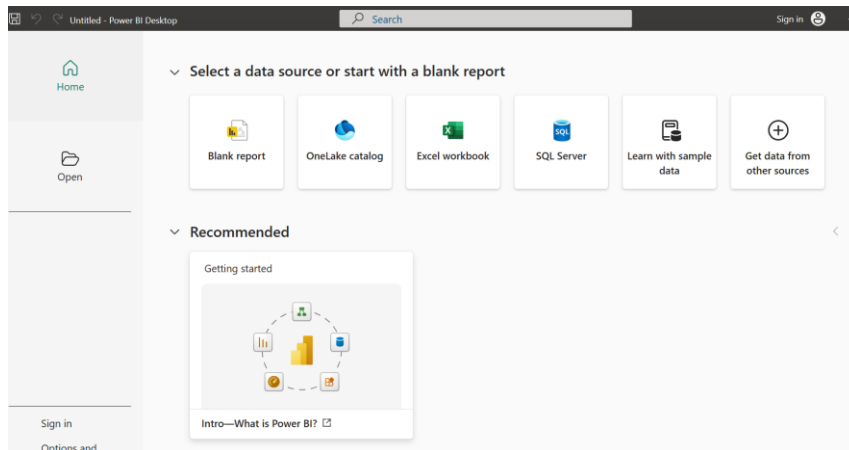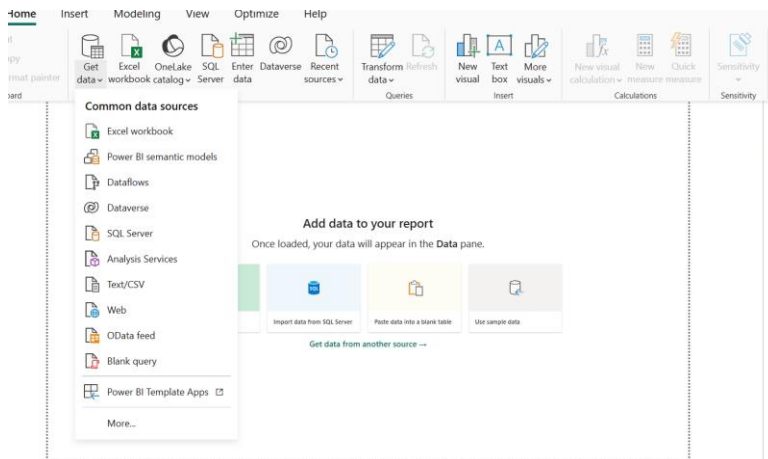Open a Blank Report or can select the source option from below:
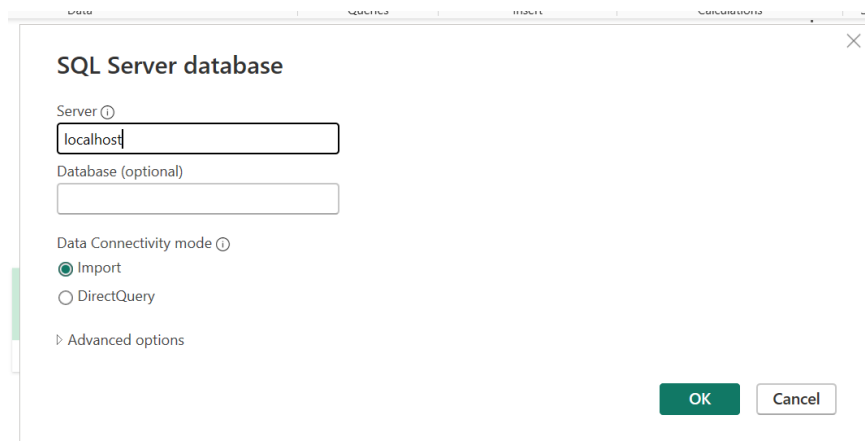

If you have selected blank report then under home tab > Data section > Get Data & use the respective source:

Different Source Options:

I am connecting to SQL Server – Localhost

We need to enter the server name we need to connect to and select respective connectivity mode

POWER BI Resource Guide

We have two different connectivity modes:

- Import Query: In this, we need to select the source which will then be stored in **VertiPaq engine, which is a highly optimized in-memory columnar storage engine.** Faster Execution since data is stored within the VertiPaq engine, **best for small to medium datasets**. Once the data is loaded it disconnects with the source **Data.** We can access and transform the data using Power Query Mode. To refresh or update the data, we need to **schedule refreshes**.
- Direct Query: In this we are directly connecting with the source data, and we need to use respective language to be able to access the info example if we are using SQL server we need to use SQL queries to be able to fetch the info. Preferred when we need real time data or large data sets. Data will be refreshed as we are connected to source dataset.

