Data Visualization: A Practical Approach for Absolute Beginners

Lab 3 – The Business of Visualization

Overview

Imagine you are the proud owner of a lemonade stand business that operates year-round. The year just ended, and your investor would like a report out of the stand's financials, as well as the ability to interact with your data in a dashboard with scorecard elements. This lab simulates the creation of a business dashboard using Excel.

What You'll Need

To complete the labs, you will need the following:

- Desktop version of Microsoft Excel. Instructions for installing Excel are in Module 0 \ Getting Started \ Lab Setup.
- The Lemonade Business dataset file from github, which you can download locally.

Exercise 1: Familiarize Yourself with the Data Set

In this exercise you will learn the context of the lemonade business and its relation to the data set

Date	Month	Day	Temperature	Rainfall	RainfallCategory	Flyers	FlyerSuccess	FlyerSuccessScore	Price	Sales	Target	MadeQuota	OverallPerformance	Revenue
1/1/2017	Jan	Sunday	27	2.00	Heavy	15	Low	5	$0.30	10	$8	0	5	$3.00
1/2/2017	Jan	Monday	28.9	1.33	Heavy	15	Low	5	$0.30	13	$8	0	5	$3.90
1/3/2017	Jan	Tuesday	34.5	1.33	Heavy	27	Medium	10	$0.30	15	$8	0	10	$4.50
1/4/2017	Jan	Wednesday	44.1	1.05	Heavy	28	Medium	10	$0.30	17	$8	0	10	$5.10
1/5/2017	Jan	Thursday	42.4	1.00	Medium	33	Medium	10	$0.30	18	$8	0	10	$5.40
1/6/2017	Jan	Friday	25.3	1.54	Heavy	23	Medium	10	$0.30	11	$8	0	10	$3.30
1/7/2017	Jan	Saturday	32.9	0.00	None	19	Low	5	$0.30	13	$8	0	5	$3.90
1/8/2017	Jan	Sunday	37.5	1.18	Heavy	28	Medium	10	$0.30	15	$8	0	10	$4.50
1/9/2017	Jan	Monday	38.1	1.18	Heavy	20	Medium	10	$0.30	17	$8	0	10	$5.10
1/10/2017	Jan	Tuesday	43.4	1.05	Heavy	33	Medium	10	$0.30	18	$8	0	10	$5.40
1/11/2017	Jan	Wednesday	32.6	1.54	Heavy	23	Medium	10	$0.30	12	$8	0	10	$3.60
1/12/2017	Jan	Thursday	38.2	0.00	None	16	Low	5	$0.30	14	$8	0	5	$4.20
1/13/2017	Jan	Friday	37.5	1.33	Heavy	19	Low	5	$0.30	15	$8	0	5	$4.50
1/14/2017	Jan	Saturday	44.1	1.05	Heavy	23	Medium	10	$0.30	17	$8	0	10	$5.10
1/15/2017	Jan	Sunday	43.4	0.00	None	33	Medium	10	$0.30	18	$8	0	10	$5.40
1/16/2017	Jan	Monday	30.6	1.67	Heavy	24	Medium	10	$0.30	12	$8	0	10	$3.60
1/17/2017	Jan	Tuesday	32.2	1.43	Heavy	26	Medium	10	$0.30	14	$8	0	10	$4.20
1/18/2017	Jan	Wednesday	42.8	1.18	Heavy	33	Medium	10	$0.30	16	$8	0	10	$4.80
1/19/2017	Jan	Thursday	43.1	1.18	Heavy	30	Medium	10	$0.30	17	$8	0	10	$5.10
1/20/2017	Jan	Friday	31.6	1.43	Heavy	20	Medium	10	$0.30	12	$8	0	10	$3.60
1/21/2017	Jan	Saturday	36.2	1.25	Heavy	16	Low	5	$0.30	14	$8	0	5	$4.20
1/22/2017	Jan	Sunday	40.8	1.11	Heavy	19	Low	5	$0.30	16	$8	0	5	$4.80
1/23/2017	Jan	Monday	38.1	1.05	Heavy	21	Medium	10	$0.30	17	$8	0	10	$5.10
1/24/2017	Jan	Tuesday	28.6	0.00	None	20	Medium	10	$0.30	12	$8	0	10	$3.60
1/25/2017	Jan	Wednesday	32.2	1.25	Heavy	24	Medium	10	$0.30	14	$8	0	10	$4.20
1/26/2017	Jan	Thursday	35.8	1.25	Heavy	18	Low	5	$0.30	16	$8	0	5	$4.80
1/27/2017	Jan	Friday	42.1	1.05	Heavy	22	Medium	10	$0.30	17	$8	0	10	$5.10
1/28/2017	Jan	Saturday	34.9	1.33	Heavy	15	Low	5	$0.30	13	$8	0	5	$3.90
1/29/2017	Jan	Sunday	35.2	0.00	None	27	Medium	10	$0.30	14	$8	0	10	$4.20
1/30/2017	Jan	Monday	41.1	1.05	Heavy	20	Medium	10	$0.30	17	$8	0	10	$5.10
1/31/2017	Jan	Tuesday	40.4	1.05	Heavy	37	Medium	10	$0.30	18	$8	0	10	$5.40
2/1/2017	Feb	Wednesday	42.4	1.00	Medium	35	Medium	10	$0.30	18	$8	0	10	$5.40
2/2/2017	Feb	Thursday	52	1.00	Medium	22	Medium	10	$0.30	20	$8	0	10	$6.00

