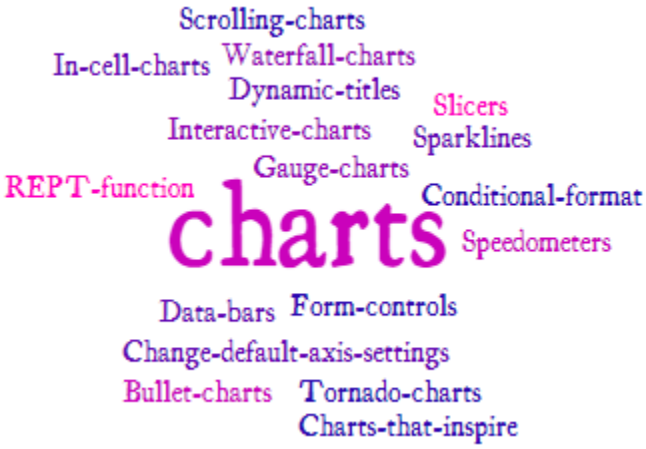
The only guide you'll need to create

Boardroom-ready charts

...get the insider tips to present various business metrics



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Tips to create Excel

charts that inspire

...guide the consumer to understand your message

In this tutorial, we shall explore some important considerations while creating visuals in Excel, that will help you to better communicate your message.

Covered:

- ❑ Change axis display units
- ❑ Always start axis units from zero
- ❑ Conditional format charts
- ❑ Dynamic chart titles

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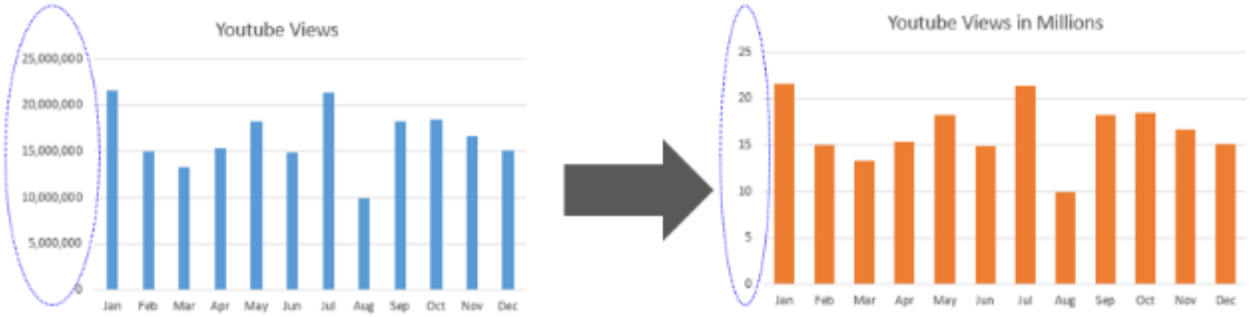
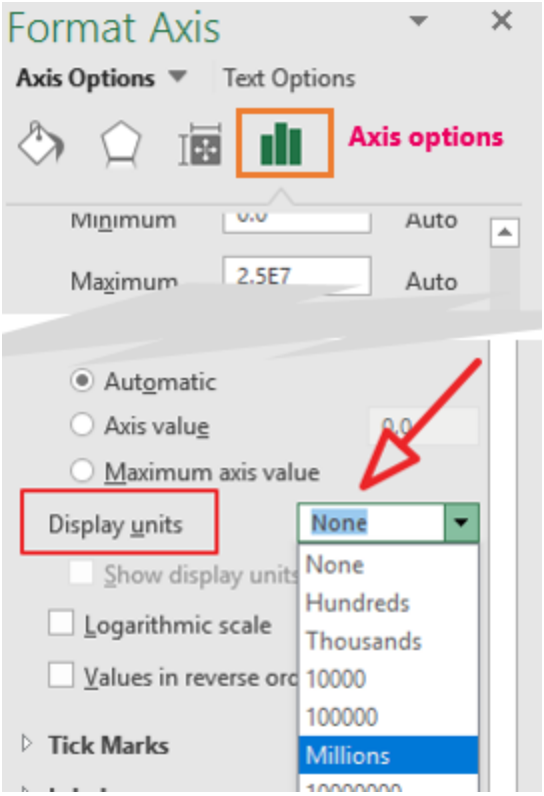
Tip #1: Change Units Display

Whenever you plot a chart that has huge numbers (millions, billions, etc.), it will make your charts more neat and legible if you could edit the axis values to display the values at a higher scale as opposed to showing the absolute value.



Steps involved:

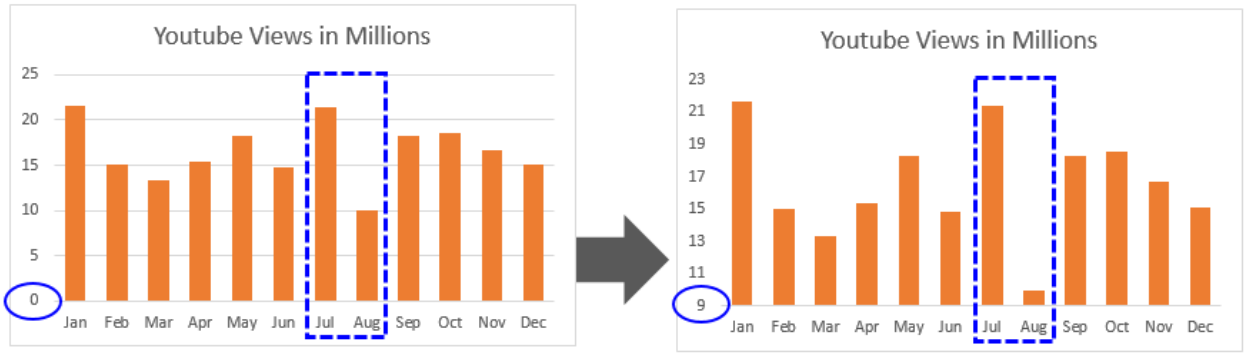
1. Right click the vertical axis and choose *Format Axis* from the shortcut menu.
2. On the Format Axis window that shows up, go to Axis Options >>Display Units >>select your preferred scale. Ensure you also indicate the same scale on the chart title or that axis title.



Tip #2: Always start axis units at zero

I have come across charts in various forums that when you look keenly you will realize they misrepresent the message. It is sometimes tempting to imagine, say for instance, because the least value in your chart series is say 14 million (for argument sake), then it would be okay to change the vertical axis to start from, say the 13 million mark.

It is advisable to not change the starting point. As you can see from the chart below, the visual appearance of the highlighted series on the chart on the right would imply the August value is a tenth of the July values. This is misleading, isn't it?



Tip #3: Conditional format your charts

When reporting performance against set targets, you may choose to show both the actual value against the target value series side by side. At other times, the context may be just to show the variance to target series alone.

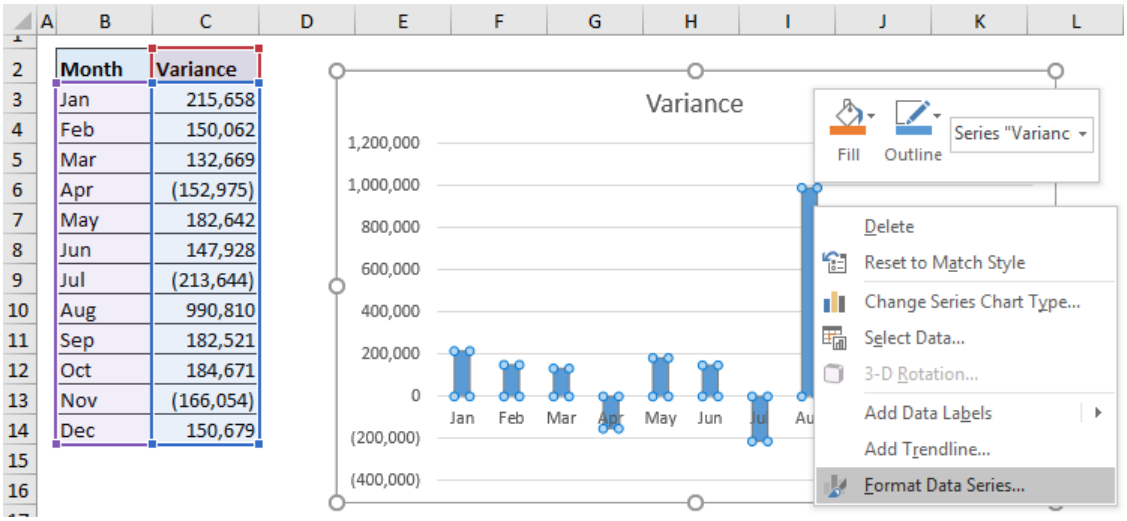
In this case, you will expect to have some positive and negative values.

When plotting these variances, most analysts wish to show a different colour for positive values and a different one for the negative ones. Unfortunately, the colouring is done manually!

This tip is the least unknown. The steps below will enable you to set the chart to be coloured conditionally based on whether a value is positive or negative.

Steps involved:

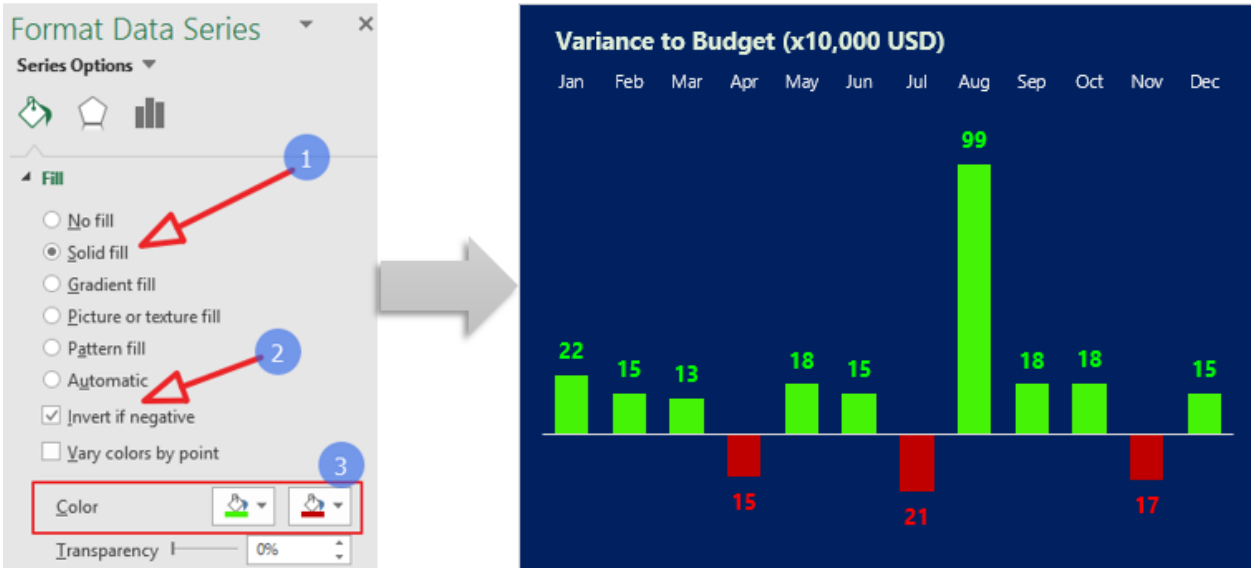
1. Insert the chart as usual. That is, select the data you wish to plot then press ALT+F1
2. Right click one of the series/bars >>***Format Data Series...***



3. On the Format Data Series options >>Fill & Line >>select Solid fill >>tick "Invert if negative"

   >>choose your preferred colours to differentiate the positive from the negative values.

4. Tidy up the chart



Tip #4: Dynamic chart titles

When you are creating a chart for your reports and dashboards, it is important to have descriptive titles that give context to the chart, signaling the underlying message you wish to put across.

To do this, you need to ***link the chart title to a cell*** in your worksheet that has the text to be displayed.

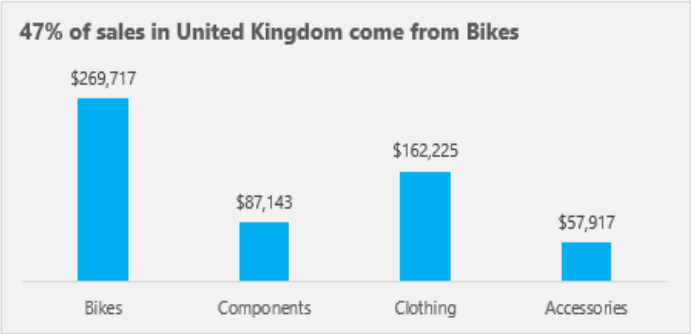
Next, ensure that ***this cell is formula driven*** to accommodate the user selections/interactions (assuming you have slicers or drop-down lists or form controls that the user selects an item to display).

Take a look at the image below (check the Excel file attached).

Summary Data

Product Segment	Sales	
Bikes	$269,717	47%
Components	$87,143	15%
Clothing	$162,225	28%
Accessories	$57,917	10%

Territory	United Kingdom
Reporting Date:	31-05-2016



	Formula	Result
Highest segment>>	=INDEX($H$3:$H$6,MATCH(MAX($J$3:$J$6),$J$3:$J$6,0))	Bikes
Percentage>>	=VLOOKUP($M$12,$H$3:$J$6,3,FALSE)	47%
Chart Title:	=TEXT($M$13,"0%")&" of sales in "&$I$8&" come from "&$M$12	47% of sales in United Kingdom come from Bikes

Notice the chart title is a function of the various parameters coming from the data.

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In-cell charts

In Excel

As the name suggests, in-cell charts in Excel in most cases occupy a single cell. These types of charts can be very useful especially when one is building a dashboard where the space needs to be optimized for the various KPIs to be shown.

Covered:

- ❑ Using the REPT () function
- ❑ Using the conditional formatting data bars
- ❑ Working with Sparklines

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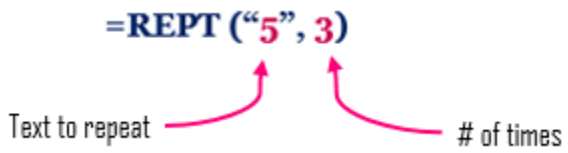
Present Data Visually Using In-Cell Charts (REPT function)

The REPT function allows you to repeat a given value (number or text) a given number of times.

