

Advanced Excel

e-book

*advanced formulas / array formulas / advanced cell naming /
pivot tables / form controls and much more...*



Introduction

The real power of Excel lies in integrating isolated concepts. For instance creating a dynamic chart by integrating formulas with named ranges.. that's super fun!

This book is divided into 9 parts that talk about various advanced concepts and explain how to integrate them with one another

I have tried to write this book like a dialogue to make it fun filled and humorous while the technical alchemy is at play. The topics are placed in logical order and often draw learnings from each other, alongside you must also refer to the spreadsheets that come along

Happy 'Excel'-ling :-D

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1. Advanced Excel Formulas – Lookup Functions

Index

The INDEX function is the big daddy of the VLOOKUP function, How? Because of its powerful utility and faster processing. Let's go check out this beast and mature our understanding step by step

Syntax

INDEX(array, row_num, [column_num])

Array is the range of cells where the lookup is to be done

Row_num is the row number that you want to look up

Column_num is the column number that you want to look up

The Index function returns the intersection of the row and column number

Case

Lets say we want to find the record Ashley for the Month of Feb, which you can easily do it with a VLOOKUP formula but here is how the INDEX would do it

	Jan	Feb	Mar	Apr	May
Roxy	105	131	186	101	115
Ron	113	112	200	176	144
Ashley	159	156	182	136	112
James	197	131	104	152	181
Peter	146	137	178	114	151
Manpreet	167	164	102	137	190
Jaspreet	165	174	149	153	176
Mohan	128	149	172	191	102
Preety	149	146	162	176	145

James's record is in row 4 and col 3

Row Number

Column Number

=INDEX(B3:G11,4,3)

Now apart from simply being an alternative to VLOOKUP and returning the row and the column number

Tricky Question? What if you wanted to do a total for James sales and not just return the sales of Feb ? Here the VLOOKUP would fail!

=INDEX(B3:G11,4,0)

Column number as 0 returns all the values in the Rows

Now when you press enter the formula will give you 'James' as an output. The reason is that no excel formula is capable of giving multiple values as an output. But writing 0 in the column number fetches all the values in the row. Now all you need to do is wrap the INDEX around the SUM function

=SUM(INDEX(B3:G11,4,0))

This formula will give you the total sales for James

Match

In continuation to what we have learnt, let's fuel our INDEX with MATCH formula. Let's quickly get rid of some theory of MATCH function and jump on 2 interesting examples

Syntax

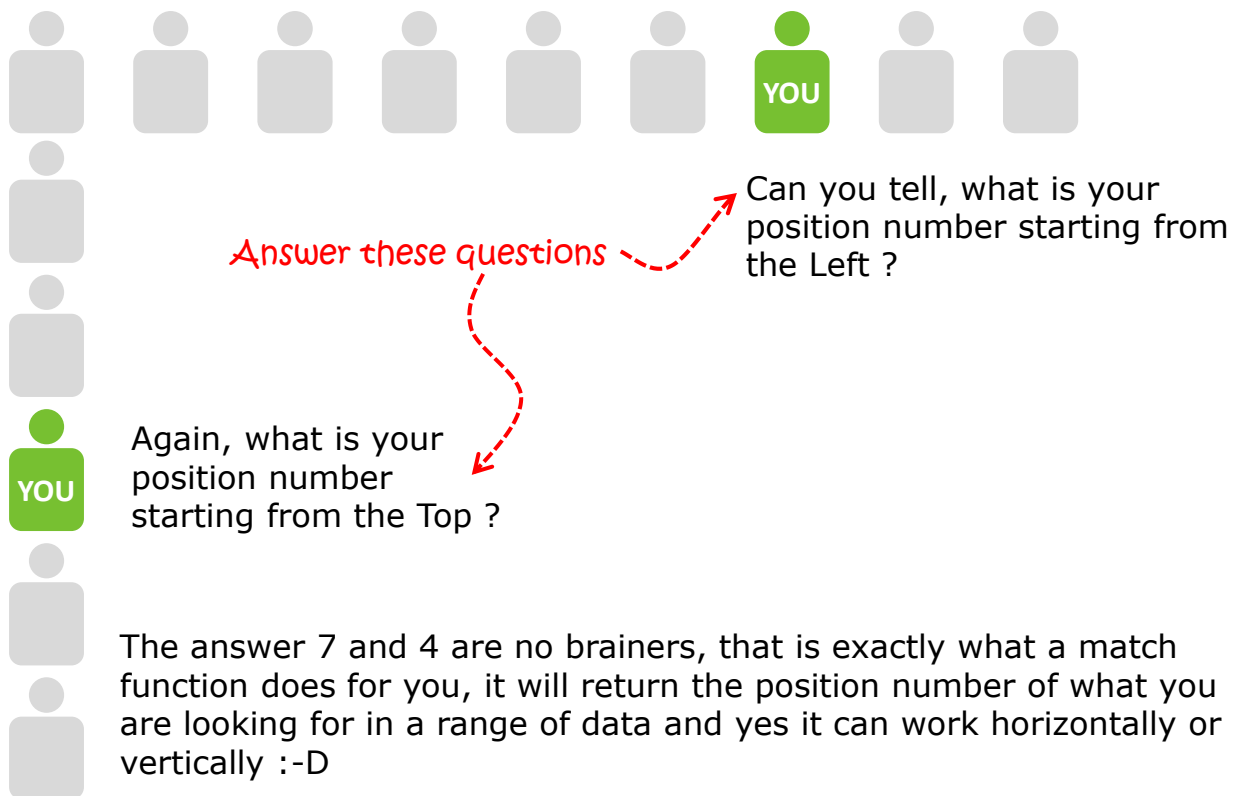
MATCH(lookup_value, lookup_array, [match_type])

Lookup_value – What are you looking for ?

Lookup_array – Where are you looking (data range) ?

Match_Type – It has 3 options (Exact match or Match less than the lookup value or match greater than the lookup value)

We will stick to the exact match (denoted by 0) option for discussion as of now



Now lets make a big deal out of this no big deal MATCH function .. Ready?? Ok lets go ahead and solve 2 problems

- Using Index Match together
- Lookup to the left ?

Index and Match together



Put both of them together and you have Superman ready !

Now the same example and we are trying to find the position of James

Roxy
Ron
Ashley
James
Peter
Manpreet
Jaspreet
Mohan
Preety

1. In this snapshot we are trying to find James. (lookup Value)
2. Trying to find James in the Range (lookup_array)
3. We want match to find the exact match

This will return the position of James i.e. 4

James `=MATCH(B17,B7:B15,0)`

	Jan	Feb	Mar	Apr	May
Roxy	105	131	186	101	115
Ron	113	112	200	176	144
Ashley	159	156	182	136	112
James	197	131	104	152	181
Peter	146	137	178	114	151
Manpreet	167	164	102	137	190
Jaspreet	165	174	149	153	176
Mohan	128	149	172	191	102
Preety	149	146	162	176	145

James `=INDEX(B7:G15,MATCH(B17,B7:B15,0),3)`

The Match formula feeds in the row number for James and the column number is 3. The result is 131

Self Work

	Jan	Feb	Mar	Apr	May
Roxy	105	131	186	101	115
Ron	113	112	200	176	144
Ashley	159	156	182	136	112
James	197	131	104	152	181
Peter	146	137	178	114	151
Manpreet	167	164	102	137	190
Jaspreet	165	174	149	153	176
Mohan	128	149	172	191	102
Preety	149	146	162	176	145

James
Apr

Can you write a INDEX MACTH formula to look for James and Apr

Lookup to the Left



Lets put our superman to work for looking up to the left of the data range

Salary	Designation	EMP ID
22,61,000	Sr Operator	EMPID0011
34,71,000	Manager	EMPID0012
38,07,000	Sr Manager	EMPID0013
20,15,000	Manager	EMPID0014
20,65,000	Assistant Manag	EMPID0015
22,96,000	Manager	EMPID0016
11,22,000	Analyst	EMPID0017
11,30,000	Analyst	EMPID0018
15,04,000	Sr Associate	EMPID0019
51,91,000	Business Head	EMPID0020

For some reason our unique employee id lies on the extreme right and we want to look for the designation of these 2 Employee IDs ?

- EMPID0011
- EMPID0012

Lets first write a MATCH formula to find the position number of those 2 employee IDs. Note that I have frozen the lookup range

EMP ID
EMPID0011
EMPID0012
EMPID0013
EMPID0014
EMPID0015
EMPID0016
EMPID0017
EMPID0018
EMPID0019
EMPID0020

EMPID0011

EMPID0014

=MATCH(F24,\$D\$24:\$D\$33,0)

Now add the INDEX function to make our superman work

Designation	EMP ID
Sr Operator	EMPID0011
Manager	EMPID0012
Sr Manager	EMPID0013
Manager	EMPID0014
Assistant Manag	EMPID0015
Manager	EMPID0016
Analyst	EMPID0017
Analyst	EMPID0018
Sr Associate	EMPID0019
Business Head	EMPID0020

EMP ID

Designation

EMPID0011

=INDEX(\$C\$24:\$C\$33,MATCH(F24,D\$24:D\$33,0),1)

EMPID0014

Manager

Note that the INDEX is only applied on the Designation

MATCH gives us the correct row number of the Emp ID

Index – Advanced *



Now think of INDEX like your intelligent secretary who is better than VLOOKUP. What I mean to say is that this secretary of yours (INDEX) has the capability of looking up at different data sets. So if INDEX won't find the lookup value in one data range it will go and find it in another range

Let's discover her (INDEX's) capabilities, I mean work capabilities ; -D

Syntax

INDEX(reference, row_num, [column_num], [area_num])

Two things change here (reference and area number, so I'll cover those 2 and the rest remains the same)

Reference – is the range of the multiple data sets

Area_num – is the number of the range where you want to search

Table 1

Names	Salary
Roxy	22,61,000
Ron	34,71,000
Ashley	38,07,000
James	20,15,000
Peter	20,65,000
Manpreet	22,96,000
Jaspreet	11,22,000
Mohan	11,30,000
Preety	15,04,000

Table 2

Names	Salary
Radha	12,80,000
Rondha	44,54,000
Parry	22,60,000
Greeko	37,40,000
Cyrus	24,29,000
Montu	18,63,000
Somya	42,41,000
Tina	19,61,000
Tanya	45,31,000

Ok, so now 2 tables containing names, we want to either look up in table 1 or table 2

Table 1

Names	Salary
Roxy	22,61,000
Ron	34,71,000
Ashley	38,07,000
James	20,15,000
Peter	20,65,000
Manpreet	22,96,000
Jaspreet	11,22,000
Mohan	11,30,000
Preety	15,04,000

Table 2

Names	Salary
Radha	12,80,000
Rondha	44,54,000
Parry	22,60,000
Greeko	37,40,000
Cyrus	24,29,000
Montu	18,63,000
Somya	42,41,000
Tina	19,61,000
Tanya	45,31,000

1. Reference – These are data ranges. Note that they are places in separate brackets and are separated by comma

=INDEX([B7:C16,E7:F16]

1

* The index function has two syntaxes, for simplicity reasons we are denoting it as Index Advanced. You see both the syntaxes when you type =INDEX(

Index - Advanced

2. We enter our usual row and the column input.

Table 1

Names	Salary
Roxy	22,61,000
Ron	34,71,000
Ashley	38,07,000
James	20,15,000
Peter	20,65,000
Manpreet	22,96,000
Jaspreet	11,22,000
Mohan	11,30,000
Preety	15,04,000

Table 2

Names	Salary
Radha	12,80,000
Rondha	44,54,000
Parry	22,60,000
Greeko	37,40,000
Cyrus	24,29,000
Montu	18,63,000
Somya	42,41,000
Tina	19,61,000
Tanya	45,31,000

We have manually entered any row and the Column numbers as 4,2

This is where we will write our area number and reference it to our Index formula

=INDEX((B7:C16,E7:F16),4,2)

2

Area Num

Table 1

Names	Salary
Roxy	2261000
Ron	3471000
Ashley	3807000
James	2015000
Peter	2065000
Manpreet	2296000
Jaspreet	1122000
Mohan	1130000
Preety	1504000

Table 2

Names	Salary
Radha	1280000
Rondha	4454000
Parry	2260000
Greeko	3740000
Cyrus	2429000
Montu	1863000
Somya	4241000
Tina	1961000
Tanya	4531000

3. The area number is the data range where you want to lookup. Not necessarily all data ranges that you specify should have same dimensions i.e. same number of rows and columns

You can specify the area number in C20 and INDEX will pull up row 4th and 2nd column from that area number

=INDEX((B7:C16,E7:F16),4,2,C20)

3

Area Num

Choose

I think life becomes great when we have the options to choose from. To make your formulas more versatile excel gives you a CHOOSE function. Lets take a look

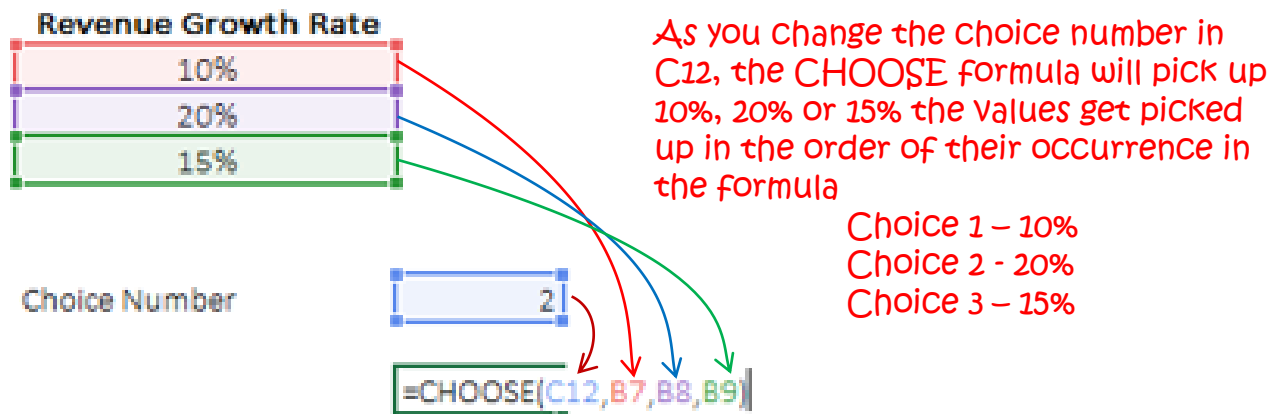
Syntax

CHOOSE(index_num, value1, [value2], ...)

Index_num – This is your choice number

Value 1 – This is the value of the first choice

Value 2 – This is the value of the second choice and so on..



Self Work

Let's play with the capabilities that we have acquired till now. Being INDEX MATCH and CHOOSE in your arsenal your secretary has now become a super woman.

Same case but a different question, you have to find the salary of 'Greeko' but you don't know in which table has his record and you neither know his row number

Table 1		Table 2	
Names	Salary	Names	Salary
Roxy	22,61,000	Radha	12,80,000
Ron	34,71,000	Rondha	44,54,000
Ashley	38,07,000	Parry	22,60,000
James	20,15,000	Greeko	37,40,000
Peter	20,65,000	Cyrus	24,29,000
Manpreet	22,96,000	Montu	18,63,000
Jaspreet	11,22,000	Somya	42,41,000
Mohan	11,30,000	Tina	19,61,000
Preety	15,04,000	Tanya	45,31,000

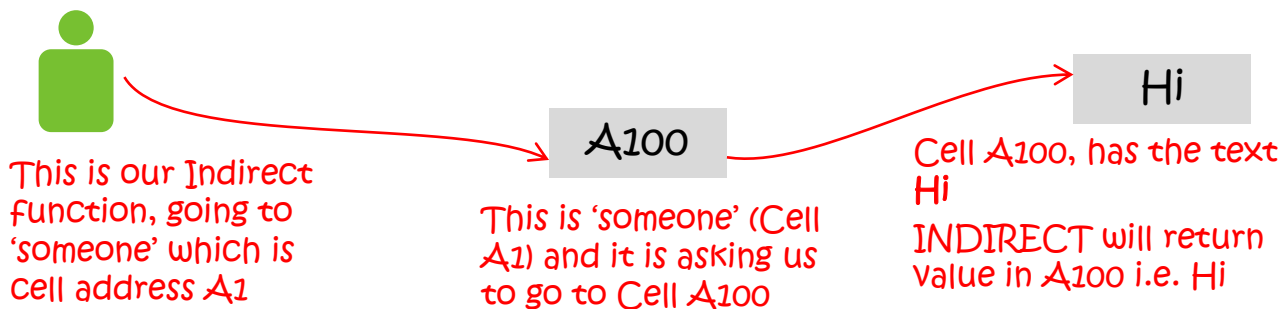
Hints

- Index will allow you to select different areas (data ranges)
- Match will let you know the row number
- Choose give you a choice to select the table 1 or table 2

You are not allowed to hard code formulas in the cell

Indirect

Let's say we are making a journey, but we don't know where are we going? .. I know it kind of sounds bizarre but I said that WE don't know about our journey someone else knows, so we have to go to that someone and find out where we are going. I know I know it sounds like a big BS but hang in there



I know INDIRECT gives you a kind of feeling that where the hell am I going to use it ? But I will settle your woes in a while, as of now lets cover the syntax in a bit more structured way

Syntax

INDIRECT(ref_text, [a1])

Ref_Text – This is your cell address which leads you to another cell address
A1 – This is the way how Indirect will read the cell address. Let's just stick to choosing TRUE as an option for now. This is an optional input & gives the TRUE value by default

Take a look



This is cell C6 and is asking the INDIRECT to go and fetch the value from cell N15. So the INDIRECT will return the value in N15

Offset

Pure Monster! It has absolute killer utility but should be used with caution because of its volatile nature, we'll discuss a bit on volatility later but as of now lets ride on OFFSET for a while

A 10x10 grid with a red 'START' label at (5,5). Two red-bordered boxes are present: one at (3,8) containing '100 800' and '300 200', and another at (8,2) containing '100 200' and '300 400'.

OFFSET function can start anywhere in your sheet and capture any set of data and give you options to sum, average any range and a whole bunch of other stuff

Syntax

OFFSET(reference, rows, cols, [height], [width])

Reference – This is your starting point in the sheet. Typically a cell address

Rows – No of rows you want to travel downwards/upwards from the start point

Cols – No of columns you want offset to travel left/right from the start point

We'll discuss height and width (which are optional) in a while as of now let's take a stock of what we got here!