Download the dataset, and review the column names and records

1. Download the dataset from github and open it in Microsoft Excel on your desktop.

2. Imagine in a normal day in a lemonade stand, you are (1) selling lemonade on a (2) particular day with (3) a particular set of conditions for that day. These three "facts" that are collected daily are represented by
    I. Date ([Date], [Month], [Day]),
    II. Weather conditions ([Temperature], [Rainfall], [RainfallCategory], and
    III. Lemonade sales ([Price], [Sales])

    These expected records are enhanced with some calculations and additional columns. Enriching data sets usually comes with business logic, that is, rules and conditions around records of fact that enable more intelligent reporting. In our case, these are (1) rainfall conditions, (2) marketing outcomes, and (3) performance metrics, including revenue.

    I. [Rainfall Category] has three values; "Heavy," "Medium," and "None." Apparently "Low" wasn't captured or considered important. Investigate the threshold for these values by looking at a sampling of the data records.
    II. [FlyerSuccess] has "High," "Medium," and "Low;" investigate the threshold for these values. [FlyerSuccessScore] gives points to each of these, instead of text values.
    III. [Target] looks like a daily target for this business, of $8. This has been set to be a constant per day, rather than month (some months have more days than others). As well, [MadeQuota] appears to be a binary point value of either 0, or 10, depending on if quota was made. [OverallPerformance] has a calculation to determine the value—read the formula in excel to see how this is done:

    ```
    =[@FlyerSuccessScore]+[@MadeQuota]
    ```

    [Revenue] is simply [Price] * [Sales] (a typical revenue formula).

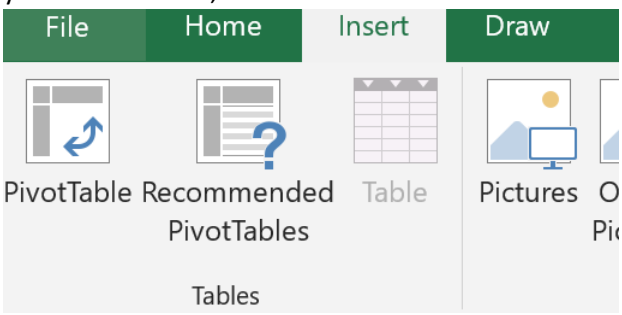
Review "Overall Performance" as a "KPI

1. [OverallPerformance] indicates that there is a daily score, based on two behaviors – handing out flyers (marketing), and selling (making the daily quota). This KPI will become important as we develop our dashboard, forming the basis for the scorecard elements.

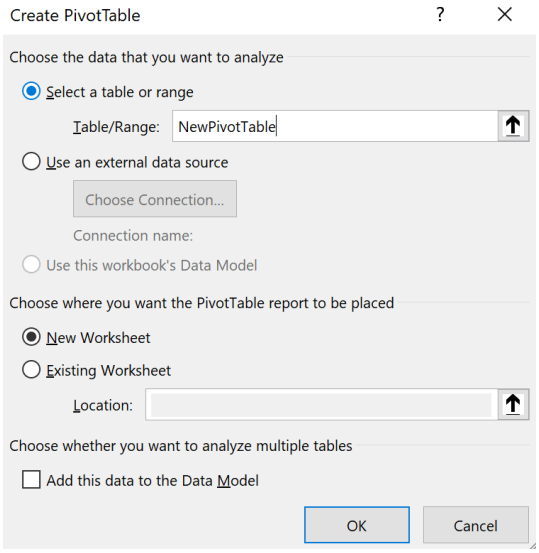
Exercise 2: Create PivotTable and PivotChart