For instance, to repeat a number 5 three times we would have:



...and the result would be 555.

With that in mind, let us assume you are tracking targets of various branches in your business in terms of sales performance. From your system you're able to extract the following data.

	A	B	C	D	E	F
1						
2		**Half Year Sales Review**				
3						
4		**Branch**	**Target (Mln)**	**Actual (Mln)**	**% Achieved**	**Chart**
5		Tennessee	114	105	92%	
6		Antananarivo	145	131	90%	
7		Springvalley	175	139	79%	
8		Capitol Hill	132	99	75%	
9		Capetown	97	66	68%	

To visualize the percentage achievement, we can use the REPT function to repeat the pipe symbol ("|") a given number of times. The *number of times* will be the percentage achievement BUT in different scenarios, you can use *any factor* that makes sense to you.

Thus in F5 above, we shall use the simple formula:

=REPT ("|", E5*150)

That is, we repeat the pipe symbol with a given factor (E5*150).

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	A	B	C	D	E	F
1						
2		**Half Year Sales Review**				
3						
4		**Branch**	**Target (Mln)**	**Actual (Mln)**	**% Achieved**	**Chart**
5		Tennessee	114	105	92%	|||||||||||||||||
6		Antananarivo	145	131	90%	|||||||||||||||||
7		Springvalley	175	139	79%	||||||||||||||
8		Capitol Hill	132	99	75%	||||||||||||||
9		Capetown	97	66	68%	||||||||||||
10						

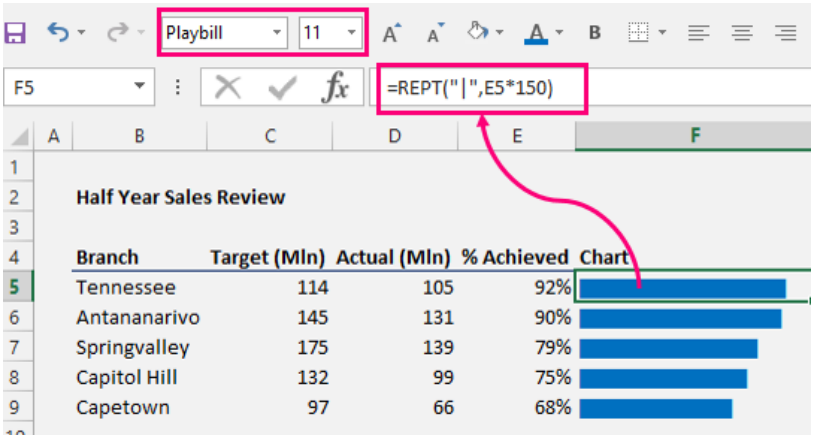
By multiplying with E5 which is the percentage achieved, we ensure the size of our in-cell chart once complete will always be proportional to this percentage. The 150 in the formula is arbitrary and you should experiment with a reasonable value.

The pipe symbol is located in different places on your keyboard depending on which make of computer you have. Alternatively, you can insert the symbol from the ***Insert menu >>Symbols***.

The next step is to change the ***font type*** of these cells –the preferred ones are:

- Playbill
- Stencil
- Niagara Solid

These font types work best with a font size of between 8 and 14 …but you can experiment to your fit. You can also change the ***font colour*** of the cells in F5:F9 to your preferred colour.



You can find out how to implement [in-cell column charts using the REPT function](#).

Using Conditional Formatting Data Bars

Conditional formatting is one of the underutilized features in Excel. Luckily, we can use it to create some nice in-cell charts especially if you want to share both the visual and the underlying numbers.

We shall use the data in the preceding section and plot the percentage achievement as bar chart. Here is the data:

	A	B	C	D	E
1					
2	**Half Year Sales Review**				
3					
4	**Branch**	**Target (Mln)**	**Actual (Mln)**	**% Achieved**	**Data Bar**
5	Tennessee	114	105	92%	
6	Antananarivo	145	131	90%	
7	Springvalley	175	139	79%	
8	Capitol Hill	132	99	75%	
9	Capetown	97	66	68%	

In cell E5 we only need to equate it to the value in D5 and autofill the formula.

We then select the range E5:E9 and from the **Home tab**, we go to ***Conditional Formatting*** and insert a *data bar –solid fill* (choose any colour).

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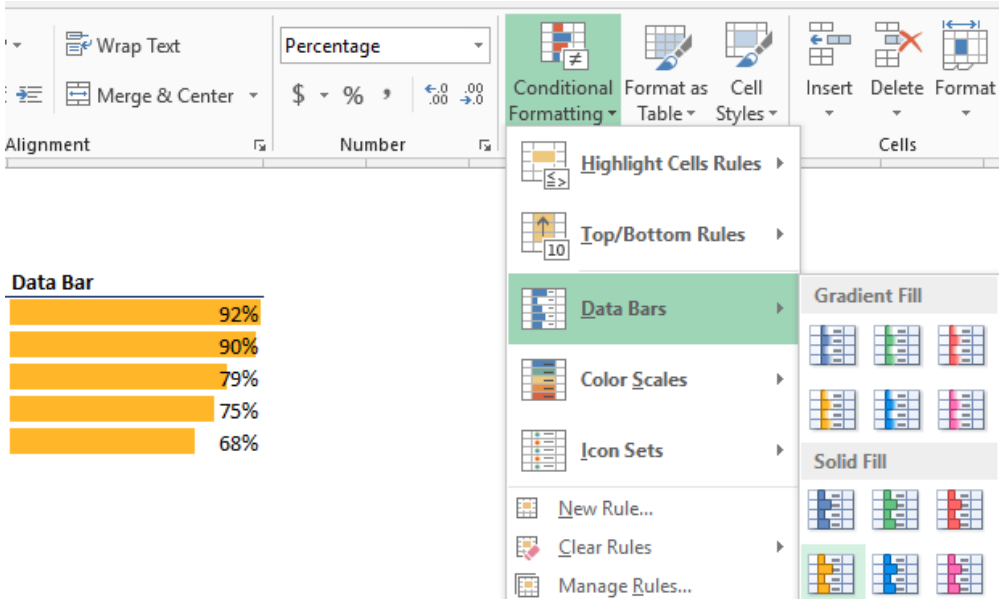
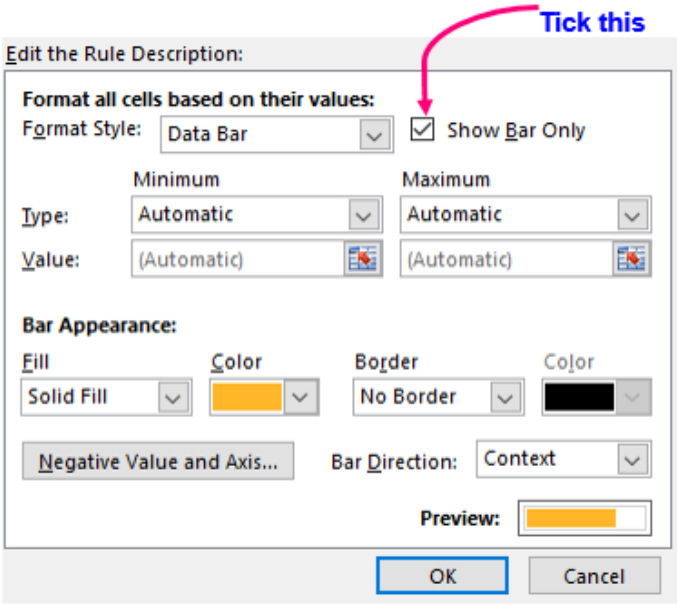


Finally, since we have the percentages showing in the adjacent column, we don't need to display them. Thus, we select the cells again and on the Conditional Formatting options, choose ***Manage Rules...*** In the window that pops up, click on **Edit Rules** and tick the option to ***Show Bar Only***. At this point you can also adjust the colour if you may.



With a few adjustments on the fill colour of the cells in your worksheet, you can have a better feel:

	A	B	C	D	E
2	Half Year Sales Review				
4	Branch	Target (Mln)	Actual (Mln)	% Achieved	Data Bar
5	Tennessee	114	105	92%	
6	Antananarivo	145	131	90%	
7	Springvalley	175	139	79%	
8	Capitol Hill	132	99	75%	
9	Capetown	97	66	68%	

Additional resource:

Chandoo also has an awesome piece illustrating how you can use 5-star rating using conditional formatting for scenarios such as product reviews, ratings on customer satisfaction, ratings about various customer touch points in your organization, etc.

Use of Sparklines in Excel

Sparklines came about in Excel 2010 and are accessible from the Insert menu on the ribbon. They provide visual representation of data in a single cell. They give you the ability to show data trends in your Excel dashboards,

There are 3 types of Sparklines as you can see below.

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Line/Column Sparkline

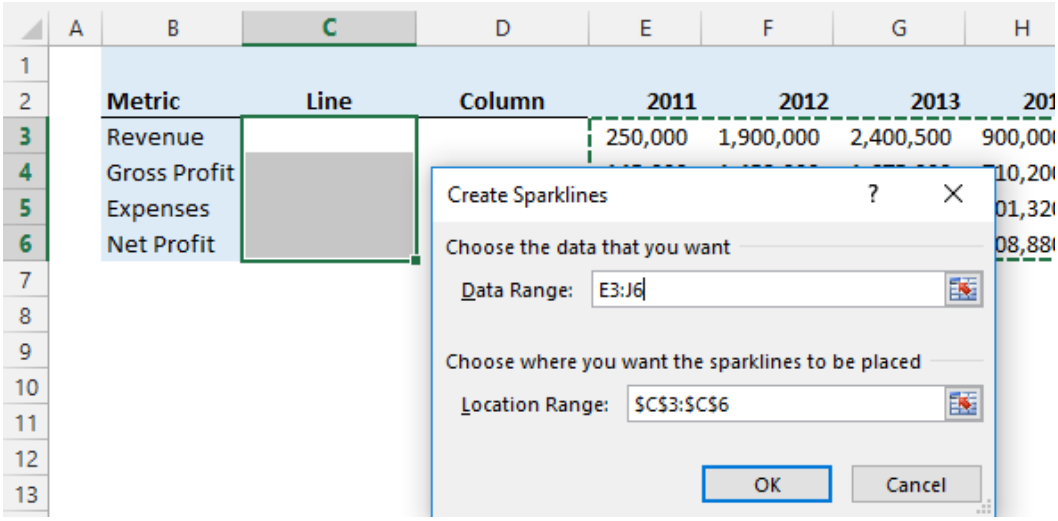
These two types are similar to the normal line/column chart with respect to their usage. They are useful when you just want to see the general trend (upward, downward, or cyclical) in your data, and help answer questions such as the magnitude of fluctuations in your data.

For instance, you could use them to show the past 12 months to date trends for sales or temperatures for different regions.

Given the data below, we can implement a line or a column Sparkline as follows.

Metric	Line	Column	2011	2012	2013	2014	2015	2016
Revenue			250,000	1,900,000	2,400,500	900,000	4,870,000	6,235,100
Gross Profit			145,000	1,452,000	1,675,000	710,200	4,120,300	5,360,000
Expenses			115,000	920,000	995,000	601,320	2,265,030	3,156,000
Net Profit			30,000	532,000	680,000	108,880	1,855,270	2,204,000

Select cells C3:C6 and from the **Insert menu**, click the ***Line*** Sparkline. You will be prompted to specify the data source. Select the range from E3 to J6 and press OK.



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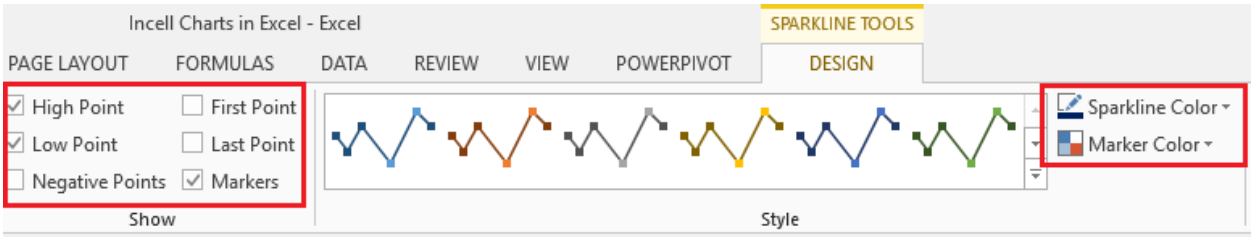
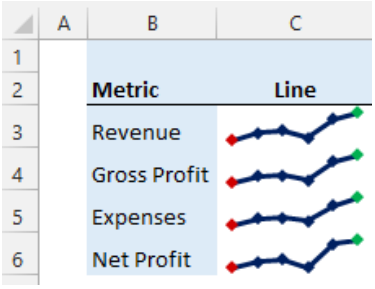
Once you get the first version of the micro line charts, a contextual Sparkline Tools menu appears where you can further customize the Sparklines.

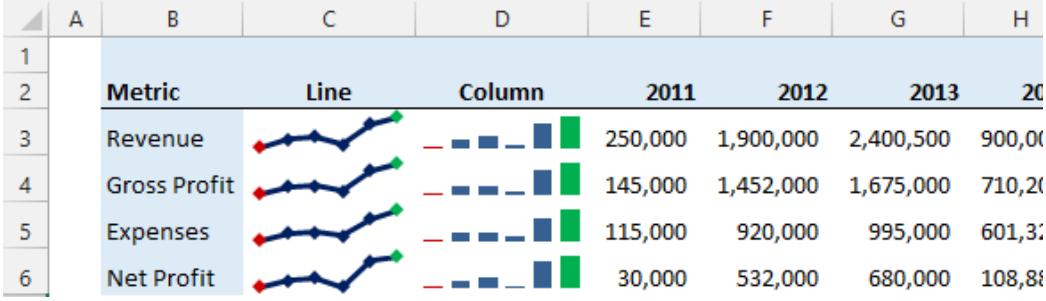


For example, in the figure above, I have adjusted the Sparkline to ***display Markers*** by ensuring I tick that option in the figure above. Likewise, I have ticked the ***High Point and Low Point*** options and adjusted the Marker Colour to Green and Red respectively. Further, I have adjusted the line weight from the ***Sparkline Colour*** options above. This gives me the following.



