

Data Visualization in **Power BI**

Learn Fundamentals of Creating Effective and Appealing Reports and Dashboards in Power BI



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Introduction:

This is my Third Training material in the series of learning Power BI. The first one was “**Data Preparation for Analysis in Power BI**”, and the Second was “**Data Modeling in Power BI**”. They were a training material about fundamentals of ETL (Extract, Transfer, Load) processes in Power BI, and how to create a robust and well-structured data model for your data and use the DAX language and make your data ready for analyzing and creating insightful reports.

This one is to continue the journey of learning Power BI for beginners.

In this stop of the journey, you will learn how to create effective reports and use visuals to present your data and be ready for story telling showing your insights to your stakeholders.

I tried to make the book easy to use with many examples. And this material is a companion to my videos of training available in play lists of my YouTube channel.

I Advise you to follow my Videos on YouTube and use this material with the companied Power Point presentation and files of exercise and solution and try everything yourself as you won't learn unless you get your hands dirty.

You can visit my channel to watch the videos and download all materials from the link in the description of each video.

www.youtube.com/saidfawzy

The evolving success of Power BI made it crucially important for all people in the field of Data Analysis to start using and make use of its power and features that are added to the software day after day. I hope I complete this series with the visualization in Power BI Book soon.

Feel free to contact me through my Linked in: www.linkedin.com/in/saidfawzy.

This Book is free and feel free to share with anyone with the accompanied material. And never hesitate to contact me if you need any help.

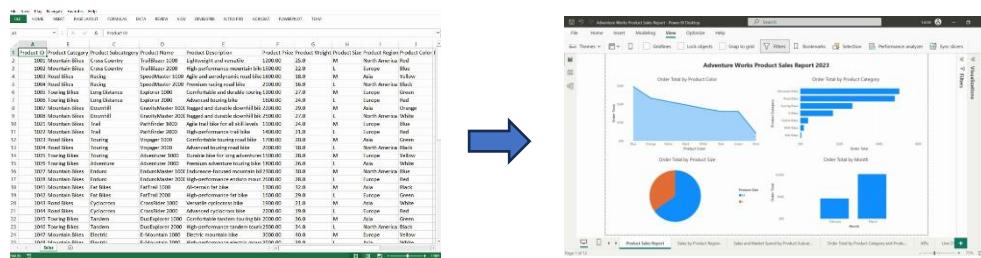
Said Fawzy

Manager of Information Center
Arab Contractors
24 June. 2024

Chapter 1: Chart Basics

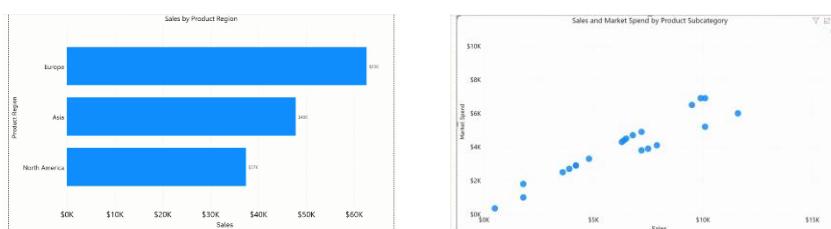
What are visualizations?

- Data visualizations can act like a navigation system with a clear interactive display
- A visualization is a graphical representation of data.
- Converting raw data into a visual format using Power BI can help you identify **patterns, trends** and **insights** that might not be apparent in text-based data.
- The data comes from several sources, ranging from sales and regional reports to customer feedback. In a spreadsheet this data would be complex and hard to digest. However, you can use Power BI with its many ways to visualize data to transform the data into a **compelling, interactive**, and easily **digestible** format.
- Visualizing data for business intelligence is crucial. Particularly in complex and dynamic business environments.



How data visualization can enhance business intelligence

- Data visualizations can reveal **patterns, trends**, and **correlations** hidden in raw data.
- For example, you could use a **bar chart** to visualize sales data demonstrating geographic regions where sales are the highest.
- You could also use a **scatter plot** to identify **correlations** between marketing spend and sales performance.



- Power BI's interactive visualizations allow companies to dive deep into their data. They can drill down into specific areas of interest such as analyzing sales trends for a particular product in a specific market over a given period leading to more precise data driven decision making.
- Visualizations make data more accessible to a **broader audience**. Not everyone at organizations will be comfortable interpreting raw data but most stakeholders can understand a well-designed charter graph. As a result, more stakeholders can **engage** with the data and contribute to data driven decision making.
- Visualizations are a powerful **communication tool** and can tell a **compelling story** with data, making the insights more memorable and persuasive.

- To demonstrate the success of a new product line to stakeholders, you could use visualizations to highlight **key performance metrics** in a visually engaging way

Creating visualizations in Power BI

- Creating visualizations in Power BI begins with **connecting** to your desired data sources. These can range from Excel spreadsheets to SQL databases.
- Once connected, you can use **Power Query** to **extract, transform and load** the data into Power BI. These transformations include:
 - renaming columns,
 - changing data types,
 - filtering rows and
 - combining data from multiple sources.
- You can then load this refined data into Power BI's **data model** for further manipulation, using data analysis expressions or **DAX** as a formula language for creating custom calculations.
- The next stage of the workflow involves **representing** this process **data in visualizations**.
- Power BI provides a wide variety of visualization types, such as **bar charts**, **scatter plots**, **pie charts** and even **geographical maps**.
- After selecting a visualization type, you map the data elements to different aspects of the visualization. From adding values to the axes or fields to the color scheme.
- Power BI allows you to add **slicers**, which are visual filters that allow viewers to segment and filter the data in real time to enhance the usefulness and interactivity of these visualizations.
- The final step in the workflow involves **arranging the visualizations on a report page** and then **sharing** the report with other stakeholders.
- The **Power BI service** allows you to **publish** these reports enabling a broader audience to interact with them online, even on mobile devices.
- Visualizations don't only present data in a more understandable form, they also enable real time data analysis for example, as sales figures are updated, the visualizations in power BI will update automatically. This provides companies with up-to-date accurate insights and enables them to react more quickly to changes in their business environment.
- Data analysts must carefully craft them to communicate the right insights effectively.
- This includes ensuring you select the **correct type of visualization** for the data you want to represent. For example, while **pie charts** are appropriate for displaying **parts of a whole**, **line graphs** are more suitable for displaying **trends** over time.

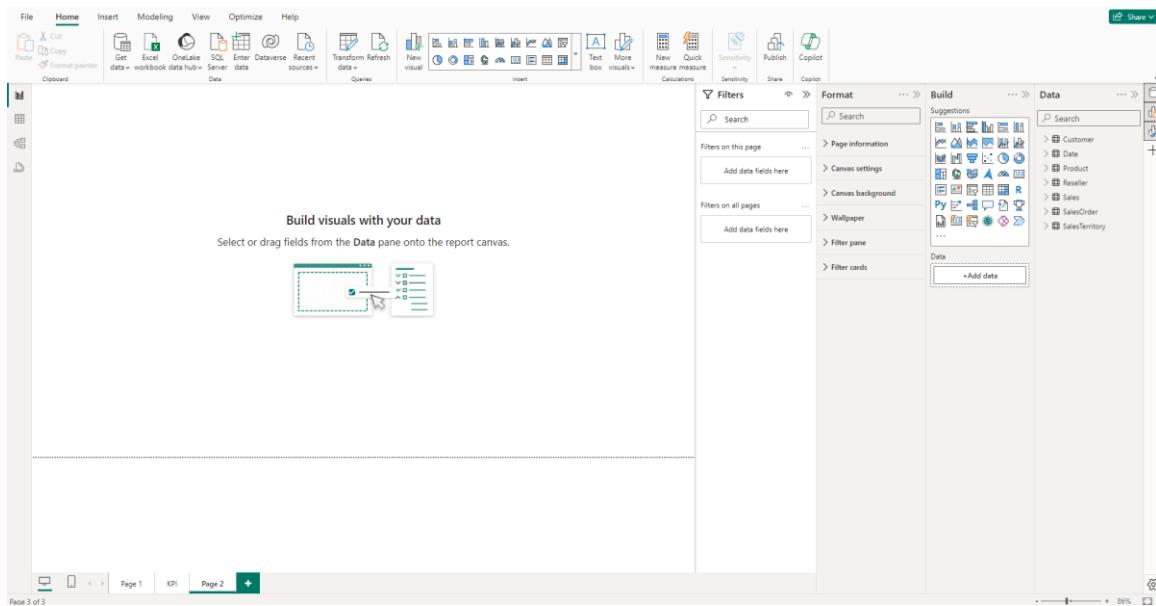
Question

What is the fundamental role of data visualization in the field of Business Intelligence?

- A. To eliminate the need for data analysis
- B. To transform complex data into understandable insights
- C. To improve the visual appeal of data reports
- D. To replace raw data

Introduction to the Report Editor

The Report Editor in Power BI is a treasure trove of features and elements, each with its unique purpose and advantages. This is where you'll spend most of your time converting raw data into meaningful visual stories. The real beauty of the Report Editor lies in its intuitive design that caters to users of all skill levels. If you're just starting out in the data world, the drag-and-drop features and easy-to-navigate interface help lower the entry barrier. Let's explore some of its core functionalities.



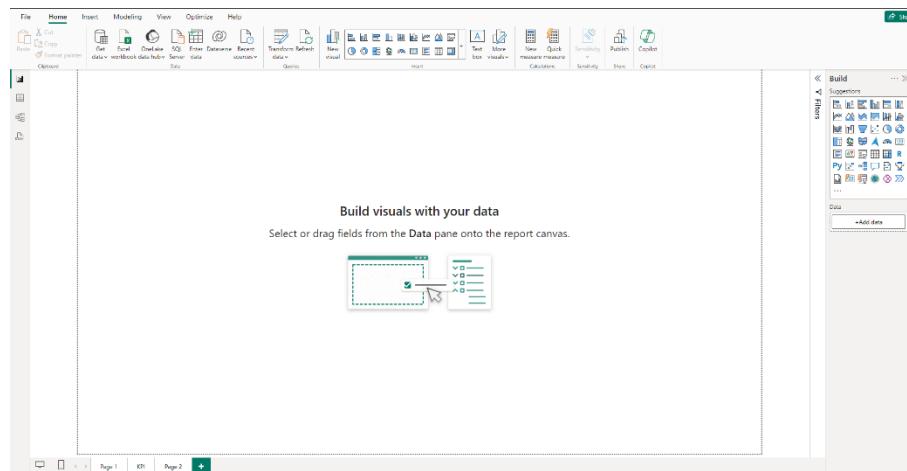
Ribbon

The Ribbon is where you have all your high-level command options. The Ribbon can be compared to the dashboard of a car, offering control over your entire project. You can save your project, change your report view, or even publish it to Power BI Service. If you're a technical assistant, you may often use the Insert option to bring text boxes, images, or even new pages to the report. The Ribbon is a highly versatile tool, allowing you to manipulate your report on a macro level.



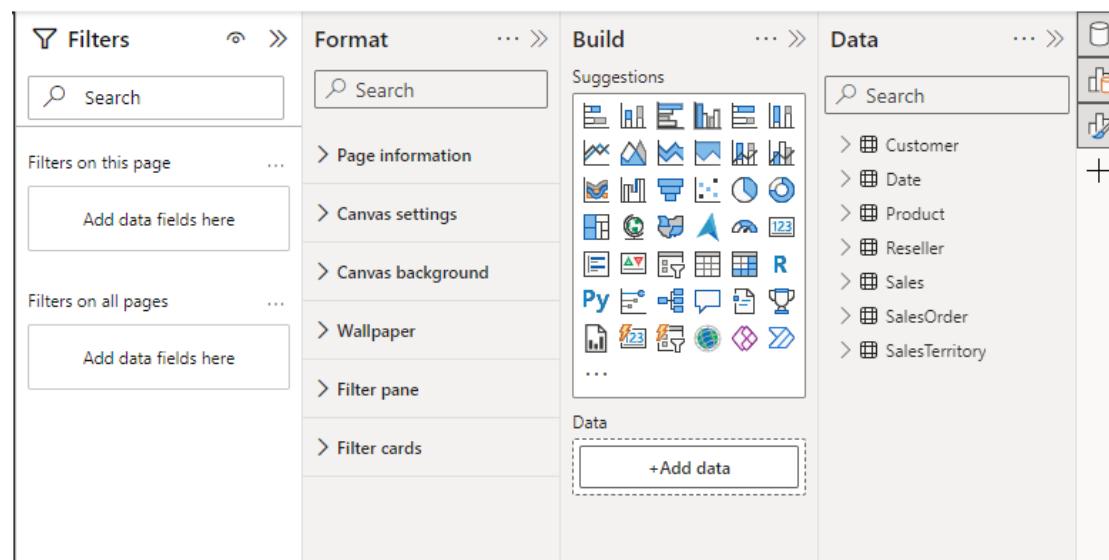
Report Canvas

The Report Canvas is your stage; this is where your performance happens. All the dragging and dropping of fields and visuals you do end up here. It's a blank slate that you populate with your data narratives. This area grants you the ability to organize multiple visuals in a cohesive layout, providing real-time, dynamic updates. The Report Canvas is your workspace to experiment, move things around, zoom in and out, and determine how your report is shaping up.



Report Editor panes

Three panes are visible when you first open a report: **Data, Build, Format, Filters.**



- **Data pane:**

When you load data into Power BI, whether it's from an Excel sheet, AzureSQL database, or any other source, those data fields appear in the Data pane on the right-hand side of your screen.

- **Build Pane**

Is where you choose your visual and add fields to build.

- **Format Pane**

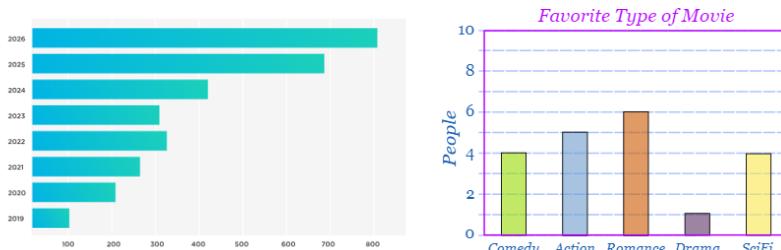
It is where you format your visuals and set properties.

- **Filter Pane**

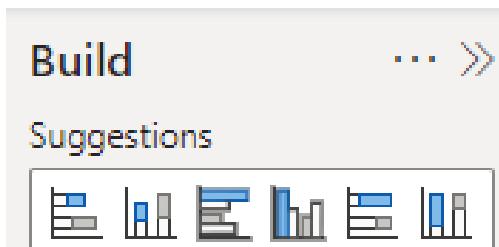
It is where you can filter your Visual, Page or entire report to get specific data.

Bar and Column Charts

- Bar and column charts are popular types of visualizations to display data in a clear and organized way.
- They are beneficial for showcasing categorical data or data that can be organized into distinct groups.
- Bar charts display data horizontally, whereas column charts display data vertically.
- The simplicity and intuitive nature of bar and column charts make them effective tools for presenting data and identifying patterns or trends over time.
- With six different types of bar and column charts in Power BI, you can convert raw data into visually appealing and meaningful insights.
- A column chart is a data visualization where each category is represented by a rectangle, with the height of the rectangle being proportional to the values being plotted.
- A Bar chart is the same as column chart, but data is presented horizontally. It is good for long category names.

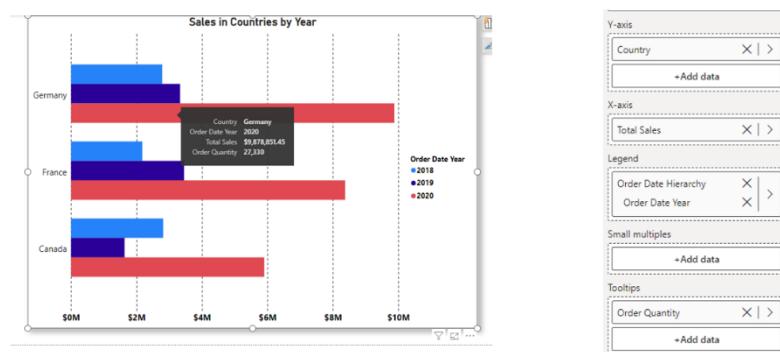


- There are 6 types of Column and bar charts



4 essential field wells in Column and Bar Charts:

- The legend, X-axis and Y-axis, and tooltips.
- The field wells represent different sections of your chart that you can customize according to your requirements.



legend

- It displays under the title or on the side of a chart.
- The legend field controls the color coding or grouping of the bars or columns in your chart.
- It helps to differentiate between different categories or subgroups within the data. The legend makes it easier to understand which color in the chart represents which item.
- You can hide the legend by turning it off in the Format tab on the visualizations pane,
- you can hover your mouse over the bar or column to display the data if the legend is not shown.

The x and y axis

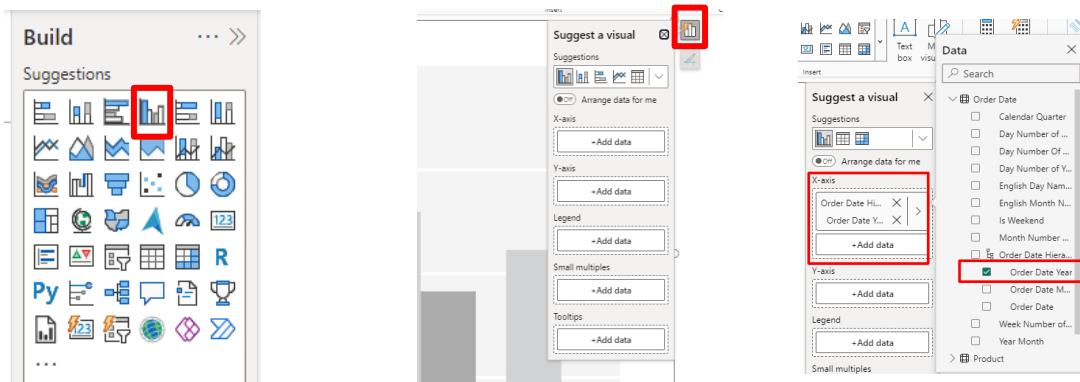
- Each axis represents the data points you want to compare or analyze.
- For bar charts, the x axis shows the values like order, quantity, and total sales, and the y axis shows the categories like month or product regions.
- For column charts, this is reversed. The x axis shows the category, and the y axis shows the values like order, quantity, or total sales.

ToolTips

- A tooltip displays data or extra information when you hover over the data points of a chart.

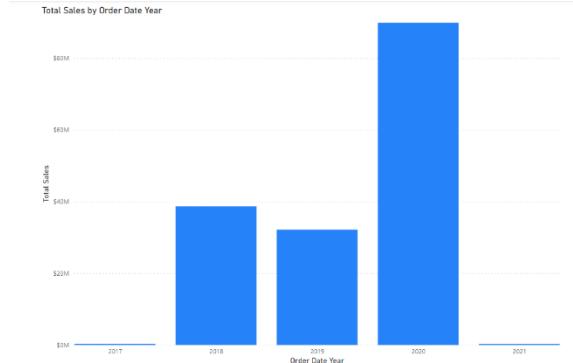
Exercise 1: Creating Column Chart

1. Use file: **Exercise 1Start.pbix**.
2. Rename Page 1 to: **Column Chart**.
3. In the Build pane select clustered Column Chart.
4. An empty bar chart appears on the canvas.
5. Resize the visual to fill the canvas.
6. Select the Visual and click the icon that appears on right (**Add data and build your visual**).
7. Click on the (+Add data) on the **X-axis Well** (input box) and add **Order date Year** field from the **Order date** table.



8. The same way add **Total Sales** measure from the **Sales** table to **Y-axis**.
9. You must now have a column chart with every year's total sales.

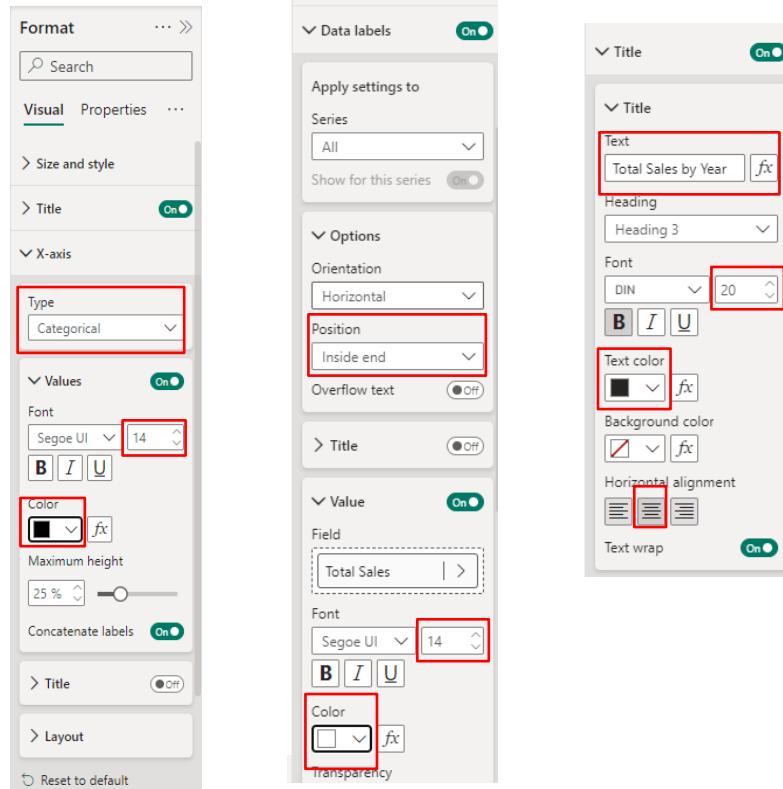
10. Hover the columns of the created chart and see the tooltip that appears.
11. Your manager wants to know the Quantity ordered for each year.
12. Add **Order Quantity** Field to the Tooltip well.
13. Hover now over each column to see the tooltip.



Formatting the column chart

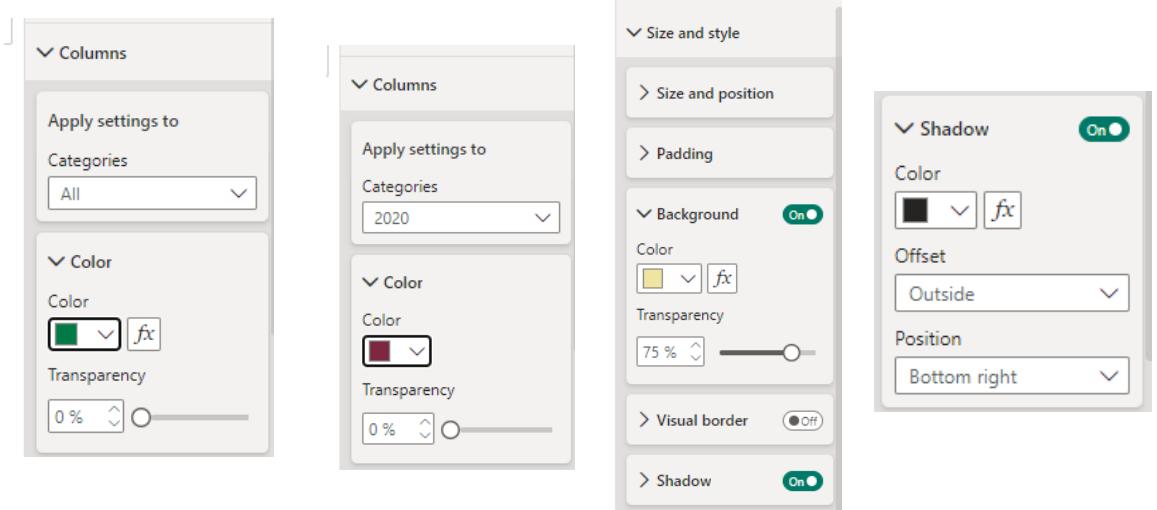
14. Make sure the column chart is selected and focused.
15. Now ribbon and Format pane reflect the current selected visual.
16. In Format pane Visual tab select **X-axis** Card.
17. Change type to **Categorical** and make the **Title off**.
18. Increase the **Values** font to 14 and color to **black**.
19. Click to close **X-axis** card (it is a good hobbit to close each card you have finished working with).
20. Expand **Y-axes** card turn the title off and increase font to 14.
21. Close **Y-axis** card.
22. Turn the **Data labels** on and expand to change **Position** to inside end font values to 14 and bold and color to white.
23. Change the chart title to **Sales Order by Year**.

24. Make the font 20, bold and text color to black and align it to center.



25. Change all column colors to #277941.

26. We want to emphasize year 2020 change its color to #782642.

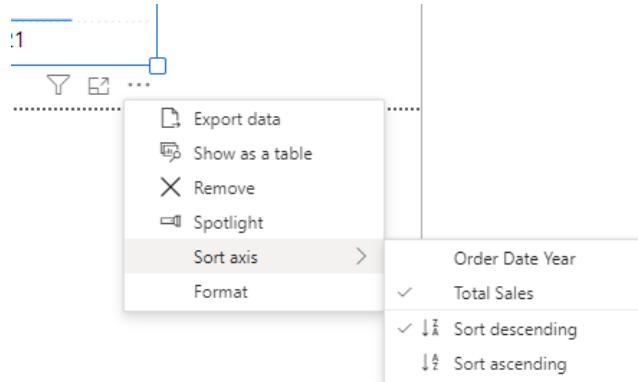


27. In Card Size and Style Change the background with color #F0E199 and transparency 75%.

28. Give the Chart Shadow black outside bottom right.

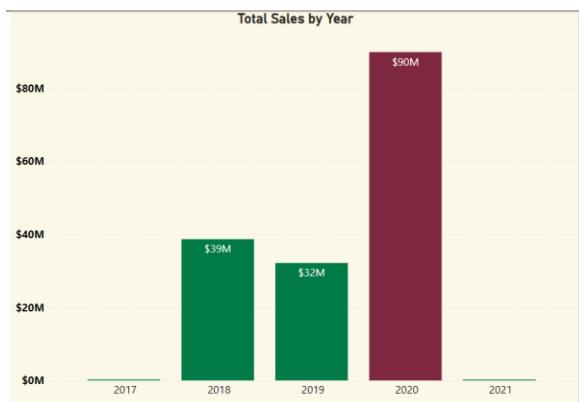
Control Sorting

29. Click on the three ... ellipsis on the right of the visual to open more options.



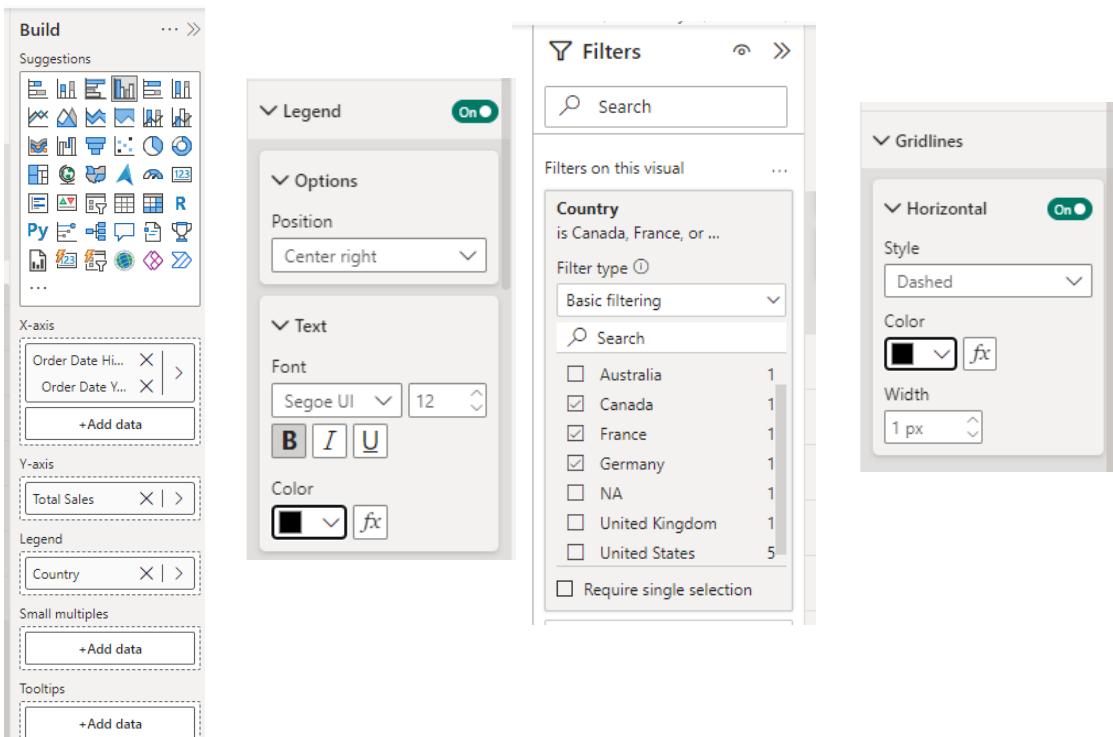
30. Here you can select Which field you would like to sort on and if it was ascending or descending.

31. Select **Order Date Year** and **ascending**.

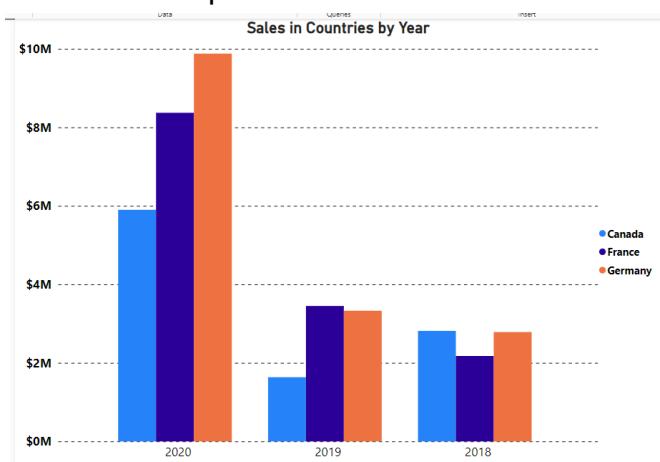


Create Clustered Column Chart

32. Duplicate the page and rename it Clustered Column chart
33. Change the color for all bars to #118DFF.

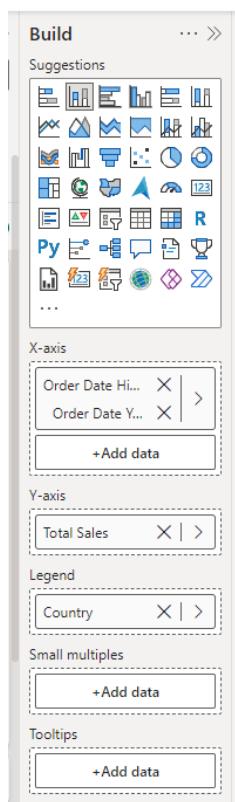


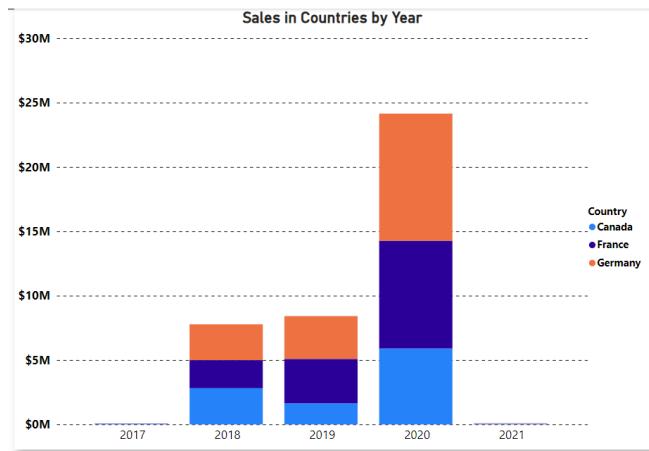
34. In the Build pane drag **country** to the legend well.
35. In the filter pane chose only **Canada, France** and **Germany**.
36. Remove **data labels**.
37. make **legend** center right and font 12 black.
38. Remove the **legend title**.
39. Make the **Grid line** Style Dashed and color black.
40. Change the title of the chart to **Sales in Countries by year**.
41. Check how the tooltip shows in each column now.



Create Stacked Column Chart

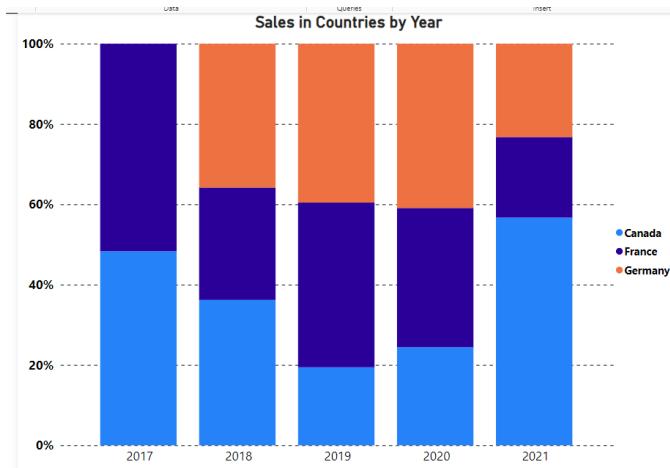
42. Duplicate the page and rename it **Stacked Column Chart**.
43. Select the Chart and click on Stacked column chart in the Build pane.
44. You have now stacked column chart.
45. Notice it has the same wells of clustered column chart.
46. Check the tooltip for each part of the stacked column.





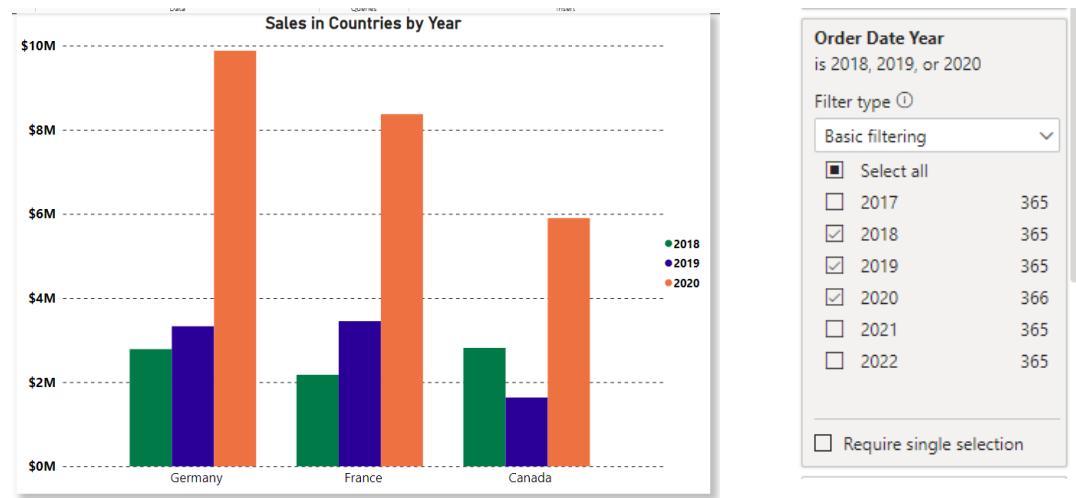
Create 100% Stacked column Chart

47. Again, duplicated your page and rename it **% Stacked Column Chart**.
48. Select the Chart and choose **%100 Stacked Column Chart**.
49. Check the tooltip for each part of the stacked column.



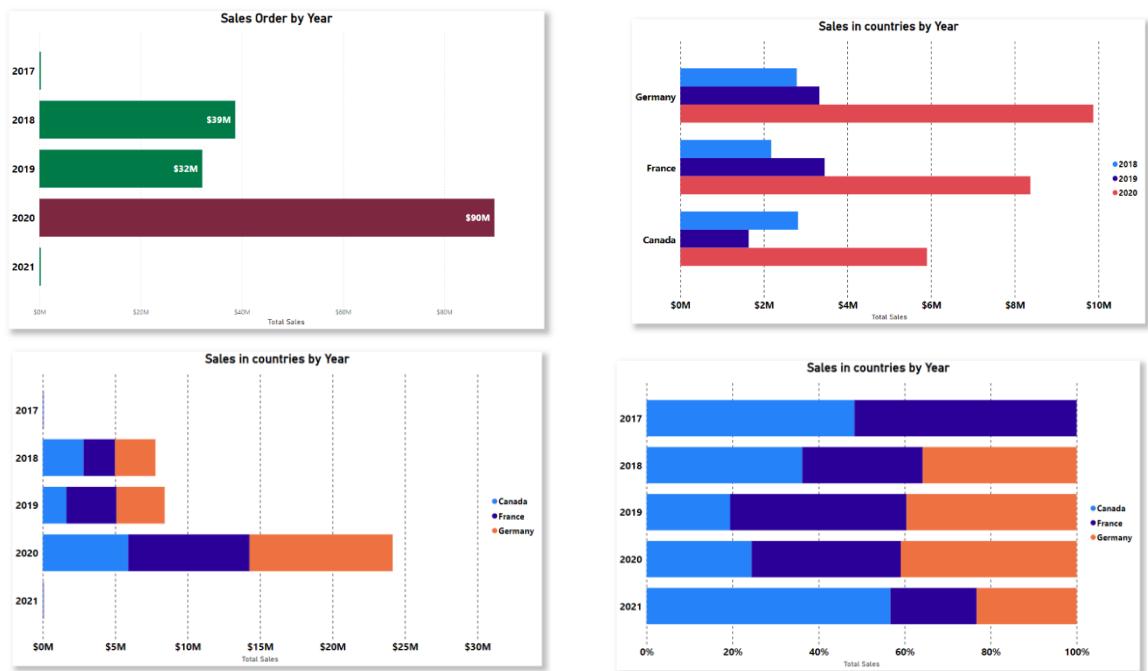
Change Legend

50. Your manager wants to compare each country through years 2018-2019-2020.
51. Go to Clustered column chart and put **year** in **legend well** and **country** in **x-axis** well.
52. In filter pane select only **2018-2019-2020**.
53. Now you can compare each country through the years.

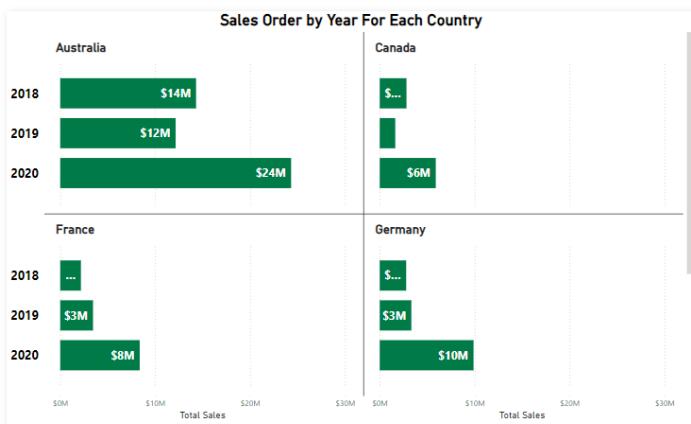


Exercise 2: Creating Bar Charts

1. Use file **Exercise 2 Start.pbix**.
2. In this exercise you have to create:
 - a. Bar chart.
 - b. Clustered bar chart.
 - c. Stacked bar chart.
 - d. Percentage stacked bar chart.
3. Repeat all steps of Exercise 1 again, but instead of using category in x-axis and values in y-axis just revert.
4. Notice that the **Shadow** in bar chart is in the **Size and style** card.



5. Try to add page **Sales Order in Each Country**, by Duplicating the 1st page and add **country** to **Small Multiples** Well.



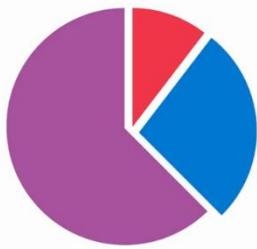
Question

Which field determines the height of bars in a column chart in Microsoft Power BI?

- A. X-axis
- B. Legend
- C. Tooltip
- D. Y-axis

Pie and donut charts

- These charts, which are circular and cut into slices, provide a way to represent data proportionally.
- While pie and donut charts are useful for comparing different categories, they become less effective when comparing large amounts of categories as the slices become too small and difficult to distinguish between them.
- In a pie chart, each slice of the pie corresponds to a unique category from your data set. The size of each slice is directly proportional to the quantity it represents.
- Like a pie chart, a donut chart segments are proportional to the data they represent. The difference between a pie and a donut chart is that the donut chart is ring-shaped with a circular central space. You can use this space to provide context for the surrounding segments.
- When choosing between a pie and a donut chart to represent parts of a whole, the donut chart may be a better choice if you'd like to display additional information in the space in the center.

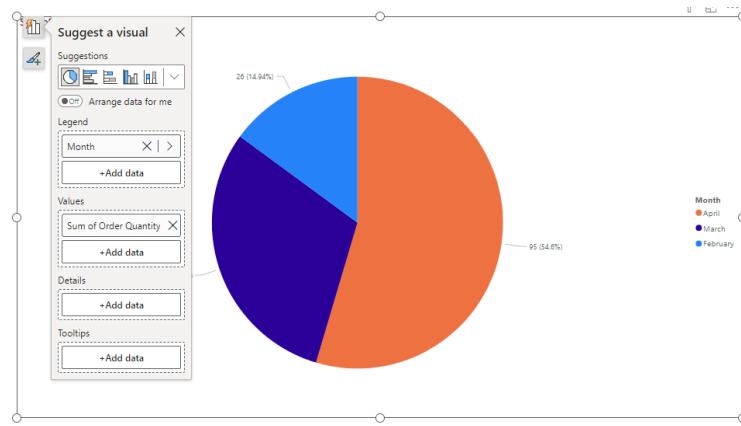


Exercise 3: Creating Pie and Donut Chart

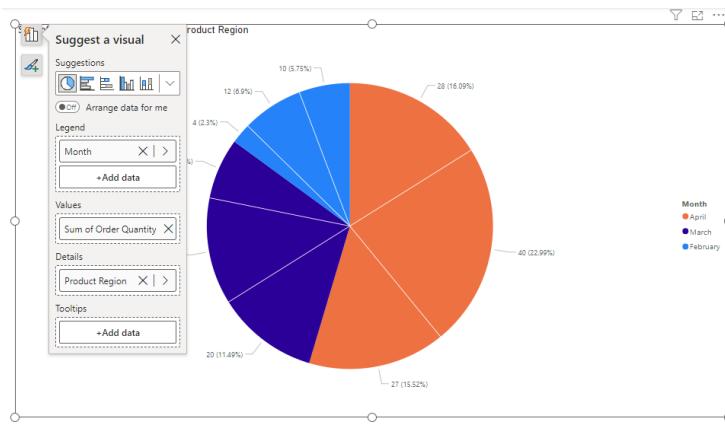
1. Use file **Exercise 3.pbix**

Pie Chart

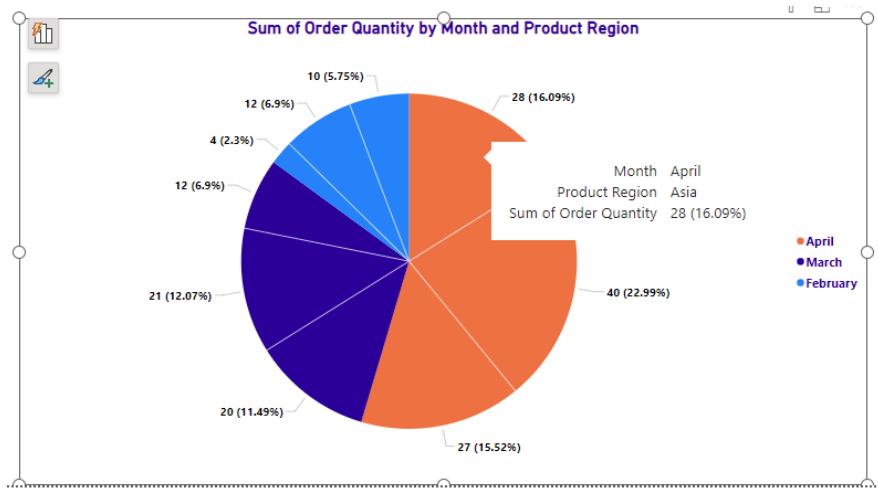
2. Start by placing a pie chart on the report area from the visualizations pane and resizing it by dragging its edges.
3. Select the **pie** chart and while keeping it selected, open the **data** pane and select two fields, **month** and **order quantity**.
4. Ensure that **month** goes to the **legend** field and the **order quantity** goes to the **values** field.



5. You can add more data to create a more detailed pie chart, or illustrate additional insights.
6. For example, you may want to examine the total order quantity by **region**. To do this, select the **Product Region** field from the data pane, and ensure that it goes to the **Details** field.

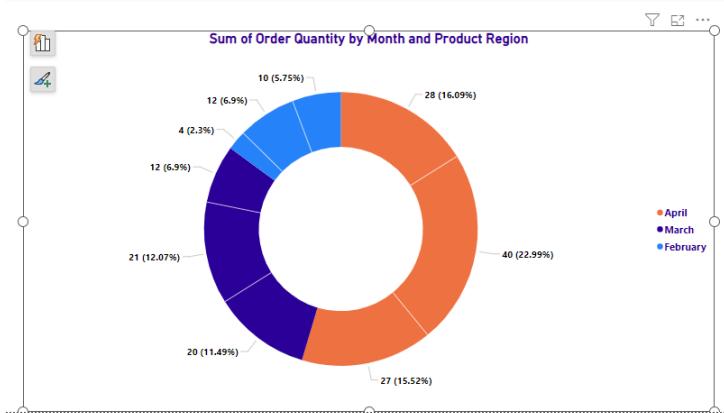


7. Now, the pie chart slices display the total order quantity sold in **February**, **March**, and **April** for **Asia**, **Europe**, and **North America**.
8. You can sort this chart by **order quantity** to display the slices in size order.
9. To do this, select the three dots in the top right corner of the chart. Select **Sort axis**, and then **Sort ascending**.



Donut Chart

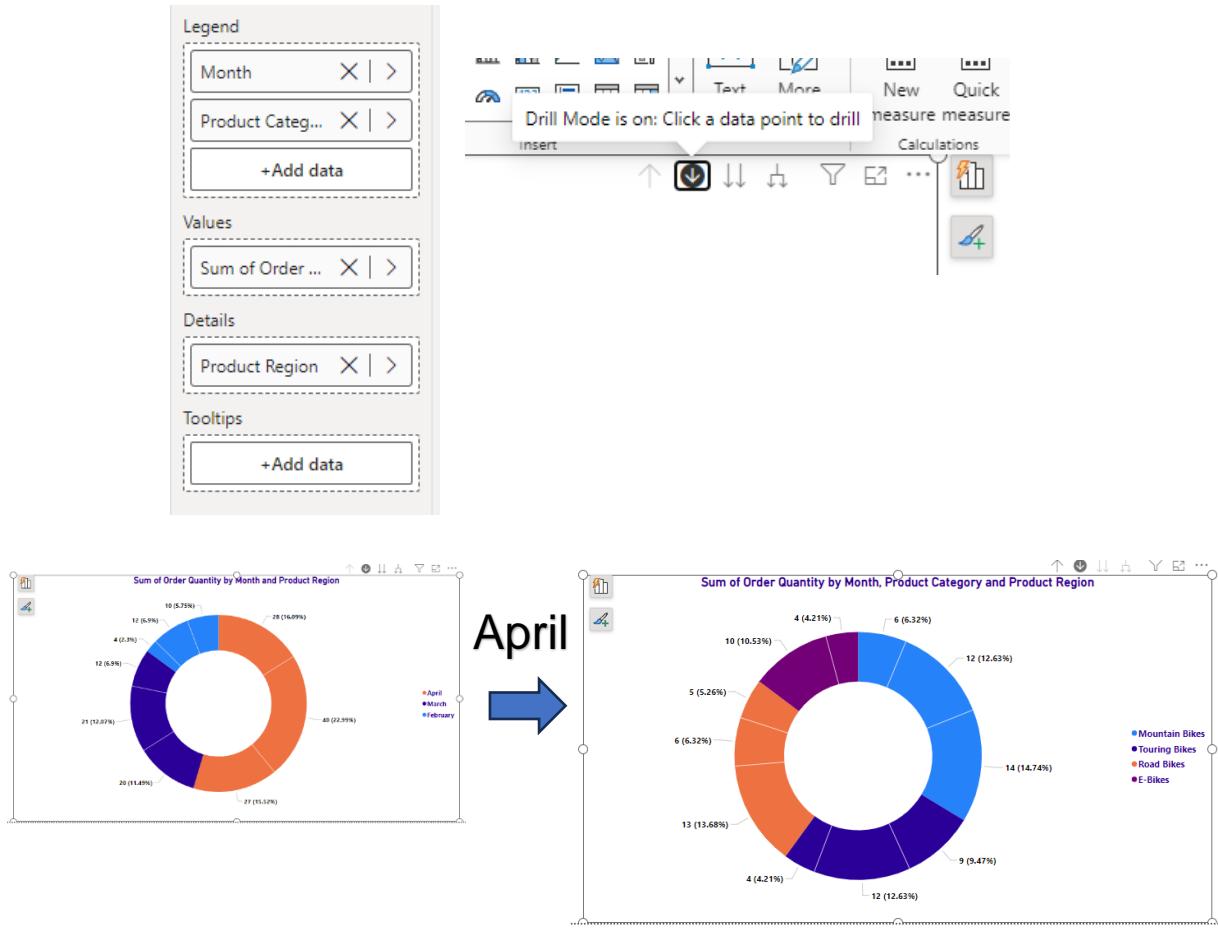
10. You can also visualize this data using a donut chart, which also shows the relationship of parts to a whole.
11. To convert the pie chart to a donut chart, select the pie chart. While it is still selected, select the **donut** chart icon on the visualizations pane.
12. Unlike a pie chart, the center of the donut chart is blank. This allows space for additional information that can provide context for the surrounding segments.



Enable Drill Mode

13. To make your charts more interactive and display more data when presenting them to your audience, you can enable **Drill mode**.
14. For example, select **Product Category** from the data pane, and then select **the Drill down** icon to turn on Drill mode.
15. Ensure that **Product Category** goes to the **Legend** field. There is no visual change if you add the Product Category field when the Drill mode is off.
16. Once you turn on Drill mode, you can display the additional details by **selecting each slice**.
17. For example, if you select the slice that displays the total sales in **April**, more information is displayed.

18. To return to the main chart, select the **Drill up** icon.



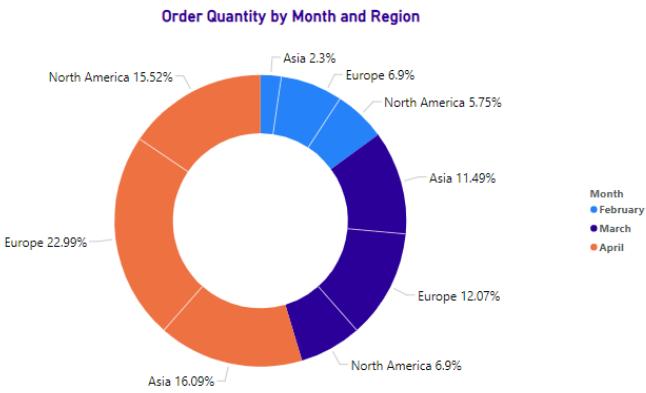
Do it Yourself

19. Change the color of slices of each month to colors you like.

The figure shows two side-by-side settings panes. The left pane is for 'Slices' under 'Colors', showing color swatches for February (orange), March (dark blue), and April (light blue). The right pane is for 'Title' styling, with options for text ('Order Quantity by N'), heading ('Heading 2'), font ('DIN', size 20), text color (dark blue), background color (white), horizontal alignment (center), and text wrap (On).

20. In **Details label** chose to display the **Category and percentage** make font 14 and make it black.

21. Change the **Title** of the chart to: **Order Quantity by Month and Region**. Make font 20 dark blue and center.



Question

What is the key difference between pie and donut charts in Microsoft Power BI?

- A. Pie charts can represent a large number of data categories more effectively.
- B. Unlike a pie chart, a donut chart can only represent a single category of data.
- C. There is no difference between pie and donut charts.
- D. A donut chart is like a pie chart with a hollowed-out center.