In this exercise, you will create a PivotTable and PivotChart from the data set

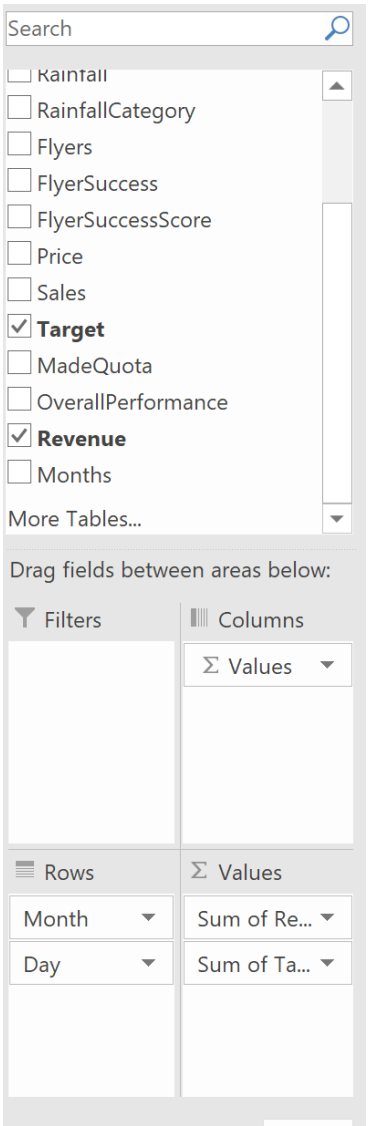
1. Click on one of the column names in your table (one of the blue cells). On the "Insert" tab in your Excel ribbon, select "PivotTable"



2. This window will pop up—assign the PivotTable a new name if you'd like (I wrote "NewPivotTable") then select "Ok"



3. Add [Month], [Day] to Rows, [Revenue], [Target] to Values:

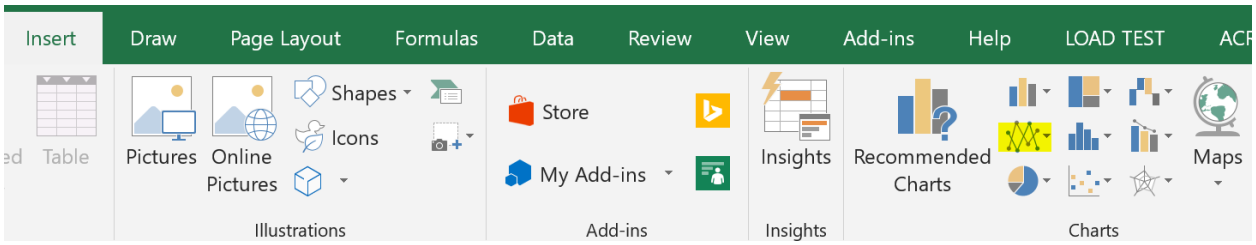


4. Collapse “Month” by right-clicking one of the month cells, and selecting “Expand/Collapse”, then select “Collapse Entire Field.”
5. Rename “Sum of Revenue” and “Sum of Target” to friendly names, like “Revenue per Month” and “Target per Month”

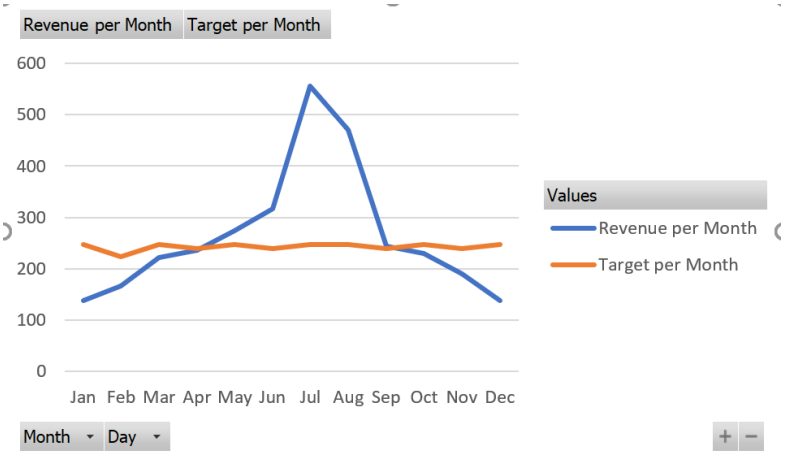
   Your PivotTable should look like so:

Row Labels	Revenue per Month	Target per Month
⊞Jan	138.6	248
⊞Feb	167.1	224
⊞Mar	222.6	248
⊞Apr	235.8	240
⊞May	274.5	248
⊞Jun	316.8	240
⊞Jul	556.5	248
⊞Aug	470.5	248
⊞Sep	243.6	240
⊞Oct	229.5	248
⊞Nov	189.6	240
⊞Dec	138.6	248
Grand Total	3183.7	2920

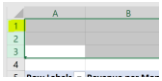
6. Create PivotChart by going to the “Insert” tab in ribbon, and selecting the highlighted chart for a line chart:



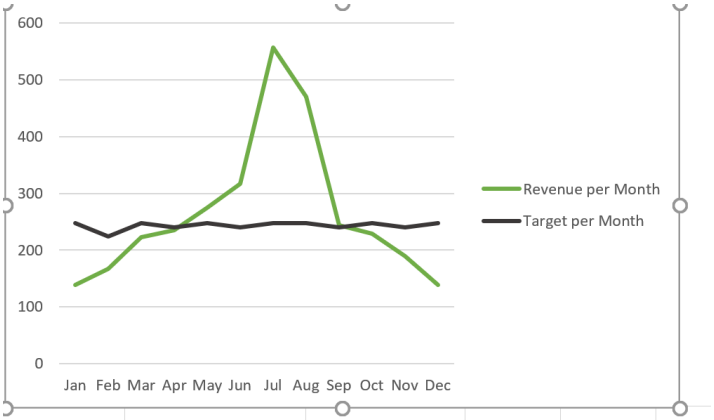
7. Insert the first selection for a 2-D line chart to get a result that looks like:



8. Remove the extra labels around the visualization by right-clicking on them, for example, Revenue Per Month, then selecting “Hide All Buttons on Chart”
9. Recolor data series to be slightly less standard—right-click on a data series value and recolor Revenue per Month to be green; Target per Month, black.
10. Insert some space/new rows above your PivotTable to create room in your dashboard by right-clicking a row and “Insert New Row” below, and create space on the columns by repeating on Column A to add some space.



11. Reposition the chart above the PivotTable. You should now have a chart and PivotTable that looks like:



Row Labels	Revenue per Month	Target per Month
Jan	138.6	248
Feb	167.1	224
Mar	222.6	248
Apr	235.8	240
May	274.5	248
Jun	316.8	240
Jul	556.5	248
Aug	470.5	248
Sep	243.6	240
Oct	229.5	248
Nov	189.6	240
Dec	138.6	248
Grand Total	3183.7	2920

Exercise 3: Add Scorecard, Calculations, and Slicers

In this exercise, you will add additional context and interactive content to your dashboard

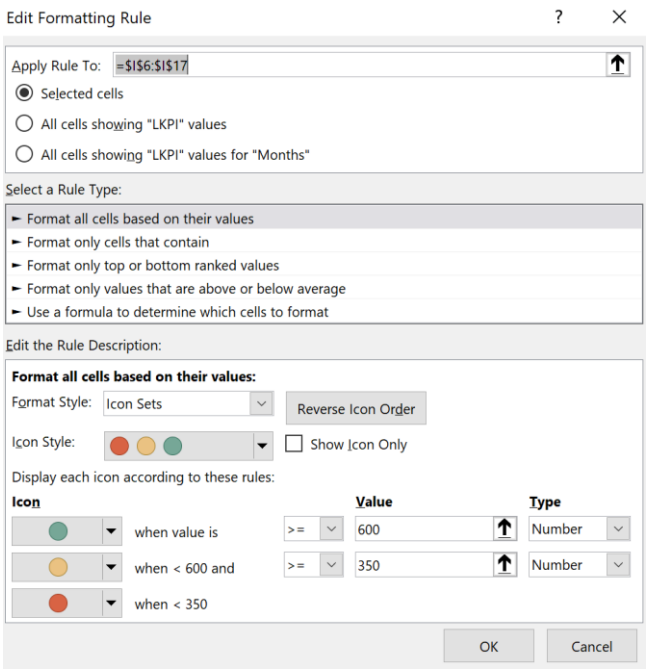
Add a heatmap

1. Add heatmap visuals to your “Revenue per Month” in the PivotTable by selecting the cells underneath “Revenue per Month” and in your home tab in the Excel ribbon, select Conditional Formatting, then “Color Scales”; choose the bottom-left visual, “Green – white Visual” to get these results:

Row Labels	Revenue per Month	Target per Month
Jan	138.6	248
Feb	167.1	224
Mar	222.6	248
Apr	235.8	240
May	274.5	248
Jun	316.8	240
Jul	556.5	248
Aug	470.5	248
Sep	243.6	240
Oct	229.5	248
Nov	189.6	240
Dec	138.6	248
Grand Total	3183.7	2920

