719	679		Flavour	Chocolate		
4	Mar	810	178	810					
5	Apr	567	926	929		Sales	217		
6	May	745	230	364					
7	Jun	298	820	947					
8	Jul	457	522	832					
9	Aug	495	500	239					
10	Sep	871	391	529					
11	Oct	585	225	791					
12	Nov	478	262	540					
13	Dec	741	883	809					
14									

Locate Maximum Value

This example teaches you how to find the **cell address** of the **maximum value** in a column.

1. First, we use the MAX function to find the maximum value in column A.

C1		•	× v .	f _x =M	AX(A:A)				
	А	В	С	D	E	F	G	Н	I.
1			12						
2									
3	6								
4	3								
5	1								
6	5								
7	12								
8	8								
9									

2. Second, we use the MATCH function to find the row number of the maximum value.

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C1		•	\times	< .	f _{sc} =M/	АТСН(МАХ	(A:A),A:A,	0)		
	А	В		С	D	E	F	G	Н	I.
1				7						
2										
3	6	i								
4	3									
5	1									
6	5									
7	12	2								
8	8									
9										

Explanation: the MATCH function reduces to =MATCH(12,A:A,0), 7. The MATCH function returns the position of the maximum value in column A. Set the third argument to 0 to return an exact match.

3. Finally, we use the ADDRESS function to return the cell address.

C1	C1 • : × ✓ f* =ADDRESS(MATCH(MAX(A:A),A:A,0),1)										
	А	В	С	D	E	F	G	н	1		
1			\$A\$7								
2											
3	6										
4	3										
5	1										
6	5										
7	12										
8	8										
9											

Explanation: the ADDRESS function reduces to =ADDRESS(7,1), \$A\$7. The first argument specifies the row number. The second argument specifies the column number.

Indirect

The **INDIRECT function** in **Excel** returns the reference specified by a text string.





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1. For example, the INDIRECT function below reduces to =INDIRECT("C2"), =C2, 5

A1		•	× v	<i>f</i> ∗ =IN	=INDIRECT(B1)						
	А	В	с	D	Е	F	G	Н	I.		
1	5	C2									
2			5								
3											

Do we really need the INDIRECT function for this? Yes. Below you can find the result without using the INDIRECT function.

A1		•	× ✓	<i>f</i> _x =B1	L				
	А	В	С	D	E	F	G	Н	I
1	C2	C2							
2			5						
3									

2. For example, the function below reduces to =SUM(INDIRECT("E3:E6")), =SUM(E3:E6), 27

A3	.3 ▼ : × ✓ f =SUM(INDIRECT("E"&A1&":E"&A2))										
	А	В		С	D	E	F	G	н	I.	
1		3				2					
2	(5				6					
3	2	7				5					
4						5					
5						10					
6						7					
7						8					
8											

Note: the & operator is used to join strings. Border for illustration only.

3. For example, the function below reduces to =AVERAGE(Scores), 9







A1		▼ 1	\times \checkmark	f _x =A	=AVERAGE(INDIRECT(B1))						
	А	В	с	D	Е	F	G	Н	I.		
1	9	Scores									
2			8								
3			9								
4			10								
5											

Note: the <u>named</u> range Scores refers to the range C2:C4.

Financial Functions

<u>Pmt | Rate | Nper | Pv | Fv</u>

To illustrate **Excel's** most popular **financial functions**, we consider a **loan** with monthly payments, an annual interest rate of 6%, a 20-year duration, a present value of \$150,000 (amount borrowed) and a future value of 0 (that's what you hope to achieve when you pay off a loan).

We make monthly payments, so we use 6%/12 = 0.5% for Rate and 20*12 = 240 for Nper (total number of periods). If we make annual payments on the same loan, we use 6% for Rate and 20 for Nper.

Pmt

Select cell A2 and insert the PMT function.

С	DUNTIF 👻 : 🗙	✓ f _x	=PMT(
	А	В	с	D	E	F
1	Pmt	Rate	Nper	Pv	Fv	
2	=PMT(0.50%	240	\$150,000	0	
3	PMT(rate oper pv [fv] [type])				
4	run (lace, npei, pr, t	(i) (c)pei/				

Note: The last two arguments are optional. For loans the Fv can be omitted (the future value of a loan equals 0, however, it's included here for clarification). If Type is omitted, it is assumed that payments are due at the end of the period.

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Result. The monthly payment equals \$1,074.65.

A2	2	Ŧ	: ×	√ <i>f</i> x	=PMT(B2,C2,D2,E2)					
		А		В	С	D	E	F		
1	Pmt			Rate	Nper	Pv	Fv			
2		(\$1,074.65)	0.50%	240	\$150,0	00 00			
3										

Tip: when working with financial functions in Excel, always ask yourself the question, am I making a payment (negative) or am I receiving money (positive)? We pay off a loan of \$150,000 (positive, we received that amount) and we make monthly payments of \$1,074.65 (negative, we pay).

Rate

If Rate is the only unknown variable, we can use the RATE function to calculate the interest rate.

B2		• : ×	\checkmark f_x	=RATE(C2,A2,D2,E2)				
		А	В	с	D	E	F	
1	Pmt		Rate	Nper	Pv	Fv		
2		(\$1,074.6	0.50%	240	\$150,00	0 0		
3								

Nper

Or the NPER function. If we make monthly payments of \$1,074.65 on a 20-year loan, with an annual interest rate of 6%, it takes 240 months to pay off this loan.

C2	2	• : ×	$\checkmark f_X$	=NPER(B2,A2	2,D2,E2)		
		А	в	С	D	E	F
1	Pmt		Rate	Nper	Pv	Fv	
2		(\$1,074.65)	0.50%	240		\$150,000 0	
3							

We already knew this, but we can change the monthly payment now to see how this affects the total number of periods.

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C2	2	-	: ×	√ f _x	=NPER(B2,A2	2,D2,E2)		
		А		в	С	D	E	F
1	Pmt			Rate	Nper	Pv	Fv	
2		(\$	2,074.65)	0.50%	89.95316057	\$150,0	0 00	
3								

Conclusion: if we make monthly payments of \$2,074.65, it takes less than 90 months to pay off this loan.

Pv

Or the PV (Present Value) function. If we make monthly payments of \$1,074.65 on a 20-year loan, with an annual interest rate of 6%, how much can we borrow? You already know the answer.

D2	D2 • : × ✓ f _x =PV(B2,C2,A2,E2)								
A B C					D		E	F	
1	Pmt		Rate	Nper	Pv	F	v		
2		(\$1,074.65)	0.50%	240		\$150,000	0		
3									

Fv

And we finish this chapter with the FV (Future Value) function. If we make monthly payments of \$1,074.65 on a 20-year loan, with an annual interest rate of 6%, do we pay off this loan? Yes.

E2	2	• : ×	✓ <i>f</i> _x	=FV(B2,C2,A2,D2)				
		А	В	с	D	E	F	
1	Pmt		Rate	Nper	Pv	Fv		
2		(\$1,074.65)	0.50%	240		\$150,000	0	
3								

But, if we make monthly payments of only \$1,000.00, we still have debt after 20 years.



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E2		•	×	√ f _x	=FV(B2,C2,A	2,D2)			
		А		В	с	D		E	F
1	Pmt			Rate	Nper	Pv		Fv	
2		(\$1,0	00.00)	0.50%	240		\$150,000	(\$34,489.78)	
3									

Loans with Different Durations

This example teaches you how to compare loans with different durations in Excel.

1. First, we calculate the monthly payment on a loan with an annual interest rate of 6%, a 20year duration and a present value (amount borrowed) of \$150,000.

D2	2 -	: ×	~	<i>f</i> _∞ =PN	PMT(A2/12,B2*12,C2)					
	А		В	с	C D E F					
1	Annual Intere	est Rate	Years	Amount	Monthly Payment					
2		6.00%	20	150000	(\$1,074.65)					
3										

Note: we make monthly payments, so we use 6%/12 = 0.5% for Rate and 20*12 = 240 for Nper (total number of periods).

- 2. Next, select the range A2:D2 and drag it down two rows.
- 3. Change the duration of the other two loans to 25 and 30 years.

Result:

D4	• • • ×	~	f _∞ =PN	MT(A4/12,B4*12,C4)			
	А	в	с	D	Е	F	G
1	Annual Interest Rate	Years	Amount	Monthly Payment			
2	6.00%	20	150000	(\$1,074.65)			
3	6.00%	25	150000	(\$966.45)			
4	6.00%	30	150000	(\$899.33)			
5							



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The monthly payment over 30 years (\$899,33) looks good in contrast to the \$966,45 and \$1,074.65. Right?

4. But now we calculate the Total Paid for each loan.

E4	• • ×	~	<i>f_x</i> =84	*12*D4			
	А	в	с	D	E	F	G
1	Annual Interest Rate	Years	Amount	Monthly Payment	Total Paid		
2	6.00%	20	150000	(\$1,074.65)	(\$257,915.18)		
3	6.00%	25	150000	(\$966.45)	(\$289,935.63)		
4	6.00%	30	150000	(\$899.33)	(\$323,757.28)		
5							

The monthly payment over 30 years (\$899,33) suddenly does not look so attractive anymore. Conclusion: the longer the duration of the loan, the more interest you pay.

Investment or Annuity

Investment | Annuity

This example teaches you how to calculate the **future value** of an **investment** or the **present value** of an **annuity**.

Tip: when working with financial functions in Excel, always ask yourself the question, am I making a payment (negative) or am I receiving money (positive)?

Investment

Assume that at the end of every year, you deposit \$100 into a savings account. At an annual interest rate of 8%, how much will your investment be worth after 10 years?