Metric	Line
Revenue	
Gross Profit	
Expenses	
Net Profit	

By following a similar approach, you can end up with the following column Sparkline.



Metric	Line	Column	2011	2012	2013	20
Revenue			250,000	1,900,000	2,400,500	900,0
Gross Profit			145,000	1,452,000	1,675,000	710,2
Expenses			115,000	920,000	995,000	601,3
Net Profit			30,000	532,000	680,000	108,8

NOTICE that these two types of Sparklines can display both positive and negative values. You can tick the ***Negative Points*** option in the Sparkline Tools contextual menu to highlight.

Win/Loss Sparklines

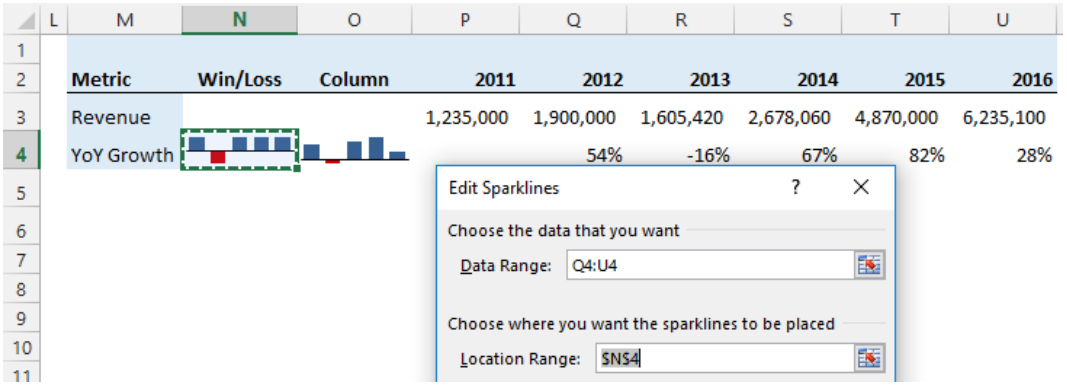
This type of Sparklines is useful for binary data, where you only want to highlight any one of two scenarios. For instance, negative changes versus positive changes, profits or loss points.

NOTE that the size of the bar displayed is not meaningful, and hence cannot be used for comparison purposes.

We have the following data set:

Metric	2011	2012	2013	2014	2015	2016
Revenue	1,235,000	1,900,000	1,605,420	2,678,060	4,870,000	6,235,100
YoY Growth		54%	-16%	67%	82%	28%

We shall insert two columns between M and N above and plot both the Win/Loss and Column Sparklines for comparisons. We shall use the year-on-year growth rates for this purpose. Having selected cell N4 in the figure below, go to the Insert menu and choose the Win/Loss Sparkline type. When prompted to select the range of data, select Q4:U4.



As you can tell from the above, clearly the Win/Loss blocks are the same size whereas the Column ones indicate the magnitude.

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Gauge charts

In Excel

Speedometers to monitor progress towards a goal

Gauge chart in MS Excel? Really, I've never seen it! How do you even imagine it?

Well, we all have, in one way or the other, monitored progress towards a certain goal in life, haven't we? Whether it is monitoring the sales generated by a department versus their targets, or it is the number of kilos one has shed towards a weight loss program, it is always good to have the results of this visualized.

There are many approaches to measuring progress towards a goal. For instance, we can use a bullet chart to monitor performance (*see how to create one below*).

In this article, we shall look at an alternative to the bullet chart and go through the steps involved in creating a gauge chart in MS Excel.

It is that time of the year when majority are setting their goals for 2017. One of the cravings for many, I included, is to achieve financial freedom.

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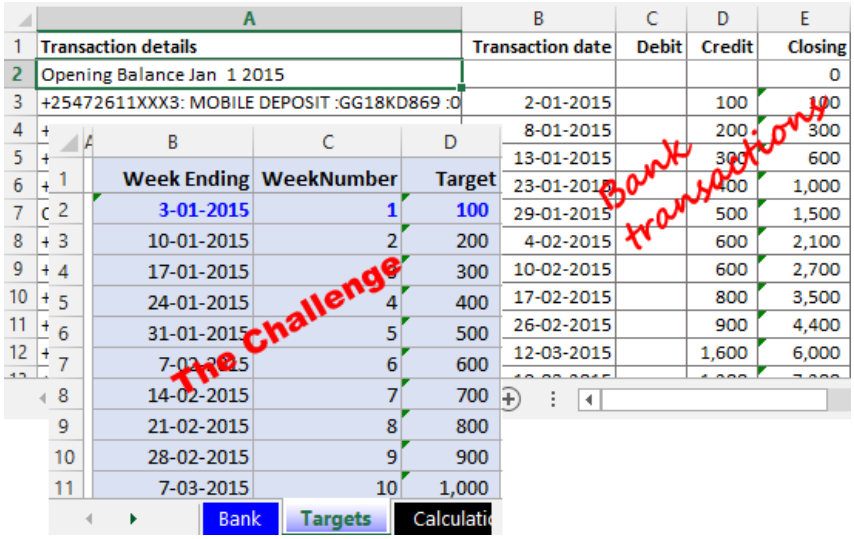
I recently read a tweet that was running on the hashtag 52WeekChallenge. The idea was that if you can save *a 100 Kenya Shillings (approx. USD $1) in the first week, KSH 200 in the second week, KSH 300 in the third week*… and so on until the last week of the year, you would target to save not less than KSH 137,800 (approx. USD $1,378) which, truth be told is good enough to start a business or go for a holiday.

We shall be looking at some data for 2015 where my colleague did take up the challenge. He used to save every week and in most cases, would send the money through his mobile phone.

The Data

The tables below are the weekly targets and a bank statement of the account in which he saved the monies.



	A	B	C	D	E
1	Transaction details	Transaction date	Debit	Credit	Closing
2	Opening Balance Jan 1 2015				0
3	+25472611XXX3: MOBILE DEPOSIT :GG18KD869 :0	2-01-2015		100	100
4	+	8-01-2015		200	300
5	+	13-01-2015		300	600
6	+	23-01-2015		400	1,000
7	C	29-01-2015		500	1,500
8	+	4-02-2015		600	2,100
9	+	10-02-2015		600	2,700
10	+	17-02-2015		800	3,500
11	+	26-02-2015		900	4,400
12	+	12-03-2015		1,600	6,000

	A	B	C	D
1		Week Ending	WeekNumber	Target
2		3-01-2015	1	100
3		10-01-2015	2	200
4		17-01-2015	3	300
5		24-01-2015	4	400
6		31-01-2015	5	500
7		7-02-2015	6	600
8		14-02-2015	7	700
9		21-02-2015	8	800
10		28-02-2015	9	900
11		7-03-2015	10	1,000

At any one time in the course of the year, we want to visualize the status of this weekly challenge, i.e. the percentage achieved.

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Prepping the data for analysis

To achieve our goal, we need to introduce some helper/auxiliary columns in the worksheet with the targets. We shall need to know the *cumulative target* and the *closing bank balances* for each week, as illustrated below:

	B	C	D	E	F	G	H
1	Week Ending	WeekNumber	Target	TargetRunningTotal	Bank Balance	Month	WeekNur
2	3-01-2015	1	100	100	100	Jan	Wk 1
3	10-01-2015	2	200	300	300	Jan	Wk 2
4	17-01-2015	3	300	600	600	Jan	Wk 3
5	24-01-2015	4	400	1,000	1,000	Jan	Wk 4
6	31-01-2015	5	500	1,500	1,500	Jan	Wk 5
7	7-02-2015	6	600	2,100	2,100	Feb	Wk 6
8	14-02-2015	7	700	2,800	2,700	Feb	Wk 7
9	21-02-2015	8	800	3,600	3,500	Feb	Wk 8
10	28-02-2015	9	900	4,500	4,400	Feb	Wk 9
11	7-03-2015	10	1,000	5,500	4,400	Mar	Wk 10

We have used the following formulas in columns E to H:

Cell E2: =SUM($D$2:D2)

Cell F2: =INDEX(Bank!$E:$E,MATCH($B2,Bank!$B:$B,1))

Cell G2: =TEXT($B2,"mmm")

Cell H2: ="Wk "&MIN(WEEKNUM($B2),52)

What is a Gauge Chart?

A gauge chart or a dial chart in Excel is a combination of a *Doughnut chart* and a *Pie chart*. The Doughnut chart is used to show the qualitative scale, usually from 0 to 100%. The Pie chart is used to show the dial or the pointer for the actual value at a given point in time.

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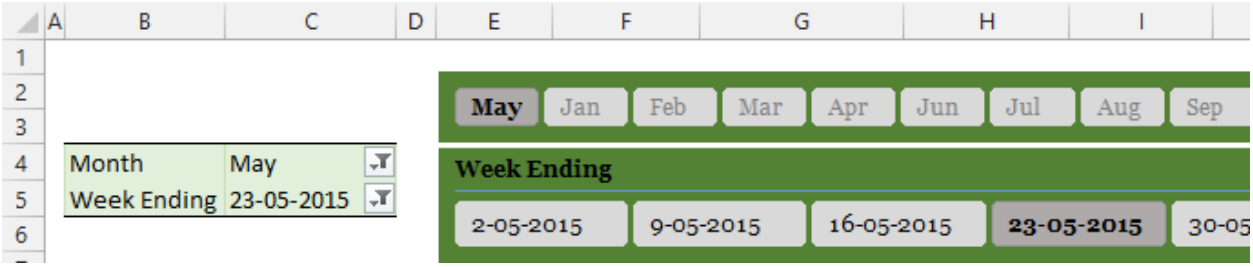
The Analysis

At any one time, based on the week selected by the user, we shall be tracking the year-to-date (YTD) status as at that week. We therefore need to insert a slicer (or a combo / drop down list) to allow the user to specify the week ending date.

Using the '*Targets*' worksheet we insert a pivot table, and drag the *week ending column* into the **filter** and also proceed to *insert a slicer* for the week ending and month columns (if you are not familiar with slicers read this article from Chandoo).



On the name box, we shall name cell C5 above as "***selWeekEnding***".

Next, we summarize the YTD targets and actuals as follows:

	Result	Formula
Start of Year	0	
Target YTD	23,100	=SUMPRODUCT(SampleData[TargetRunningTotal]*(SampleData[Week Ending]=selWeekEnding))
Actual YTD	20,620	=SUMPRODUCT(SampleData[Bank Balance]*(SampleData[Week Ending]=selWeekEnding))
YTD Goal Achieved	89%	=D12/D11
Target Whole Year	137,800	=MAX(SampleData[TargetRunningTotal])
Balance to Year End	117,180	=D14-D12

In the formulas above, you will see the text "*SampleData*" -this is just the name given to the table with the targets and transactions data. What follows in square brackets, [ ], is the column name in the table. Learn more on Excel Tables here.

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Data for the Doughnut Chart

The next thing we do is to define the *qualitative scale* for our gauge chart. In most cases, the gauge chart will have 3 categories (i.e. **Red**, **Amber**, **Green**) but you can include as many as reasonably possible. For our case, we have defined 0 to 45% as Red, 45 to 80% as Amber, and 80 to 100% as Green zone, as shown below. In actual sense, therefore, the size of Amber is 35% (difference between 80% and 45%) whereas the Green is 20%.

	B	C	D	E	F	G	H
9			**Result**		**Doughnut Chart Data**		
10		Start of Year	**0**		**Percentile**	**Zones**	**Target Levels**
11		Target YTD	23,100		0%	Start	
12		Actual YTD	20,620		45%	Red	
13		YTD Goal Achieved	**89.3%**		35%	Amber	
14		Target Whole Year	137,800		20%	Green	
15		Balance to Year End	117,180		100%	Blank area	

To get the *target levels values* that are representative of the various zones, we shall apply the PERCENTILE function on the array of values between 0 (zero) and the target YTD. The formula is applied in cells H11:H14 in the figure below. The sum of these values (cell H15) should total to the YTD target.

SUM | =PERCENTILE.INC($D$10:$D$11,F14)

PERCENTILE.INC(array, k)

	B	C	D	E	H	I	J
9			**Result**		**Doughnut Chart Data**		
10		Start of Year	**0**		**Percentile**	**Zones**	**Target Levels**
11		Target YTD	23,100		0%	Start	0
12		Actual YTD	20,620		45%	Red	10,395
13		YTD Goal Achieved	**89.3%**		35%	Amber	8,085
14		Target Whole Year	137,800		20%	Green	=PERCENTILE.INC($D$10:$D$11,F14)
15		Balance to Year End	117,180		100%	Blank area	23,100

Data for the Pointer/Dial/Needle

This shall help us to plot the pie chart that will act as the pointer of the actual bank balance. We shall need 3 data points as follows:

- ***Position of the pointer*** -i.e. the Actual Bank Balance value
- ***Width of the pointer*** -in most cases this is set to 1 but if you are dealing with huge values like in our example, we shall use any other convenient number. We have used 2.5% of the actual bank balance YTD.
- ***The balancing value*** -which is a formula that subtracts the sum of the actual bank balance and the needle size from the sum of the values used to plot the Doughnut chart in the previous section.

	B	C	D	E	F	G	H	I	J
9			**Result**		**Doughnut Chart Data**				
10		Start of Year	**0**		**Percentile**	**Zones**	**Target Levels**		
11		Target YTD	23,100		0%	Start	0		
12		Actual YTD	20,620		45%	Red	10,395		
13		YTD Goal Achieved	**89.3%**		35%	Amber	8,085		
14		Target Whole Year	137,800		20%	Green	4,620		
15		Balance to Year End	117,180		100%	Blank area	23,100		
16									
17					**Pie Chart Data**				
18					**Pointer Data**		**Formula applied**		
19					Actual Savings YTD	20,620	=D12		
20					Needle width/size	516	=G19*0.025		
21					Balancing Value	25,065	**=SUM(H11:H15)-SUM(G19:G20)**		

Now we have the data needed for our gauge chart.