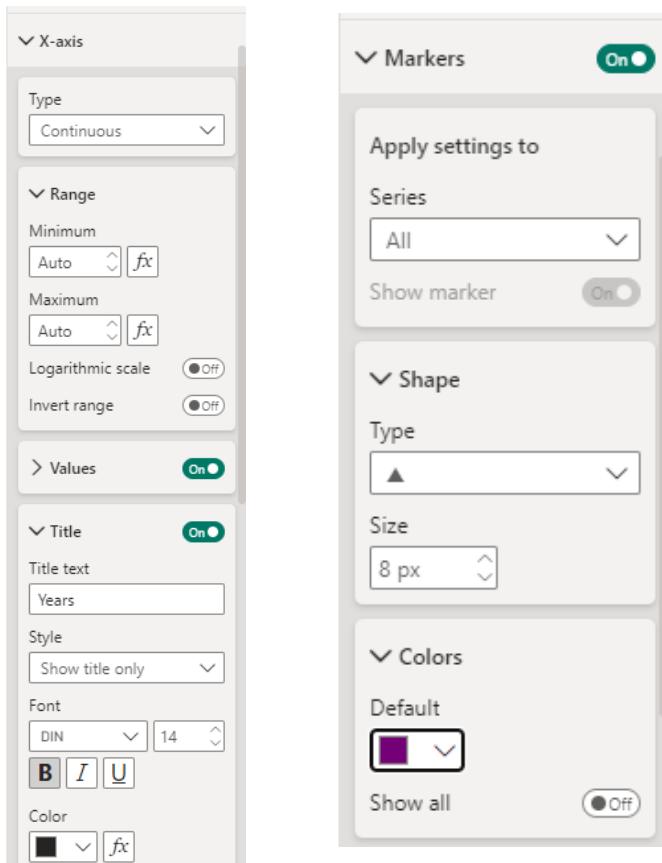
Line Chart

- A line chart uses a line to connect individual data points.
- It is the perfect tool for illustrating a sequence of values or displaying trends over a time.
- For example, a line chart can help company understand how sales are progressing month to month or year to year.
- A line chart with multiple lines can show sales across different regions over time and help the stakeholders understand the trend or sales performance.



Exercise 4: Creating Line Chart

1. Use file **Exercise 4 Start.pbix**.
2. In the **Build** pane click on the line chart visual.
3. Resize the visual to fill the page.
4. Drag **Order date Year** field to x-axis well.
5. Drag **Total Sales** measure to y-axis well.
6. In **x-axis** card change the title of the axis to **Years** make font 14 and bold black.



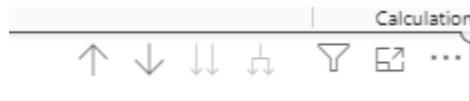
7. Turn **Markers** on and make the shape type **triangle** with **purple** color.
8. Add **Order Quantity** field to **tooltip** well.
9. Hover over each point to see the tooltip.
10. Change the title of the chart to **Sales Performance** make font 20 bold dark blue in the center.
11. Add **contentent** field to the **legend** well.
12. You now have performance of three contentent area.
13. Hover over each point to see details of sales and quantity ordered in each region.

14. Name your page **Sales Performance**.



Drill Down

15. Your manager wants to see total sales performance in detail of each year each month, and each day.
16. Duplicate your page and rename it **Sales Performance Drill down**.
17. Remove **Total Quantity** field from **tooltip** well.
18. Remove **Continent** field from **Legend** well.
19. Turn markers off.
20. Now the chart shows only the year's sales, hover on points to see the tooltip.
21. Remove Order date year field from **x-axis** and replace it with the **Order Date Hierarchy**.
22. Click on **drill up arrow** (1st arrow on left on top of the chart) twice to go to only years on the x-axis.



23. Remove the **title** of x-axis.
24. Click on each **point** of every year, the chart is only highlight that point and if there were other charts on the page will be filtered.
25. Enable **drill down** by clicking in enable **drill down arrow** (2nd arrow from the left on top of the chart) it will turn to black meaning the drill down is enabled.
26. Now click on the point of **year 2020**.
27. You will get the 12 months of the year 2020.
28. Notice the report is sorted by month name and starts in **April**.
29. We need to change the sort order to start with **January**.
30. Go to Model view.
31. Select **Order Date Month** field in **Order Date** table (the hidden field).
32. In the advanced section of field properties make the field sorted by **Month Number of year**.

33. Notice you can do the same in the **table** view from the **column tools** ribbon tab and select **Sort by column**.

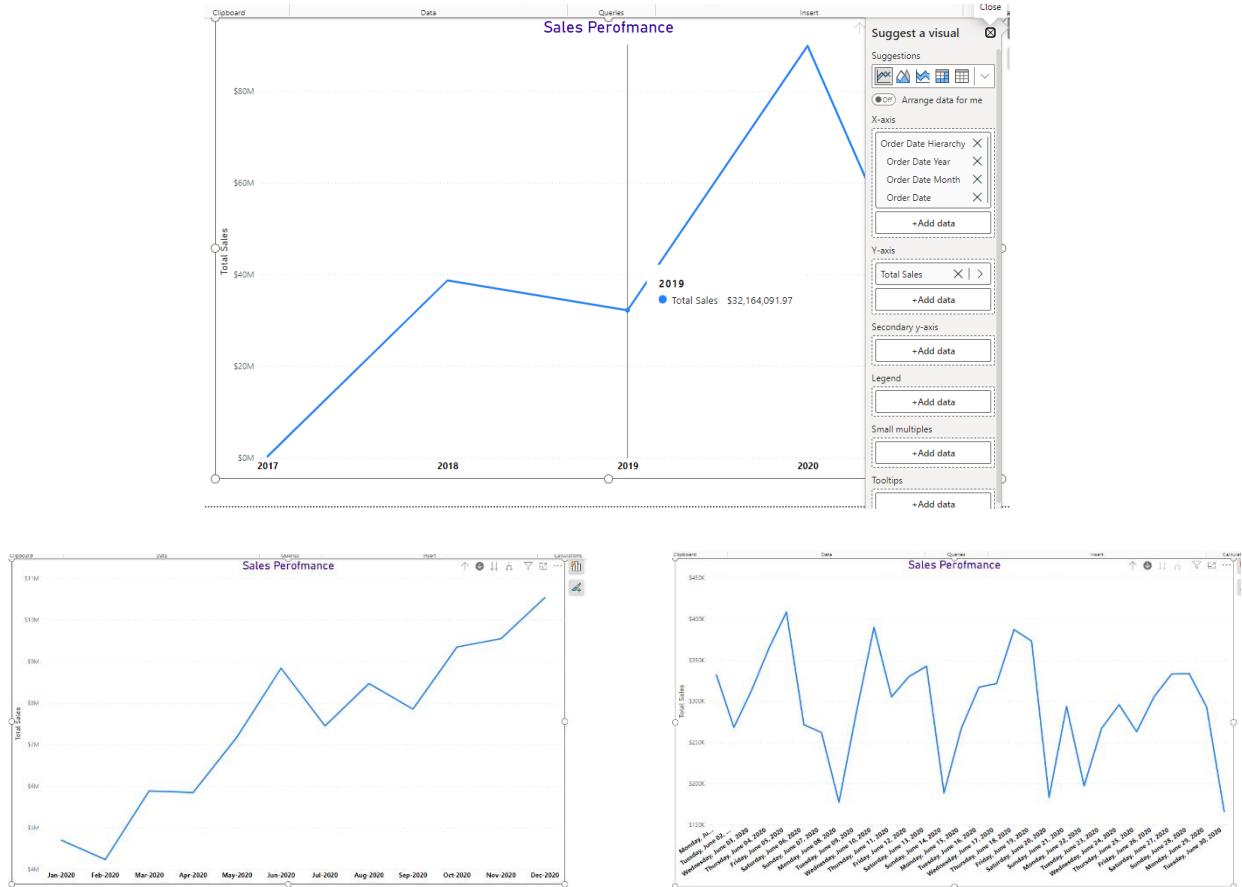
The screenshot shows the Power BI ribbon with the 'Column tools' tab selected. Under the 'Sort by column' section, the 'Month Number of Year' dropdown is highlighted. To the right is a table of data with columns for English Day Name of Week, Day Number of Month, and Day Number.

English Day Name of Week	Day Number of Month	Day Number
Monday	2	2
Monday	9	9
Monday	16	16
Monday	23	23
Monday	30	30
Monday	6	6
Monday	13	13
Monday	20	20
Monday	27	27
Monday	34	34
Monday	1	1
Monday	8	8
Monday	15	15
Monday	22	22
Monday	29	29
Monday	5	5
Monday	12	12
Monday	19	19
Monday	26	26
Monday	3	3
Monday	10	10
Monday	17	17
Monday	24	24
Monday	1	121

34. Now go back to the report view to see that the months are sorted starting from January.

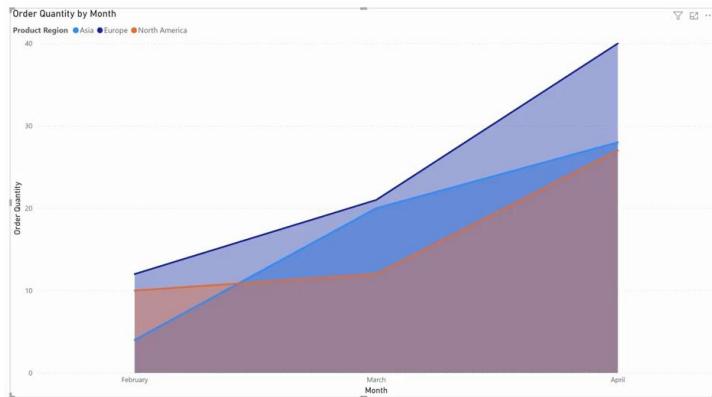
35. Notice we have a **peak** in sales in **June 2020**, so click on that point to drill down to the sales of this month **day by day**.

36. Click the drill up arrow again twice to go to year view again.



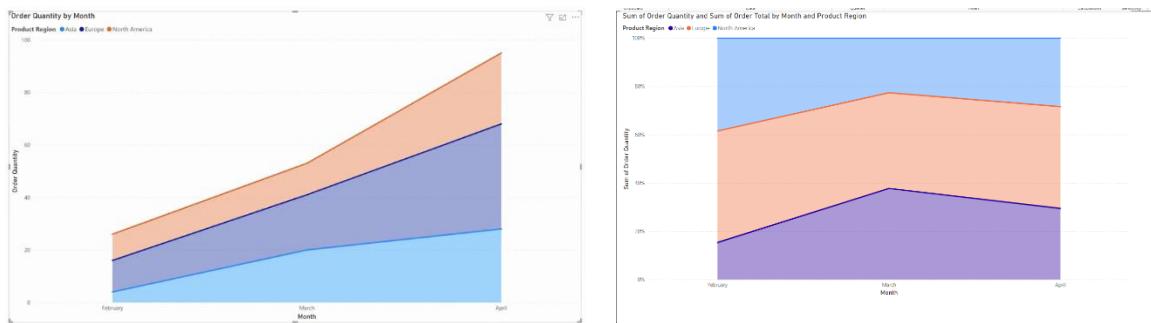
Area Chart

- While a line chart focuses on trends, an area chart emphasizes the magnitude of changes.
- It can display the part-to-whole relationships among your data, making it easier to compare quantities.
- For example, regional sales represented by an area chart can help stakeholders intuitively understand and compare the degree each product region contributed to total sales for each month.



Stacked Area Chart

- There's a variant of the area chart called a stacked area chart, where the data points from multiple categories are stacked on top of one another.
- This can be useful when emphasizing the total across several categories.
- For example, you could use a stacked area chart to illustrate the total orders over a period and demonstrate how each product region contributes to the total.



When to use bar and column charts, or line and area charts?

- When presenting a few items, bar and column charts can be visually appealing and effective.
- However, when dealing with many data points, these charts can become cluttered and difficult to read. Each bar or column takes up a certain amount of space, and the chart can become overcrowded if there are too many to plot.
- Unlike bar and column charts, area charts are effective for visualizing changes in multiple values over time.

- Both line and area charts are effective in visualizing the changes in values of multiple categories, particularly over time.
- While line charts are useful for identifying trends, area charts offer a further benefit. They help us interpret the magnitude of the values. They also effectively illustrate the cumulative impact of the data points over the selected time, providing an overall picture of the data trends.

Exercise 5: Creating Area Chart

1. Use file **Exercise 5 Start.pbix**.

Create a Line Chart

2. To create a line chart, select the Line chart icon from the Visualizations pane and place it on the Report section.
3. Open the data pane and select two fields, **month** and **order quantity**. The x-axis of the visualization is sorted by descending order quantity.
4. To modify it to ascending order, navigate to the **visual settings** (The three-dot ellipsis on the top right corner of the visual) and select **Sort Access** and **Sort Ascending**.



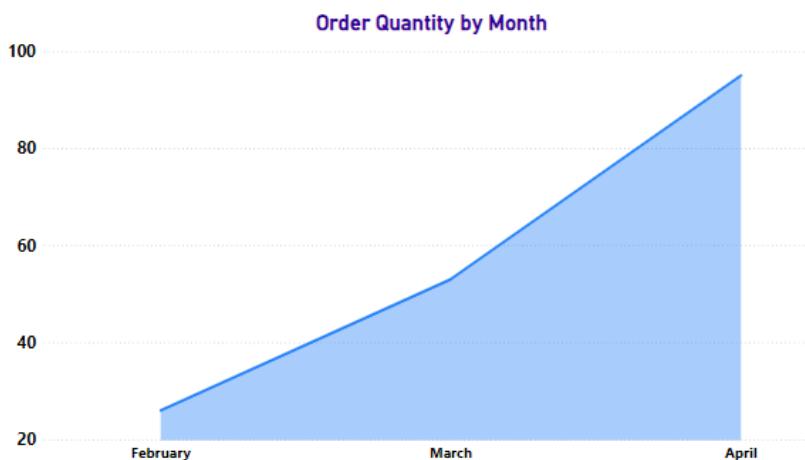
5. As before make the Field **Month** Sorted by **Month Number**.
6. A line chart is handy for illustrating trends. For example, this line chart displays the total sales from February to April. It clearly demonstrates an **upward trend** in sales for the quarter.
7. The sales team may also want to compare the performance and trends of different regions across the quarter.
8. To do this, select the Line chart, open the **Data** pane, and select the **Product region**.



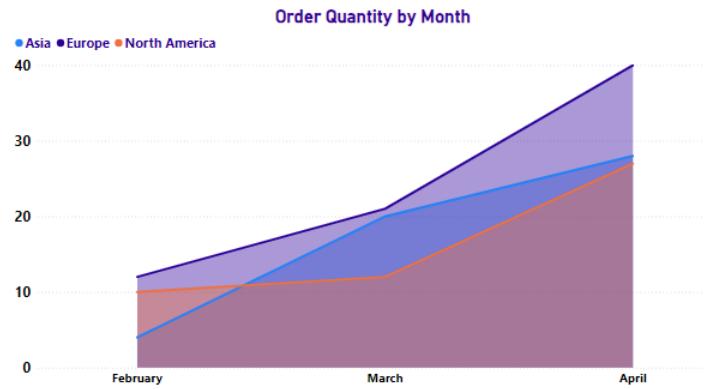
- The line chart now indicates that although there appears to be a general upward trend in sales in all regions, the **European region** outperformed both Asia and North America in February, March, and April.

Create Area Chart

- You can display your data another way using Area charts and Stacked Area charts.
- Create a new page.
- To create a new area chart, select the **Area chart** icon from the Visualizations pane, place it on the Report section, and select the **Month** and **Order Quantity** fields from the Data pane.
- Using the Visualization settings, change the ascending order quantity to descending order in the x-axis to highlight the increase again.

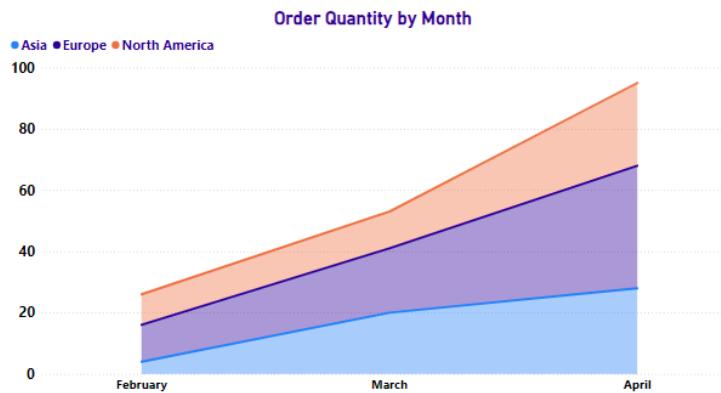


- For a more nuanced understanding of the number of orders for the quarter, you may want to display the data by individual regions.
- To do this, select the **Product Region** field from the Data pane while keeping this chart selected.
- The sales team can get a better idea of how the regions contributed to the order quantity in February, March, and April.

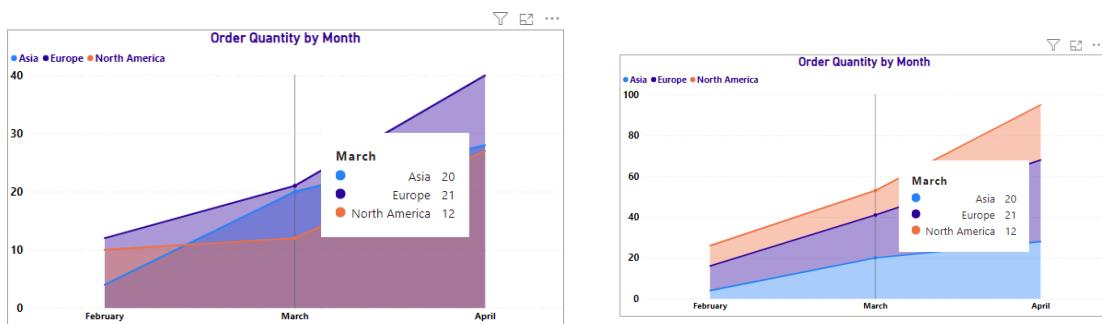


Create Stacked Area Chart

17. You can also display the values in a stacked manner.
18. You can do this by selecting the Visual and then selecting the Stacked Area icon on the Visualizations pane. This allows you to display the individual values, as well as the total on a single chart.



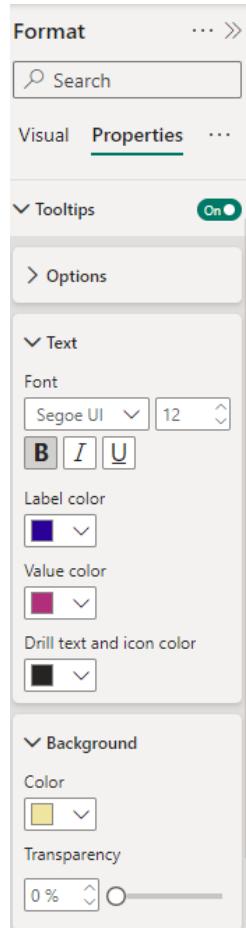
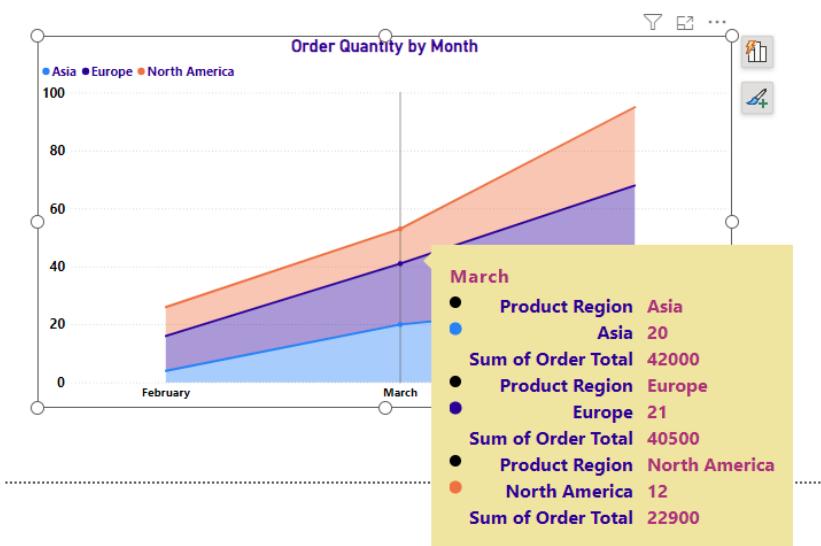
19. In all these charts, you can hover over the data points to display the values in a tooltip.
20. For example, a **tooltip** could display the exact sales figure for a specific month.



21. Add **Order Total** Field to the **Tooltip** well field.
22. This tooltip is one of the **four essential field wells** available in many visualizations in Power BI. The other three important field wells are the **Legend**, **the x**, and the **y axis**.

23. You can configure the format of the tooltip text and background in the **Properties** tab of **Format** pane.

24.

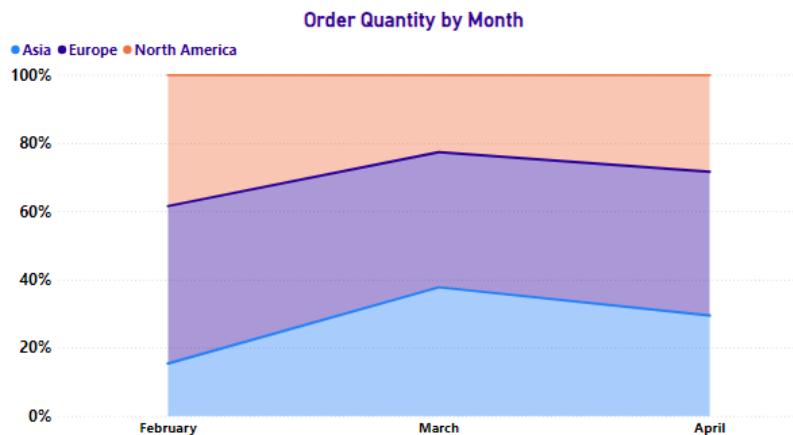


25. You can configure the titles of these axes, colors, and other details by using the Format pane where you can make any necessary changes.

Create 100% Stacked Area Chart

26. While selecting the chart click on the visual 100% Stacked Area Chart.

27. The chart now shows you the percentage of contributions on sales for each region.



Question

In Microsoft Power BI, which chart type is more suitable if you want to highlight the trends rather than the quantity of your data over a period of time?

- A. Column chart
- B. Line chart.
- C. Pie chart
- D. Area chart

Table Visualization

- There are moments when your audience wants simplicity, a straightforward, no frills presentation.
- Microsoft Power BI table visualization is useful when you want to employ the classic clear-cut style of tables to ensure your audience can grasp the essence of the data quickly.
- It elegantly presents refined data, allowing viewers to immediately consume critical information and insights. The table displays summarized insights which is much more user friendly to work with.
- You can even customize the table visualization to improve its aesthetic appeal or aid engagement and comprehension.

Exercise 6: Creating Table Visualization

1. Use file **Exercise 6 Start .pbix**.

Create a table

2. Click on table visual to add to your report and resize.
3. Notice that this visual has only one well field **Columns**. That is where you drag all your fields to.
4. Click on the following fields to add to your table (**Sub-category, Sales, Profit, Quantity**).

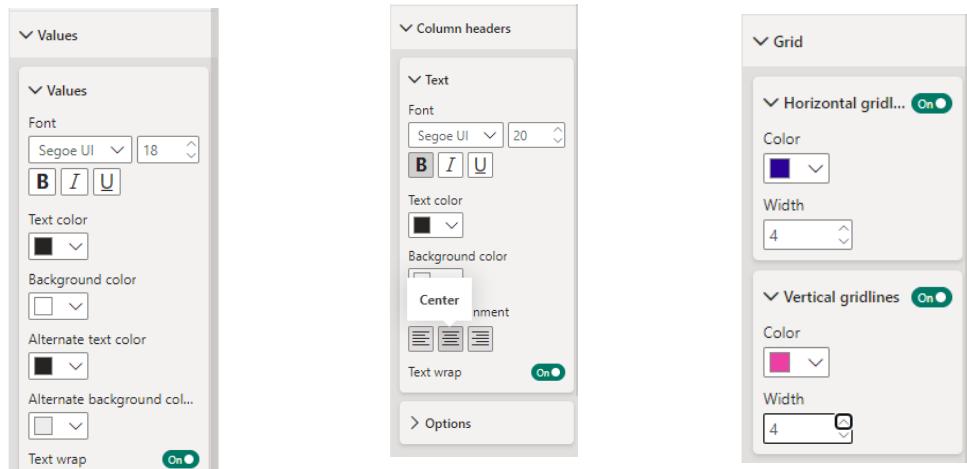


Sub-Category	Sales	Profit	Quantity
Copiers	149530.00	55,618	234
Machines	189242.00	3,385	440
Supplies	46679.00	-1,189	647
Bookcases	114879.00	-3,473	868
Envelopes	16477.00	6,964	906
Fasteners	3024.00	950	914
Tables	206967.00	-17,725	1241
Labels	12505.00	5,546	1400
Appliances	107537.00	18,138	1729
Chairs	328452.00	26,590	2356
Accessories	167400.00	41,937	2976
Art	27136.00	6,528	3000
Storage	223860.00	21,279	3158
Phones	330047.00	44,516	3289
Total	2297339.00	286,397	37873

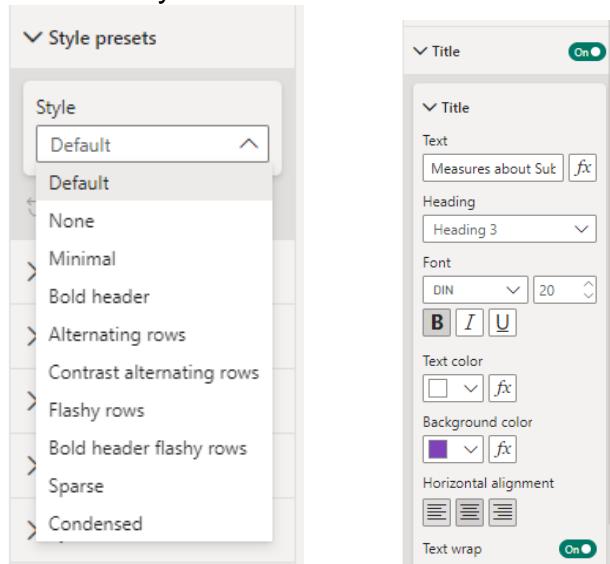
5. You can sort any column in ascending or descending order by just clicking on the column header once or twice to change sort order.
6. Click on Quantity to sort in ascending order, then click again to sort in descending order.
7. Try to sort Sales and profit columns the same way.
8. Try to sort Sub-Category in alphabetical order.
9. You can click (X) on any field in the columns Well to remove.
10. Remove Profit and drag it again to table.
11. You can double click any field and rename it if you want to.
12. You can reorder the fields by arrange their orders in Columns well.

Format a table

13. Create a new page.
14. Copy and paste the table from Page1 to Page2.
15. Increase the size of the values.
16. Increase the size of the headers and make it bold and center.



17. Enable **Vertical** and **horizontal grid**, change the **color** of each and increase **width**.
18. Try the **Style presets** card and chose the styles available one by one to see how they works.

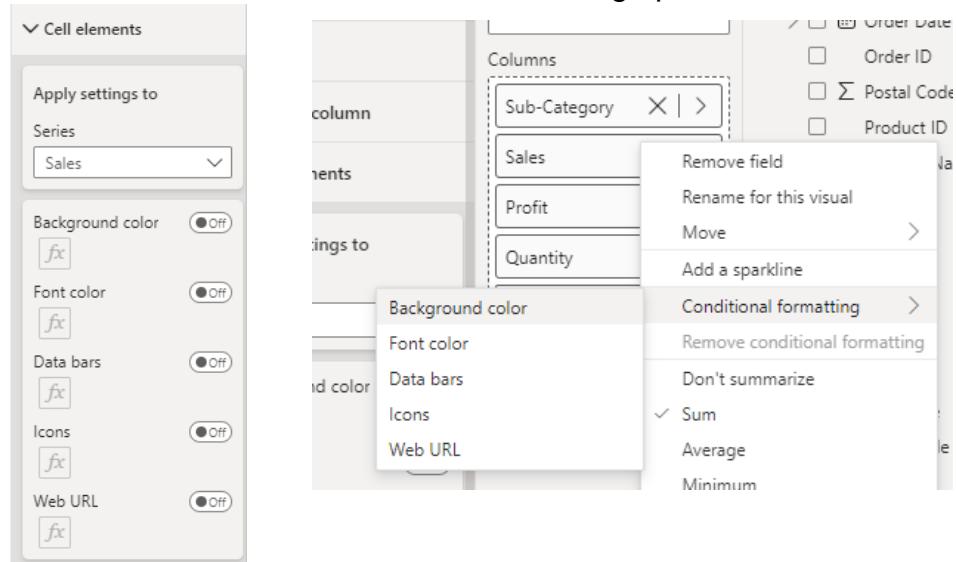


19. Enable the **Title** Card of the table make the text = **Measures about Sub-Categories**.
20. Make its **font** 20 **Bold** and **Center**.
21. Make **text** color is **white** and background **purple**.

Measures about Subcategories			
Sub-Category	Sales	Profit	Quantity
Copiers	149530.00	55,618	234
Machines	189242.00	3,385	440
Supplies	46679.00	-1,189	647
Bookcases	114879.00	-3,473	868
Envelopes	16477.00	6,964	906
Fasteners	3024.00	950	914
Tables	206967.00	-17,725	1241
Labels	12505.00	5,546	1400
Appliances	107537.00	18,138	1729
Chairs	328452.00	26,590	2356
Accessories	167400.00	41,937	2976
Art	27136.00	6,528	3000
Storage	223860.00	21,279	3158
Phones	330047.00	44,516	3289
Furnishings	91704.00	13,059	3563
Paper	78475.00	34,054	5178
Total	2297339.00	286,397	37873

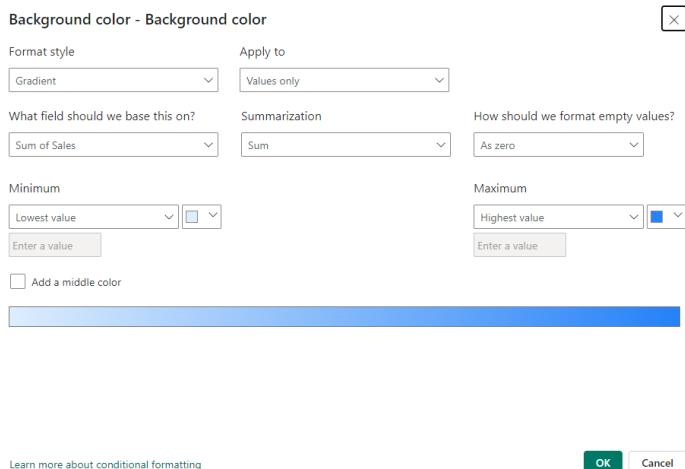
Conditional Formatting

22. Create a new page and copy the table from page 1.
23. Select the **Cell elements** Card and Chose **sales** to apply conditional formatting to.
24. You can also reach conditional formatting in the Build pane by right click the field and chose conditional formatting option.



25. You have many options to apply.
26. For the **sales** column I want to apply a background color.
27. Turn on the background color.
28. Blue color is in the background and when the value is **higher** it is **darker**.
29. You can click the **fx** icon next to the background and select other color and control the gradient.

30. Sort the column sales in descending order to see the dark cells are on top.

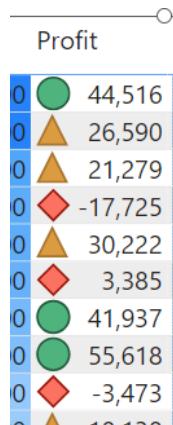


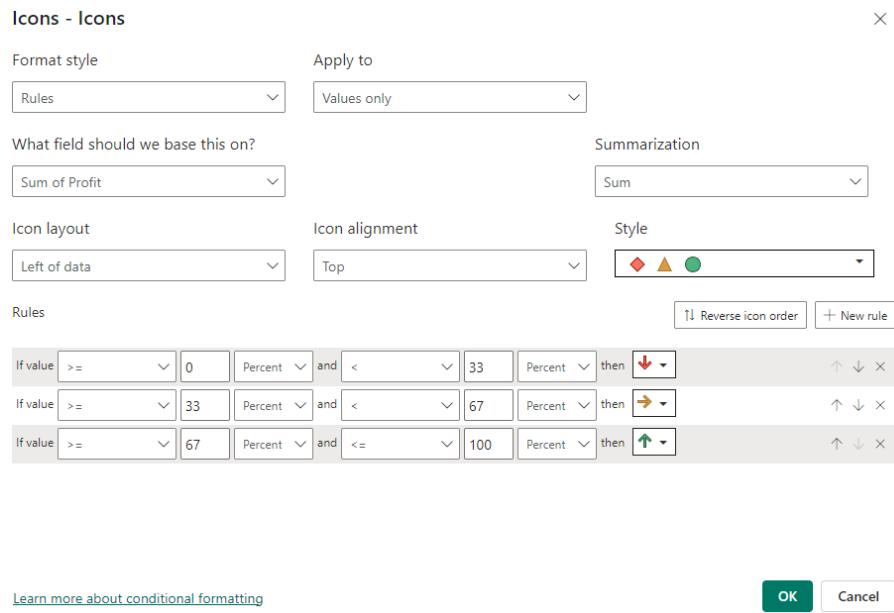
31. For the **Profit** column apply **Font color** conditional format and see.
 32. Change the color to dark red.

33. For **Quantity** column apply **Data Bars** conditional formatting
 34. **Sort Quantity descending** to see the format.

Sub-Category	Sales	Profit	Quantity
Phones	330047.00	44,516	3289
Chairs	328452.00	26,590	2356
Storage	223860.00	21,279	3158
Tables	206967.00	-17,725	1241
Binders	203425.00	30,222	5974
Machines	189242.00	3,385	440
Accessories	167400.00	41,937	2976
Copiers	149530.00	55,618	234
Bookcases	114879.00	-3,473	868

35. Go to **Profit** column again and disable **Font color** conditional formatting and apply **Icons** conditional formatting.
 36. Different icons appear beside the number in each cell.
 37. **Sort profit** column descending and see how it works.
 38. A **Green** circle is when the profit is high , **yellow** triangle if it was medium and **red** rhombus if it was low.
 39. Click on fx icon to change the icons like the figure below.
 40. Review the values in **Percentage** and you can change and you can also use **values** instead of percentage.





41. Your final table should look like this one

Sub-Category	Sales	Profit	Quantity
Phones	330047.00	44,516	3289
Chairs	328452.00	26,590	2356
Storage	223860.00	21,279	3158
Tables	206967.00	-17,725	1241
Binders	203425.00	30,222	5974
Machines	189242.00	3,385	440
Accessories	167400.00	41,937	2976
Copiers	149530.00	55,618	234
Bookcases	114879.00	-3,473	868
Appliances	107537.00	18,138	1729
Furnishings	91704.00	13,059	3563
Paper	78475.00	34,054	5178
Supplies	46679.00	-1,189	647
Art	27136.00	6,528	3000
Total	2297339.00	286,397	37873

Aggregation in table

42. Create a new page and copy the table from page1 to it.
43. If you want the average profit.
44. Click the arrow on the right of the Profit field in the columns well of Build pane and click the **summarization** drop down list and choose **average**.

The build pane shows:

- Columns:** Sub-Category, Average of Profit, Max of Sales, Quantity
- Data:**
 - Field: Average of Profit
 - Summarization: Average

45. You will get the **Average of Profit** in the column and the title changed too.
46. The same way chose **Maximum of Sales** column.
47. Drag the profit field again to the table.
48. Now you have two columns **average of profit** and **Profit**.
49. We want to make this new column as a percentage of the total sales.
50. **Right click** on the **Profit** column and choose **show value as** then choose **Percentage of grand total**.

The screenshot shows the Power BI Data pane with the following configuration:

- Format**: Shows 'Search' and 'Visual Properties'.
- Build**: Shows 'Suggestions' and a grid of icons for various data types.
- Data** pane:
 - Field**: Set to 'Average of Profit'.
 - Summarization**: Set to 'Average'.
 - Operations**: Options include 'Sum', 'Average', 'Minimum', and 'Maximum'.
- Columns** pane:
 - 'Sub-Category' is the current column being edited.
 - 'Sales' is listed below it.
 - 'Average of Pr...' is another column listed.
 - 'Quantity' is listed below it.
 - '+Add data'
- ContextMenu** for the '%GT Profit' column:
 - Remove field
 - Rename for this visual
 - Move
 - Conditional formatting
 - Remove conditional formatting
 - Don't summarize
 - ✓ Sum
 - Average
 - Minimum
 - Maximum
 - Count (Distinct)
 - Count
 - Standard deviation
 - Variance
 - Median
 - No calculation
 - ✓ Percent of grand total
 - Show value as

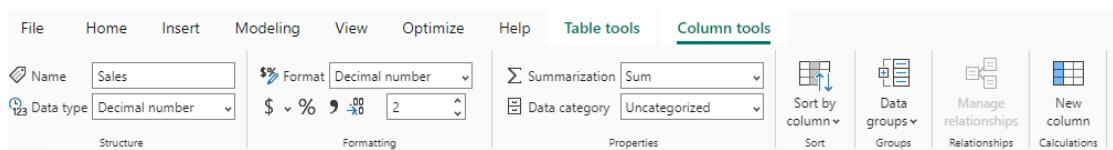
51. You can now see the % of each sub-category profit to the total.
52. Click on descending order to know which sub-category has much profit contribution of the total profit.
53. At the bottom of the table you will find the negative profit % sub-categories.

Sub-Category	Average of Profit	Max of Sales	Quantity	%GT Profit
Copiers	818	17500.00	234	19.42%
Phones	50	4549.00	3289	15.54%
Accessories	54	3347.00	2976	14.64%
Paper	25	734.00	5178	11.89%
Binders	20	9893.00	5974	10.55%
Chairs	43	4416.00	2356	9.28%
Storage	25	2934.00	3158	7.43%
Appliances	39	2625.00	1729	6.33%
Furnishings	14	1336.00	3563	4.56%
Envelopes	27	605.00	906	2.43%
Art	8	1113.00	3000	2.28%
Labels	15	786.00	1400	1.94%
Machines	29	22638.00	440	1.18%
Fasteners	4	93.00	914	0.33%
Total	29	22638.00	37873	100.00%

Formatting Numbers

54. Create a new page and copy the table from page 1.
55. In Data pane select **sales** field in the **sales** table.

56. A Column tools tab appears on the ribbon.

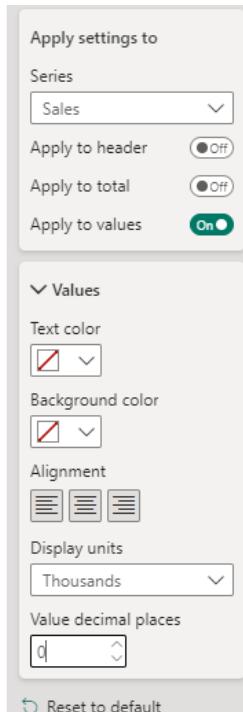


57. Change the **Data type** to **decimal Number** and format with 2 decimal places.

58. If you want to show the Numbers in sales in Thousands or Millions, Go to **Specific column** card → Apply Settings to → Choose sales.

59. In Display Units chose **Thousands**.

60. Make the **Value Decimal places = 0**.



61. Do the same with the **Profit** field.

Question

What happens when you select the column header in the table visual of Microsoft Power BI?

- A. The data within that column is highlighted for editing.
- B. The table visual's position on the report changes.
- C. It opens a detailed view of the data within the column.
- D. The column data is sorted in ascending order; selecting again sorts it in descending order.

Knowledge check

Question 1

You are creating a data analysis report for the sales department at Adventure Works exploring sales of different bicycle models over the past five years.

What type of visualization is appropriate to clearly and effectively demonstrate trends in bicycle sales over time for stakeholders?

- A. Pie charts
- B. Column chart
- C. Line charts
- D. Bar charts

Question 2

At Adventure Works, the financial department requires raw, detailed data and exact numbers of bicycle production quantities as part of its cost analysis and financial reporting and planning. Which visualization is best suited to presenting the production quantities in this scenario?

- A. Pie charts
- B. Tables
- C. Line charts
- D. Bar charts

Question 3

As a Power BI data analyst, you need to create data analytics reports, including sales reports for businesses like Adventure Works. What purpose does the **Build** pane serve in the analysis process?

- A. To create, modify, and manage visual elements.
- B. To manage the data
- C. To convert the data into text-based reports
- D. To analyze the data

Question 4

The project manager at Adventure Works has been allocated a fixed budget for a new project. The funding is distributed across several categories: salaries, equipment, software, training, and miscellaneous expenses. You want to create a visual representation for the project manager that displays the proportion of the total budget that each category represents. What chart type is most suitable for this purpose?

- A. Line
- B. Pie
- C. Bar
- D. Area

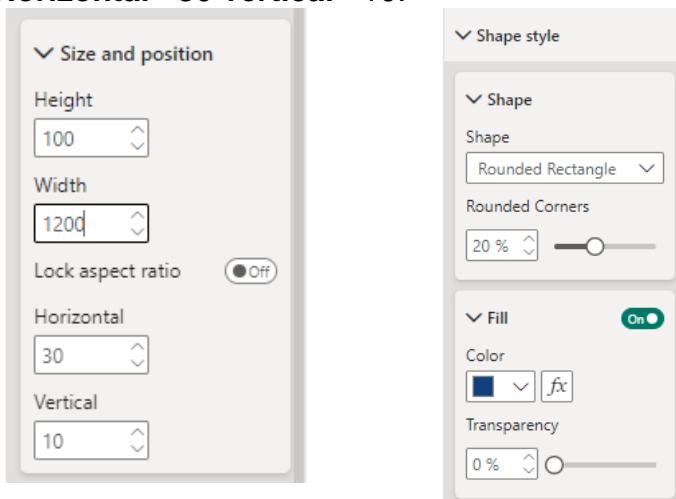
Chapter 2: Report Design Basics

Exercise 7: Design an appealing Report Page

1. Use **Exercise 6 Start.pbix**.

Create Title Bar with Logo

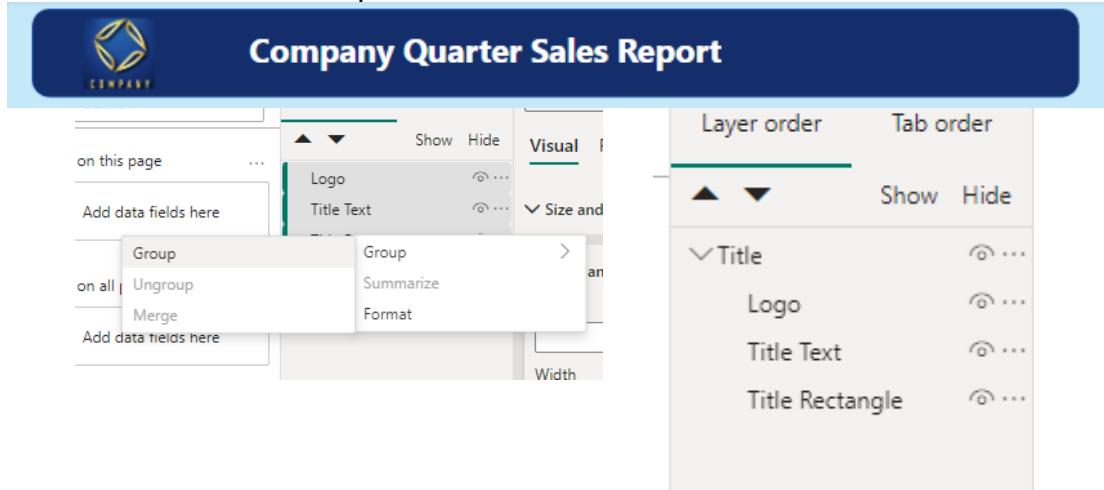
2. Create a new page and rename it : **Power BI Design Report**.
3. Click on the page empty space to select the page.
4. Change the Canvas background to **#93D7F7** with **50%** transparency.
5. On Top of the page **Insert → Elements → Rounded Rectangle**.
6. Make the shape rounded corner **20%**.
7. Make its fill color **#0C346E** with **0** transparency.
8. In size and position make it as in figure **Hight = 100 width = 1200 Horizontal= 30 vertical= 10**.



9. In the right side of screen click the **(+)** icon and add the **Selection Pane**.
10. Click the **selection** pane to open.
11. Rename the Shape to **Title Rectangle**.
12. Insert a Text Box and write: **Company Quarter Sales Report**.
13. Format the text font = **28 bold** color = **white**.
14. Turn the background of the text off.
15. Position the **text**: Hight = 70, Width = 650, Horizontal = 230, Vertical = 25.
16. Rename the Text in the Selection pan to **Text Title**
17. Insert Image **Background.png**.
18. Position the Image Hight = 90, width = 200, Horizontal = 30, Vertical = 15.
19. Rename the image in the pan to **Logo**.
20. In the Selection pan select **rectangle, text and image** and right click and choose **Group**.

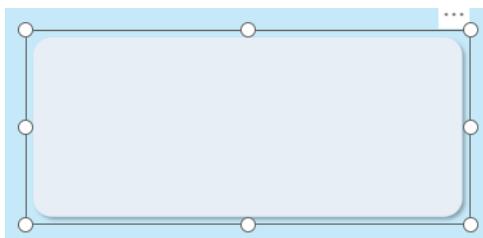


21. Rename the Group to **Title**.



Create Line chart Background

1. Insert → Elements → Rounded Rectangle.
2. Make the shape rounded corner **10%**.
3. Make its fill color **#E8EFF7** with **0** transparency.
4. In size and position make it as in figure **Hight = 230 width = 525 Horizontal= 30 vertical= 140**.
5. In the shape style enable **Shadow**.
6. In the selection pane rename the shape to **Line Chart BG**.



Create Pie Chart Background

7. Copy and paste the Line chart BG rectangle and rename it: **Pie Chart BG** in the selection pane.
8. Change its dimensions to be **Hight = 230 width = 525 Horizontal= 700 vertical= 140**.

Create Column Chart Background

1. Copy and paste the Line chart BG rectangle and rename it **Column Chart BG** in the selection pane.
2. Change its dimensions to be **Hight = 230 width = 525 Horizontal= 30 vertical= 430**.

Create Bar Chart Background

1. Copy and paste the Line chart BG rectangle and rename it **Bar Chart BG** in the selection pane.
2. Change its dimensions to be **Hight = 230 width = 525 Horizontal= 700 vertical= 430**.

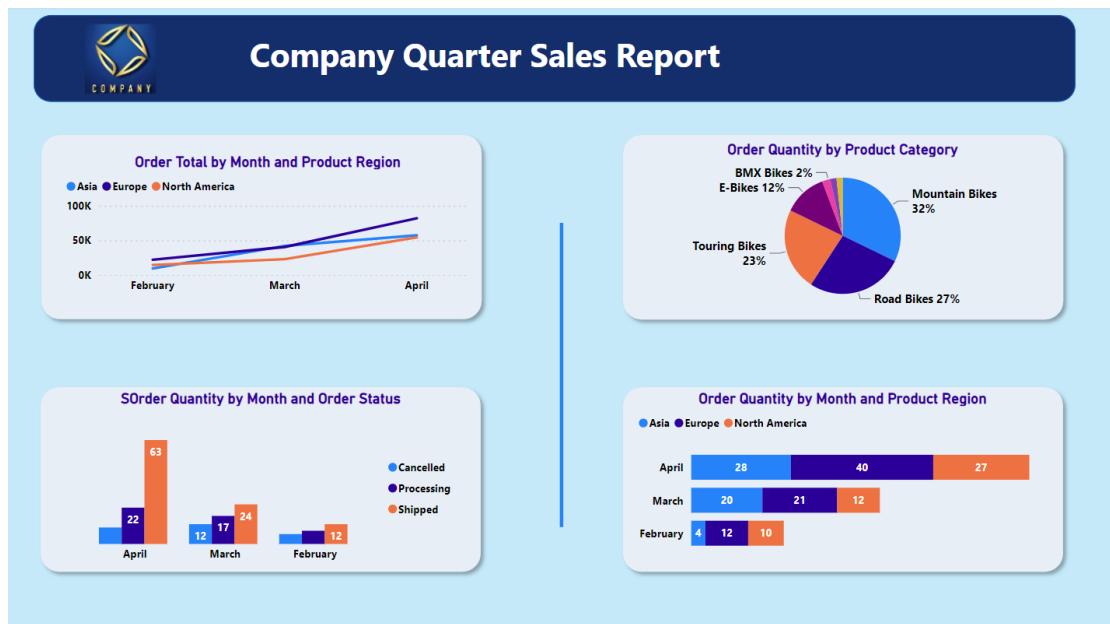
Insert Vertical line

3. Insert line.
4. In rotation make All = 90
5. Make color = #118DFF
6. Make width = 2
7. Change height = 350, Horizontal = 600, Vertical 250.



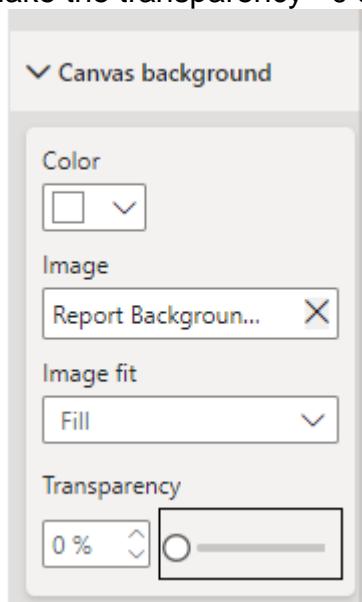
Copy Charts to the new page

8. Select each chart on page 1 and copy to its position in the new page.
9. Click on the **Focus mode** button to make the chart fill the page
10. Turn off the **background** of the chart.
11. Change the Title for each chart to short one makes it bold and center font 14 and color = #12239E
12. Delete the **title** of the **legend** if any and make text of legend font 12 bold and black.
13. Format **X-axis** and **Y-Axis** to text bold and font 10 and delete axis titles.
14. Remove decimal from percentage in the Pie Chart.
15. Click on **Back to report** button to get back to report.
16. You must have your report like the following now:



Design Report Background outside Power BI

17. It is better to design the background in another program and get it as a background to your report page.
18. It is easier for design.
19. It also fast to load than loading separate objects in the report using shapes in design.
20. Open the Power point file **Background Design.pptx** file.
21. Explore the design I have created for you.
22. Save the page as **Report Background.png** file.
- 23. Create new page in your Power BI report and rename it **PowerPoint Design Report**.**
24. In Canvas Background brows to your background.
25. Make the transparency =0 and Image fir = Fill.



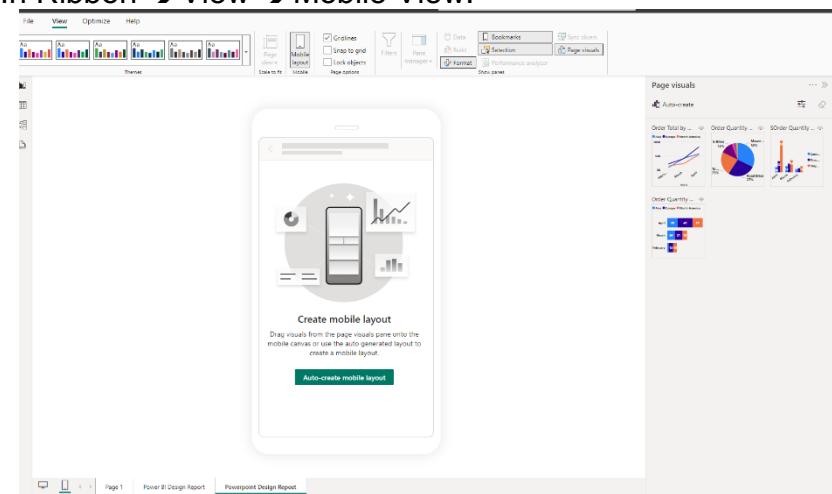
26. From your second page report copy the formatted chart one by one to their corresponding position in the page.
27. You must reach the same result with your report.