1. Insert the FV (Future Value) function.





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СО	UNTIF	•	×	~	f_{x}	=FV(
	А		в			С		D	E	F	G
1											
2		Annual	Intere	st Rat	e		8%				
3		Years					10				
4		Yearly I	Payme	nt		(\$10	0.00)				
5											
6		Future	Value			=FV(
7						EV(rate	pper r	omt [nv] [t	(nel)		
8						rv(rate,	ubert b	and that to	16211		

2. Enter the arguments.

C6	j	\bullet : \times \checkmark f_x	=FV(C2,C3,C4)				
	А	В	С	D	E	F	G
1							
2		Annual Interest Rate	8%				
3		Years	10				
4		Yearly Payment	(\$100.00)				
5							
6		Future Value	\$1,448.66				
7							

In 10 years time, you pay 10 * \$100 = \$1000 (negative), and you'll receive \$1,448.66 (positive) after 10 years. The higher the interest, the faster your money grows.

Note: the last two arguments are optional. If omitted, Pv = 0 (no present value). If Type is omitted, it is assumed that payments are due at the end of the period.

Annuity

Assume you want to purchase an annuity that will pay \$600 a month, for the next 20 years. At an annual interest rate of 6%, how much does the annuity cost?

1. Insert the PV (Present Value) function.





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С	DUNTIF	\bullet : \times \checkmark f_x	=PV(
	А	В	С	D	Е	F	G
1							
2		Present Value	=PV(
3			PV(rate, nper,	pmt, [fv], [ty	/pe])		
4		Annual Interest Rate	6.00%				
5		Years	20				
6		Monthly Payment	\$600.00				
7							

2. Enter the arguments.

C2	2	\bullet : $\times \checkmark f_x$	=PV(C4/12,C5	*12,C6)			
	А	В	С	D	E	F	G
1							
2		Present Value	(\$83,748.46)				
3							
4		Annual Interest Rate	6.00%				
5		Years	20				
6		Monthly Payment	\$600.00				
7							

You need a one-time payment of \$33,748.46 (negative) to pay this annuity. You'll receive 240 * \$600 (positive) = \$144,000 in the future. This is another example that money grows over time.

Note: we receive monthly payments, so we use 6%/12 = 0.5% for Rate and 20*12 = 240 for Nper. The last two arguments are optional. If omitted, Fv = 0 (no future value). If Type is omitted, it is assumed that payments are due at the end of the period. This annuity does not take into account life expectancy, inflation etc.

Compound Interest

What's **compound interest** and what's the formula for compound interest in **Excel**? This example gives you the answers to these questions.

1. Assume you put \$100 into a bank. How much will your investment be worth after one year at an annual interest rate of 8%? The answer is \$108.

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2. Now this interest (\$8) will also earn interest (compound interest) next year. How much will your investment be worth after two years at an annual interest rate of 8%? The answer is \$116.64.

A3	•	: ×	$\sqrt{-f_x}$	=A2*1	L.08				
	А	в	с	D	E	F	G	н	1
1	100								
2	108								
3	116.64								
4									

3. How much will your investment be worth after 5 years? Simply drag the formula down to cell A6.

A	j –	: ×	$\sqrt{-f_x}$	=A5*:	1.08				
	А	В	С	D	E	F	G	Н	I.
1	100								
2	108								
3	116.64								
4	125.9712								
5	136.048896								
6	146.9328077								
7									

The answer is \$146.93.

4. All we did was multiplying 100 by 1.08, 5 times. So we can also directly calculate the value of the investment after 5 years.



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A	2 👻	: ×	√ fs	=A1*:	1.08*1.08*	1.08*1.08*	1.08		
	А	в	с	D	E	F	G	Н	I.
1	100								
2	146.9328077								
3									

which is the same as:

A2	2 -	: ×	$\checkmark f_x$	=A1*:	1.08^5				
	А	В	с	D	E	F	G	н	1
1	100								
2	146.9328077								
3									

Note: there is no special function for compound interest in Excel. However, you can easily create a compound interest calculator to compare different rates and different durations.

5. Assume you put \$10,000 into a bank. How much will your investment be worth after 10 years at an annual interest rate of 5% compounded monthly? The answer is \$16,470.

B7	7 🔻 : 🗙 🗸 f _x	=B2*(1+B3/B4)^(B4*B5)				
	А	В	С	D	E	F
1						
2	Principal	\$10,000				
3	Annual Interest Rate	5%				
4	Compounding Periods Per Year	12				
5	Years	10				
6						
7	Amount Earned	\$16,470				
8						

6. Assume you put \$10,000 into a bank. How much will your investment be worth after 15 years at an annual interest rate of 4% compounded quarterly? The answer is \$18,167.





5
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B7	τ \cdot : $\times \checkmark f_x$	=B2*(1+B3/B4)^(B4*B5)				
	А	В	с	D	E	F
1						
2	Principal	\$10,000				
3	Annual Interest Rate	4%				
4	Compounding Periods Per Year	4				
5	Years	15				
6						
7	Amount Earned	\$18,167				
8						

Loan Amortization Schedule

This example teaches you how to create a loan amortization schedule in Excel.

1. We use the <u>PMT</u> function to calculate the monthly payment on a loan with an annual interest rate of 5%, a 2-year duration and a present value (amount borrowed) of \$20,000. We have <u>named</u> the input cells.

=	=PMT(AnnualInterestRate/PaymentsPerYear,Years*PaymentsPerYear,Amount)								
	А	В	С	D	E	F			
1	Annual Interest Rate	5.00%							
2	Years	2							
3	Payments Per Year	12							
4	Amount	\$20,000							
5									
6	Payment Number	Payment	Principal	Interest	Balance				
7	1	(\$877.43)							
8									

2. Use the PPMT function to calculate the principal part of the payment. The second argument specifies the payment number.

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=	=PPMT(AnnualInterestRate/PaymentsPerYear,A7,Years*PaymentsPerYear,Amount)								
	A B C D E F								
1	Annual Interest Rate	5.00%							
2	Years	2							
3	Payments Per Year	12							
4	Amount	\$20,000							
5									
6	Payment Number	Payment	Principal	Interest	Balance				
7	1	(\$877.43)	(\$794.09)						
8									

3. Use the IPMT function to calculate the interest part of the payment. The second argument specifies the payment number.

=	=IPMT(AnnualInterestRate/PaymentsPerYear,A7,Years*PaymentsPerYear,Amount)								
	А	В	с	D	E	F			
1	Annual Interest Rate	5.00%							
2	Years	2							
3	Payments Per Year	12							
4	Amount	\$20,000							
5									
6	Payment Number	Payment	Principal	Interest	Balance				
7	1	(\$877.43)	(\$794.09)	(\$83.33)					
8									

4. Update the balance.

=Amount+C7							
	А	В	с	D	E	F	
1	Annual Interest Rate	5.00%					
2	Years	2					
3	Payments Per Year	12					
4	Amount	\$20,000					
5							
6	Payment Number	Payment	Principal	Interest	Balance		
7	1	(\$877.43)	(\$794.09)	(\$83.33)	\$19,205.91		
8							

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The Hi-Tech Computers Hardware & Software Institute (Regd. By Haryana Govt.) 5. Select the range A7:E7 (first payment) and drag it down one row. Change the balance formula.

=	=E7+C8							
	А	В	С	D	E	F		
1	Annual Interest Rate	5.00%						
2	Years	2						
3	Payments Per Year	12						
4	Amount	\$20,000						
5								
6	Payment Number	Payment	Principal	Interest	Balance			
7	1	(\$877.43)	(\$794.09)	(\$83.33)	\$19,205.91			
8	2	(\$877.43)	(\$797.40)	(\$80.02)	\$18,408.50			
9								

6. Select the range A8:E8 (second payment) and drag it down to row 30.



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2						
	А	В	С	D	E	F
1	Annual Interest Rate	5.00%				
2	Years	2				
3	Payments Per Year	12				
4	Amount	\$20,000				
5						
6	Payment Number	Payment	Principal	Interest	Balance	
7	1	(\$877.43)	(\$794.09)	(\$83.33)	\$19,205.91	
8	2	(\$877.43)	(\$797.40)	(\$80.02)	\$18,408.50	
9	3	(\$877.43)	(\$800.73)	(\$76.70)	\$17,607.78	
10	4	(\$877.43)	(\$804.06)	(\$73.37)	\$16,803.71	
11	5	(\$877.43)	(\$807.41)	(\$70.02)	\$15,996.30	
12	6	(\$877.43)	(\$810.78)	(\$66.65)	\$15,185.53	
13	7	(\$877.43)	(\$814.15)	(\$63.27)	\$14,371.37	
14	8	(\$877.43)	(\$817.55)	(\$59.88)	\$13,553.82	
15	9	(\$877.43)	(\$820.95)	(\$56.47)	\$12,732.87	
16	10	(\$877.43)	(\$824.37)	(\$53.05)	\$11,908.50	
17	11	(\$877.43)	(\$827.81)	(\$49.62)	\$11,080.69	
18	12	(\$877.43)	(\$831.26)	(\$46.17)	\$10,249.43	
19	13	(\$877.43)	(\$834.72)	(\$42.71)	\$9,414.71	
20	14	(\$877.43)	(\$838.20)	(\$39.23)	\$8,576.51	
21	15	(\$877.43)	(\$841.69)	(\$35.74)	\$7,734.81	
22	16	(\$877.43)	(\$845.20)	(\$32.23)	\$6,889.62	
23	17	(\$877.43)	(\$848.72)	(\$28.71)	\$6,040.89	
24	18	(\$877.43)	(\$852.26)	(\$25.17)	\$5,188.64	
25	19	(\$877.43)	(\$855.81)	(\$21.62)	\$4,332.83	
26	20	(\$877.43)	(\$859.37)	(\$18.05)	\$3,473.45	
27	21	(\$877.43)	(\$862.96)	(\$14.47)	\$2,610.50	
28	22	(\$877.43)	(\$866.55)	(\$10.88)	\$1,743.95	
29	23	(\$877.43)	(\$870.16)	(\$7.27)	\$873.79	
30	24	(\$877.43)	(\$873.79)	(\$3.64)	(\$0.00)	
31						
32						

It takes 24 months to pay off this loan. See how the principal part increases and the interest part decreases with each payment.