Start from D14 then move up five rows (-5) and then move right one column (1) and **OFFSET** returns the value 200

Now lets say that you want to select the entire range of cells here and add them up

=OFFSET(D14,-5,1)

Offset Advanced

Just for simplicity reasons lets call this as Offset Advanced. Let's look at our case where I want to add the range of data (100,800,300,200)

	-2	-1	0	1	2	3
-7						
-6			100	800		
-5			300	200		
-4						
-3						
-2						
-1						
0			START			
1						
2						

Just to reiterate Start at cell D14, then move five rows up (-5) and then don't move any column (0), from here you want to select 4 cells

Now we specify

- Height as -2 (our range of cells is 2 rows upwards in height)
- Width as 2 (range of cells is 2 columns in width)
- Don't press enter!!

=OFFSET(D14,-5,0,-2,2)

↓
Width
↓
Height

OFFSET holds the array of cells in its mind and is not capable of displaying them in one single cell, secondly we have not specified anywhere that we want to take a sum of those value... OFFSET is so dumb!! I know .. but we'll have to wrap OFFSET around a SUM function

=SUM(OFFSET(D14,-5,0,-2,2))

Now the possibilities are limitless of how can you use this. I'll discuss some of its advanced features a bit later.

Please note that

- Positive Row Numbers or Height – Travel Down that many rows
- Negative Row Numbers or Height – Travel Up that many rows
- Positive Column Numbers or Width – Travel Right that many columns
- Negative Column Numbers or Width – Travel Left that many columns

Columns and Rows


They say simple things always make a killing utility, the saying goes true for COLUMNS and ROWS functions as well

Syntax

=COLUMNS(array) =ROWS(array)


Array – select a range of cells and it will specify how many columns or rows are there in that range

B	C	D	E	F	G	H
---	---	---	---	---	---	---


`=COLUMNS(B7:H7)`

This will return 7, since there are seven columns in the range selected. Damn simple, isn't it?

13
14
15
16
17
18
19
20


`=ROWS(C13:C20)`

Rows formula will return the number of rows in the range selected i.e. 8

Lets make a killing by combining the VLOOKUP and the COLUMNS function

1	2	3
TICKET NO	CLIENT	PRODUCT CODE
TD12311558	The Dcm	0917B003AA
TD12311559	India India	0917B003AA
TD12311560	Gold Exl	0917B003AA
TD12312085	Suzuki &	0917B003AA

`=COLUMNS(I6:K6)`

1. I have used the column function to count the number of columns to use in VLOOKUP

1	2	3
TICKET NO	CLIENT	PRODUCT CODE
TD12311558	The Dcm	0917B003AA
TD12311559	India India	0917B003AA
TD12311560	Gold Exl	0917B003AA

2. The column number in VLOOKUP is linked to the cell which has the column function

TICKET NO	CLIENT	PRODUCT CODE
TD13312300	<code>=VLOOKUP(\$M7,\$I\$7:\$K\$17,J5,0)</code>	
TD12311560		

2

Address

The simplest way to describe this function is that it returns the cell address of any cell. Let's take a look

Syntax

ADDRESS(row_num, column_num, [abs_num], [a1], [sheet_text])

Row_num – The row number of the cell

Col_num – The column number of the cell. A is 1st column & B is 2nd and so on

Abs_num – This input is Optional. How would you like to reference the cell.

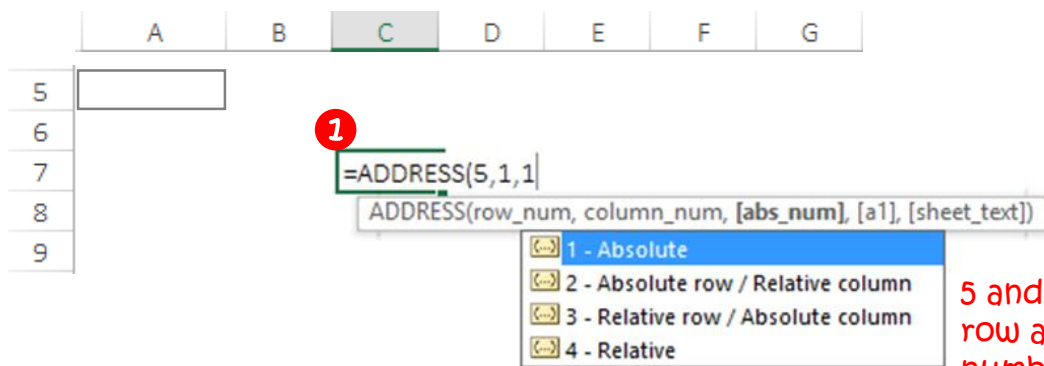
There are 4 options here

- 1 stands for absolute referencing (\$A\$1)
- 2 stands for freezing the row (A\$1)
- 3 stands for freezing the column (\$A1)
- 4 stands for not freezing either row or column

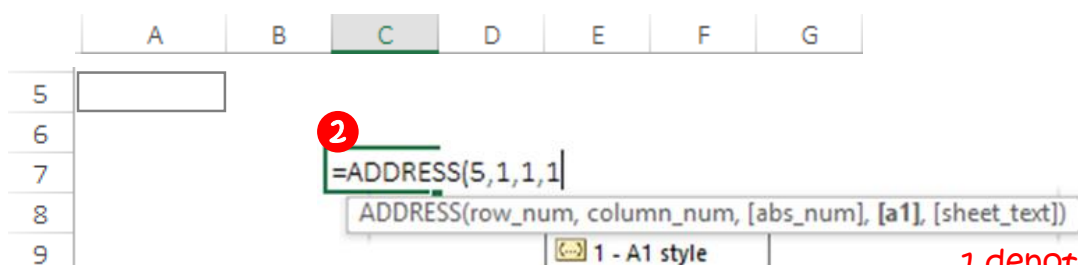
A1 – Optional. Style of referencing, lets stick to A1 style (denoted by 1 or True)

Sheet_Text – Optional. This is the sheet name where you are addressing the cell.

Lets say we are using the ADDRESS function on the cell A5 (outlined in picture)



5 and 1 denote the row and column number. 1 denotes absolute referencing



1 denotes the A1 style referencing. We'll stick to A1 style referencing to most part of our learning

When you press enter you'll get the cell address \$A\$5. Now seriously, there is no big deal about this. Let's get into a case where use the INDIRECT function with the ADDRESS Function

Indirect Function Application

Lets take a look at an interesting case. I have 3 sheets and some data on each of them

Ron	Susan	Pualine	Daura	
399	471	373	354	Sales of Jan in Sheet 1

Ron	Susan	Pualine	Daura	
301	242	218	328	Sales of Feb in Sheet 2

Ron	Susan	Pualine	Daura	
412	239	392	487	Sales of Mar in Sheet 3

My job is to consolidate data on a single sheet. There could be many ways to do that (ranging from copying the data to linking each cell) but we are going to use the INDIRECT function

	C7	D7	E7	F7
Sheet1!	=INDIRECT(\$B10&C\$8)			
Sheet2!		301	242	218
Sheet3!		412	239	392

The cell address is placed here

I have written the sheet names here

The INDIRECT formula can pick up cell address from cells linked

Note a couple of things

1. & operator is combining the sheet name with the cell address
2. Proper cell referencing is allowing to pick up data from multiple sheets
3. As of now we have manually written the sheet names and cell address but we can automate that too with ADDRESS function

Using Wildcards in Formulas



Just like the Joker in playing cards (which can fit anywhere) we have wildcards in excel that do a similar job. Now these wild cards can be combined with excel functions like AVERAGEIF/IFS, COUNTIF/IFS, H&VLOOKUP, MATCH, SEARCH, SUMIF/IFS, etc..

Lets get going with an example. In the example below we have to total the CTC for all employees whose EMP codes are in 11 series (i.e. starting from 11). Now if this data would have been a couple of thousand rows, it would truly have been a nightmare without the wildcard feature

EMP ID **CTC** We have here EMP ID and their CTC

EMP 12253	67,700
EMP 12022	84,600
EMP 12295	68,600
EMP 11417	49,000
EMP 11701	78,000
EMP 11357	62,900
EMP 11421	73,100
EMP 12426	75,600
EMP 11249	50,200
EMP 11591	49,400
EMP 11201	48,900
EMP 11754	42,300

EMP ID	CTC
EMP 12253	67,700
EMP 12022	84,600
EMP 12295	68,600
EMP 11417	49,000
EMP 11701	78,000
EMP 11357	62,900
EMP 11421	73,100
EMP 12426	75,600
EMP 11249	50,200
EMP 11591	49,400
EMP 11201	48,900
EMP 11754	42,300


`=SUMIF(B6:B17,"*11*",C6:C17)`

Notice the * (asterisk) sign before and after 11. This simple SUMIF formula will give you the total CTC for EMP series 11

This will find all the records which have 11 in the EMPID

How the * Asterisk works: If the asterisk symbol is applied before a text string, it would match everything that ends with that text string. For example SUMIF(Range,"*ber",Sum_Range) will include the sales for the last 4 months because they end with the string **ber** (September, October, November, December)

How the ? Question mark works : Unlike the asterisk, a question mark matches any single character For example, =COUNTIF(range, "sm?th") will count all the smiths either with an I or Y (smith / smyth)



1. Advanced Excel Formulas – Date & Time Functions

A quick recap - how date & time works in Excel

There is a special way how excel treats dates. For Excel, dates are nothing but numbers. To give you more insight, each date is a sequential number to excel for example my birthday 27-Apr-1986 is numbered as 31529. Now the obvious question is that, where did this number come from?

Let's unravel this, The excel calendar begins on 1st Jan 1900 so that it is stored as the number 1 in Excel's memory, 2nd Jan 1900 is stored as the number 2. Programmers have stretched the calendar till 31st-Dec-9999 (I am not sure if we are going to go that far in any sort of calculations, at-least I have not!)

DATES ARE NUMBERS IN EXCEL



A quick exercise - Can you find out the number of your birthdate ?

Just like dates, time is also a number but time being a smaller fraction (as compared to dates) they are presented as decimals. Let's continue with my birthday, so the number is 31529

Take a look at how the time progress as I increase the decimals

Number	Date and Time
31529	27-Apr-86 12:00 AM
31529.25	27-Apr-86 06:00 AM
31529.5	27-Apr-86 12:00 PM
31529.75	27-Apr-86 06:00 PM
31530	28-Apr-86 12:00 AM

Notice how the time changes when the decimal values are changing. If you increase the decimal places the time would reflect in minutes and seconds too!

Day, Month, Year

Now that you have an understanding that dates are nothing but numbers in excel. Lets take a look at 3 foundation building functions (DAY, MONTH, YEAR)

Syntax DAY function

DAY(serial_number)

Serial_number – The date or the serial number

Simply put the DAY function will return the DAY of the month, for example if the date is 14 Feb 2014, DAY will return the number 14 (as the 14th day of the month)

15-Jun-97	15			
01-Jul-97	1			
06-Aug-97	=DAY(C9)			
16-Aug-97	16			
16-Sep-97	16			
17-Oct-97	17			

Make no mistake in understanding, The DAY function is extracting the day of the month from a serial number(which is appearing to you as a date)

35596
35612
35648
35658
35689
35720

Syntax MONTH function

MONTH(serial_number)

Serial_number – The date or the serial number

The MONTH function will return the Month of the Year, for example if the date is 14 Feb 2014, MONTH will return the 2 (as 2nd month of the year)

MONTH				
15-Jun-97	6			
01-Jul-97	7			
06-Aug-97	=MONTH(C9)			
16-Aug-97	8			
16-Sep-97	9			
17-Oct-97	10			

MONTH is returning the month number, starting from Jan as 1

Syntax YEAR function

YEAR(serial_number)

Serial_number – The date or the serial number

The YEAR function will return the Year, for example if the date is 14 Feb 2014, YEAR will return the 2014 (as the year number)

YEAR				
15-Jun-97	1997			
01-Jul-97	1997			
06-Aug-97	1997			
16-Aug-97	=YEAR(C10)			
16-Sep-97	1997			
17-Oct-97	1997			

Since all the dates are of 1997. The YEAR function returns 1997

Date

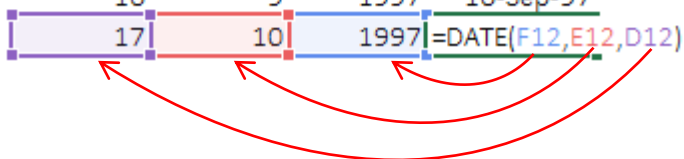
The date function in excel can combine the (DAY, MONTH AND YEAR) function and return the date. The previous 3 functions can disassemble a date and the DATE function can reassemble a date

Syntax

DATE(year, month, day) – They are pretty explanatory, so I'll directly jump into an example

In our earlier example we used the DAY, MONTH and YEAR function. I am now adding a fourth column to combine the 3 separated elements (day, month, year) by the DATE function

DAY	MONTH	YEAR	DATE
15	6	1997	15-Jun-97
1	7	1997	01-Jul-97
6	8	1997	06-Aug-97
16	8	1997	16-Aug-97
16	9	1997	16-Sep-97
17	10	1997	=DATE(F12,E12,D12)



Lets do a quick exercise to create a series of month starting dates. Take a closer look at the DATE function used. I have manually input the year and the day and to get the correct month number I have used the ROWS function (with expanding range) by locking on the first part of the range

As you copy the formula down the range keeps expanding.

01-Jan-14
01-Feb-14
01-Mar-14
01-Apr-14
=DATE(2014,ROWS(\$J\$7:J11),1)
01-Jun-14
01-Jul-14
01-Aug-14
01-Sep-14
01-Oct-14
01-Nov-14
01-Dec-14

Second, Minute, Hour

Here we break down the date into even smaller elements (Second, Minute and Hour). Lets take a look

Syntax SECOND function

SECOND(serial_number)

Serial number is again the date or a number

Numbers	Date & Time	Seconds
30191.8594	21-Feb-82 00:13:33	=SECOND(C7)
30027.3708	07-Oct-83 01:18:18	18
30266.9217	06-Dec-83 02:26:34	34
30244.9042	15-May-82 18:36:45	45
30804.7819	07-Sep-84 11:35:50	50

The SECONDS function is extracting the seconds from the date and time, which otherwise would be a big formula alchemy

Syntax MINUTE function

MINUTE(serial_number)

Numbers	Date & Time	Minutes
30191.8594	21-Feb-82 00:13:33	=MINUTE(C7)
30027.3708	07-Oct-83 01:18:18	18
30266.9217	06-Dec-83 02:26:34	26
30244.9042	15-May-82 18:36:45	36
30804.7819	07-Sep-84 11:35:50	35

The MINUTE function is extracting the minutes from the date and time

Syntax HOUR function

HOUR(serial_number)

Numbers	Date & Time	Hour
30191.8594	21-Feb-82 00:13:33	=HOUR(C7)
30027.3708	07-Oct-83 01:18:18	1
30266.9217	06-Dec-83 02:26:34	2
30244.9042	15-May-82 18:36:45	18
30804.7819	07-Sep-84 11:35:50	11

The HOUR function is extracting the hours from the date and time

Time

Just like the DATE function, the TIME function combines the 3 elements of time (Hour, minutes and seconds)

Syntax

TIME(hour, minute, second)

Here the TIME function is combining the smaller elements and giving the time

Hour	Minute	Second	Time
15	24	41	=TIME(B7,C7,D7)
12	47	25	12:47:25
1	38	24	1:38:24
16	8	9	16:08:09
3	52	29	3:52:29

Ok let's look at a similar function which combines the TIME and the Date together

Now

=NOW() returns the present date with time

Weekday and Weeknumber Functions

Excel has some built in functions that help you do different date related analysis like counting the day of the week or counting the week of the year, lets check out these

Syntax Weekday Function

WEEKDAY(serial_number,[return_type])

Serial_number is the date or the number

Return_type this input determines on which day do you want to start and end the week

Weekday function returns numbers 1 to 7 denoting the day of the week. Let's say I want to know which day of the week was 3rd May 1988. In the example below I select the date and choose the week starting number. Take a look at the drop down that pops up when I am inputting the return type. It gives you a lot of flexibility to choose when is your week is starting

The screenshot shows an Excel spreadsheet with a table of dates. The first row has headers 'Date' and 'Weekday'. The second row contains the date '03-May-88' and the formula '=WEEKDAY(B7,1)'. A dropdown menu is open for the return type '1', showing various options for week numbering. A red arrow points to the first option, '1 - Numbers 1 (Sunday) through 7 (Saturday)', with a red text box explaining that choosing 1 sets the week number starting from Sunday and ending on Saturday.

Date	Weekday
03-May-88	=WEEKDAY(B7,1)
13-Sep-96	WEEKDAY(serial_number, [return_type])
07-Dec-84	
17-Apr-96	
04-Jul-88	
03-Jun-07	

1 - Numbers 1 (Sunday) through 7 (Saturday)
2 - Numbers 1 (Monday) through 7 (Sunday)
3 - Numbers 0 (Monday) through 6 (Sunday)
11 - Numbers 1 (Monday) through 7 (Sunday)
12 - Numbers 1 (Tuesday) through 7 (Monday)
13 - Numbers 1 (Wednesday) through 7 (Tuesday)
14 - Numbers 1 (Thursday) through 7 (Wednesday)
15 - Numbers 1 (Friday) through 7 (Thursday)
16 - Numbers 1 (Saturday) through 7 (Friday)
17 - Numbers 1 (Sunday) through 7 (Saturday)

Choosing 1 will set the week number starting from Sunday and ending on Saturday

Syntax Weeknum Function

WEEKNUM(serial_number,[return_type])

Serial_number - is the date or the number

Return_type - this input determines the starting day of the week

This function returns the week number of the year. Continuing with 3rd May 1988, the week number of this date is 19 (if we start the week on Monday)

The screenshot shows an Excel spreadsheet with a table of dates. The first row has headers 'Date' and 'Weeknum'. The second row contains the date '03-May-88' and the formula '=WEEKNUM(B7,2)'. A dropdown menu is open for the return type '2', showing various options for week numbering. A red arrow points to the first option, '2 - Monday', with a red text box explaining that choosing 2 sets the starting day of the week as Monday.