Add a scorecard

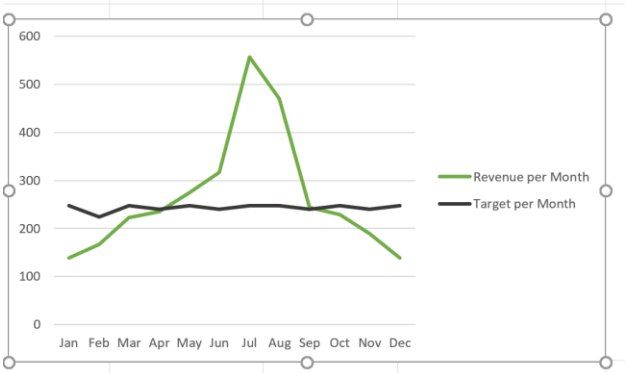
1. Copy your entire PivotTable. We're going to add a scorecard column in the new PivotTable, but we don't want it to appear on the chart we created from the first PivotTable. Put the new Table to the right of your existing PivotTable using the same rows.
2. Add in another field to the "Values" section of the new PivotTable Field List, [OverallPerformance]. This will add new column.
3. Rename the new column to "LKPI" (for "Lemonade KPI")
4. Format the new LKPI column using icon sets to make it look like a scorecard.
    a. Select the LKPI values.
    b. Set a formatting rule under Conditional Formatting -> Manage Rules.
    c. Use the icon "Type" in the bottom to "Number," and write in 600 for green range, and 350 for yellow range.



    d. Your LKPI column should look like this:

ow Labels	Revenue per Month	Target per Month	LKPI
Jan	138.6	248	265
Feb	167.1	224	295
Mar	222.6	248	360
Apr	235.8	240	520
May	274.5	248	730
Jun	316.8	240	735
Jul	556.5	248	755
Aug	470.5	248	750
Sep	243.6	240	570
Oct	229.5	248	380
Nov	189.6	240	335
Dec	138.6	248	260
rand Total	3183.7	2920	5955

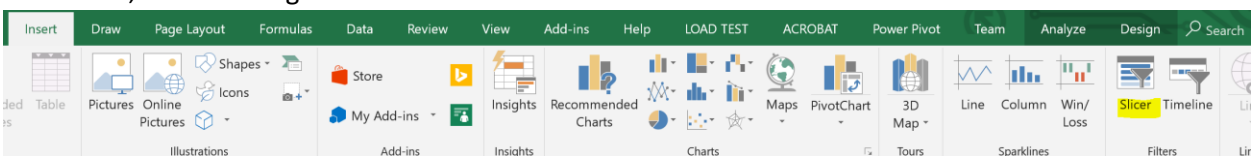
5. Hide all the columns in your new PivotTable except for LKPI by selecting the columns, holding the “Shift” key, and then right-click on one of the columns and select “Hide”
    a. *The reason we’re hiding these columns are so that the additional “LKPI” data series need not show up on the time series chart, but is useful in our PivotTable as an “indicator” for each month*
6. Resize your chart as needed so your dashboard, with one chart and two PivotTables, resembles the following:



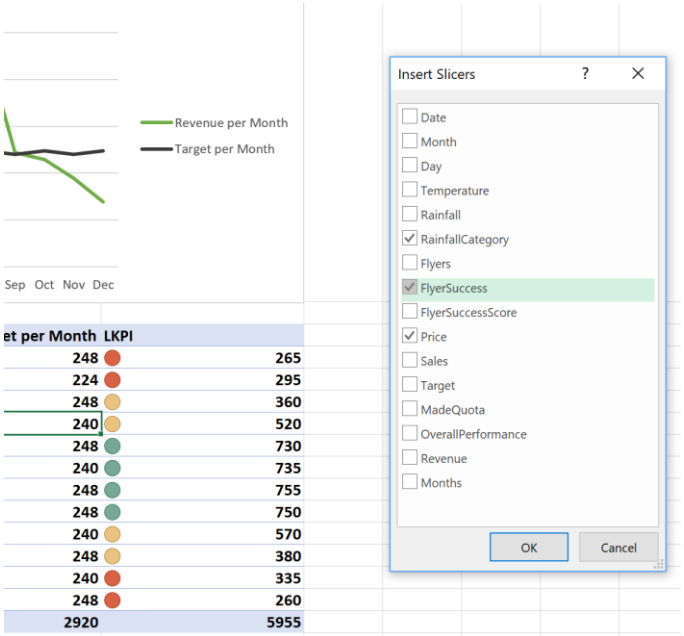
Row Labels	Revenue per Month	Target per Month	LKPI
Jan	138.6	248	265
Feb	167.1	224	295
Mar	222.6	248	360
Apr	235.8	240	520
May	274.5	248	730
Jun	316.8	240	735
Jul	556.5	248	755
Aug	470.5	248	750
Sep	243.6	240	570
Oct	229.5	248	380
Nov	189.6	240	335
Dec	138.6	248	260
Grand Total	3183.7	2920	5955

Add data slicers

1. Add in slicers into your dashboard by going to the insert tab after selecting a cell in your first PivotTable, and selecting “Slicer”