Depreciation

<u>SLN | SYD | DB | DDB | VDB</u>

Excel offers five different **depreciation functions**. We consider an asset with an initial cost of \$10,000, a salvage value (residual value) of \$1000 and a useful life of 10 periods (years). Below you can find the results of all five functions. Each function will be explained separately in the next 5 paragraphs.





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	А	В	С	D	E	F	G
1							
2	Cost	\$ 10,000					
3	Salvage	\$ 1,000					
4	Life	10					
5							
6	Depreciat	ion Value					
7							
8	Period	SLN	SYD	DB	DDB	VDB	
9	1	\$900.00	\$1,636.36	\$2,060.00	\$2,000.00	\$2,000.00	
10	2	\$900.00	\$1,472.73	\$1,635.64	\$1,600.00	\$1,600.00	
11	3	\$900.00	\$1,309.09	\$1,298.70	\$1,280.00	\$1,280.00	
12	4	\$900.00	\$1,145.45	\$1,031.17	\$1,024.00	\$1,024.00	
13	5	\$900.00	\$981.82	\$818.75	\$819.20	\$819.20	
14	6	\$900.00	\$818.18	\$650.08	\$655.36	\$655.36	
15	7	\$900.00	\$654.55	\$516.17	\$524.29	\$524.29	
16	8	\$900.00	\$490.91	\$409.84	\$419.43	\$419.43	
17	9	\$900.00	\$327.27	\$325.41	\$335.54	\$338.86	
18	10	\$900.00	\$163.64	\$258.38	\$268.44	\$338.86	
19							
20	Asset Valu	Je					
21							
22	Period	SLN	SYD	DB	DDB	VDB	
23	0	\$10,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$10,000.00	
24	1	\$9,100.00	\$8,363.64	\$7,940.00	\$8,000.00	\$8,000.00	
25	2	\$8,200.00	\$6,890.91	\$6,304.36	\$6,400.00	\$6,400.00	
26	3	\$7,300.00	\$5,581.82	\$5,005.66	\$5,120.00	\$5,120.00	
27	4	\$6,400.00	\$4,436.36	\$3,974.50	\$4,096.00	\$4,096.00	
28	5	\$5,500.00	\$3,454.55	\$3,155.75	\$3,276.80	\$3,276.80	
29	6	\$4,600.00	\$2,636.36	\$2,505.67	\$2,621.44	\$2,621.44	
30	7	\$3,700.00	\$1,981.82	\$1,989.50	\$2,097.15	\$2,097.15	
31	8	\$2,800.00	\$1,490.91	\$1,579.66	\$1,677.72	\$1,677.72	
32	9	\$1,900.00	\$1,163.64	\$1,254.25	\$1,342.18	\$1,338.86	
33	10	\$1,000.00	\$1,000.00	\$995.88	\$1,073.74	\$1,000.00	
34							

Most assets lose more value in the beginning of their useful life. The SYD, DB, DDB and VDB functions have this property.





SLN

The SLN (Straight Line) function is easy. Each year the **depreciation value** is the same.

₿9 ▼ : ×				<i>√ ∫x</i> =	SLN(Cost,Salva	age,Life)		
	А		В	с	D	E	F	G
1								
2	Cost	\$	10,000					
3	Salvage	\$	1,000					
4	Life		10					
5								
6	Depreciat	ion	Value					
7								
8	Period	SLN		SYD	DB	DDB	VDB	
9	1		\$900.00	\$1,636.36	\$2,060.00	\$2,000.00	\$2,000.00	
10	2		\$900.00	\$1,472.73	\$1,635.64	\$1,600.00	\$1,600.00	

The SLN function performs the following calculation. Deprecation Value = (10,000 - 1,000) / 10 = 900.00. If we subtract this value 10 times, the asset depreciates from 10,000 to 1000 in 10 years (see first picture, bottom half).

SYD

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The SYD (Sum of Years' Digits) function is also easy. As you can see below, this function also requires the period number.

CS)	• : ×	√ f _x =	SYD(Cost,Salva	age,Life,A9)		
	А	В	С	D	E	F	G
1							
2	Cost	\$ 10,000					
3	Salvage	\$ 1,000					
4	Life	10)				
5							
6	Depreciat	ion Value					
7							
8	Period	SLN	SYD	DB	DDB	VDB	
9	1	\$900.00	\$1,636.36	\$2,060.00	\$2,000.00	\$2,000.00	
10	2	\$900.00	\$1,472.73	\$1,635.64	\$1,600.00	\$1,600.00	

The SYD function performs the following calculations. A useful life of 10 years results in a sum of years of 10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 55. The asset loses 9000 in value. Depreciation value period 1 = 10/55 * 9000 = 1,636.36. Deprecation value period 2 = 9/55 * 9000 = 1,472,73, etc. If we subtract these values, the asset depreciates from 10,000 to 1000 in 10 years (see first picture, bottom half).

DB

The DB (Declining Balance) function is a bit more complicated. It uses a fixed rate to calculate the depreciation values.

_		_	_					
D	9	* 1	\times	✓ <i>f</i> _x =	DB(Cost,Salvag	ge,Life,A9)		
	A		В	C	D	E	F	G
1								
2	Cost	\$	10,000					
3	Salvage	\$	1,000					
4	Life		10					
5								
6	Depreciat	ion Va	lue					
7								
8	Period	SLN		SYD	DB	DDB	VDB	
9	1		\$900.00	\$1,636.36	\$2,060.00	\$2,000.00	\$2,000.00	
10	2		\$900.00	\$1,472.73	\$1,635.64	\$1,600.00	\$1,600.00	

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The DB function performs the following calculations. Fixed rate = $1 - ((salvage / cost) \wedge (1 / life)) = 1 - (1000/10,000)^{(1/10)} = 1 - 0.7943282347 = 0.206 (rounded to 3 decimal places). Depreciation value period 1 = 10,000 * 0.206 = 2,060.00. Deprecation value period 2 = (10,000 - 2,060.00) * 0.206 = 1635.64, etc. If we subtract these values, the asset depreciates from 10,000 to 995.88 in 10 years (see first picture, bottom half).$

Note: the DB function has a fifth optional argument. You can use this argument to indicate the number of months to go in the first year (If omitted, it is assumed to be 12). For example, set this argument to 9 if you purchase your asset at the beginning of the second quarter in year 1 (9 months to go in the first year). Excel uses a slightly different formula to calculate the deprecation value for the first and last period (the last period represents an 11th year with only 3 months).

DDB

The DDB (Double Declining Balance) function is easy again. However, sometimes you don't reach the salvage value when you use this function.

E9)	•	: ×	√ f _x =	DDB(Cost,Salva	age,Life,A9)		
	А		В	С	D	E	F	G
1								
2	Cost	\$	10,000					
3	Salvage	\$	1,000					
4	Life		10					
5								
6	Depreciat	ion \	/alue					
7								
8	Period	SLN		SYD	DB	DDB	VDB	
9	1		\$900.00	\$1,636.36	\$2,060.00	\$2,000.00	\$2,000.00	
10	2		\$900.00	\$1,472.73	\$1,635.64	\$1,600.00	\$1,600.00	

The DDB function performs the following calculations. A useful life of 10 years results in a rate of 1/10 = 0.1. Because this function is called Double Declining Balance we double this rate (factor = 2). Depreciation value period 1 = 10,000 * 0.2 = 2,000.00. Deprecation value period 2 = (10,000 - 2,000.00) * 0.2 = 1600.00, etc. As said earlier, sometimes you don't reach the salvage value when you use this function. In this example, if we subtract the depreciation values, the asset depreciates from 10,000 to 1073.74 in 10 years (see first picture, bottom half). However, read on to fix this.

Note: the DDB function has a fifth optional argument. You can use this argument to use a different factor.

VDB

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The VDB (Variable Declaring Balance) function uses the DDB (Double Declining Balance) method by default. The 4th argument indicates the starting period, the 5th argument indicates the ending period.

F9)	• : ×	√ f _x =	VDB(Cost,Salva	age,Life,A9-1,A	.9)	
	А	в	с	D	E	F	G
1							
2	Cost	\$ 10,000					
3	Salvage	\$ 1,000					
4	Life	10)				
5							
6	Depreciat	ion Value					
7							
8	Period	SLN	SYD	DB	DDB	VDB	
9	1	\$900.00	\$1,636.36	\$2,060.00	\$2,000.00	\$2,000.00	
10	2	\$900.00	\$1,472.73	\$1,635.64	\$1,600.00	\$1,600.00	
11	3	\$900.00	\$1,309.09	\$1,298.70	\$1,280.00	\$1,280.00	
12	4	\$900.00	\$1,145.45	\$1,031.17	\$1,024.00	\$1,024.00	
13	5	\$900.00	\$981.82	\$818.75	\$819.20	\$819.20	
14	6	\$900.00	\$818.18	\$650.08	\$655.36	\$655.36	
15	7	\$900.00	\$654.55	\$516.17	\$524.29	\$524.29	
16	8	\$900.00	\$490.91	\$409.84	\$419.43	\$419.43	
17	9	\$900.00	\$327.27	\$325.41	\$335.54	\$338.86	
18	10	\$900.00	\$163.64	\$258.38	\$268.44	\$338.86	
19							

The VDB function performs the same calculations as the DDB function. However, it switches to Straight Line calculation (yellow values) to make sure you reach the salvage value (see first picture, bottom half). It only switches to Straight Line calculation when Depreciation Value, Straight Line is higher than Depreciation Value, DDB. In period 8, Depreciation Value, DDB = 419.43. We still have 2097.15 - 1000 (see first picture, bottom half) to depreciate. If we use the Straight Line method this results in 3 remaining depreciation values of 1097.15 / 3 = 365.72. Depreciation Value, Straight Line is not higher so we do not switch. In period 9, Depreciation Value, DDB = 335.54. We still have 1677.72 - 1000 (see first picture, bottom half) to depreciate. If we use Straight line method this results in 2 remaining depreciation values of 677.72 / 2 = 338.86. Depreciation Value, Straight Line is higher so we switch to Straight Line calculation.