Date	Weeknum
03-May-88	=WEEKNUM(B7,2)
13-Sep-96	WEEKNUM(serial_number, [return_type])
07-Dec-84	
17-Apr-96	
04-Jul-88	
03-Jun-07	

2 - Monday
11 - Monday
12 - Tuesday
13 - Wednesday
14 - Thursday
15 - Friday
16 - Saturday
17 - Sunday
21 - Monday

Choosing 2 will set the starting day of the week as Monday

Time Stamp Problem

Now with some of functions under our belt let's solve a typical problem at work. Lets say we need a time stamp against every data entered but the condition is that once the time is stamped against the data it cannot be changed. We would use a simple IF formula for this but with a new concept called Circular Referencing

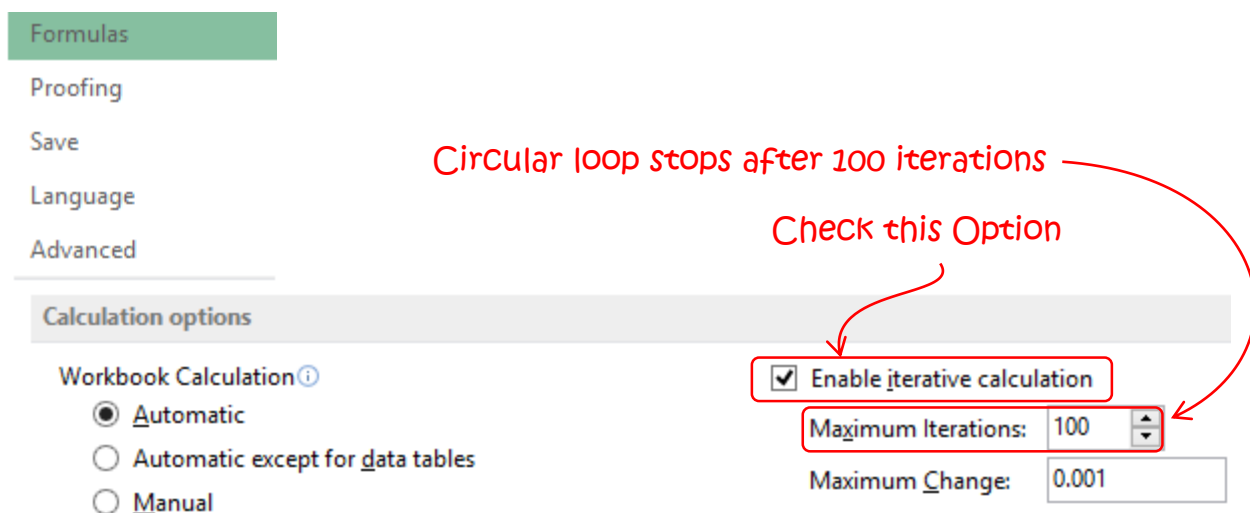
Introducing Circular Referencing – One or more cell references in a circular formula circles back to itself. For example.. IF you type the following in Cell A10

=IF(A10<1000, A10+1, A10) → It is a Circular Formula

Each time we run the formula (pressing F9) the value in A10 will goes up by 1.

Setting Iterations for Circular Formulas – Although the formula is made in such a way that it will increase the value by 1 each time but the number of iterations that are set in excel settings for circular formulas can change the result.

Turning ON Iterative calculations - Office Button > Excel Options > Formulas > Check




Now that we have understood circular referencing, let's make a circular referencing formula. Be sure to turn ON circular referencing

Names	Time Stamp
Chandeep	17:10
Rohan	17:11
	=IF(B9<>"",IF(C9="",NOW()+2,C9),"")

The IF Formula is checking IF

1. Cell B9 is empty if it is not Empty then it gives nothing
2. If not empty then it checks IF cell C9 is empty (here the circular referencing starts)
3. If cell C9 is empty then it enters the current time and date using NOW function else gives the value of C9



1. Advanced Excel Formulas – Math Functions

Ceiling and Floor Functions

I think these 2 functions are incredibly simple and powerful

Syntax CEILING function

CEILING(number, significance)

Number – can be any number

Significance – is the multiple

I think I'll make more sense with this example. Consider a set of numbers, In the formula I have specified the number and the significance as 3. Now this function will take the numbers and push them up to the next multiple of 3. For example if =CEILING(11,3) will result in 12, because the next multiple of 3 after 11 is 12

Numbers	
2	3
7	9
9	9
11	=CEILING(B10,3)
14	15
18	18
21	21
27	27

Note the CEILING function is returning the next multiple of 3

For Example
=CEILING(14,3) will result in 15

If you have understood the CEILING function the FLOOR function is just a sitter for you. Just as the CEILING function pushes any number to the next multiple of the significance, the floor function pushes the number downwards, here is the syntax

Syntax FLOOR function

=FLOOR(number, significance)

Nothing much to explain in the syntax here, lets jump right into an example

Numbers	
2	0
7	6
9	9
11	=FLOOR(B10,3)
14	12
18	18
21	21
27	27

The FLOOR function here is returning the previous multiple of 3

For Example =FLOOR(14,3) will result in 12 (which is the previous multiple of 3)

Even and Odd

A little less sophisticated are the cousins of CEILING & FLOOR i.e. EVEN and ODD functions

Syntax EVEN function

=EVEN(number)

Number could be any number

Just as the name suggests, the EVEN function returns the next even number to the number specified in the function

Syntax ODD function

=ODD(number)

Right opposite to that is ODD which returns the next odd number to the number specified in the function

Take a look, its pretty easy!

Numbers	Even
2	2
7	8
9	=EVEN(89)
11	12
14	14
18	18
21	22
27	28

The EVEN function is returning the next even number to the number selected

Numbers	Odd
2	3
7	7
9	9
11	11
14	15
18	19
21	21
27	=ODD(814)

The ODD function is returning the next odd number to the number selected

Finding out Quarters of Dates

Self work Exercise

Make a formula to find out quarters of the dates. For example

- 02-Feb-2014 is the 1st Quarter
- 15-Apr-2013 is the 2nd Quarter
- 27-Aug-2010 is the 3rd Quarter

Finding Indian Quarters - See if you can tweak the formula a bit to find out Quarters for Indian financial year? That means that quarter 1 is from Apr - June

Dates Between	Quarter
Jan - Mar	4
Apr - June	1
July - Sep	2
Oct - Dec	3

1. Advanced Excel Formulas – Information & Text Functions

Cell and Info Functions

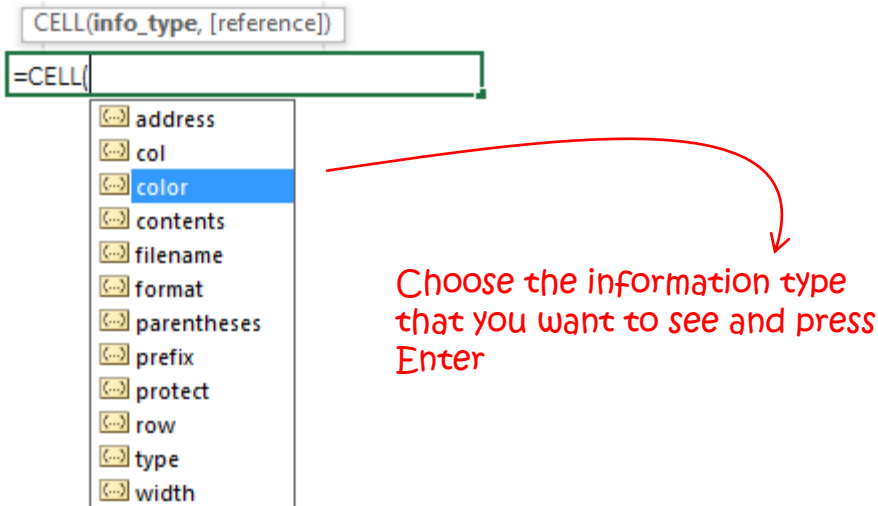
These come handy when you want to know some information about a cell. Take a look the syntax

Syntax

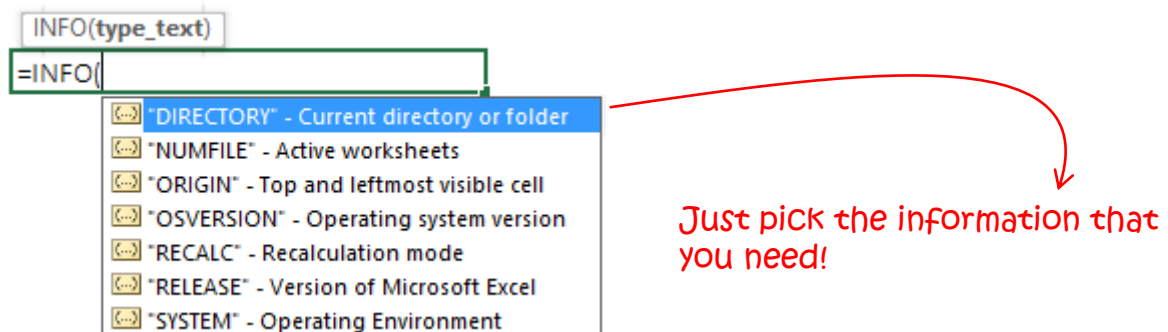
=CELL(info_type, [reference])

Info_Type – It gives you a list of information that you can pick up from

Reference – Cell address for which you the information selected. This is optional if not specified the formula gives the information about the cell in which the formula is typed



The INFO Function is similar to cell function. Just type =INFO and select the information that you need



IFNA function is similar to IFERROR function. The only difference is that it only checks for #N/A error

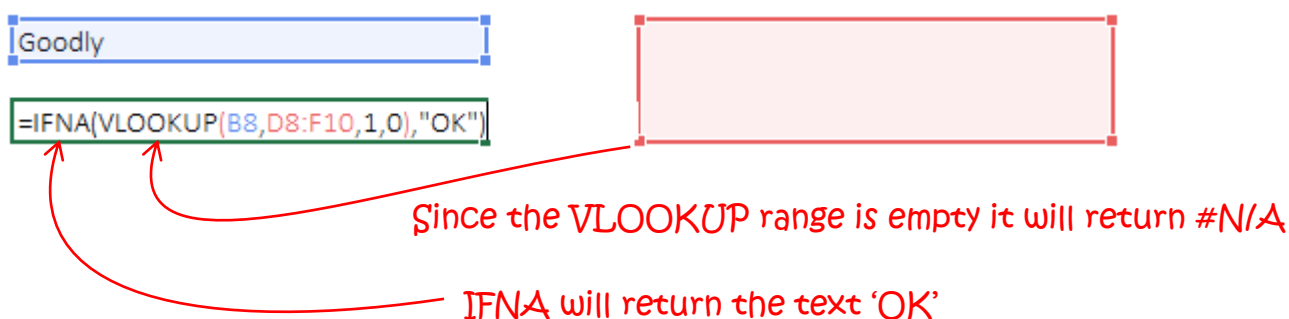
Syntax

IFNA(value, value_if_na)

Value – Could be a formula or reference to a cell that you are evaluating

Value_if_na – Is the value/number/formula/cell reference that you want in case the value returns a #NA error

In the case mentioned below IFNA will return N/A since the VLOOKUP range is empty, in that case the formula will return the text OK



Clean and Trim

These two function come very handy when you have to clean your data. Lets take a dive

Syntax CLEAN function

CLEAN(Text)

Text could be any text

The clean function is used for removing all non printable characters from the next. Take a look at this case where each last name is appearing the next line. I have to remove all the 'enters' before the last name for which I can use the clean function

Full Names	
Ram Mishra Werma	=CLEAN(B7)
Pradeep Kumar Sharma	Pradeep Kumar Sharma
Jackson Roy Huffinson	Jackson Roy Huffinson

The CLEAN function is cleaning all the unwanted (enters) before the last name

Syntax TRIM function

TRIM(Text)

The trim function removes all spaces from text except for a single space between words. You can use TRIM on text that you have received from another application that may have irregular spacing

Hi My name is Jon	Hi My name is Jon
Hi My name is Peter	Hi My name is Peter
Hi My name is Samuel	Hi My name is Samuel
Hi My name is Rosy	=TRIM(B15)
Hi My name is Molly	Hi My name is Molly

Notice the irregular spacing between the words in the text. The TRIM function is clearing all the spaces apart from a single space between the words

Rept

At the first glance this function will look like, am I really going to use this? But I'll tell you one of the coolest trick with function. Let's do this

Syntax

=REPT(text,num_times)

Text – is any text

Num_times – is the number of times you want to repeat that text

For example if you write =REPT("a",10) it will repeat 'a' ten times and return aaaaaaaaaa, now as promised let me show you something cool about this function. Lets say we have a set of sales numbers for which we want to make a chart

Sales	Chart
14	
19	
13	=REPT(" ",B9)
14	
13	
17	
10	

I have used the REPT function to repeat a line "|" the number of times of sales and it somewhat looks like a Compact Chart.

Self Work – Based on this I have a question for you

How would you make a Chart using the REPT function when the sales values are large, consider this example ?

Sales	Chart?
2996	
3876	
2145	
3304	
3666	
5780	
3760	

2. Array Formulas

They are also known as CSE (CTRL+SHIFT+ENTER) formulas because of their conditional capability of only working by pressing Ctrl + Shift + Enter. This is one of the difficult topics in Excel so to make this topic fun and interesting we'll take a look at various concepts in various examples discussed in this section

Array Formulas

An array formula has an advanced capability of handling operations for not a single cell but a range of cells together.. Eh?? Confused? Forget that take a look a case here

Stock	Open	Close
Apple	\$648.00	\$770.00
Facebook	\$533.00	\$553.00
Google	\$689.00	\$602.00
Amazon	\$633.00	\$570.00
Alibaba	\$428.00	\$660.00

We have close and open price information of 5 stocks

Question : You have to find the total change (close price – open price) by writing one formula in a single cell?

Stock	Open	Close
Apple	\$648.00	\$770.00
Facebook	\$533.00	\$553.00
Google	\$689.00	\$602.00
Amazon	\$633.00	\$570.00
Alibaba	\$428.00	\$660.00

I am sure you can do that with that giant ugly formula. But could there be a better way?

Total Change `=D8-C8+D9-C9+D10-C10+D11-C11+D12-C12`

Introducing Array Formulas: Now to do the same operation I am going to write simple and short (array) formula, which is going to be slightly different than how a normal formula would look like.. Ready?

Stock	Open	Close
Apple	\$648.00	\$770.00
Facebook	\$533.00	\$553.00
Google	\$689.00	\$602.00
Amazon	\$633.00	\$570.00
Alibaba	\$428.00	\$660.00

This formula will take the difference between each value of the 2 ranges and then sum it up. Please make sure to press CTRL SHIFT ENTER to execute this formula. A simple ENTER command will not work

Total Change `=SUM(D8:D12-C8:C12)`

Notice the following

1. Inside the SUM function I have selected the Close Price Range and Open Price Range
2. The way it will work is, the formula will take the difference between each values in the 2 ranges and then sum it up
3. But I cannot run this formula by pressing ENTER, it will give me a #VALUE error, I have to use CTRL + SHIFT + ENTER to execute this formula

Array Formulas

Now the obvious question arises that how would you know if a formula is an array formula?

Some ground rules of array formulas

1. Whenever you force an array into a formula argument that cannot by default handle an array, you turn the formula into an array formula
 - o In the case that we just discussed, although SUM function can handle a range of cell (or an array) but inherently it cannot perform any calculation with the array selected

Total Change `=SUM(D8:D12-C8:C12)`

Notice that we are first performing array calculation then wrapping that around the SUM function. The sum function does not support that so we use CTRL + SHIFT + ENTER to enforce that into an array formula

2. Array formulas only work only by pressing CTRL + SHIFT + ENTER, without that either the formula gives you a wrong answer or an ERROR

Auditing array formulas

Undoubtedly array formulas can do the unthinkable in Excel and sometimes these formulas can become extremely lengthy and geeky. Just to get a hang of how the array formulas are working, you have got to know a way to audit them. As an example I would use our recently discussed =SUM array formula

To see how the formula is working

Total Change `=SUM(D8:D12-C8:C12)` Select the range and press F9

Total Change `=SUM(D8:D12-{648;533;689;633;428})` It shows the values in the range

`=SUM({770;553;602;570;660}-{648;533;689;633;428})` Select the second range and press F9. It would show the values for that range too

`=SUM({770;553;602;570;660}-{648;533;689;633;428})` Select the two ranges together and press F9

`=SUM({122;20;-87;-63;232})` It then shows up how each value of the range is picked up to give a difference

Total Change `=224` The when you press F9 on the entire SUM function, it finally gives you the answer 224

Array Formulas

Observations from the example

1. Do not press enter mistakenly after you have evaluated a part of the formula by pressing F9. WHY? Because F9 is the calculation key and it would replace the cell references with absolute values in the formula after you press enter. So either press ESC key (to come out of formula cell edit mode) or press CTRL Z to undo the F9 key effect
2. Just as we saw in the example the F9 key can evaluate a part of the formula so you can technically break down the evaluation in bits and pieces and understand a formula
3. This F9 calculation feature is insanely beneficial when you are making some serious formula alchemy and you want to keep testing the results as you build up a giant formula monster

Boolean Logic in Array Formulas

Lets delve deeper and get more Geeky with Array Formulas. Let me pick up an example an introduce a new concept (that works as a backbone) in array formulas. We have stocks their Purchase Price and Market Price. We have to find the total Profit made on all the stocks but keeping the power of array formulas in mind, we got to do that with a single formula in one single cell

The Logic is that the stock would obviously be sold if the Purchase Price is less than the Market Price, else one would not sell the stock! Sounds Right?

Stock	Purchase Price	Market Price
Apple	\$648.00	\$770.00
Facebook	\$533.00	\$553.00
Google	\$689.00	\$602.00
Amazon	\$633.00	\$570.00
Alibaba	\$428.00	\$660.00

Total Profit

Stock	Purchase Price	Market Price
Apple	\$648.00	\$770.00
Facebook	\$533.00	\$553.00
Google	\$689.00	\$602.00
Amazon	\$633.00	\$570.00
Alibaba	\$428.00	\$660.00

Total Profit =IF(C8:C12<D8:D12,D8:D12-C8:C12,0)

1

2

3

The IF statement has 3 parts

1. We are checking if the Purchase Price range is less than the Market Price Range
2. If that condition is true I want the difference of the market price range and purchase price range
3. Else 0

Array Formulas

Evaluating the formula with the F9 key – How the Boolean Works

1. Select the first range in the IF Condition and press F9 – The first range expands to show the purchase prices of different stocks

```
=SUM(IF({648;533;689;633;428}<D8:D12,D8:D12-C8:C12,0))
```

2. Select the second range in the IF Condition and press F9 – You will get the range of market prices

```
=SUM(IF({648;533;689;633;428}<{770;553;602;570;660},D8:D12-C8:C12,0))
```

3. Select both the ranges in IF condition and press F9 – You will get TRUEs and FALSEs for purchase price being compared to market price. Where ever the condition is true it will display TRUE else FALSE

```
=SUM(IF({TRUE;TRUE;FALSE;FALSE;TRUE},D8:D12-C8:C12,0))
```

These TRUEs and FALSEs are Booleans. For each True IF will pick up the difference between Market Price and Purchase Price and for each False IF will pick up 0

4. Select the next range for Value if TRUE and you will get the difference between the two ranges by pressing F9

```
=SUM(IF({TRUE;TRUE;FALSE;FALSE;TRUE},{122;20;-87;-63;232},0))
```

5. Finally select the entire IF statement and press F9 - IF will pick Market Price – Purchase Price for only the TRUE Values

```
=SUM({122;20;0;0;232})
```

Check out the 0 (zeros) in between the values. Those are places where the IF condition was giving a FALSE

6. Now SUM will sum only the positive values (i.e. where you have made a profit)

Array Formulas

As of now we have been talking about formulas that can be forced to operate and calculate arrays by pressing CTRL SHIFT ENTER but then there are also exclusive array formulas that just work with CTRL SHIFT ENTER not otherwise

Frequency Function

This function can calculate the frequency distribution between different intervals.