In the past we use to have one more called Live Connection which is now part of Direct Query option hence has been removed.

I have selected SQL Server > import mode:
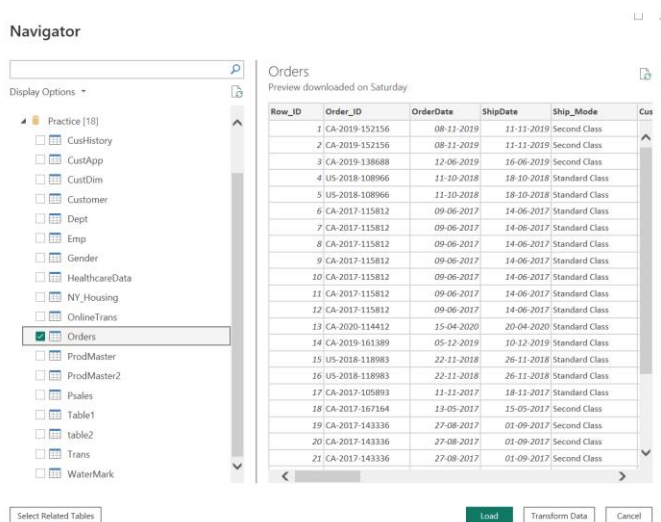
We will see the list of databases within the SQL server, select the respective database and the table you want to load into Power BI.

Upon selecting the table, we have 3 options, Load will directly load the data into Table View and model view as per what PBI has detected the data to be.
In case if you want to perform Data Preprocessing, best practice is to use Transform Data > which will take us to Power Query mode where in we can perform all the data transformations
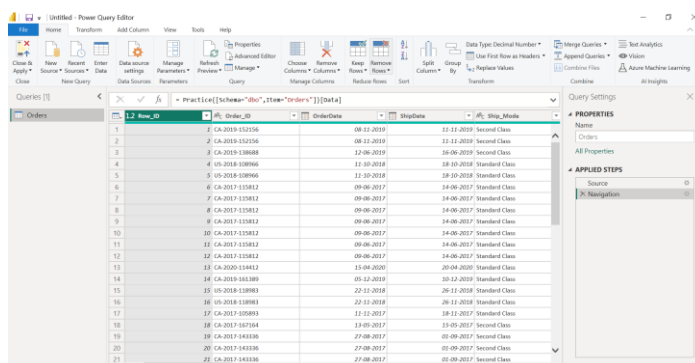
POWER BI Resource Guide

Now let's go through the options available within Power Query Data Transformations

Depending on the source we connect to under Applied steps we can review and see what steps Power BI has applied initially and also all the data transformations we perform each step we do is recorded and shows within the applied steps:

Source will have the information about the server, csv file location, excell file location depending on the source we are connected to, in our case SQL server : = Sql.Databases("localhost")

Navigation will have the information about the database and the table selected:

> = Practice{[Schema="dbo",Item="Orders"]}[Data]
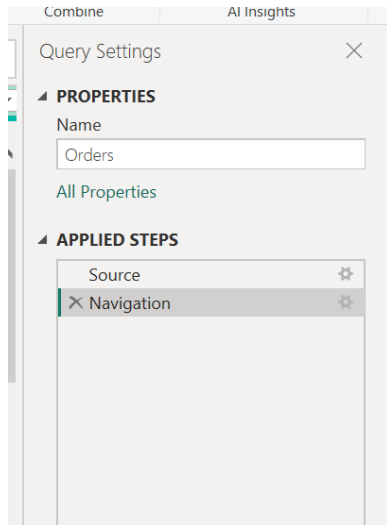
In order to optimize the performance, we can control which datasets needs to be loaded into Power BI upon transformation and this can be done by click on Properties > Enable load to report

And if we need the source data to refresh then select Include in Report Refresh

First and the basic step is to understand the data, check number of rows and columns, column names, Data Types, Dimension Columns, Measure Columns, Data Categorization is correct for effective usage, summarization of dimension fields which will hamper the aggregations.