Note: the VDB function is much more versatile than the DDB function. It can calculate the depreciation value of multiple periods. In this example, =VDB(Cost,Salvage,Life,0,3) reduces to 2000 + 1600 + 1280 = 4880. It contains a 6th and 7th optional argument. You can use the 6th argument to use a different factor. If you set the 7th argument to TRUE it does not switch to Straight Line calculation (the same as DDB).

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Round

Round | RoundUp | RoundDown

This chapter illustrates three functions to **round** numbers in **Excel**. The ROUND, **ROUNDUP** and **ROUNDDOWN** function.

Before your start: if you round a number, you lose precision. If you don't want this, show fewer <u>decimal places</u> without changing the number itself.

Round

1. Round a number to two decimal places.

B1		• : ×	~	<i>f</i> _∞ =RO	UND(A1,2)				
	А	В	с	D	E	F	G	н	I.
1	114.7261	114.73							
2									
								11	

Note: 1, 2, 3, and 4 get rounded down. 5, 6, 7, 8, and 9 get rounded up. In this example, 114.72<u>1</u>1, 114.72<u>2</u>1, 114.72<u>31</u> and 114.72<u>41</u> get rounded down to 114.72 and 114.72<u>51</u>, 114.72<u>61</u>, 114.72<u>71</u>, 114.72<u>81</u> and 114.72<u>91</u> get rounded up to 114.73.

2. Round a number to one decimal place.

B1		• : :	× v	f∞ =RO	UND(A1,1)				
	А	В	с	D	E	F	G	Н	I.
1	114.7261	114.	7						
2									

3. Round a number to the nearest integer.

B1	· · ·	• : [× ✓	<i>f</i> _∞ =RC	=ROUND(A1,0)				
	А	В	с	D	Е	F	G	Н	I
1	114.7261	1	15						
2									

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4. Round a number to the nearest 10.

B1		•	X 🗸	<i>f</i> _∞ =RO	=ROUND(A1,-1)				
	А	В	с	D	E	F	G	Н	I
1	114.7261	1	10						
2									

5. Round a number to the nearest 100.

B1	B1 ▼ : × ✓ <i>f</i> _x =ROUND(A1,-2)								
	А	В	С	D	Е	F	G	н	1
1	114.7261	10	0						
2									

RoundUp

The ROUNDUP function always rounds a number up (away from zero). For example, round a number up to one decimal place.

B1	B1 ▼ : × ✓ <i>f</i> _x =ROUNDUP(A1,1)									
	А	В	С	D	E	F	G	н	I.	
1	114.7261	114.8								
2										
B1		• : ×	V .	fx =RO	UNDUP(A:	L,1)				
	А	В	С	D	E	F	G	Н	I.	
1	-114.7261	-114.8								
2										

RoundDown

The ROUNDDOWN function always rounds a number down (toward zero). For example, round a number down to the nearest integer.




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B1	•	• : ×	 	f∞ =RO	UNDDOWI	N(A1,0)			
	А	В	с	D	Е	F	G	н	I.
1	114.7261	114							
2									

B1	L	• : ×	 ✓ 	✓ f _x =ROUNDDOWN(A1,0)						
	А	В	с	D	Е	F	G	н	I.	
1	-114.7261	-114								
2										

Chop off Decimals

Int | Trunc

This example illustrates two functions to **chop off decimals** in **Excel**. The **INT** and the **TRUNC** function.

Int

The INT (Integer) function rounds a number down to the nearest integer.

B1		•	×	 . 	f _x =INT	r(A1)				
	А	В		С	D	E	F	G	н	I.
1	114.7261		114							
2										

B1	L	• : :	X V	f _x =IN	Γ(A1)				
	А	В	с	D	E	F	G	Н	I.
1	-114.7261	-11	5						
2									

Conclusion: the INT function only chops off decimals from positive numbers.

Trunc



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The TRUNC (Truncate) function always chops off decimals.

B1		• = >	< <	f _x =TR	UNC(A1,0)				
	А	В	С	D	E	F	G	Н	I.
1	114.7261	114	L .						
2									

B1	L ·	• : ×	 V 	f _x =TR	UNC(A1,0)				
	А	В	с	D	Е	F	G	н	I.
1	-114.7261	-114							
2									

The TRUNC function can keep any number of decimals and chop off the rest.

B1		• E 🛛 🗙	 . 	fx =TRI	JNC(A1,2)				
	Α	В	С	D	E	F	G	н	1 I I
1	114.7261	114.72							
2									
		_							
B1	. '	- I X	 . 	f∞ =TRU	JNC(A1,3)				
	A	В	С	D	E	F	G	Н	I.
1	114.7261	114.726							
1	114.7261	114.726							

Nearest Multiple

Mround | Ceiling | Floor

This example illustrates three functions to **round** numbers to a **multiple** of x in **Excel**. The **MROUND**, **CEILING** and the **FLOOR** function.

Mround

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1. For example, round a number to the nearest multiple of 10.

B1		• = >	< 🗸	f _x =MR	OUND(A1	=MROUND(A1,10)					
	А	В	С	D	E	F	G	Н	I.		
1	114.7261	110									
2											

2. For example, round a number to the nearest multiple of 5.

B1		• : ×	~	<i>f</i> _∞ =MR	=MROUND(A1,5)							
	А	В	с	D	E	F	G	н	I			
1	114.7261	115										
2												

Ceiling

The same as MROUND but rounds up.

B1		• : ×	- V .	f _x =CE	LING(A1,1	0)			
	А	В	с	D	E	F	G	н	I.
1	114.7261	120							
2									
Floo	or								

The same as MROUND but rounds down.

B1		>	< <	f _x =FLC	DOR(A1,5)				
	А	В	с	D	E	F	G	н	I.
1	114.7261	110							
2									

Even and Odd

Even | Odd | Even or Odd?



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This example illustrates the **EVEN** and the **ODD** function in **Excel**. It also shows you how to determine if a number is even or odd.

Even

1. Rounds a positive number up to the nearest even integer.

B1		\checkmark : \times \checkmark f_x =EVEN(A1)									
	А	В	С	D	E	F	G	Н	I.		
1	114.7261	116									
2											

2. Rounds a negative number down to the nearest even integer.

B1		• = >	< <	f _∞ =EV	EN(A1)				
	А	В	с	D	E	F	G	Н	I
1	-114.7261	-116							
2									

Odd

1. Rounds a positive number up to the nearest odd integer.

B1		• = >	× v	fx =OD	D(A1)				
	А	В	с	D	E	F	G	н	I.
1	114.7261	11	5						
2									

2. Rounds a negative number down to the nearest odd integer.

B1	L	•	×	~	<i>f</i> _x =(DDD(A1)				
	А	В		С	D	E	F	G	н	I.
1	-114.7261	-	115							
2										

Even or Odd?





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One way to determine if a number is even or odd is to use the MOD function. The MOD function gives the remainder of a division.

1. Even numbers divided by 2 always give a remainder of 0. For example, 28 is divided by 2 (exactly 14 times) to give a remainder of 0. As a result, the IF function returns Even.

B1 ▼ : × ✓ <i>f</i> _x =IF(MOD(A1,2)=0,"Even","Odd")									
	А	В	С	D	E	F	G	н	I.
1	28	Even							
2									

2. Odd numbers divided by 2 always give a remainder of 1. For example, 29 is divided by 2 (14 times) to give a remainder of 1. As a result, the IF function returns Odd.

B1	B1 ▼ : × ✓ <i>f</i> _* =IF(MOD(A1,2)=0,"Even","Odd")								
	А	В	с	D	Е	F	G	н	I.
1	29	Odd							
2									

Formula Errors

error | #NAME? error | #VALUE! error | #DIV/0! error | #REF! error

This chapter teaches you how to deal with some common formula errors in Excel.

error

When your cell contains this **error code**, the column isn't wide enough to display the value.

A2	2	•	\times	~	<i>f</i> _x 150	00000	
	А	В		С	D	E	F
1	7,500,000						
2	*****						
3	500,000						
4							

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1. Click on the right border of the column A header and increase the column width.

A2	2 -	w	idth: 10.5	7 (79 pixels)	15000	1500000			
	A +	₽	в	с	D	E	F		
1	7,500,000								
2	15,000,000								
3	500,000								
4									

Tip: double click the right border of the column A header to automatically fit the widest cell in column A.

#NAME? error

The #NAME? error occurs when Excel does not recognize text in a formula.

A 4	Ļ	•	× ✓	f _∞ =SU	J(A1:A3)		
	А	В	С	D	E	F	
1	4						
2	5						
3	3						
4	#NAME?	1					
5							
1. Si	mply corr	ect SU	to SUM.				
A4	ţ	•	×	f _∞ =SU	JM(A1:A3)		
	А	В	с	D	E	F	
1	4						
2	5						
3	3						
4	12						
5							

#VALUE! error

Excel displays the #VALUE! error when a formula has the wrong type of argument.



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A	1	• : :	× ✓	<i>f</i> _x =A1	L+A2+A3	
	А	В	с	D	E	F
1	4					
2	5					
3	Hi					
4	#VALUE!	٠				
5						

1a. Change the value of cell A3 to a number.