Syntax

`=FREQUENCY(data_array, bins_array)`

data_array – The data from which we want to calculate frequencies

bins_array – These are intervals

Lets take a look at an example

Racing time (sec) Upper Limits

65.52	Time <= 40
52.10	40 < Time <= 45
46.50	45 < Time <= 50
39.40	50 < Time <= 55
43.50	55 < Time <= 60
46.80	60 < Time
47.80	
48.10	
48.00	
43.50	
52.30	
56.35	
41.85	

We have race time data for which we want to find how many values fall between the specified time intervals

Although we have written the intervals in this fashion but the Frequency formula would need a series of values

This formula would require you to first select a range of cells where you want the result (one extra cell than the bins_array)

Data Array	Bins Array	Frequency
Racing time (sec)	Upper Limits	
65.52	40	=FREQUENCY(B8:B20,D8:D12)
52.10	45	3
46.50	50	5
39.40	55	2
43.50	60	1
46.80		1
47.80		
48.10		
48.00		
43.50		
52.30		
56.35		
41.85		

1. Select the cells (one more than the bins array)
2. Select the data array and bins array
3. Use CTRL + SHIFT + ENTER to execute the formula

Note that Bins_array is always the upper limit. We select one additional cell while typing the formula because that gives us frequency more than the last value in the bins_array

Array Formulas

Transpose Function

This function can turn horizontal data into vertical and vice-versa

Syntax

=Transpose(array)

Array is the range of cells that you want to transpose. Excel automatically converts a vertical array to horizontal and vice-versa.

Take a look at an example here

Sales	Year
121	2001
152	2002
198	2003
155	2004
133	2005
159	2006

← This is a vertical data

=TRANSPOSE(B7:C13)		152	198	155	133	159
Year	2001	2002	2003	2004	2005	2006

With TRANSPOSE formula we have converted that into a horizontal

1. Select the number of columns/rows needed to fit the data
2. Write the TRANSPOSE function and select the array
3. Press Ctrl + Shift + Enter to execute

This can also be done with Paste Special but in that case the Data is pasted and there is no link between the two data sets, so in case your main data changes the changes will not reflect in the paste special transposed data

3. Excel Tables

Before we get started with this section, I want to write a prologue about its awesomeness. I have not seen this feature to be too familiar with the excel fraternity but this is very powerful for whole bunch of reasons. Lets take a sneak peak into what are we going to cover in this section

1. Excel Tables – What are they and how are they created ?
2. 8 reasons should you consider using excel tables !
3. Writing formulas in Excel Tables - Introducing structural referencing

Excel Tables - getting started

What are Excel Tables ?

An excel table is a structure given to a set of data in excel automatically when you access this feature. The structure includes

- A neat and prominent formatting of data
- The data is stored under the Table Name as Table1 or Table2 and so on, you can also customize the name of the table
- Because the data is stored under a unified table structure, excel does not see this as individual cell addresses but as Table1 or Table4 etc..

I am not going to make this boring.. So let's take a look at some sales transaction data

Date	Sales Rep	Customer	Amount	Profit	Region
06-Jun-07	Varsha	Shyam & Sharma Co	10900	3920	East
17-Nov-07	Veronica	MNTL	13050	3040	West
06-Jul-05	Ramesh	Sharma & Co	12300	5720	West
06-Nov-06	James	Sharma & Co	10400	5680	South
21-Mar-08	Rajat	White Associates	14200	5240	South
16-Jun-05	Varsha	Shyam & Sharma Co	10450	4500	South
12-Mar-06	Swati	Boston Consultants	12350	3620	South
08-Aug-06	Charley	Shah Associates	12450	2860	North
10-Sep-07	Mark	Namint Enterprises	10450	2720	West
16-Nov-07	Abhay	Data Tronics	11400	5680	East
06-Dec-06	Varsha	MNTL	14800	2680	North

590 rows of such data

Creating a Table ?

This data spreads from Column B to G and runs in about 600 rows. Lets convert this data into a table

1. Select any cell inside the data range and use the shortcut Ctrl+T
2. You'll have a 'Create Table' dialogue box intuitively guessing the range of the data and asking if your data has headers
3. Go ahead and click OK. Note that headers should be present in the data range and should be ticked (in our case)

Date	Sales Rep	Customer	Amount	Profit	Region
06-Jun-07	Varsha	Shyam & Sharma Co	10900	3920	East
17-Nov-07	Veronica	MNTL	13050	3040	West
06-Jul-05	Ramesh	Sharma & Co	12300	5720	West
06-Nov-06	James	Sharma & Co	10400	5680	South
21-Mar-08	Rajat	White Associates	14200	5240	South
16-Jun-05	Varsha	Shyam & Sharma Co	10450	4500	South
12-Mar-06	Swati	Boston Consultants	12350	3620	South
08-Aug-06	Charley	Shah Associates	12450	2860	North

- Formatting has changed
- Filters appeared
- Alternate rows coloured
- Thin border outside the table

Excel Table – What is so special about them

Here are my top 8 reasons to use table. Lets explore them

- 1. Quick Formatting** – As soon as you convert the data range to a table structure you quickly format the table. Even you revert the table back to a normal data range the formatting stays
- 2. Effortless data entry** – As soon as you enter a new row or column Excel picks up the new data in the table structure
- 3. Customize Output Options** – This is awesome, You can change the operations (for sum, count, average etc) at the end of any column

A	Date	Sales Rep	Customer	Amount	Profit	Region
	26-Jul-06	Veronica	Shah Associates	11200	3480	North
	25-Mar-07	Ramesh	Shah Associates	12850	2720	North
	12-Sep-07	Bruce	Namint Enterprises	14000	2000	West
	04-Apr-08	Abhay	White Associates	13750	2220	North
	28-Jul-05	James	Shyam & Sharma Co	14600	4720	East
	05-Sep-07	Ramesh	Jindle Power Works	13550	2960	North
	19-Mar-07	Swati	Shyam & Sharma Co	14200	3380	West
Total				7405200		

None

Average

Count

Count Numbers

Max

Min

Sum

StdDev

Var

More Functions...

Total column has filters to change the Operations (Sum, Count, Avg etc)

Also note that the headers are always visible. Here the column names have been replaced by the table headers

- 4. Visible Headers** – The table feature will always display the headers of the data, even if the screen is scrolled till the end of the table. In that case the column headers are replaced by the table headers
- 5. Auto Fill Formulas** – Let’s say I am calculating the costs (Amount – Profit) in our table, the table feature auto fills the rest of the rows by itself for a particular calculated column

Date	Sales Rep	Customer	Amount	Profit	Region	Costs
06-Jun-07	Varsha	Shyam & Sharma Co	10900	3920	West	=([Amount]-[Profit])
17-Nov-07	Veronica	MNTL	13050	3040	West	10010
06-Jul-05	Ramesh	Sharma & Co	12300	5720	West	6580
06-Nov-06	James	Sharma & Co	10400	5680	South	4720
21-Mar-08	Rajat	White Associates	14200	5240	South	8960

Excel Table – What is so special about them

If you are wondering, how is the formula written. Is this range naming or something else? Let me tell you it is none of those but Structural references

6. Structural References – Lets decode structural references. In table the way you reference an entire column is by its header name, since you convert the entire data into a table structure, individual cells (or range of cells) lose significance

Lets say you want to calculate 30% tax on profit, the way it will work in tables is as follows. Start typing in the highlighted cell

Date	Sales Rep	Customer	Amount	Profit	Region	Tax
06-Jun-07	Varsha	Shyam & Sharma Co	10900	3920	East	
17-Nov-07	Veronica	MNTL	13050	3040	West	

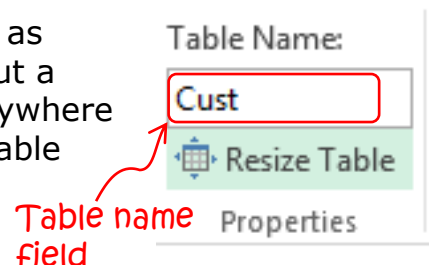
=[Profit]*30%

As soon as you press enter excel will populate the answer in the cells in the Tax Column. This kind of referencing is called structured referencing

Please take a note of a few points to make better sense of structured referencing

1. Since there is no cell referencing (=A1) the table is referred by its structure or the headers for example =[sales]*[commission], this will take each row in the sales column and multiply it with each row in commission column
2. If you only type headers or column name (always in square [...] brackets), be sure to be working in the adjacent row or column of the table. Like we just did our tax calculation(which was an adjacent column to the table)
3. If you are referring the column header in some function or anywhere else in the sheet (which is not adjacent to the table) then you also have to specify the table name. Here is how you do it
=SUM(TableName[Sales]) this would total the sales column in the table name you specify
=Sales[Profit]*Tax[TaxRate] this would take each item row of Profit Column from the sales table and multiply it with TaxRate column in the Tax Table

4. Naming Tables – By default your tables are named as Table1 or Table2 (in the order you create them). But a better practice is to name the tables by clicking anywhere in the Table and from the Design tab, click in the Table Name field and type the new name for your Table



Excel Table – What is so special about them

7. How formulas work in Structural referencing – Don't be afraid it is pretty simple.. Simpler than you think :-D

Case

For instance we have two tables

Date	Sales Rep	Customer Name	Amount	Profit	Region	Customer Code
06-Jun-07	Varsha	Shyam & Sharma Co	10900	3920	East	
17-Nov-07	Veronica	MNTL	13050	3040	West	
06-Jul-05	Ramesh	Sharma & Co	12300	5720	West	
06-Nov-06	James	Sharma & Co	10400	5680	South	

Customer Name	Customer Code
Shyam & Sharma Co	101
MNTL	102
Sharma & Co	103
White Associates	104

Named as Cust

Named as Sales

Our task: find the correct customer code from the customer table and put it against each customer in the sales table. Simple VLOOKUP, here is how we would do it!

Customer Name	Amount	Profit	Region	Customer Code
Shyam & Sharma Co	10900			=VLOOKUP([Customer Name],Cust,2,0)
MNTL	13050	3040	West	102
Sharma & Co	12300	5720	West	103
Sharma & Co	10400	5680	South	103
White Associates	14200	5240	South	104
Shvam & Sharma Co	10450	4500	South	101

Customer Name	Customer Code
Shyam & Sharma Co	101
MNTL	102
Sharma & Co	103
White Associates	104
Boston Consulta	105
Shah Associates	106

[Customer Name] becomes the Lookup value

Cust Table is the Table array

Next Task: We have expanded the customer table and we have to find the total of each customer sales from the sales table

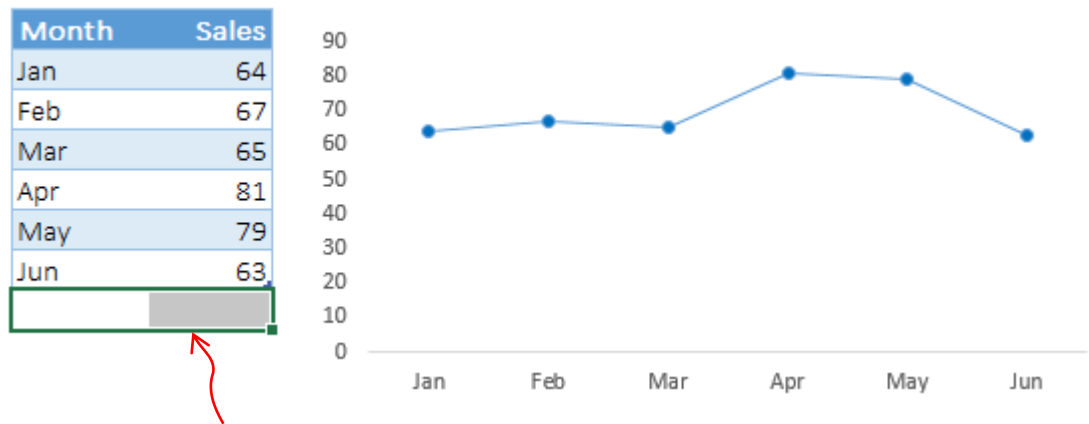
Customer Name	Customer Code	Total Sales
Shyam & Sharm	101	=SUMIF(Sales[Customer Name],[Customer Name],Sales[Amount])
MNTL	102	
Sharma & Co	103	621200
White Associate	104	547200

Take a note of couple of things

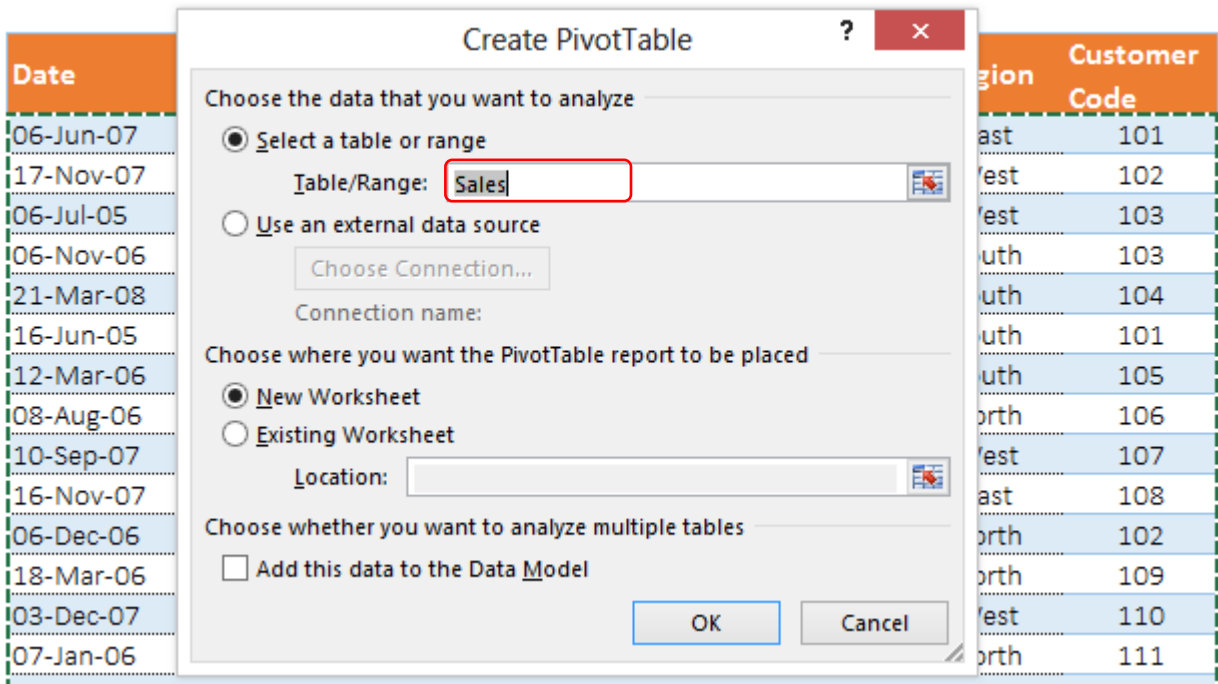
1. Since we have to pick up the criteria range from the sales table we have to specify the table name along with the column header i.e. Sales[Customer Name]
2. We are writing the formula in the 'Cust' table so no need of table name
3. The sum range is again picked from the sales table i.e. Sales[Amount]

Excel Table – What is so special about them

8. Dynamic Charts and Data Ranges – now such a beauty can be extended to charts and dynamic ranges in pivot tables as well. Consider the following data, where we have used a table to make a chart



The same concept can be applied to pivot tables as well. Let's say we want to make a pivot table from Sales table



We just entered the table name in the Range field, now as and when new data is added to the sales table the Pivot table just needs to be refreshed and new data will be picked up in the Pivot Table automatically

4. Advanced Filter

Advanced Filter in Excel

This is one of the most underrated features on the contrary it is of great utility and easy to use !! Lets pick up a case to get a hang of this

Consider this data

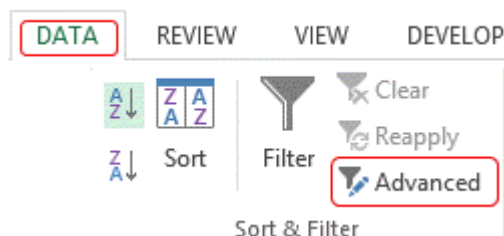
Date	Sales Rep	Customer	Sales	Region
30-Dec-05	Varsha	Shyam & Sharma Co	10900	East
17-Nov-07	Veronica	MNTL	13050	West
06-Jul-05	Ramesh	Sharma & Co	12300	West
06-Nov-06	James	Sharma & Co	10400	South
21-Mar-08	Rajat	White Associates	14200	South
16-Jun-05	Varsha	Shyam & Sharma Co	10450	South
12-Mar-06	Swati	Boston Consultants	12350	South
08-Aug-06	Charley	Shah Associates	12450	North

Filter criteria for data

- Sales Rep = Veronica
- Customer = MNTL

~600 records

The advanced filter is located in the DATA tab by the name 'Advanced' (Shortcut key – Alt A Q)



Make a separate place for writing the criteria on the sheet, let's say on the top of our data. Include the headers too while writing the filter criteria, with the help of headers advanced filter will identify the which criteria will apply to which column of the data. So this is how we do it