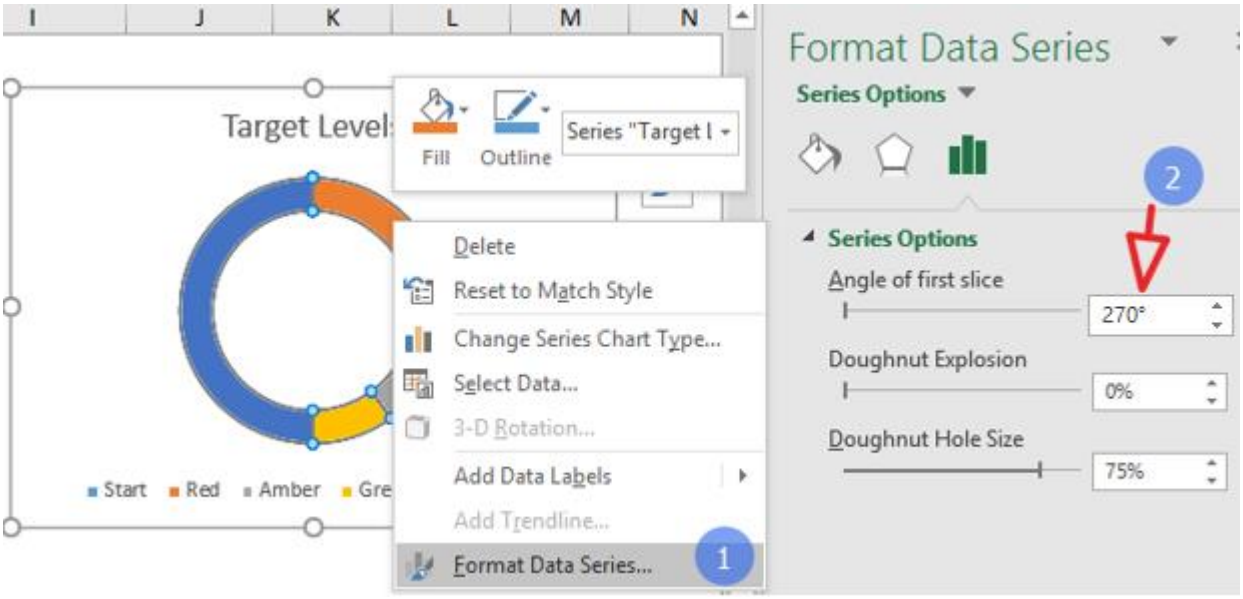
Creating the Gauge Scale with a doughnut chart

1. Select the range G10:H15 in the figure above and from the **Insert menu** in Excel, plot a doughnut chart.

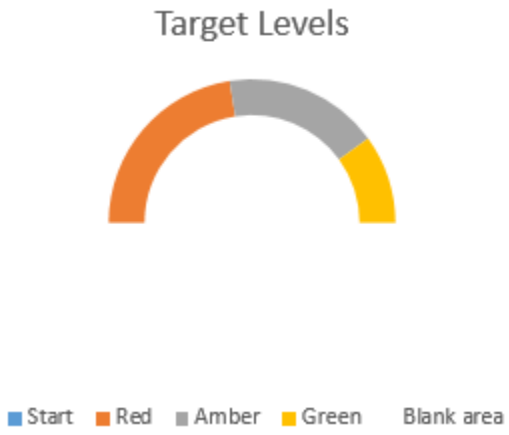
2. *Right click* any of the slices/pies in the resultant chart and select ***Format Data Series*** from the shortcut menu that appears.

   On the Format Data Series dialog box, adjust the "Angle of first slice" to 270%.

   Next, select the wedge on the bottom (*labelled blank area and shaded blue at this juncture*) and from the Format Data Series, change the **Fill colour** to **none (No fill)**.

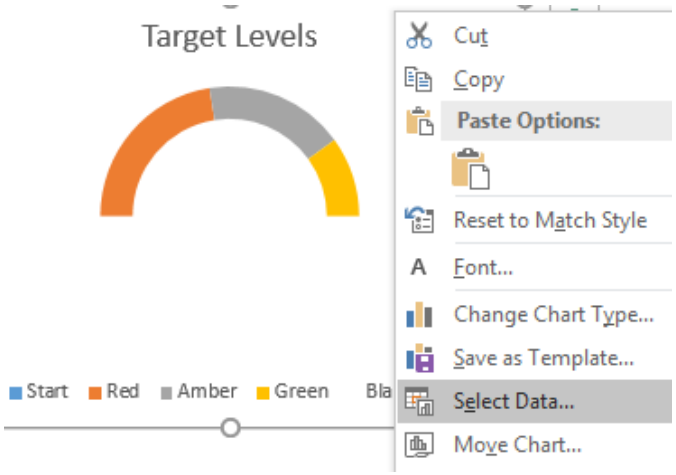


The two steps above should give you the following chart.



Adding the pointer as a pie chart

1. Right click the Gauge chart you have just created and choose ***Select data***. Alternatively, select the chart you have created and from the contextual **Design menu** on the ribbon, click ***Select data***.



2. On the dialogue box that pops up, **(1)** click the **Add** button and select the cell F18 as the series name, and specify the series values as the 3 data points we created above for the pie chart data. Next, **(2)** click the **Edit** button and on the dialog box that appears (the Axis Labels box), select the data points for the pie chart data *in the following order* -G20, G19 and G21. Use the CTRL key.

   Caution: *The numbers you see on the screenshot may not necessarily match what you have in yours. What is important is that you do not skip any of the steps*.

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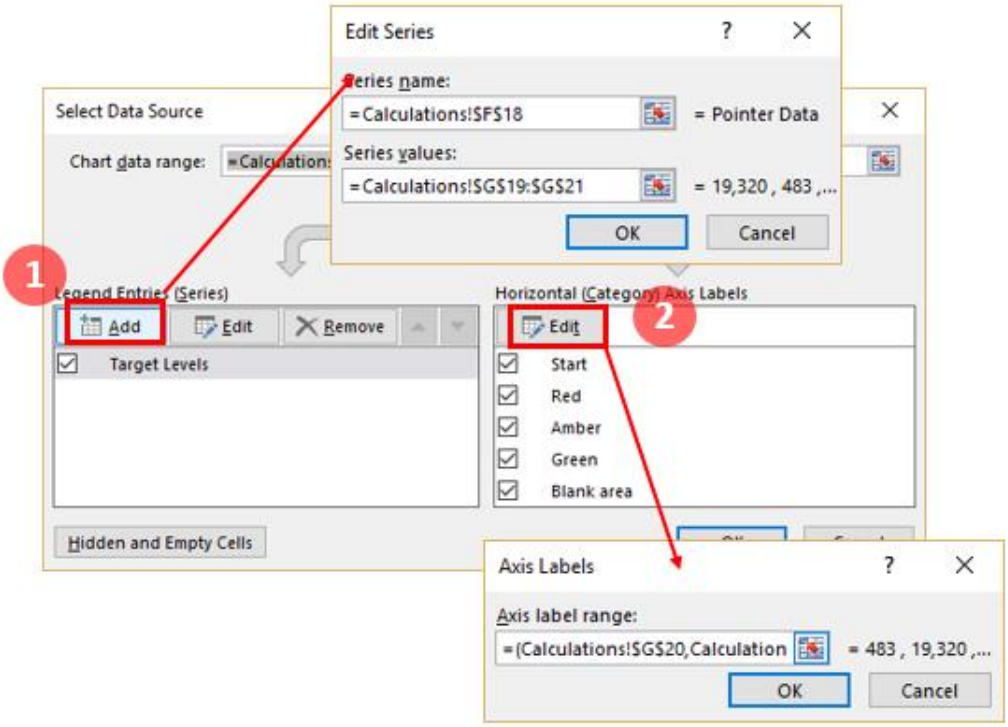
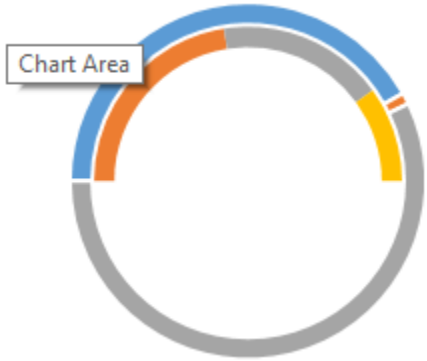


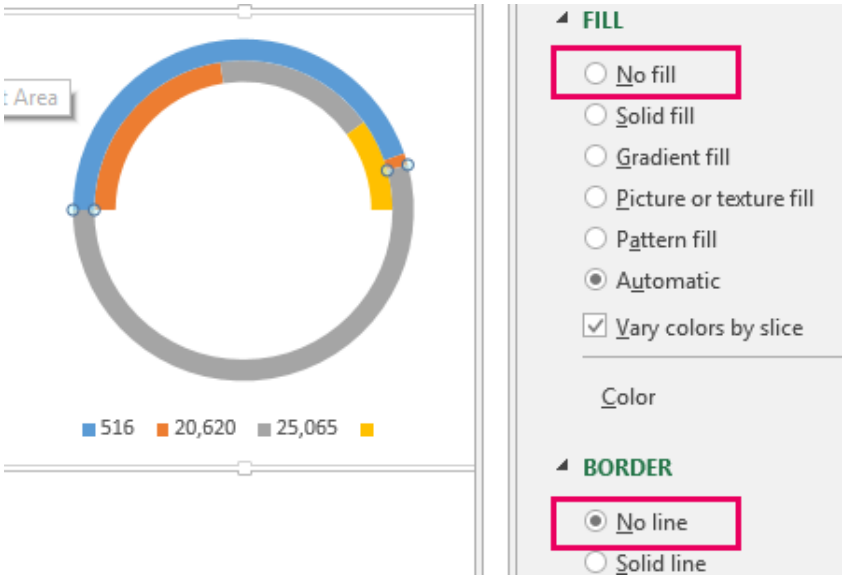
3. You should have the chart looking like the following:



4. We shall format the outer ring to make it a pie chart on a secondary axis and only retain the smallest pie which is our needle/pointer. Do the following:

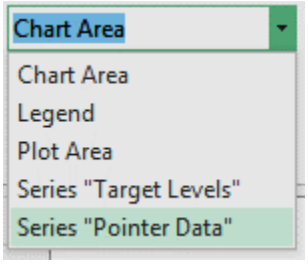
   a. Right click any of the pies in the outer ring and select Format Data Series. The Format Data Series dialog will appear / pop up. Set the fill colour of the *blue and light gray series* to **No fill**

and the border colour to **no border** (or none). Note that you would need to select each series separately (click on it 2 times →don't double click).

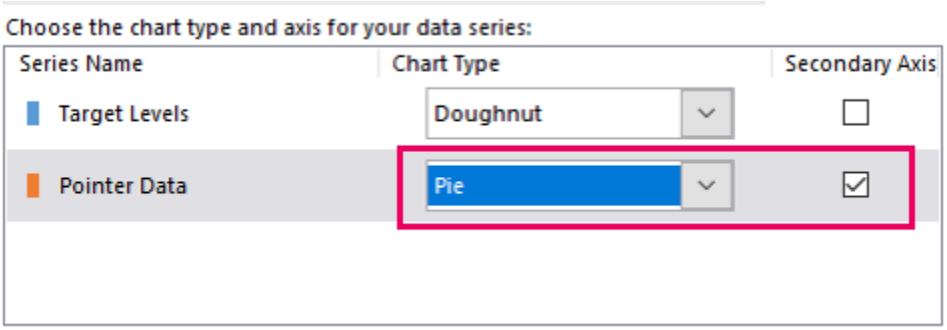


b. In a similar way, format the smallest pie to a colour of your choice. A black or a dark blue normally blends very well. You should end up with a chart similar to the one below.

c. Select the chart area and from the contextual **Format menu**, select the *pointer data series*.

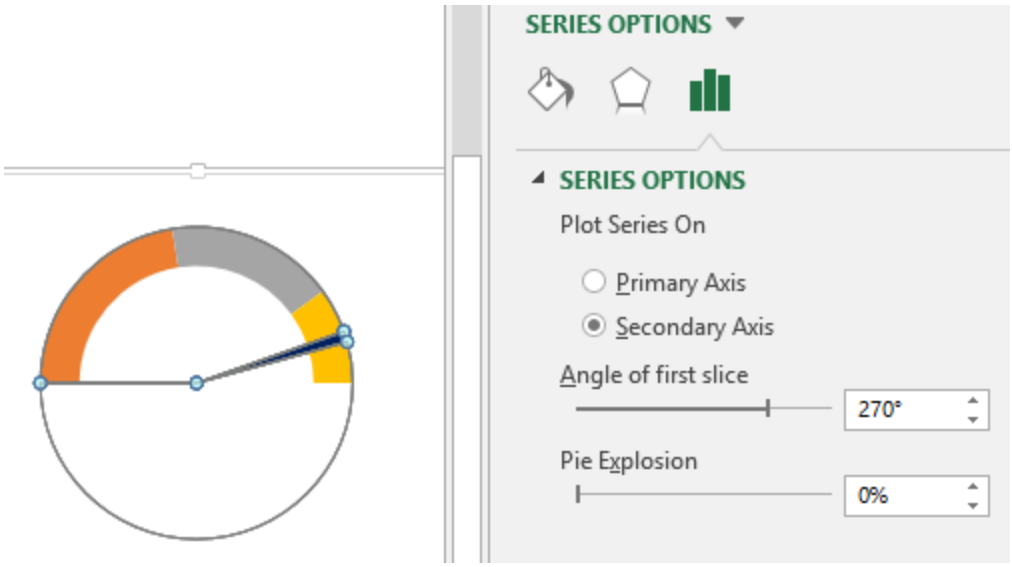


d. Once selected, go to the contextual **Design menu** and click ***Change Chart Type*** (or right click the selected series and choose ***Change Series Chart Type…*** On the window that pops up, change the series for pointer data to *Secondary Axis* and plot as a *Pie chart*.