1b. Use a function to ignore cells that contain text.

A4	Ļ	▼ : :	× v	<i>f</i> _x =SU	JM(A1:A3)		
	А	в	С	D	E	F	
1	4						
2	5						
3	Hi						
4	9						
5							

1000

#DIV/0! error

Excel displays the #DIV/0! error when a formula tries to divide a number by 0 or an empty cell.

A3	}	•	×	~	$f_{\mathcal{K}}$	=A:	l/A2	
	А	В		с	[0	E	F
1	4							
2	0							
3	#DIV/0!	٠						
4								

1a. Change the value of cell A2 to a value that is not equal to 0.

1b. Prevent the error from being displayed by using the logical function IF.





AB	}	• :	× ✓	<i>f</i> _∞ =IF	(A2=0,"",A	1/A2)
	А	В	с	D	E	F
1	4					
2	0					
3						
4						

Explanation: if cell A2 equals 0, an empty string ("") is displayed. If not, the result of the formula A1/A2 is displayed.

#REF! error



1. Cell C1 references cell A1 and cell B1.

C1		•	×	~	<i>f</i> _x =A:	L+B1		
	А	В		С	D	E	F	
1	4		6	10				
2								

2. Delete column B. To achieve this, right click the column B header and click Delete.

	А	В		C D	E	F
1	4		፠	Cu <u>t</u>		
2			Ē	<u>C</u> opy		
3			Ĉ	Paste Options:		
4				n.		
5						
6				Paste <u>Special</u>		
7				<u>I</u> nsert		
8				Delete		
9				Clear Co <u>n</u> tents		
10				5 10 1		
11				Format Cells		
12				Column <u>W</u> idth		
13				<u>H</u> ide		
14				<u>U</u> nhide		
15						

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3. Select cell B1. The reference to cell B1 is not valid anymore.

B1		- :	×	~	f_{x}	=A:	1+#REF!	
	А	В		с	D)	E	F
1	4	#REF!						
2								

4. To fix this error, you can either delete +#REF! in the formula of cell B1 or you can undo your action by pressing CTRL + z

IfError

This example illustrates the **IFERROR function** in **Excel**.

1. For example, Excel displays the #DIV/0! error when a formula tries to divide a number by 0.

_										
C2	1	▼ ± 2	× 🗸	<i>f</i> _x =A2	2/B2					
	А	в	С	D	E	F	G	н	I.	
1	829	2	414.5							
2	953	0	#DIV/0!							
3	946	4	236.5							
4	604	4	151							
5	576	3	192							
6	554	5	110.8							
7	637	0	#DIV/0!							
8	560	2	280							
9	672	4	168							
10	728	10	72.8							
11										

2. Use the IFERROR function. If a cell contains an error, an empty string ("") is displayed.



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C2	C2 • : × ✓ fx =IFERROR(A2/B2,"")								
	А	В	С	D	Е	F	G	н	I.
1	829	2	414.5						
2	953	0							
3	946	4	236.5						
4	604	4	151						
5	576	3	192						
6	554	5	110.8						
7	637	0							
8	560	2	280						
9	672	4	168						
10	728	10	72.8						
11									

IsError

This example illustrates the **ISERROR function** in **Excel**.

1. For example, Excel displays the #DIV/0! error when a formula tries to divide a number by 0.

C2	1	▼ ∃ 2	× 🗸	<i>f</i> _x =A2	2/B2				
	A	В	C	D	E	F	G	н	
1	829	2	414.5						
2	953	0	#DIV/0!						
3	946	4	236.5						
4	604	4	151						
5	576	3	192						
6	554	5	110.8						
7	637	0	#DIV/0!						
8	560	2	280						
9	672	4	168						
10	728	10	72.8						
11									

The ISERROR function checks whether a value is an error and returns TRUE or FALSE.

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2. Use the IF and the ISERROR function. If a cell contains an error, the value 5 is returned. If not, the value 100 is returned.

C2	C2 \checkmark : \times \checkmark f_{x} =IF(ISERROR(A2/B2),5,100)								
	А	в	С	D	E	F	G	н	1
1	829	2	100						
2	953	0	5						
3	946	4	100						
4	604	4	100						
5	576	3	100						
6	554	5	100						
7	637	0	5						
8	560	2	100						
9	672	4	100						
10	728	10	100						
11									

Array Formulas

Without Array Formula | With Array Formula | F9 Key

This chapter helps you understand **array formulas** in **Excel**. Single cell array formulas perform multiple calculations in one cell.

Without Array Formula

Without using an array formula, we would execute the following steps to find the greatest progress.

1. First, we would calculate the progress of each student.





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D	2	▼ ∃ ⊃	× 🗸	<i>f</i> _x =C2	2-B2				
	А	В	С	D	E	F	G	н	I.
1	Student	Test A	Test B	Progress					
2	Jason	59	78	19					
3	Lisa	34	67	33					
4	Ryan	30	93	63					
5	Richard	35	83	48					
6	Anna	69	82	13					
7									

2. Next, we would use the MAX function to find the greatest progress.

D	D7 • : × ✓ fx =MAX(D2:D6)								
	А	В	С	D	Е	F	G	н	I.
1	Student	Test A	Test B	Progress					
2	Jason	59	78	19					
3	Lisa	34	67	33					
4	Ryan	30	93	63					
5	Richard	35	83	48					
6	Anna	69	82	13					
7				63					
8									

With Array Formula

We don't need to store the range in column D. Excel can store this range in its memory. A range stored in Excel's memory is called an **array constant**.

1. We already know that we can find the progress of the first student by using the formula below.





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E1	L	▼ : □	× 🗸	<i>f</i> _x =C2	2-B2				
	А	в	с	D	E	F	G	н	I
1	Student	Test A	Test B		19				
2	Jason	59	78						
3	Lisa	34	67						
4	Ryan	30	93						
5	Richard	35	83						
6	Anna	69	82						
7									

2. To find the greatest progress (don't be overwhelmed), we add the MAX function, replace C2 with C2:C6 and B2 with B2:B6.

С	COUNTIF \checkmark : \checkmark \checkmark f_x =MAX(C2:C6-B2:B6)									
	А	В	С	D	E	F	G	Н	I.	
1	Student	Test A	Test B		=MAX(C2:	C6-B2:B6)				
2	Jason	59	78							
3	Lisa	34	67							
4	Ryan	30	93							
5	Richard	35	83							
6	Anna	69	82							
7										

3. Finish by pressing CTRL + SHIFT + ENTER.

E1	L	▼ : □	× v	<i>f</i> _x {=M	AX(C2:C6-E	32:B6)}			
	А	В	С	D	E	F	G	Н	I.
1	Student	Test A	Test B		63				
2	Jason	59	78						
3	Lisa	34	67						
4	Ryan	30	93						
5	Richard	35	83						
6	Anna	69	82						
7									

Note: The formula bar indicates that this is an array formula by enclosing it in curly braces {}. Do not type these yourself. They will disappear when you edit the formula.

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(Regd. By Haryana Govt.) Explanation: The range (array constant) is stored in Excel's memory, not in a range. The array constant looks as follows:

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{19;33;63;48;13}

This array constant is used as an argument for the MAX function, giving a result of 63.

F9 Key

When working with array formulas, you can have a look at these array constants yourself.

1. Select C2:C6-B2:B6 in the formula.

C	COUNTIF \checkmark : \checkmark \checkmark f_{\ast} =MAX(C2:C6-B2:B6)										
	А	в	с	D	E	F	G	н	I.		
1	Student	Test A	Test B		=MAX(C2:						
2	Jason	59	78								
3	Lisa	34	67								
4	Ryan	30	93								
5	Richard	35	83								
6	Anna	69	82								
7											
	-										

2. Press F9.

C	DUNTIF	- : J	× ✓	<i>f</i> _x =M	AX({19;33;	63;48;13})			
	А	В	с	D	E	F	G	Н	I.
1	Student	Test A	Test B		3;48;13})				
2	Jason	59	78						
3	Lisa	34	67						
4	Ryan	30	93						
5	Richard	35	83						
6	Anna	69	82						
7									

That looks good. Elements in a vertical array constant are separated by semicolons. Elements in a horizontal array constant are separated by commas.

Count Errors

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This example shows you how to create an array formula that **counts** the number of **errors** in a range.

1. We use the IF function and the ISERROR function to check for an error.

D5		•	X V	f _∞ =IF(ISERROR(A1),1,"")			
	А	В	С	D	Е	F	G	н	I.
1	#REF!	2	#DIV/0!						
2	4	7	2						
3	5	3	#NAME?						
4									
5				1					
6									

Explanation: the IF function returns 1, if an error is found. If not, it returns an empty string.

2. To count the errors (don't be overwhelmed), we add the COUNT function and replace A1 with A1:C3.

SU	IMIF	• :	× ✓	<i>f</i> _x =c0	DUNT(IF <mark>(</mark> IS	ERROR(A1	C3),1,"" <mark>)</mark>)		
	Α	в	С	D	E	F	G	н	I.
1	#REF!	2	#DIV/0!						
2	4	7	2						
3	5	3	#NAME?						
4									
5				=COUNT(I	F(ISERROR	(A1:C3),1,"	"))		
6									

3. Finish by pressing CTRL + SHIFT + ENTER.



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D5		▼ :	\times \checkmark	<i>f</i> _x {=CC	<i>f</i> _x {=COUNT(IF(ISERROR(A1:C3),1,""))}					
	А	в	С	D	E	F	G	Н	I.	
1	#REF!		2 #DIV/0!							
2	4		7 2	2						
3	5		3 #NAME?							
4										
5				3						
6										

Note: The formula bar indicates that this is an array formula by enclosing it in curly braces {}. Do not type these yourself. They will disappear when you edit the formula.