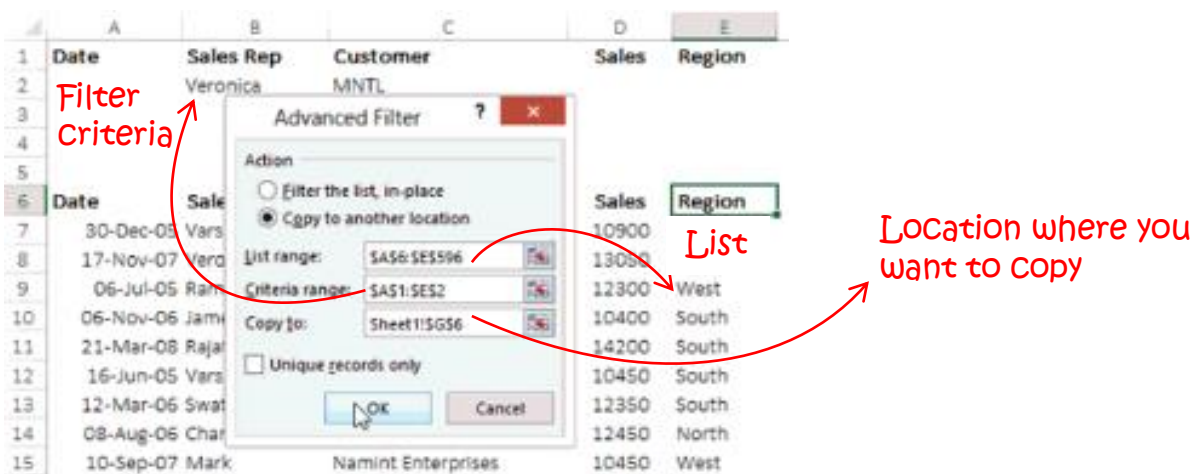
	A	B	C	D	E
1	Date	Sales Rep	Customer	Sales	Region
2		Veronica	MNTL		
3					
4					
5					
6	Date	Sales Rep	Customer	Sales	Region
7	30-Dec-05	Varsha	Shyam & Sharma Co	10900	East
8	17-Nov-07	Veronica	MNTL	13050	West
9	06-Jul-05	Ramesh	Sharma & Co	12300	West
10	06-Nov-06	James	Sharma & Co	10400	South
11	21-Mar-08	Rajat	White Associates	14200	South
12	16-Jun-05	Varsha	Shyam & Sharma Co	10450	South

Criteria for Advanced Filter

Advanced Filter in Excel

Applying the Advanced Filter

1. Go to the DATA tab and click on Advanced
2. Advanced Filter dialogue box pops up with 4 inputs
 - List Range -> Select the entire data including the headers
 - Criteria Range -> Select the criteria range (two rows including the headers)
 - Click the Radio Button -> Copy to another location and click anywhere else on the sheet, where you want the filtered data to be copied
 - Unique Records -> If you are looking for only unique records then check the unique records button
3. And you are done! Yes it is that simple :-D



Applying Diverse Filter Criteria - You can apply filter criteria in a diverse ways.. lets check outs some

1	Date	Sales Rep	Customer	Sales	Region
		Veronica	MNTL		
			White Associates	>10000	

Filtered records for Veronica and MNTL and records for White Associates with Sales greater than >10000

2	Date	Date	Sales Rep	Sales	Region
	>01-01-2005	<01-01-2007	Varsha		

Filtered records from 2-Jan-2005 till 31-Dec-2006 for Varsha

3	Date	Date	Customer	Sales	Region
	>01-01-2005	<01-01-2007	MNTL		
			Boston Consultants	>10000	East

Filtered records between 2-Jan-2005 and 31-Dec-2006 for Customer MNTL and filtered records for Boston Consultants for Sales >10000 in the Region East

Advanced Filter in Excel

Partial Filter Result - You can also retrieve partial information, for instance I want to apply the following filter

- Sales Rep = Swati
- Region East = East

And the filtered records should only come for Date and Sales for that just write the headers Date and Sales in the Copy to Location (on the sheet) Select those headers only in the advanced filter (copy to location) option The records will only populate the Date and Sales for Swati and East

Date	Sales Rep	Customer	Sales	Region
	Swati			East

Criteria

Date	Sales Rep	Customer
30-Dec-05	Varsha	Shyam & Sharma Co
17-Nov-07	Veronica	MNTL
06-Jul-05	Ramesh	Sharma & Co
06-Nov-06	James	Sharma & Co
21-Mar-08	Rajat	White Associates
16-Jun-05	Varsha	Shyam & Sharma Co
12-Mar-06	Swati	Boston Consultants
08-Aug-06	Charley	Shah Associates
10-Sep-07	Mark	Namint Enterprises
16-Nov-07	Abhay	Data Tronics
06-Dec-06	Varsha	MNTL
18-Mar-06	Bruce	VCC

Sales	Region	Date	Sales
-------	--------	------	-------

Advanced Filter

Action

☐ Filter the list, in-place

☒ Copy to another location

List range:

Criteria range:

Copy to:

☐ Unique records only

OK

Cancel

Filtered records only for Date and Sales

Food for thought !

Have you thought of using Advanced filter with wild cards. Give it a shot!





5. Advanced Cell and Range Naming

Cell & Range Naming

This is very straight forward and is the foundation of what we are going to learn about dynamic range naming and integrating multiple ranges in a formula. Lets get done with this quickly. You have a list of employees for which you need to calculate 20% commission on annual CTC

- 1. Lets name the commission % cell. Select the cell and type the name in the Name box on top left corner. Be sure to press Enter after typing the name

Employees	Annual CTC	Commission
Mickey	3,41,000	
Varsha	4,51,000	
Chandy	5,27,000	
Mandy	2,94,000	
Priyanka	9,88,000	
Natasha	7,43,000	
Jack	4,67,000	
Michael	7,00,000	

FILEHOMEINS

Cut

Copy

Paste

Format Painter

Clipboard

Commission

A

E

Commission%20%

- 2. Now write your formula to calculate commission using the cell name

Employees	Annual CTC	Commission
Priyanka	9,88,000	197600
Natasha	7,43,000	148600
Jack	4,67,000	=Commission*C14
Michael	7,00,000	140000

You can start typing the name and excel will automatically pick up the reference

Commission%20%

Just like naming a single cell you can name the entire range as well. Nothing too complicated, just select the entire range and type a name in the name box and then use them in your formula. Here is a snippet

Employees	Annual CTC	Commission
Mickey	3,41,000	=Salary*Commission
Varsha	4,51,000	90200
Chandy	5,27,000	105400
Mandy	2,94,000	58800
Priyanka	9,88,000	197600
Natasha	7,43,000	148600
Jack	4,67,000	93400
Michael	7,00,000	140000

The entire range is named as Salary

Commission%20%

Cell & Range Naming

Cell Naming Rules that you need to keep in mind

- An Excel name can't contain space characters
- The first character of a name must be a letter, underscore (_) backslash (\). Remaining characters in the name can be letters, numbers, period, underscore characters
- Names can contain uppercase and lowercase letters, and Excel does not distinguish between them. For example, North and NORTH are treated as the same name.
- Names cannot be the same as a cell reference, such as A\$35 or R2D2

Additional Naming Options

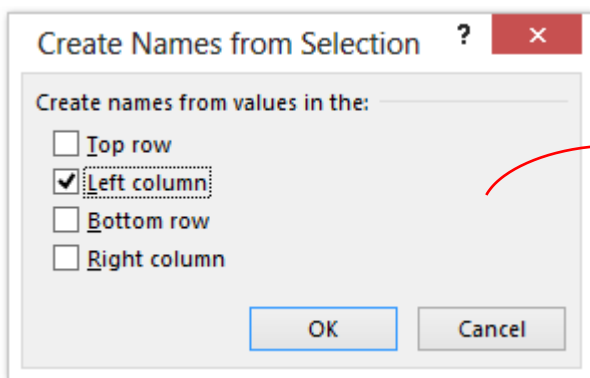
1. To edit/delete/modify the names. Visit name manager by Ctrl + F3. Also can be accessed in the formula tab
2. To auto complete the cell name or your function, use the Tab key
3. To insert the name in your formula use F3 (this will display the list of all names in the workbook)
4. Use the shortcut Ctrl + Shift + F3 to name a bunch of cell together. This is how it works

Lets say we have a range of values

Variables	Values
Loan Tenure	7 Years
Interest Rate	11.25%
Total Loan	15,00,000
GDP Growth	4.95%
Gov Bond 10yr	8.69%
Gov Bond 5yr	8.24%

With these
names

These Cells
to be named



1. Select the entire range including the variable
2. Use the shortcut CTRL + SHIFT + F3 and then tick left columns
3. All the cells with numbers will be named with the variable text values

Formula Based Range Naming

Now that we have covered all good to know stuff, lets have the real meat. So we have a situation where we need to automatically create a sales chart for the most recent quarter

Quarter	North	West	South	East
Q1 2013	25	32	58	91
Q2 2013	34	33	61	120
Q3 2013	37	37	77	168
Q4 2013	48	49	101	205
Q1 2014	67	63	147	247
Q2 2014	73	79	215	311
Q3 2014	92	105	247	445

Need to create a chart for the most recent quarter. So the logic goes like..
When ever new data is added please take that data and make a Chart

So I need to start counting from the start and count till end and pick all the data in the last row.. Sounds right? We'll pick the Offset formula from our arsenal

<div><div>1</div><div>2</div><div>3</div><div>4</div></div> <div>=OFFSET(\$B\$7,COUNTA(\$B\$8:\$B\$19),1,,4)</div>				
Quarter	North	West	South	East
Q1 2013	25	32	58	91
Q2 2013	34	33	61	120
Q3 2013	37	37	77	168
Q4 2013	48	49	101	205
Q1 2014	67	63	147	247
Q2 2014	73	79	215	311
Q3 2014	92	105	247	445

1. The Offset starts at \$B\$7
2. Then counts the number of filled cells from the next cell. We have selected some blank cells in the range so that when we add new data that gets picked up automatically.
3. We then move to the next column by specifying 1
4. Width is set to 4 which will pick up the data in the next 4 columns

Note that this is not the correct place to write the formula. The formula will be written in the Name Box

If you have gotten till here understanding most of what we have discussed then you must be thinking that this can be done by Excel Tables (they are self expanding when new data is added) but my friend they just expand and pick up all the data in the table, but we need to only pick up on the most recent quarter and not all.

We are going to do this by creating a dynamic range (a named range which only pick up the most recent quarter) with a formula

Jack (the genius) will tell us how to do it



Hi my name is Jack

Formula Based Range Naming

=OFFSET(\$B\$7,COUNTA(\$B\$8:\$B\$19),1,,4)			
Quarter	North	West	South
Q1 2013	25	32	58

Copy the formula in the cell edit mode



Now go to the Name Manager (CTRL + F3) in formulas tab and click on the 'New'. A New Name dialogue box will appear

New Name ? X

Name: Last_Row

Scope: Workbook

Comment:

Refers to: =OFFSET(\$B\$7,COUNTA(\$B\$8:\$B\$19),1,,4)

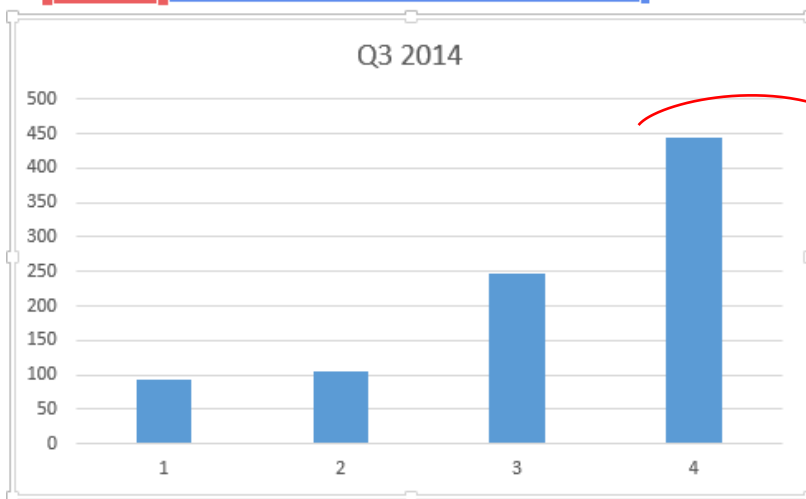
OK Cancel

Enter a suitable name. Keeping in mind the cell naming rules!!

Paste your formula here

Now pick up the last of data and make a simple column chart

Q3 2014	92	105	247	445
---------	----	-----	-----	-----



1. Right click on the chart and choose select data option
2. Then click on Edit in the left column

Edit Series ? X

Series name: ='Dynamic Range'!\$B\$14 = Q3 2014

Series values: ='mapping sheet.xlsx'!Last_Row = 92, 105, 247, ...

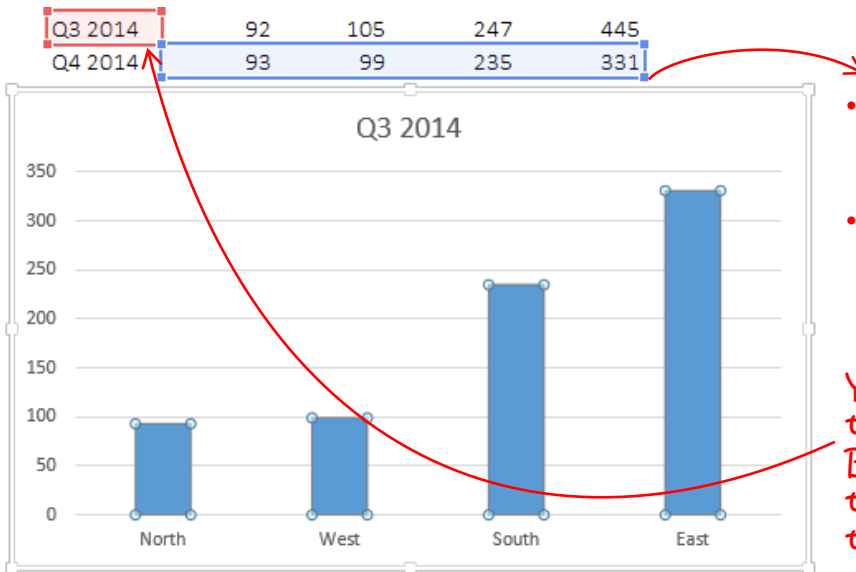
OK Cancel

I have first written the sheet name and then written my named cell (which picks up the last row)

'mapping sheet.xlsx'!Last_row



Formula Based Range Naming



- As soon as I enter new data the Chart updates itself
- But there is a slight problem! Could you figure that out?

Yeah that's right the label of the chart is incorrect !
Because it is not dynamic as the data is. Can you make the label dynamic ?

Jack's Dynamic Data Label Challenge!



Here are a few hints for you excel studs!

1. Create a formula that only picks up the quarter in the last row
2. Name a cell with that formula
3. Place it in the chart!!



6. Form Controls

Form Controls

Ever imagined talking to your spreadsheet report



You: Hi, Spreadsheet can you show the comparison between Co A and Co B and take off Co C from the chart



Spreadsheet: Sure sir.. <Some operations....axkj jhbkznkpbwhih921u392u49> here you go.. This is the updated chart with only Co A and Co B information



You: Ok great, Now I want the top ten customers for Co A and Co B



Spreadsheet: <asldk289.amskjdf912342.o> here are the top 10 list of customers (with graphs) for Co A and Co B

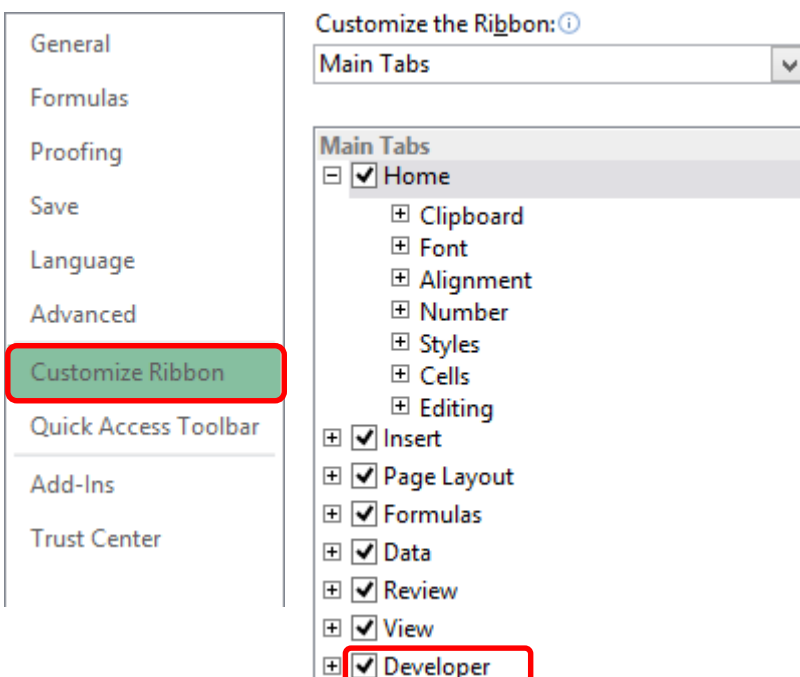
The form controls feature let's you do just that. Cool..eh? We can develop some self explanatory buttons and tools to get answers to questions like above and make our bosses happy... So let's do this

Where are Form Controls ?