Imitate Design from the Internet

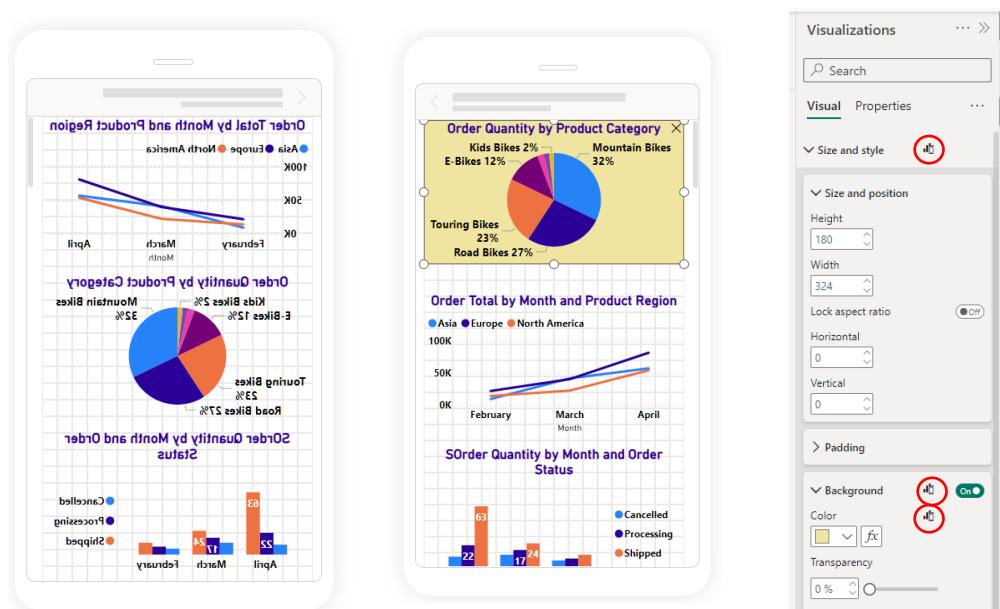
28. Go to PowerPoint file again slide 2 and 3.
29. It is a copied design from the internet by searching in google.
30. And I have imitated the parts of the design shape, Position and color.

Mobile View

31. If you want your report to appear well for your mobile users you must prepare the Mobile view of your page.
32. If you design a Mobile view for your page, Power BI will show your design to user if they were using the mobile application.
33. In Ribbon → View → Mobile View.



34. You will have all your visual in the page Visuals pan.
35. Click on **Auto-create Mobile Layout** button and let Power BI suggests



the Mobile layout for you.

36. Click CTRL+Z to undo.
37. Drag and drop and arrange your layout yourself.
38. You can reposition the charts as you want.

39. Select **Pie Chart** and in Visualization pane change the background of the Chart to Yellow.
40. Notice that you have now **Mobile Only** Icon means that this change in format only for mobile view.

Site you might use for design

Try searching for words like Dashboard on those sites

Adobe Stoke

https://stock.adobe.com/eg/search?k=dashboard&search_type=recentsearch

Freepik

https://www.freepik.com/search?format=search&last_filter=query&last_value=dashborad&query=dashborad

Pinterest

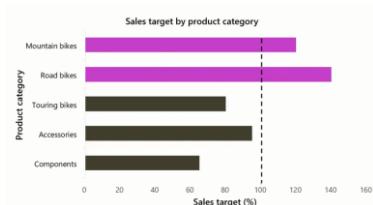
<https://www.pinterest.com/search/pins/?q=dashboard&rs=typed>

Conditional formatting

- Conditional formatting is a feature that allows you to apply specific formatting to cells or rows in a table or matrix based on specific conditions.
- This feature is significant when you have vast amounts of data and want to highlight certain elements that meet specific criteria.
- For example, if the total profit displayed in a table was a negative value indicating a loss, you could highlight this by using conditional formatting to change the value to a red color.
- Other visuals also support conditional formatting. For example, you can format a **bar chart** so that if the sales target for a specific product category goes beyond a certain threshold, that category's bar will change color.
- Conditional formatting offers many benefits:
 - It provides immediate insights,
 - allowing users to quickly spot trends, anomalies, and focal points.
 - making the information more accessible and readable.
 - reducing the potential for errors.

Profit table

Year	Revenue (\$)	Expenses (\$)	Profit (\$)
2020	85000	90200	-5200
2021	120000	95000	25000
2022	110000	112000	-2000
2023	160000	115000	45000



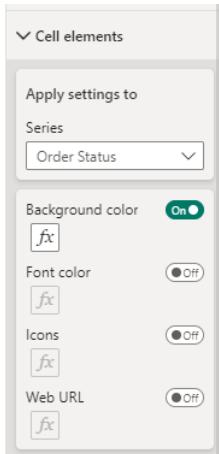
Exercise 8: Conditional Formatting

1. Use file **Exercise 8 Start .pbix**.
2. You have one page with two visuals a table and bar chart



Conditional Formatting in table

3. You have a table we want to apply rules to change Order status background to 3 different colors according to the 3 status of the order (Shipped, Processing, cancelled).
4. Use **Cell elements** card in the table format to apply background conditional formatting.



5. Click the fx icon to add three rules like the one in the figure below
6. You also can right click the **Order Status** field in the **build pane** and select **Conditional formatting** → **background color**.

Background color - Order Status

Format style Apply to

What field should we base this on? Summarization

Rules

If value	is	Shipped	then	red	<input type="button" value="↑"/>	<input type="button" value="↓"/>	<input type="button" value="X"/>
If value	is	Processing	then	yellow	<input type="button" value="↑"/>	<input type="button" value="↓"/>	<input type="button" value="X"/>
If value	is	Cancelled	then	light blue	<input type="button" value="↑"/>	<input type="button" value="↓"/>	<input type="button" value="X"/>

[Learn more about conditional formatting](#)

Conditional Formatting in Bar Chart

7. Select the bar chart.
8. In Bars card select apply to all.
9. Beside color click the fx button to configure conditional formatting for Numbers between 30K and 1 Million.

Color - Categories

Format style

What field should we base this on? Summarization

Rules

If value	>=	30000	Number	and	<=	100000	Number	then	dark purple	<input type="button" value="↑"/>	<input type="button" value="↓"/>	<input type="button" value="X"/>
----------	----	-------	--------	-----	----	--------	--------	------	-------------	----------------------------------	----------------------------------	----------------------------------

[Learn more about conditional formatting](#)

10. Your final report must look like this:



Question

Which of the following are examples of conditional formatting in Power BI?
Select all that apply.

- A. Changing the background color of a cell in a table based on certain conditions.
- B. Customizing the color of bars in a bar chart based on predefined thresholds.
- C. Changing the color of data bars based on their values.
- D. Changing the font size and color of a text field.

Exercise 9: Position and Align Objects

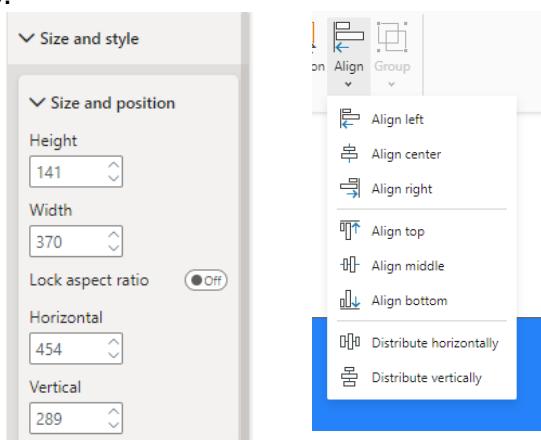
1. Use file **Exercise 9 Start.pbix**.

Dimension and Position

2. In Page: **Shape Dimension and Position**.



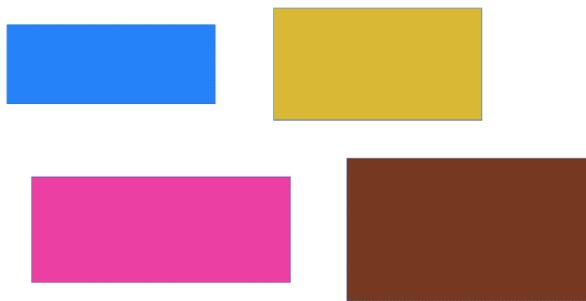
3. Select the blue rectangle.
4. In the Format pane → Size and style.
5. Try to change height and width using mouse and changing numbers.
- 6.



7. Select the object and move it in the screen its Horizontal and Vertical changes.
8. Put the object on the top left.
9. X and Y of the Object become 0.
10. Notice while moving around a red dotted line appears to show center horizontally and vertically.

Object Alignment

11. Go to Page: **Align Objects**.

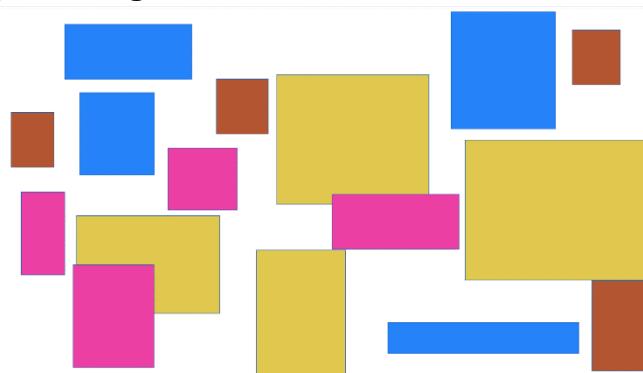


12. Try to use options in the **Size and position** card to make the three objects align horizontally once and vertically once.

13. Try step 12 again using the **align** button on **Format** ribbon tab.

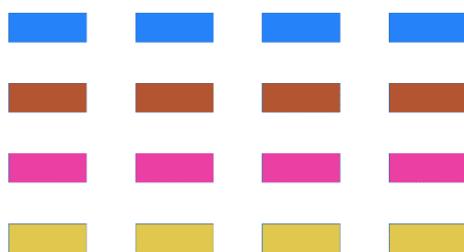
Arrange Objects

14. Go to page: **Arrange**.



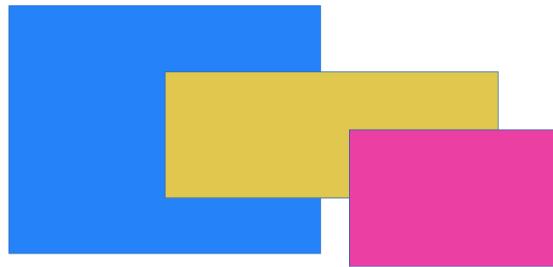
15. Make all objects Height 75, and width 200.

16. We want to arrange each 4 rectangles of the same color horizontally and all have the same size. (Hint: use **Ctrl+A** to select them all and make them the same size, then align them horizontally and vertically using the format tab).



Layers

17. Go to Page: **layers**.



18. Use the Format tab to arrange layers **Send backwards** and **bring forward**.

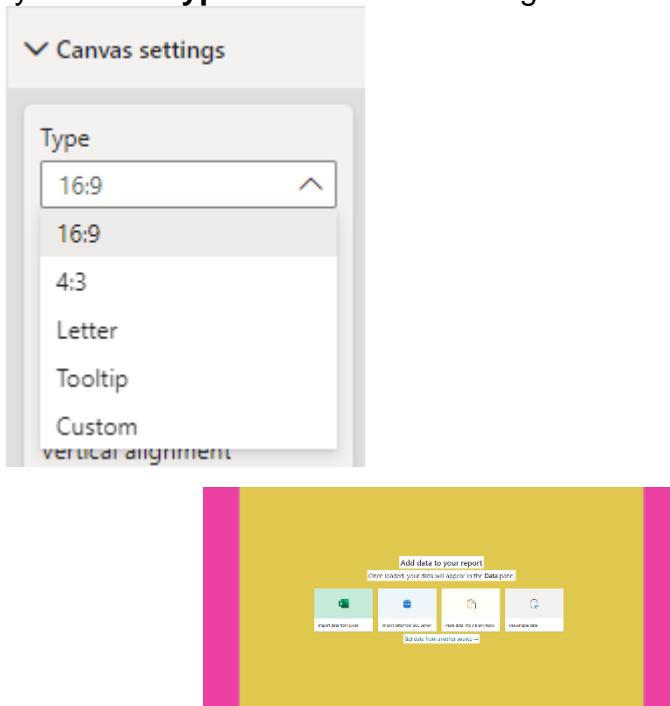
19. Use the **selection pane** and rename the 3 objects and arrange them using this pane.

Page Properties

20. Go to Page: **Page background**.

21. Change **canvas background** to yellow and **wallpaper** to red.

22. Try **Canvas Type** in the canvas settings.



Working with themes

- Your report should always align with the company's brand, colors, and style guide.
- To update the design elements of the report to reflect the company's brand aesthetics would be a tedious, time-consuming task.
- Luckily, themes in Microsoft Power BI could simplify the task at hand and save you a lot of time and effort.

What are themes?

- Themes in Power BI are predefined sets of colors, fonts, and visual styles that you can apply to your reports easily and quickly.
- They ensure visual consistency across different reports and can save significant time that would be otherwise spent customizing individual items.
- You can customize themes to align with company color schemes and design guidelines. This can help enforce a strong brand identity in your reports and create a more impactful and professional appearance.
- Using themes in Power BI can **enhance accessibility** in a variety of ways. Power BI offers theme customization options you can use to cater to specific **accessibility** needs, such as **high contrast themes** for users with visual impairments.
- You can also enhance readability by using themes that employ distinct and consistent colors, assisting users in differentiating between various data points and categories.

Exercise 10 Working with themes

1. Use **Exercise 10 Start.pbix**.

Applying Theme

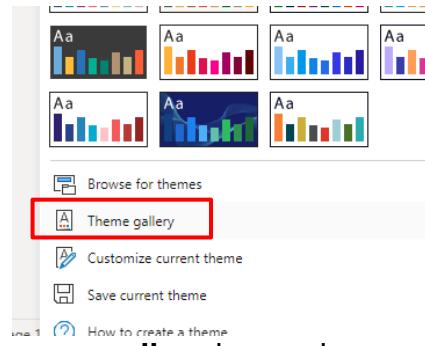
2. You can choose Report Themes by going to the **View** ribbon. In the **theme** section, select the dropdown arrow and then select the theme you want to apply to your report.
3. These themes are similar to themes seen in other Microsoft products such as Microsoft PowerPoint.



4. Here you can also find **accessible themes**, which you can utilize to create accessible reports.
5. Select a theme **Accessible City Park** to apply it to your report instantly.
6. If you would like to **customize** the appearance of your Power BI reports in the future, changing the theme allows you to update all your visuals at once.

Theme online collection

7. For more options, you can also browse the collection of themes created by members of the Power BI community by selecting **Theme Gallery** from the themes dropdown menu.



8. This opens the **themes gallery** in your browser. In the theme's gallery, you can select any theme, then scroll down and **download the JSON file** for the theme.

9. For Example, select **Steller** Theme and download the JSON file and save it to your folder as **Steller Theme.json**.

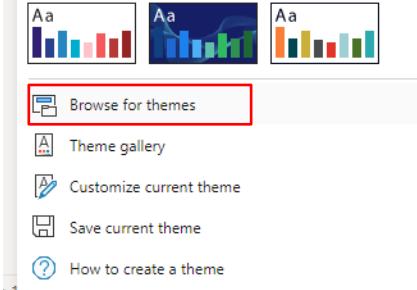
10. Drag the file to your internet browser to see its content.

```

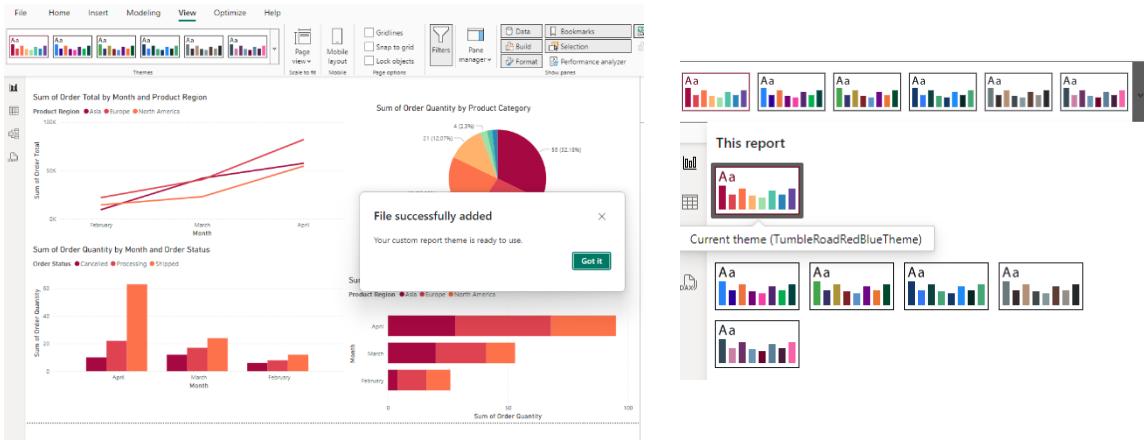
1 {
2   "name": "TumbleRoadRedBlueTheme",
3   "dataColors": [
4     "#9e0142",
5     "#d4354f",
6     "#f4a643",
7     "#fdde61",
8     "#abdd44",
9     "#66c2a5",
10    "#20a090",
11    "#55afca2",
12    "#bbbbbb",
13    "#999999",
14    "#666666",
15    "#333333"
16  ],
17  "background": "#FFFFFF",
18  "foreground": "#67001f",
19  "tableAccent": "#b2182b"
20 }

```

11. To install the downloaded file, select **Browse for Themes** from the theme's dropdown menu. Go to the location where you downloaded the JSON file and select it to import the theme into Power BI Desktop as a new theme.

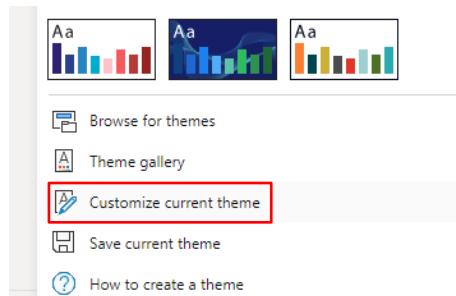


12. This theme will instantly apply to your current report.

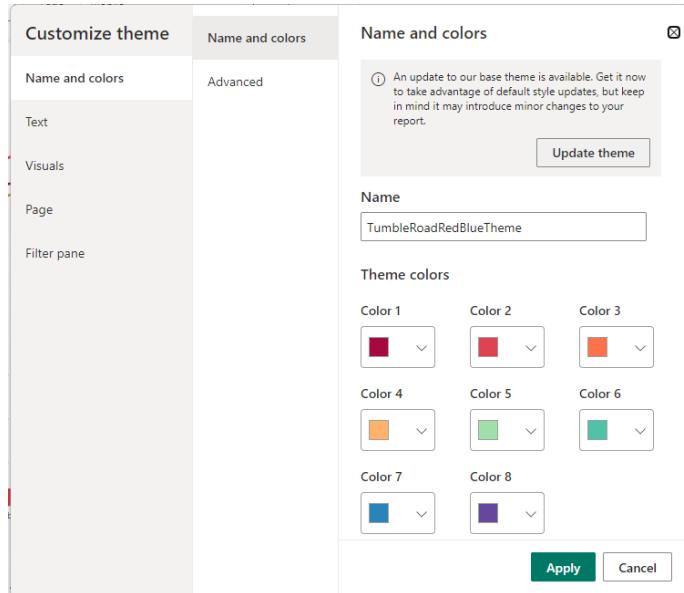


Customize theme

13. You can **customize** a theme directly in Power BI Desktop.
14. To do this, select a theme that is close to what you'd like. You can then customize the theme by making any necessary adjustments.
15. To customize a theme from the view ribbon, select the **Themes** Dropdown button and select **Customize Current Theme**. A dialogue appears where you can make changes to the current theme.



16. You can then **save** your settings as a new theme.
17. There are **customizable** theme settings in various categories.



18. You can:

- name** your custom theme and
- define color settings,**
- customize tech settings such as **font family, size**
- color, and visual settings**, which cover **background, border, header, and tooltips**,
- adjust page elements** like **wallpaper** and **background, transparency, font and icon color, size, and filter cards.**

19. After you make your desired changes, select **Apply** to save your theme.

20. You can now use the theme in your current report.

21. It will also be available in the custom theme section in the themes dropdown menu.

Create your own Theme

22. Go to site [Trending Color Palettes - Coolors](#).
23. Choose a color pallet from the existing ones.
24. Click on the 3-ellipsis next to the pallet and choose **Open Pallet**.
25. You can take a snapshot and use it in your design in PowerPoint.
26. Now go to your Power BI and in view tab → Themes → Customize current theme.
27. In the **name and color** section change the 8 colors by clicking on each color on the site and paste it in its corresponding number.
28. For example change the colors to: #03071E, #370617, #6A040F, 9D0208, DC2F02, E85D04, F48C06 , FAA307.
29. Name your new Theme: **My Red theme**.
30. Leave the **sentiment colors** as they are.
31. On Text Section change **Font Color** to black: #000000.
32. In Visuals section change:

- a. the background color to : #DCEB0B.
 - b. Border on and color #3F4FC5.
 - c. Header Background #D71BDA
 - d. Tooltip Label text #F41212 , Value text #F114E2 and background color #D3E50E
- 33.** In Page section change
- a. Wallpaper color to #F38DD5
 - b. Page background color #C2F669 with transparency #C2F669
- 34.** In Filter Pane section change
- a. Filter pane background color #520C0C.
 - b. Font and icons #F2F62D
 - c. Checkbox #499A45

Question

What is the function of themes in Microsoft Power BI? Select all that apply.

- A. Enabling alignment of reports with brand guidelines
- B. Improving the accessibility and readability of reports
- C. Enhancing the visual consistency across reports
- D. Changing the colors of each report visual based on various conditions

Chapter 3: Advanced Visuals

Combo Chart

- In Power BI, a combo chart is a dynamic combination of a line and a column chart, allowing you to visually represent two different, yet interconnected data points.
- Power BI offers two types of combo charts:
 - (1) A line and a stacked column chart
 - (2) A line and a clustered column chart.
- A line and stacked column chart is helpful for displaying a total across the series of data and how each individual part contributes to the total.
- Line and clustered column charts are excellent for comparing several sets of data side by side. This can be useful to track and compare different metrics over the same period.



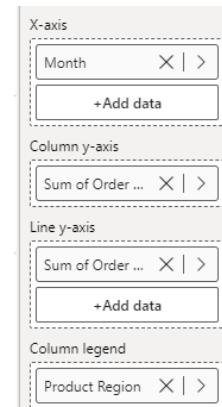
A line and a stacked column chart



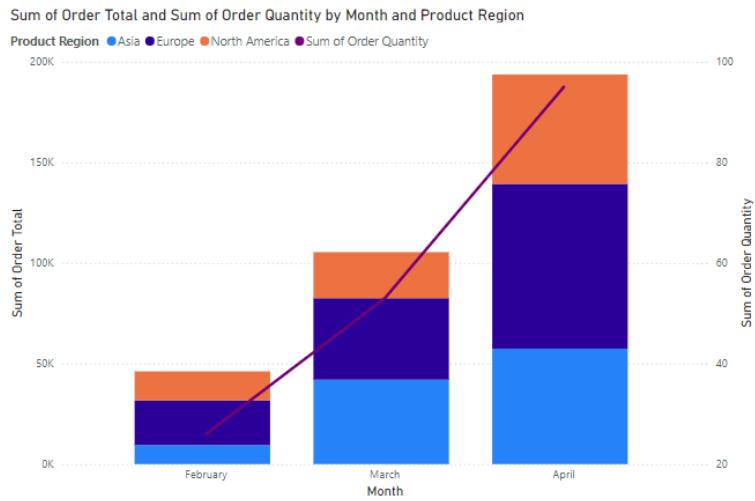
A line and a clustered column chart

Exercise 11: Combo Chart

1. Use file **Exercise 11 Start.pbix**.
2. Suppose you need to create a combo chart to provide the **sales** team with insights into orders for **February**, **March**, and **April**, including the overall performance of each month and each sales **region**.
3. Place a **line and stacked column** chart on the report area from the Visualizations pane and resize the visualization.
4. To create this combo chart, you'll need four data fields:
 - a) Month → x-axis
 - b) order total → Column y-axis
 - c) order quantity → Line y-axis
 - d) product region. → Column Legend
5. The chart now has a **stacked look**, with each **colored segment** representing the contribution of each **product region** to the order total.
6. Stakeholders can now not only compare the sales performance over the quarter, but also compare the performance of each region month to month.
7. You can also **sort the chart** in ascending order.

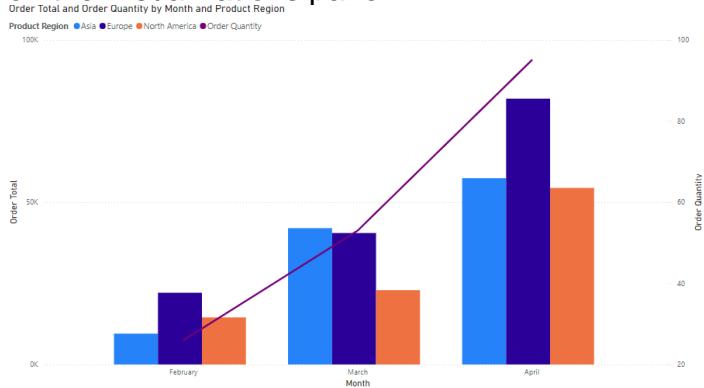


8. To do this, select the three dots on the top right corner of the chart, followed by sort axis from the dropdown menu, and **sort ascending**.



Convert to Line and Clustered Column Chart

9. You can change this chart to a line and clustered column chart by selecting the chart and then selecting the **line and clustered column chart** icon on the Visualizations pane.



Explore key field wells

- The x-axis**, or **shared axis** for the **line and columns** displays the categories. In this chart, month is used as the category.
- The line y-axis** is where you place the data to be displayed as a line like sum of order quantity.
- The column y-axis** is where you place the data to show as columns like order total.
- The legend** is used to add categorical fields to the chart. For example, the product regions. When you hover over a data point with your mouse, some default values for the data point display.
- Tool tip** If you'd like to add additional information to this display data, select the appropriate fields from the data pane and drag them to the tool tip area.

Question

In Microsoft Power BI, which combo chart is most suitable for comparing multiple sets of data side by side?

- A. Line and clustered column chart
- B. Area chart
- C. Bar chart
- D. Line and stacked column chart

Matrix

- The matrix visual is similar to a table but has key features that allow the report designer to communicate multiple levels of information in the data.
- A table supports two dimensions, and the data is flat, meaning duplicate values are displayed and not aggregated. On the other hand, a matrix makes it easier to display data meaningfully across multiple dimensions because it supports a stepped layout.
- Unlike the table, the matrix automatically aggregates the data, enabling the viewer to drill down into the detail.

Sub-Category		Region	Sales				
			Central	East	South	West	Total
Accessories	Central	33,962					167,400
Accessories	East	45,038					107,537
Accessories	South	27,280					27,136
Accessories	West	61,120					203,425
Appliances	Central	23,581					114,879
Appliances	East	34,191					328,452
Appliances	South	19,525					149,530
Appliances	West	30,240					16,477
Art	Central	5,763					3,024
Art	East	7,497					91,704
Art	South	4,662					12,505
Art	West	9,214					189,242
Binders	Central	56,926					78,475
Binders	East	53,500					330,047
Binders	South	37,032					223,860
Binders	West	55,967					46,679
Total		2,297,339					501,252 678,828 391,748 725,511 2,297,339

Sub-Category	Central	East	South	West	Total
Accessories	33,962	45,038	27,280	61,120	167,400
Appliances	23,581	34,191	19,525	30,240	107,537
Art	5,763	7,497	4,662	9,214	27,136
Binders	56,926	53,500	37,032	55,967	203,425
Bookcases	24,153	43,819	10,900	36,007	114,879
Chairs	85,227	96,262	45,177	101,786	328,452
Copiers	37,260	53,220	9,300	49,750	149,530
Envelopes	4,638	4,375	3,344	4,120	16,477
Fasteners	776	821	504	923	3,024
Furnishings	15,256	29,067	17,310	30,071	91,704
Labels	2,454	2,607	2,358	5,086	12,505
Machines	26,800	66,107	53,890	42,445	189,242
Paper	17,491	20,174	14,146	26,664	78,475
Phones	72,410	100,628	58,311	98,698	330,047
Storage	45,933	71,618	35,770	70,539	223,860
Supplies	9,470	10,763	8,320	18,126	46,679
Tables	39,152	39,141	43,919	84,755	206,967
Total	501,252	678,828	391,748	725,511	2,297,339

Rows

Sub-Category X | >

+Add data

Columns

Region X | >

+Add data

Values

Sales X | >

+Add data

Exercise 12: Create Matrix

1. Use file **Exercise 12 Start.pbix**.

Create a table

2. Create a table with columns (**Sub-category**, **Region**, **Sales**) fields.
3. Notice now that every **sub-category** is repeated **4** times to give values of it in every region.

4. It is one dimension and difficult to explore data.
5. If I want it in two dimensions, we can convert it to matrix visual.
6. Keep selecting the table and click the Matrix Visual.
7. You have now the same data in two dimensions.
8. You have each sub-category once in a row and value of 4 regions in the columns.



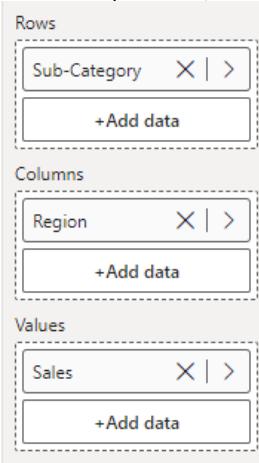
The figure shows a transformation from a flat table to a matrix visual. On the left, a table lists products by category and region with their respective sales figures. On the right, the same data is presented in a matrix format where categories are rows and regions are columns, allowing for easier comparison across regions for each category.

Sub-Category Region Sales		
Accessories	Central	33,962
Accessories	East	45,038
Accessories	South	27,280
Accessories	West	61,120
Appliances	Central	23,581
Appliances	East	34,191
Appliances	South	19,525
Appliances	West	30,240
Art	Central	5,763
Art	East	7,497
Art	South	4,662
Total		2,297,339

Sub-Category	Central	East	South	West	Total
Accessories	33,962	45,038	27,280	61,120	167,400
Appliances	23,581	34,191	19,525	30,240	107,537
Art	5,763	7,497	4,662	9,214	27,136
Binders	56,926	53,500	37,032	55,967	203,425
Bookcases	24,153	43,819	10,900	36,007	114,879
Chairs	85,227	96,262	45,177	101,786	328,452
Copiers	37,260	53,220	9,300	49,750	149,530
Envelopes	4,638	4,375	3,344	4,120	16,477
Fasteners	776	821	504	923	3,024
Furnishings	15,256	29,067	17,310	30,071	91,704
Labels	2,454	2,607	2,358	5,086	12,505
Total	501,252	678,828	391,748	725,511	2,297,339

Create a Matrix

9. Let us delete this table and create the matrix from scratch.
10. Click on Matrix Visual to create and resize.
11. You have 3 Well to fill (**Rows, columns, and Values**).

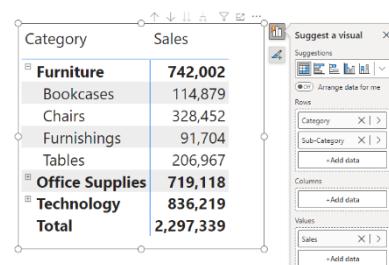


The screenshot shows the configuration pane for a matrix visual. It has three main sections: 'Rows', 'Columns', and 'Values'. Each section contains a list box with the selected fields ('Sub-Category', 'Region', and 'Sales') and a 'X | >' button to remove or expand the selection. Below each list box is a '+Add data' button to add more fields to that category.

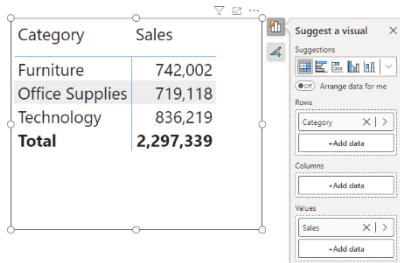
12. Drag the fields as in the figure to create the matrix again.

Hierarchies in rows

13. Create a new page.
14. Create a matrix with **Category** in rows and **Sales** in Values.
15. Now drag **sub-category** under category in row well.
16. A small + appears beside each category.



The screenshot shows a matrix visual with hierarchical data. The rows are grouped by category: Furniture, Office Supplies, and Technology. Within Furniture, there are sub-categories like Bookcases, Chairs, and Tables. The values column displays the sales figures for each item. A 'Suggest a visual' pane is open on the right, showing the current row and column settings.



17. If you want to see details about **the furniture** category and explore where that total came from, just expand the **category** to see values of its subcategories.
18. Again, you can do the same with **the Technology** category.
19. Remove **sub-category** from the rows well and replace it with **regions**.
20. You can now see the details by regions.
21. Add also **Segments** to the rows well.

Category	2016	2017	2018	2019	Total
Furniture	157,188	170,517	198,908	215,389	742,002
Central	32,912	35,588	50,770	44,518	163,788
Consumer	20,125	22,303	19,372	24,421	86,221
Corporate	5,673	6,225	26,246	13,941	52,085
Home Office	7,114	7,060	5,152	6,156	25,482
East	47,233	53,815	46,390	60,851	208,289
South	26,966	24,105	27,925	38,310	117,306
West	50,077	57,009	73,823	71,710	252,619
Office Supplies	151,778	137,247	183,959	246,134	719,118
Technology	175,285	162,793	226,384	271,757	836,219
Total	484,251	470,557	609,251	733,280	2,297,339

22. As you can see you can add many levels as you want.
23. Click the **Fork Icon (Expand all one level in the hierarchy)** twice to see all expanded.



24. Click the **Drill up arrow twice** to collapse all again.
25. If you want to move completely one level (you are now in **category** level and want to move to **region** level) use the two arrows down (**Go to Next level in the hierarchy**).
26. You will go completely to **region** level.
27. If you click again, you will go completely to **segment** level.

Hierarchy in columns

28. If you want to also have Hierarchy in columns you can do that.
29. Drag **Order Date** hierarchy to the columns well.
30. Notice we have already hierarchy created in **Order Date**.
31. You can now see **sales** for each category for each year.
32. Now you have a drop-down list for choose column or rows to drill down.



33. You can only drill down one-way columns of rows in a time.

34. Choose to drill down for **column** section.

35. Click the fork button.

Year	2016				2017					
Segment	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Total	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Total
Consumer	21,964	47,854	96,108	100,177	266,103	40,967	56,337	79,405	89,848	2
Corporate	13,992	27,246	32,992	54,207	128,437	22,281	18,982	35,251	52,246	1
Home Office	38,488	11,440	14,541	25,242	89,711	5,610	13,814	15,609	40,207	
Total	74,444	86,540	143,641	179,626	484,251	68,858	89,133	130,265	182,301	4

36. Now we have the next level expanded for all years (**Quarters**).

37. Click fork again.

38. You will get Year → Quarters → Months.

Year	2016				2017					
Quarter	Qtr 1			Qtr 2			Qtr 3			
Segment	January	February	March	Total	April	May	June	Total	July	Aug:
Consumer	6,927	3,167	11,870	21,964	9,109	12,818	25,927	47,854	20,200	16,21
Corporate	1,703	1,183	11,106	13,992	14,132	9,142	3,972	27,246	10,033	7,45
Home Office	5,608	168	32,712	38,488	5,053	1,688	4,699	11,440	3,714	4,24
Total	14,238	4,518	55,688	74,444	28,294	23,648	34,598	86,540	33,947	27,90

39. Go drill up twice.

40. Try expanding Drill to next level button (two arrows up button).

Sub-totals and Totals

41. Create a new page.

42. Create a matrix with **Category**, **sub-category** in rows and **sales** in values.

43. Notice you have the Grand total at the bottom of the matrix for sale.

Category	Sales
Furniture	742,002
Office Supplies	719,118
Technology	836,219
Total	2,297,339

44. Click the **fork** button to expand all one level.

Category	Sales
Furniture	742,002
Bookcases	114,879
Chairs	328,452
Furnishings	91,704
Tables	206,967
Office Supplies	719,118
Appliances	107,537
Art	27,136
Binders	203,425
Envelopes	16,477
Fasteners	3,024
Labels	12,505
Total	2,297,339

45. Now you have subtotal also for each category.

46. You can show or hide subtotals using the on object menu **Row subtotals**.

The screenshot shows a Power BI report with a table visual. A context menu is open over the table, specifically the 'Row subtotals' card. The 'Row subtotals' option is checked and highlighted with a red box. Other options like 'Column subtotals' and 'More options' are also visible. To the right of the table, the 'Format' pane is open, showing settings for 'Row subtotals' which are currently turned 'On'. The 'Rows' section has 'Show subtotal' turned on with a 'Total' label at the top. The 'Values' section shows font settings (Segoe UI, 18pt) and text color (black). The 'Apply to labels' option is turned off.

47. You can turn it on and off from the Format pane in the Card **Row Subtotals** and you can format the values too.

48. Notice that also **Grand total** disappeared.

49. Change the Text color of subtotals to #F0F003.

50. Change background color of subtotal to #6E1C50.

51. Turn the option **Apply to labels** on.

52. Change the Row grand total text to white and background to black using **Row Grand total** Card.

53. Turn the **Apply to label** option on.

54. You can do the same for columns if you have.

Category	Sales
Furniture	742,002
Bookcases	114,879
Chairs	328,452
Furnishings	91,704
Tables	206,967
Office Supplies	719,118
Appliances	107,537
Art	27,136
Binders	203,425
Envelopes	16,477
Fasteners	3,024
Labels	12,505
Total	2,297,339

Treemaps

- Like a pie or donut chart, treemaps are another helpful tool in Power BI for illustrating your proportional data.
- However, instead of circles, treemaps use rectangles to display your data, making the best use of **space** in your reports and add variety by displaying data in new and exciting ways.
- A treemap is a unique visual used to display **hierarchical** data or data that's organized in a treelike structure as nested rectangles.
- The entire chart represents the total dataset or tree and each **rectangle** or branch represents a **portion** of the whole tree.
- Each **rectangle size** corresponds to the **value** or size of the data it represents.
- While pie and donut charts are familiar and widely used to represent data proportionally, pie and donut charts can become **cluttered** and **difficult** to read when dealing with **many categories** of variables, or when the **differences** between data points are **small**.
- However, the design of a treemap chart allows for easier visualization and interpretation of larger datasets. Its rectangular, nested structure means it can handle more data points without becoming overly complex.

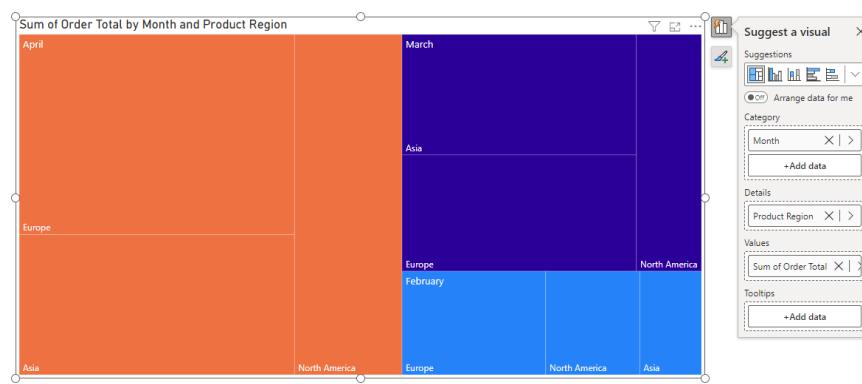


Exercise 13: Create Treemap

1. Use file **Exercise 13 Start.pbix**.

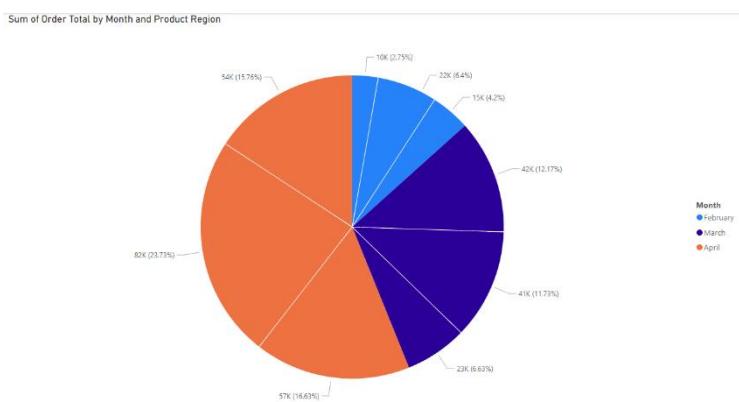
Create a Treemap

2. Place a treemap chart from the visualizations pane on the report area.
You can resize it as required by dragging the edges.
3. To create a treemap chart, you need **three fields**:
 - a. Category well,
 - b. Details well,
 - c. Values well.
4. Drag:
 - a. Month to the category well,
 - b. Product region, to the details well, and
 - c. Order total to the values well.



Compare Treemap and Pie chart.

5. Create the same presentation in a new page but using Pie chart.

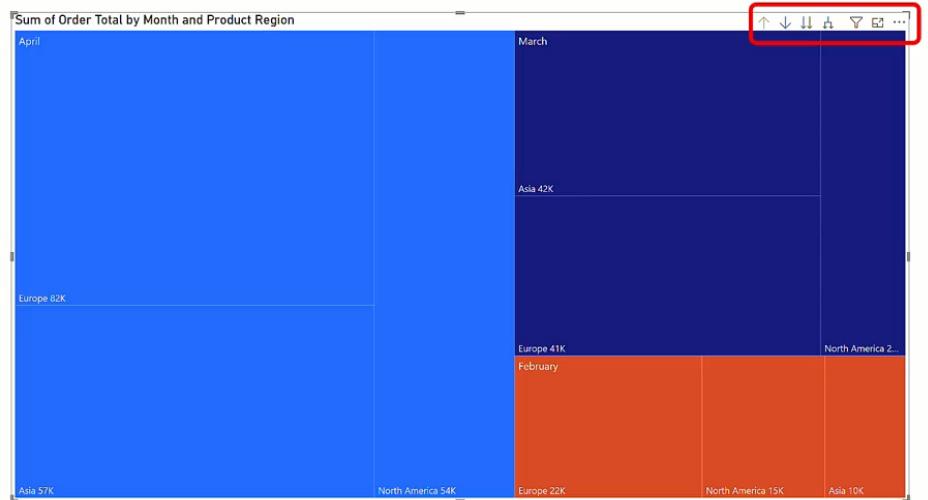


6. Let's compare this treemap chart to a pie chart created using the same data:
 - a. There is a **legend** in the pie chart which is absent in the treemap chart because the month names are already displayed in each branch inside the tree, a separate legend is not required.
 - b. Also, **pie chart displays the data values by default** which are **missing from the treemap chart**.

7. You can **enable** the **data values** in the treemap chart. To do this, select the chart and open the Format pane.
8. Select "**Data Labels**" to turn **on** the data values.
9. Now the treemap chart displays the values beside the month and the region name.

Drill Down

10. Similar to a pie and donut chart you can **add more fields** to the treemap chart and enable **drill mode**.
11. Add field "**Order Status**" to Category well.
12. A **drill down** arrow icon appears on the top right-hand corner of the chart.



13. Select the **drill down** icon to enable the Drill mode, then select any branch to display the detailed information, making it interactive.
14. If you'd like to return to the main less detailed visual, you can select the **drill up** arrow icon.
15. Customize your treemap by changing:
 - a. the font size of the **category**, and **data labels**
 - b. **colors** of the **categories**.
16. On the **Format** pane open the **data labels** and **Category labels** sections. Here you have the option to change colors and the font sizes of your chart as needed.



Question

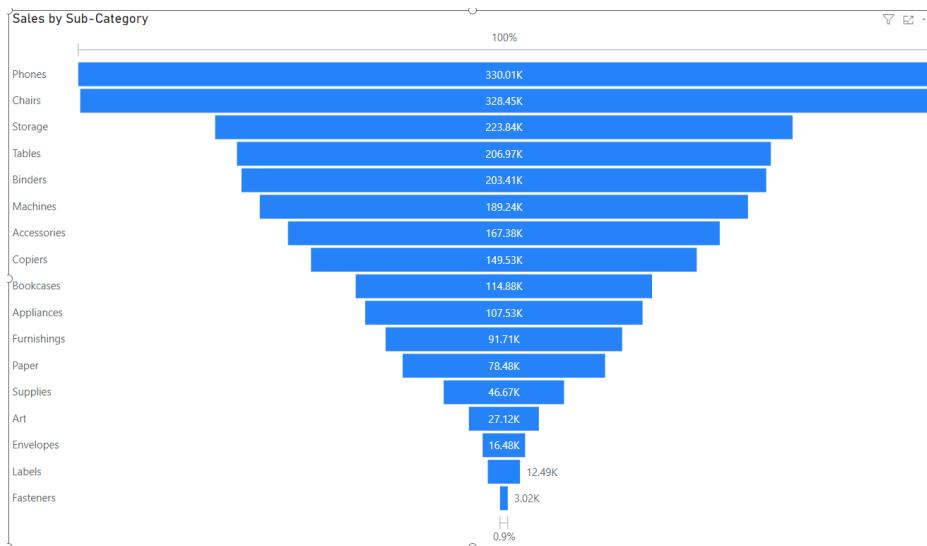
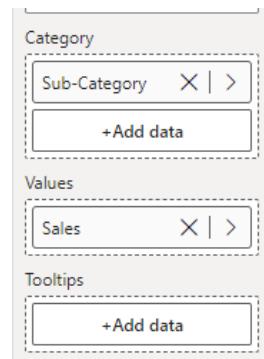
In Microsoft Power BI, what is the primary purpose of a treemap chart?

- A. A treemap chart is used to display hierarchical data.
- B. A treemap is used to compare multiple data series and identify trends.
- C. A treemap chart is used to visualize changes in data over time.
- D. A treemap chart is used to represent small datasets.

Funnel charts

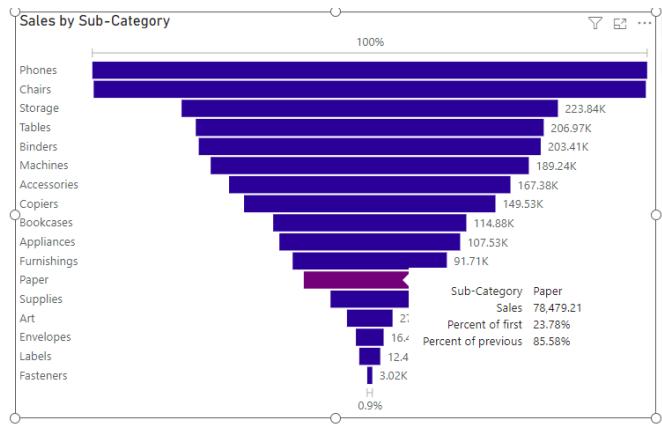
Exercise 14: Create Simple Funnel Chart

1. Use file **Exercise 14 Start.pbix**.
2. Click on Funnel Visual and resize it.
3. Add **sub-category** to **Category** well.
4. Add **Sales** to **values** well.
5. That is a simple power chart in power BI.
6. It shows sub-category arranged from top to bottom according to sales.
7. Higher sales on top and at bottom lower sales
8. **Hover** over the first and then second sub-category to see the sales value, % to 1st and % to previous one.



Format Funnel chart

9. In Format pane → Color → Default = #12239E.
10. If you want to change color of a specific sub-category you must first enable **show all** in the colors card then change what you want to change.
11. Change paper color to #6B007B.

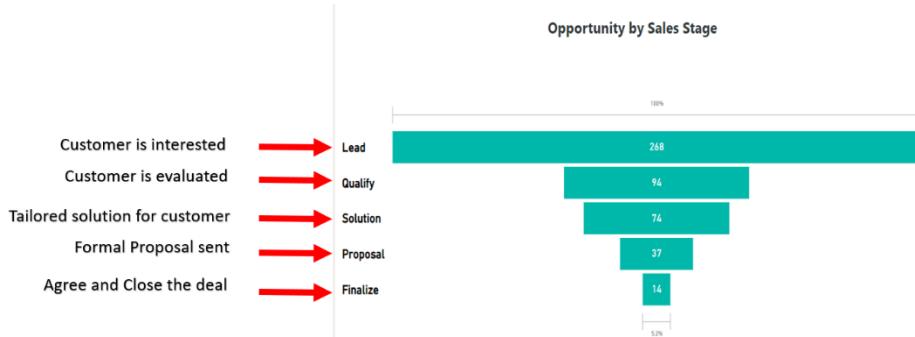


Funnel Chart in Marketing and Sales

- Funnel charts in Power BI are one type of visualization you can use to represent the **progression** of data through **different stages** like a **sales workflow**.
- The funnel visualization displays a **linear process** that has **sequential connected stages**, where items flow sequentially from one stage to the next.
- Funnel charts are commonly used in **business** or **sales** contexts. They are well suited to visualizing data that's sequential and moves through at least four stages, where you expect a **greater** number of items in the **first stage** than in the **final stage**.
- The charts can help reveal **bottlenecks**, such as where a significant number of items are being **lost** or not moving forward in linear processes.
- In addition, you can use them to calculate a **potential outcome** by stages such as **revenue**, **sales** or **deals**, and track **conversion** and **retention rates**. These rates relate to how many **potential customers** move through each stage of the sales process and stay in the process.
- Similarly, you can use them to track the progress and success of **click through advertising** campaigns.

Sales Funnel Chart

- A funnel chart representing the stages of a sales workflow.

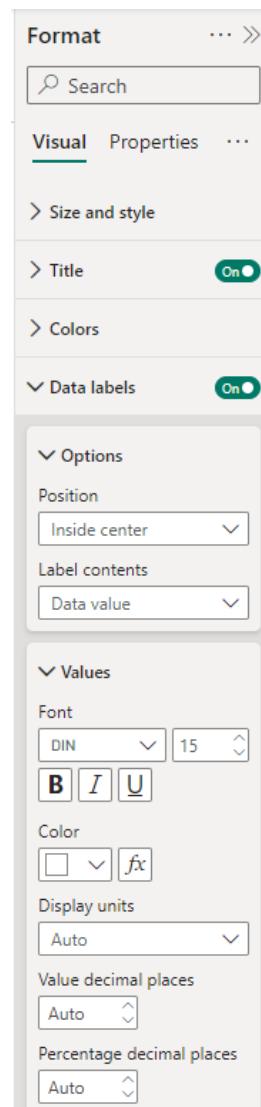


- Each bar in the chart represents a stage the customer goes through during the sales process:

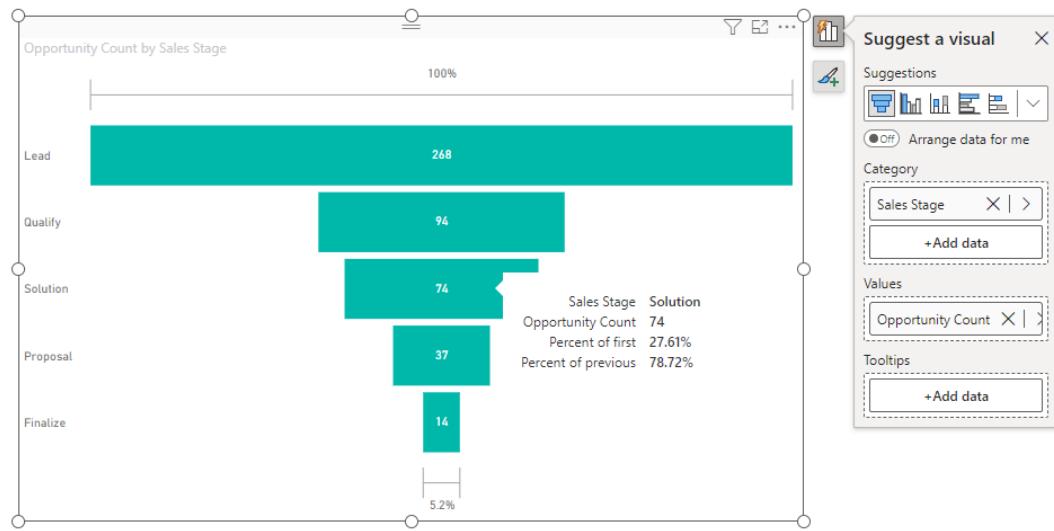
- **lead stage:** at the top of the funnel, representing customers interested in a product or service.
- **Qualify Stage:** leads are evaluated for their potential.
- **Solution Stage:** presented tailored solutions.
- **Proposal stage:** sent formal sales proposals.
- **Finalized stage:** is where the lead agrees to the proposal closing the sales deal.
- Each stage in the chart decreases as the lead conversion process progresses, creating a funnel shape.
- The narrowest part of the funnel represents the leads that resulted in actual sales.