Explanation: The range (array constant) created by the IF function is stored in **Excel's** memory, not in a range. The array constant looks as follows:

{1,"",1;"","","";"","",1}

This array constant is used as an argument for the COUNT function, giving a result of 3.

4. To count specific errors, use the COUNTIF function. For example, to count the number of cells that contain the #DIV/0! error.

D5	D5 • : $\times \checkmark f_x$ =COUNTIF(A1:C3,"#DIV/0!")									
	А	В	с	D	E	F	G	н	I.	
1	#REF!	2	#DIV/0!							
2	4	7	2							
3	5	3	#NAME?							
4										
5				1						
6										

Count Unique Values

This example shows you how to create an array formula that **counts unique values**.

1. We use the COUNTIF function. For example, to count the number of 5's, use the following function.



 $_{age}124$

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۲	: × ✓ f _x =COUNTIF(A1:A6,5)											
	в	С	D	E	F	G	н	I				
		1										

2. To count the unique values (don't be overwhelmed), we add the SUM function, 1/, and replace 5 with A1:A6.

С	COUNTIF \checkmark : \checkmark f_x =SUM(1/COUNTIF(A1:A6,A1:A6))								
	А	В	С	D	E	F	G	н	I.
1	7								
2	sun								
3	moon		=SUM(1/C	OUNTIF(A1	L:A6,A1:A6))			
4	5								
5	7								
6	7								
7									

3. Finish by pressing CTRL + SHIFT + ENTER.

C3

1

1

2 sun

3

4

5

6

7

A

moon

7

5

7

7

C	3		• : :	× ✓	<i>f</i> _x {=SU	JM(1/COUI	NTIF(A1:A6	i,A1:A6))}		
	А		в	С	D	E	F	G	н	I.
1		7								
2	sun									
3	moon			4						
4		5								
5		7								
6		7								
7										

Note: The formula bar indicates that this is an array formula by enclosing it in curly braces {}. Do not type these yourself. They will disappear when you edit the formula.



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Explanation: The range (array constant) created by the COUNTIF function is stored in **Excel's** memory, not in a range. The array constant looks as follows:

{3;1;1;1;3;3} - (three 7's, one sun, one moon, one 5, three 7's, three 7's)

This reduces to: {1/3;1/1;1/1;1/3;1/3}

This array constant is used as an argument for the SUM function, giving a result of 1/3+1+1+1/3+1/3 = 4.

Count with Or Criteria

Counting with **Or criteria** in **Excel** can be tricky. This article shows several easy to follow examples.

1. We start simple. For example, we want to count the number of cells that contain Google or Facebook (one column).

A1	A10 COUNTIF(A1:A8, "Google")+COUNTIF(A1:A8, "Facebook")									
	А	В	С	D	E	F	G	н	I	
1	Google									
2	Facebook									
3	Twitter									
4	Facebook									
5	Google									
6	Twitter									
7	Google									
8	Twitter									
9										
10	5									
11										

2a. However, if we want to count the number of rows that contain Google <u>or</u> Stanford (two columns), we cannot simply use the COUNTIF function twice (see the picture below). Rows that contain Google and Stanford are counted twice, but they should only be counted once. 4 is the answer we are looking for.





2b. What we need is an array formula. We use the IF function to check if Google or Stanford occurs.

B10

1

4

7

8 9

10 11 A

Google

3 Twitter

5 Google

6 Twitter

Google

Twitter

Harvard

Harvard

Stanford

Harvard

6

B1	B10 =IF((A1="Google")+(B1="Stanford"),1,0)									
	Α	В	С	D	E	F	G	Н	1	
1	Google	Stanford								
2	Facebook	Harvard								
3	Twitter	Stanford								
4	Facebook	Columbia								
5	Google	Harvard								
6	Twitter	Harvard								
7	Google	Stanford								
8	Twitter	Harvard								
9										
10		1								
11										

Explanation: TRUE = 1, FALSE = 0. For row 1, the IF function evaluates to IF(TRUE+TRUE,1,0), IF(2,1,0), 1. So the first row will be counted. For row 2, the IF function evaluates to IF(FALSE+FALSE,1,0), IF(0,1,0), 0. So the second row will not be counted. For row 3, the IF function evaluates to IF(FALSE+TRUE,1,0), IF(1,1,0), 1. So the third row will be counted, etc.

2c. All we need is a SUM function that counts these 1's. To achieve this (don't be overwhelmed), we add the SUM function and replace A1 with A1:A8 and B1 with B1:B8.

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The Hi-Tech Computers Hardware & Software Institute (Regd. By Haryana Govt.) COUNTIF =SUM(IF((A1:A8="Google")+(B1:B8="Stanford"),1,0)) Ŧ в c D G н А Е Google Stanford 2 Facebook Harvard Stanford Twitter Facebook Columbia Google Harvard 6 Twitter Harvard

7	Google	Stanford						
8	Twitter	Harvard						
9								
10		=SUM(IF(()	A1:A8="Go	ogle")+(B1	L:B8="Stan	ford"),1,0))	
11								

2d. Finish by pressing CTRL + SHIFT + ENTER.

B1	B10 T : {=SUM(IF((A1:A8="Google")+(B1:B8="Stanford"),1,0))}									
	1								L	
	Α	В		С	D	E	F	G	Н	- I
1	Google	Stanfor	rd							
2	Facebook	Harvard	d							
3	Twitter	Stanfor	rd							
4	Facebook	Columb	oia							
5	Google	Harvard	b							
6	Twitter	Harvard	d							
7	Google	Stanfor	ď							
8	Twitter	Harvard	d							
9										
10			4							
11										

Note: The formula bar indicates that this is an array formula by enclosing it in curly braces {}. Do not type these yourself. They will disappear when you edit the formula.

Explanation: The range (array constant) created by the IF function is stored in Excel's memory, not in a range. The array constant looks as follows:

 $\{1;0;1;0;1;0;1;0\}$

1

3

4

5

This array constant is used as an argument for the SUM function, giving a result of 4.



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3. We can go one step further. For example, we want to count the number of rows that contain (Google and Stanford) or Columbia.

C1	.0 🔻 :	{=SUM(IF((A1:A8="Go	ogle")*(B	1:B8="Stan	ford")+(B1	:B8="Colur	mbia"),1,0))}
	А	В	С	D	Е	F	G	н	1
1	Google	Stanford							
2	Facebook	Harvard							
3	Twitter	Stanford							
4	Facebook	Columbia							
5	Google	Harvard							
6	Twitter	Harvard							
7	Google	Stanford							
8	Twitter	Harvard							
9									
10			3						
11									

Sum Every nth Row

This example shows you how to create an array formula that sums every nth row in Excel. We will show it for n = 3, but you can do this for any number.

1. The ROW function returns the row number of a cell.

_									
B1		▼ E ⊃	K 🗸	<i>f</i> _x =R0	DW(A1)				
	А	В	с	D	Е	F	G	н	I.
1	70	1							
2	74	2							
3	5	3							
4	4	4							
5	92	5							
6	66	6							
7	88	7							
8	52	8							
9	21	9							
10									

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2. The MOD function gives the remainder of a division. For example, for the first row, MOD(1,3) equals 1. 1 is divided by 3 (0 times) to give a remainder of 1. For the third row, MOD(3,3) equals 0. 3 is divided by 3 (exactly 1 time) to give a remainder of 0. As a result, the formula returns 0 for every 3th row.

B1	B1 ▼ : × ✓ <i>f</i> _x =MOD(ROW(A1),3)								
	Α	В	С	D	Е	F	G	н	1
1	70	1							
2	74	2							
3	5	0							
4	4	1							
5	92	2							
6	66	0							
7	88	1							
8	52	2							
9	21	0							
10									

Note: change the 3 to 4 to sum every 4th row, to 5 to sum every 5th row, etc.

B1	B1 ▼ : × ✓ <i>f</i> _x =MOD(ROW(A1),3)=0									
	А	В	с	D	Е	F	G	н	1	
1	70	FALSE								
2	74	FALSE								
3	5	TRUE								
4	4	FALSE								
5	92	FALSE								
6	66	TRUE								
7	88	FALSE								
8	52	FALSE								
9	21	TRUE								
10										

3. Slightly change the formula as shown below.

4. To get the sum of the product of these two ranges (FALSE=0, TRUE=1), use the SUM function and finish by pressing CTRL + SHIFT + ENTER.



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A1	A11 • : × ✓ f _* {=SUM(A1:A9*(MOD(ROW(A1:A9),3)=0))}								
	А	в	с	D	E	F	G	н	1
1	70								
2	74								
3	5								
4	4								
5	92								
6	66								
7	88								
8	52								
9	21								
10									
11	92								
12									

Note: The formula bar indicates that this is an array formula by enclosing it in curly braces {}. Do not type these yourself. They will disappear when you edit the formula.

Explanation: The product of these two ranges (array constant) is stored in **Excel's** memory, not in a range. The array constant looks as follows.

{0;0;5;0;0;66;0;0;21}

This array constant is used as an argument for the SUM function, giving a result of 92.

Sum Largest Numbers

This example shows you how to create an array formula that **sums** the **largest numbers** in a range.