The above step will result into the chart shown below.

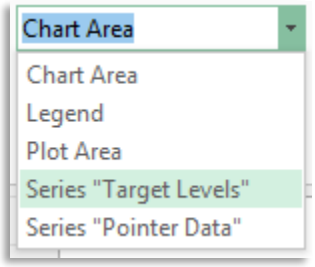
e. Select the *Pointer Data series* again and adjust the angle of first slice to 270%. If you have trouble selecting the series, go to **Format menu** and select from there as we did in (c) above.



Final touches on the gauge chart

The final stage of this chart will be formatting the Doughnut (qualitative scale) series into our preferred colours (normally, **Red**, **Amber**, **Green**), as well as add data labels to show the actual value against the pointer.

5. To fill the colours to **Red**, **Amber**, **Green** we select the respective series from the Format menu.

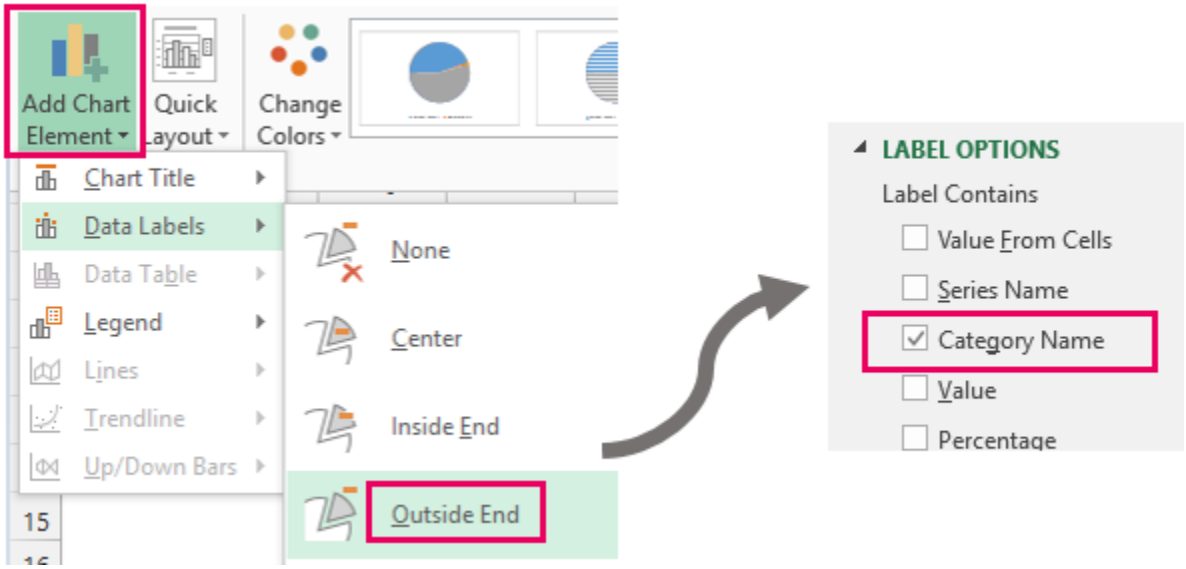


At this point, you may face trouble trying to select a single data point.

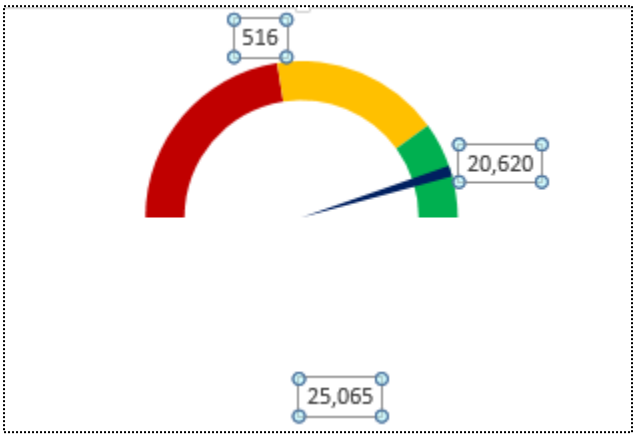
The trick is -*Once the entire series has been selected, use the left/right arrows on the keyboard to select a specific data point*... then fill with appropriate colours.

6. The final step is to set the pointer value to the actual YTD savings.

   Select the *Pointer Data* series and from the **Design menu** or the *Chart Elements icon* on the chart, select ***Data labels*** and set the same to *Outside end*. Next, select the data labels and press CTRL+1 to format. On the *Format Data Labels* dialog box, choose/tick the ***Category Name*** instead of *Value*.



   You will end up with the following chart.



7. Finally, clean the chart of unnecessary items. For instance, click on the other data labels (one at a go) and press delete, apart from the one indicating the actual savings YTD. You can also work on the fill

colours, add a nob at the centre, add a text box to indicate the status, and any other final touches of your choice. The final look could be something like the one shown below.

Final thoughts

As you have seen, creating a gauge chart isn't a hard task to accomplish. With a few tweaks on the available charts we were able to create one.

There are those who argue in favor or against the use of gauge charts. Those who argue against it say it takes a lot of space in, say a dashboard, but provides little info. As such, they propose to use a bullet chart which gives more context of the KPI status.

I leave that for you to decide which one best fits your scenario.

In my opinion though, apart from giving more context for your data, a bullet chart doesn't fall short in scenarios where the savings exceed the target (>100%). As you may have noticed with a Gauge chart, it is assumed the scale runs up-to a 100 percent.

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Add interaction using

Scrolling charts

...very useful when presenting a long list of data

Creating interactive charts, or dynamic charts if you prefer, is one of the rare skills among Excel users. There are many approaches that make Excel as a tool very interesting to use... and to be honest, creating dynamic charts is one of my favourite.

What makes a chart or a table dynamic is being able to change the underlying data set. You can employ different ways but the common ones include:

1. Using form controls such as combo boxes, spin buttons, scroll bars or option buttons
2. Using pick lists (or drop-down lists if you like)
3. Using slicers for those with MS Office 2010 and above
4. Using macros / VBA
5. Using Excel tables

Today we are going to look at how we can leverage on a scroll bar to create a dynamic scrolling chart.

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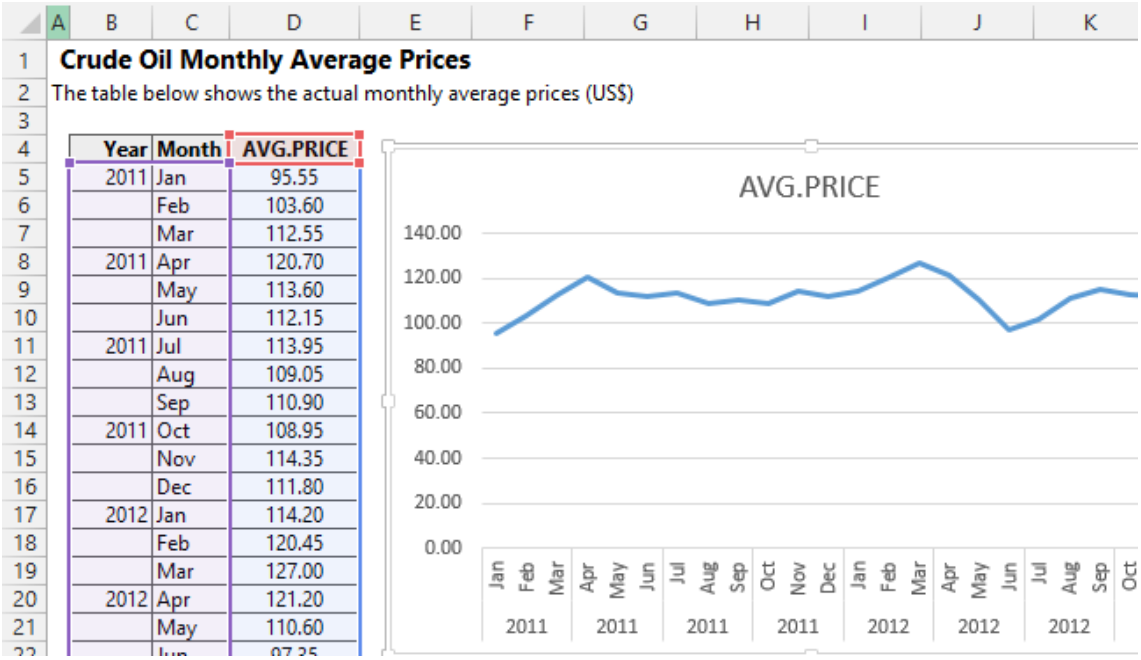
We are going to use data that shows monthly average prices for crude oil imports for a span of 4 years, 2011 to 2014, for our illustration.



Crude Oil Monthly Average Prices

The table below shows the actual monthly average prices (US$)

Year	Month	AVG.PRICE
2011	Jan	95.55
	Feb	103.60
	Mar	112.55
2011	Apr	120.70
	May	113.60
	Jun	112.15
2011	Jul	113.95
	Aug	109.05
	Sep	110.90
2011	Oct	108.95
	Nov	114.35
	Dec	111.80
2012	Jan	114.20
	Feb	120.45
	Mar	127.00
2012	Apr	121.20
	May	110.60

We have a total of 48 data points but we shall be showing 9 data points at any single view and then allow the user to scroll to see the rest of the data set.

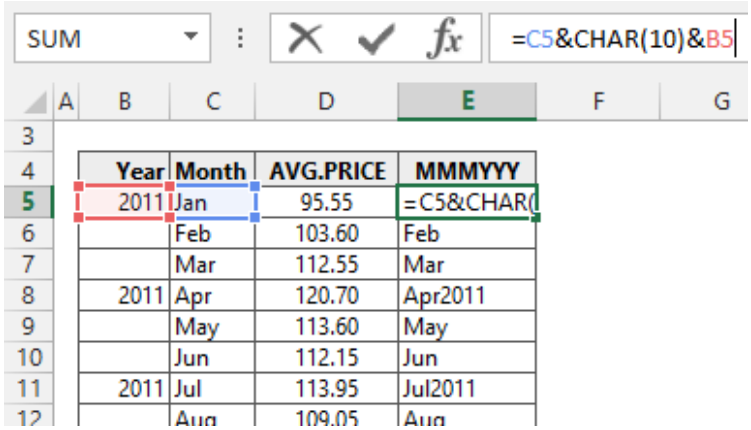
Preparing the data for the scrolling chart

The idea behind any dynamic chart in most cases involves *extracting a subset of the original data set* in another section in your worksheet.

We shall be combining the year and the month column and use the combined column for our horizontal axis. In cell E5, we will enter the following formula:

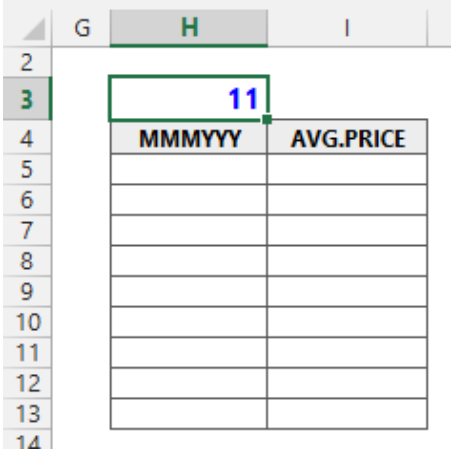
=C5 & CHAR (10) & B5

CHAR (10) in the above formula acts as a **hard return** (equivalent to ALT+ENTER) so that we can force the year to appear in a new line in our chart and therefore avoid having the horizontal axis labels for our chart slanted.



For this chart, we shall only need column D and E.

We therefore need to extract 9 data points from this data. We shall do this in the following area on our worksheet.



The next step will involve generating these 9 data points depending on the scroll position. Initially, let us just type a dummy number in cell H3… but this cell will be populated by the scroll bar in Excel.

In cells H5 and I5 we shall enter the following formula and drag it in the other adjacent cells.

Cell H5: **=INDEX (E5:$E$52, $H$3)**

Cell I5: **=INDEX (D5:D$52, $H$3)**

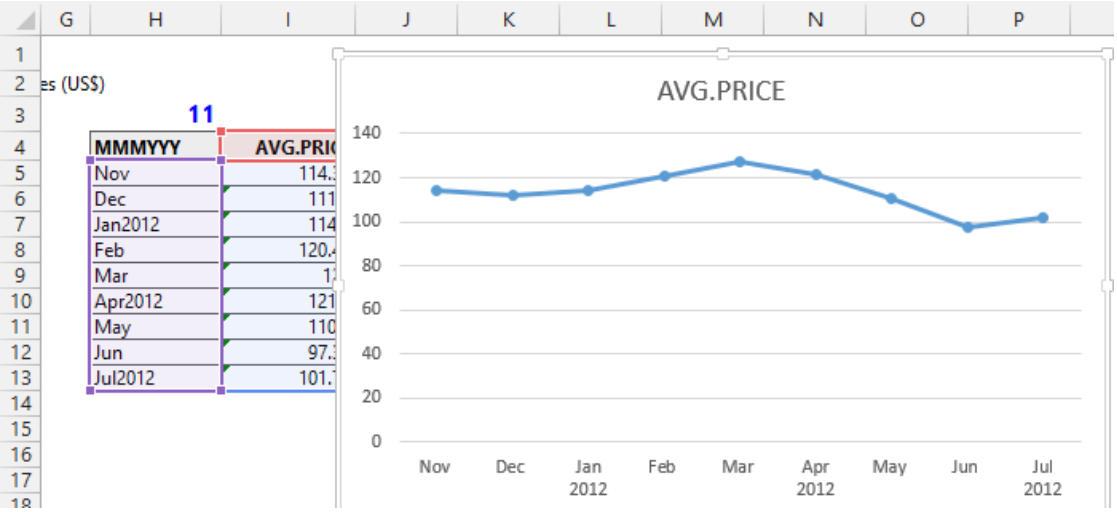
Notice how we ***fix the last data point*** in row 52 but ***allow the starting point to adjust*** as we autofill the formulae.