Form controls are placed in the Developer Tab. If you are unable to locate the Developer Tab you'll probably have to turn it on

Turning on the Developer Tab Excel 2010 and 2013

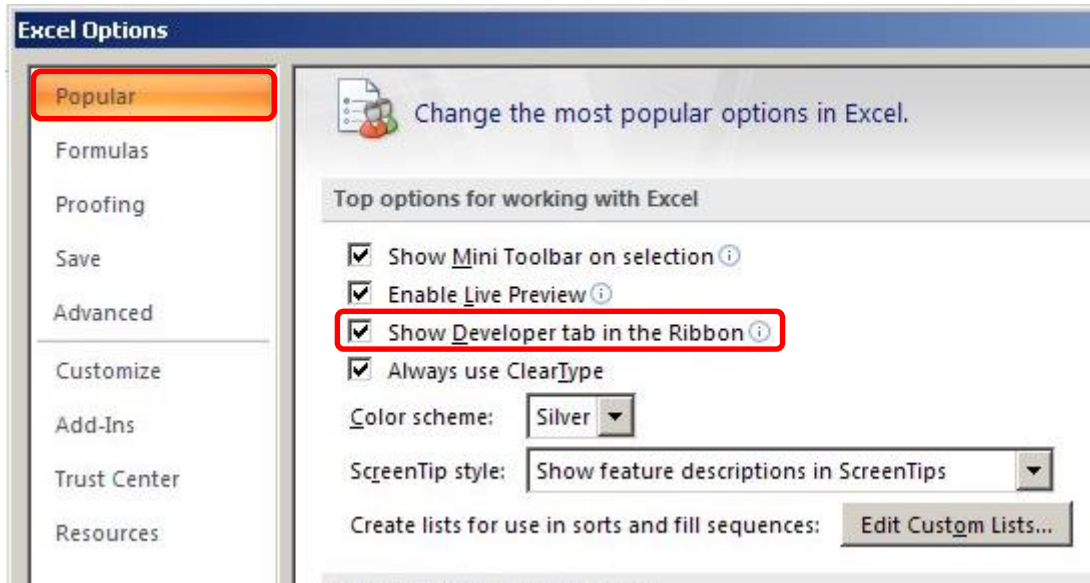
1. Go to Excel Options in the FILE Tab
2. In the Excel Options Window go to Customize Ribbon in left panel
3. And tick on 'Developer' option



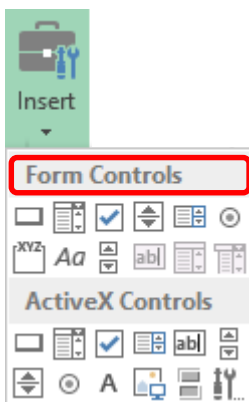
Form Controls

Turning on Developer Tab in Excel 2007

1. Visit the 'Excel Options' again by clicking the Microsoft Window button on the top left corner of the screen
2. The Popular Tab (left panel) will have option to turn on the Developer Tab



Inserting Form Controls



Click on the Insert button drop down in the Developer Tab for accessing a whole range of Form controls. As you can see there are two types of controls and both look similar, the other one being Active X Controls. We'll talk about them once we finish discussing Form Controls

Let's get started! There are 9 of them out there of which **we will cover 6**. Before I start naming each and help you understand how to use them, I just want to mention two critical aspects about Form Controls

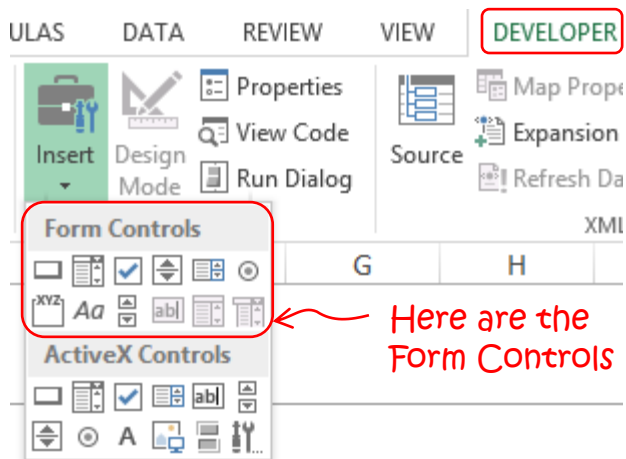
- 1. Using Form Controls** – Form controls are extremely easy and intuitive to use. For example if you see a scrollbar you don't need an Einstein brain to figure out what to do with it.. Its simple.. Just scroll baby, just scroll up and down
- 2. Creating Form Controls** – Now here is where you will require some geniuses because you need to connect that scrollbar to your data in excel so that when the user is using it, it populates correct data

Our learning will be focused on becoming geniuses i.e. Creating Form Controls



Form Controls

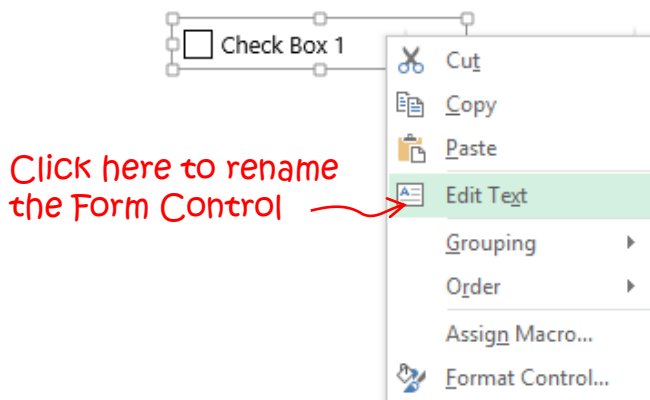
Creating Form Controls – Form controls are found in the Insert Tab drop down in the Developer Tab



You can pick any form control and cursor icon will change to a plus sign. Simply drag the plus sign on the sheet and Form Control will be drawn. No rocket science, its very intuitive!

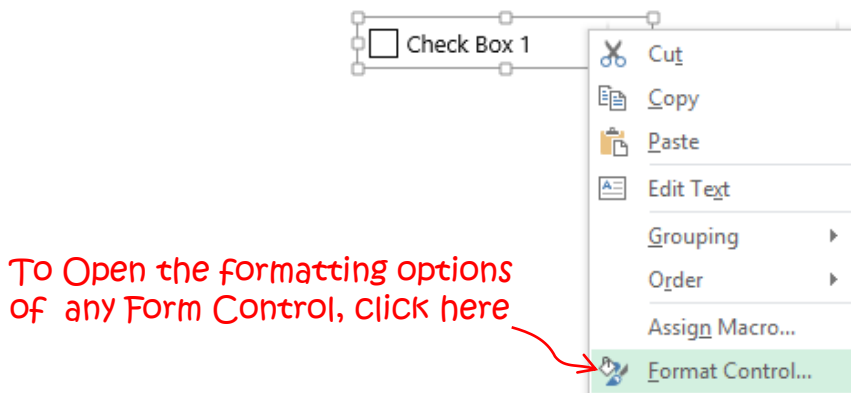
Renaming Form Controls

Form Controls make no sense with their default names the. So you can right click on (any) form control and choose Edit Text option. When you are done editing the name simply press the Esc key. The form control naming has no effect on their working, its is just for the reference of the user



Format Control Options

This is where the real game lies. Each Form Control comes with different formatting options. In the coverage ahead we are mainly going to discuss only the formatting options of some very useful form controls



Form Controls

1. Button

Button 1


Looks and works like any button. So what would happen if you press the (on/off) button on your laptop.. Yeah right your laptop will turn ON or it will turn OFF? .. Getting smarter.. Huh?


Just as the way buttons work in real life.. They do something. The excel Form Control Button will also do something. Now that something comes from a Macro so as soon as you draw the Button control excel will populate an Assign Macro window to assign some Macro (that will do something) to that button you just created. When you press the button that macro will run

Here we are setting our bounds to some crazy out of the box stuff without using VBA

2. Combo Box

I am sure you are familiar with the List option in Data Validation which creates a drop down, the combo box is just a bit different. The format control gives 3 design options to link this with the spread sheet

Input range:  ← Range to be shown in drop down list

Cell link:  ← The cell (any cell) which is to be linked to the spreadsheet

Drop down lines: ← When you drop down the list how many items you want to show. The rest can be scrolled

- If you select the first Item ...any item (text or num) from the list, the cell linked will show number 1
- If you select second item it will show number 2 and so on

I know the above explanation is not enough, we need to be more practical here so lets do a case. You have a long list of Emp IDs and Grades, you need to make a combo box which selects one ID and based on that it shows the grade of the employee

Emp Id	Grade
EMP ID 10	Vice President
EMP ID 11	Vice President
EMP ID 12	Manager
EMP ID 13	Vice President
EMP ID 14	Manager
EMP ID 15	Vice President
EMP ID 16	Associate
EMP ID 17	Associate
EMP ID 18	Vice President
EMP ID 19	Vice President

40+ records

Step 1) Insert a Combo Box, close to the data on the sheet. That is simple!!

Form Controls

Step 2) Open the format controls of the combo box inserted and select the data from the sheet, link it to cell in the sheet and specify the drop down lines

Range of employee IDs

A cell linked to sheet, which will change as the user selects the value from the drop down

No of items that will be displayed in the drop down, rest can be scrolled

Step 3) Now when you click the combo box dropdown it will show the list drop down of the EMP IDs we just need to connect the drop down to a formula that fetches the correct grade for that ID.. Which is our regular INDEX or a VLOOKUP (you are already a pro at it)

Emp Id	Grade
EMP ID 10	Vice President
EMP ID 11	Vice President
EMP ID 12	Manager
EMP ID 13	Vice President
EMP ID 14	Manager

When list item is picked, the number of the list item gets displayed in the cell

A simple index formula to get the desired Grade for the Emp ID selected

We'll this could have been done without the combo box as well.. but at times combo box serves as a great utility in dashboards and automation reports!

Form Controls

3. Spin Button



They are pretty simple to construct, but they can only be constructed like a portrait. By looking at spin button you can realize that it is meant to increase or decrease a particular value

Let's create a spin button and open the Format Control box

Current value:	<input type="text" value="1"/>	← Current Value displayed at start
Minimum value:	<input type="text" value="0"/>	← Minimum Value
Maximum value:	<input type="text" value="100"/>	← Maximum Value
Incremental change:	<input type="text" value="2"/>	← Increment when you click the button
Page change:	<input type="text"/>	
Cell link:	<input type="text" value="\$I\$9"/>	← Address of the linked cell

Since we specified the current value as 1, we start from 1 and increment by 2 till we reach 100 (3,5,7,9 and so on..) each time you click the up button

▲	<input type="text" value="1"/>
▼	

4. Option Button

☐ Option Button 1

Option button are meant to give the user the flexibility of choosing an option between some. You can insert as many option button on a single sheet and link them all to a single cell. Lets insert 4 option buttons on the sheet and work with them

- ☐ Option 1
 - ☐ Option 2
 - ☐ Option 3
 - ☐ Option 4
- Apart from inserting 4 option buttons
I have also renamed them by right clicking and choosing Edit Text option
Let's format them each!

The format Control box gives us the only option to link each of the Option button to a single cell in the sheet

- ☒ Unchecked
- ☐ Checked
- ☐ Mixed

Cell link: ← Address of the linked cell

Form Controls

When you change the value of the Option Button the value updates in the linked cell

- ☐ Option 1
- ☐ Option 2
- ☒ Option 3
- ☐ Option 4

3

Note that the linked cell picks up the value as per the order of options button inserted.. So the option button inserted first will by default have the number 1 and so n. The cell value has nothing to do with the text that you enter to name the option button

You can use them in various scenario analysis

4. List Box

The list box can hold a list of values (some) visible at a time (if your list is large) and lets the user choose any one of the list item. Depending the number of the item chosen (from top to bottom) it will give its sequence number. Lets explore this as well

Here is how we format this

Input range:

Cell link:

Selection type

☒ Single

☐ Multi

☐ Extend

Although the format control gives us the option to select multiple values from the list, but alas! multiple values cant be executed without a VBA Code (macro)

Ravi

Peter

Suzzane

Mike

Poppy

Tina

Ayisha

Katie

Anisha

1

5. Check Box ☐ Check Box 1

The check box lets you check and uncheck the button and return a TRUE/FALSE Boolean where TRUE means 1 and FALSE means 0. The format controls of the Check Box looks like this

Value

☒ Unchecked

☐ Checked

☐ Mixed

Cell link:

Only gives you the option to link to a cell address. When you check the check box it returns TRUE, when unchecked it returns FALSE

Form Controls

6. Scroll Bar



The scroll bar scrolls a particular value up or down. You can insert the scroll bar horizontally or vertically. Lets first get the format control basic right and then delve into an interesting case

The value appears as per the scroller's position in the bar

Change in value when you click the corner arrows

Change in value when you click in between the scroll bar

Linked cell in the sheet

Case – Making a scrollable list!!

Lets say that we have a long list of Employee Names and their Cost to Company

Names	CTC
Rishika Rajpurohit	22,50,000
Uma Paul	4,90,000
Danish Shaikh	13,30,000
Anindita Baishya agrawal	8,00,000
Gayatri Soni	12,80,000
Nisha Das	8,00,000
Shivali Sharma	24,80,000

150 records

Step 1) Create a vertical scroll bar and link it to a cell in the sheet

1. Minimum value has been set to 0

2. Maximum value has been set to 140

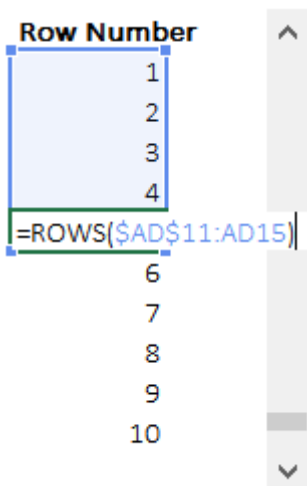
3. And linked a cell in the sheet

1. Minimum value has been set to 0
2. Maximum value has been set to 140
3. And linked a cell in the sheet

The reason why have we specified mini value as 0 and max value as 140 will be clear to you in a while!!

Form Controls

Step 2) Add row numbers next to the scroll bar. Use the =ROWS function with an expanding array (freeze only the first part of the range)



Step 3) Write a simple INDEX formula to pull the records from the table. Lets see how the INDEX formula is working

Names	CTC
Rishika Rajpurohit	22,50,000
Uma Paul	4,90,000
Danish Shaikh	13,30,000
Anindita Baishya agrawal	8,00,000

Row Number
1
2
3

Names	CTC
Uma Paul	
Danish Shaikh	

Diagram illustrating the INDEX formula: `=INDEX(AA10:AB159,$AD11+$AF$9,1)`. The formula is broken down into four parts: 1. `AA10:AB159` (Range), 2. `$AD11+$AF$9` (Row Number), 3. `1` (Column Number), and 4. `1` (Array Constant).

- It is taking the array on the data range specified
- The row number is deriving from the ROWS function used and we are adding the value in the cell linked to the scroll bar.
 - WHY ? Because when you scroll down.. The value will change (2,3,4, and so on) the new value will then be added to the ROWS function that is being fed into the INDEX... phew!! Too much is it??
- The column number is 1 for the Names and should change to 2 (manually) when to copy the formula right to fetch the CTCs

This trick is incredibly helpful in dashboards, you can further compact the formula by consolidating the logic in a single formula and may be using the MATCH function to fetch the column numbers



7. Pivot Tables

Pivot Tables

In my opinion Pivot Table's usage has been mixed. Some live and sleep with it and some shy away. I am going to discuss some basic stuff and more of unconventional advanced stuff in this topics. Let's see if I can spurt your love for pivot tables ?

Let's roll some unique features with a case (data)

Date	Sales Rep	Customer	Sales	Profit	Region
30-Dec-05	Varsha	Shyam & Shar	10900	3920	East
17-Nov-07	Veronica	MNTL	13050	3040	West
06-Jul-05	Ramesh	Sharma & Co	12300	5720	West
06-Nov-06	James	Sharma & Co	10400	5680	South
21-Mar-08	Rajat	White Associa	14200	5240	South
16-Jun-05	Varsha	Shyam & Shar	10450	4500	South
12-Mar-06	Swati	Boston Consu	12350	3620	South
08-Aug-06	Charley	Shah Associati	12450	2860	North
10-Sep-07	Mark	Namint Enterp	10450	2720	West

~600 such records

Exploring the Grouping Feature

We want to summarise the data region wise by quarterly sales. So we draw a quick pivot table on the data and it looks like this

Sum of Sales		Region			
Date	East	North	South	West	Grand Total
30-May-05		14900			14900
31-May-05			12400		12400
05-Jun-05			14150		14150
07-Jun-05			11100		11100
09-Jun-05	12650				12650
12-Jun-05	10800				10800
13-Jun-05	12950				12950
14-Jun-05			11950		11950
16-Jun-05			10450		10450
18-Jun-05				13900	13900

Filters

Region

Rows

Date

Columns

Region

Values

Sum of Sales

A pivot table with Region in columns and Date in Rows looks like this

But this kind of pivot table wont be of much help since the dates are not showing in quarters and years. So Let's group them

- 1. Right click on the dates in the pivot table data and choose Group
- 2. Then Group it with quarters and years

Pivot Tables

Once you have done the grouping the data will show something like this. Beautiful.. Just as we wanted!

Sum of Sales		Region				
Years	Date	East	North	South	West	Grand Total
2005	Qtr2	59350	49350	72000	28800	209500
	Qtr3	158950	34900	111000	161450	466300
	Qtr4	161900	124350	133800	175400	595450
2006	Qtr1	146950	169950	115250	100900	533050
	Qtr2	100100	218750	178300	155800	652950
	Qtr3	109200	96000	40250	138000	383450
2007	Qtr4	187850	144650	166150	183400	682050
	Qtr1	218400	178000	194700	151300	742400
	Qtr2	196600	127950	112700	197150	634400
2008	Qtr3	87550	211950	197500	94300	591300
	Qtr4	203550	186000	102700	151200	643450
	Qtr1	156200	144700	229050	130350	660300
	Qtr2	90200	137350	181650	188250	597450
	Qtr3		13150			13150
Grand Total		1876800	1837050	1835050	1856300	7405200

Just as this you can do grouping in multiple ways

Problems associated with Grouping

This was cool, lets check out some problems that you might face with grouping. Lets create another pivot table on a different sheet with the same data and try and group the dates into months and years this time

Row Labels	Sum of Sales
Qtr1	1935750
2006	533050
2007	742400
2008	660300
Qtr2	2094300
2005	209500
2006	652950
2007	634400
2008	597450
Qtr3	1454200
2005	466300
2006	383450
2007	591300
2008	13150
Qtr4	1920950
2005	595450
2006	682050
2007	643450
Grand Total	7405200

PivotTable Fields

Choose fields to add to report:

- ☒ Date
- ☐ Sales Rep
- ☐ Customer
- ☒ Sales
- ☐ Profit
- ☐ Region
- ☒ Years

Drag fields between areas below:

FILTERS	COLUMNS
ROWS	VALUES
Date	Sum of Sales
Years	

☐ Defer Layout Update UPDATE

Just for saving space I have skipped inserting the regions in the columns

Notice 2 things

1. Since you had grouped the earlier pivot with Years and quarter a new year field starts to appear
2. If you change the grouping by months the earlier pivot also changes.. That is not what we want

Pivot Tables

The solution is to separate the grouping for each pivot table, so we are going to go back in 2003 and take the solution from there. Old is gold!! Lets create a pivot table like the way it was done in version 2003. The shortcut was **ALT D P**. It will pop with the 3 stage process

PivotTable and PivotChart Wizard - Step 1 of 3

Where is the data that you want to analyze?

☒ Microsoft Excel list or database

☐ External data source

☐ Multiple consolidation ranges

☐ Another PivotTable report or PivotChart report

What kind of report do you want to create?

☒ PivotTable

☐ PivotChart report (with PivotTable report)

Cancel < Back Next > Finish

1. Click Next, make sure that the options selected here match with your working

Date	Sales Rep	Customer	Sales	Profit	Region
30-Dec-05	Varsha	Shyam & Shar	10900	3920	East
17-Nov-07	Veronica	MNTL	13050	3040	West
06-Jul-05	Ramesh	Sharma & Co	12300	5720	West
06-Nov-06	James	Sharma & Co	10400	5680	South
21-Mar-08	Rajat	White Associa	14200	5240	South
16-Jun-05	Varsha	Shyam & Shar	10450	4500	South
12-Mar-06	Swati	Boston Consu	12350	3620	South
08-Aug-06	Charlev	Shah Associat	12450	2860	North
10-Sep-07					
16-Nov-07					
06-Dec-06					
18-Mar-06					
03-Dec-07					
07-Jan-06					

2. It will self select the data and show you the range, Click Next

Your new report will use less memory if you base it on your existing report [mapping sheet.xlsx]Pivot1 - Grouping!PivotTable1, which was created from the same source data. Do you want your new report to be based on the same data as your existing report?