Exercise 15: Sales Funnel Chart

1. Use file **Exercise 15 Start.pbix**.
2. Go to **table view** and explore **Sales Stage** table.
3. You have 5 stages for sales process.
4. Go to **Model view** and explore relationship between **Sales stage** table and **Fact** table.
5. Go **table view** and see what in the column **Sales Stage ID** in **Fact** table.
6. Create a Funnel chart and resize it.
7. Add **Sales Stages** to **Category** well.
8. Add **Opportunity Count** measure to **Values** well (see the DAX function of the measure) it count Opportunity ID.
Opportunity Count = `COUNTA([Opportunity ID])`
9. Increase data labels font size to 15.
10. Also, Category Labels font size to 18 and color black.
11. Hover for each category to see the tooltip for each stage.
12. **Category** defines the **stages of the process**, and **values** assigns the to each stage.
13. Notice the shape of the funnel. The **highest value** is displayed on the **top**, gradually displaying the lower values.
14. Each of the horizontal bars in a funnel chart is called a **stage**, this is the typical pattern of the **sales conversion process**. Many people are identified as **potential leads** in the **first stage**, but the number gradually decreases as they finally **become the customer**.
15. If you **hover** your mouse over **each stage**, it displays information that **compares to its previous stage**, and the **highest** or the **first stage**.
16. You can use the **tool tips field well** for providing this additional information when hovering over a specific stage.
17. You can format the **colors** of each stage, whether to reflect your brand colors, or improve readability and aesthetic appeal.
18. You can also **sort funnel** charts in reverse order, where the lowest value shows at the top, and the highest value at the bottom



19. Select the **three dots icon** at the top right corner of the chart, then sort access and sort **ascending**.



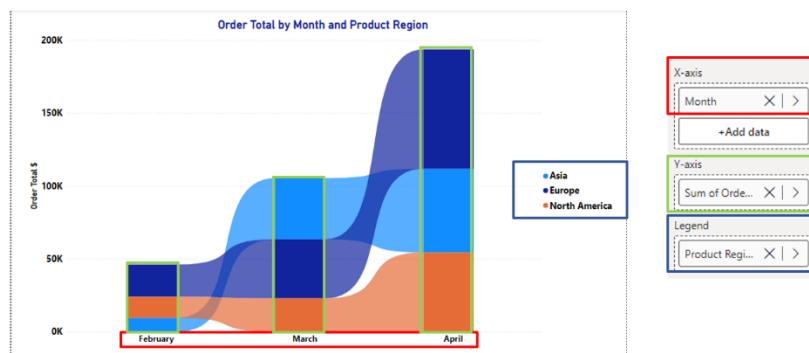
Question

In Microsoft Power BI, which field in a funnel chart is used to define the different stages of a process?

- A. Legend
- B. Values
- C. Category
- D. Tooltips

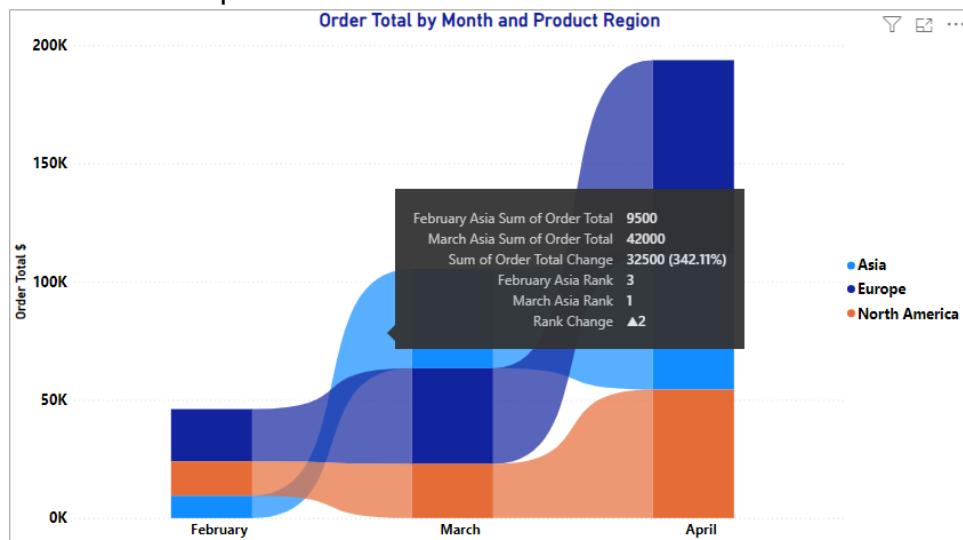
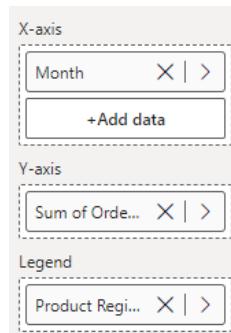
Ribbon Charts

- A ribbon chart is a form of stacked chart for visualizing data and changes over time and has a clear ranking order.
- These charts stack the highest ranked series at the top of the chart, making it easy to track shifts in the rankings over time.
- They are also helpful for comparing the **performance** of different categories across distinct time intervals.



Exercise 16: Create Ribbon Chart

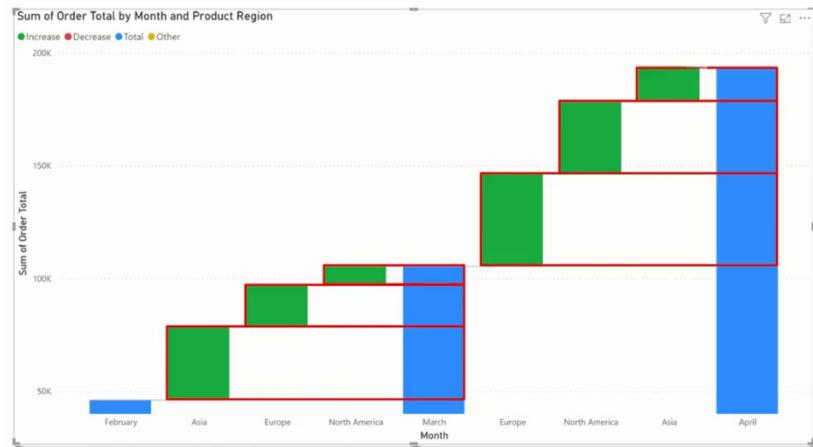
1. Use file **Exercise 16 Start.pbix**.
2. Explore your data in sales table.
3. The data contain **sales** of the company in **different regions** over **three months**.
4. Place a **ribbon** chart from the visualizations pane on the report area.
You can resize it as needed.
5. The aim of the ribbon chart is to demonstrate the change in sales value and ranking changes in categorical data like **product**, **regions** and **month**.
6. You'll need to fill in three data fields in three wells to display the data properly:
 - a. X-axis field,
 - b. Legend field
 - c. Y-axis field.
7. Drag the following three fields:
 - a. **Month** goes to the X-axis field,
 - b. **Product region**, to the legend field, and
 - c. **Order total** to the Y-axis field.
8. None of these fields is optional when creating a ribbon chart.
9. Note that each month has two distinct areas on this chart:
 - a. First is the actual **sales value** for each region.
 - b. The other **shaded area** shows **how that region performed compared to the previous month's** data.
10. For example, by hovering over this **shaded area** for **Europe** in April, the **tooltip** reveals that **Europe's sales rank** changed from **second** in March to **first** in April.



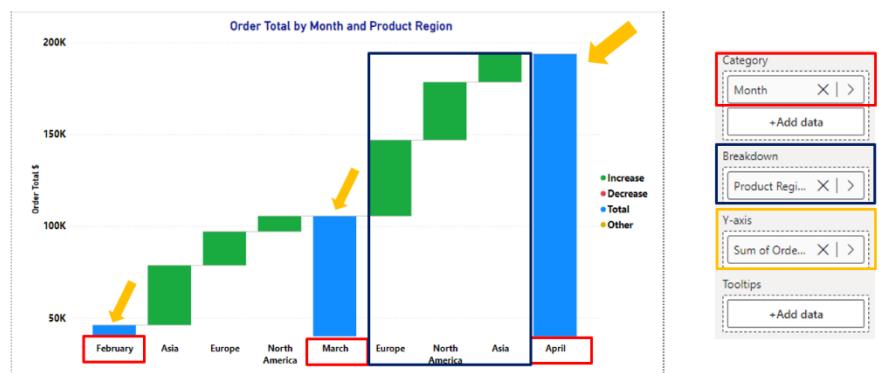
Waterfall Charts

- Waterfall charts show a **running total** as Power BI **adds** and **subtracts** values.

- These charts are useful for understanding **cumulative effects**.

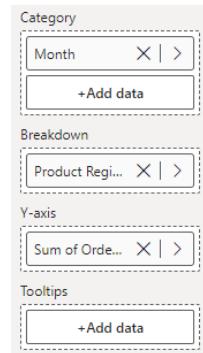


- In data analysis and visualization, **cumulative effects** refer to how an **initial value is affected by a series of positive or negative sequential factors, events, or changes over time**.
- For example, a waterfall chart can be used in financial analysis to visualize how a company's net income results from a cumulative effect of various financial elements including **revenue**, **costs**, and other **factors** like taxes.
- With this visual, stakeholders can intuitively grasp the overall **sales performance**, as well as easily compare and contrast the contributions of each month and the regions to the sales total over time.

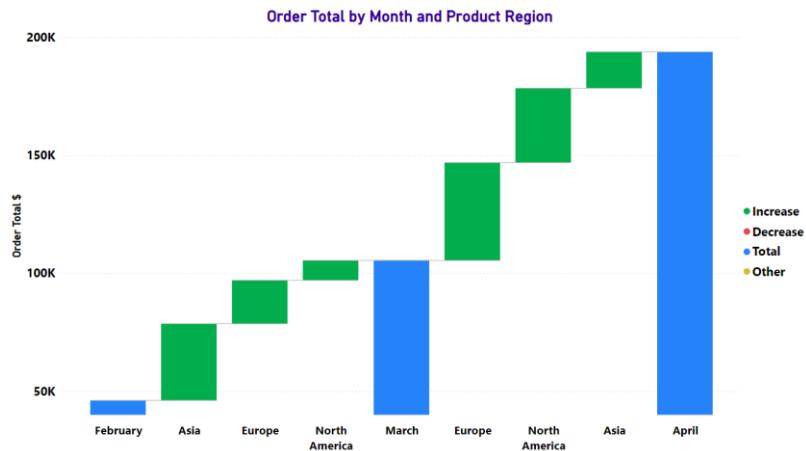


Exercise 17: Create Waterfall Chart

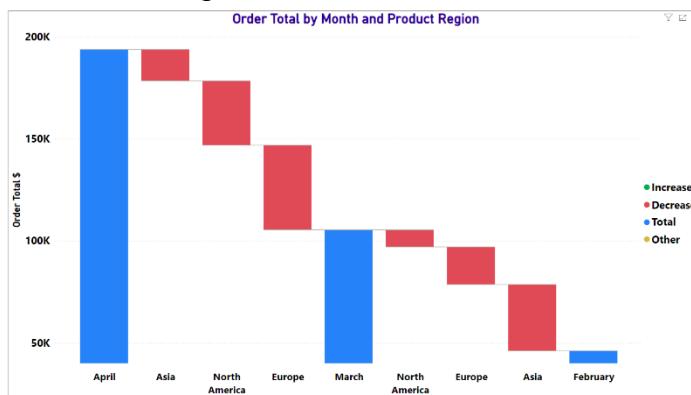
- Use file **Exercise 17 Start.pbix**.
- You can create a waterfall chart using the same process as you followed with the ribbon chart.
- Alternatively, you can **convert** the ribbon chart you created by selecting it and then selecting the **waterfall chart** icon from the **Build** pane.
- Create a new page and add a waterfall chart.
- There are four field wells in the **waterfall chart**:
 - Category,
 - breakdown,
 - order total,



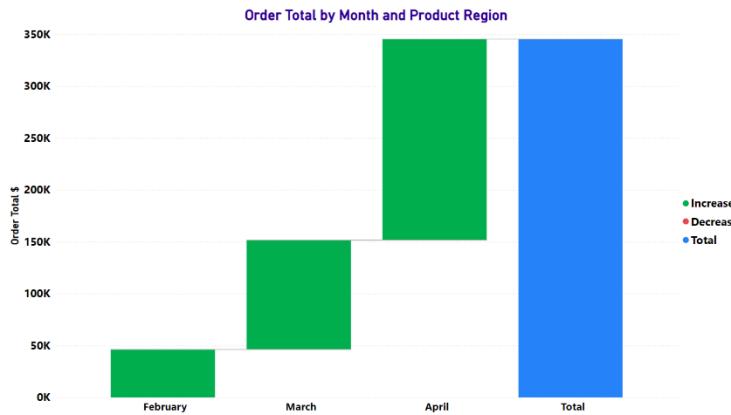
- d. tool tips.
6. Ensure that:
- a. **Month** goes to the **category** field, which defines the **X-axis** and shows the individual **positive** and **negative** values.
 - b. Then ensure the **product region** goes to the **breakdown** field, which represents **different segments** in the category. However, unlike ribbon charts, this field is **optional** in waterfall charts.
 - c. Lastly, ensure the **order total** goes to the **Y-axis** field. This field denotes the Y-axis values to calculate the **running total**.



7. If there is a **decrease** in the sales total, the waterfall chart displays **red areas**.
8. To observe this, you can **sort** the chart in **descending order** by clicking on the **three dots** in the top right corner. Then selecting sort axis and sort descending.



9. Each month shows the total sales and how these regions are performing compared to the previous month's data.
10. You can find out **additional information** about this performance using the **tooltips** field by hovering over any of the red or green areas.
11. Remove the **Product Region** from the **Breakdown** well. The chart will show the total of the three months and break down the total through each month.



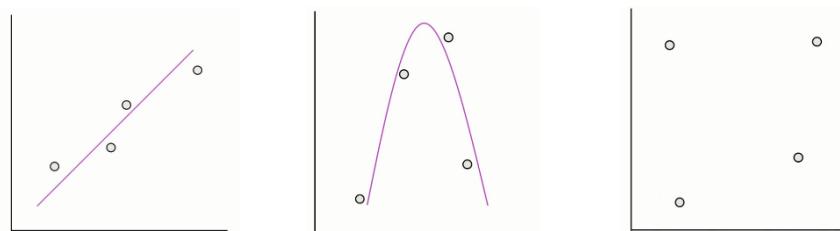
Question

Which of the following scenarios is best suited to using a waterfall chart in Microsoft Power BI?

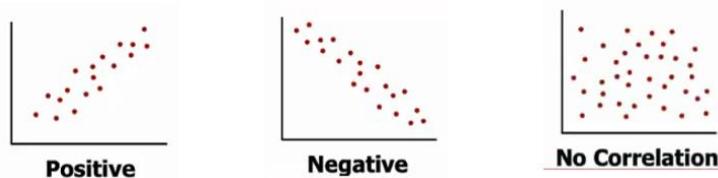
- A. To compare numerical data points across different categories
- B. To track a single metric overtime and identify trends.
- C. To track the changes in sales ranking of different product categories over time
- D. To analyze the cumulative impact of financial factors on net income.

Scatter charts

- Scatter charts are a powerful tool in data visualization. They use **dots** to represent **values** obtained for **two variables** in a dataset, plotting these two numeric variables along **two axes**.
- Scatter plots help illustrate how one factor is affected by another, representing **correlations** between the variables.
- The relationship between the variables can be:
 - **linear**, follows a straight line,
 - **nonlinear**, follows a curved line, or
 - **random**.



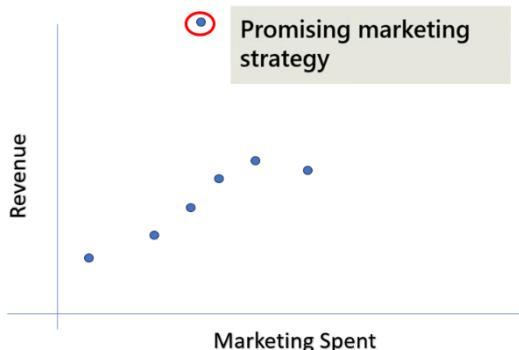
- Scatter charts can help you identify **trends**, **patterns**, and perhaps most importantly, **anomalies** like **outliers** in your data.



- Anomalies refer to deviations from the general pattern of the data.

- Outliers are a type of anomaly where valid data points significantly differ from other observations deviating from the general data trend. They tend to lie far away from other data points in a scatter chart.

Example:



- in a scatter chart representing the relationship between **sales revenue** and **advertising spend**, you might expect the data points to show a **positive correlation** where **higher advertising spend** is associated with **more sales**.
- An **outlier** would be a data point representing **unusually high sales revenue and low marketing spend**. This data point is worth investigating as it may indicate an effective marketing strategy able to generate revenue beyond what is expected based on the amount of money spent on marketing.
- A keen eye for **outliers** is essential because they can dramatically skew statistical measures and data distributions. Though they might seem problematic at first, outliers often carry vital information about the process under investigation or the data gathering mechanism. They can help businesses gain valuable insight into potential issues or areas for improvement and optimization.

Scatter, Bubble and Dot Plot Charts

Dot Plot Chart

- Dot plot is one such visualization that is popular when presenting **categorical data** in relation to a **numerical value**.

Scatter Plot Chart

- To display the relationship between two numeric variables, you can create a scatter plot that defines the correlation between variables.

Bubble Chart

- A variation of a scatter plot is a bubble chart that can display the relationship between **three variables**.
- The third variable is represented in the **size of a bubble**.

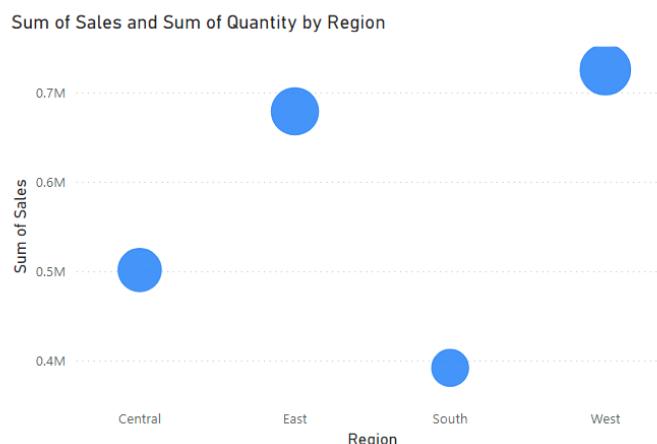
Dot Plot Chart

- Dot plot is one such visualization that is popular when presenting **categorical data** in relation to a **numerical value**.
- A dot plot is like a bubble chart, but instead of numeric data, you use categorical information on the x-axis.

- Dot plot charts are a simple, yet effective data visualization technique used to display the distribution of data points along a single axis.
- In a dot plot chart, each data point is represented by a dot, and dots are stacked vertically above the corresponding data values on the axis. This makes dot plots especially useful for visualizing the distribution and frequency of categorical data.
- Power BI does not have any visual named **dot plot** or dot chart, but you can create a dot plot by converting a scatter chart to a dot plot. However, there are certain custom visuals available in the Power BI marketplace that are used to directly create dot plots in Power BI.

Example

- Your Company needs insights into regional product category sales performance.
- They need to know:
 - the **quantity** sold for each category and
 - the **revenue** per **country**.
- The challenge is the number of variables to be presented in a single visual.
- As a Power BI analyst, you can deploy a dot plot to present categorical information such as **category** or **country** on the **x-axis**, **sales** on the **y-axis**, and **quantity** as the **size of the dot**.

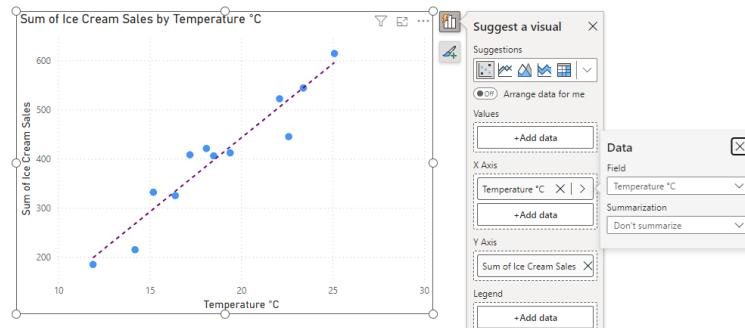


Exercise 18: Scatter chart

1. Use file **Exercise 18 Start.pbix**.

Ice Cream Sales

2. Rename the page **Ice Cream Sales**
3. Create Scatter Chart
4. From **Ice cream** table Add:
 - a. Temperature → x-axis.
 - b. Ice Cream Sales → Y-axis.
5. Click the arrow next to the x-axis and y-axis and chose **Don't summarize**.
6. Add a trend line and change its color.
7. This is a chart representing two Numerical Values so it is a **Scattered Chart**.

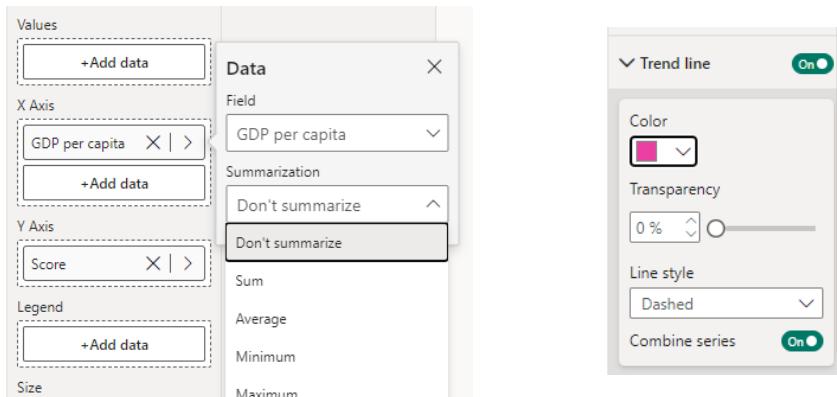


Relation between GDP and Happiness

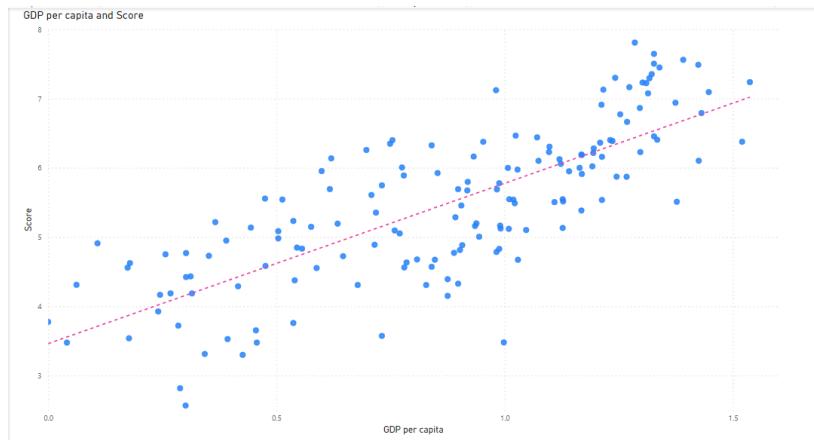
8. We have the World **Happiness Report 2020** form **Wikipedia**, you can find in this link:

https://en.wikipedia.org/wiki/World_Happiness_Report

9. Go and explore data in table **Happiness 2020** in table view.
10. We want to answer the question if there is a relationship between **GDP per capita** (Gross Domestic Product) of the country and its **happiness score**.
11. Create a new page and Rename it “**GDP and Happiness**”.
12. Create a scatter chart.
13. Add **GDP per capita** to X-axis, and **Score** to y-axis.
14. You only got one dot, because Power BI has aggregated the values.
15. Click the arrow next to the x-axis and y-axis and chose **Don't summarize**.
16. Now you have relationship between **GDP** and **Happiness score** in the scatter plot.
17. Enable trend line and change its color to fuchsia.



18. This is also a chart representing two Numerical Values so it is a **Scattered Chart**.



Health and Life Choice

19. Create a new page: **Health and Life choice.**

20. Create a scatter chart.

21. From table Happiness 2020 add:

- Healthy life expectancy → x-axis.
- Freedom to make life choice → y-axis.
- Country or region → Values.

22. Now each point represents **Country**.

23. Let **Category label ON**.

24. you have now name for each country point.

25. For example, **Singapore** has high life expectancy (1.14) and life choice of (0.64).

26. But **Greece** has high life expectancy but low freedom of making life choice for other reasons in this country.

Values

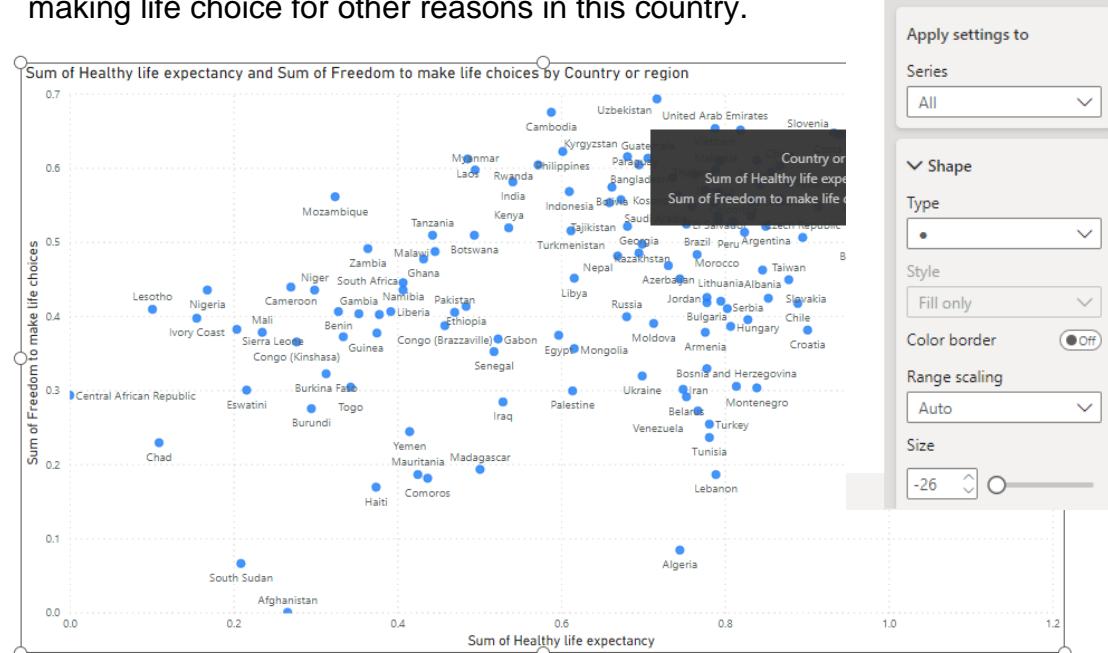
+Add data

X Axis

+Add data

Y Axis

+Add data

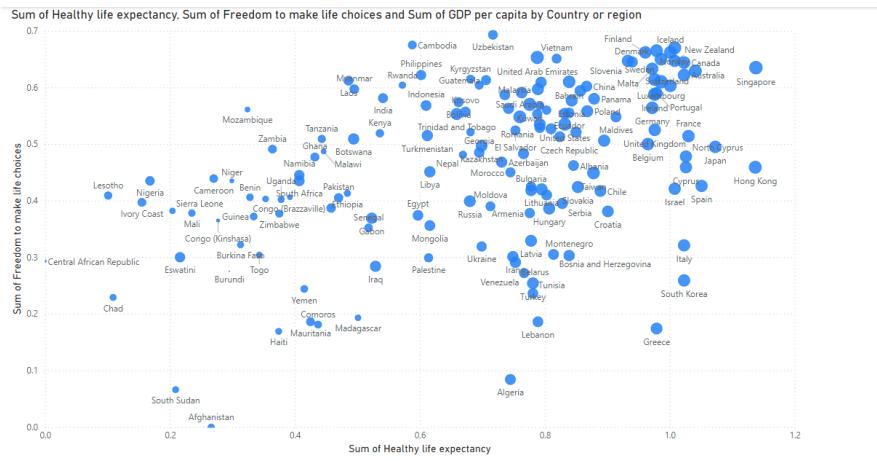


3-Dimensional Scatter plot

27. What if I want to add another dimension to the chart for example **GDP**.

28. Add **GDP** to **Size well**.

29. Go to **Format** pane Change the marker size to -26.
 30. You can change the **marker type** if you want to.
 31. The size of the markers corresponds to the high GDP.

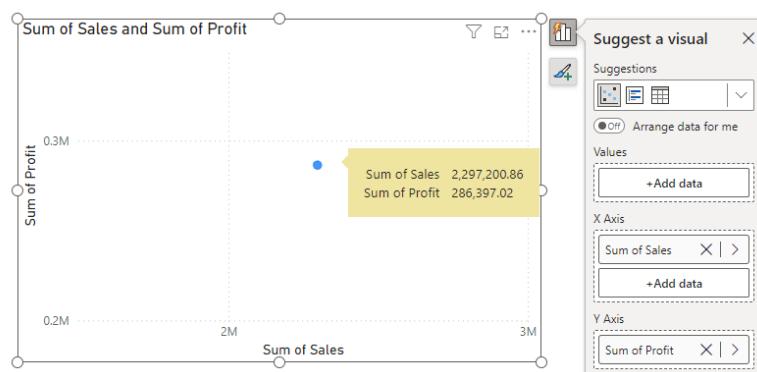


Sales and Profit

32. To create a scatter chart, you need to have 2 **Numerical** fields (the one with **SIGMA** sign).
 33. We want see relationship between **Sales** and profit.
 34. Create a new page with the name **Sales and Profits**.
 35. Add a Scatter Chart.

X and Y Axis

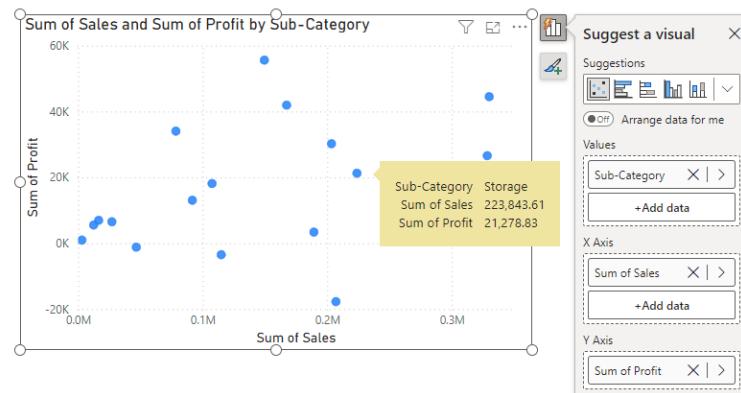
36. From table **Orders**:
 37. Add **Sales** → X-axis.
 38. Add **Profit** → Y-axis.
 39. You have got only one dot to tell you what the total sales is and what is the total profit.
 40. Hover over the point to get the values of sales and profit of each point.



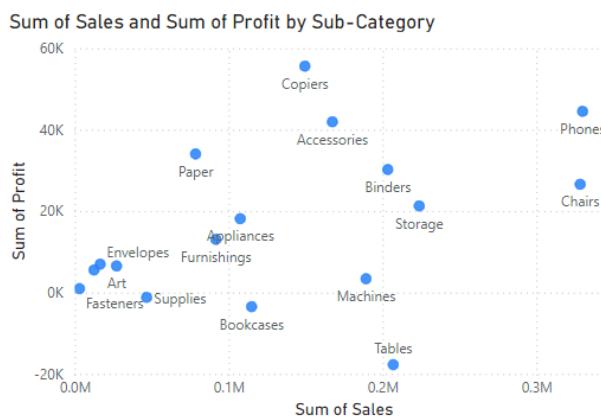
41. If I want to see how different **sub-category** are distributed.

Values

42. Add **sub-category** → Values.
43. Hover over any point it will tell you what subcategory is and what is sales and what is profit.



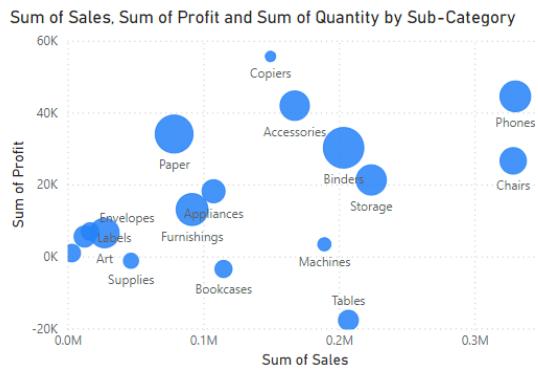
44. For sure you will concentrate on the points on the top because it has the high profits (above 40K).
45. In **Format** pane enable **Category label on**.
46. Highr profits come from **Copiers** then **Phones** then **accessories**.
47. Higher Sales are in the right **Phones** and **Chairs**.



Size

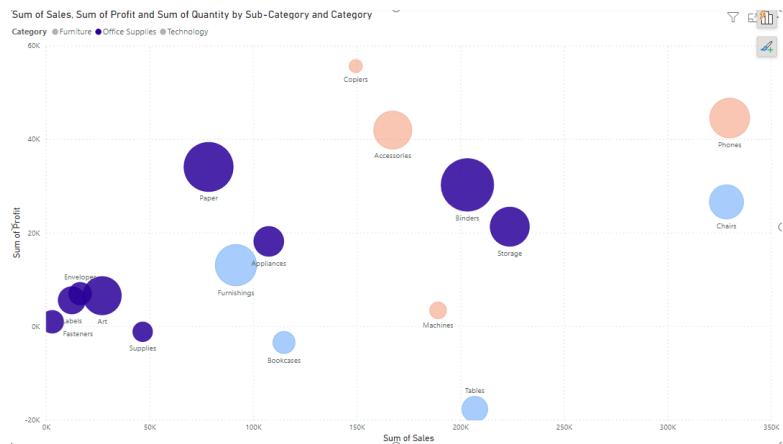
48. If I want to add the **Quantity** Dimension to → Size.
49. The **bigger Bubble** size has higher **quantity**.

50. Quantity needs more cost for packaging.



Legend

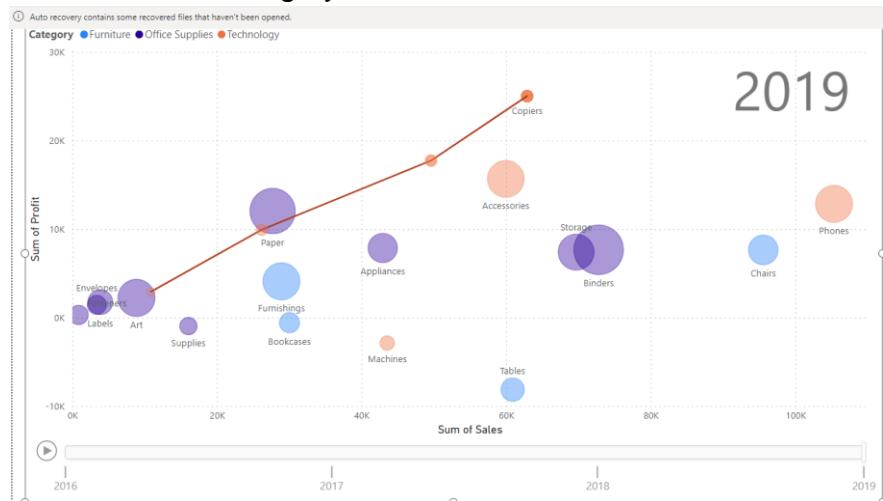
51. If I want to group, the bubbles using Categories.
52. Drag **Category** → Legend.
53. You will have each category with a color.
54. On Legend click **Category office Supplies**.
55. It will highlight only office supplies.
56. This will show you which subcategory is doing in this category.
57. Click again to clear the highlighting.
58. Click on **Technology**, Copiers are in the top profit and **Phones** have the highest sales.



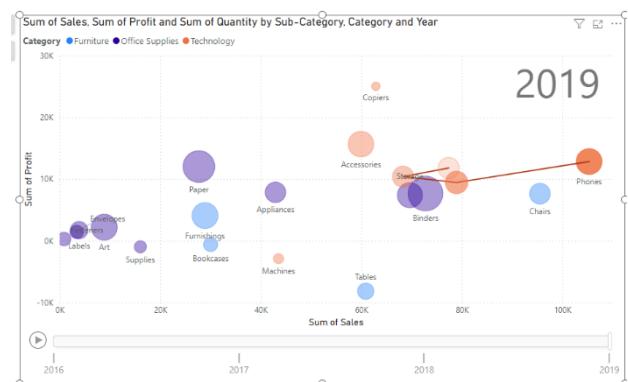
Animation

59. Drag only **Year** from **Date Hierarchy** to → Play Axis and wait for seconds.
60. Now you can play and animate the condition year after year.
61. Play the years.

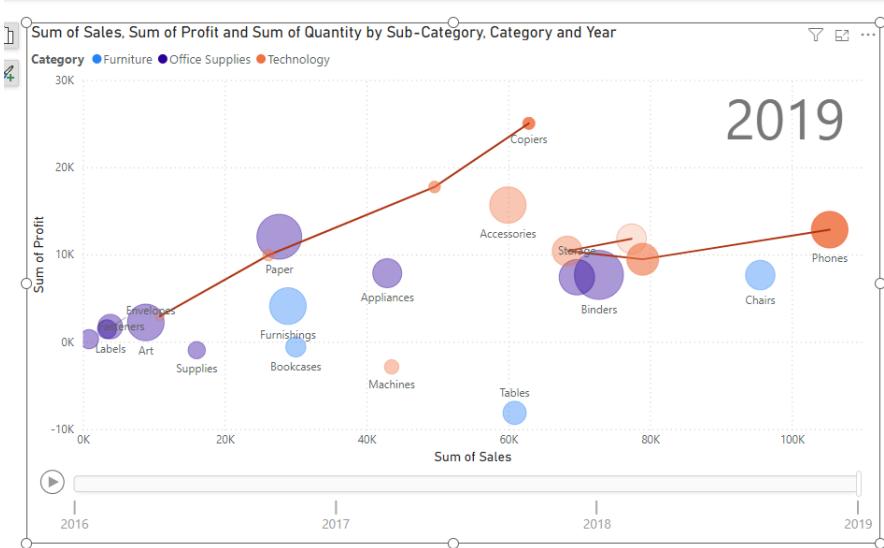
62. When you finish Click on **Copiers**, it will give you a line showing how it goes and its trend through years.



63. Try **Phones**.



64. If you want to compare copiers and phones, Use (**CTRL + Click**) on both.



65. As you select both **Copiers** and **Phones** run the **Play Button** again, to see how the two lines go for each sub-category.

Dot Plot Chart

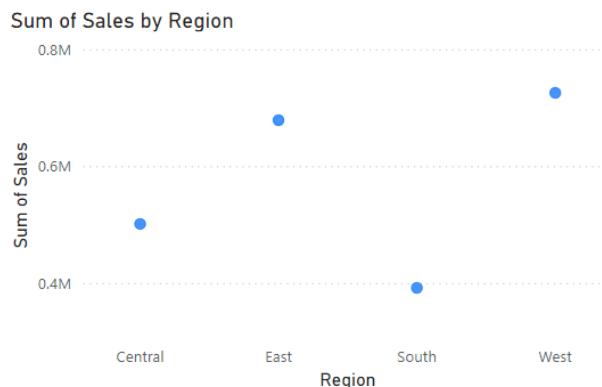
66. Create a new page and name it **Dot Plot Chart**.

67. Add a scatter plot chart.

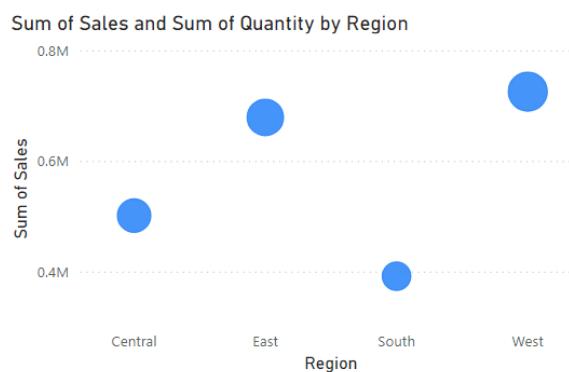
a. X-axis: Region.

b. Y-Axis: Sales.

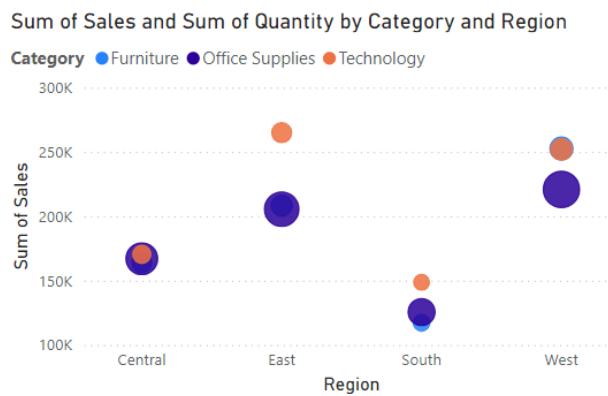
68. You got a chart showing how each region sales.



69. Add the Quantity to Size well to show each region quantity.



70. You can go further and add Category to Legend well to show each region's **Sales – Quantity** for each **category**.



Question 1

In a scatter chart, what term describes a data point that significantly deviates from the other data points?

- A. Axis
- B. Outlier
- C. Legend
- D. Cluster

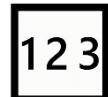
Question 2

Which statements are true about dot plot chart? Select all that apply.

- A. Dot plot chart is a variation of a scatter plot in Power BI.
- B. Dot plot chart allows you to display relationship between two numerical data values.
- C. Dot plot chart can be directly created from the visualization pane of Power BI desktop.
- D. Dot plot chart enables you to plot categorical data on the horizontal axis of the chart.

Card, Multi-row Card, Gauges, KPI

Card visualization



- The card visualization displays one value or a single data point.
- This type of visualization is ideal for representing essential statistics you want to track on your Power BI dashboard or report.
- For example, you could use a card visual in a sales dashboard to provide a snapshot of the total sales revenue, enabling stakeholders to gain instant insight into overall financial performance.

Multi-row card visualization

- Multi-row card visualization that displays one or more data points, with one data point for each row.

February	46100	Sum of Order Total
March	105400	Sum of Order Total
April	193700	Sum of Order Total

Radial gauge Visualization



- This visual is a circular arc that displays a **single value, measuring progress** toward a **goal or target**, or indicates the health of a single measure.
- Although radial gauges can highlight critical insights in a visually appealing, engaging way, they **take up a lot of space** compared to the insights they provide.
- Power BI spreads all the data values evenly along the arc, from the minimum leftmost value to the maximum right most value.
- The **default maximum value is double the actual value**.
- You should specify the target **minimum** and **maximum** values using the corresponding field wells in the visualizations pane, to create a realistic gauge chart that represents your data.
- The **shading** in the arc represents the **progress** towards your target, and the **value** underneath the arc represents the **progress value**.

KPI visualization

- It is a powerful tool for **tracking** the **performance** of a **metric** against a **target**.
- The KPI visual also includes a **trend line** or **chart** to show the data's trajectory over time.
- It displays an indicator that shows whether the performance is above or below the target.
- The KPI visual usually has three field wells:
 - **Indicator**, which is the primary measure you are tracing.
 - **Trend axis**, which shows how the indicator is performing over time.
 - **Target goals**, which represents the benchmarks you are trying to achieve.
- Key performance indicators act as a health checkup for a business, providing stakeholders with insights into their progress toward reaching business goals.



Exercise 19: Creating Card Visual Charts

1. Use file **Exercise 19 Start.pbix**.

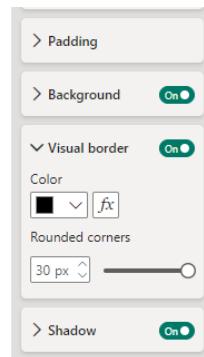
Card Visual with Numbers

2. Create 3 new Card Visuals.
3. Add **Sales**, **Profit**, **Quantity** fields to them.



Region	Sum of Sales
Central	501,239.89
East	678,781.24
South	391,721.91
West	725,457.82
Total	2,297,200.86

4. The 3 cards now show all **total** values.
5. Cards are so great on the top of a dashboard to show an overall view of totals.
6. Create a table with **Region** and **Sales** fields.
7. Click on any region in the table, the Cards show totals of this region.
8. In **Format** pane add **border** with **rounded corner = 30** and **shadow** to the 1st Card then Copy Format to the other 2 cards.

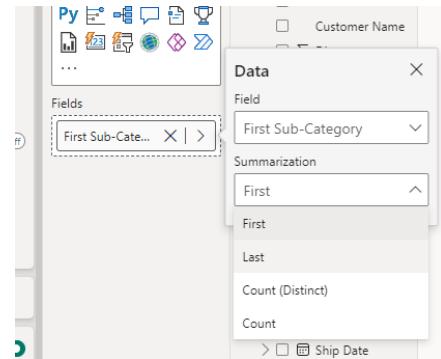


Create Visual with Text

9. Create new Card.
10. Add **sub-category** field to it.



11. Notice that the Card shows **First Sub-Category alphabetically** (Accessories).
12. In the **Build** pane click the arrow next to the Fields well to choose which Value you want to show (**First, Last, Count, Count Distinct**).
13. Try all options yourself.

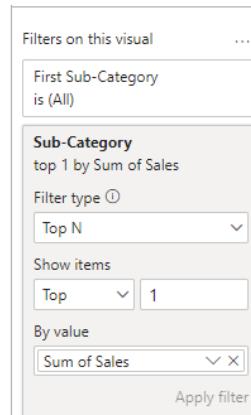


Showing Highest Selling Sub-Category

14. Create a new page.
15. Create a table with **sub-category, Sales, Profit and Quantity** fields.

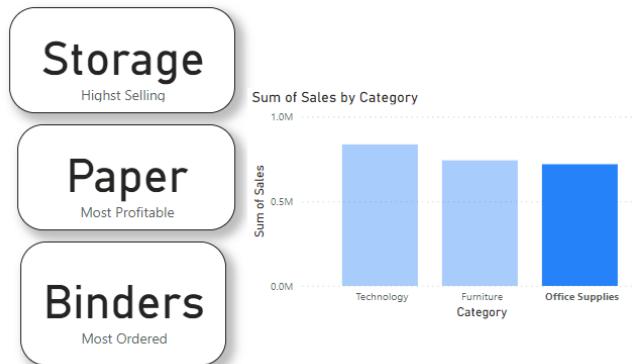
Sub-Category	Sum of Sales	Sum of Profit	Sum of Quantity
Copiers	149,528.03	55,617.82	234
Phones	330,007.05	44,515.73	3289
Accessories	167,380.32	41,936.64	2976
Paper	78,479.21	34,053.57	5178
Binders	203,412.73	30,221.76	5974
Chairs	328,449.10	26,590.17	2356
Storage	223,843.61	21,278.83	3158
Appliances	107,532.16	18,138.01	1729
Furnishings	91,705.16	13,059.14	3563
Envelopes	16,476.40	6,964.18	906
Art	27,118.79	6,527.79	3000
Labels	12,486.31	5,546.25	1400
Machines	189,238.63	3,384.76	440
Fasteners	3,024.28	949.52	914
Supplies	46,673.54	-1,189.10	647
Bookcases	114,880.00	-3,472.56	868
Tables	206,965.53	-17,725.48	1241
Total	2,297,200.86	286,397.02	37873

16. Now I want a card that shows which is the highest sub-category in sales.
17. Add a Card to the page with **sub-category** field on its fields well.
18. Drag the **sub-category** field to **Filter** pane to filter the Card.
19. Choose **Top N** in Filter Type, shows item **Top 1** and by value drag **sales** to this well.
20. Do not forget to click **Apply filter**.
21. Now the Card shows **Phones**, the highest sub-category in sales.
22. Check from the table by clicking the **head of sales** to sort descending and know that phones is the top one in sales.
23. Repeat steps 17 to 22 to add two other cards for **Top profit** and **top Quantity**.
24. You should have **Phones, Copiers, and Binders** in the three cards now.
25. In the Build pane, double click each Fields well and change the names of the cards to : **Highest Sales, Most profitable** and **Most ordered**.



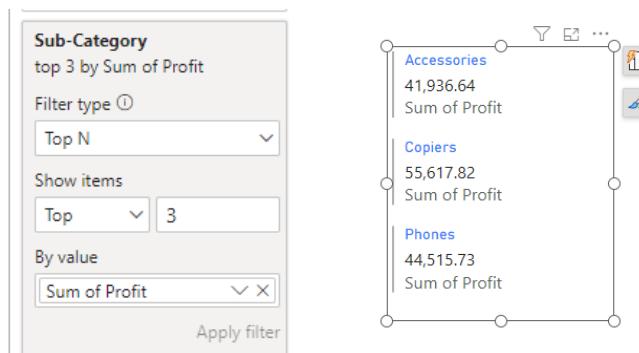
Sub-Category	Sum of Sales	Sum of Profit	Sum of Quantity
Copiers	149,528.03	55,617.82	234
Phones	330,007.05	44,515.73	3289
Accessories	167,380.32	41,936.64	2976
Paper	78,479.21	34,053.57	5178
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Chairs	328,449.10	26,590.17	2356
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Appliances	107,532.16	18,138.01	1729
Furnishings	91,705.16	13,059.14	3563
Envelopes	16,476.40	6,964.18	906
Art	27,118.79	6,527.79	3000
Labels	12,486.31	5,546.25	1400
Machines	189,238.63	3,384.76	440
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Supplies	46,673.54	-1,189.10	647
Bookcases	114,880.00	-3,472.56	868
Tables	206,965.53	-17,725.48	1241
Total	2,297,200.86	286,397.02	37873

26. Add rounded boarder and shadows to cards.
27. Add a column chart with **category** in x-axis and **sales** in y-axis.
28. Click on each category on the column chart to see which **sub-category** high selling was most profitable and most ordered.



Multi Row Card

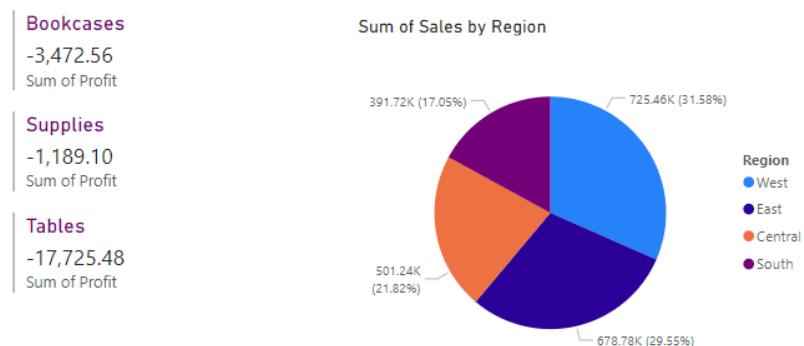
29. Cards give you one value at a time.
30. What if you want to have Multi values?
31. Create a new page and add a multi-row card.
32. Add **sub-category** field to the fields well.
33. You got all the 17 names of the sub-category.
34. Drag **Sales, Profit, Quantity** to the fields well.
35. Columns appear on the Card with the value for each sub-category.
36. Delete all other fields and keep only **sub-category** and **profit**.
37. Now I want to show only **the top 3** sub-categories with profit.



38. Drag the **sub-category** field to **Filter** pane for this visual and filter for the top 3 by profit.
39. Format the Card title in Format Pane.
40. What if we want the lowest profitable sub-categories?
41. Change the value in the Filter pane to Bottom 3.

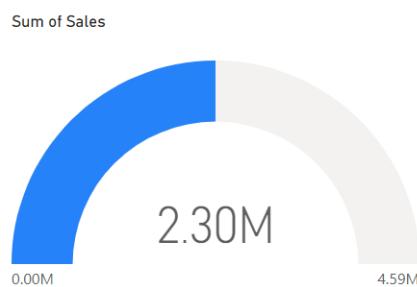
The screenshot shows the Power BI Filter pane. In the 'Sub-Category' section, it is set to 'top 3 by Sum of Profit'. Under 'Filter type', 'Top N' is selected. In 'Show items', 'Bottom' is selected with a value of '3'. Under 'By value', 'Sum of Profit' is listed. At the bottom right is an 'Apply filter' button.