This is because the number generated by the scroll bar is constant, as you shall see later in this article. As such the range needs to adjust downward or upwards as the scroll bar positon changes ...much like a slider.

Plot the chart

We shall go ahead and plot a line chart based on this new data set. At this point we shall not worry much about the formatting and customization.

Select the data set, cells H4:I13, and from the **Insert menu** select the ***stacked line chart with markers*** to have the following:



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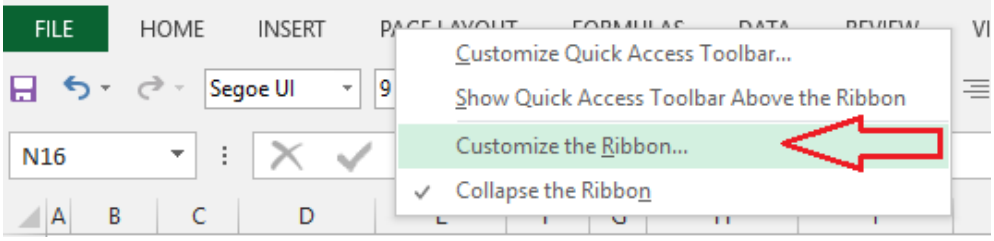
Creating a Scroll Bar for the Interactive Chart

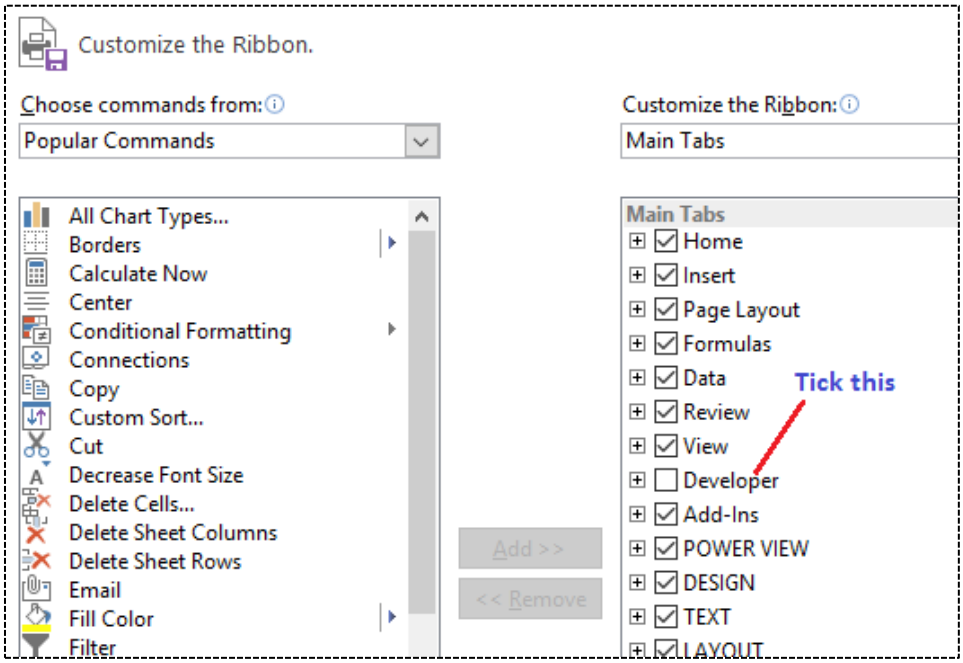
To create a scroll bar, we shall need to access the **Developer menu** on the Ribbon. This however is not a default menu and you may have to enable it first.

Enabling the developer menu

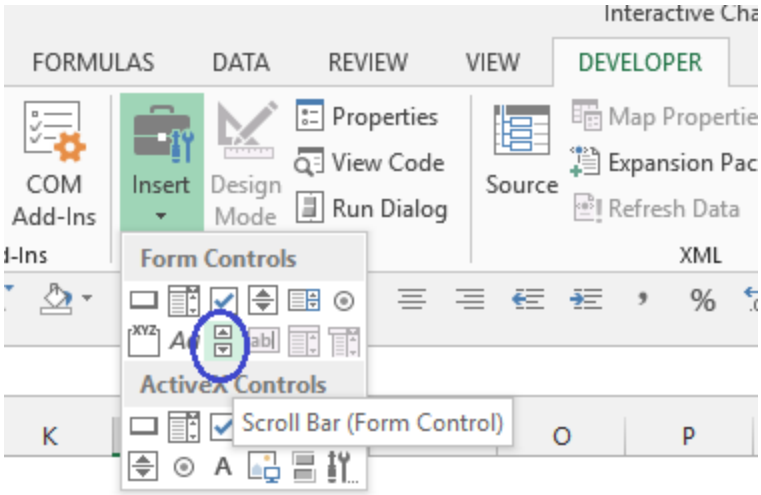
Right click anywhere on the ribbon and select customize the ribbon.



On the window that appears, just check the box next to the Developer option ...see below. Press OK.

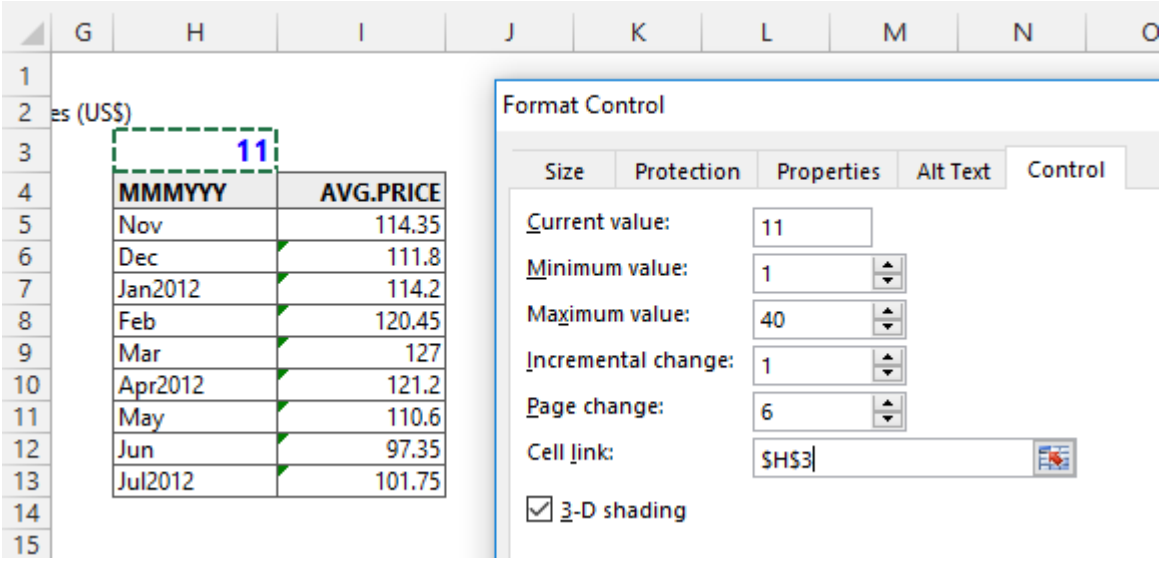


To insert the scroll bar, we head to the developer menu and insert a scroll bar, i.e. ***Developer menu >>Insert >>Scroll bar***



Once you select the scroll bar, hold down your left mouse button and draw a sizeable horizontal bar next to your chart.

Next, ***right click*** the scroll bar and select ***Format control*** to set the properties for this scroll bar. On the control tab, set the properties as shown in the figure that follows.



Understanding the scroll bar properties

Current value: This is the current scroll bar position. You can initially set this to 1 but for us we have defaulted it to 11, which is the random number we had chosen earlier on.

Minimum value: This is the lowest value that your scroll bar can return. In most cases this will be one (1). But in some scenarios, for instance, if your scroll bar allows you to scan through a list of years between 2008 to 2017, you should set this to 2008 since this is the earliest year in your series.

Maximum value: This value represents the **maximum change** that can happen such that the *first value or data point* in your original list *becomes the first data point in the last "X" (in our case, last 9) items* for our chart. [I want you to read this again until it sinks somewhere at the back of your mind.]

I have devised a way to compute what this value should be as follows:

> **(Total no. of data points *less* the number of data points to display) + 1**
>
> In our case,
>
> **(48-9) + 1 =40**

Incremental change: This is the change that will happen when the user scrolls one position forward or backward *using the arrows at the beginning or end of the scroll bar*. For this example, we want the data points to be scanned one row at a time.

Page change: This is the change that will happen when the user clicks anywhere on top of the scroll bar, besides the arrows.

Cell link: Majority of the form controls in the Developer menu will always generate an index/number upon the user making a selection. This number need to go somewhere and that is the purpose of this cell. In this example, we specify H3 as the link so that the formula we had done earlier on gives results based on what is selected on the scroll bar.

Final touches on the chart

By this time if you scroll the bar you should see the chart updating accordingly. If there is a step that was not clear, this is the time to revisit it.

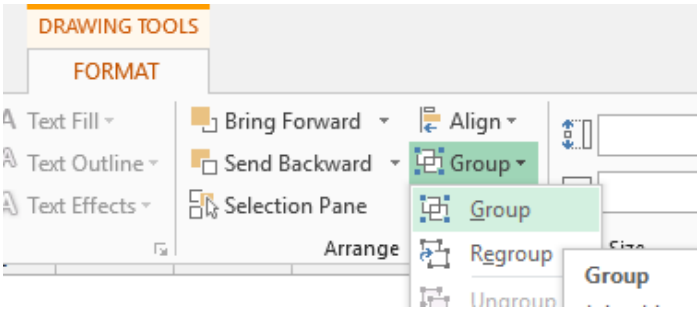
This bonus step involves customizing the chart elements such as the chart and axes titles. Further, change the line colour if you prefer and make any other changes that may be necessary.

For instance, *select the chart title place holder, click inside the formula bar, press = and select cell A1* to link the chart title.

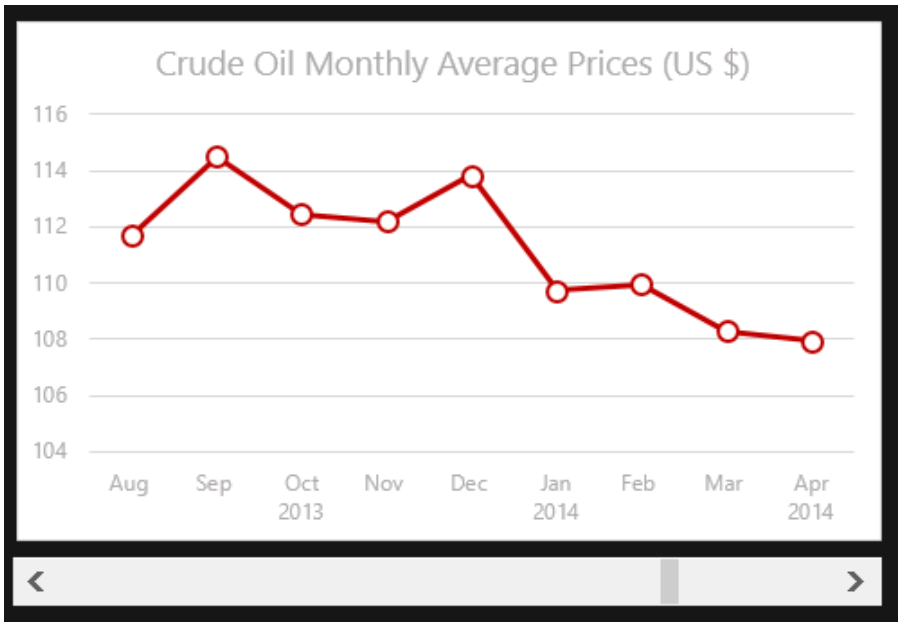
Make all elements such as the gridlines, chart title and horizontal axis labels *faint in colour* to allow the line to stand out.

One last tip: To ensure that you can move both the chart and the scroll bar at one go"

- Hold down the CTRL key on the keyboard and select the chart
- While still holding the CTRL key, select the scroll bar
- You will notice Drawing Tools <Format> menu on the ribbon from which you choose group to group the 2 selected items



The final chart looks like the one shown below.



Read more about dynamic, scrolling charts here: Sliders on an Excel chart by Darren Hall and creating sexy scrolling charts in Excel by Annie Cushing.

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Progress towards a goal using

Bullet charts

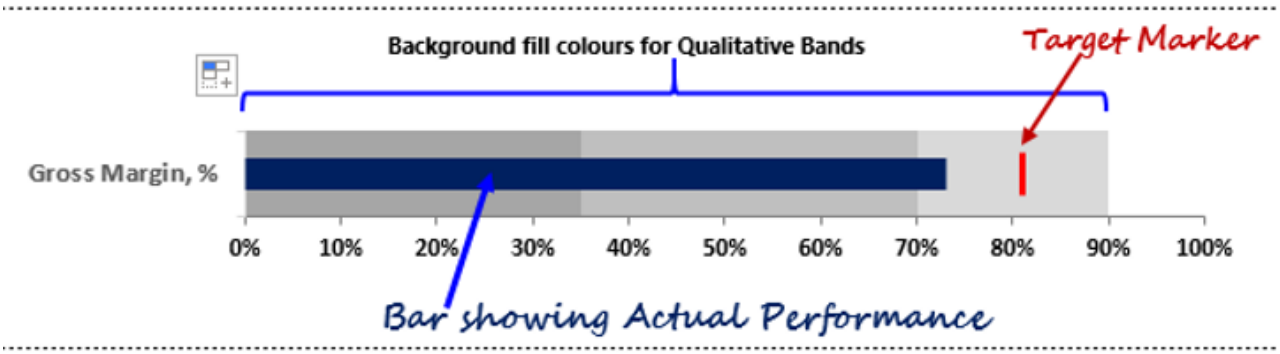
...gives context to performance achieved

The first time you come across this name for a chart, it's even difficult to figure out what it would look like.