Handle: Missing, Null, Duplicate values, Outlier detection, Column distribution range

POWER BI Resource Guide

Right click on each column to access & perform Data transformations on that particular column directly, below are the different options: Remove, Remove other columns, Duplicate column, Remove Duplicates from the column, Remove errors and provide what error values are, change Type, Replace values with a certain values, replace errors with certain values, Group by, fill up to will missing values with previous value, fill down to fill missing value with next value, unpivot columns, unpivot other columns, unpivot only selected columns, rename, move to different column sequence, Drill down
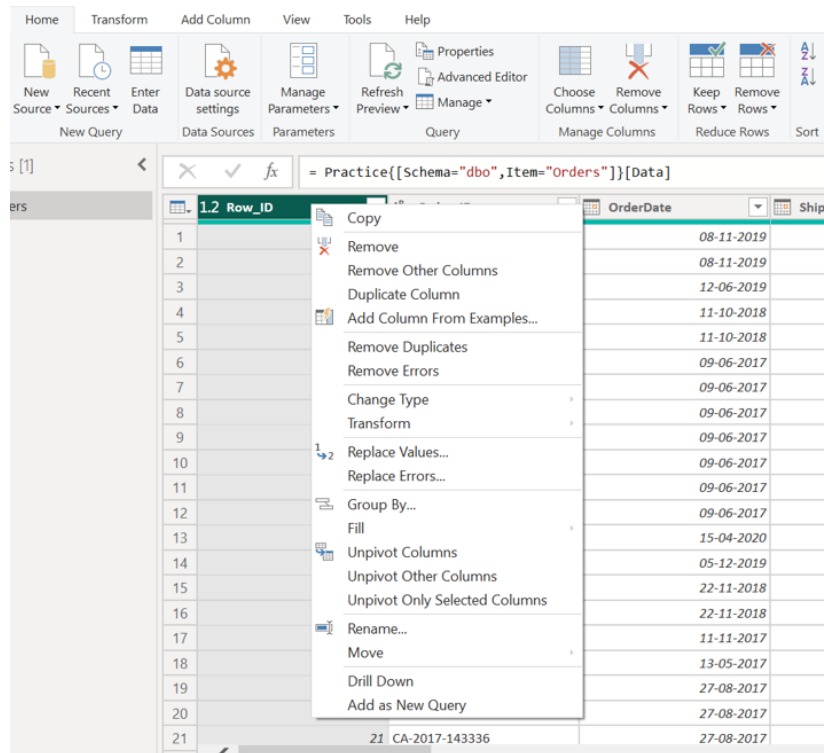
We can also access different options from the menu bar to perform advanced transformations:

Power Query uses Mashup Language

Home
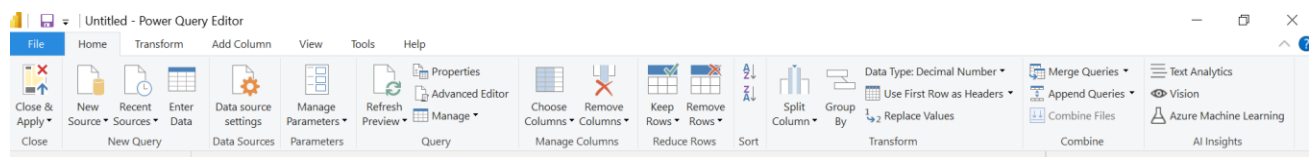
New Source: If we want to connect to a new source Dataset or add

Recent Sources will give us list of all recent sources we connected to, for quick access

Enter Data if we want to create a table and enter the data manually, best example Calendar table

Data Source settings this helps in managing the source of the dataset, example if we are done with the development and the report is approved, we can switch from toy datasets to original data sets for real time information

New Parameters: Allows us to set dynamic inputs (e.g., Date Range, Region, Product Category), help filter data before loading into Power BI, improving performance.