42. Create a **Pie** chart showing sales in each region.
43. Click on **West region** to filter the multi-row card to the top or lowest sub-category for this region.



Gauge Chart

44. Create a new page and add a **gauge** chart.
45. Drag Sales to **values** well.
46. A Gauge Chart is created with total sales as value occupying **50%** of the area.
47. Power BI adds **double** the value as the Maximum value of the gage by default.



48. Gauge charts are always used to show if we have achieved the **target** or not.

49. Let us create a fictitious Target in a measure.

$$\text{Target sales} = \text{SUM}(\text{Orders}[Sales]) * 1.3$$

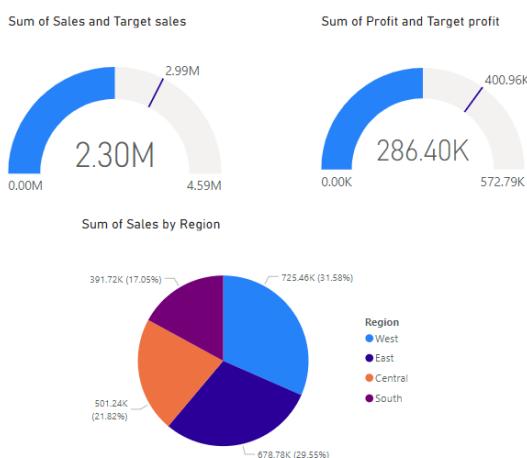
50. Drag **Target Sales** to **Target Value** well.

51. The value 2.99 M is added to the gage as a target value.

52. Create another Gauge chart with **Profit** and create a measure **Target Profit**.

$$\text{Target profit} = \text{SUM}(\text{Orders}[Profit]) * 1.4$$

53. Copy the **Pie** chart of **region and sales** from previous page and test your gauges with regions.



54. Click each region to see its progress towards target.

KPI Chart

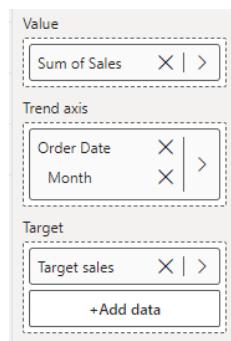
55. Create a new page.

56. Add a **KPI** visual.

57. Drag **Sales** field into **Value** well.

58. **Month** into the **Trend Axis** well.

59. **Target Sales** into the **Target** well



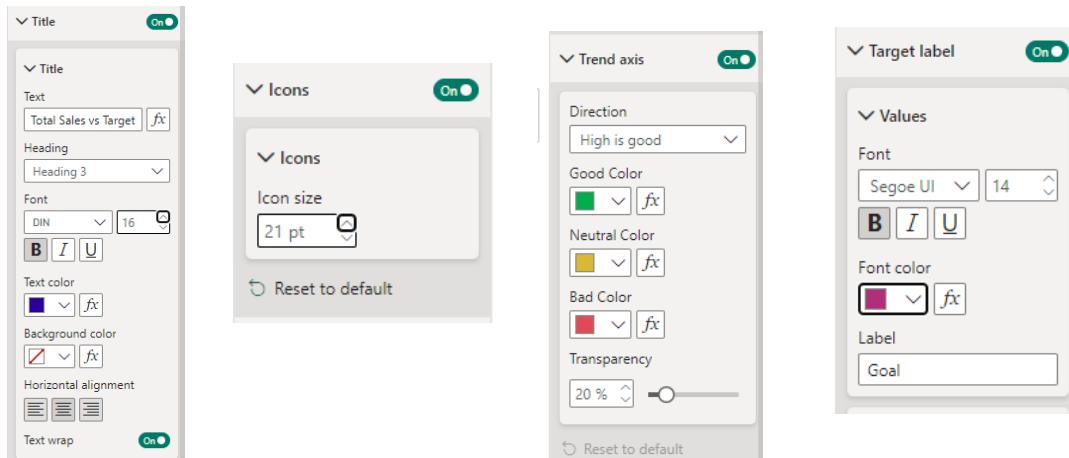
60. Notice the values in red because you are under target.

61. Go and change the Target sales measure to be

$$\text{Target sales} = \text{SUM}(\text{Orders}[Sales]) * 0.95$$

62. Notice the Chart turned into Green as you are above the target 5%.

63. Change the Title to: **Total Sales vs Target Sales** and format it.



64. Increase **icon** size.

65. You can format the **Trend Axis**.

66. Format Target label.

Question

In Microsoft Power BI, which visualization tool allows you to track a measure's performance against a target and how the data changes over time?

- A. Multi-row card
- B. Gauge
- C. KPI visual
- D. Card

Knowledge Check

Question 1

In Microsoft Power BI, which of the following statements is true about using the report area space more effectively?

- A. Both treemap and pie charts use the same amount of space to display the same data.
- B. Pie charts are more space-efficient than treemap charts.
- C. The space efficiency of a chart type does not impact the readability of the data.
- D. Treemap charts make more efficient use of space than pie charts.

Question 2

You are analyzing data for a multi-department company and want to show how each department's monthly expenses contribute to the total expenses over a year. Which chart type would be the most suitable choice in this scenario?

- A. Stacked area chart
- B. Pie chart
- C. Donut chart
- D. Line chart

Question 3

You've been tracking the monthly sales and advertising spending of a company's product line over the past two years. You want to show the correlation between advertising spending and sales and the trend of sales from different product categories. Which chart type would be the most suitable choice in this scenario?

- A. Area chart
- B. Bar chart
- C. Line and stacked column chart
- D. Line chart

Question 4

Which of the following statements are true about funnel charts? Select all that apply.

- A. Funnel charts are ideal for illustrating data that follows a sequential order through multiple stages.
- B. Funnel charts must be used only when the data volume increases from the initial to the final stage.
- C. Funnel charts are ideal for calculating and tracking conversion and retention rates.
- D. Funnel charts are helpful in identifying bottlenecks in a process.

Question 5

The regional sales team of a large retail corporation wants to evaluate their performance over the last year. They've collected data including the average customer satisfaction score, total sales, and the number of customer complaints received per month for each store in the region. Which type of visualization would be most suitable for analyzing the relationship between average customer satisfaction score and total sales, while also considering the number of customer complaints per store?

- A. Line chart
- B. Bar chart
- C. Scatter chart
- D. Pie chart

Chapter 4: Interactive Report

Custom tooltips

- Tooltips in Power BI display additional information about the data being displayed in your visuals when users hover over different data points.
- You can create custom tooltips by adding extra items to the tooltips field well, for a visual, tailoring the content to the needs of your report users.
- Tooltips can contribute to improved accessibility of Power BI reports and dashboards in various ways.
- Tooltips allow you to provide an extra layer of detailed information without cluttering the dashboard.



Exercise 20: Create Custom Tooltip

1. Use file **Exercise 20 Start.pbix**.
2. Rename the page to **Sales**.
3. Create a **column** Chart show the **Region Sales**.
4. Add **data labels** to columns.
5. Rename title: **Sales in Regions**.
6. Format Title to **font 20 Bold color = #E044A7 and center**.
7. Format columns color = **#12239E**.
8. Remove **x-axis** and **y-axis titles**.
9. Format X-axis values: **Font 12 Bold Black**.
10. Format Y-axis
11. Format data labels position: **Inside end**.
12. Format data labels Values to **Font 12 Bold White**.
13. Format data labels **Display Unit to Thousands with 0 decimals**.
14. Remove Y-axis values.



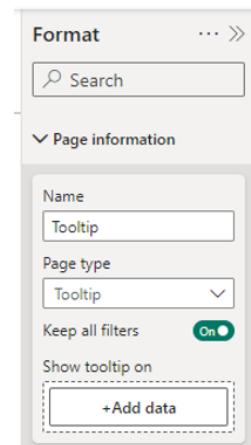
Using Default tooltip

15. Hover each column default tooltip appears showing Region name and Sum of sales.
16. If you want to show more information add it to the **tooltip** well.
17. Add **Quantity** to tooltip to show for each Region in tooltip.
18. Hover again to see total sales and quantity for each region.
19. Format text and Background of the default tooltip.
20. The **tooltip** card is in **Properties** tab of the **Format** pane

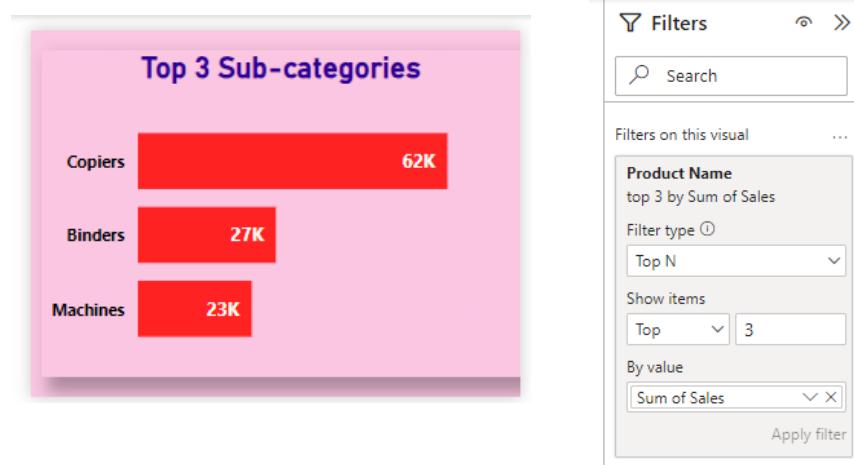


Create Custom tooltip

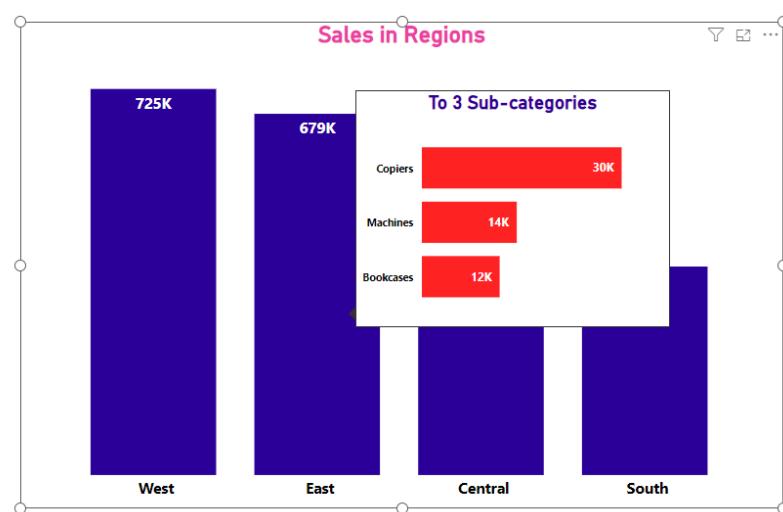
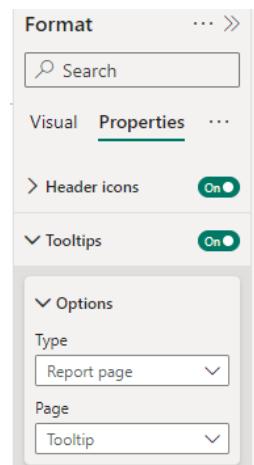
21. If you want to show a custom tooltip you can create a custom tooltip **page** and assign it to your visual.
22. Suppose we want to show a bar chart showing the top 3 selling **sub-category** for each **region**.
23. Create a new page and rename it **tooltip**.
24. Right click on the page tab and **hide** the page.
25. In the **Format** pane in **page Information** Card change the page type to tooltip.
26. The size of the page is decreased.
27. Zoom in to work with the page.
28. Add clustered bar chart with **sub-category** and **Sales**.
29. Resize the chart to fill the page.



30. In **Filter** pane filter to show only **top 3 products** according to Sales field.



31. Format columns color to #F70A16.
32. Enable **data labels**.
33. Format labels to be **Inside End bold and white**.
34. Remove X and Y axis.
35. Change title to: **Top 3 Sub-Category**.
36. Make the title **center Bold Dark blue**.
37. Go now to Page Sales and select the column Chart.
38. In the Format pane → Properties tab → Tooltips card.
39. Make the tooltip type: **Report page** and select the page: **tooltip** from the drop-down list.
40. Hover now on each column to see your new custom tooltip.



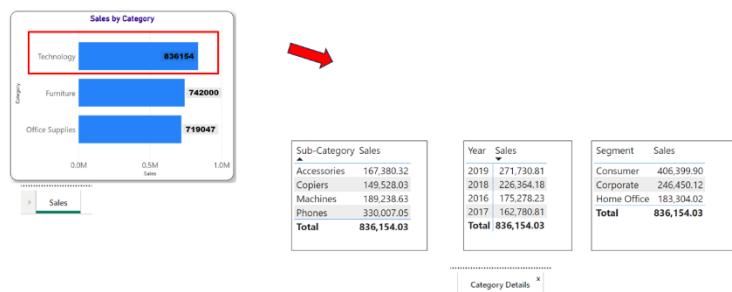
Question

What is the purpose of custom tooltips in Microsoft Power BI?

- A. Custom tooltips enhance user engagement by providing interactive insights.
- B. Custom tooltips enhance the aesthetic appeal of visuals.
- C. Custom tooltips automatically update report data.
- D. Custom tooltips enable connection to multiple data sources at once.

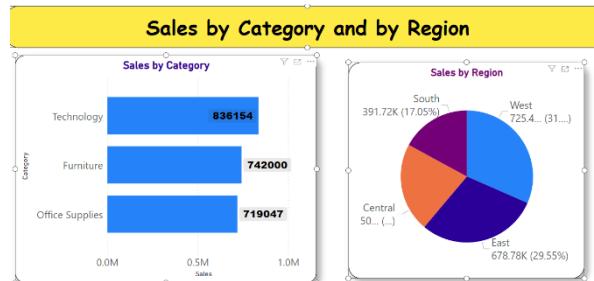
Drill Through

- While **drill down** only allows users to navigate from a broader to more detailed level within the **same visualization**, with Power BI's **drill through** feature, users can **navigate** from a **visualization** to a **separate detailed report page** focused on the selected data point.



Exercise 21: Drill Through

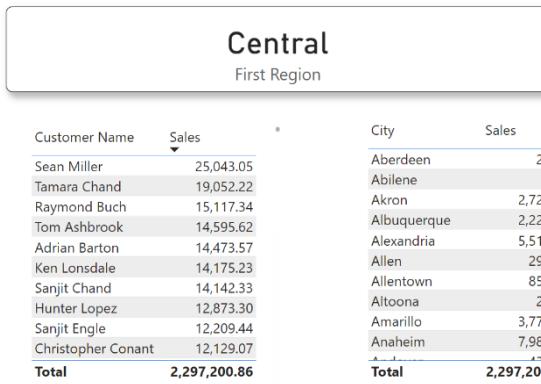
1. Use file **Exercise 21 Start.pbix**.
2. You have 3 Pages.
3. In **Sales page** you have two charts shows Sales by Category and Sales by Region.



4. In **Category Details** Page you have details about sales in Each Sub-Category, Year, and Segment.
5. Notice that it shows total sales of the company **2,297,200 \$**.
6. That is because there is no filter here.
7. Notice that we have a Card on top having Category field and it shows only the first category alphabetically.
8. In the **Region Details** Page, you have two tables: **Sales by Customers** and **sales by City** and with the same total **2,297,200 \$** as there is no filter.



9. The same way you have **Region Details** page.



10. Go to the **Sales** page.

11. In the bar chart we want to know the details of each Category.

Drill Through Category

12. We want to drill through to page Category details from the chart and show only the values of the selected category.

13. We must do two steps:

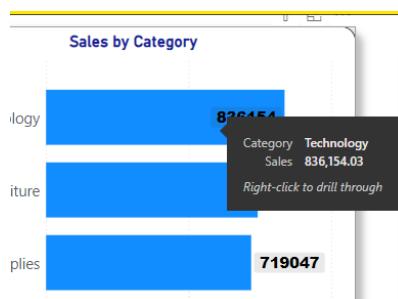
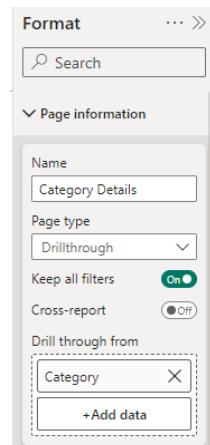
- Convert the **Category Details** Page type to **Drill through**.

- Add field Category to well **Drill through from**.

14. Go to **Category Details** Page in Page Information change its type to **Drillthrough** and add field **Category** to the Drillthrough from.

15. Go back to the **Sales** page.

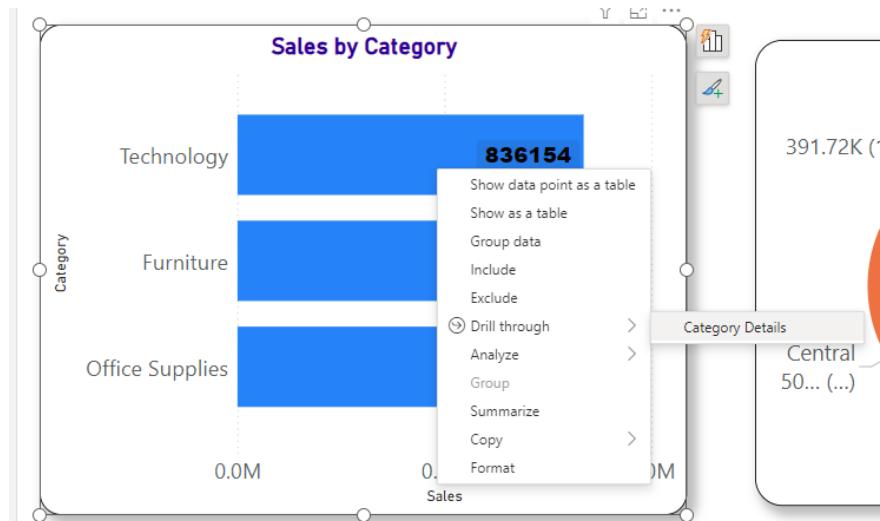
16. Hover over the bars now and notice that there is a new sentence in italics now appears on the tooltip "*Right-click to drill through*".



17. Right click on the **Technology** bar in the bar chart.

18. Notice you have a new option now **Drill through** and when you hover you will have the name of the page you have converted to Drill through page with Category to drill through from.

19. Notice that if you right click any portion of the Pie chart you do not have



this option because there is no category field in the visual that you can drill through.

20. Click the Category Details option to go to the page.

The figure shows a card titled "Technology First Category". Below the card are three tables: "Sub-Category Sales", "Year Sales", and "Segment Sales". The "Sub-Category Sales" table shows totals for Accessories, Copiers, Machines, and Phones, with a total of 836,154.03. The "Year Sales" table shows totals for 2017, 2016, 2015, 2014, and 2013, with a total of 836,154.03. The "Segment Sales" table shows totals for Consumer, Corporate, Home Office, and a Total of 836,154.03.

21. Notice you have the whole page has been:

- filtered to **Technology** sub-category.
- All totals of the 3 tables showing total of the technology 836,154.
- The card on top show the only sub-category available which is Technology.
- On the top left of the page there is a **back button** to get back to the previous page.

22. Click (CTRL+ Back) Arrow to get back to the Sales page.

Note: when you publish the report the user only clicks the button but you have to click the CONTRL button on design to test any button or any other object clickable in your report.

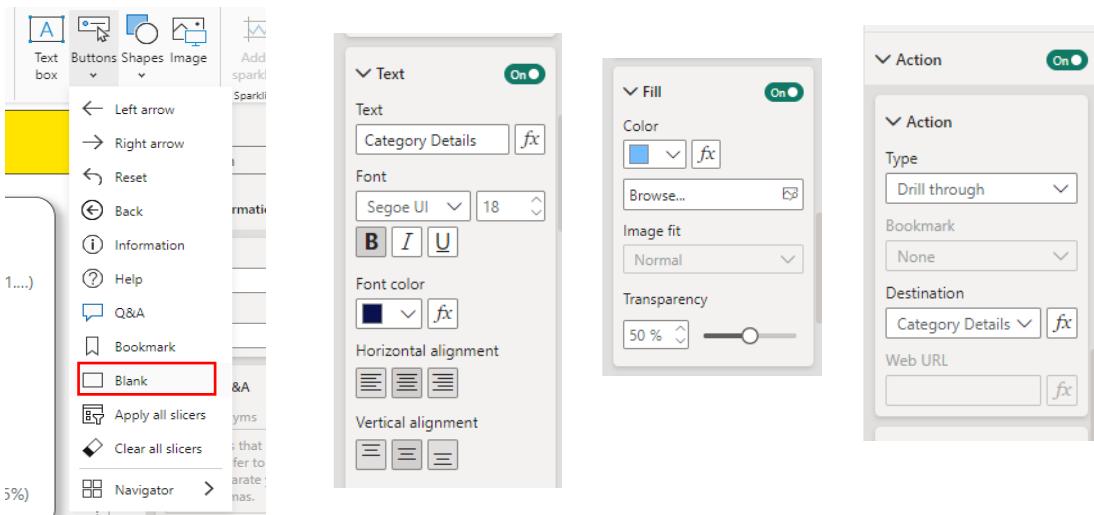
23. Repeat the same steps again to see the details of **Furniture** and **office supplies** sub-category.

Drill Through Region

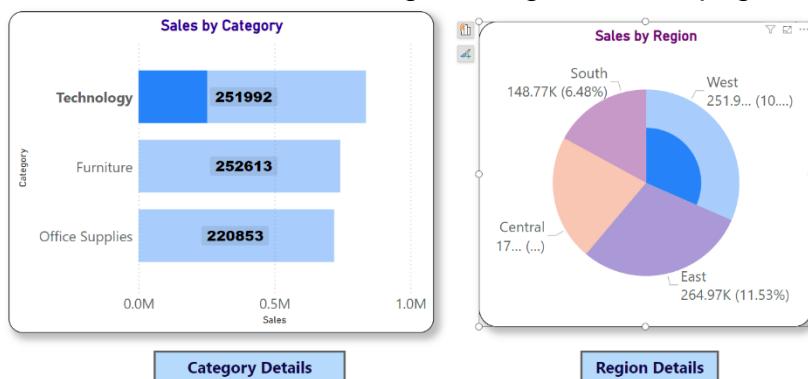
24. Do the same steps from 13-22 to convert the page Region Details to a Drill through page.
25. In the sales page test your Pie chart and drill through to Region Details.

Add Action Button

26. You can save your report user time and effort and add action button to your report to drill through report details.
27. Go to the **Sales** Page.
28. From **Insert** tab in the ribbon → Elements → Buttons → Blank.
29. A button added to your page on the top left.
30. Drag it under the bar chart and resize it.
31. As the button is selected go to **Format** pane:
 - a. Enable **Text** Card and.
 - b. Add text: **Category Details**, format as bold black and center.
 - c. Enable **Fill** card and color light blue.
 - d. Enable **Action** Card with Type: **Drill Through** and destination is the **Category Details** Page.



32. Notice that when you add the action the button became **DIMMED**.
33. That is because no selection is available to drill through.
34. Click on the **Technology** to select on the bar chart.
35. The button now is available and ready to use.
36. Click (CTRL + Category Details Button) to go to the technology details.
37. Repeat steps from 26-34 to add another button “**Region Details**” beneath the Pie chart to drill through to Region Details page.



Question

What is the primary purpose of using drillthrough in Microsoft Power BI?

- A. To navigate from a data point or visual in a main report to a detailed report page
- B. To create hierarchies for data fields in the same visualization
- C. To pivot data and change its orientation in a table
- D. To drill down into data in the same visualization

Bookmarks

- Bookmarks in Power Bi are a way to **capture the current state** of the report you are viewing and share this state with other viewers.
- For example, if you apply filters to a report, you can save the filtered state as a bookmark. Viewers can then select the bookmark and the report will change to the filtered state you established.
- When adding a bookmark, there are four state options that you can save:
 - **Data** properties such as filters and slicers,
 - **Display** properties such as visualization highlighting and visibility.
 - **Current page** changes, which present the page that was visible when you added the bookmark,
 - **All visuals or selected visuals**: selecting if the bookmark applies to All visuals or selected visuals.
- Bookmarks will enable different users to focus on different parts of the data without setting up **filters** every time.
- You can also **highlight specific insights** and create customized views relevant to the different departments.
- **By default, all states are saved for all visuals.**
- If you modify a report after you create a bookmark, any visualizations not present when you created the bookmark will appear in a default state. **So remember, if you change a report, you should make sure to update your bookmarks** to reflect the changes.
- Given that bookmarks in Power Bi are excellent for creating **tailored, interactive** reports that users can easily navigate and extract crucial insights from

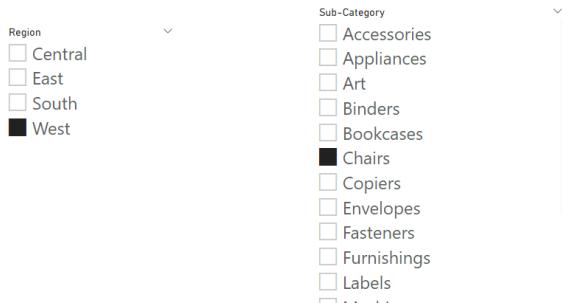


Exercise 22: Basics of Bookmarks

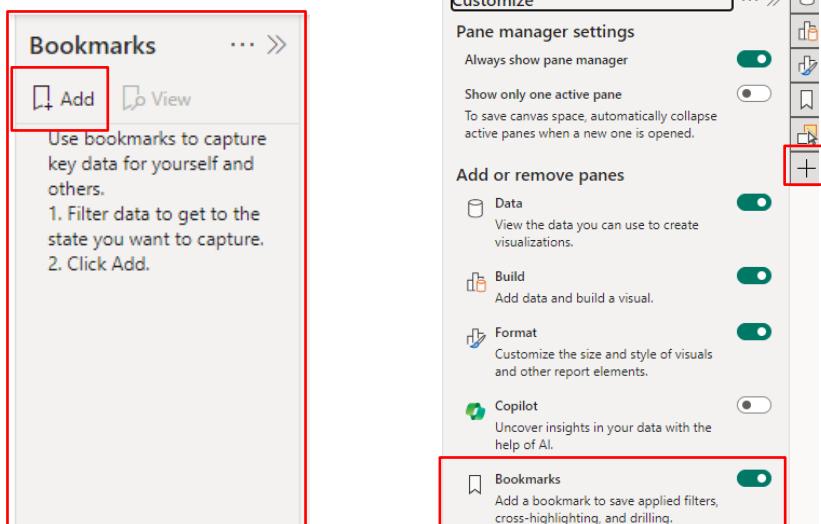
1. Use **File Exercise 22 Start.pbix**.
2. Go to Page **Bookmark Basics**.
3. We want a report showing the **Sales** and **profit** of **West** Region for the Chair **Sub-Category**.

4. Filter the two Slicers for that.

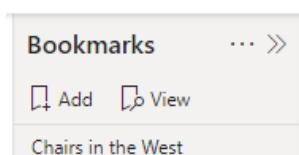
101.78K 4.03K
Sales Profit



5. Now that the report is in a filtered state, let's create a bookmark.
6. Select **View** in the Ribbon menu and then **bookmarks**, this opens the bookmarks panel.
7. Or click the **+** sign in the right-hand side icons to open customize pane and enable **bookmarks** pane.



8. To create the bookmark, select the **Add** button, this saves the state and creates a new bookmark with a default name **Bookmark1**.
9. To rename the bookmark select the **three dots** beside its name and select **Rename** (or you can double click).
10. For this bookmark, let's rename it to **Chairs in the west**.



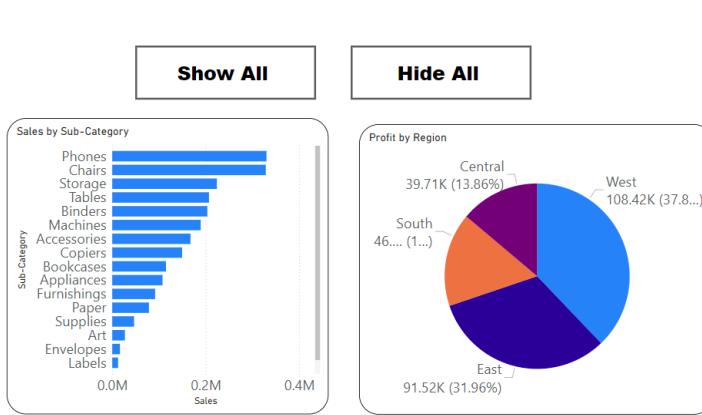
11. Now let's test the bookmark:

- clear all slicers so that the report is reset.
- Open the bookmark panel again and select the bookmark, you can observe the filters reapplied to the report.
- Clear all filters again.
- Go to any other page in the report.
- Click the bookmark again to go to the page and filtered.

Hide and Show

12. Go to Page **Show and Hide**.

13. You have two charts and two buttons.



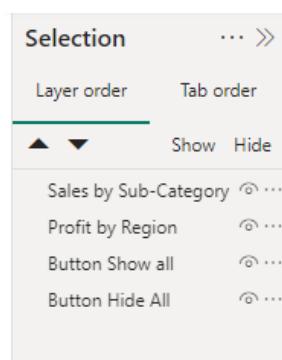
14. We want to hide both visuals and show them using those buttons.

15. We have created the two buttons using the blank buttons as we did before.

16. You should first create 2 bookmarks, one all visible and one all hidden.

17. Make both the **Selection pane** and **Bookmark pane** visible.

18. As you can see, I have **renamed** all objects in the selection pane to make things clearer.



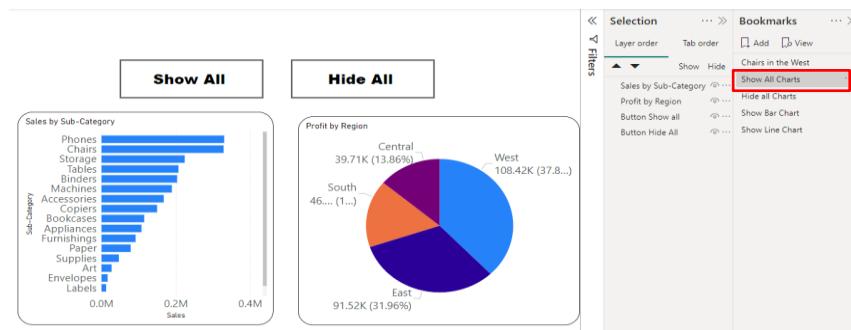
19. Notice we have **Eye Icon** beside each object that you can show and hide.

20. With both Charts visible click **Add** button to create a bookmark and rename it **Show all Charts**.

21. In the **selection** pane click the eye icons beside the two charts: **Sales by sub-category** and **Profit by Region**.



22. The two charts have now disappeared.
23. Now create another bookmark and rename it **Hide all charts**.
24. Test both your two bookmarks to hide and show the charts.



25. Instead of making the user open and choose bookmarks, let us assign these actions to two buttons.
26. Select the **Show All** button and in **Format** pane enable **Action Card**.
27. Make Type = **Bookmark** and select the **Show All Charts** from the Dropdown list as its bookmark.
28. Select the **Hide All** button and in **Format** pane enable **Action Card**.
29. Make Type = **Bookmark** and select the **Hide All Charts** from the Dropdown list as its bookmark.
30. Now test your two **buttons** to show and hide the charts.

31. Do not forget to use **CNTRL + CLICK** when using the buttons.

The screenshot shows the Power BI interface with the 'Selection' pane open, displaying items like 'Layer order', 'Tab order', and several buttons labeled 'Show All' and 'Hide All'. The 'Bookmarks' pane is also visible. To the right, a detailed view of a bookmark named 'Chairs in the West' is shown in a configuration dialog. The dialog includes sections for 'Action' (set to 'On'), 'Type' (set to 'Bookmark'), 'Bookmark' (set to 'Show All Charts'), and 'Destination' (set to 'None').

Bar chart or Line chart (try it yourself).

32. Go to the page **bar chart or line chart**.

33. Sometimes the data is much for a bar chart, and we want our user to be able to convert the chart to bar or line.

34. Try yourself using the bookmark:

- Duplicate the bar chart and convert it to a line chart.
- Rename the new chart to line chart.
- Put the line chart above the bar chart to cover.
- Create a bookmark **show bar chart** that shows the bar and hide the line.
- Create another bookmark **Show Line chart** opposite to the first bookmark you have created.
- Assign the two bookmarks to your buttons to make them actionable.

35. You can also make the two buttons over each other and hide and show with each bookmark.

Bookmarks Options

- In Power BI Bookmarks are more powerful than ordinary bookmarks you use in your books.
- On Ordinary bookmarks only tells you which page you can go to.
- In power BI bookmarks not only navigate to the page, but also remember the filtering and display status were in the page and its visuals.
- Let us explore options that are available in bookmarks.

Data Option

- When this option is ticked that is mean that all:
 - Filtering,
 - Drill through,
 - Sort Settings.

Are memorized by this bookmark.

Update
Rename
Delete
Group
✓ Data
✓ Display
✓ Current page
✓ All visuals
Selected visuals

Display Option

- When this option is ticked, Display states are memorized.

- That means both:
 - Spotlight and
 - Visibility (shown or hidden).

Current page

- It means that if you click the bookmark, it will take you to the page that was **current** when you created the bookmark.

All Visuals or Selected Visuals

- Do you want the bookmark to remember settings and data for all visuals on the page or only the Selected Visuals (from the Selection pane or directly select on the page) when you created the bookmark.
- For example, many visuals may be filtered, do you want bookmark remember filters on all visuals or just the one you want and selected when you create the bookmark.

Exercise 23: Bookmarks Options

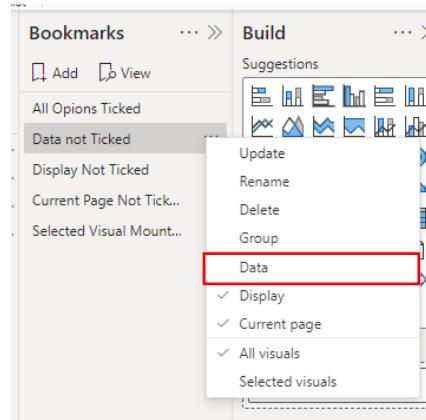
1. Use file: **Exercise 23 Start.pbix**.
2. Go to page **Product Sales**.
3. You have a bar chart showing sales and 2 slicers for Month and Product Category.
4. Select **February** and **Mountain Bikes** from the Slicers.
5. Your Page is now filtered.
6. Create a Bookmark with **All options ticked** and rename it “All Options ticked”.



7. Clear all filters and go to the 1st page in the report and check your bookmark.
8. Your bookmark remembers **everything**, the page, data (Filtering), etc.

Data Option

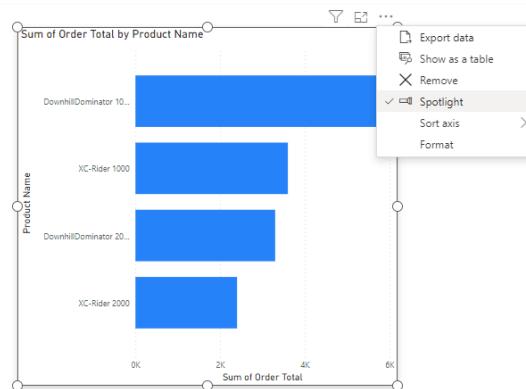
9. Let us add a new bookmark and rename it **Data Not Ticked**.
10. Click the 3 ellipsis of this bookmark and **untick** the **data** option.



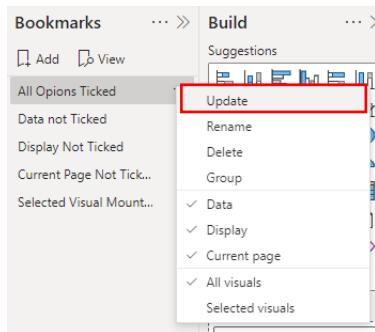
11. Now let us check.
12. Change the Month filter to **March** and **Road Bikes** in Category.
13. Go to the 1st page “**Sales By Category**” and click your **Data Not Ticked** bookmark.
14. Notice that the filtering is still the same and the filtered were not saved.
15. Go to 1st page “**Sales By Category**” again and try **All options ticked** bookmark.
16. You go to the page with filtered of **Feb** and **Mountain bikes**.
17. Clear all filters and change the **sorting** of the bar chart to ascending order.
18. Try the two bookmarks now, with **Data Not Ticked** and **All options Ticked**.
19. Again, the sort order stays the same when you do not save the data.

Display Option (spotlight)

20. Click on the Bookmark **All Options Are Ticked**.
21. Click the 3 ellipsis of the bar chart and select Spotlight.
22. Only Bar chart is **focused** now and other objects are grayed out.



23. Select bookmark **All Options Are Ticked** and click the 3 ellipses of it and click update to **update** the bookmark as bar chart is spot lighted.



24. Clear the spotlight) uncheck the option or click anywhere on report) now and go to the 1st page.
25. Click the bookmark **All Options Are Ticked**.
26. You go to your page with bar chart in spotlight.
27. Create a new bookmark with the name: **Display Not Ticked**.
28. Click on the bookmark ellipsis and untick the **Display** Option.
29. Now go to your 1st page and click on the bookmark **Display Not Ticked**.
30. You go to your page again with your data filtered but the spotlight was not saved.
31. Click on **All Options Are Ticked** the spotlight was saved.

Display Option (Show and Hide)

32. Go to selection pane and **Hide Report Title**.
33. Update your bookmark **All Options Are Ticked**.
34. Update your bookmark **Display Not Ticked**.
35. Go to selection pane and **Unhide Report Title**.
36. Go to 1st page.
37. Click on bookmark **All Options Are Ticked**.
38. The title is hidden again because the bookmark remembers the display settings.
39. Go to selection pane and **Unhide Report Title**.
40. Go to 1st page.
41. Click on bookmark **Display Not Ticked**.
42. The title is Shown because this bookmark does not remember the display settings.

Current page

43. Unhide the **Report title**.
44. Update the bookmark **All Options Are Ticked**.
45. Create a new bookmark with name **Current Page not Ticked**.
46. Click on the three ellipses of the new bookmark and **untick** the **current page** option.
47. Clear all filters on the page.
48. Go to 1st Page.
49. Click on the **All Options Are Ticked** bookmark.
50. You go to the page and all filters are applied.
51. Clear all Filters.
52. Go to 1st Page.
53. Click the **Current Page not Ticked** bookmark.
54. Nothing happened you still on the same page.

55. But if you move to the **Product Sales Page** you will find that the filters were applied but you did not move to the page.

All Visuals or Selected Visuals

56. Let us create a bookmark to remember only **Product Category Slicer**.
57. Select Product Category Slicer on the page.
58. Add a new bookmark with name **Selected Visual Mountain Bike**.
59. Click the three ellipsis and unselect **All visuals** option.
60. Click again to make sure that **selected visuals** are ticked.
61. Clear all filters on the page.
62. Go to 1st page and click on the **All Options Are Ticked** bookmark.
63. You go to Product sales page with both **February** and **Mountain bikes** are filtered.
64. Clear all filters on the page.
65. Go to 1st page and click on the **Selected Visual Mountain Bike** bookmark.
66. You go to Product sales page with only Mountain bikes are filtered.

Question

You added new visualizations to a report after previously creating a bookmark with the default options. When you select the bookmark, which of the following statements are true? Select all that apply.

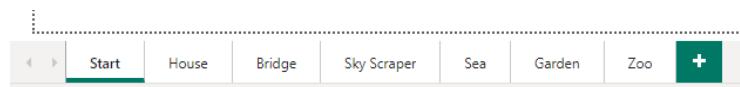
- A. The new visualizations will appear in a default state.
- B. The new visualizations will have the bookmarked filters applied to it.
- C. The previous visualizations will have the bookmarked filters applied to it.
- D. The current page of the report will change to the bookmarked page.

Page Navigator and Bookmark Navigator

- You can use either or both features to make your users navigate your report so easily.

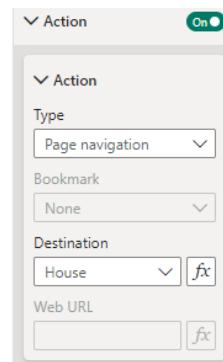
Exercise 24: Page and Bookmark Navigators

1. Use file **Exercise 24 Start.pbix**.
2. You have a Start Page and 6 other pages you want to Navigate to.



Add Buttons Manually

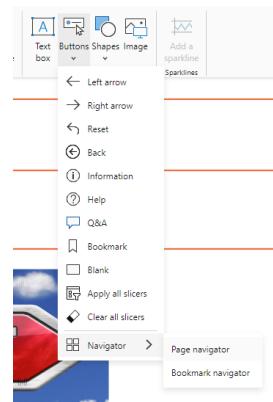
3. You can manually add buttons and format as you like.
4. In Start Page and Add **button** on the page Navigator section.
5. Change its text to House.
6. Enable the **action** and choose type to **Page Navigation** and select **House** page as your destination.



7. Try your button using **CTRL + CLICK**.
8. You will go to the **house** page.

Create Page Navigator

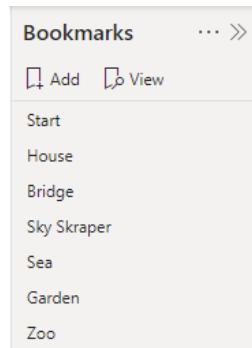
9. Go to Page **Start** and **delete** the button you have created.
10. Insert page navigator from Insert tab in the Ribbon.
11. Insert → Elements → Buttons → Navigator → Page Navigator.
12. A group of buttons appears on the top.
13. Position them in the page Navigation section.
14. Try each button to see you go to each page.
15. Now copy the page navigator to all other pages (use **CTRL + C** and **CTRL+ V**).
16. Check your work and navigate.



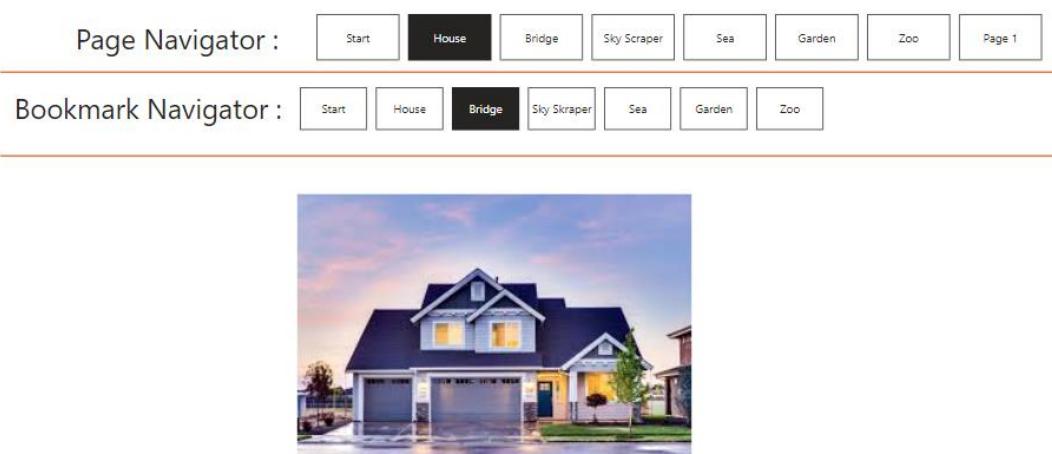
Page Navigator : Start House Bridge Sky Scraper Sea Garden Zoo Photos

Create Bookmark Navigator

1. Go to the **Start** page.
2. Insert Bookmark navigator from Insert tab in the Ribbon.
3. Insert → Elements → Buttons → Navigator → Bookmark Navigator.
4. You will get an empty Bookmark navigator because you do not have bookmarks in your report.
5. Move the empty bookmark to the bookmark section in the page.
6. Copy and paste on every page of your report.
7. Create bookmark for each page you have (Start, House, Bridget.... etc.) with names of pages.
8. Notice that the buttons are added one by one as you create each bookmark.



9. Check your navigation now.

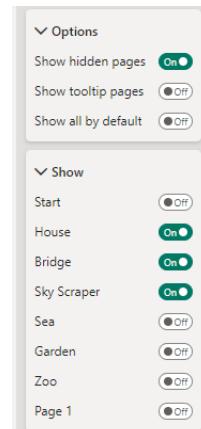


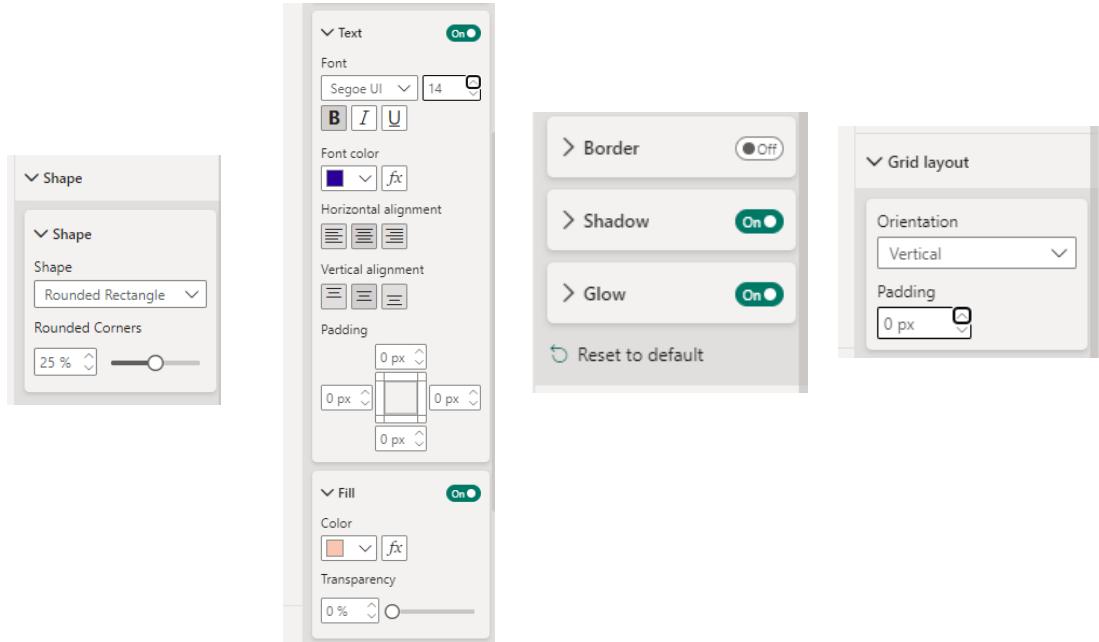
Difference between Page and Bookmark navigators

10. Add a new page with the name **New**.
11. Go to Start page, a new button added to the page navigator, but the bookmark navigator is still the same.
12. Create a bookmark for the **new** page with the name **new**.
13. A button is added to the bookmark navigator.
14. Delete the new page you have created; it is deleted from the page navigator.
15. But the new button is still there for the bookmark navigator.
16. Click on the **new** button on the bookmark navigator, nothing happens.
17. Delete the **New** bookmark, it is deleted from the bookmark navigator now.

Exclude pages from navigators

18. What if you want to exclude some pages from navigator.
19. Create a new page.
20. Add a page navigator.
21. In the **Format** pane in **Pages** Card in **options** turn off **show all by default**.
22. Include only **House**, **Bridge** and **Skyscraper** pages.
23. Only those pages appear on the navigator.
24. In **Shape** card make it **rounded rectangle**.
25. Adjust the text and fill color.
26. Remove Boder and add shadow and glow.
27. In Grid layout make orientation **Vertical** with **0 Padding**.
28. Adjust the **Navigator** now on the **left** side of the page.

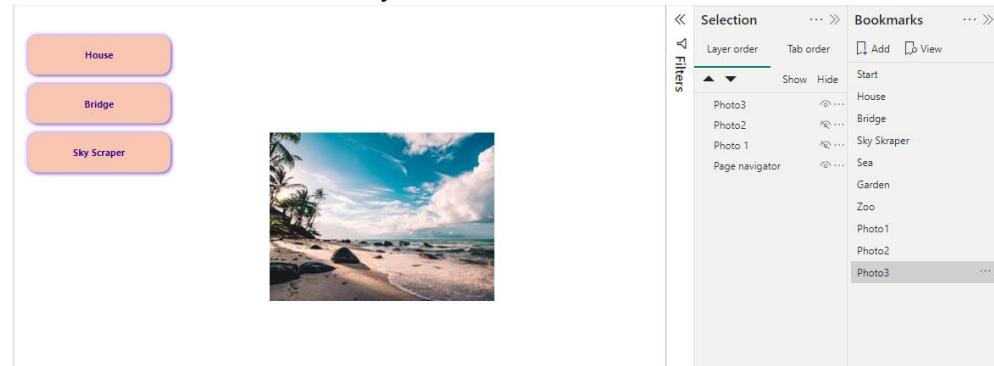




29. Add 3 Photos to the page over one another and rename them **Photo1**, **Photo2**, and **Photo3** (use the selection pane to rename them).

30. Create 3 Bookmarks with the names:

- Photo1** that shows only Photo1 and hides the two others.
- Photo2** that shows only Photo2 and hides the two others.
- Photo3** that shows only Photo3 and hides the two others.



31. Add a Bookmark navigator on the top of the photos.

32. A navigator with a button for every bookmark appears.

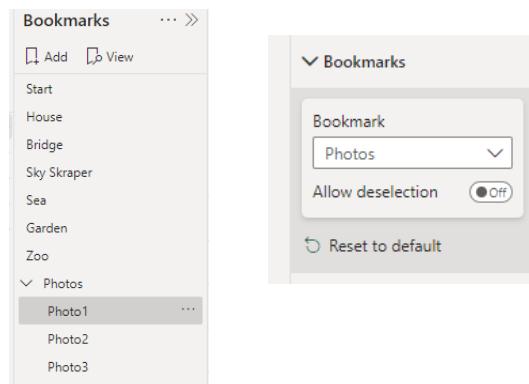
33. That is not what we want, we want only buttons for each photo.

34. In the selection pane create a **group** with the name **Photos** and add photo1, photo2 and photo3 to it.

35. Select the 3-bookmarks first and then right click on them and select **Group** then rename the group.

36. Select the **bookmark navigator**.

37. In Format pane in Bookmarks Card select Photos in Bookmark instead of All.



38. Now only the **photos** group is there.

39. Notice that you can enable **Allow deselection** button and choose the 3 photos too.

40. Now you can navigate to other pages from the side.

41. Try Yourself: you can add a Rectangle and format the buttons as you can see in the figure below.



Filtering

- Filtering enables you to select **specific** data points or subsets of data as needed to ensure the data presented is relevant and clear.
- This is helpful for **excluding** certain values when representing your data with different visuals.

Exercise 25: Filtering Context

Scenario

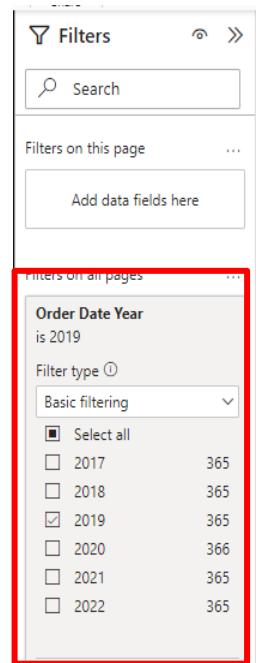
- We want to review some of the filtering context like:
 - Filters on All Pages.
 - Filters on this Page.
 - Filters on a Visual.

Steps:

1. Use file **Exercise 25 Start.pbix**.

Step 1: Review the Data Model

2. Go to **Model View**.
3. Review the two tables' **Sales** and **Products** and their relationship.



Step 2: Review the Calculated field

4. Go to **table view**.
5. Select **Sales** Table.
6. Select the calculated column **Total Sales**.
7. Let us explore deeper the DAX expression of the column.
8. Imagine a **Pointer** goes row by row and calculate each value in the column in the **Row Context**.
9. This happens more than 60,000 times for all rows one by one.

Create 3 tables in Report View

10. Go to **Report View**.
11. Create table with 3 columns: **Product**, **Year**, **Total Sales**

(Expand Order Date Hierarchy to find the Year field)

12. Select the Table you have created and Copy (Ctrl+C)
13. Paste the table again in the **same Page**.
14. Create **another page** and paste the table again.
15. We now have 3 copies of the same visual.