But yes, it is possible!

A bullet basically is a projectile towards a given target. Bullet charts are useful *to measure progress towards a goal* or some targeted value. More than often as a manager or departmental head, you are always monitoring your milestones –Actual versus Target.

A bullet chart gives more than how far you are from your goal. It gives you **the context**! A typical bullet chart looks like this:



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The data points required to create this chart in Excel fall into these three categories:

1. ***Primary Measure*** -i.e. the Actual Value recorded, e.g. YTD Revenue
2. ***Standard Measure*** -this is the Target Value to be compared with the Primary Measure
3. ***Qualitative bands for performance*** -such as Poor, Fair, Satisfactory, Good and Excellent

There are a couple of ways to create this chart but this article will focus on a fairly simple approach.

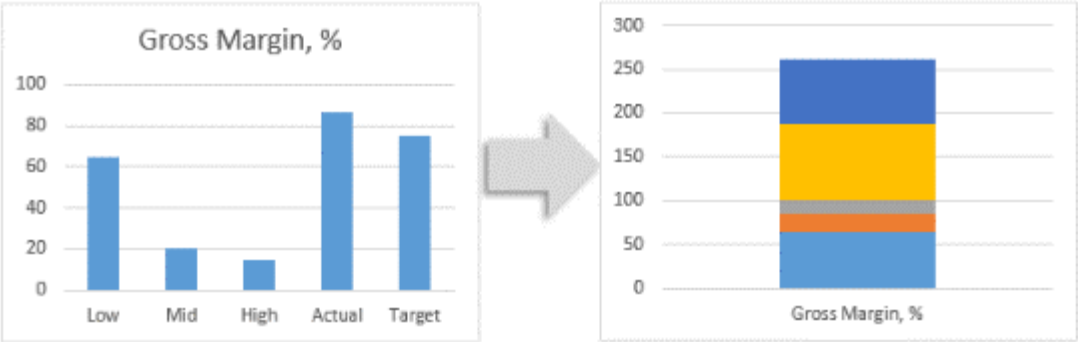
Step 1: Arrange your data as shown below.

The low, mid & high will provide the context in terms of a qualitative scale for your chart. The values you use here will depend on what you consider good or bad in terms of performance.

	Gross Margin, %
Low	65
Mid	20
High	15
Actual	87
Target	75

Step 2: Select B2:C7 and insert a 2D Stacked Column chart.

As this data is in a single column, it will be plotted as separate/clustered columns instead of stacked ones. Go to **Design** menu and choose **Switch Row/Column**. This will give you one column with all the data points as shown below.



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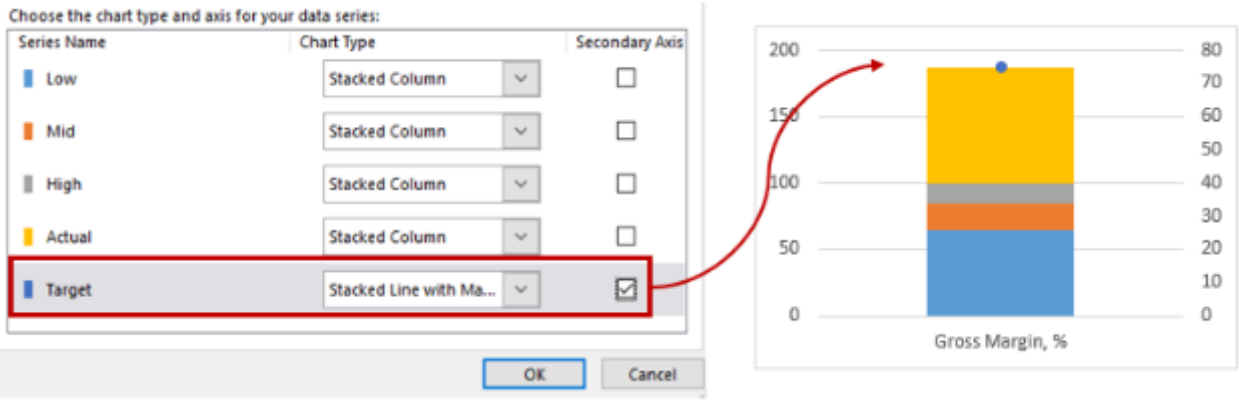
Step 3: Change Series Chart Type for Target Bar

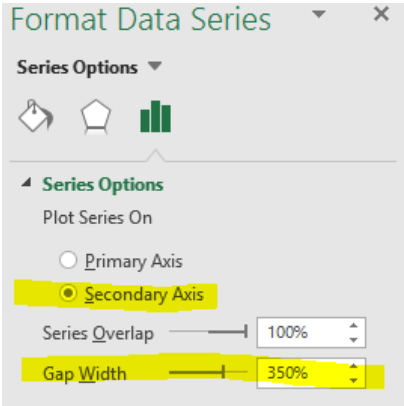
Right-click on the Target bar and choose "Change Series chart type…" on the dialog box that pops up, change the Target Value chart type to ***Stacked Line with Markers***, and put it on the ***secondary axis***.



Upon clicking **OK**, there would be a dot in the middle of the bar (see the figure above). Notice the primary and secondary vertical scales are different. To harmonize, *select the secondary vertical axis and delete it*.

Step 4: Format the Actual Series

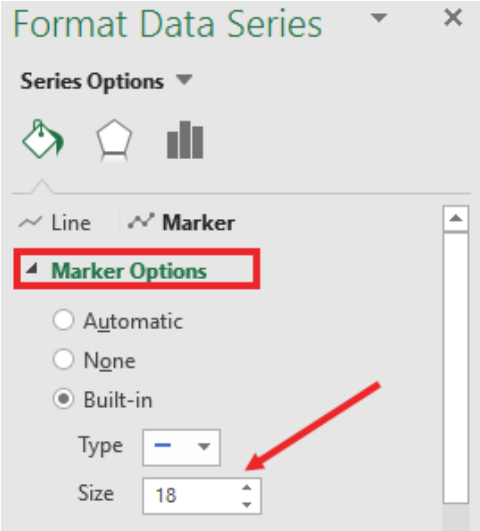
Right click the Actual bar and choose *Format Data Series*…This provides you with various format options. Under ***Series Options***, check the ***Secondary Axis check*** box and adjust the ***Gap Width*** for this series to, say 350%. You can give this series a Dark Blue fill with no Borders.



Step 5: Format the Target Value Marker Dot

Select the Target value marker dot and press CTRL+1 to format it. In the Format Data Series dialog box and make the following changes:

- **Marker Options:** choose Built-in and make the following adjustments:
    - Type -select ***dash***
    - Size -adjust to 18 (or one that fits your chart)



- **Fill Option:** select 'Solid fill' and use Red colour or any other colour that complements your chart
- **Line Options:** choose 'No line'
- **Border Options:** choose 'No line'

Step 6: Format the Qualitative Bands

Right click the qualitative ranges one at a go and change its feel colour. Preferably, *blue or gray shades* are easy on charts. Give these ranges a gradient feel by selecting a fill colour with varying degrees of transparency.

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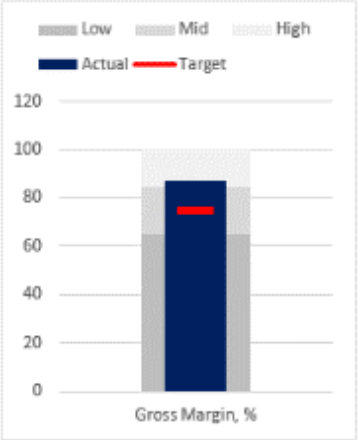
Further, adjust the gap width of these bands to, say 150%.

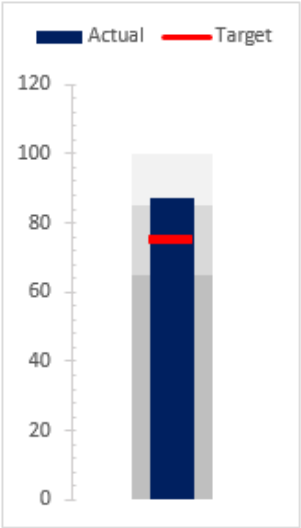
You should have the following at this stage:



Step 7: Re-size your Chart and Remove Chart Junk

For instance, delete the gridlines and the legend for the 3 qualitative bands. You may also add tick marks to the vertical value axis.

Once you follow all the steps above, you will end up with a chart like the one below. You can introduce this power-packed visual in your next dashboard presentation.



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Show underlying drivers of change

Waterfall charts

...with major negative changes

Creating a Waterfall Chart with Negatives in Excel

As you may be aware, a waterfall chart, which is also called a bridge or cascade chart, provides an easy way to illustrate how an initial value is impacted by a series of intermediate rises and falls in the course of time. That is, it shows the cumulative effect.

They can be used in almost every field. Examples include:

- Inventory analysis
- Projected profit analysis
- Employee count analysis

For better insights and impact, endeavor to ***show the underlying drivers to the change***! This could be in form of market share movements, impact of competitor pricing, store number movements (margins), etc.

There are more than 2 ways to create this type of chart in Excel. I've discussed one that uses stacked column chart in this blog post. As you may have experienced, the methodology of using stacked column chart fails when you have negative values that force, say the final/intermediate cumulative value(s) to be below the zero axis.

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With Excel 2016, the Waterfall chart is a native chart and doesn't require a lot of work. But those with Excel 2013 and below, read on.

We shall focus on a scenario with negative values, but this methodology should work either way.

How to build

Assuming you have data for an income statement as shown below. We want to illustrate how the net revenue is impacted by the series of inflows and outflows.

	A	B	C
1		DC Income Statement	
2			Amount
3		**Revenue**	**$243,219**
4		*Inventory*	($114,899)
5		*Other COGs*	($24,975)
6		**Gross Income**	**$103,345**
7		*Operating Exp.*	($124,024)
8		**Operating Income/Loss**	**($20,679)**
9		*Interest Income*	$35,775
10		**PBT**	**$15,096**
11		*Taxes*	($6,400)
12		**Net Income**	**$8,696**
13			

Step 1: Rearrange your data

In this example, we shall take a simplified approach where we shall skip the intermediary subtotals. We shall hence extract the main line items and based on these values, we shall generate 3 extra columns as shown below.

	E	F	G	H	I	J
1						
2		**P&L Item**	**Values**	**Ends**	**Before**	**After**
3		**Revenue**	$243,219	$243,219		
4		*Inventory*	($114,899)		$243,219	$128,320
5		*Other COGs*	($24,975)		$128,320	$103,345
6		*Operating Exp.*	($124,024)		$103,345	($20,679)
7		*Interest Income*	$35,775		($20,679)	$15,096
8		*Taxes*	($6,400)		$15,096	$8,696
9		**Net Income**	$8,696	$8,696		
10						

Whereas the ***stacked column*** approach relies on a floating bar to support the positive and negative values above the zero axis, our approach is based on ***2D line charts*** and a line chart feature called ***up-down bars***.

If you have two series of data, up-down bars are *used to emphasize the difference in measurement* between the two data series. Hence, the extra columns (Before and After) in the figure above! These two columns represent the resultant *values before and after adding a line item to the previous total*.

The calculations are as follows:

Cell H3: =G3

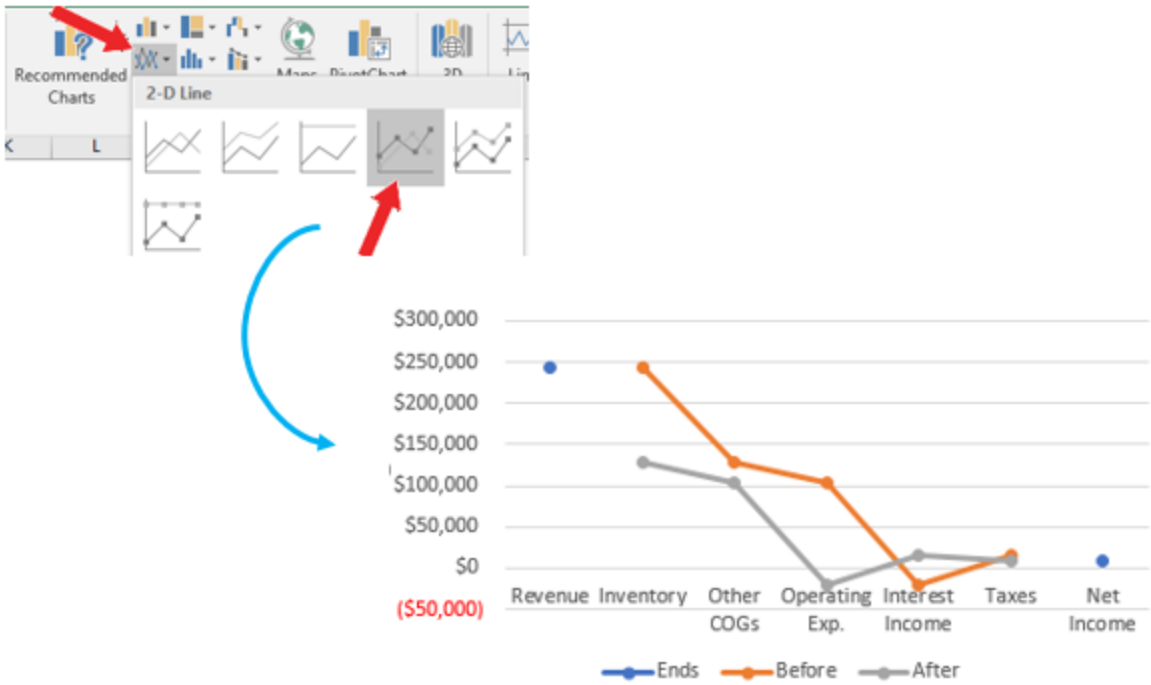
Cell H9: =G9

Cell I4: = SUM(G$3:G3)

Cell J4: = SUM(G$3:G4)

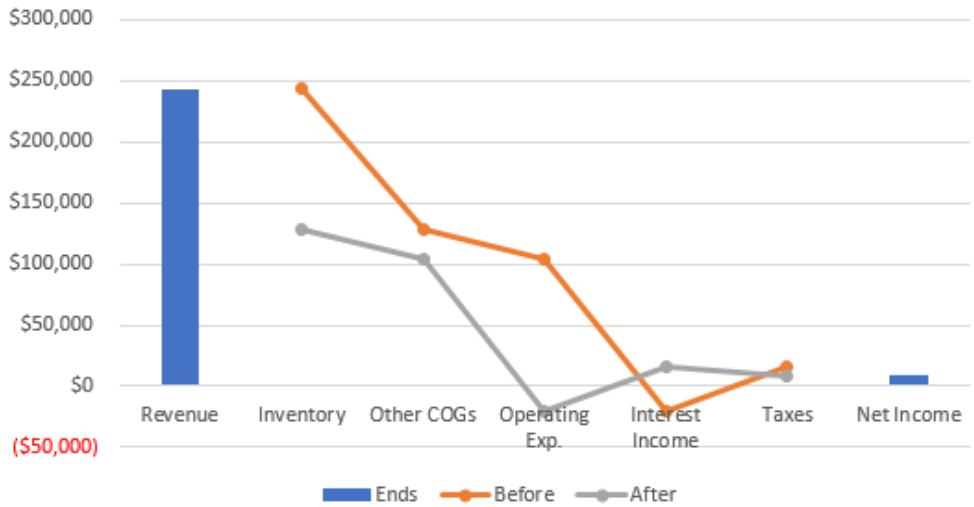
Step 2: Create a 2D line chart from the before and after columns

Select cells F2:F9, hold down the CTRL keyboard key and select the range H2:J9 and from the Insert menu, select the clustered line with markers.