• If you click Yes, you will save memory and your workbook file will be smaller.

• If you click No, the two reports will be separate.

Yes No

3. Now this dialogue box is important. If you read the message it says you'll save memory if you choose to keep the same grouping as the other pivot table but that is exactly that we don't want to do.. So choose NO

After you are done with this process you can freely group the dates in a different date structure

Pivot Tables

The grouping feature also can split the data in class intervals. Take a look at this case

Age	Name
40	Varsha
38	Veronica
23	Ramesh
29	James
32	Rajat
24	Varsha
39	Swati
31	Charley

Names and age of
about 600 people

We want to find the number of people in the following categories

- 20-24
- 25-29
- 30-34
- 35-40

FILTERS	COLUMNS
ROWS	VALUES
Age	Count of Name

We have dropped the Age in the rows and Name in Columns (that will give the count of name)

Row Labels

Count of Name

20	
21	
22	
23	
24	
25	
26	
27	

Grouping

Auto

☒ Starting at:

20

☒ Ending at:

40

By:

5

OK

Cancel

In the grouping dialogue box we simply define the start and end age brackets and specify the class interval to be 5

Row Labels	Count of Name
20-24	167
25-29	132
30-34	132
35-40	159
Grand Total	590

And we get the desired result

Pivot Tables

The problem occurs when the data (numbers) are in decimal units

Wage/Hour	Name	
\$24.61	Varsha	
\$38.78	Veronica	
\$40.50	Ramesh	
\$30.20	James	
\$37.54	Rajat	
\$29.84	Varsha	
\$35.27	Swati	
\$22.81	Charley	

We want to find the number of people in the following wage categories

- 20-24
- 25-29
- 30-34
- 35-39
- 40-44

Tweaked the data a bit with Names and Wage/Hour

We follow the same pattern to add Age to Rows Field and Name to the Values field in the pivot table

Row Labels	Count of Name	
20-25	131	
25-30	149	
30-35	124	
35-40	155	
40-45	31	
Grand Total	590	

Take a look at the Class intervals and answer the following question

In which category the value 30 will belong ?

- Category 2
- Category 3

When the grouping feature in pivot tables are dealing with decimal numbers the categories are created in continuous forms but our question is still unanswered. In this kind of grouping lower limit is included and upper limits is not included in category. **So the value 30 will belong to category 3**

Slicers and Timelines in Pivot Tables

If you have not been a serial user of excel 2010 and pivot tables then Slicers will send you a tingle.. Ready for the tingle?

If I have to explain slicers, I would say they are better looking filters that can be applied on pivot table reports. Consider this Pivot Table report of our initial data with date as years in columns and customers in rows

Sum of Sales	Date					
Customer	2005	2006	2007	2008	Total Sales	
Boston Consultants	46100	186750	244450	90750	568050	
Data Tronics	118700	127750	218000	70450	534900	
Good Fly	101350	275800	186300	141050	704500	
India Trotters	120550	151300	209200	176850	657900	
Jindle Power Works	154900	149050	210500	52150	566600	
MNTL	121150	219450	160550	62600	563750	
Namint Enterprises	78300	229600	298450	114250	720600	
Shah Associates	72400	176500	283850	89800	622550	
Sharma & Co	129550	173050	220150	98450	621200	
Shyam & Sharma Co	156000	201900	165650	139450	663000	
VCC	75750	230950	269150	59100	634950	
White Associates	96500	129400	145300	176000	547200	
Total Sales	1271250	2251500	2611550	1270900	7405200	

PivotTable Fields

Choose fields to add to report:

☒ Date
☐ Sales Rep
☒ Customer

Drag fields between areas below:

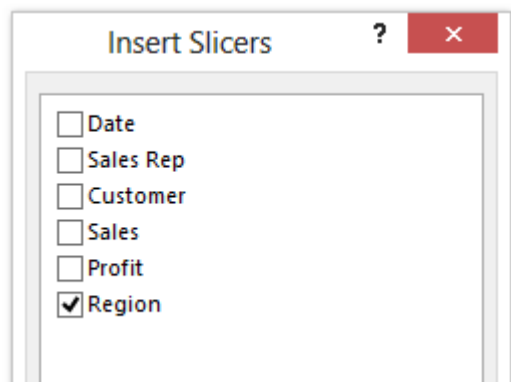
FILTERS	COLUMNS
	Date
ROWS	VALUES
Customer	Sum of Sales

Pivot Tables

Find slicer option the Insert Tab. As soon as you click on slicer excel will throw a dialogue box asking on which field do you want to apply slicers?



This is a slicer, found in the Insert Tab



Sum of Sales	Date					
Customer	2005	2006	2007	2008	Total Sales	Region
Boston Consultants	46100	186750	244450	90750	568050	East
Data Tronics	118700	127750	218000	70450	534900	North
Good Fly	101350	275800	186300	141050	704500	South
India Trotters	120550	151300	209200	176850	657900	West
Jindle Power Works	154900	149050	210500	52150	566600	
MNTL	121150	219450	160550	62600	563750	

Excel inserts a neat looking option box (slicer) where you can choose between different regions

Got the tingle? Now let's explore **Timelines** (to enhance the tingle) along with slicer on the same data. Just next to slicer you will find the option for inserting timelines. Could not see it ? Hmm

Timelines (enhanced tingle) is available in Excel 2013 only.. So upgrade!!

Nevertheless, check out its awesomeness



Timelines in Insert Tab of Excel 2013

Pivot Tables

Check out the timelines are inserted on Dates. You can select partial period to display adequate data. You can also change the unit of the date from months to quarters to even days

Sum of Sales

Date

Customer

2005

Total Sales

Data Tronics	14900	14900
Sharma & Co	12400	12400
Total Sales	27300	27300

Region

East

North

South

West

Date

Jan - May 2005

MONTHS

2005

JAN

FEB

MAR

APR

MAY

JUN

JUL

Timelines can be adjusted to select relevant time period.. And look equally awesome!!

One of the issues that you may face with Slicers and Timelines is that you may want to attach a single slicer to many pivot tables or vice versa, here is how you do that

Sum of Sales	Date	
Customer	2005	Total Sales
Data Tronics	14900	14900
Sharma & Co	12400	12400
Total Sales	27300	27300

Sum of Sales	Date	
Sales Rep	2005	Total Sales
Mark	14900	14900
Rajat	12400	12400
Total Sales	27300	27300

Region

East

North

South

West

So I have two pivot tables from the same data and a single slicer should work on both pivot tables

1. Select the slicer that you want to connect or disconnect and go Options Tab (only highlights when you select the slicer)
2. Click on Report Connections
3. In the dialogue box pick up the pivot tables where you want to link the slicer

Report Connections (Region) ? x

Select PivotTable and PivotChart reports to connect to this filter

Name	Sheet
<input type="checkbox"/> PivotTable1	Pivot1 - Grouping
<input type="checkbox"/> PivotTable2	Pivot2 - Grouping Pr...
<input checked="" type="checkbox"/> PivotTable1	Sheet4
<input checked="" type="checkbox"/> PivotTable2	Sheet4

OK Cancel

Pick up the pivot tables you want to link on unlink to the slicer here

Pivot Tables

Now that we have looked at some unique features of Pivot Tables lets grab some calculations too

Running Totals

Let's say we have grouped the dates by month and years and calculated sales

Row Labels		Sales
2005		
May		27300
Jun		182200
Jul		151400
Aug		234800
Sep		80100
Oct		292950
Nov		147200
Dec		155300
2006		
Jan		214100
Feb		122500
Mar		196450
Apr		274650
May		228050
Jun		150250

ROWS

Years

Date

☐ Defer Layout Update

UPDATE

VALUES

Sales

Running Total

Jan (214100)

Jan + Feb (214100 + 122500)

Jan + Feb + March (214100 + 122500 + 196450)

And so on.. For all years

This is what we want!

Right click on the sales and select

2005

May	27300
Jun	182200
Jul	151400
Aug	234800
Sep	80100
Oct	292950
Nov	147200
Dec	155300

2006

Jan	214100
Feb	122500
Mar	196450
Apr	274650
May	228050
Jun	150250

Copy

Format Cells...

Number Format...

Refresh

Sort

Remove "Sales"

Summarize Values By

Show Values As

Show Details

Value Field Settings...

PivotTable Options...

Show Field List

No Calculation

% of Grand Total

% of Column Total

% of Row Total

% of...

% of Parent Row Total

% of Parent Column Total

% of Parent Total...

Difference From...

% Difference From...

Running Total In...

% Running Total In...

Choose this option

Then select the running total on Dates

Pivot Tables

Then select the running total on dates and your sales column will be replaced by running total grouped by years. Just add sales again to your value field to have two columns – one for running total and the other for sales

Show Values As (Sales) ? X

Calculation: Running Total In

Base Field: Date

OK Cancel

Row Labels	Running Total	Sales
2005		
May	27300	27300
Jun	209500	182200
Jul	360900	151400
Aug	595700	234800
Sep	675800	80100
Oct	968750	292950
Nov	1115950	147200
Dec	1271250	155300
2006		
Jan	214100	214100
Feb	336600	122500
Mar	533050	196450
Apr	807700	274650
May	1035750	228050
Jun	1186000	150250
Jul	1305150	119150
Aug	1455450	150300

Sales column

Running Total (column name has been renamed)

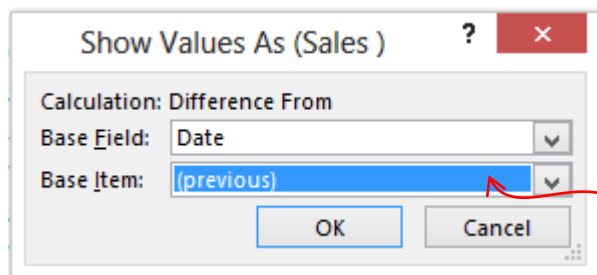
Just as running total we also have **difference from calculation**, lets check that out. I have restored the earlier monthly sales and now we want to take the difference from the last month

Row Labels	Sales	Difference From Last Month
2005		
May	27300	0
Jun	182200	154900
Jul	151400	-30800
Aug	234800	83400
Sep	80100	-154700
Oct	292950	212850
Nov	147200	-145750
Dec	155300	8100
2006		
Jan	214100	

The additional column is telling us if the sales have increased or decreased from the last month

Pivot Tables

Right click on the sales and choose → Show Values as → Difference from option → click on Previous in the dialogue box → OK



Row Labels	Sales	Difference from previous Month
2005		
May	27300	
Jun	182200	154900
Jul	151400	-30800
Aug	234800	83400
Sep	80100	-154700
Oct	292950	212850
Nov	147200	-145750
Dec	155300	8100
2006		
Jan	214100	
Feb	122500	-91600
Mar	196450	73950
Apr	274650	78200
May	228050	-46600

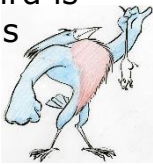
Here is the result.. Pure awesomeness

You might want to check out some other interesting options like

- Ranking of the data
- % Difference from (to calculate the % change)
- % Running total (to calculate % additions)
- Many more useful operations depending on your needs

Pivot Table – Data Models

Finally we now come to a bird called Data Model in Pivot Table. This bird is found in excel 2013 and beats the shit out data analysis.. Guys here is **DATA MODEL**



Jokes apart, data model feature really takes the analysis capabilities of pivot table to another level. Lets begin with an example

Date	Sales Rep	Customer Code	Sales	Profit	Region
30-Dec-05	Varsha	CUSTN 1016	10900	3920	East
17-Nov-07	Veronica	CUSTN 1021	13050	3040	West
06-Jul-05	Ramesh	CUSTN 1022	12300	5720	West
06-Nov-06	James	CUSTN 1020	10400	5680	South

We have our old Sales Data with Customer Code this time

Customer	Customer Code	Association Date
Shyam & Sharma Co	CUSTN 1011	23-Jun-05
MNTL	CUSTN 1012	04-Aug-05
Sharma & Co	CUSTN 1013	09-Jun-05
White Associates	CUSTN 1014	28-Jul-05
Boston Consultants	CUSTN 1015	01-Jul-05
Shah Associates	CUSTN 1016	11-Jul-05
Namint Enterprises	CUSTN 1017	05-Jun-05
Data Tronics	CUSTN 1018	22-Aug-05
VCC	CUSTN 1019	11-Aug-05
India Trotters	CUSTN 1020	03-Sep-05
Good Fly	CUSTN 1021	13-Jun-05
Jindie Power Works	CUSTN 1022	07-Aug-05

Customer data, with 12 unique customer names. These are the same customers that appear in the sales table with Customer code and an association date

Now convert the data in Excel Tables (refer to the tables reading) by pressing Ctrl + T

- Name the Sales table as mysales
- Name the Customer table as Customers

Make a pivot table from the sales data and be sure to check the data model in the Pivot Table dialogue box

Create PivotTable ? x

Choose the data that you want to analyze

☒ Select a table or range

Table/Range: MySales

☐ Use an external data source

Choose Connection...

Connection name:

Choose where you want the PivotTable report to be placed

☒ New Worksheet

☐ Existing Worksheet

Location:

Choose whether you want to analyze multiple tables

☒ Add this data to the Data Model

OK Cancel

Be sure to check the Data Model option before you click OK

Pivot Table – Data Models

Let's keep some the data model aside for a while and let's get our head around a couple of concepts

Primary Key – Sound like you have heard it ?? It is the genesis of forming data relationships. Anything item which is unique and exists in a set of data is a primary key. Could you guess what is the primary key in our sales data ?

Date	Sales Rep	Customer Code	Sales	Profit	Region
30-Dec-05	Varsha	CUSTN 1016	10900	3920	East
17-Nov-07	Veronica	CUSTN 1021	13050	3040	West
06-Jul-05	Ramesh	CUSTN 1022	12300	5720	West
06-Nov-06	James	CUSTN 1020	10400	5680	South

If you have guessed correctly, there is **no primary key** in our sales data, since no unique field exists

Ok how about the customer data, what is the primary key here ?

Customer	Customer Code	Association Date
Shyam & Sharma Co	CUSTN 1011	23-Jun-05
MNTL	CUSTN 1012	04-Aug-05
Sharma & Co	CUSTN 1013	09-Jun-05
White Associates	CUSTN 1014	28-Jul-05
Boston Consultants	CUSTN 1015	01-Jul-05
Shah Associates	CUSTN 1016	11-Jul-05
Namint Enterprises	CUSTN 1017	05-Jun-05
Data Tronics	CUSTN 1018	22-Aug-05
VCC	CUSTN 1019	11-Aug-05
India Trotters	CUSTN 1020	03-Sep-05
Good Fly	CUSTN 1021	13-Jun-05
Jindal Power Works	CUSTN 1022	07-Aug-05

The primary key here is the **customer code**. If you are thinking the primary key to be Customer Name, which is wrong because in the real world the customer names can be same (but as of now they are not repeating)

Foreign Key – would be the repeated records in table which can be uniquely identified by records in another table.. Eh?? Ok ok sorry for the weird definition take a look at the example.

Customer Code in Sales Table is a Foreign Key, WHY ? because the records are repetitive but if I want to bring together all the transaction of a particular customer code together I have a customer table with unique customer code that matches with the customer codes (multiple entries) in the sales table!! I hope you got it this time.. NO?? Read again, slowly, you'll get it

Date	Sales Rep	Customer Code	Sales	Profit	Region
30-Dec-05	Varsha	CUSTN 1016	10900	3920	East
17-Nov-07	Veronica	CUSTN 1021	13050	3040	West
06-Jul-05	Ramesh	CUSTN 1022	12300	5720	West
06-Nov-06	James	CUSTN 1020	10400	5680	South

Customer Code in mysales table is the foreign key that can be identified uniquely with the Customer code in customers table

Pivot Table – Data Models

Coming back to our pivot table. Take a look at the pivot table field list, Mysales table has been added. Note a few visual and conceptual difference

1. A little table symbol in front of MySales – displaying column headers in it
2. A separate tab for Active tables and All tables

PivotTable Fields

ACTIVE | ALL

Choose fields to add to report:

- ☒ MySales
- ☐ Date
- ☐ Sales Rep
- ☐ Customer
- ☐ Sales

Two tabs for Active Tables and All Tables

MySales table added to the pivot table Field List

PivotTable Fields

ACTIVE | ALL

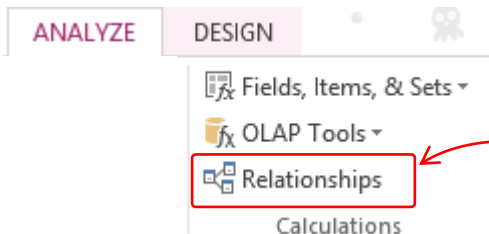
Choose fields to add to report:

- ☒ Customers
- ☐ Customer
- ☐ Customer Code
- ☐ Association Date

Show in Active Tab

Right Click and take the customers to the Active Tab for further analysis

Now establish the relationships that we have just learnt



The Relationships exist in the Analyze Tab. Click and establish a new relationship

Pick the tables and columns you want to use for this relationship

Table:	MySales	Column (Foreign):	Customer Code
Related Table:	Customers	Related Column (Primary):	Customer Code

Creating relationships between tables is necessary to show related data from different tables on the same report.

OK Cancel

- Customer Code in Customers table is the Primary key
- Customer Code in MySales table is the foreign key
- Click OK

Pivot Table – Data Models

Now that we done set up the field for our analysis lets make a pivot table report. Notice a couple of interesting things going around here..!!