1. We use the LARGE function. For example, to find the second to largest number, use the following function.



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C1	C1 • : $\times \checkmark f_x$ =LARGE(A1:A11,2)								
	А	В	С	D	E	F	G	н	I.
1	5		10						
2	1								
3	6								
4	4								
5	2								
6	3								
7	10								
8	8								
9	22								
10	3								
11	5								
12									

2. To sum the 4 largest numbers (don't be overwhelmed), add the SUM function and replace 2 with {1,2,3,4}.

SU	MIF	▼ :	× ✓	<i>f</i> _∞ =SU	M(LARGE(A1:A11,{ <mark>1</mark> ,	2,3,4}))		
4		-	-		-	_	~		
	A	в	C	D	E	F	G	н	
1	5		=SUM(LAR	GE(A1:A11	,{1,2,3,4}))				
2	1								
3	6								
4	4								
5	2								
6	3								
7	10								
8	8								
9	22								
10	3								
11	5								
12									

3. Finish by pressing CTRL + SHIFT + ENTER.



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				<i>a</i>			(Regu	. By Fiarya	na Govt./
C1		*	XV	<i>f_x</i> {=SU	JM(LARGE(A1:A11,{1,	2,3,4}))}		
	А	В	С	D	E	F	G	н	1
1	5		46						
2	1								
3	6								
4	4								
5	2								
6	3								
7	10								
8	8								
9	22								
10	3								
11	5								
12									

Note: The formula bar indicates that this is an array formula by enclosing it in curly braces {}. Do not type these yourself. They will disappear when you edit the formula.

Explanation: The range (array constant) created by the LARGE function is stored in **Excel's** memory, not in a range. The array constant looks as follows.

{22,10,8,6}

This array constant is used as an argument for the SUM function, giving a result of 46.

Sum Range with Errors

This example shows you how to create an array formula that **sums** a **range with errors**. You can also use the <u>AGGREGATE</u> function to sum a range with errors.

1. We use the IFERROR function to check for an error.



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AS	A9 \checkmark : \times \checkmark f_{x} =IFERROR(A1,0)												
	А	в	с	D	E	F	G	н	1				
1	#REF!												
2	5												
3	4												
4	#DIV/0!												
5	#NAME?												
6	1												
7	3												
8													
9	0												
10													

Explanation: the IFERROR function returns 0, if an error is found. If not, it returns the value of the cell.

2. To sum the range with errors (don't be overwhelmed), we add the SUM function and replace A1 with A1:A7.

SU	SUMIF 🔻 : 🗙 🖌 fx =SUM(IFERROR(A1:A7,0))												
	А	В	с	D	E	F	G	н	1				
1	#REF!												
2	5												
3	4												
4	#DIV/0!												
5	#NAME?												
6	1												
7	3												
8													
9	=SUM(IFEF	ROR(A1:A	7,0))										
10													

3. Finish by pressing CTRL + SHIFT + ENTER.



			ĩ	he Hi- Hard	Tech ware & S (Regd.	Comp Softwore By Harya	uters Institute na Govt.)	
(~	<i>f</i> _x {=SU	M(IFERRO	R(A1:A7,0))}			
	с	D	E	F	G	н	I.	

Note: The formula bar indicates that this is an array formula by enclosing it in curly braces {}. Do not type these yourself. They will disappear when you edit the formula.

Explanation: The range (array constant) created by the IFERROR function is stored in **Excel's** memory, not in a range. The array constant looks as follows:

{0;5;4;0;0;1;3}

A9

1

2

3

4

5

6

7

8 9

10

Δ

#REF!

#DIV/0!

#NAME?

5

4

1

3

13

R

This array constant is used as an argument for the SUM function, giving a result of 13.

Sum with Or Criteria

Summing with **Or criteria** in **Excel** can be tricky. This article shows several easy to follow examples.

1. We start simple. For example, we want to sum the cells that meet the following criteria: Google <u>or</u> Facebook (one criteria range).



					1	he Hi Hard	-Tech ware & S (Regd.	Comp Softwore By Harya	Institute na Govt.)					
B	B10 SUMIF(A1:A8, "Google", B1:B8)+SUMIF(A1:A8, "Facebook", B1:B8)													
	А	В	с	D	E	F	G	н	I.					
1	Google	3												
2	Facebook	5												
3	Twitter	2												
4	Facebook	5												
5	Google	4												
6	Twitter	3												
7	Google	1												
8	Twitter	1												
9														
10		18												
11			T											

2a. However, if we want to sum the cells that meet the following criteria: Google <u>or</u> Stanford (two criteria ranges), we cannot simply use the SUMIF function twice (see the picture below). Cells that meet the criteria Google and Stanford are added twice, but they should only be added once. 10 is the answer we are looking for.

C1	LO	▼ : =	SUMIF(A1:	A8,"Googl	e",C1:C8)+	SUMIF(B1:	B8,"Stanfo	rd",C1:C8)	
			-		_	_			
	A	B	C	D	E	F	G	н	
1	Google	Stanford	3	6					
2	Facebook	Harvard	5						
3	Twitter	Stanford	2	2					
4	Facebook	Columbia	5						
5	Google	Harvard	4	4					
6	Twitter	Harvard	3						
7	Google	Stanford	1	2					
8	Twitter	Harvard	1	1					
9				×					
10			14						
11									

2b. We need an array formula. We use the IF function to check if Google or Stanford occurs.



					T	he Hi Hard	-Tech dware & S (Regd.	Comp Softwore By Harya	Institute na Govt.)
C1	.0	▼ : =	IF((A1="Go	ogle")+(B	1="Stanfor	d"),1,0)*C	1		
	А	В	С	D	E	F	G	н	I.
1	Google	Stanford	3						
2	Facebook	Harvard	5						
3	Twitter	Stanford	2						
4	Facebook	Columbia	5						
5	Google	Harvard	4						
6	Twitter	Harvard	3						
7	Google	Stanford	1						
8	Twitter	Harvard	1						
Э									

Explanation: TRUE = 1, FALSE = 0. For row 1, the IF function evaluates to IF(TRUE+TRUE,1,0)*3, IF(2,1,0)*3, 3. So the value 3 will be added. For row 2, the IF function evaluates to IF(FALSE+FALSE,1,0)*5, IF(0,1,0)*5, 0. So the value 5 will not be added. For row 3, the IF function evaluates to IF(FALSE+TRUE,1,0)*2, IF(1,1,0)*2, 2. So the value 2 will be added, etc.

3

2c. All we need is a SUM function that sums these values. To achieve this (don't be overwhelmed), we add the SUM function and replace A1 with A1:A8, B1 with B1:B8 and C1 with C1:C8.

_									
CC	DUNTIF	* : =	SUM(IF((A	1:A8="Goo	gle")+(B1:	B8="Stanfo	ord"),1,0)*	C1:C8)	
	А	В	С	D	E	F	G	н	I.
1	Google	Stanford	3						
2	Facebook	Harvard	5						
3	Twitter	Stanford	2						
4	Facebook	Columbia	5						
5	Google	Harvard	4						
6	Twitter	Harvard	3						
7	Google	Stanford	1						
8	Twitter	Harvard	1						
9									
10			=SUM(IF((A1:A8="Go	ogle")+(B	1:B8="Stan	ford"),1,0)	*C1:C8)	
11									

2d. Finish by pressing CTRL + SHIFT + ENTER.

10

11





Note: The formula bar indicates that this is an array formula by enclosing it in curly braces {}. Do not type these yourself. They will disappear when you edit the formula.

Explanation: The range (array constant) created by the IF function is stored in **Excel's** memory, not in a range. The array constant looks as follows:

 $\{1;0;1;0;1;0;1;0\}$

multiplied by C1:C8 this yields:

{3;0;2;0;4;0;1;0}

This latter array constant is used as an argument for the SUM function, giving a result of 10.

3. We can go one step further. For example, we want to sum the cells that meet the following criteria: (Google and Stanford) or Columbia.





1	Google	Stanford	3			
2	Facebook	Harvard	5			
3	Twitter	Stanford	2			
4	Facebook	Columbia	5			
5	Google	Harvard	4			
6	Twitter	Harvard	3			
7	Google	Stanford	1			
8	Twitter	Harvard	1			
9						
10			9			
11						

Two-column Lookup

В

C10

This example teaches you how to perform a **two-column lookup** in **Excel**. See the example below. We want to look up the salary of James Clark, not James Smith, not James Anderson.

1. To join strings, use the & operator.

_								
F4	L 🔻		$\sqrt{f_x}$	=F2&	F3			
	Α	В	С	D	E	F	G	Н
1	First Name	Last Name	Salary					
2	James	Smith	\$64,901		First Name	James		
3	James	Anderson	\$70,855		Last Name	Clark		
4	James	Clark	\$188,657		Salary	JamesClark		
5	John	Lewis	\$97,566					
6	John	Walker	\$58,339					
7	Mark	Reed	\$125,180					
8	Richard	Lopez	\$91,632					
9								

2. The MATCH function returns the position of a value in a given range. Insert the MATCH function shown below.

3. Finish by pressing CTRL + SHIFT + ENTER.

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F4		1	\times	√ f _×	{=MAT	{=MATCH(F2&F3,A2:A8&B2:B8,0)}						
	А	В		с	D	E	F	G	н			
1	First Name	Last N	ame	Salary								
2	James	Smith		\$64,901		First Name	James					
3	James	Ander	rson	\$70,855		Last Name	Clark					
4	James	Clark		\$188,657		Salary	3					
5	John	Lewis		\$97,566								
6	John	Walke	er	\$58,339								
7	Mark	Reed		\$125,180								
8	Richard	Lopez		\$91,632								
9												

Note: The formula bar indicates that this is an array formula by enclosing it in curly braces {}. Do not type these yourself. They will disappear when you edit the formula.

Explanation: The range (array constant) A2:A8&B2:B8 is stored in Excel's memory, not in a range. The array constant looks as follows:

{"JamesSmith";"JamesAnderson";"JamesClark";"JohnLewis";"JohnWalker";"MarkReed";"R ichardLopez"}

This array constant is used as an argument for the MATCH function, giving a result of 3 (JamesClark found at position 3).