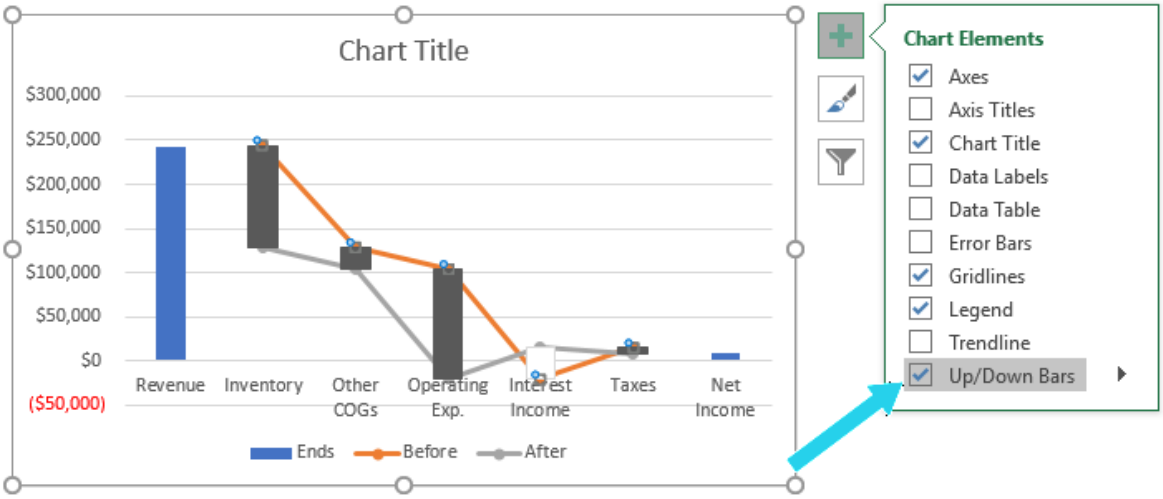


Step 3: Transform the chart to a waterfall chart

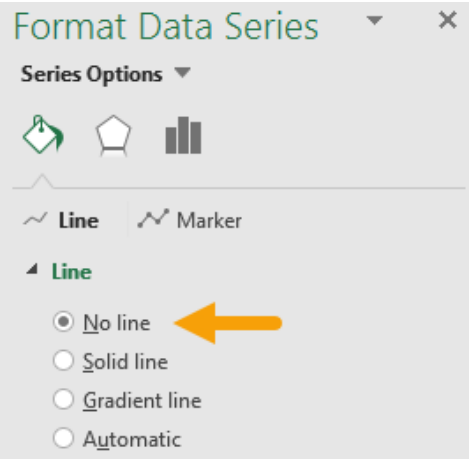
At this stage, right click the "**Ends**" series represented by the dots/markers and choose ***Change series chart type…*** make it a *clustered column chart*. You will have:

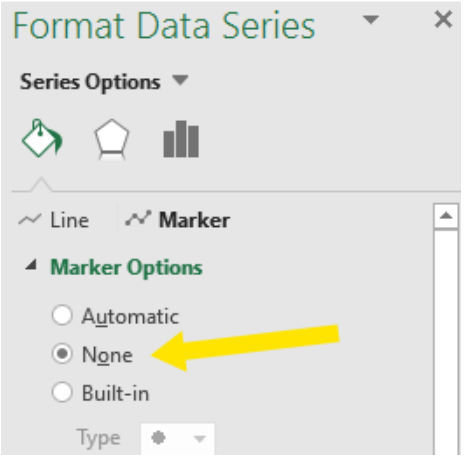


Secondly, select one of the line charts and add up/down bars as shown below or from the Design menu:

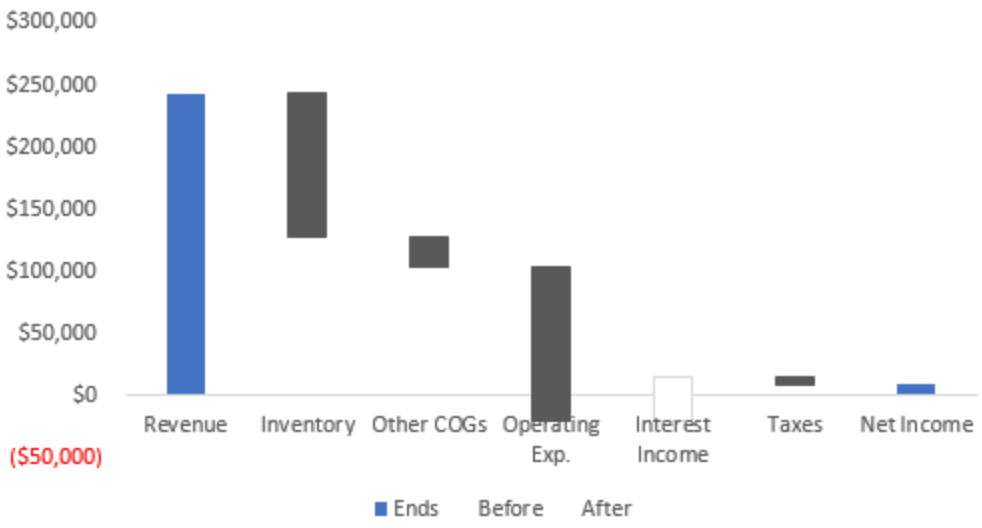


Lastly, select each data series in turn and set line to "**no line**" and marker options to "**None**":





This is what you should get after setting both data series to "no line":



Step 4: Format and clean up the chart

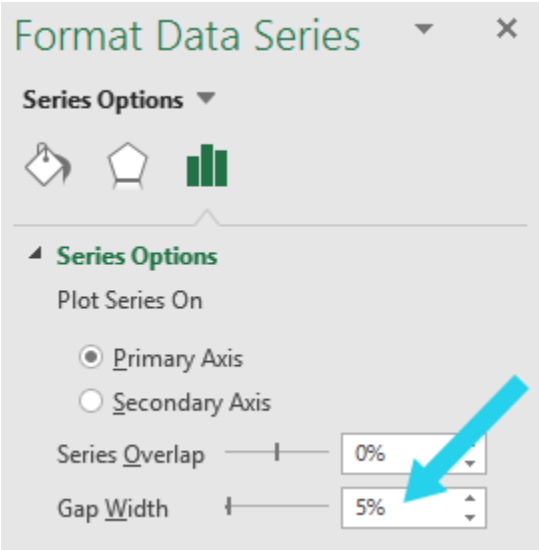
The following are the final touches that may be necessary:

a) Select and delete the **legends and gridlines**

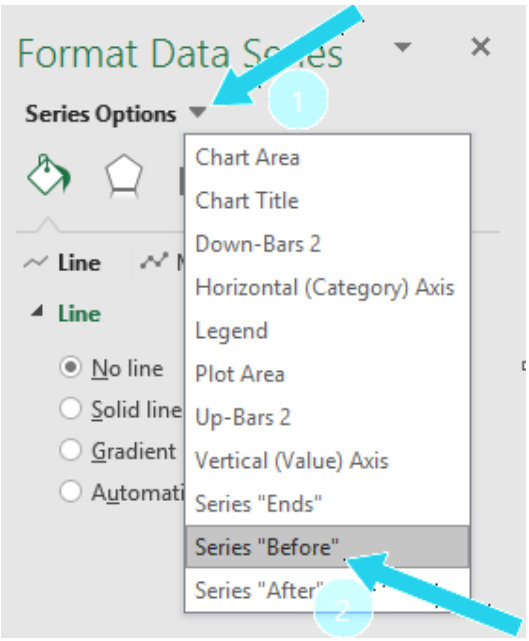
b) Select up/down bars and change the **fill color and border** as desired

c) Change the **gap width** of the column and the up-down bars to some value close to zero, say 5%

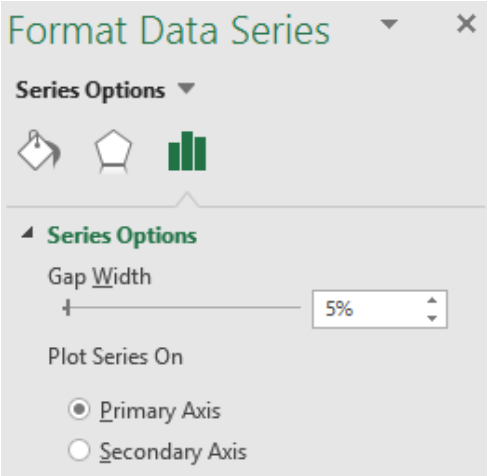
   a. Double click one of the '**Ends' column** to get the formatting options and change the gap width as shown:



b. For the Up/Down bars, once selected on the chart itself, you would then need to select the specific series (either Before or After) from the Format Data Series dialog box.

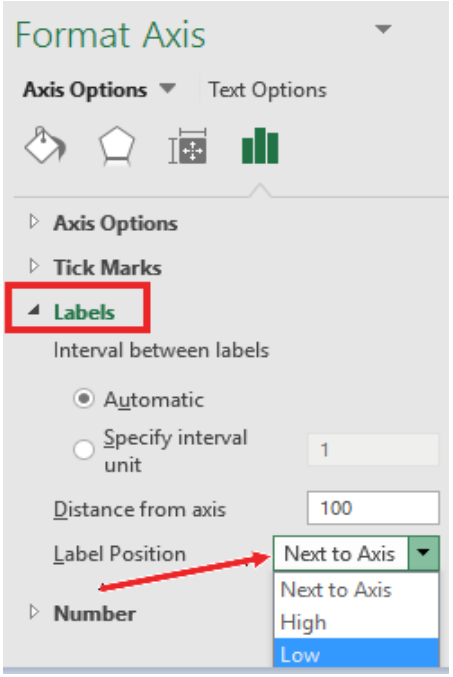


Upon selecting the series, the following format options will then be available to adjust.

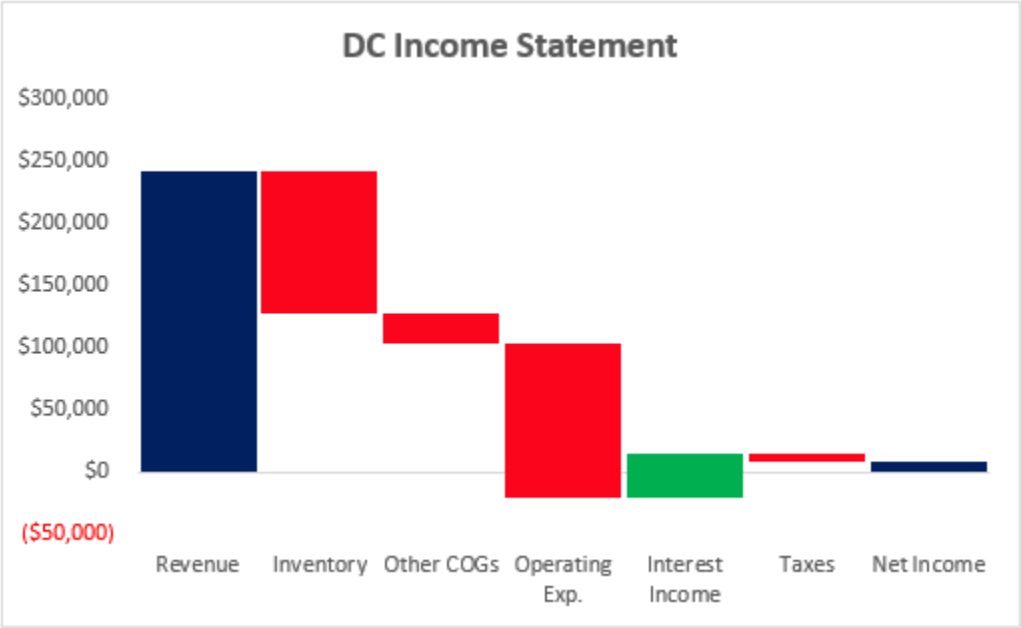


d) If your chart doesn't have a lot of categories/series, you may choose to **add data labels** to your chart, and further **delete the vertical value axis**. This is purely optional and one needs to be careful

e) To avoid the horizontal axis labels from overlapping with the bars, you can select it and show the Labels either at High or Low position.



Here is the final chart having followed every step.



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