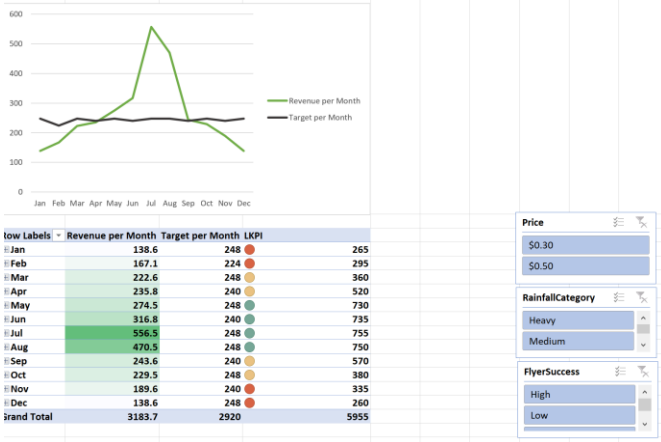


    a. Select [Price], [RainfallCategory], and [FlyerSuccess], then select “Ok”



et per Month	LKPI
248	265
224	295
248	360
240	520
248	730
240	735
248	755
248	750
240	570
248	380
240	335
248	260
2920	5955

b. Resize the slicers and move to the right to create some space for our next steps



low Labels	Revenue per Month	Target per Month	LKPI
Jan	138.6	248	265
Feb	167.1	224	295
Mar	222.6	248	360
Apr	235.8	240	520
May	274.5	248	730
Jun	316.8	240	735
Jul	556.5	248	755
Aug	470.5	248	750
Sep	243.6	240	570
Oct	229.5	248	380
Nov	189.6	240	335
Dec	138.6	248	260
Grand Total	3183.7	2920	5955

2. Try out your data slicers by clicking to select various filters to see how your dashboard changes.

   HINT: you can click to select, and shift-click to de-select elements in the slicers.

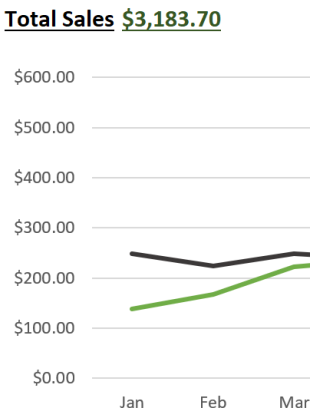
Add a field reference for Total Sales

Create a cell reference to enable an “at a glance” summary of the Total Sales.

1. Add text above your line chart in a field that says “Total Sales”. Make it a larger font and bold.
2. Add a calculated value by adding a cell reference in a cell next to your new label. Type “=” in the cell and then click on the cell in your PivotTable that contains the value for **Grand Total** of Revenue per Month. The value in your new cell will be similar to this:

   ```
   =GETPIVOTDATA("Revenue per Month",$A$20)
   ```

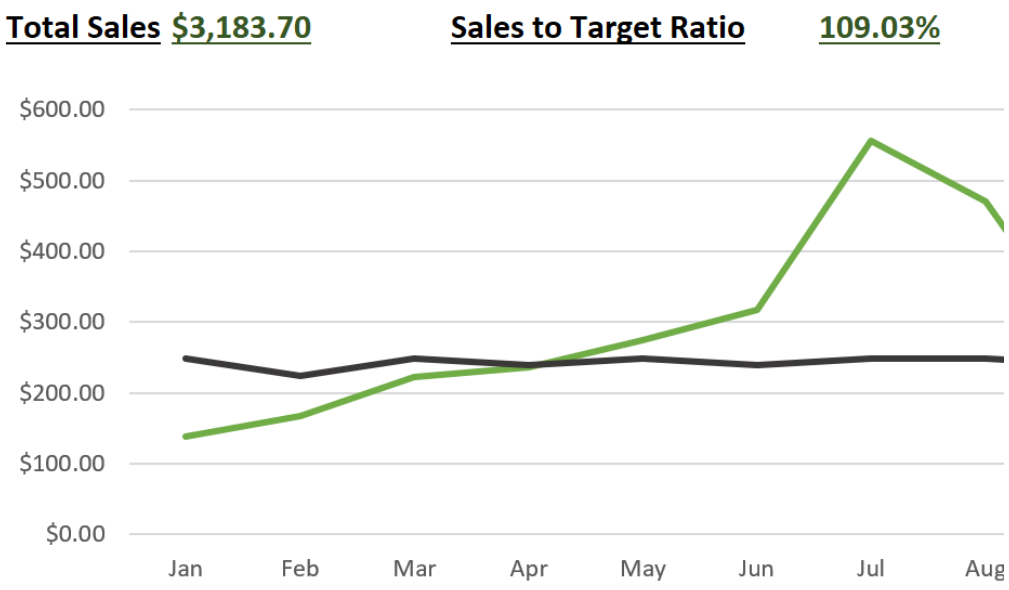
3. Format the PivotTable revenue, target and your new cell reference for Total Sales as currency.
4. Your new Total Sales at-a-glance field should resemble the following:



OPTIONAL: Add a Sales to Target calculated field

5. Repeat the same following steps for a “Sales to Target Ratio” right next to your “Total Sales” you calculated by writing “= ” and then selecting the Grand Total for Revenue, then write “/ “ to divide that grand total by “Target per Month”
6. Format your new value as a percentage.
7. Your field for Sales to Target and the resulting dashboard should resemble the following:

```
=GETPIVOTDATA("Revenue per Month",$B$5)/GETPIVOTDATA("Target per Month",$B$5)
```

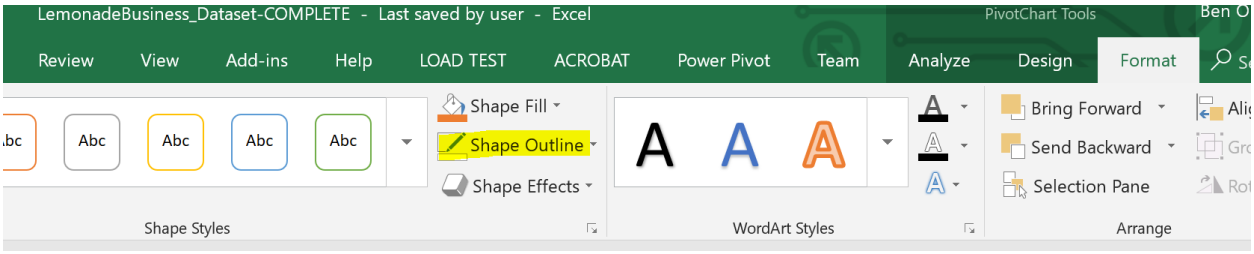


Exercise 4: Finalize the Dashboard for Investor Use

In this exercise, you will finalize your dashboard for use, including polish and finish of all elements

Polish existing elements

1. Remove border from your chart by selecting the time series chart, and going to the “Format” part of your ribbon, and selecting “No Color” in Shape Outline:



2. Add in a legend that you hand-type. You can type a legend right into the cells, and use cell formatting to make it look similar to the following:

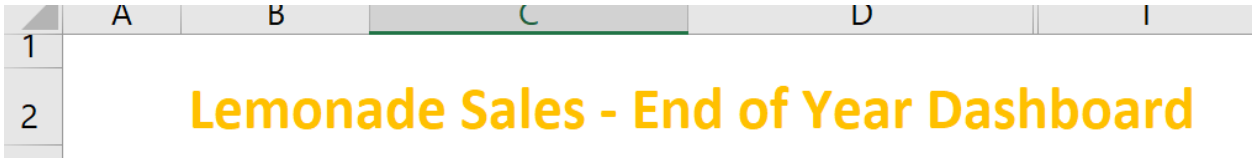
LKPI	
265	
295	
360	
520	
730	
735	
755	
750	
570	
380	
335	
260	

Lemonade KPI Legend

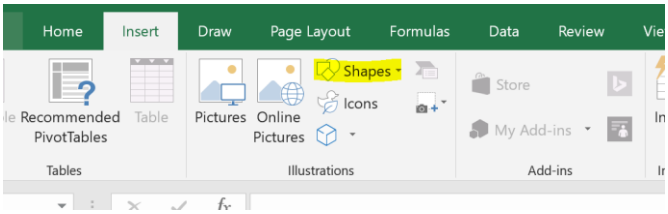
> 600/Month =
350-600/Month =
<350/Month =