Refresh Preview: To refresh the dataset

Properties: Enable load to report and if we need the source data to refresh then select Include in Report Refresh

Advanced Editor to access the DAX Mashup Language code to see what steps have been applied.

Manage: Create Duplicate, Delete, Reference (Duplicate will just be a duplicate copy, reference will change as per the changes we make on source dataset)

Choose Columns, Remove Columns, Keep rows, Remove Rows, Sort the data A-Z or Z-A

Split Columns: Access info based on need
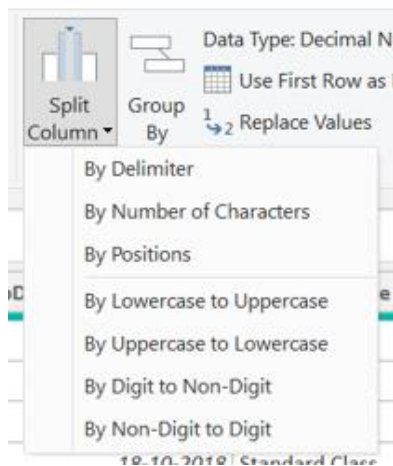
Group By, Data Types, User first row as Header, Use header as first row (To add), Replace values

Merge Queries: Helps perform different joins, updates the selected query or dataset (Default is left join, when we do it in the model view or manage relationships but merge helps create different join types)
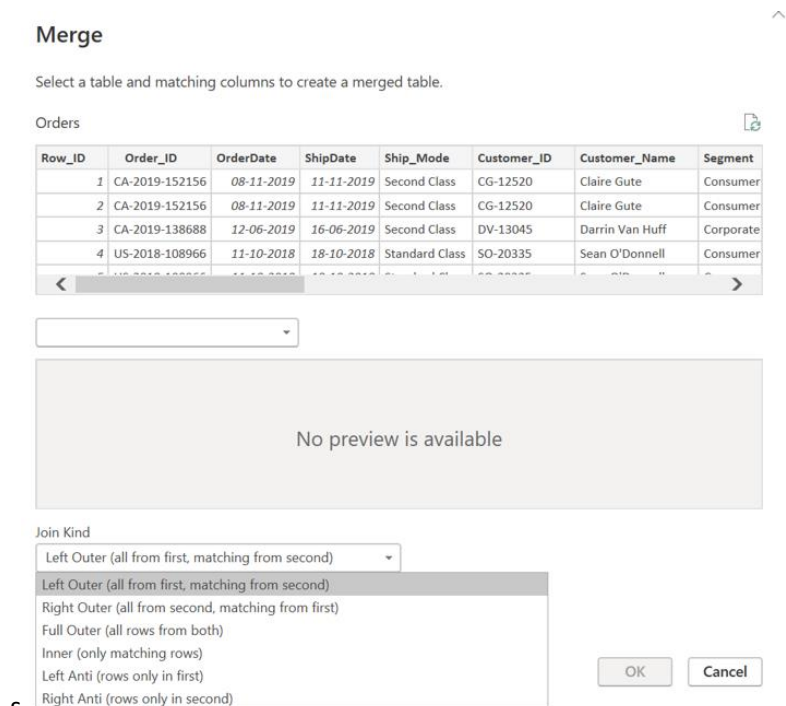
Merge as new Query: will create a new table or dataset can be seen under queries

Append: If we have data from two or three table and if we want to append (Union) the tables we use this, Column names, sequence and Data type has to be same for effective data usage, can have more columns (Unlike SQL power BI helps append even though number of columns are different will fill null if the column is not part of the table)

Append Query will add to the existing dataset or query. Append query as new will add new dataset or query.