Step 4: Filters on All Pages

16. Go back to Page 1
17. From table **Order Date hierarchy** Drag **Year** field to the **Filters on All Pages** in the **Filters** pane.
18. In **Filter Type** select **Basic Filtering** and Choose **2019**.
19. Notice that the two visuals on the page have accepted 2019 and the table were filtered to one row showing totals of **2019**.
20. Also, if you go to the other page, it will see that filter was applied.
21. That is because we have applied the filter to **All Pages**.
22. Click the (X) sign in the filter to clear the filter from All Pages.

Step 5: Filters on This Page

23. Repeat steps 16,17,18 but this time in **Filters on this Page**.
24. This time it will be applied to Page 1 only and Page 2 is not affected.
25. Click the (X) sign in the filter to clear the filter.

Step 6: Filters on a Visual

26. Go to Page 1 and select the 2nd Visual.
27. You will find now that the Filter Pan has a new Option **Filters on this Visual**.
28. Repeat steps 13,14, 15 but this time in **Filters on this Visual**.

29. Only that visual is filtered.

30. Click the (X) sign in the filter to clear the filter.

Notice also that Power BI filter the table in each row **in context of each year (2017,2018,2019,2020)** each row is calculated filtering only record from each.

Question

Which of the following statements best describes the purpose of filtering in data analysis?

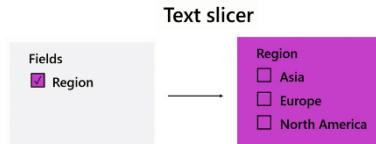
- A. To change the graphical representation of the data
- B. To screen out or focus on parts of the data based on specific conditions.
- C. To arrange data in a sequential manner
- D. To highlight specific cells or rows in a dataset based on certain criteria or rules.

Slicers

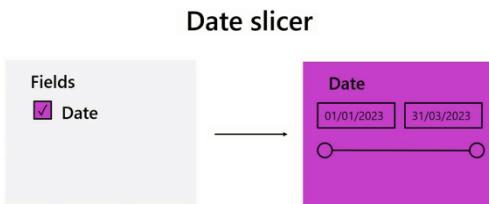
- A slicer is a great way to apply common **filters** to a report page quickly.
- When added to a report, you can use the slicer to display a list of commonly used or most important filters.

Slicer Format

- The slicer can be displayed in **multiple formats** depending on the **field** on which the slicer is filtering.
- For example, if you apply the slicer to a field with **text data type**, the slicer can display as a list of unique entries in that field.



- Similarly, if you apply the slicer to a field with a **date type**, the slicer can be displayed as a **date range selector**.



- However, no matter which format the slicer is displayed in, the underlying behavior is the same.
- The slicer provides a list of filters that users can apply to the visualizations in the report. When a filter is selected, the visualizations will immediately update to reflect the filtered data.
- It is important to note that you do not need to connect every visualization in a report to the slicer.

Slicer Impact

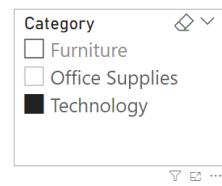
- As a Power BI data analyst, you can **configure** which visualizations are **impacted** by the slicer's selected filters.
- You can also **synchronize multiple slicers** so that when a slicer applies a filter, other slicers on different pages are updated to reflect the selected filter. This is useful when filtering through multiple layers of data.
- For example, if you had one slicer for regions on a sales page and another slicer for regions on a costs page, when you select a specific region, the region is selected on both slicers. This helps improve the user experience as filtering remains consistent as you navigate multiple pages of the report.

Exercise 26: Creating Slicers

- Use File: **Exercise 26 Start.pbix**.
- It is only one Visual can be used with any type of field.
- Options in display and format differ according to the type of field you use in the slicer.

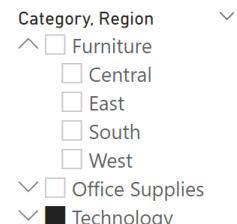
Text Field

- Create a new table with fields **Sub-category** and **Sales**.
- Create a new slicer with field **Category**.
- Whatever **Category** you select from the slicer the table is filtered to show sales of this category.
- If you want to select **multiple** categories, Use the **CNTRL** button while selecting.
- To clear the selection, click the **Eraser Icon** on top right of the filter.



Add levels in Slicer

- You can **drag** multiple **fields** to the slicer to create hierarchy.
- Drag **Region** to the slicer.
- Now you have **arrow down** beside each category you can expand to show the next level.
- Drag **Segment** to the slicer, to have 3 levels.
- Add another slicer with **States** and **City**.



Sub-Category Sales	
Accessories	1,584.91
Art	276.43
Binders	430.94
Chairs	3,915.54
Envelopes	105.84
Fasteners	3.62
Furnishings	40.48
Labels	491.55
Machines	3,040.00
Paper	826.70
Phones	2,525.35
Total	16,135.82

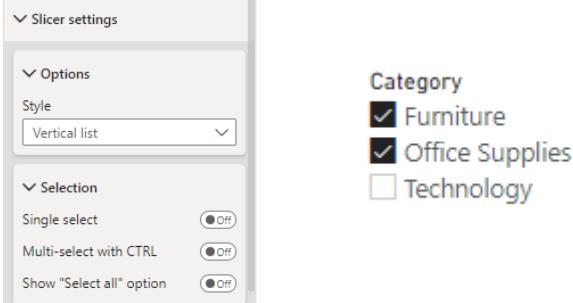
Category, Region, Segment
^ <input type="checkbox"/> Furniture
^ <input type="checkbox"/> South
<input type="checkbox"/> Consumer
<input type="checkbox"/> Corporate
<input type="checkbox"/> Home Office
✓ <input type="checkbox"/> Office Supplies
✓ <input type="checkbox"/> Technology

State, City
^ <input checked="" type="checkbox"/> Alabama
<input type="checkbox"/> Auburn
<input type="checkbox"/> Decatur
<input type="checkbox"/> Florence
<input type="checkbox"/> Hoover
<input type="checkbox"/> Huntsville
<input type="checkbox"/> Mobile
<input type="checkbox"/> Montgomery
<input type="checkbox"/> Tuscaloosa
✓ <input type="checkbox"/> Arizona
✓ <input type="checkbox"/> Arkansas

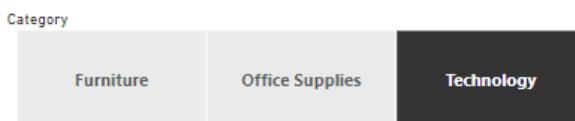
Format Text Slicer

- Create a new page.
- Copy your **table** from page 1 to page 2.

16. Create a new slicer with **Category** field.
17. We want to enable **multiple selection** without making our user use the **CTRL** key.
18. In the **Format** pane, in Card **Slicer settings** in **Selection** section turn off **Multi-select with CTRL** option.
19. Now you can select multiple selection without having to press **CTRL** key.
20. We want to make the slicer in horizontal tiles.



21. Format pane → Slicer settings → Options → Style → Tile.
22. You now have your slicer as horizontal buttons, and you can reshape to make it vertical if you want.

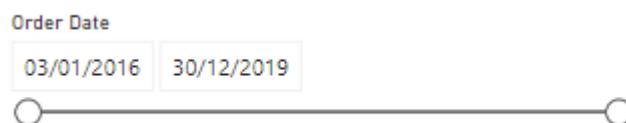


23. When the button is **darker** means it is **selected**.
24. In the **Values** Card change font to be white Bold and background color to blue.
25. This gives you button colors when not selected.
26. When selected it is white font with black background always.

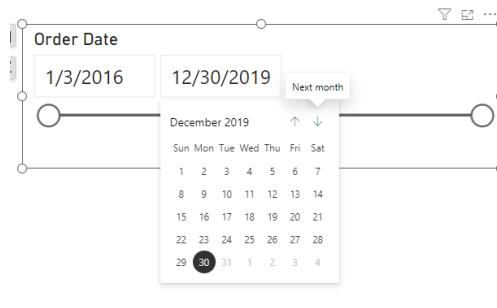


Date Slicer

27. Create a new page.
28. Create a table with **Order Date** and **Sales**.
29. Add slicer with the Order Date field.
30. You will have a slicer with a **scroll** you can set the period of date you want to filter on or select start and end date.

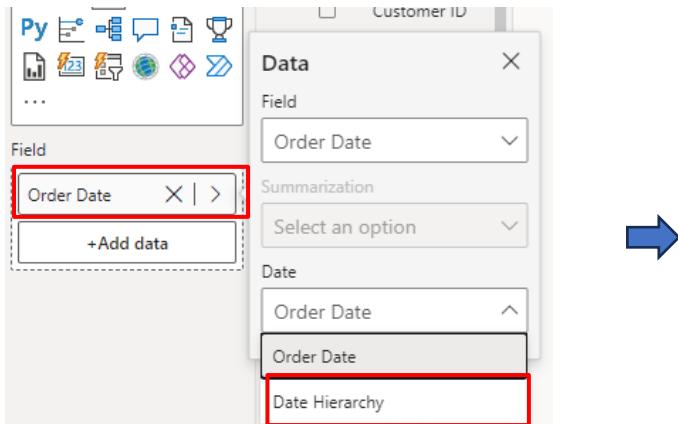


31. Scroll form left and right to adjust start and end date.
32. The table is filtered for this period.
33. You can click on **Start** or **End** Date and a calendar will appear to select your start and end date.



34. You can also **type** your **start** and **end** date on the boxes.
 35. Click on the Clear Filter button to unfiltered the date.
 36. In the **Format pane** in **Visual tab** in Card **Slicer Settings** and in **Section Options** try all **Styles** available for the slicer.
- The default for the Date slicer is **Between Style**.
 - The **Dropdown** option is good for saving space in your report.
 - In The **Relative date** you can for example filter on **last 5 years**.

37. If you don't want to filter using date periods and want to filter using **Year**, or **Month** or **Quarter** you can change to date hierarchy.
 38. On **Build** pane in the **Field** well click on the **arrow** right to Order Date Field and select the **Date** dropdown list and chose **Date Hierarchy**.



39. Your **Field** well now shows the Order **Date hierarchy**, and you have **down arrows** in your slicer starting from **year** down to **quarter** then **month** then **date**.

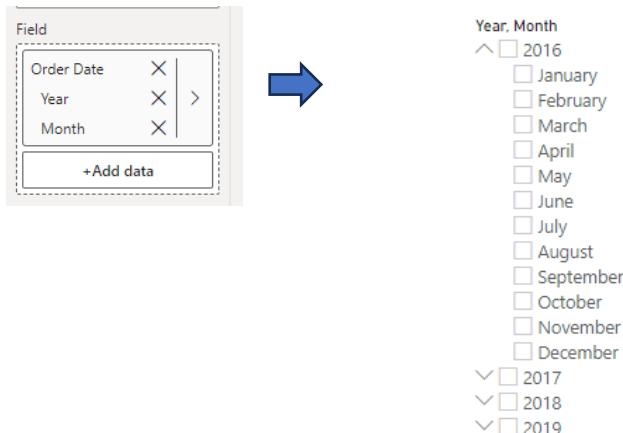


40. You can click the **X** icon next to any field in the hierarchy you do not want to remove from your slicer.

41. Suppose we want to filter only on years and months.

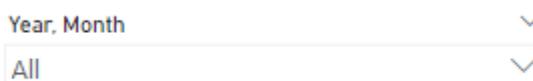
42. Delete all fields in the hierarchy and keep only **years** and **months**.

43.



Format Date Slicer

44. In Format pane change your slicer style to **Dropdown** to save space.



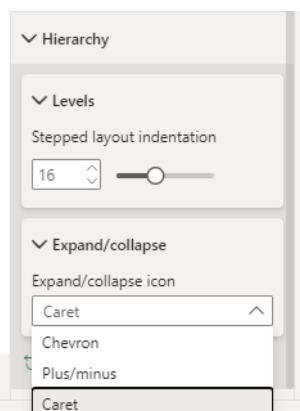
45. Change the Style back to **Vertical list**.

46. In Slicer Setting card → Selection turn Show “Select all” option on.

47. Now you have a “**Select all**” option on top of your slicer.

48. You can click if you want to select all and then start to **deselect** what you don't want to select.

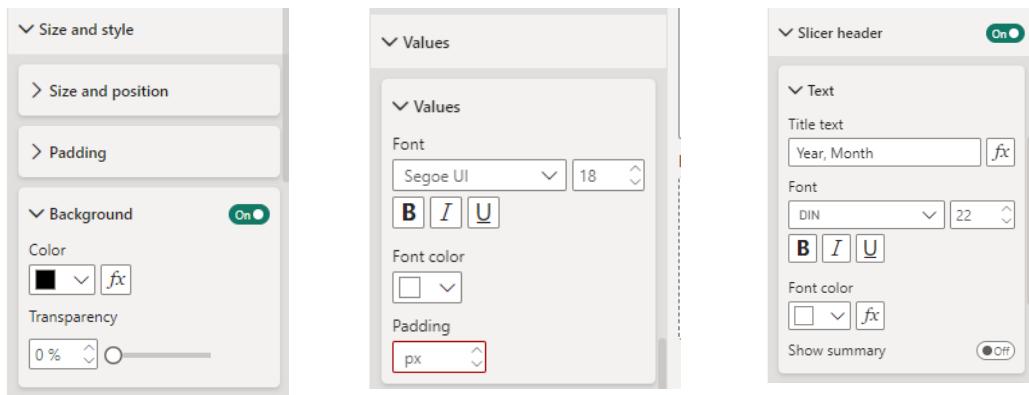
49. In the Hierarchy Card you can change the Levels of indentation in your layout and the icon used to expand or collapse the hierarchy.



50. In **Size and Style** → Background change the color to black.

51. In **Values** Card → Values make font color **white**.

52. In Slicer Header Card → Text make color **white**.

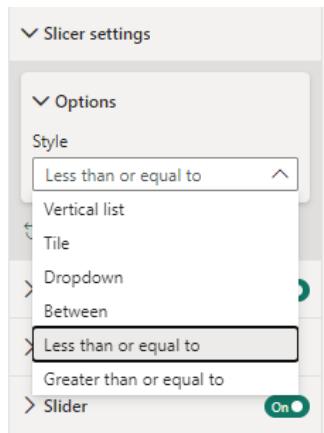


Number Slicer

53. Create a new page.
54. Create a table with **Customer name**, and **Sales** Fields.
55. I was asked by my manager to show customers that has bought specific number of products.
56. Add a new slicer with field **Quantity**.

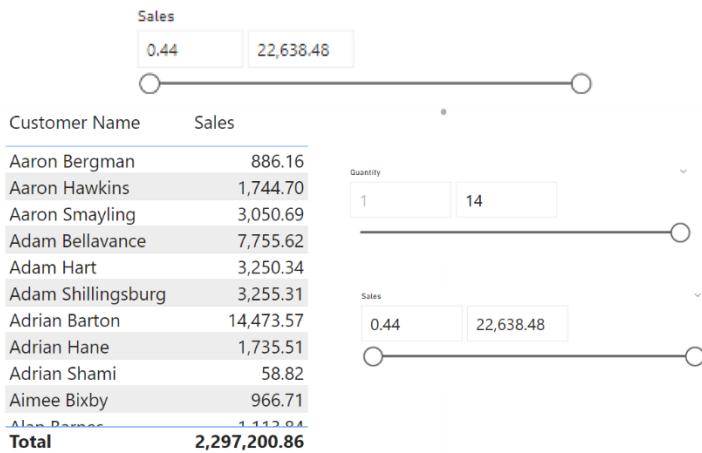


57. The slicer shows me that the **min** quantity was **1** and **max** was **14**.
58. If I want to know which customers have bought between 1 to 3 quantities.
59. Change the slicer start and end to 1 and 3.
60. The table is filtered to show those customers.
61. Now change the slicer values to show high values 12 to 14.
62. The table show customers with high quantity values.
63. Go to Format pane and try all options in Slicer Settings → Options → Style.



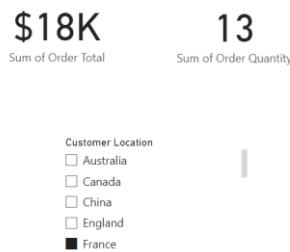
64. Create another slicer for the **Sales** field.

65. As you can see the Sales min is 0.44 and Max 22K.



Exercise 27: Synchronize Slicers

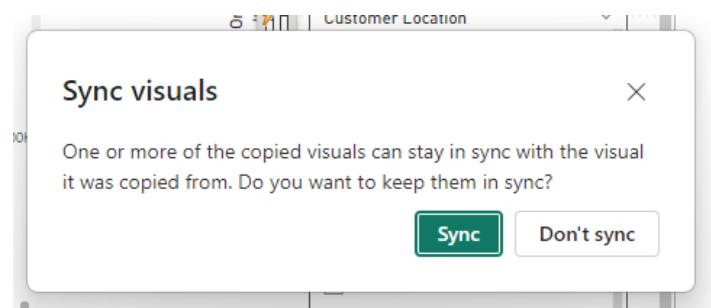
1. Use file **Exercise 27 Start.pbix**.
2. Go to the **Sales Summary** page.
3. Create slicer for **Customer Location** filed.
4. Select **France** from the Customer Location slicer.
5. The report is filtered to **France** Sales and Quantity.



6. I want now to add another **Customer Location** Slicer to the other page and synchronize each other so they have the same filter, and the filter is consistent through my report pages.

Copy and paste Method

7. You can simply copy the slicer from the **Sales Summary** page and paste it on the **Summary Details** page.
8. A popup Dialogue box appears asking you if you want to synchronize both slicers.



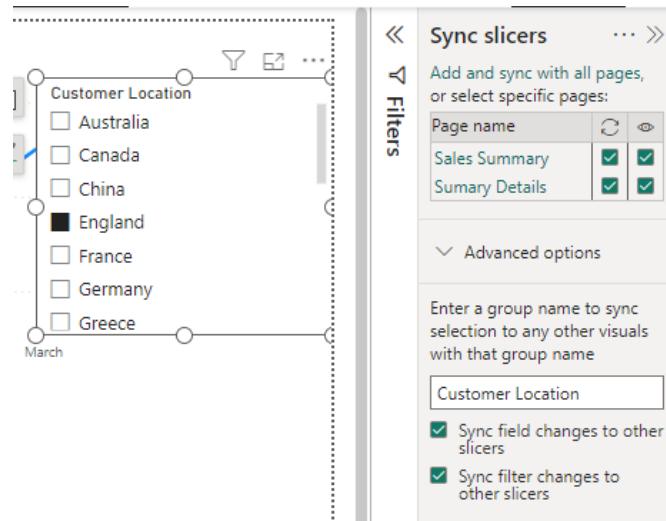
9. Click the **Sync** button to synchronize your slicers.
10. In Summary Details page select **China** from the slicer.

11. Go to Sales Summary page the slicer there also has **China** selected.



12. Go to **Sync Slicers** pane, you can select from **View** tab in the Ribbon or use the **+** Icon on the right side of the screen to add icon for it.

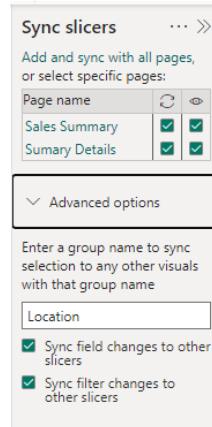
13. Select your slicer in each page and you will find that Power BI has created the Synchronization options in the two page and created a **group** with name of **Customer Location**.



Manually Create the Synchronization

14. Now **delete** both slicers from the two pages and create them all from the start.
15. Go to the page **Sales Summary** and create a **Customer Location** Slicer.
16. Go to the page **Summary Details** and create a **Customer Location** Slicer.
17. Select **Canada** in **Sales Summary** and go to the **Summary details** page the two slicers are different.

18. In **Summary Details** page select the slicer and in **Sync Slicers** pane create the synchronization and **Group Name** manually as in the figure



below

19. Go to the **Sales Summary** page and do the same and make sure you write the **group name exactly the same**.

20. Now select **England** on the Sales Summary page and go to Summary details page you will find the slicer also selecting England.

Question

When synchronizing slicers, which of the following ensures that a slicer synchronizes when other slicers or visualizations are interacted with? Select all that apply.

- A. Navigate to the View menu and select Sync Slicers
- B. Ensure that the group name is consistent
- C. Enable Sync filter changes to other slicers
- D. Enable Sync field changes to other slicers

Cross-filter and cross-highlight

- Microsoft Power BI's cross filter and cross highlight functionalities make it possible for you to **emphasize** related data across multiple charts or **remove** unrelated data.

Cross-filter

- Cross filtering refers to the practice of selecting an item or data point on one visual, which in turn **filters out unrelated data** in another visual.
- It creates a relationship between two separate visuals, such that a selection in one visual affects the data shown in another.
- For example, with cross filtering, selecting the Mountain Bikes column in a report will filter the table visual to display only sales data related to this product category. The other product categories are no longer shown.



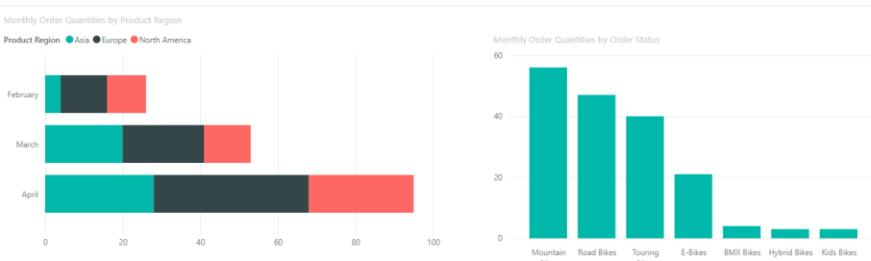
Cross-highlight

- With cross highlighting, when you select a data point in one visual, it **highlights** the related data in other visuals instead of filtering out unrelated data.
- This is the **default behavior** for most visuals in Power BI.
- Unlike cross filtering, it still **displays unrelated data**. However, it's **dimmed or faded**.

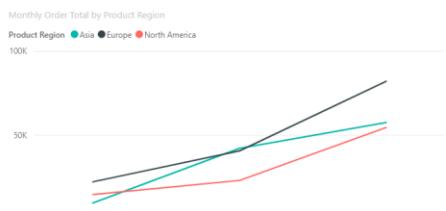


Exercise 28: Cross-Filter and Cross-Highlight

- Use file **Exercise 28 Start.pbix**.
- In this report, there are four different visuals displaying various sales data.



Month	Product Region	Product Category	Sum of Order Quantity	Sum of Order Total
February	Asia	BMX Bikes	1	600
February	Asia	Mountain Bikes	2	5700
February	Asia	Road Bikes	1	3200
February	Europe	BMX Bikes	3	1200
February	Europe	Hybrid Bikes	1	1500
February	Europe	Kids Bikes	1	200
February	Europe	Mountain Bikes	2	5800
February	Europe	Road Bikes	4	11000
February	Europe	Touring Bikes	1	2400
February	North America	Hybrid Bikes	2	2400
February	North America	Kids Bikes	2	300
February	North America	Mountain Bikes	2	3600
February	North America	Road Bikes	2	4200
February	North America	Touring Bikes	2	4000
Total			174	345200



Cross-Highlight

- Let's start by examining how **default cross highlighting** works in Power BI, using the stacked bar chart in the top left corner.
- If you select any **region**, for example, **Europe**, it **highlights** the bar related to Europe and **dims** the other bars (*Click Europe in the legend of the chart to select it in the 3 months*).

5. Notice how all other charts instantly reflect your selection and highlight data that is related to your selection in the stacked bar chart.



6. The bright areas represent data related to Europe and the dim areas represent data from other regions.
 7. You can press the **Shift key** on the keyboard and select **multiple regions** or even **multiple units** in the stacked bar chart.
 8. Every time your selection changes, the other charts respond automatically by highlighting the related data.

Cross Filtering

9. Take note that the **Table Visual** behaves differently. Rather than fading the irrelevant data, it **hides** them based on your selection. This is called **cross filtering**.



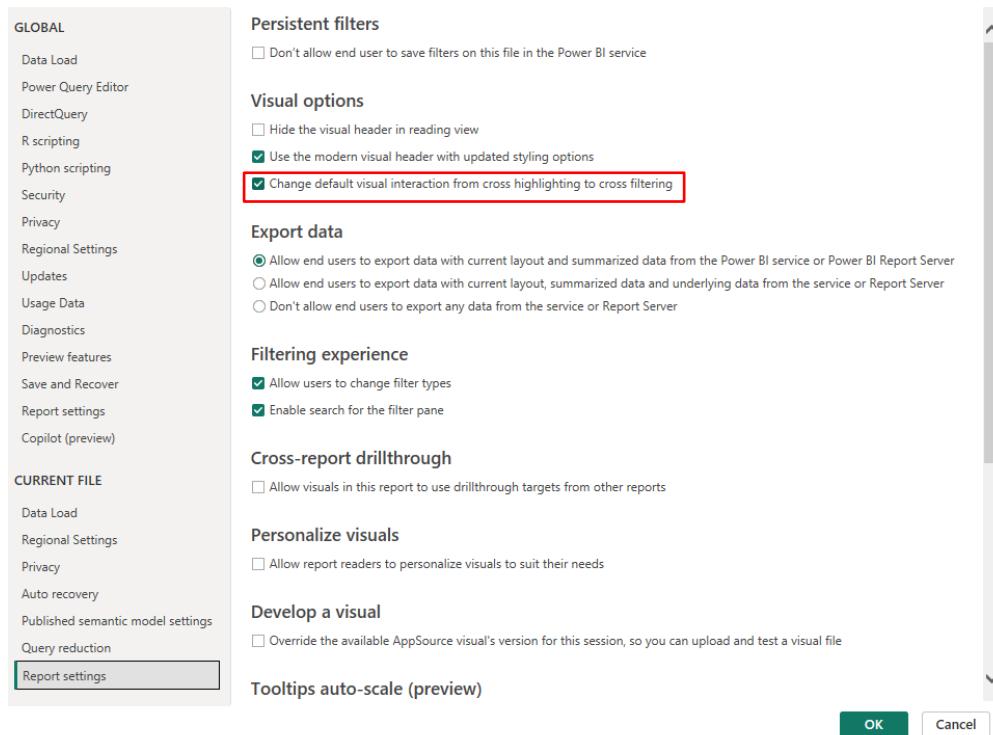
10. To clear your selection, you can select the selected item again to return to normal view.
 11. If you select data points on any of the charts on this page, the other charts will cross highlight based on your selection instantly.
 12. For example, if you select **Mountain Bike** on the stacked column chart, in the top right corner, the other charts respond.
 13. Just remember that **cross highlighting means irrelevant data will remain visible but dimmed**, and **cross filtering means irrelevant data will be hidden**.

Change Default behavior

14. You can change the default behavior of interaction in Power BI reports from **cross highlighting** to **cross filtering**.
 15. To do that, select the **File** menu, **Options and Settings** and then **Options**.
 16. This opens the **Options dialog box**.
 17. From here, select the **Report settings** from the left sidebar.

18. And then check, “*change default visual interaction from cross highlighting to cross filtering*” in the **Visual Options** section and select OK.

Options

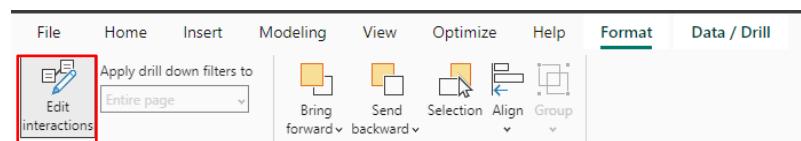


19. Now, if you select **Mountain Bike** on the stacked column chart, notice how the stacked bar chart on the left reacts. It is not showing the dimmed areas anymore and is displaying data related to the mountain bikes only.



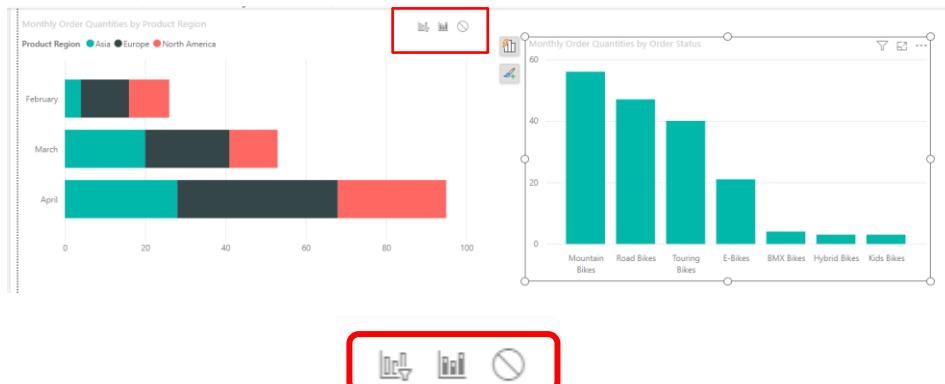
Change Behavior Individually

20. You can Change the behavior individually by selecting the visual you want to change its effect on other visuals then select **Edit interaction** from the **Format** tab in the ribbon.



21. On the top right corner of the other visuals three icons will appear to make you control how this visual will affect the other one by one

22. You can choose either **Filter**, **Highlight** or **Non.**



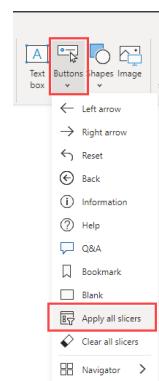
Question

What best describes the function of cross-filtering in visual reports?

- A. It displays the raw data of the selected visual.
- B. It highlights the selected data across multiple visuals without changing the displayed data.
- C. It highlights specific cells or rows in a dataset based on certain criteria or rules.
- D. It allows a selection in one visual to filter out unrelated data in another visual.

Buttons

- With *buttons* in Power BI, you can create reports that behave similarly to apps, and create an environment where users can hover, click, and further interact with Power BI content.
- When you share your reports in the Power BI service, buttons provide an app-like experience.

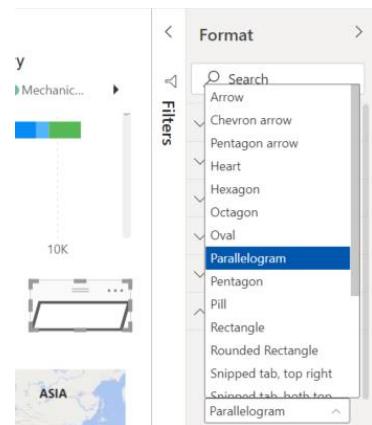


Create buttons

- In Power BI Desktop, on the **Insert** ribbon, select **Buttons** to reveal a drop-down menu, where you can select the button you want from a collection of options.

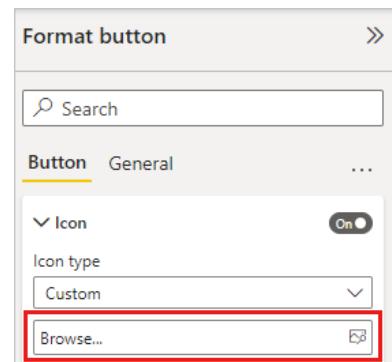
Customize a button

- The **Format** pane shows you the many ways you can customize the button to fit your requirements. For example, you can customize the shape of a button.
- Select the button, navigate to the Shape tab of the Format button pane, and customize the button to any of these shapes:

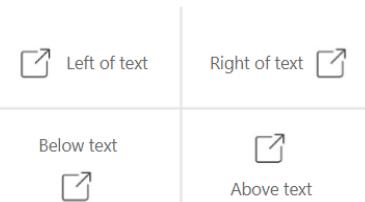


Add a custom image or icon

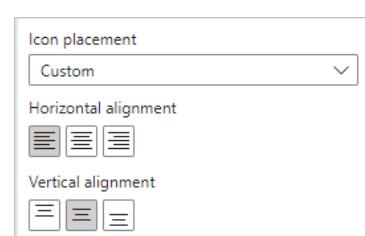
- Select the button, and navigate to the **Style > Icon** tab of the **Format button** pane.
- Select the **Custom** option for **Icon**, then select **Browse**.



- After you add your image, you can customize the **Image fit** and **Icon placement**. With icon placement, you can place the image either **Left of text**, **Right of text**, **Below text**, or **Above text**.



- You can choose the **Custom** option to control the icon's **Vertical alignment** and **Horizontal alignment**.



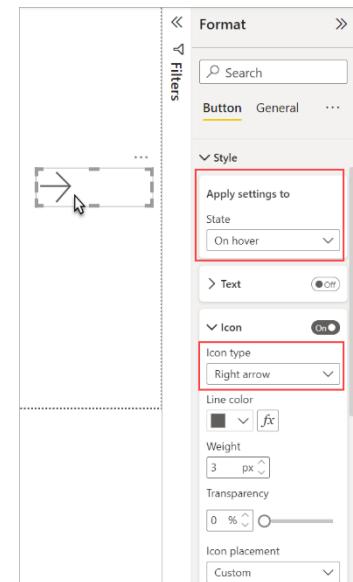
- You can also customize the **Icon size**. By default, the icon size is set to **Auto**, meaning that as you resize the button, the icon size automatically changes size. You can set a fixed **Icon size** (in pixels) by typing a number in the **Icon size** box.

Add effects

- Just like Power BI built-in shapes, Power BI buttons can have artistic effects to suit your design needs:
 - **Shape shadow** effects
 - **Shape glow** effects
 - Button **Shape rotation** and **Text rotation**.

Button states

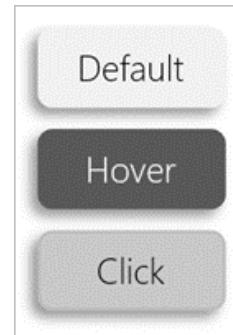
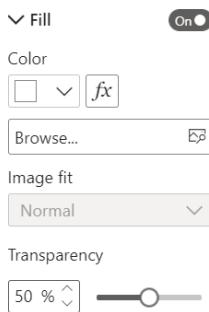
- Buttons in Power BI have four possible states:
 - **Default**: How buttons appear when not hovered over or selected.
 - **On hover**: How buttons appear when hovered over.
 - **On press**: How buttons appear when selected.
 - **Disabled**: How buttons appear when they can't be selected.
- You can modify many of the cards in the **Format** pane individually, based on these four states, which provides plenty of flexibility for customizing your buttons.
- The following cards in the **Format** pane let you adjust formatting of a button for each of its four states:
 - Shape
 - Style
 - Rotation (applies to all states automatically)
- To select how a button should appear for each state:
 1. In the **Format** pane, select the **Button** tab, and then expand the **Shape** or **Style** card.
 2. Select **State** under **Apply settings to** at the top of the card, and then select the settings you want to use for that state.



Buttons support fill images

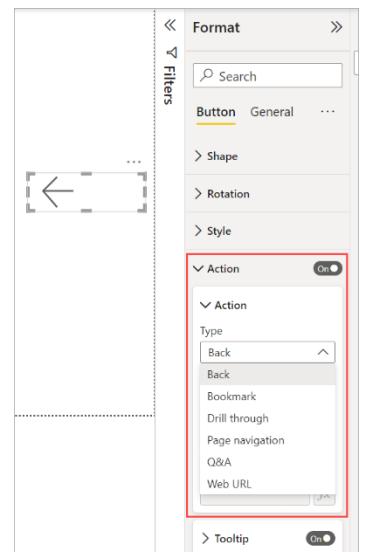
- Power BI buttons support fill images. With fill images, you can customize the look and feel of your button, combined with the built-in button states: default, on hover, on press, and disabled (for drillthrough).

- Under **Style**, set **Fill** to **On**, and then **Browse** for an image for each style state.



Actions for a button

- You can select which action is taken when a user selects a button in Power BI:
 - Back** returns the user to the previous page of the report. This action is useful for drillthrough pages.
 - Bookmark** presents the report page that's associated with a bookmark that is defined for the current report.
 - Drillthrough** navigates the user to a drillthrough page filtered to their selection, without using bookmarks.
 - Page navigation** navigates the user to a different page within the report, also without using bookmarks.
 - Bookmark navigation** navigates the user to a different state in the report, either on the same or a different page, by using bookmarks.
 - Q&A** opens a **Q&A Explorer** window. When your report readers select a Q&A button, the Q&A Explorer opens, and they can ask natural-language questions about your data.
 - Apply all slicers** and **Clear all slicers** buttons apply all the slicers or clear all the slicers on a page.
 - Web URL** opens a web page in a browser.
- Certain buttons have a default action that's selected automatically. For example, the **Q&A** button type automatically selects **Q&A** as the default action.
- To select a button action:
 - On the **Button** tab of the **Format** pane, turn the **Action** to **On**, and then expand the card.
 - Expand **Action**, and then select the **Type** of button action.

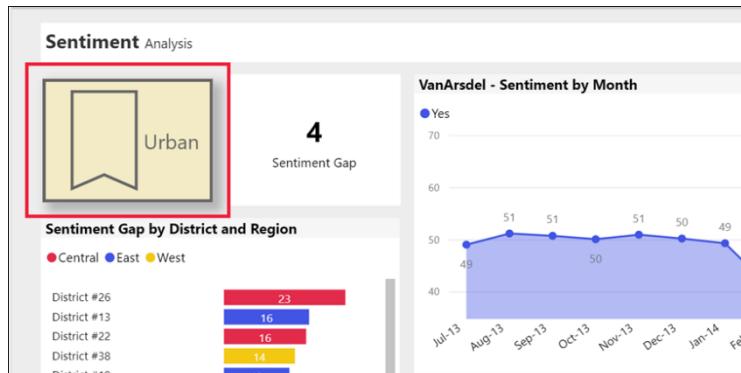


Back buttons

- A back button can have an arrow icon.
- When you select it, Power BI takes you to the previous page. Back buttons are often used with **drillthrough**.

Bookmark buttons

- When a report designer adds a bookmark button, it's just an alternate way to navigate to a particular report page associated with that bookmark



Drillthrough buttons

- There are two ways to drill through in the Power BI service.
 - Right-click a data point in a visual, select **Drill through**, and choose the destination.
 - Add a **drillthrough button**. The button makes the action more obvious and calls attention to important insights.
- Drillthrough buttons can have more than one prerequisite. If you don't fulfill all the prerequisites, the button won't work.

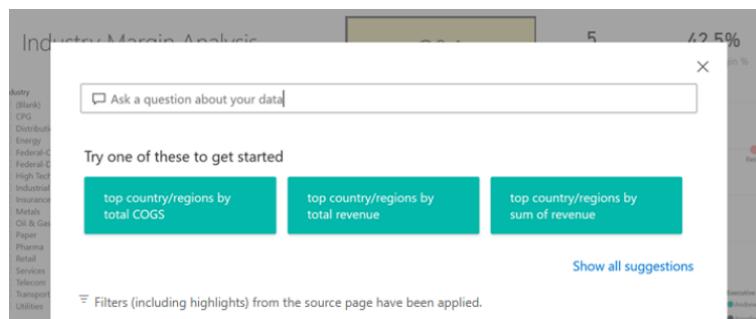


Page navigation buttons

- Page navigation buttons take you to a different page in the same report.
- Report designers often create navigation buttons to tell a story or guide you through the report insights.

Q&A buttons

- If you select a Q&A button it opens the Power BI Q&A Explorer window. The Q&A window displays on top of the report page and closes when you select the X.



Web URL

- Web URL buttons open a new browser window.
- Report designers might add this type of button as a reference source, to link to the corporate website or a help page, or even as a link to a different report or dashboard.

Exercise 29: Create Buttons

1. Use file **Exercise 29 Start.pbix**.

Apply All Slicers and Clear All Slicers Buttons

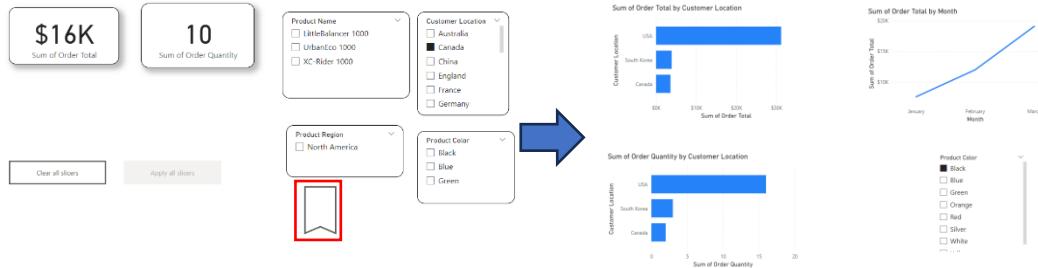
2. In Page **Sales Summary** you have 4 slicers.
3. If you publish your report, it would be so tedious for user to keep selecting and the report reflect the filters one by one when there are many slicers to choose from.
4. It would be better if we save user time and make him select all options, he/her wants from the slicers, then apply all filters just by clicking one button.
5. Also, if you make the user have the option to clear all filters with only one click.
6. On Ribbon → Insert tab → Elements group → Buttons → Apply all slicers.
7. A button added but it is **dimmed** (because there is no slicer option selected yet).
8. Now Notice the Value in the Cards.
9. Click **Asia** on the Product Region Slicer.
10. Notice that the value in Cards do not change, that is because Power BI now will not apply any filtering from slicers tell you click the Apply all slicers button.
11. Also notice that the button is not activated and ready to click on.
12. Select different options from the four slicers.
13. Now click on the Apply al slicers button.
14. Your filtering now applied all at once.
15. Add another button the same way but this time choose **Clear All Slicers** Button.
16. Click to clear all slicers.



Bookmark Button

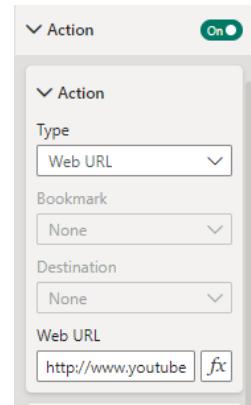
17. Go to **Page Summary Details**.

18. Select **Black** from the Product Color slicer.
19. Create a Bookmark **Black Product** to reflect your filter.
20. Clear your filter now.
21. Go to Page **Sales Summary**.
22. Add a Bookmark button with the Black Product bookmark you have created.



Web URL Button

23. Go to Page **Sales Summary**.
24. Create a Blank Button.
25. Change its text to **Visit my YouTube Cannel**.
26. Enable action and make its type: **Web URL**
27. In Field **Web URL** type:
<http://www.youtube.com/saidfawzy>.



Use Shape and Photo Action

28. You can also use **photo** or **shape** and Add action to it.
29. Add a new **Triangle** shape.
30. Change its text to Said Fawzy Channel.
31. Enable action and make its type: **Web URL**
32. In Field **Web URL** type: <http://www.youtube.com/saidfawzy>

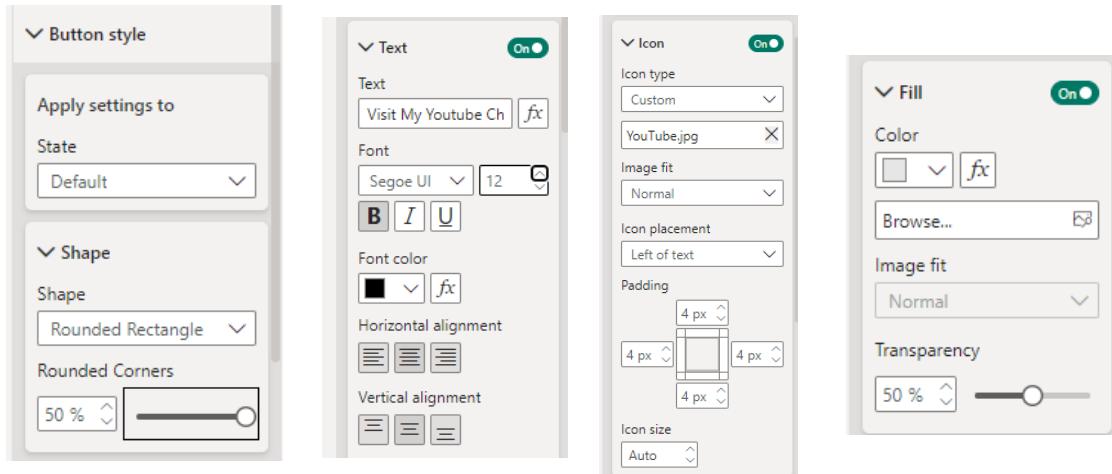


33. Insert Photo **YouTube.Jpg**.
34. Enable action and make its type: **Web URL**
35. In Field **Web URL** type: <http://www.youtube.com/saidfawzy>

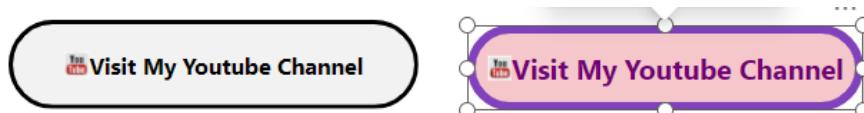


Format Button

36. Select Visit my YouTube Channel button.
37. In **Format** pane.
38. Choose **Button Style** Card → Apply Settings to: **Default State**.
39. Change the following:



- a. Shape: **Rounded Rectangle** with 50% round.
 - b. Text: Font **12** Black Center
 - c. **Icon**: Icon type: custom-- YouTube.jpg-- Left to text.
 - d. Enable **Fill** with color: **#E6E6E6**.
 - e. Enable **border** and make it black 3px width.
40. Go to **Button Style** again and Apply Settings → **On Hover State**.
41. Change the following options:
- a. Text Font **16** with color **#6B007B**.
 - b. Fill color: **#E68F96**
 - c. Border color: **#744EC2** with width **6px**.
42. Check now and hover your button.



Knowledge Check

Question 1

You're creating a Microsoft Power BI report for a supply chain management team. They need the ability to drill through to detailed information about specific products when clicking on a product category in a visual. Which actions are necessary to set up drillthrough capabilities for this scenario?

Select all that apply.

- A. Create a drillthrough page with relevant visuals and filters.
- B. Add conditional formatting to the product category field.
- C. Change the theme of the report to match the supply chain branding.
- D. Define drillthrough filters on the product category field.

Question 2

You have created a Microsoft Power BI report with several pages. You have added a bookmark to easily navigate to a specific filtered state. A viewer has requested that the report page shouldn't change when the bookmark is clicked. Which action should you take?

- A. Replace the bookmark with a button
- B. Disable the current page option for the bookmark
- C. Replace the bookmark with a slicer

Question 3

In Microsoft Power BI, when you interactively select a data point in one visual, and other visuals on the same page are filtered to show related data points, which feature is being used?

- A. Drillthrough
- B. Slicer filtering
- C. Cross-highlighting
- D. Cross-filtering

Question 4

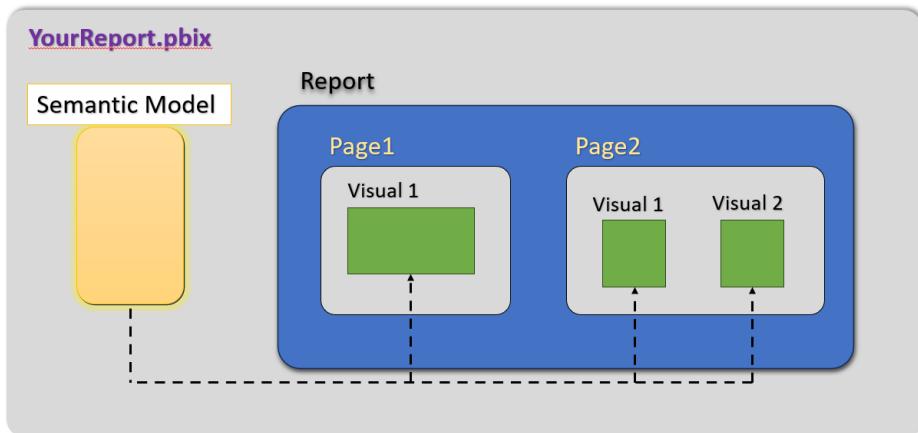
What are the benefits of adding slicers to a report? Select all that apply.

- A. Faster loading of visualizations
- B. Improved interactivity
- C. Improved user experience

Chapter 5: Power BI Service

The Structure of .pbix file

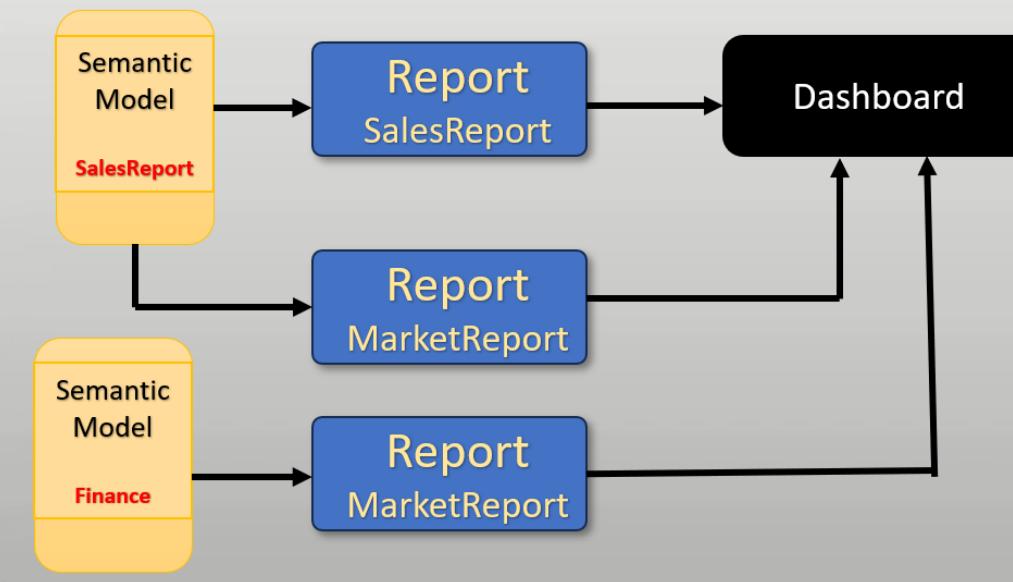
- The file you create in power BI desktop is saved with the extension of .pbix file.
- It contains **Semantic Model** (known as dataset before) and **pages** with **visuals**.
- Visuals in pages gets its data from the **Semantic Model**.
- A report can be connected to only one **Semantic Model**.



Publish your report to Power BI Service

- When publish your report to the power BI service the .pbix file is separated into a **Report** and a **Semantic Model**.
- You can use the Semantic Model to create many other Reports.
- Remember that a **Report** can get its data from only one Semantic Model.
- You can create a **Dashboard** from visuals from many reports.

My Workspace in Power BI Service



Create a Power BI Account

- To publish your .pbix file you must have at least a free Power BI account to publish your file to **My Workspace** you have.
- **My Workspace** is a personal workspace you cannot share with others.
- If you have a **Pro power BI account**, you can create many others workspace and share your work with others.
If you do not have an account, please watch my video on my channel on YouTube, to Create a developer account on Microsoft Developer program to proceed with exercises in this chapter.

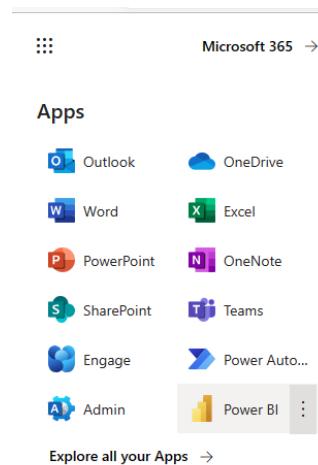


Exercise 30: Publish a Report

1. Use file **Exercise 30 Start.pbix**.

Sign in to Power BI Service

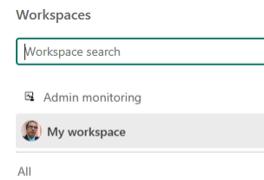
2. Create a power BI Developer account as I mentioned in the previous section.
3. Go to either:
 - a. <https://app.powerbi.com/>
 - b. <https://Office.com>
4. Login with your account.
5. If you login to your account office account, click the **waffle** icon on the top left then select Power BI.



Create a new Workspace

(**Note:** You can skip this part and use your My Workspace if you have a Free Power BI account).

6. On the left bar click the **Workspaces** button.
7. All your workspaces will show if you have any.
8. Click a **New workspace** button to create a new one.
 - a. Name: **AC Training**.
 - b. Description: **This workspace contains all reports and Semantic Models for training in AC Institute.**
9. Now you have an empty workspace.