Sum of Sales		Column Labels			
Row Labels	East	North	South	West	Grand Total
Boston Consultants	183800	96450	175850	147000	603100
Data Tronics	150150	113450	117150	169650	550400
Good Fly	130400	134450	108850	186300	560000
India Trotters	139450	160450	228400	115600	643900
Jindle Power Works	141100	89300	177200	192050	599650
MNTL	143300	173000	85900	101000	503200
Namint Enterprises	153250	117450	257300	115600	643600
Shah Associates	185750	134650	211050	226450	757900
Sharma & Co	170700	207300	104400	175700	658100
Shyam & Sharma Co	174250	151300	102150	154300	582000
VCC	127500	206650	103850	183950	621950
White Associates	177150	252600	162950	88700	681400
Grand Total	1876800	1837050	1835050	1856300	7405200

PivotTable Fields

ACTIVE | ALL

Choose fields to add to report:

Customers

☒ Customer

☐ Customer Code

☐ Association Date

MySales

☐ Date

☐ Sales Rep

☐ Customer Code

☒ Sales

☐ Profit

Drag fields between areas below:

FILTERS

COLUMNS

Region

ROWS

VALUES

Customer

Sum of Sales

☐ Defer Layout Update

UPDATE

- You have two tables MySales and Customers and their columns to choose from
- I have taken Customer (name) from the Customers table and Region and Sales values from the MySales table and make a pivot out of it

Now this is really something incredible.. No VLOOKUP stuff to get the customer name and then make a pivot, I deserve a treat here.. Don't I?

This way you can do multiple tables and link them in a single pivot table. Just a couple of things before I close on Pivot Tables

- **Identical data type in both columns:** Columns that you are connecting in both tables should have same data type (i.e. both numbers or dates or text etc.)
- **One to one or One to many relationships only:** Data Model works with only one to many or one to one relationships. That means one of the tables must have no duplicate values on the column you are linking to



8. Custom Formatting & Applications

Custom Formatting and Applications

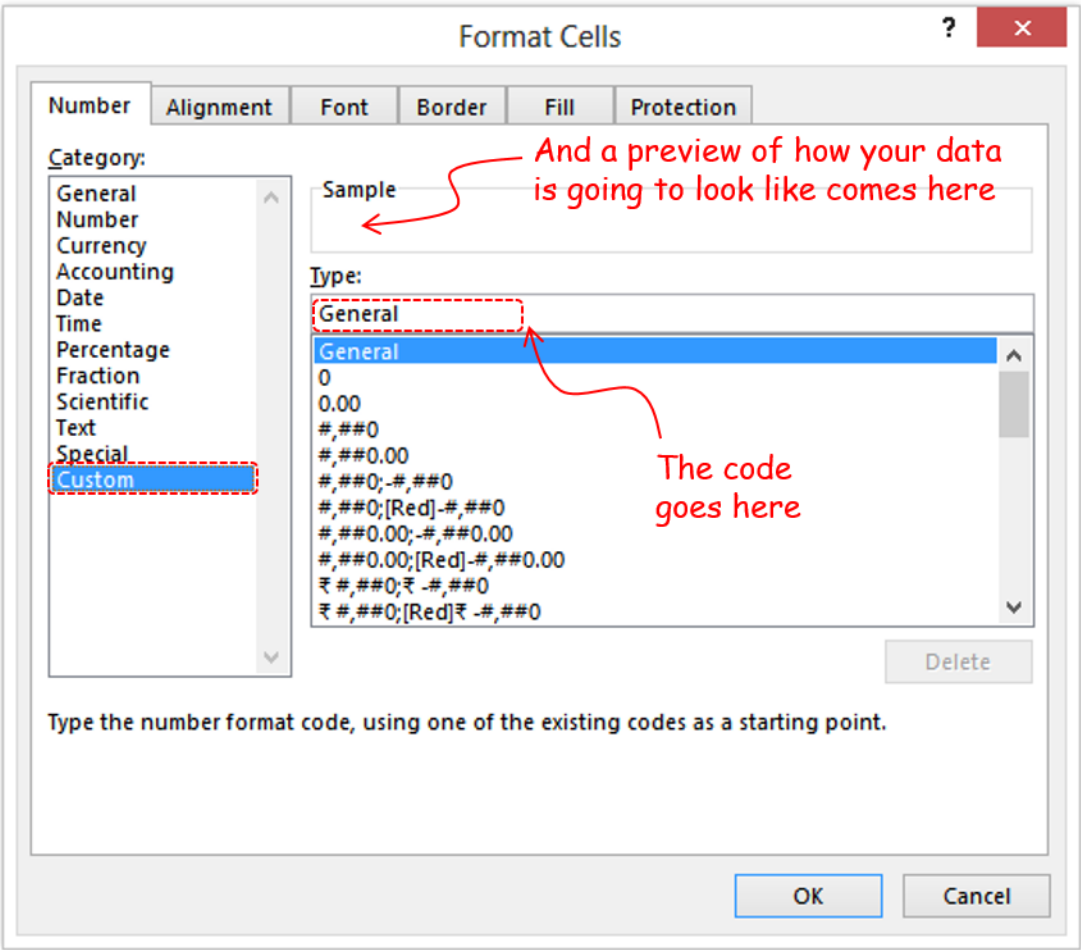
This feature allow you the change the way how your data appears.. Something like before and after make up transformation



But just as the old and wise say.. Make up does not change who you really are! So does it apply to custom formatting, it does not change the underlying data but only changes how it looks (and this is really important to remember)

Custom Formatting Basics – Structure and Logic

Custom formatting is applied by writing a code in the Format Cells dialogue box (shortcut Ctrl +1) in the custom formatting section



Custom Formatting and Applications

We'll discuss how to make a code in while but let's discuss some ground rules first!!

Thumb Rule 1) The custom formatting code can consist of 4 parts

1. The Positive Numbers (1, 4, 100, 5000 etc)
2. The Negative Numbers (-1, -5, -10, -1000 etc)
3. Zero (0)
4. Text (Hi dude, Million, Days etc)

You don't necessarily need to write the code for all 4 parts. Excel will assume the following in case you choose to omit one or more parts of the code

- 1. If you writing only the first part** – then it applies to all numbers (+ve, -ve and zeros)
- 2. Writing only first and second part** – then first part formats +ve numbers and zeros and second part formats the -ve numbers
- 3. Three parts** – 1st formats the +ve numbers, 2nd formats the -ve numbers, 3rd formats the zeros

Thumb Rule 2) You have to follow the sequence while writing the code. I mean you cannot write the code for a text first and then for a negative number... it wont work!! So the sequence for all 4 parts of the code will be Positive Number Code ; Negative Number Code ; Zero Code ; Text Code

Thumb Rule 3) Always separate the parts of codes with a semicolon. Remember the separator is a semicolon (;) not a comma. Simple right?

Thumb Rule 4) Put the text in the code in double quotes, example "Mn"

Writing a Short Code – Case

	Jan	Feb	Mar	Apr	May	June
Sales	173	123	197	167	179	101
Profit/Loss	21	-14	31	0	87	-82

Consider this
Sale/Profit data
over 6 months

Your boss asks you to format it this way

1. Stacey (even if you are not Stacey :-D), all the positive sales/profit numbers should appear this way – \$ 173.0 Mn
2. All negative numbers should appear this way in red color - \$ (14.0) Mn
3. All zeros should be replaced with a hyphen -

Custom Formatting and Applications

According to the rules our code will follow this sequence
positive number code ; negative number code ; zero code

1. Select your data (numbers only)
2. Go to cell formatting (Ctrl+1) and click custom and start writing the code (by replacing 'General')
3. Code for positive numbers for excel to format any profit/sales number in one decimal prefixed with a \$ sign and suffixed with a Mn, we need a variable for sales/profit number.

0 is a variable for any number. So we will write **\$ 0.0 "Mn";**

Code for negative numbers Now negative number need to be in red and in brackets, rest is the same as positive number coding

Thumb Rule 5) When applying color to any part of the code, make sure the color is written first in square brackets [Red]

So our revised code looks like - **\$ 0.0 "Mn";[Red] \$ (0.0) "Mn";**

Finally Code for zeros We don't need to see zeros, instead we want a hyphen or a dash so our revised quote looks like **\$ 0.0 "Mn";[Red] \$ (0.0) "Mn";-**

Note: code is separated with semicolon. Press Ok and see the result

	Jan	Feb	Mar	Apr	May	June
Sales	\$ 173.0 Mn	\$ 123.0 Mn	\$ 197.0 Mn	\$ 167.0 Mn	\$ 179.0 Mn	\$ 101.0 Mn
Profit/Loss	\$ 21.0 Mn	\$ (13.9) Mn	\$ 30.7 Mn	-	\$ 86.7 Mn	\$ (81.5) Mn

Characters used in Coding and their function

" "	Displays any text between the double quotes
\	Displays the next character as it is
@	Character for displaying any text
*	Repeats the preceding character to fill the width of the cell
#	Displays only significant digits and does not display insignificant zero's, for example it won't display 0001 rather will display 1
0	Displays both significant (non zero numbers) and insignificant zero's, for example the code 000 will display 001,002 and so on
.	Decimal separator shows the number of decimal places after the number, for example 0.0 will show insignificant zeros and 0.# will only significant decimal places
,	Comma if suffixed after # or a 0 it divides the number by 1000, for example 0, "k" will result the number (15000) in 15 k
%	The percentage (%) symbol multiplies the number by 100 and suffixes the number with a % symbol, for example #.0% will result in 12.0%

Custom Formatting and Applications

Date & Time Characters and their utility

d	Shows the number of the day
dd	Shows the number of the day in 2 digit places. For example 07, 09, 15
ddd	Shows the day in words. For example Sun, Mon, Tue
dddd	Shows the day as unabbreviated. For example Monday, Tuesday, Friday
m	Shows the month number from 1-12
mm	Shows the month number in 2 digits for example 01, 02, 10
mmm	Shows the month as a short word, example Jan, Feb, Mar
mmm	Shows the month as a complete word, example March, April, September
yy	Show the last digits of the year, for example 2014 will be shown as 14 and 2000 as 00
yyyy	Shows all four digits of the year
h	Shows the hour
hh	Shows the hour in a 2 digit number example 02 or 09
[h]	Shows the total hours, for example a number (2) formatted as [h] will show 48
m	Shows the minutes. Note it only shows minutes if used as time formatting code (hh mm ss) otherwise it shows single digit months
mm	Shows minutes as a two digit number. Note it only shows minutes if used as time formatting code (hh:mm:ss) otherwise it shows single digit months
[m]	Shows the total minutes, for example a number (2) formatted as [m] will show 2880
S	Shows seconds
ss	Shows the seconds in a 2 digit number example 02 or 59
[s]	Shows the total seconds, for example a number (2) formatted as [s] will show 172800
am/pm	Adds am/pm after the time as per 12 hour clock

Custom Formatting and Applications

Adding Conditions to your custom formatting code !

This is a real game changer and alters some of the thumb rules that have been with us this far. In custom formatting you can also apply conditions if the number is > than 100 then color is red else color is blue

The new rules!

- 1. The conditions are written in square brackets [condition]
- 2. If any color needs to be applied with a condition then colors will come first in the code. For example [red] [condition]
- 3. The sequence of the condition is important – Excel stops reading the code further if the condition is met
- 4. Semicolon (;) is used to separate conditions
- 5. You can write 3 conditions at max

Consider this Code

```
[>=1000000] 0.0#,, "m";[>=1000] 0.0#, "k";0
```

- 1. Notice the semicolons. 2 semicolons for separating 3 conditions
- 2. 1st Condition (in square bracket) is checking if the number is more or equal to 1000000. If this condition is met then format the number as 1.0 m
- 3. 2nd Condition is checking if the number is greater or equal to 1000 then format the number as 1.0 k
- 4. 3rd Condition is checking if the number is not meeting any of the above conditions just write the number

This is how the code will format the following numbers

Number	Custom Format
5293925	5.29 m
4761090	4.76 m
874911	874.91 k
390410	390.41 k
5246138	5.25 m
4514427	4.51 m
1785909	1.79 m
2802888	2.8 m

Custom Formatting and Applications

Fractions in Custom Formatting

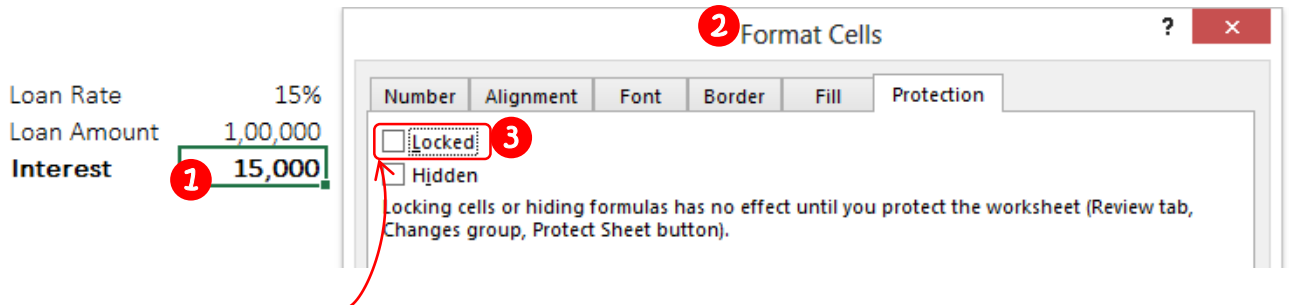
Number in the Cell	Custom Formatting Code	Result
2.235	?/???	447/200
2.25	# ?/?	2 1/4
2.235294	# ?/??	2 4/17
2.235	# ?/???	2 47/200
2	# ?/2	2
2.333333	# ?/3	2 1/3
2.25	# ?/4	2 1/4
2.25	# ?/8	2 2/8
2.2	# ?/10	2 2/10

9. Sheet Protection

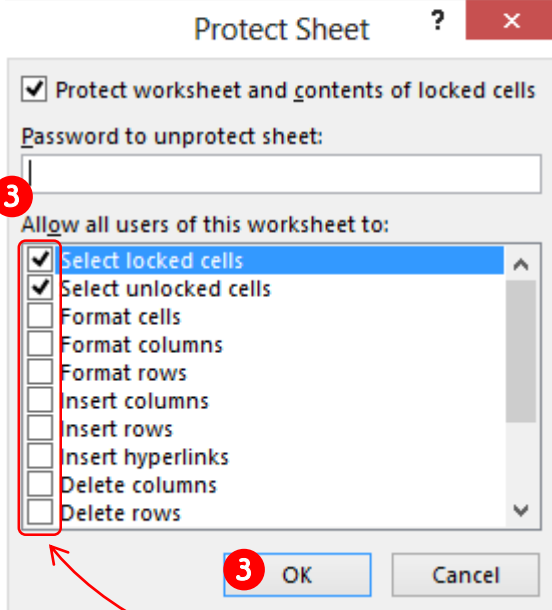
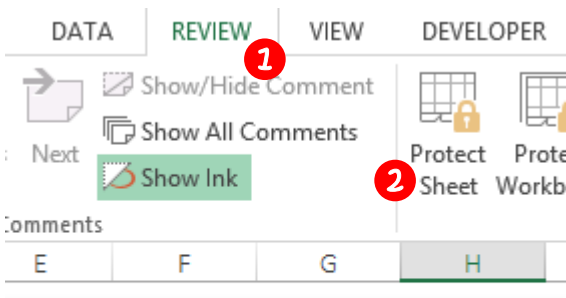
Sheet Protection

If you want to prevent the user from accidentally or deliberately editing or deleting important data (cells) from your worksheet, you can protect certain or all cells, with or without a password

Lets say we have Loan Rate, Amount and Interest (Calculated) in a sheet and you wan that the user should not be able to edit the formula in the Interest calculation. This is how you would do it



1. Select the interest cell
2. Go to format cells dialogue box
3. And uncheck locked (by default all cells are locked)



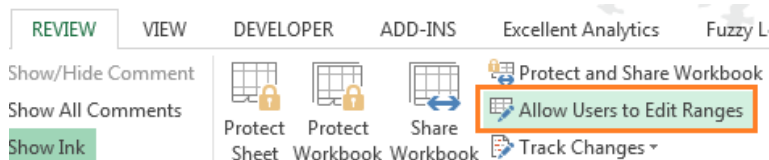
1. In the Review Tab
2. Click on Protect Sheet
3. And if you wish you can specify a password. The user would need the password to edit
4. OK

Note that without protecting the sheet, cell locking is useless

The users are just allowed to perform the following if the sheet is protected.

Password Protect Different Ranges

You can also protect different ranges with different passwords. It's called Allow Users to Edit Ranges and found in the Review tab



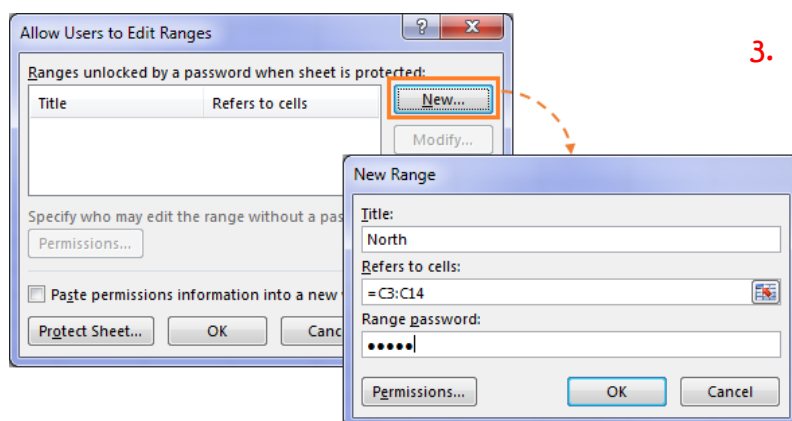
Lets say we have 4 regions where each region will have a different user enter the data

	A	B	C	D	E	F
1						
2		Month	North	South	East	West
3		Jan				
4		Feb				
5		Mar				
6		Apr				
7		May				
8		Jun				

1. In Review tab in the Changes group > Click on Allow Users to Edit Ranges button

2. Click on 'New' to set up your first range for North, which will be cells C3:C14 and enter your password

3. Repeat for regions South, East and West using different passwords for each



4. Now you should have all 4 ranges listed in the Allow Users to Edit Ranges dialog box

5. Click on the Protect Sheet button and enter a unique password (this is your master password so it should be different from the passwords for the users)

6. Now when anyone attempts to enter data into the protected cells they'll be prompted for their password

Note the Following

1. Upon the user entering their password, that range becomes unlocked while the other ranges remain locked.
2. You can unlock multiple ranges and doing so will **not** lock any previously unlocked ranges.
3. Once a range has been unlocked by a user, it will remain unlocked until the workbook is closed.
4. Saving a workbook doesn't lock any ranges.
5. No protection is actually applied until you password protect the workbook. Don't forget this step

Thank you for reading...



I hope you enjoyed reading this e-book!

Let me know if you have any questions or even if you would like to drop in a "hi", I am active on goodly.wordpress@gmail.com

Hey, feel free to send this e-book over to your folks / excel nerds

Apart from delivering live training sessions for companies, I also run online training courses on [Mastering Excel](#) and [Business Intelligence Dashboards](#). If you want to acquire top notch excel skills you much check them out

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