4. Use this result and the INDEX function to return the 3rd value in the range C2:C8.

F4	ļ –	\pm \times	$\checkmark f_x$	{=INDE	EX(C2:C8,MA	TCH(F2&F3,A2:A8	&B2:B8,0))}
	А	В	с	D	E	F	G	н
1	First Name	Last Name	Salary					
2	James	Smith	\$64,901		First Name	James		
3	James	Anderson	\$70,855		Last Name	Clark		
4	James	Clark	\$188,657		Salary	\$188,657		
5	John	Lewis	\$97,566					
6	John	Walker	\$58,339					
7	Mark	Reed	\$125,180					
8	Richard	Lopez	\$91,632					
9								

Most Frequently Occurring Word

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This example teaches you how to find the most frequently occurring word in Excel.

You can use the MODE function to find the most frequently occurring number. However, the MODE function only works with numbers.

C3	C3 \checkmark : \times \checkmark f_{x} =MODE(A1:A7)												
	А	в	С	D	E	F	G	н	I.				
1	12												
2	16												
3	16		16										
4	16												
5	11												
6	11												
7	16												
8													

You can use the COUNTIF function to count the number of occurrences of each word. However, we are looking for a single formula that returns the most frequently occurring word (circle in our example).

D2		• : × ✓		<i>f</i> _x =cc	DUNTIF(\$A	\$1:\$A\$7,C2	2)		
	А	В	С	D	Е	F	G	н	1
1	triangle								
2	circle		triangle	1					
3	circle		circle	4					
4	circle		square	2					
5	square								
6	square								
7	circle								
8									

To find the most frequently occurring word, execute the following steps.

1. The MATCH function returns the position of a value in a given range.



				1
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C3 🔻 :			× ✓ f _* =MATCH(A7,A1:A7,0)						
	А	В	С	D	E	F	G	н	1
1	triangle								
2	circle								
3	circle		2						
4	circle								
5	square								
6	square								
7	circle								
8									

Explanation: circle (A7) found at position 2 in the range A1:A7. Set the third argument to 0 to return an exact match.

2. To find the position of the most frequently occurring word (don't be overwhelmed), we add the MODE function and replace A7 with A1:A7.

3. Finish by pressing CTRL + SHIFT + ENTER.

C3		• : :	× ✓	<i>f</i> _x {=M	ODE(MATC				
	А	В	С	D	Е	F	G	н	1
1	triangle								
2	circle								
3	circle		2						
4	circle								
5	square								
6	square								
7	circle								
8									

Note: The formula bar indicates that this is an array formula by enclosing it in curly braces {}. Do not type these yourself. They will disappear when you edit the formula.

Explanation: The range (array constant) created by the MATCH function is stored in Excel's memory, not in a range. The array constant looks as follows:

{1;2;2;2;5;5;2} - (triangle found at position 1, circle found at position 2, circle found at position 2, etc.)

This array constant is used as an argument for the MODE function, giving a result of 2 (the position of the most frequently occurring word).



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4. Use this result and the INDEX function to return the 2nd word in the range A1:A7, the most frequently occurring word.

C3		• : :	× ✓	<i>f</i> _x {=INDEX(A1:A7,MODE(MATCH(A1:A7,A1:A7,0)))}						
	А	В	С	D	E	F	G	н	1	
1	triangle									
2	circle									
3	circle		circle							
4	circle									
5	square									
6	square									
7	circle									
8										

System of Linear Equations

This example shows you how to **solve a system of linear equations** in **Excel**. For example, we have the following system of linear equations:

5x + 1y + 8z = 464x - 2y = 126x + 7y + 4z = 50

In matrix notation, this can be written as AX = B

with $A = \begin{bmatrix} 5 & 1 & 8 \\ 4 & -2 & 0 \\ 6 & 7 & 4 \end{bmatrix}$, $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$, $B = \begin{bmatrix} 46 \\ 12 \\ 50 \end{bmatrix}$

If A^{-1} (the inverse of A) exists, we can multiply both sides by A^{-1} to obtain $X = A^{-1}B$. To solve this system of linear equations in Excel, execute the following steps.

1. Use the MINVERSE function to return the inverse matrix of A. First, select the range B6:D8. Next, insert the MINVERSE function shown below. Finish by pressing CTRL + SHIFT + ENTER.

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• :	\times	f_{x}	{=MINV	ERSE(B2:D	4)}						
В	С	D	E	F	G	Н	I	J			
5	1	8			46						
4	-2	0		В	12						
6	7	4			50						

Note: the formula bar indicates that the cells contain an array formula. Therefore, you cannot delete a single result. To delete the results, select the range B6:D8 and press Delete.

0.0606

-0.0303 0.197

-0.0606 -0.1061 0.1212 0.1515 -0.1098 -0.053

B6

1 2 3

4 5

6

7

8 9 А

A⁻¹

2. Use the MMULT function to return the product of matrix A^{-1} and B. First, select the range G6:G8. Next, insert the MMULT function shown below. Finish by pressing CTRL + SHIFT + ENTER.

G6 ▼ : × ✓ <i>f</i> _* {=MMULT(B6:D8,G2:G4)}							i2:G4)}			
	А	в	С	D	Е	F	G	н	I.	J
1										
2		5	1	8			46			
3	Α	4	-2	0		В	12			
4		6	7	4			50			
5										
6		-0.0303	0.197	0.0606			4			
7	A ⁻¹	-0.0606	-0.1061	0.1212		Х	2			
8		0.1515	-0.1098	-0.053			3			
9										

3. Put it all together. First, select the range G6:G8. Next, insert the formula shown below. Finish by pressing CTRL + SHIFT + ENTER.

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G6		•	×	f _x	{=MMUL	T(MINVER	RSE(B2:D4	4),G2:G4)}		
	А	в	С	D	Е	F	G	н	I.	J
1										
2		5	1	8			46			
3	Α	4	-2	0		В	12			
4		6	7	4			50			
5										
6							4			
7						Х	2			
8							3			
9										

Data Form

The **data form** in **Excel** allows you to add, edit and delete records (rows) and display only those records that meet certain criteria. Especially when you have wide rows and you want to avoid repeated scrolling to the right and left, the data form can be useful.

1. Open the downloadable Excel file.

	А	В	С	D	
1	Last Name	Sales	Product Type	Company	Contact I
2	Smith	\$1,675.00	EEE-312	Wok N Roll	Adams
3	Johnson	\$1,480.00	DC-1	Wok N Roll	Rogers
4	Williams	\$1,064.00	EE-2	Peace A Pizza	Evans
5	Jones	\$1,390.00	DF-3	Kung Food	Webb
6	Brown	\$4,865.00	EEE-45	Peace A Pizza	Fields
7	Williams	\$1,243.00	FD-2	Kung Food	Mccoy
8	Johnson	\$9,339.00	DC-1	Kung Food	Hansen
9	Smith	\$1,891.00	EEE-312	Wok N Roll	Hamiltor
10	Jones	\$9,213.00	FG-5	Wok N Roll	Woods
11	Jones	\$7,433.00	DF-7	Kung Food	Cunning
12	Brown	\$3,255.00	FD-2	Pancakes on the Rocks	Myers
13	Williams	\$1,486.00	A-34	Wok N Roll	Ford
14	Williams	\$1,930.00	A-34	Pancakes on the Rocks	Edwards
15	Smith	\$9,698.00	F-3334	Peace A Pizza	Murphy
16					

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- 2. Add the Form command to the Quick Access Toolbar.
- 3. Click the Form command.
- 4. Use the Find Prev and Find Next buttons to easily switch from one record (row) to another.

L <u>a</u> st Name: Johnson Sales: 1480		^	2 of 1	4	
<u>S</u> ales: 1480					
			Ne <u>w</u>	<u>L</u>	
Product Type: DC-1			<u>D</u> elet	e	
Company: Wok N Roll			Resto	re	
Contact Person: Rogers			Find P	rav	
Phon <u>e</u> : 030 569 378					
Co <u>u</u> ntry: United States of	f America		E Find N	ext 🖓	
C <u>i</u> ty: New York			<u>C</u> riter	ia	
Discount: No			C <u>l</u> os	e	
Quarter: 4					
Month: October					
Status: Production		~			

Note: use the New or Delete button to add or delete records. Once you start editing a record, you can use the Restore button to undo any changes you make.

- 5. To display only those records that meet certain criteria, click the Criteria button.
- 6. Enter the criteria and click the Form button.



			1	he I	Hi-Tech Computers ardware & Software Institute (Regd. By Haryana Govt.
Sales			?	×	
L <u>a</u> st Name:		^	Criter	ria	
<u>S</u> ales:			Nev	v	
Pr <u>o</u> duct Type:			<u>C</u> lea	ir	
Co <u>m</u> pany:			<u>R</u> esto	re	
Con <u>t</u> act Person:			Find P	lrav	
Phon <u>e</u> :			rinu <u>r</u>	iev	
Co <u>u</u> ntry:	United Kingdom		Find <u>N</u>	<u>l</u> ext	
C <u>i</u> ty:			<u>F</u> orr		
Discount:			C <u>l</u> os	e	
<u>Q</u> uarter:	4				
Month:					
Status:		~			

7. Now, when you use the Find Prev and Find Next buttons, you will only see those records that meet these criteria. In our example, only record 13.

Sales			? ×	
L <u>a</u> st Name:	Williams	^	13 of 14	
<u>S</u> ales:	1930		Ne <u>w</u>	
Product Type:	A-34		<u>D</u> elete	
Co <u>m</u> pany:	Pancakes on the Rocks		Restore	
Con <u>t</u> act Person:	Edwards		Final Press	
Phon <u>e</u> :	050 958 917		Find Prev	
Co <u>u</u> ntry:	United Kingdom		Find Next	
C <u>i</u> ty:	London		<u>C</u> riteria	
Discount:	Yes		Close	
Quarter:	4	10		
Month:	December			
Status:	Transport			

Note: to edit the criteria, click the Criteria button again. To close the data form, click the Close button.

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