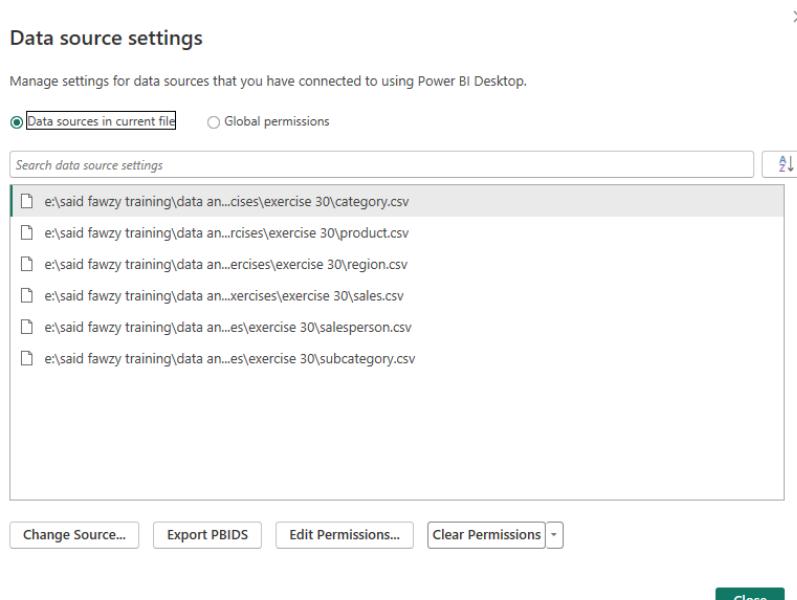


The image shows a "Create a workspace" dialog box. It has fields for "Name" (set to "AC Training") and "Description" (set to "This workspace contains all reports and Semantic Models for training in AC Institute"). A note below the description says "This name is available". At the bottom right is a green "New workspace" button.

Publish Report to your Workspace

10. Open your exercise file.
11. Go to Power Query and explore the files you have imported to your report.

12. Go back to Power BI and from Home tab in ribbon → Queries Click the arrow down the Transform Data and choose Data Source Settings



13. Notice your data source is 6 .CSV files.

14. Go to Model View and review your data model.

15. You have a report of one page **Sales Report**.

Save Your File

16. The first step is to save your report, you cannot publish unsaved report.

17. Save your report as **Sales Report.pbix**.

Login to your account

18. Click on the top right corner of Power BI and make sure you are logged into your power BI account.

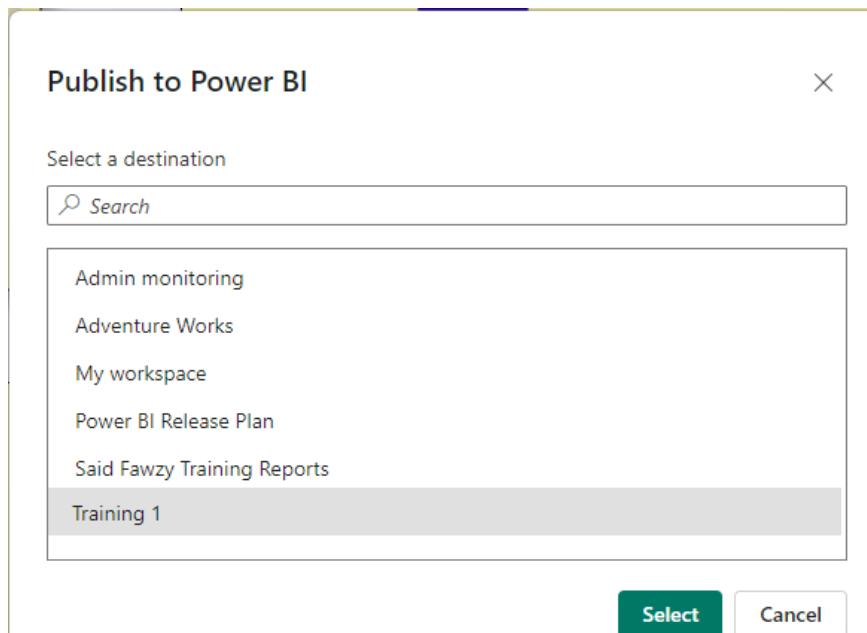
19. If not click on to login.

Publish your Report

20. In Home tab in the ribbon on Share Group click Publich.

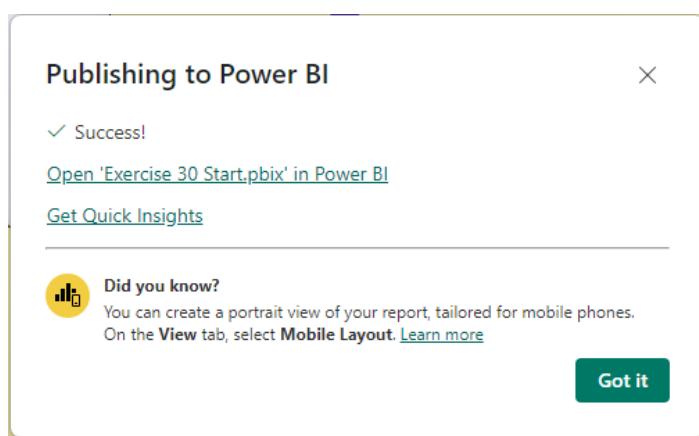
21. You will receive a list of all Workspaces you have in your account.

22. Select **AC Training** workspace and click Select button.



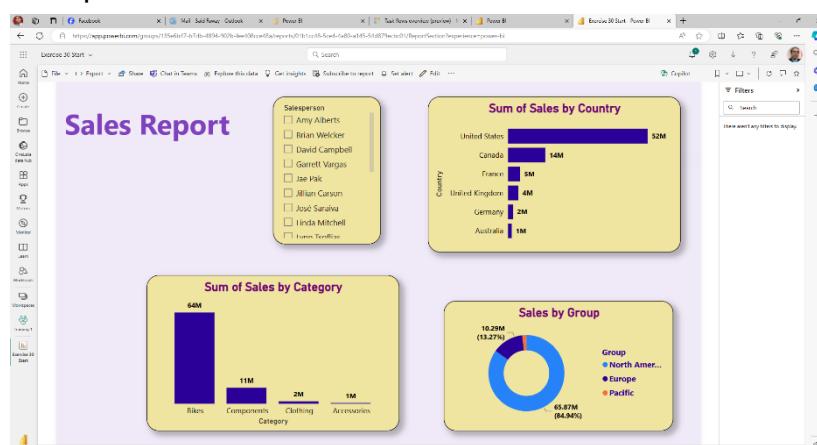
23. A **Publishing to Power BI** dialogue box appears.

24. After a while you will get a success notification.



25. Click on the link he gives to you to open your report

26. Your report is now available online.



27. Click on the Workspace **AC Training**.

28. You can see you have two objects now, your **report** and your **Semantic Model** and they have the same name Sales Report, the same name of your .pbix file.

29. When you have many objects in your workspace you can filter them using the **Filter Dropdown** list or writing key words in the **search box**.

30. Notice the icon beside the **Report** and **Semantic model**.

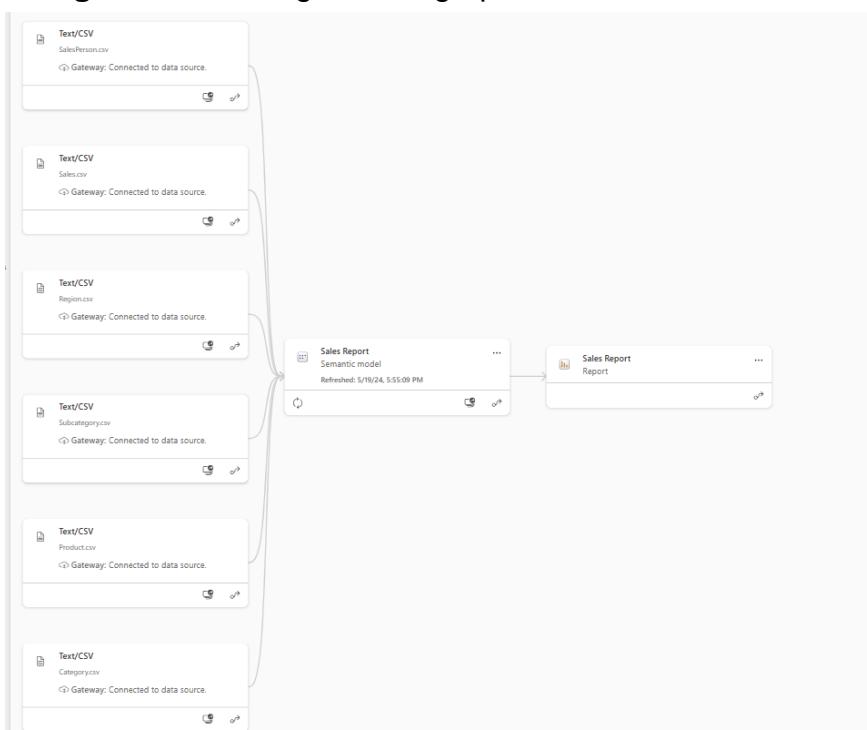
Lineage View

31. Notice you have two views of your workspace:

- List View.
- Lineage View.



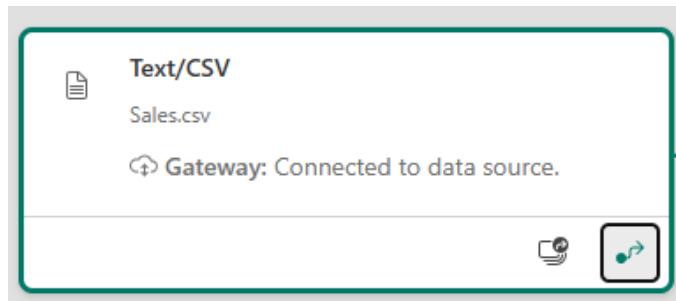
32. Click on **Lineage** view icon to go to this graphical view.



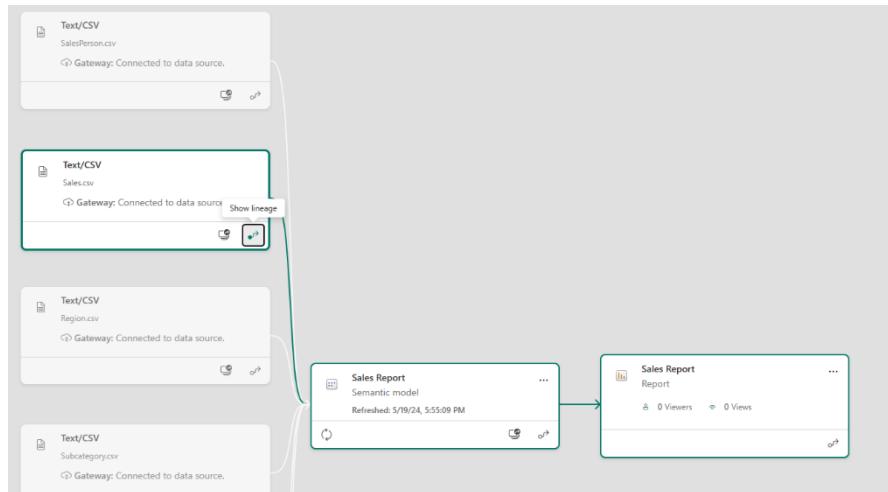
33. This diagram tells you that you have 5 .csv files, you have used to create the “Sales Report” **Sematic Model** the “Sales Report” Report used to get its data.

34. Click on any object a window with its properties appears.

35. In every object you have a **show lineage icon**, in the bottom right corner: if you click on it a **green border** will show you how data flow goes on this object.



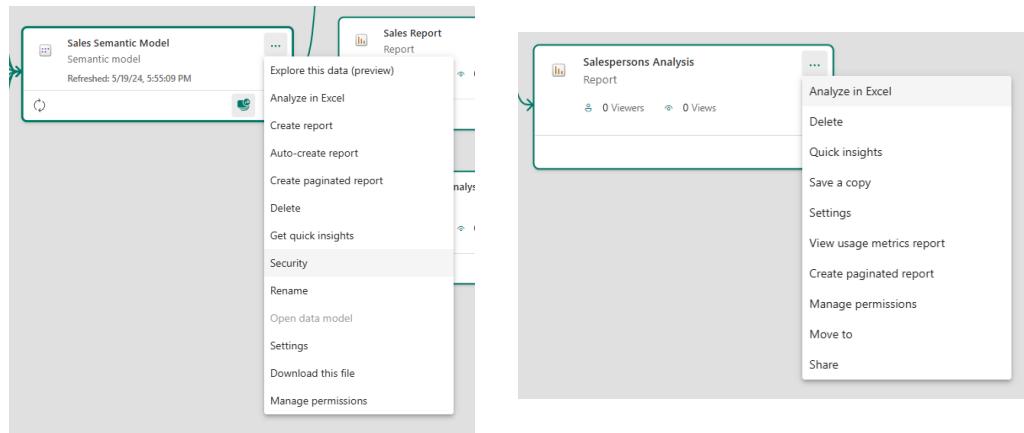
36. Click on Sales.csv file and click the show lineage icon.



37. This will show you the data flow from the Symantec model to report.

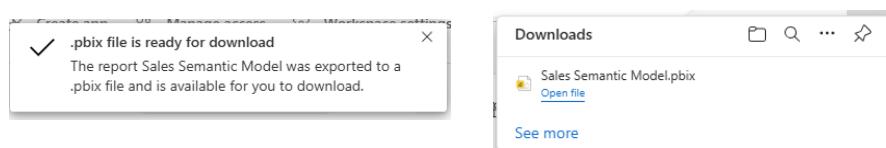
38. You have **3 dot ellipsis** on Semantic Model and Report rectangle.

39. Click to show action you could take, for example you can click on the Sales Report Semantic Model and change its name to more proper name like **Sales Semantic Model**.



40. Click on the ellipsis on the semantic model and select **Download this file**.

41. You will have a copy of your .pbix file to your computer.



42. Click on the ellipsis on the semantic model and select **Explore this data(preview)**.

43. You will have an exploration window where you can explore more data.

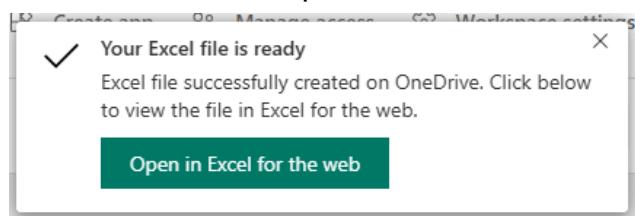
44. From Data on the right select **Category** and **Quantity** fields.

45. It will create a small report with **Matrix** and a **visual** for you to explore.

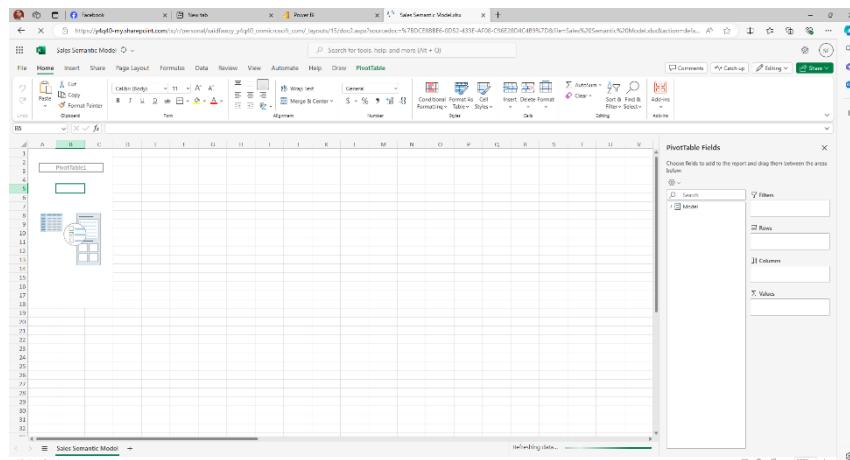
46. Click to close and do not save as a new report.

Category	Sum of Quantity
Accessories	24264
Bikes	71880
Clothing	61498
Components	46472
Total	204114

47. Click on the ellipsis on the semantic model and select **Analyze in Excel**, and when finished click to open in the Excel online.



48. A file with your data model appears with **Pivot table** to analyze your data.

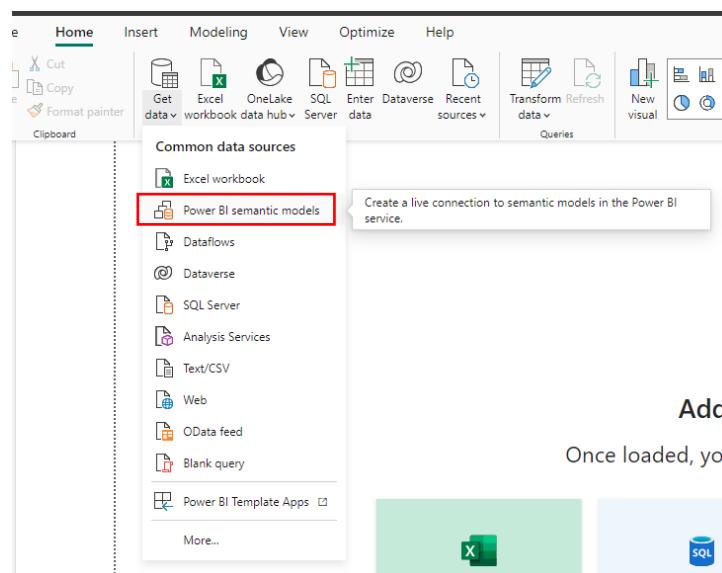


Exercise 31: Creating Reports Using the Same Semantic Model

1. We want to make use of the Semantic Model that is available online after Transformation, Relationships and DAX calculations.
2. The Market Department want create report for them using the Sales Semantic Model, and when the company update online all data in both reports will be updated.

Create Report Using Power BI Desktop

3. Create a new power BI Desktop.
4. Home → Get Data → Power BI semantic models.



5. In the dialogue box that appears filter your data to **Semantic model** and search by **Sales** key word.

The screenshot shows the OneLake data hub interface. At the top, there's a search bar with 'sales' and a 'Filter(1)' button. Below it is a table with columns: Name, Owner, Refreshed, Location, Endorsement, and Sensitivity. The first row, 'Sales Semantic Model', is highlighted in grey. The table also contains other rows like '02_Adventure-Works-Product-Sal...' and '05_Exercise_Adventure-Works-Pr...'. At the bottom right are 'Connect' and 'Cancel' buttons.

6. Select Sales Semantic Model and Click Connect.

You will have your data fields on the right as usual.

7. But notice you do not have a table view.

The screenshot shows the Power BI 'Modelling' page. On the left, there's a 'Data' pane with various tables listed. In the center, there's a 'Build' interface with a 'Report canvas' where a small chart is being拖放 (dragged and dropped). The ribbon at the top has tabs like Home, Insert, Modeling, View, Optimize, Help, and Search.

8. Create a Market Report page with 3 visuals:

- A bar chart of **Sales by color** sort descending.
- Funnel chart for the **Top 5 Selling products**.
- Area chart that shows **sales through months according to Group**



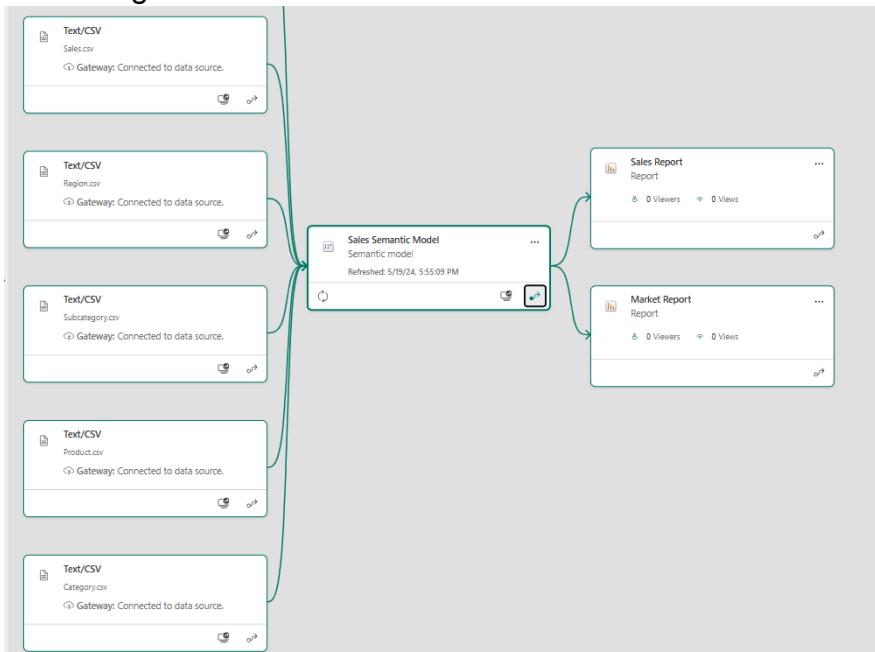
9. Save your file as **Market Report.pbix**.

10. Publish your report to your **AC Training workspace**.

11. Go to your AC training workspace and refresh.
12. You now have **two reports** and **one Semantic Model**.

	Name	Type	Task
	Market Report	Report	
	Sales Report	Report	
	Sales Semantic Model	Semantic model	

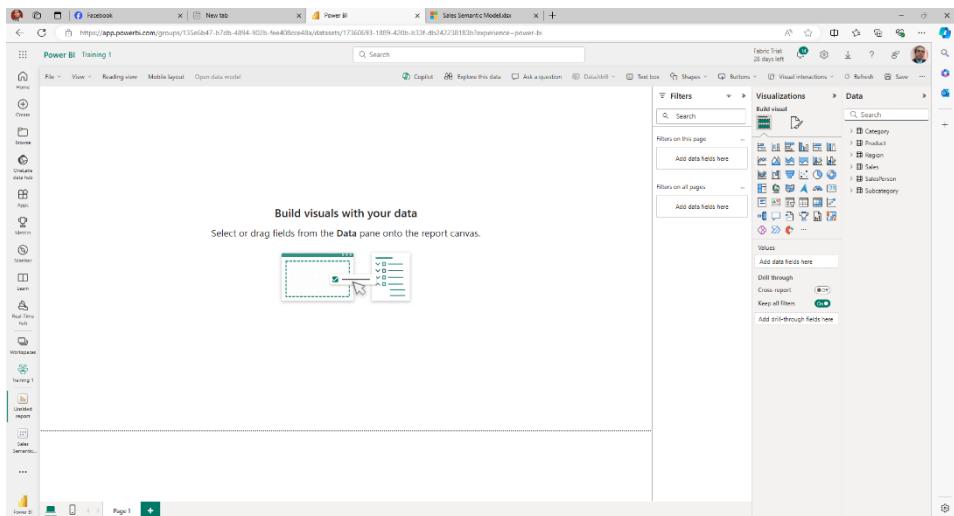
13. Go to lineage View.



14. You can see that your data model is giving data for two reports.

Create a Report On Power BI Service

15. You can create a report on the Power BI service directly.
16. Click on the ellipses next to **Sales Semantic Model** and select **Create Report**.
17. You will have an empty Report.



18. It looks like the Power BI desktop but a little bit older.

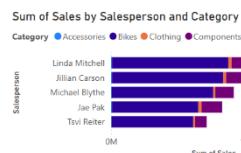
19. Create a report Top 10 Salespersons

20. Create:

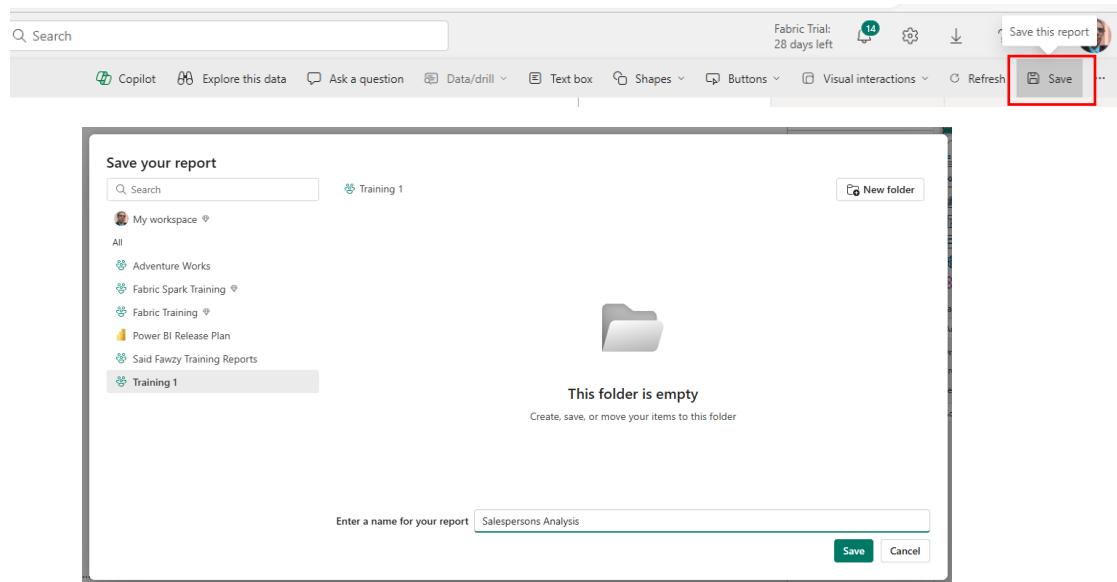
- table for Salespersons and Sales
- Column chart for salespersons sales in Countries
- Var chart for Salespersons sales by Category.

Top 10 Salesperson

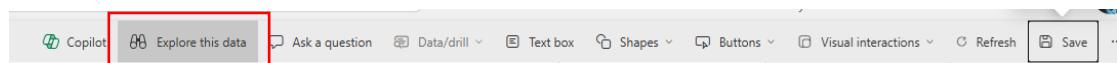
Salesperson	Sum of Sales
Linda Mitchell	10,158,634.52
Jillian Carson	9,755,992.01
Michael Blythe	8,952,751.48
Jae Pak	8,099,816.95
Tsvi Reiter	6,976,128.29
Shu Ito	6,283,193.33
Jose Saravia	5,536,439.26
Ranjit Varkey Chudukatil	4,429,368.45
David Campbell	3,614,760.61
Garrett Vargas	3,486,102.49
Total	67,293,187.39



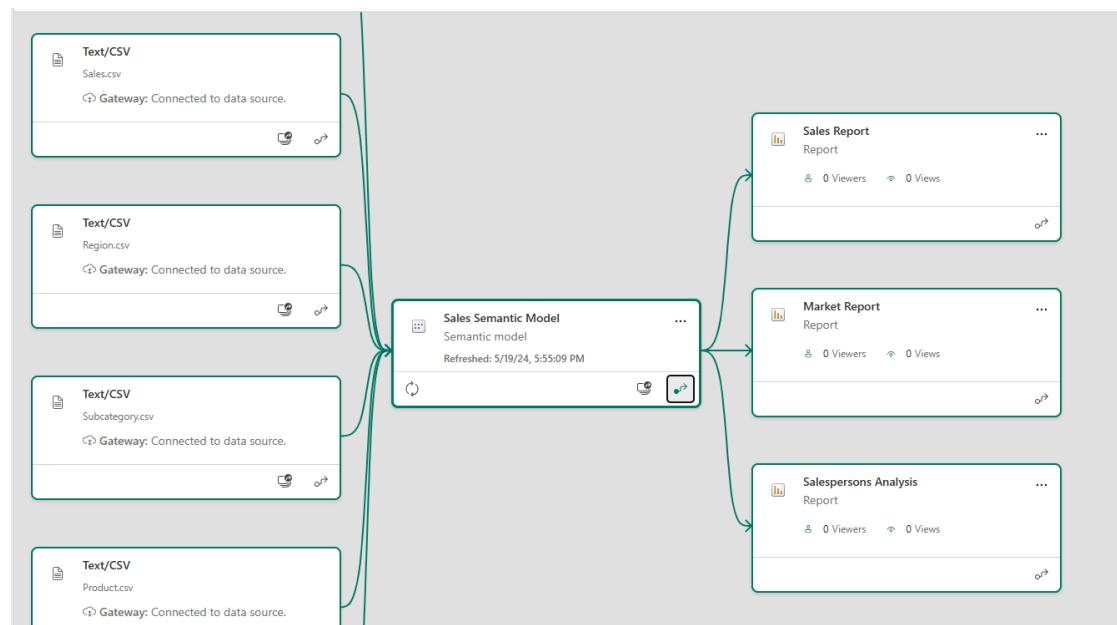
21. When you finish click Save on the top right and save your new report as **Salespersons Analysis**.



22. You can get back to edit this report or any other report online by clicking the **Edit** option on the Top.

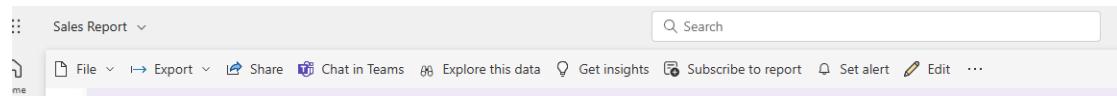


23. Now go to your workspace to see your reports and Semantic Model.
 24. You now have three reports created from the same Semantic Model.



Explore Menu of Online Report

25. Click Sales Report to open.
 26. On the top of your report there is menu bar with many options

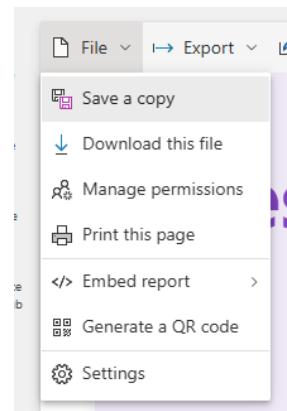


27. Let us explore them one by one

File:

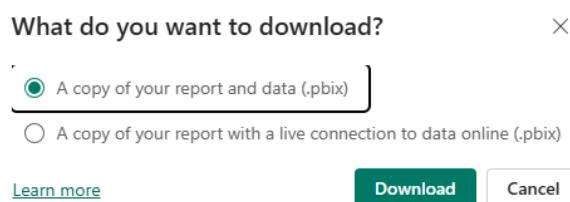
28. Save a Copy:

- (to save another copy of report into your workspace or any other workspace).
- when select you have a dialogue box to enter name for your new report and you can select from the left which workspace to save into.

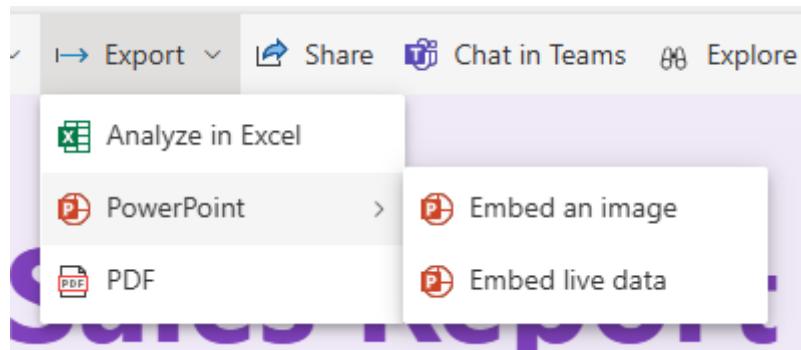


29. Download this file

- You can download a .pbix file either with data or with live connection to data online.



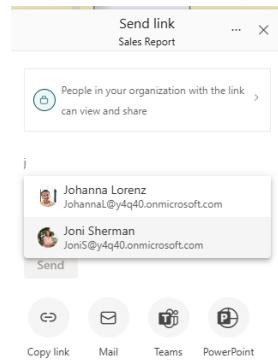
Export:



- You can analyze in Excel.
- Save as a PowerPoint with Visuals as image or dynamic.
- Save as a PDF file.

Share:

- You can create a link and share it with people in your organization.



Edit

- Go to Edit mode.

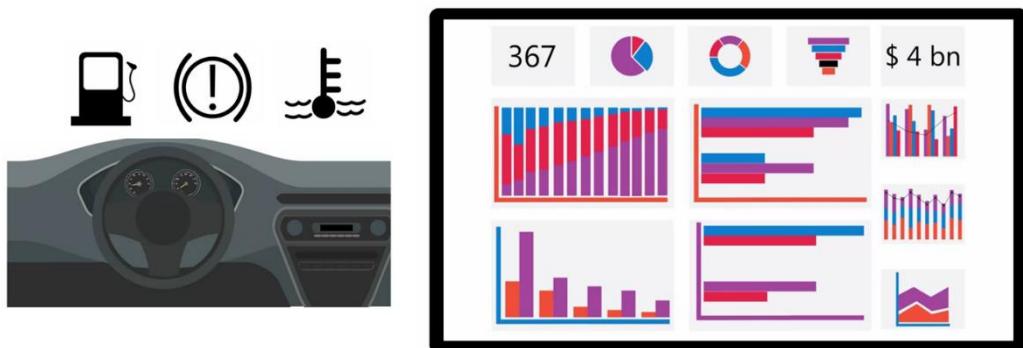
Question

What is the primary function of publishing reports in Microsoft Power BI?

- To connect your Power BI report with other data visualization tools.
- To move your report from Power BI Desktop to Power BI Service.
- To create a report using Power BI Desktop.
- To analyze data in your report using Power BI tools.

Dashboard

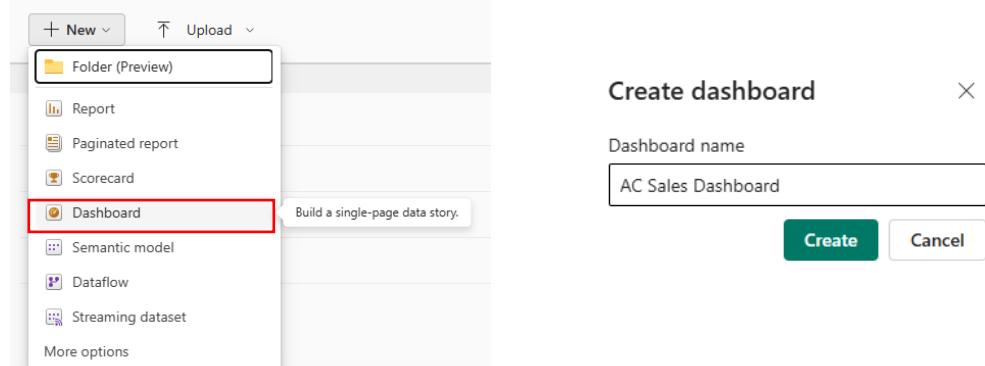
- Consider the dashboard of a car. It presents critical data like speed, fuel level, and engine temperature in a consolidated visually understandable way. This information allows you to make necessary decisions while driving.
- Similarly, in the business context, a dashboard **visualizes the critical information** required to accomplish specific objectives, skillfully arranged and consolidated on one screen.
- Dashboards can present data from **different sources** in various forms, making it easier for stakeholders to understand.



Exercise 32: Create a Dashboard

- Open your Microsoft Power BI service and navigate to your **workspace** in the left navigation pane.
- From your available workspaces, select the **AC Training** workspace.
- Change to **List** view.
- On the top left corner, select **New**, and then select **Dashboard**.

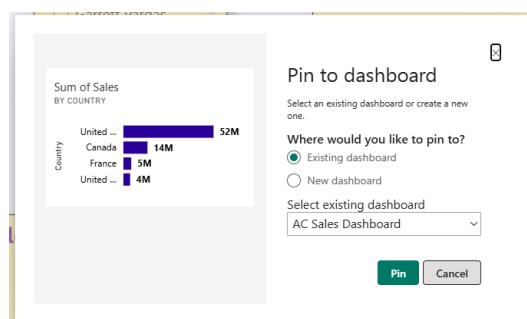
5. A pop up appears asking you to name your dashboard.



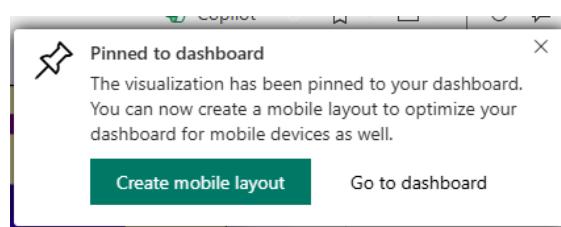
6. Let's name it **AC Sales Dashboard**. then select **Create**.
 7. Once you have created your dashboard, you can start adding visuals.
 8. Return to your workspace and open the **sales report** you and your team created.
 9. Each visualization in your report has a **Pin icon** in the top right corner. Select the Pin icon for the **Sum of sales country**, bar chart.



10. This opens a dialog box where you can choose where to pin this visual. Select your newly created **AC Sales Dashboard** from the dropdown menu.



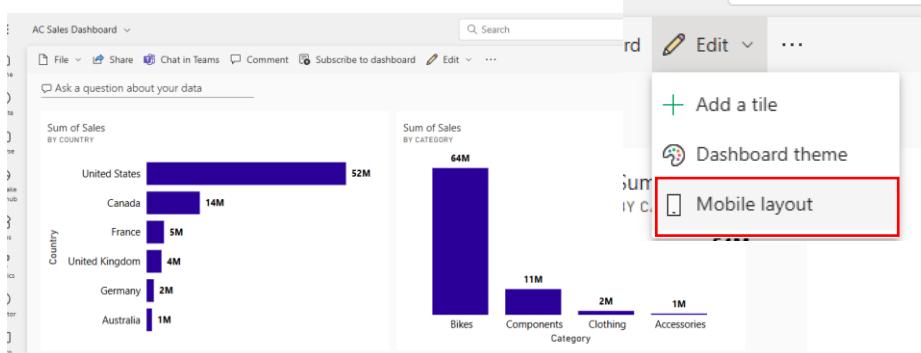
11. Then pin the **Sum of Sales by Category** Column Chart.
 12. Click the Go to dashboard in the pop-up message that shows up.



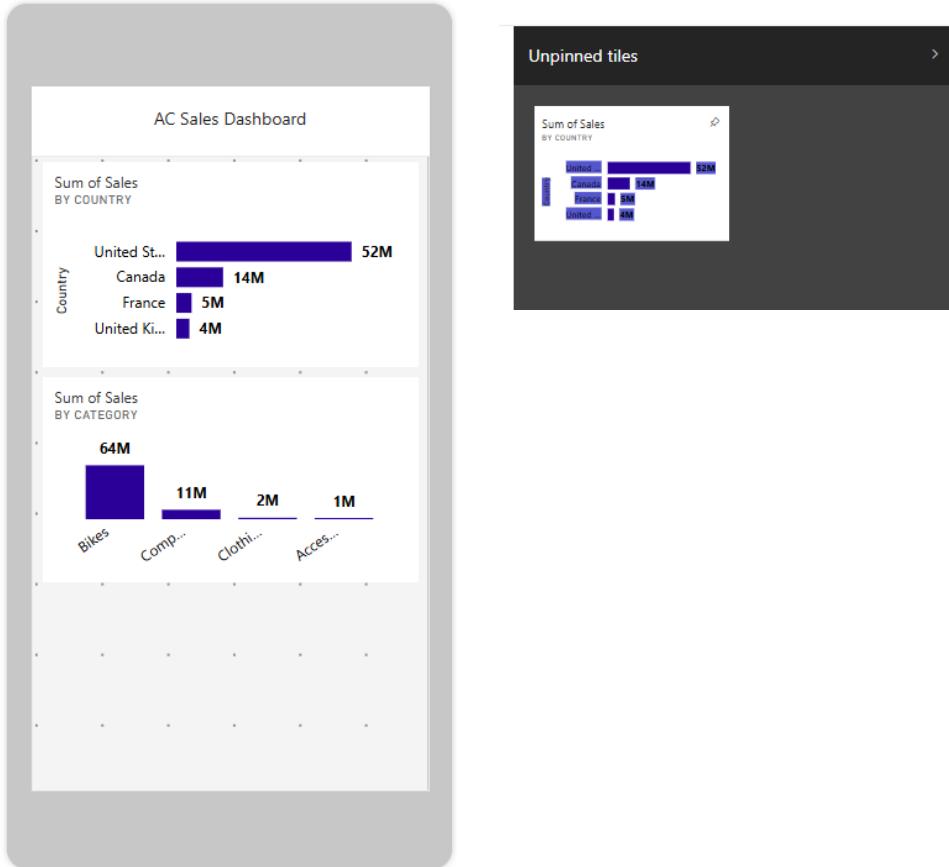
13. You have now your dashboard with two **Tiles**.

Mobile View

14. In the modern business landscape. Having mobile accessible data is key.
15. With Power BI's mobile layout feature, you can configure your AC Sales Dashboard to be **mobile friendly**, ensuring stakeholders can access insights on the Go.
16. To switch to mobile view, go to the main navigation bar.
17. Find and select the **Edit** menu.
18. From the dropdown options, select **Mobile layout** to switch the view from desktop to mobile.

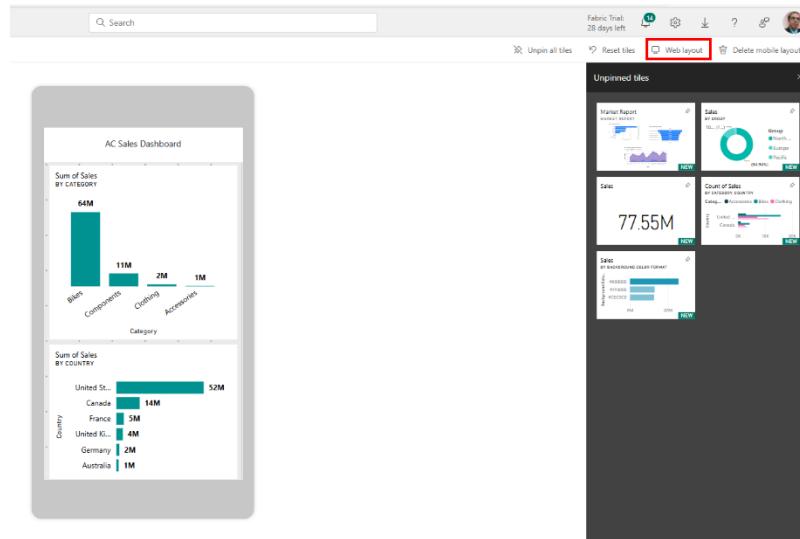


19. Once you select the mobile layout, your screen adjusts to replicate a mobile devices screen size.



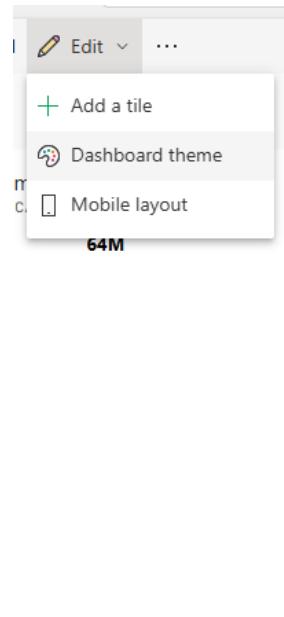
20. Now, instead of a wide canvas, it displays a vertical layout.
21. You just need to decide which visuals to show on the mobile layout and where to place them.

22. A list of all the visualizations in your dashboard is displayed on the right side of your screen.
23. Each visualization has a **Pin icon** next to it to select the visuals you'd like to appear in the mobile layout.
24. You can select and drag each visualization to move it around on the canvas.
25. You can also resize each visualization by dragging its edges.
26. Click on the **Web Lay out** on the top right to get back to your report.



Change the theme of a Dashboard.

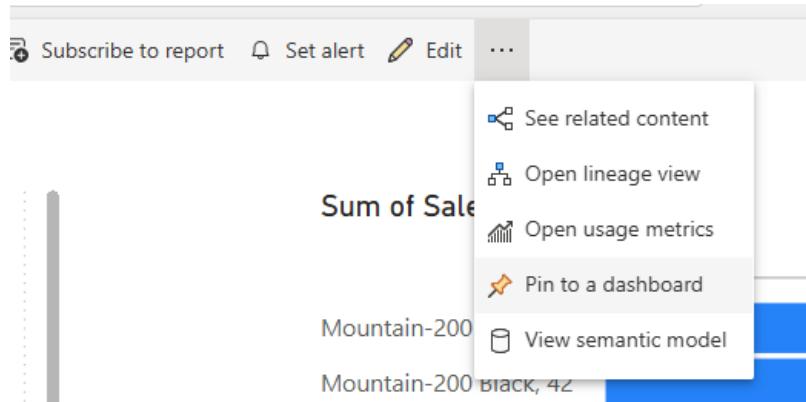
27. In the upper menu find and select the **Edit** menu.
28. Select **Dashboard theme**.
29. Another drop-down list appears.
30. You have a few themes to choose from.
31. You can also choose custom and select your color or upload a JSON file with the theme you want.



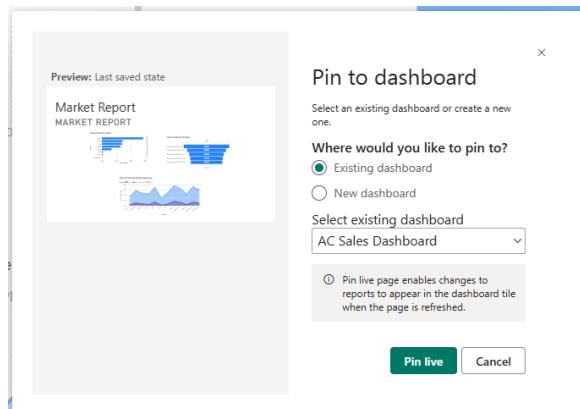
32. Choose a theme that you feel best visually represents the data and select it. Then select Save.
33. The theme is now applied to your dashboard, and you'll immediately observe the changes in color and style applied across all your visualizations.

Pinning a Live Report

34. In Power BI, a **pinned visual** is a **snapshot** of a specific piece of data or chart from a report that is attached or pinned to a dashboard.
35. Pinned visuals provide an at a glance overview of specific insights. However, they have certain limitations. The main limitation is their **lack of interactivity**. You can't cross filter or drill through data using pinned visuals, which prevents you from exploring data trends in greater detail.
36. The solution lies in pinning live reports to your dashboard instead. **Pinning a live report** means attaching an **entire report page** to your dashboard as a **live tile**.
37. Unlike standard visuals pinned to a dashboard, live report tiles are **dynamic** and maintain the interactivity of the original report. This includes the ability to drill through data, cross-filter and view tooltips, which provides a more immersive data exploration experience directly from the dashboard.
38. Pinned live reports retain the original report **layout** and **formatting**, making the visuals aesthetically consistent.
39. Open **Market report**.
40. Select the **Reading View** button at the top left of the screen.
41. Select the **Ellipsis** menu at the top right of your screen. Then select **Pin to Dashboard** from the drop-down menu.

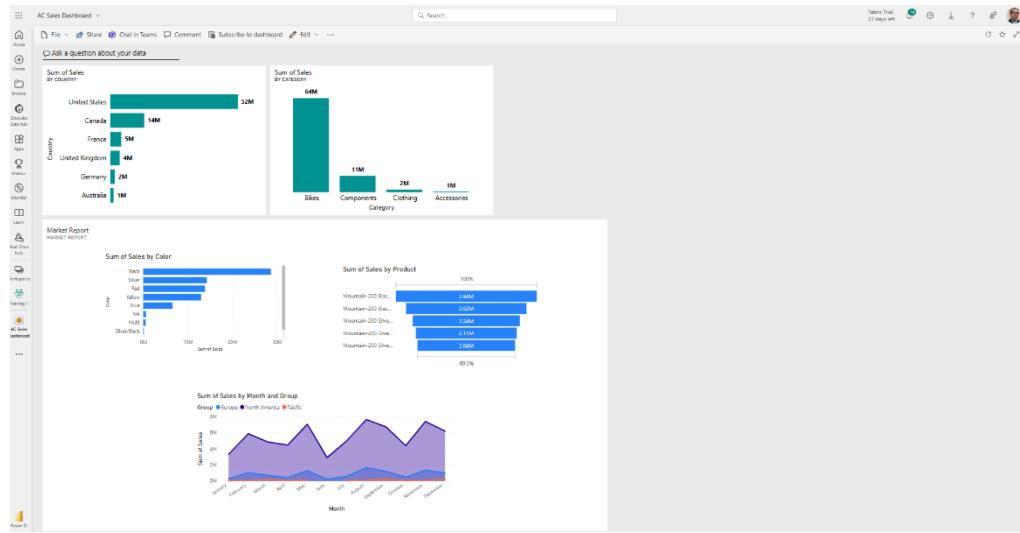


42. A dialog box asks you to choose a **destination** for your pinned live report. You can select an existing dashboard or create a new one by typing a new name into the text box.



43. After you've selected the destination, select the **Pin Live** button in the bottom right corner to pin your live report to the selected Dashboard.
44. To view your newly pinned live report, navigate to your **AC Sales Dashboard**.
45. Now, a live interactive report is directly accessible from your Dashboard.

46. Any changes you make to the original report will reflect in the live report on your Dashboard ensuring Real Time Data Updates.



Question 1

How does a report in Power BI differ from a dashboard?

- A. There is no difference between a report and a dashboard in Power BI.
- B. A report is an in-depth, interactive view of a specific dataset, while a dashboard provides a summary of the most important metrics.
- C. A report provides a summary of the most important metrics, while a dashboard is an in-depth, interactive view of a specific dataset.
- D. A dashboard in Power BI allows for interactive analysis, while a report does not.

Question 2

In configuring the mobile layout for a Microsoft Power BI dashboard, how do you select which visuals to show on the mobile layout?

- A. The visuals that fit best within the mobile screen size are automatically selected.
- B. By selecting the pin icons next to the desired visualizations.
- C. The visuals are chosen based on their alignment with the dashboard's theme.
- D. The visuals are automatically chosen by Power BI based on their related data.

Question 3

What is the primary limitation of pinned visuals in Power BI Dashboard.

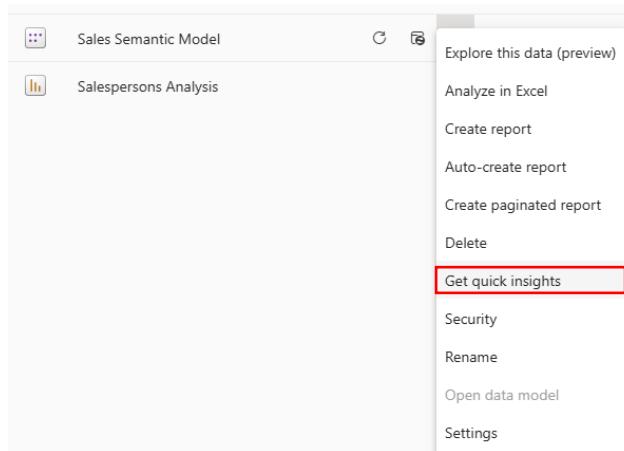
- A. They are challenging to create.
- B. They can only show limited data.
- C. They are not visually appealing.
- D. They lack interactivity.

Quick Insights

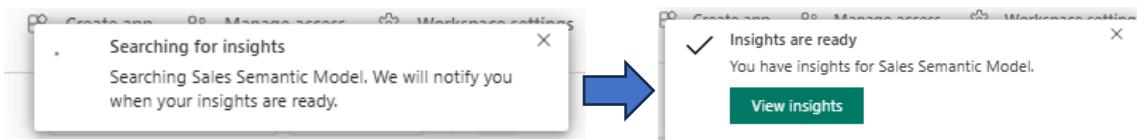
- Quick insights is a feature in Power BI that automatically **searches** datasets to **discover** and visualize **potential insights**.
- It identifies **patterns**, **trends**, **outliers**, and other useful insights that may not be immediately obvious.
- Quick Insights not only presents the insights in an easy-to-understand format, but also explains how it arrived at these insights. This way, even if you're new to data analysis, you can follow along and gain a solid understanding of the data.