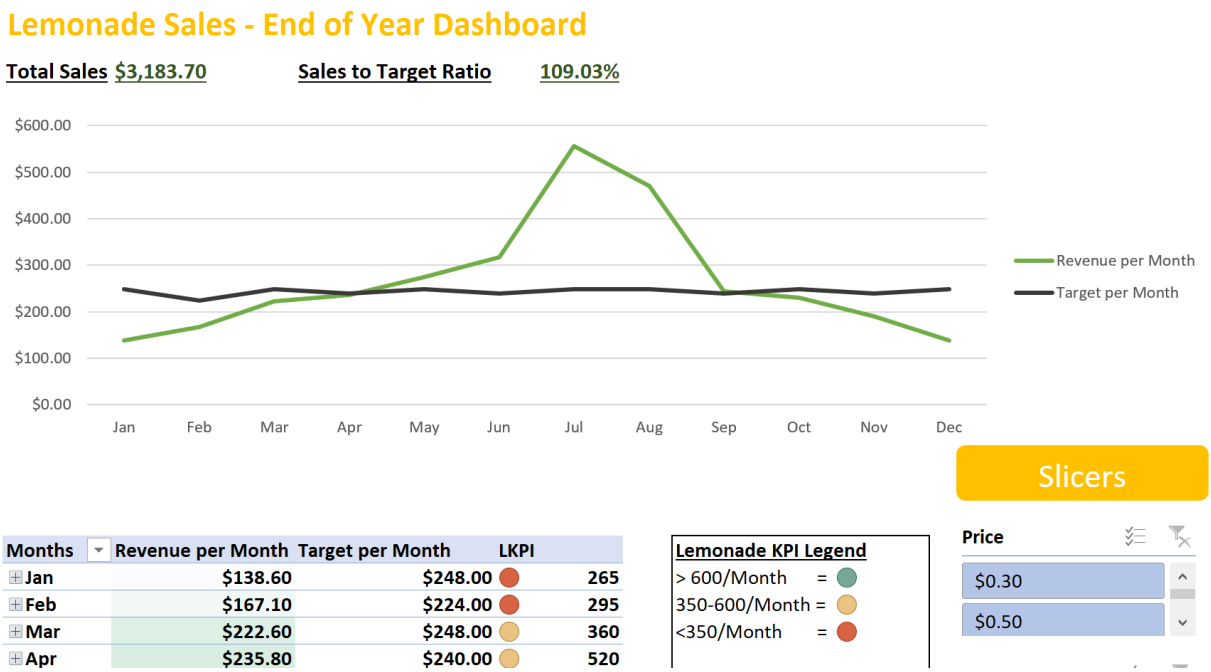
The Lemonade KPI is an aggregate score composed of Flyer Success Score (Marketing Efforts) and hitting Daily Sales Quota.

3. In your "View" tab in the ribbon, de-select "Gridlines" to remove cells in your dashboard
4. Add in title for the dashboard, preferably in cell 2B: "Lemonade Sales – End of Year Dashboard"
    a. Reformat, increase font size, choose color of your liking



5. **OPTIONAL**: Insert a shape above your data slicers with the text "Slicers" by going to "insert" -> Shapes, and then selecting a rectangle of choice, then format to your liking.





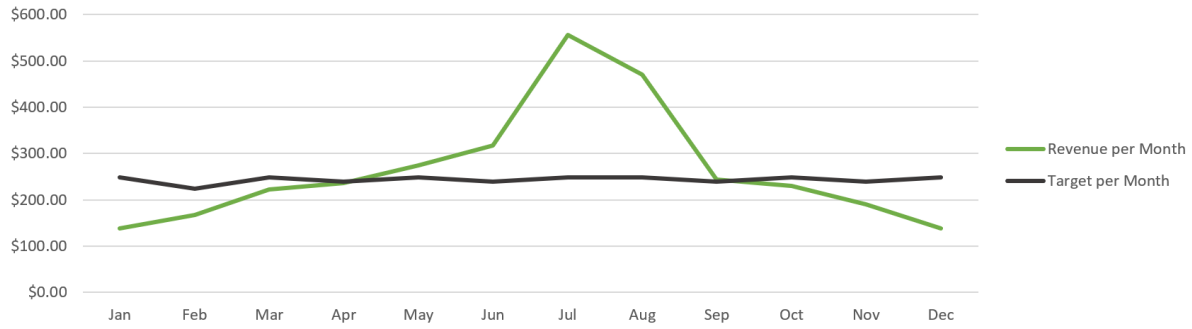
6. Your dashboard should now look approximately like the one below!

Congratulations on creating your first "business dashboard," combining many of the elements we've learned in the course to-date!!

Did you make a great dashboard? Feel free to customize your formatting and layout. We'd love to see your work by posting a screen shot of your dashboard in the forums!

Lemonade Sales - End of Year Dashboard

Total Sales $3,183.70 **Sales to Target Ratio** 109.03%



Months	Revenue per Month	Target per Month	LKPI
Jan	$138.60	$248.00	265
Feb	$167.10	$224.00	295
Mar	$222.60	$248.00	360
Apr	$235.80	$240.00	520
May	$274.50	$248.00	730
Jun	$316.80	$240.00	735
Jul	$556.50	$248.00	755
Aug	$470.50	$248.00	750
Sep	$243.60	$240.00	570
Oct	$229.50	$248.00	380
Nov	$189.60	$240.00	335
Dec	$138.60	$248.00	260
Grand Total	$3,183.70	$2,920.00	

Lemonade KPI Legend

> 600/Month =
350-600/Month =
<350/Month =

The Lemonade KPI is an aggregate score composed of Flyer Success Score (Marketing Efforts) and hitting Daily Sales Quota.

Slicers

Price

$0.30
$0.50

RainfallCategory

Heavy
Medium

FlyerSuccess

High
Low