Exercise 32: Quick Insights

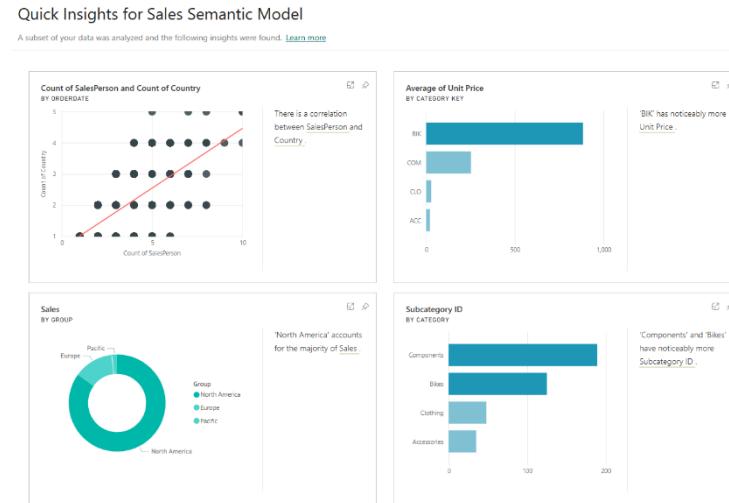
1. Open your **AC Training** workspace.
2. You have only one Semantic Model that contains all your company data, that is **Sales Semantic Model**.
3. Select the ellipsis menu next to it and get quick insights to initiate the automated analysis.



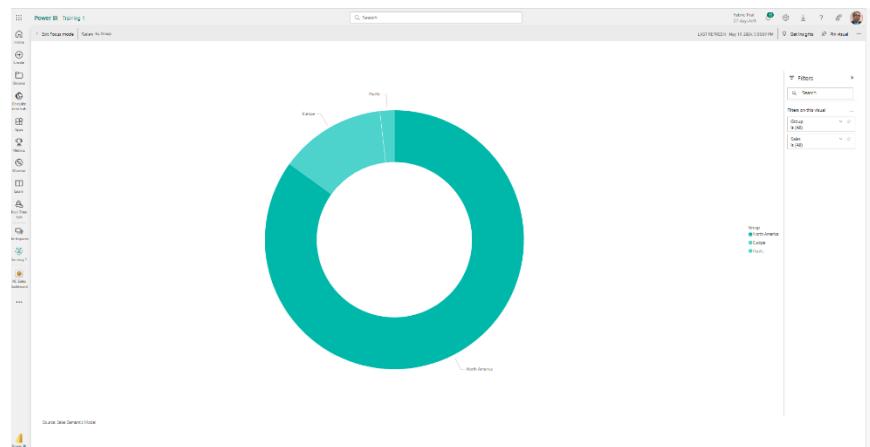
4. Power BI starts an automatic scan of your data. During this process, the function applies various machine learning algorithms and statistical functions to your data set.



5. It searches for potential **patterns**, **trends**, **correlations**, **outliers**, and other interesting attributes. This process can take a few minutes, depending on the size and complexity of your data set.
6. After the scan, you can access the Insights by selecting **view insights**.
7. This will lead you to a new page filled with **cards**.
8. Each insight card visually represents a particular pattern or trend in your data.



9. Hover over the visuals or select them to display more details.



10. Click Exit Focus Mode to get back to Insight page.

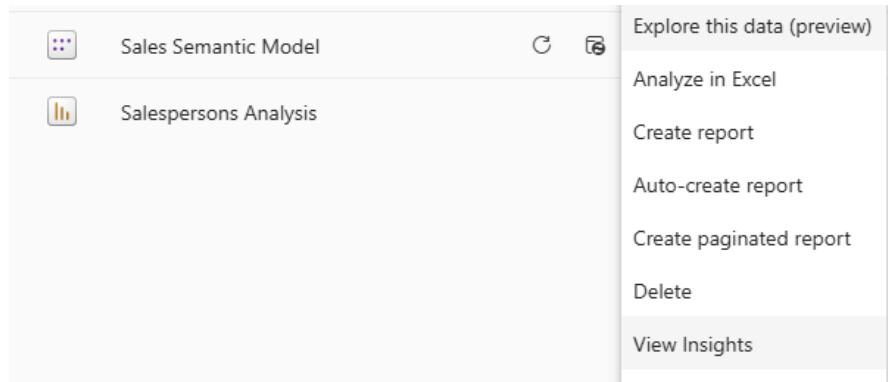
Pin Insight to Dashboard

11. If you find any insight particularly useful or wish to share it with others in your team, you can pin it to a dashboard.
12. To do this, hover over the card and select the **pin icon** in the top right corner of the card, then select the dashboard you want to pin it to or create a new one.
13. Select the **Sales by Group** Pie visual and pin to your Dashboard.



14. Then select the dashboard you want to pin to.

Note: You can get back to the created insights by right clicking your Semantic Model and choose **View Insight** this time.

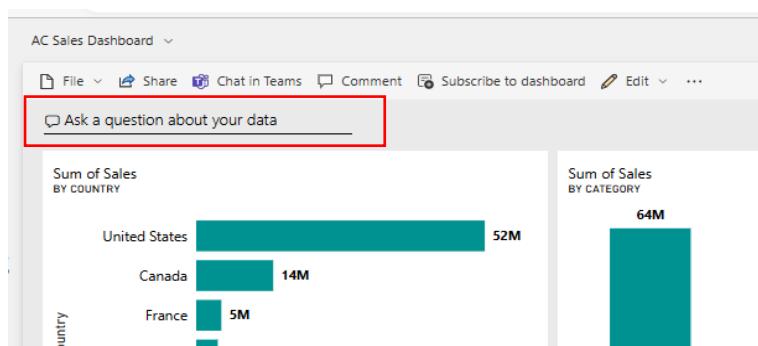


Q&A

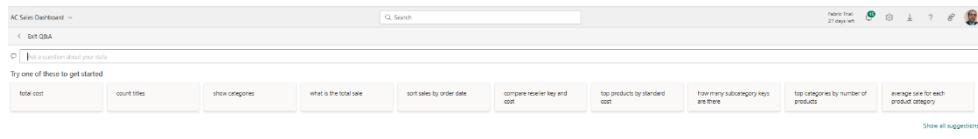
- The Q&A feature is a natural language processing tool in Power BI. It allows you to ask questions about your data in plain English and provides answers in the form of **charts, graphs, or simple numeric results**.
- This feature is invaluable in the business context because it allows users of all levels to interact with their data and find specific answers without requiring deep technical knowledge.
- The more you use the Q&A feature, the more it learns and adapts to your question style, offering even more relevant and precise answers over time.

Exercise 33: Q&A

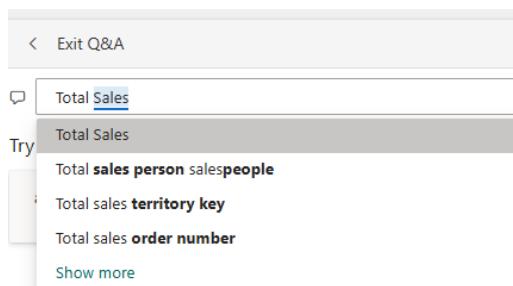
1. Open AC Sales Dashboard.
2. At the top of your dashboard, there's a field “ask a question about your data”.



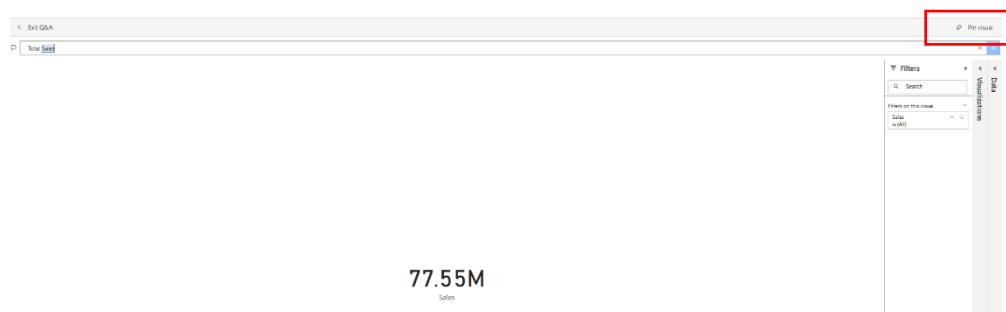
3. This is the Q&A box. Place your cursor in the box to ask your question. Type your question in normal conversational language. As you type, Power BI Q&A will start offering suggestions and autocomplete options based on the data in your dashboard.



4. Write **Total Sales**.
5. Notice that Power BI underlines a **blue line** and give you suggestions to choose from that means he had found Sales field in your Data and can analyze.



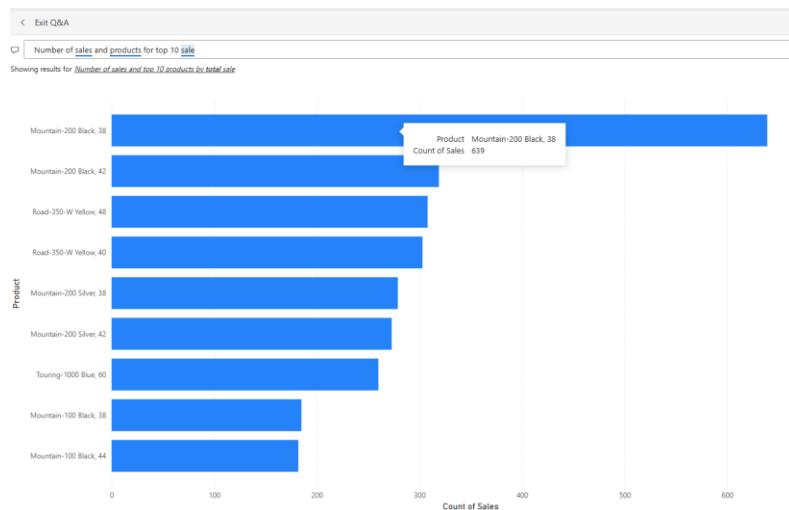
6. Press the **arrow** or press **Enter** to make the Power BI Answer you.
7. Power BI create a Card with total sales for you.



8. In the top right corner click the **Pin Icon** (Pin visual) and it pin to your dashboard.

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Sales

9. Continue typing **Total Sales by Country** and press Enter.
10. Power BI Give you sales by Country bar chart.
11. Pin the bar chart to your dashboard.
12. Try: **Total Sales by country showing product category**.
13. Pin the clustered bar chart to your dashboard.
14. Try: **Number of sales and products for top 10 sale**



Scope Insights

15. You can ask questions for a specific visual in your dashboard to get answer according to the data of this visual only.

16. This is what we call **Scope Insights**.

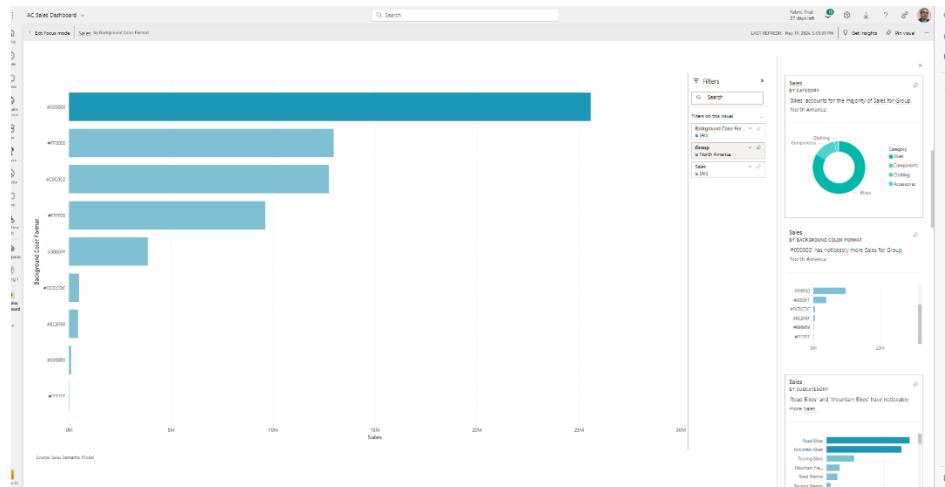
17. Go to your Dashboard.

18. In Tile **Sum of Sales** select the ellipsis on top right and select view insights.

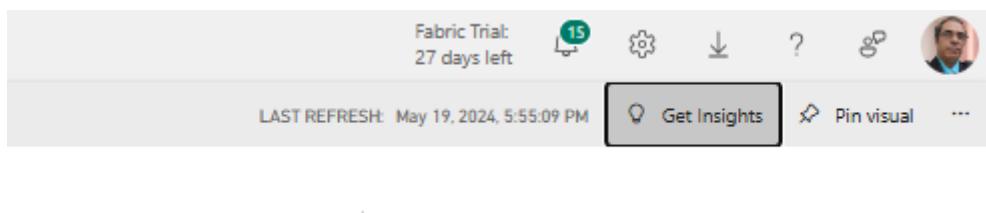
19. You will have new page showing the insights on the right.

20. Select **Sales by Background color Format** and pin to your dashboard.

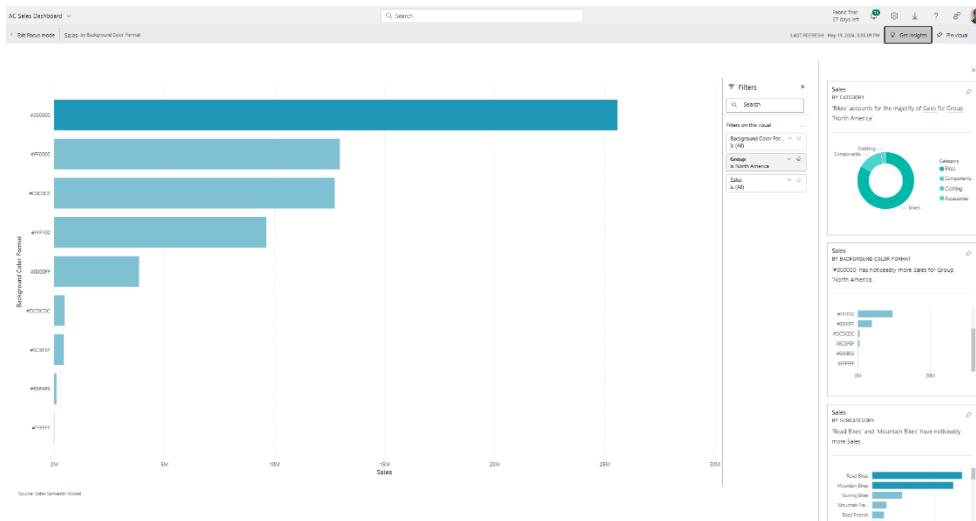
21. Click this visual to make it bigger in the page.



22. Click **Get Insights** from the top right corner of the page to explore more deeper for this visual.



23. Power BI will analyze deeper for the data in this visual and give you cards on the left with the insights.



Question

What is the primary role of the Quick Insights feature in Power BI?

- A. To immediately implement changes in the dataset.
- B. To ask questions about the dataset in plain English.
- C. To automatically search datasets and visualize potential insights.
- D. To store additional data for future analysis.

Knowledg Check

Question 1

How does a dashboard differ from a report in Microsoft Power BI?

- A. Unlike a report, a dashboard provides an in-depth, interactive, multi-perspective view of a specific dataset.
- B. A dashboard is a one-page view of the most important metrics or key performance indicators (KPIs) selected from various pages of one or more reports.
- C. A report is a one-page view of the most important metrics or key performance indicators (KPIs) selected from one or more dashboards.
- D. A report is less interactive than a dashboard.

Question 2

In Microsoft Power BI, what is the primary role of the **Quick Insights** feature?

- A. It allows you to ask questions about your data in plain English.
- B. It displays data in the form of charts and graphs.
- C. It automatically searches datasets to discover and visualize potential insights.
- D. It scans and cleans your data for analysis.

Question 3

What is the advantage of pinning live reports to your Microsoft Power BI dashboard over pinning static visuals?

- A. Live reports automatically update every minute.
- B. Live reports maintain the interactivity of the original report.
- C. Live reports display only a single type of visualization.
- D. You can pin live reports to multiple dashboards.

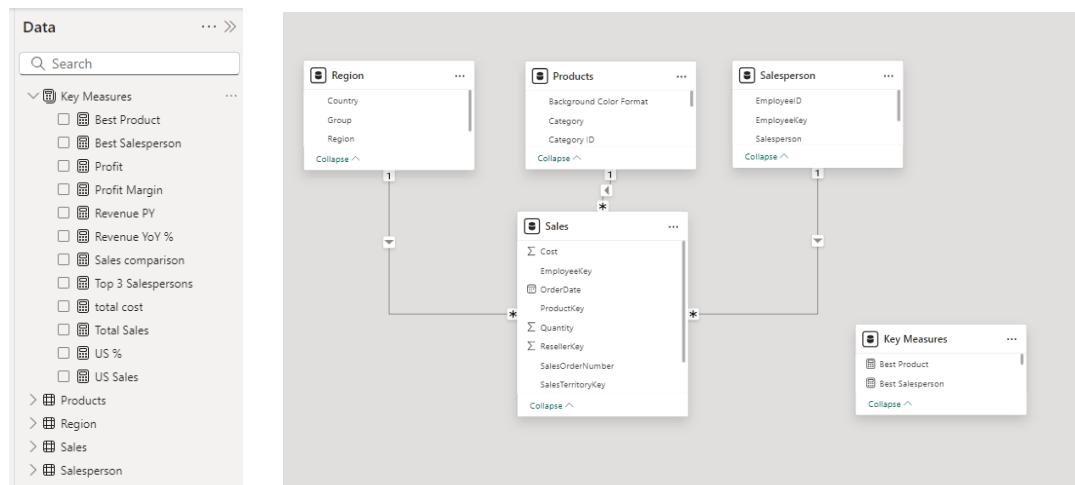
Question 4

What is a crucial prerequisite for publishing a report to Power BI Service from Power BI Desktop?

- A. The report needs to be a specific size before publishing.
- B. You need to delete the report from Power BI Desktop to avoid duplication when publishing.
- C. You need to save the report on Power BI Desktop before publishing.
- D. You need to open the report in Power BI Service before publishing.

Chapter 6: Data Visualization Project

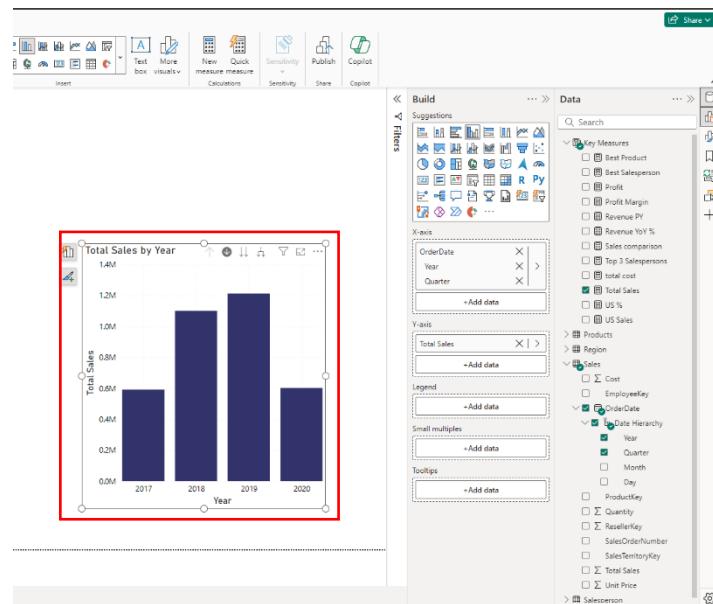
1. Use file: **Project Start.pbix**.
2. You are required to create the following visualization:
 - a. A column/bar chart to display sales on a time scale.
 - b. A donut chart or funnel chart can show sales by category.
 - c. A map visual, a pie chart, or bar chart can be used to display sales by country.
 - d. A bar chart can be used to show the sales performance of salespeople.
 - e. A treemap can be used to visualize units sold for each category.
 - f. As the objective of the story is to show the quarterly sales performance you can add slicers for the year and quarters to interactively explore the data.
 - g. You can also add top selling products, top performing regions, and salesperson to your report to support your story. Card visuals highlight key metrics for the executive board such as profit, revenue, profit margin and so on.
3. Review the data fields available.
4. Review the measures available and their calculations.



5. Rename the 1st page “Sales”.

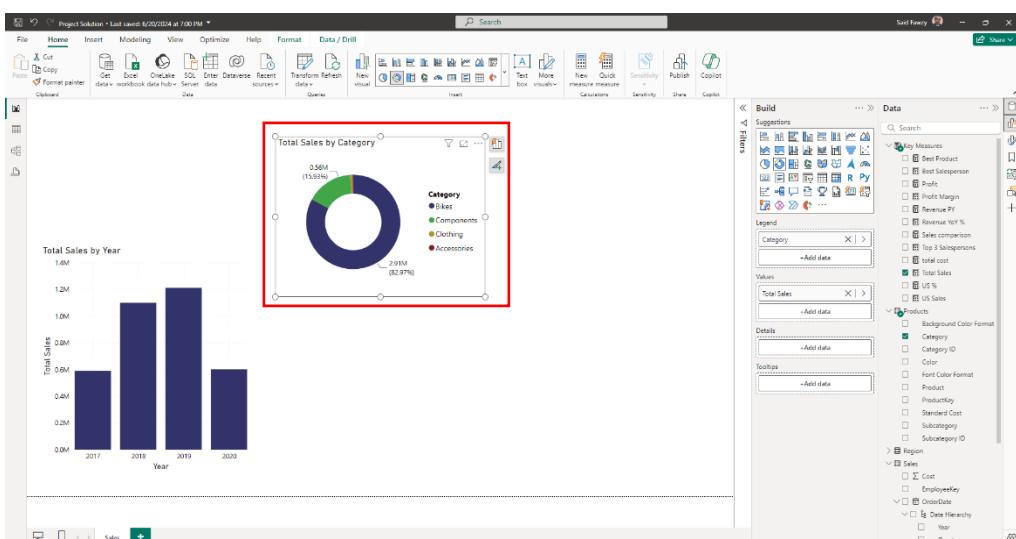
Sales on a time scale

6. A **column or bar chart** is the best option to visualize time related data. You can create a date hierarchy based on your analytical needs.
7. In this case, you need to bring **year** and **quarter** fields from the **sales table** date field to the column chart **x-axis**
8. and **total sales** measure on **y-axis**.
9. Enable **drill mode**, then click on any year to drill down to its quarters.



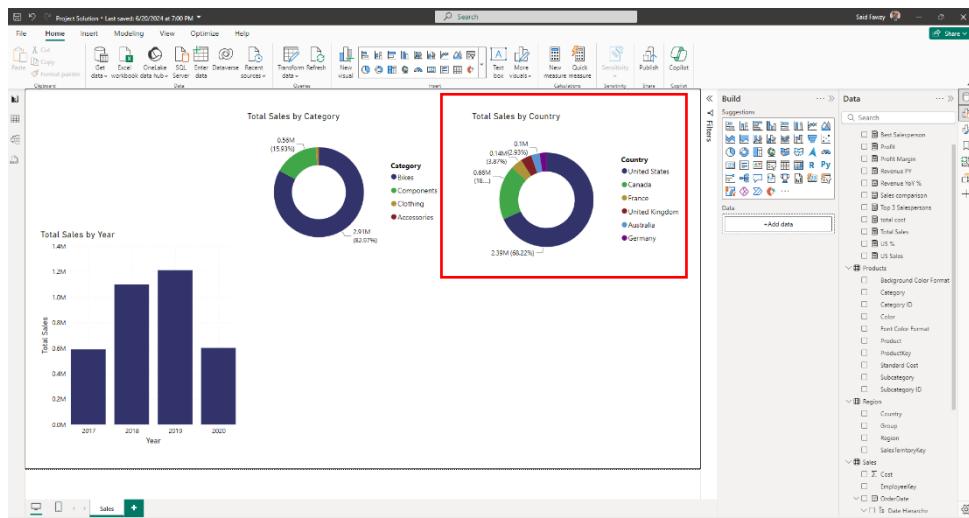
Sales by category

10. The Company has only four product categories.
11. You can use a **donut chart** to display the **sales by category**.



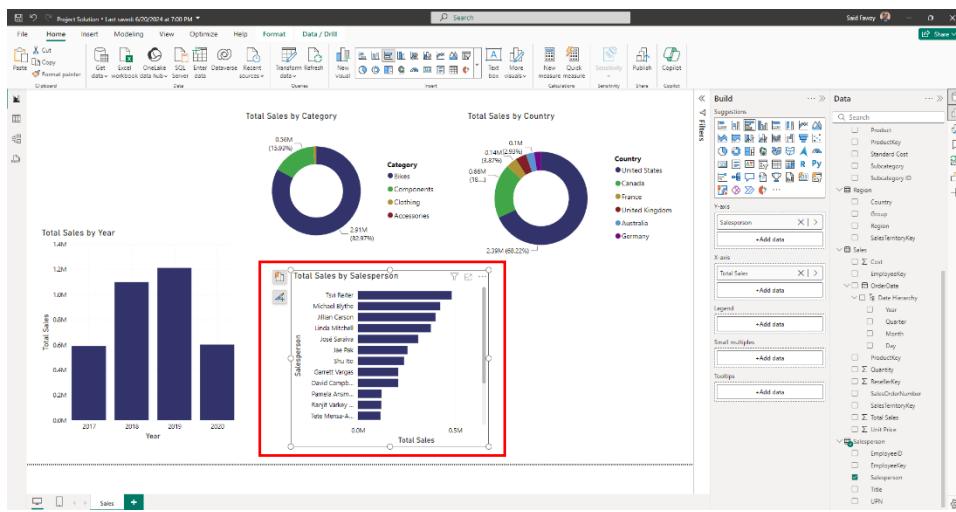
Sales by country

12. Although you can use any map visual to display sales values by each country, to create a consistent design look, it is good to use the **donut chart** as there are only 6 countries worth of data available.



Sales performance of salespeople

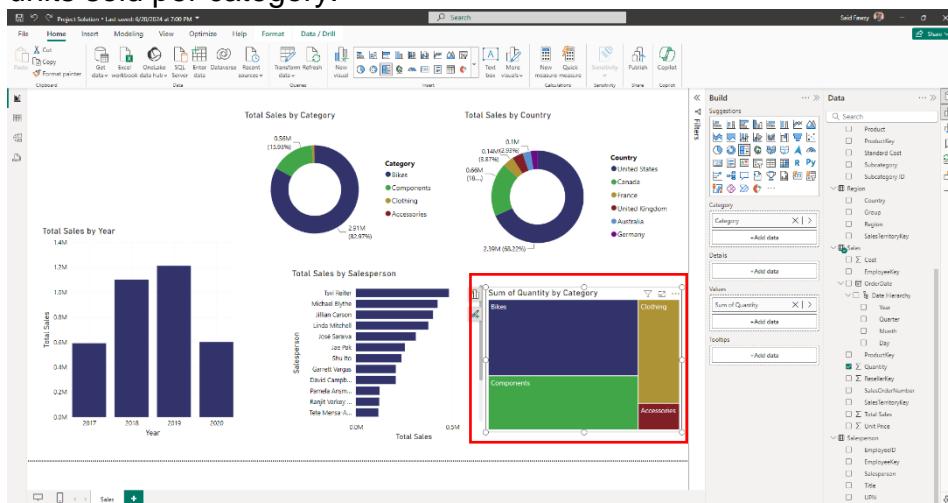
13. You can use a bar chart to show the sales performance by salespersons.



Units sold for each category

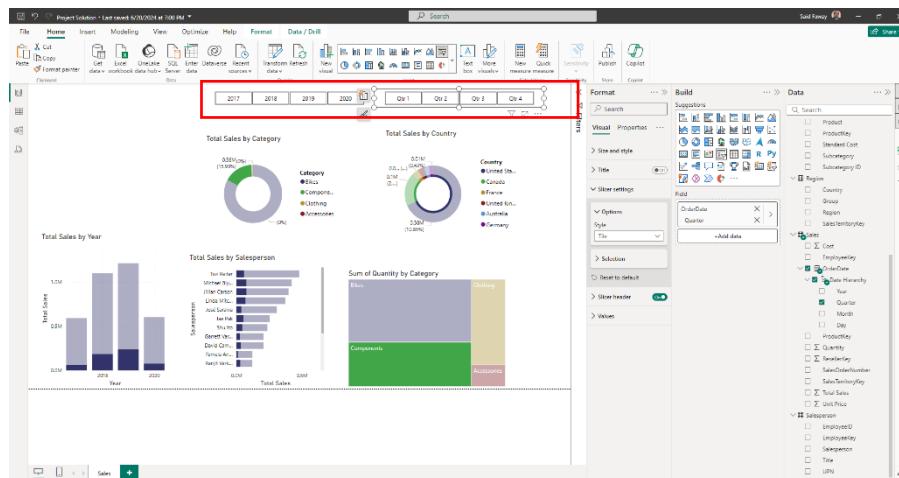
14. You can use a treemap to visualize units sold for each category.

15. The size of each rectangle proportionally represents the number of units sold per category.



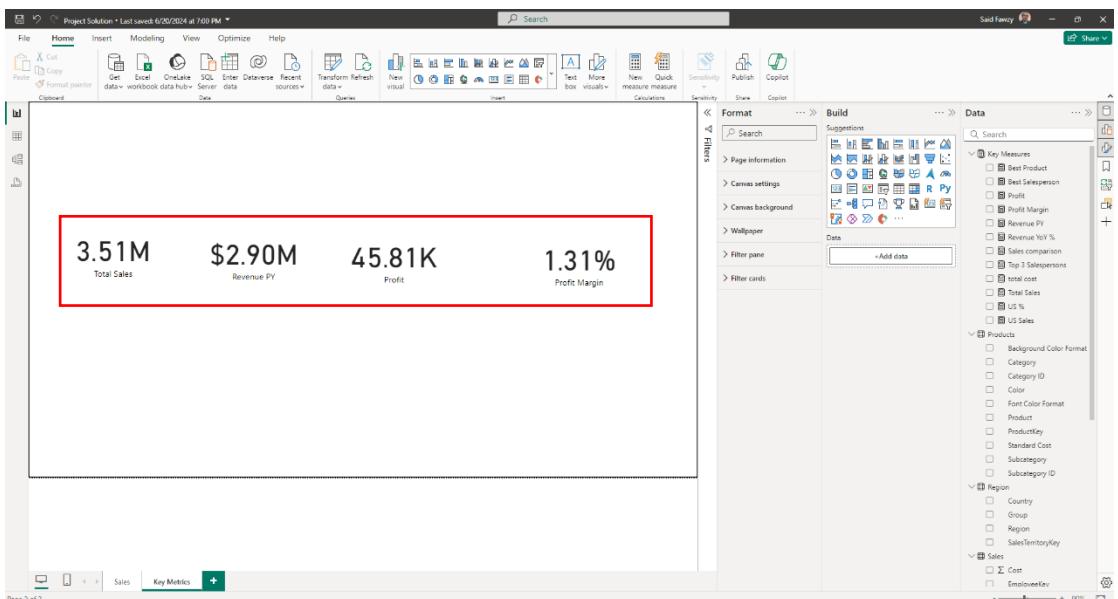
Quarterly sales performance

16. To show quarterly sales performance, you can add **slicers** for the **years** and **yearly quarters** so users can interactively explore the data.
17. You need to create
 - a **slicer** for each **year** and
 - a **slicer** for each **quarter**.
18. You can use the **tile style** of **slicer** because there are only **4 years** of data available in the report.

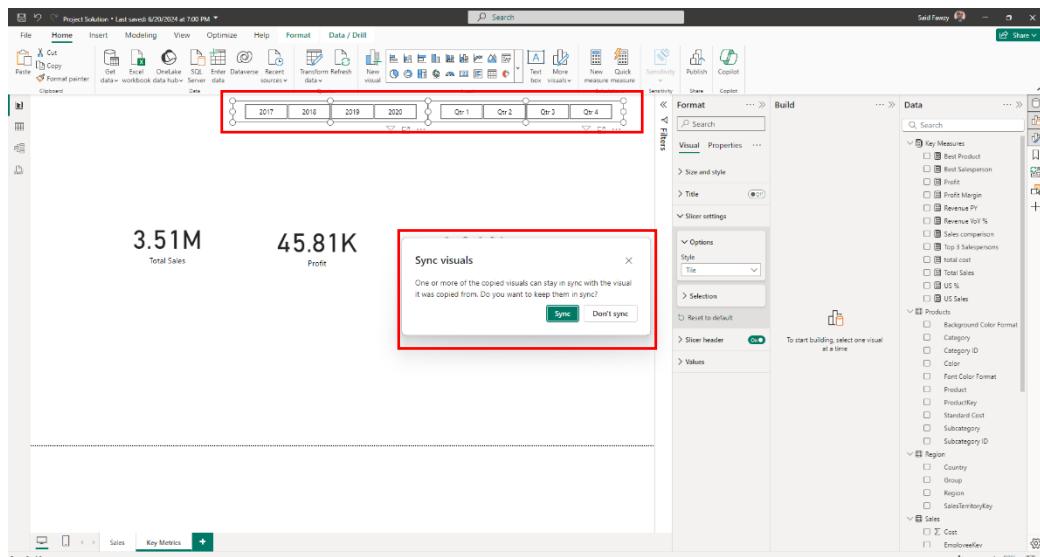


Key metrics: profit, revenue, profit margin

19. Create a new page with the name: **Key Metrics**.
20. You need to create **card visuals** to highlight key metrics such as **profit, revenue, profit margin**.
21. Adding **card visuals** or **KPIs** (Key Performance Indicators) is recommended.



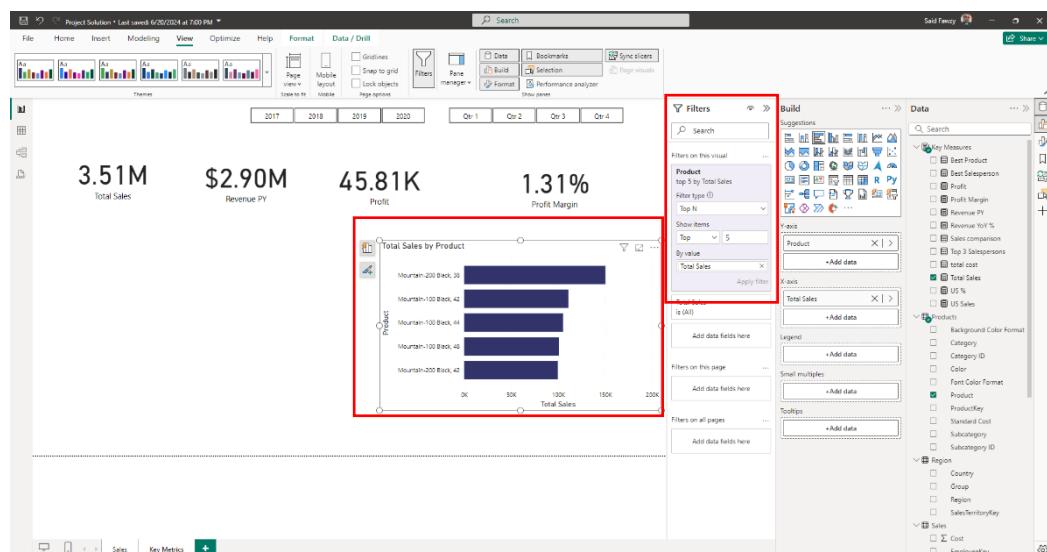
22. You need to **copy and paste the slicers** to the new page to apply the filters to the card visuals which only displays the relevant data.
23. Select Sync to synchronize the two slicers



Top products, regions, and salesperson

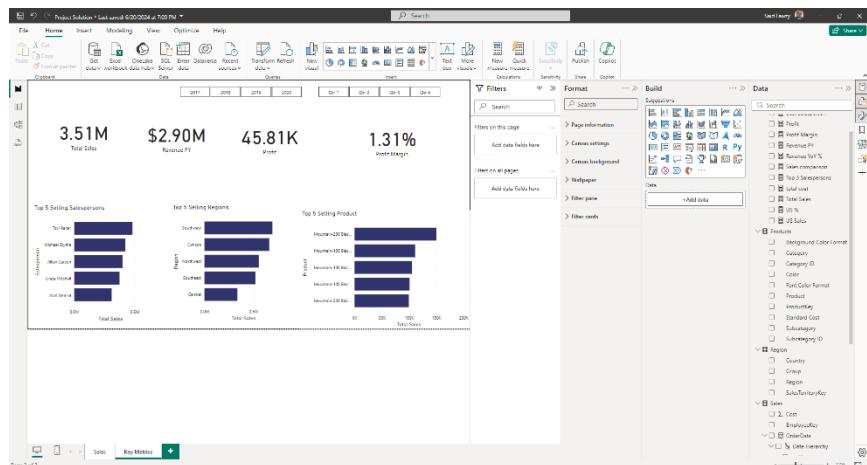
24. Create bar chart for **Sales** and **Product**.

25. In Filter pane Filter for top 5.



26. Rename the Chart to: Top 5 Selling Products

27. The same way create other two charts for top **Regions** and **Top Sales Persons**.



Apply and Customize Them to your report

28. You first need to activate and customize the **Accessible City Park** theme from the View tab of Power BI desktop.

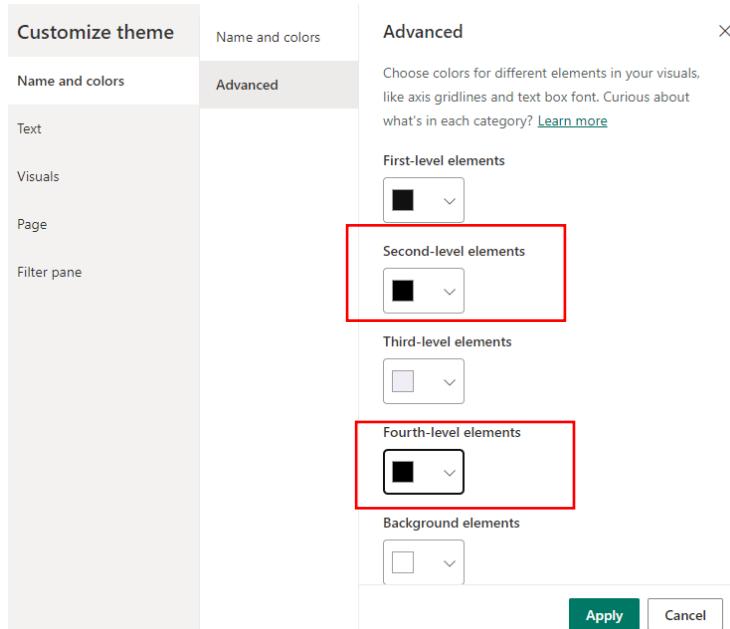


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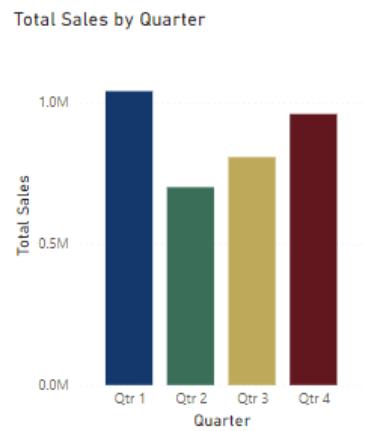
29. You need to adjust the color to **black** in the **second and fourth level** elements.

30. This will automatically convert all **axis** and **legend** text to **black** color, so you do not have to change each chart individually.

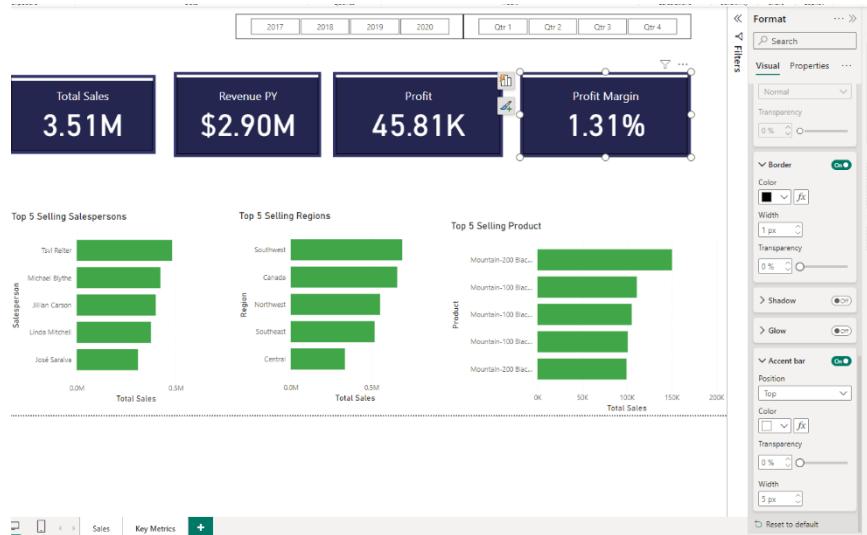




31. After you have activated the theme, the colors of the charts change according to the theme color palette.
32. You need to adjust the color of **individual charts** if needed.
33. For example, in the **Total Sales by Quarter** column chart all columns are blue, so you can change them to distinct colors.
34. You can also apply conditional formatting to the bars if needed.

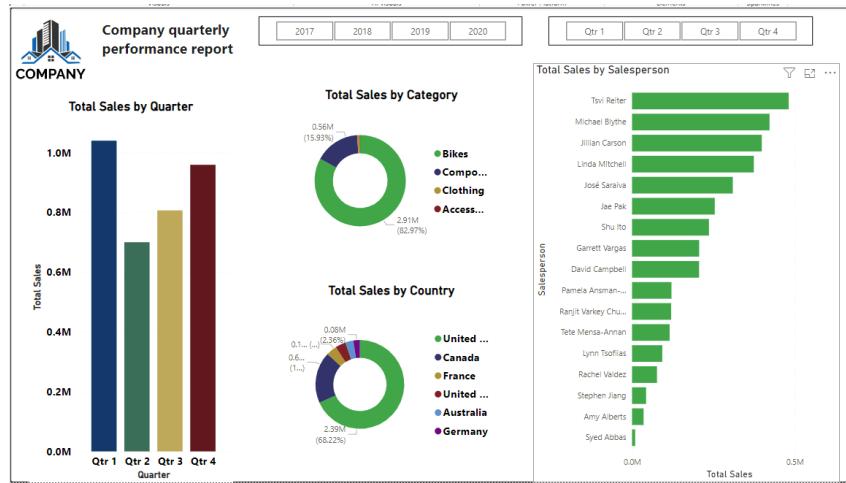


35. **For all visuals** You need to adjust:
 - a. The font size of axis title and values to 12 bold and black.
 - b. chart title to 16 Bod and Dark Blue and center.
 - c. legend to 12 bold black and remove title.
 - d. In the **slicers**,create a border to differentiate the **slicers** from the rest of the report
36. For cards use the **New Card Visuals** and format them like this



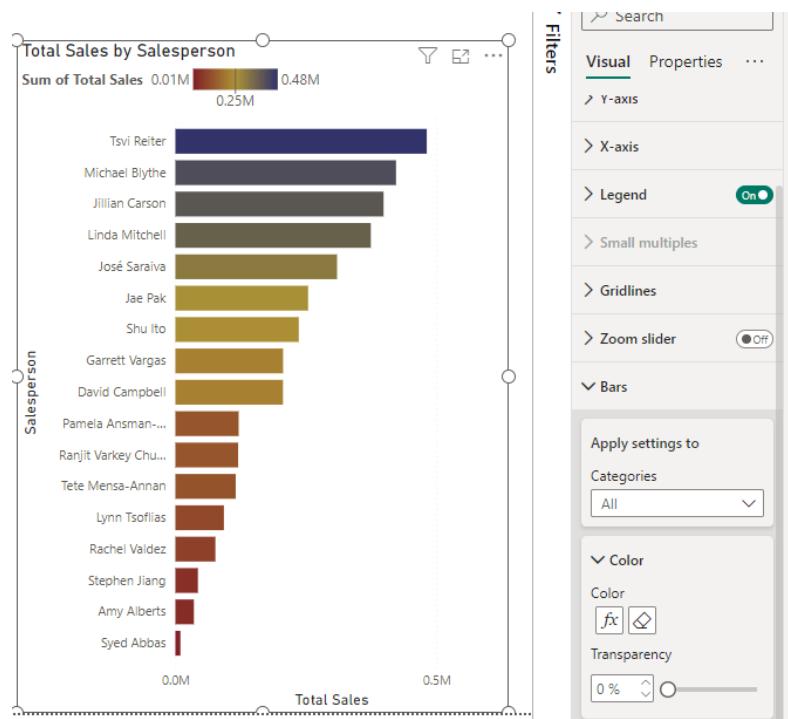
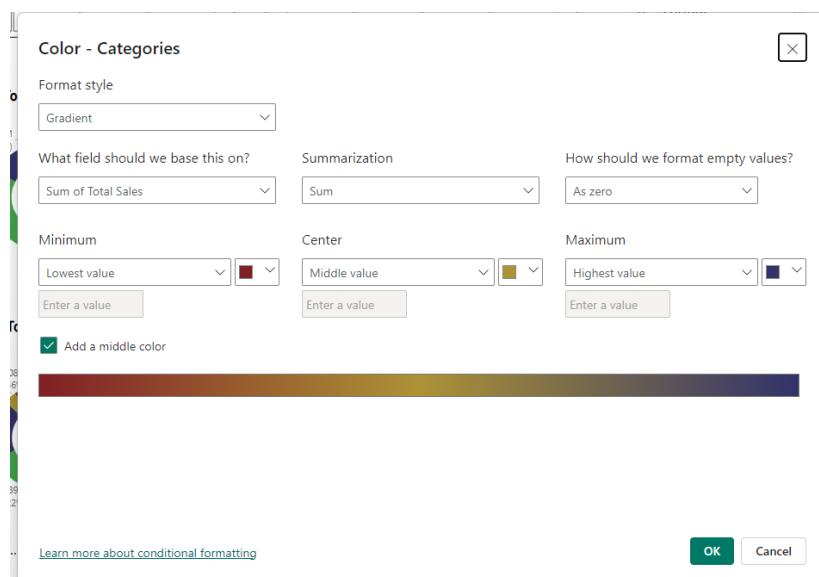
Add Descriptive Title

37. Add a text box from the **Insert** tab of Power BI desktop, where you can write and format the text.
38. add “**Company quarterly performance report**” for the sales
39. Add the company Logo.
40. Cut the Treemap and move to metric page and rearrange pages.



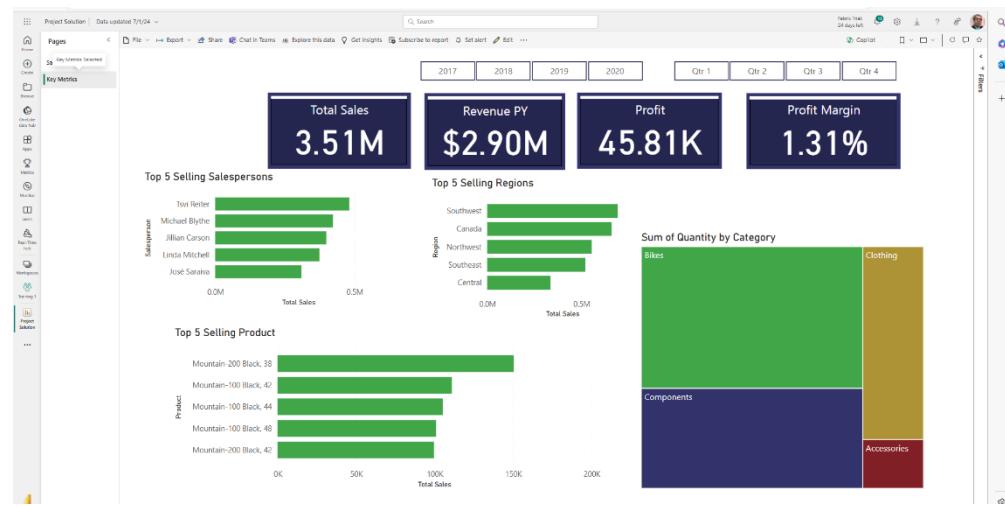
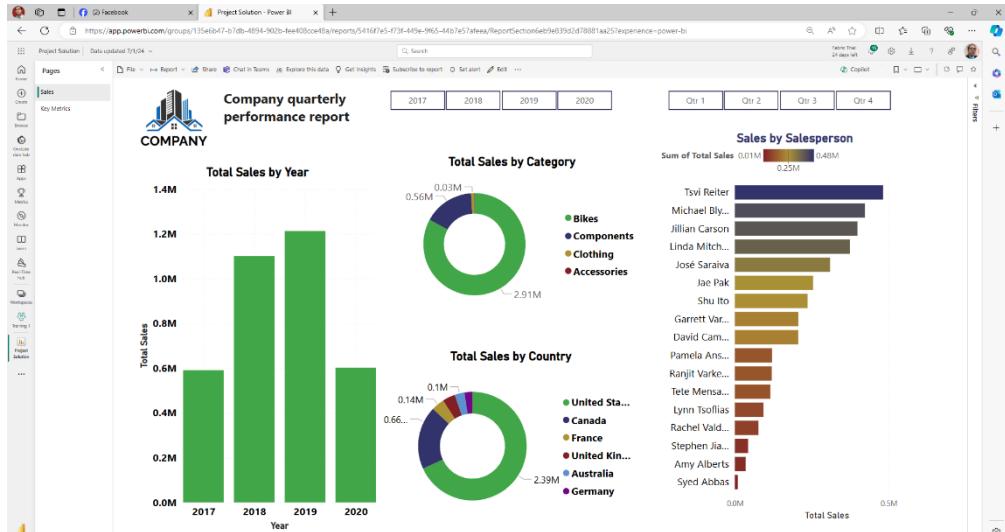


41. Apply Conditional formatting to bars of Sales by Person bar chart.



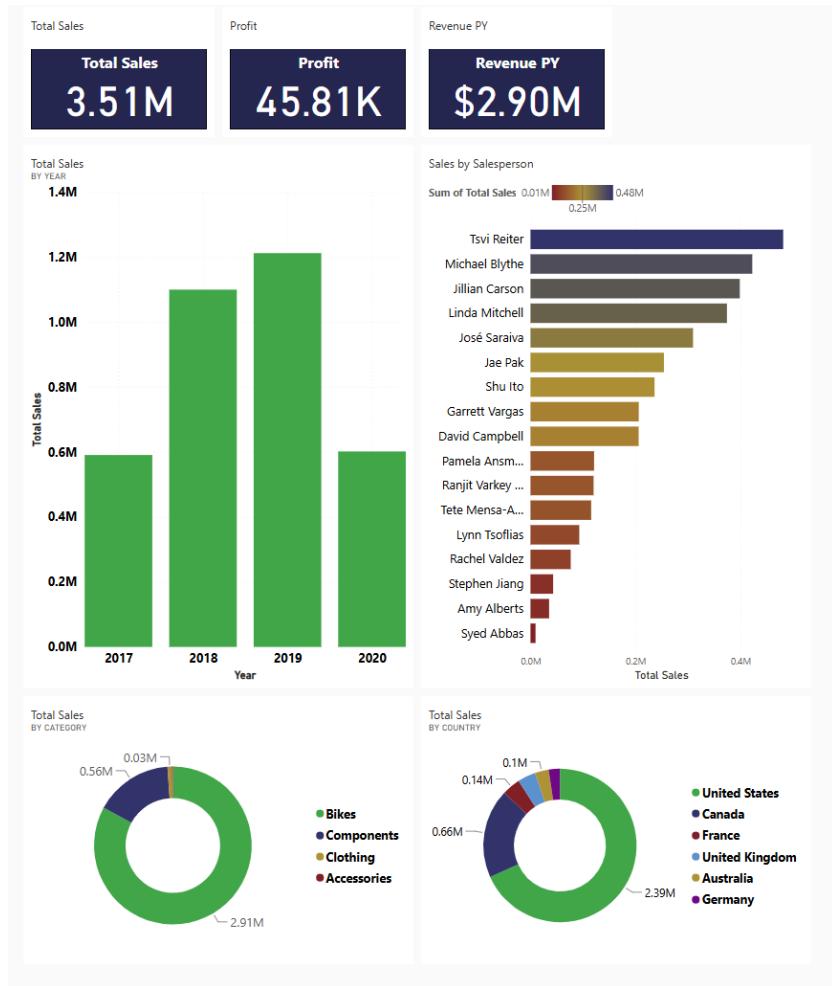
Publish your report

42. Log into your account and publish your report to your workspace.



43. Create a Dashboard and add visuals to it.





Create a mobile view.

44. Click unpin all tiles and start arranging them