Transform Tab
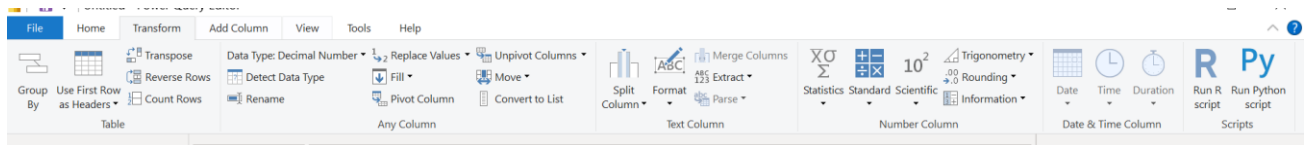
These options help transform the existing data or columns:

Group By if we want to performing grouping and aggregations

Use first row as header, same as previously seen

Transpose the date if we need to transpose rows into columns or columns into rows

Reverse rows, Count Rows (Will give a scalar value)

Data Type: Update or mange data type

Detect Data Type: will help identify the type of data within a column

Rename current column

Replace values > Replace values or Replace errors by manually assigning a value

Fill Up or Fill Down handle missing values by filling with previous or next value

Pivot columns: Converts Column values into headers and perform aggregations
Select column you want to pivot and then select the aggregation to perform:

Unpivot Columns: Converts Column Headers into column values, use respective option if we want to unpivot certain data from the dataset
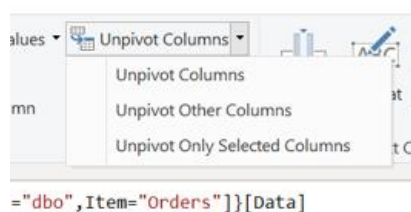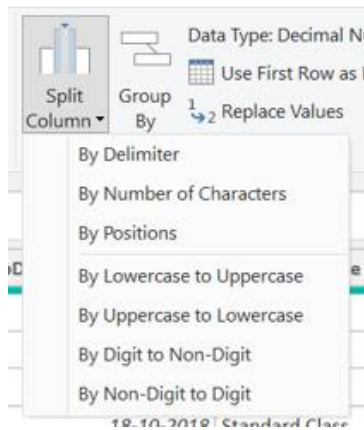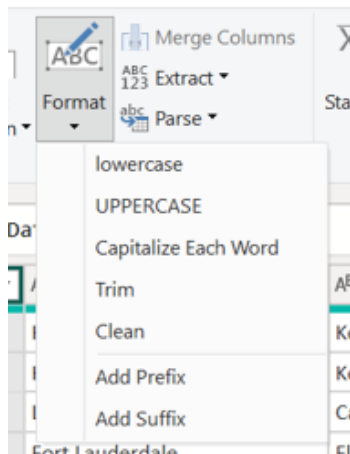
Move columns: If we want to handle position of a column we can use to move them or drag to the position needed

Convert to list, it will create a list of the selected column which can be used to create a new dataset

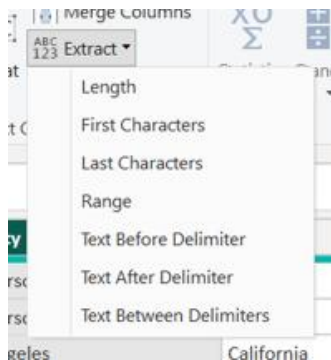Split columns: If we want to split the columns based on a give condition we can use the predefined options:

Handling textual format:

Merge Columns: If we want to concatenate tow values, we can use Merge columns under TAXT editor option
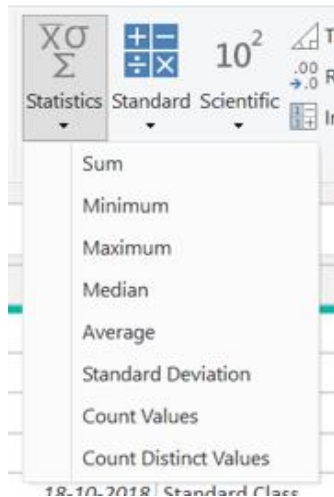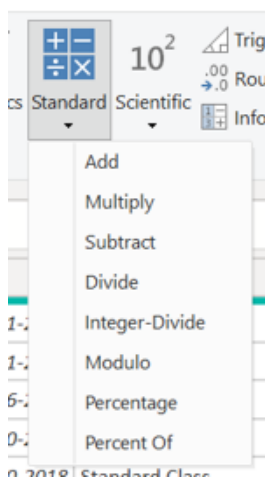
Extract Textual data:

Parse: if we have dataset from Json or XML to normalize the dataset, You can expand columns to extract values into a tabular format.
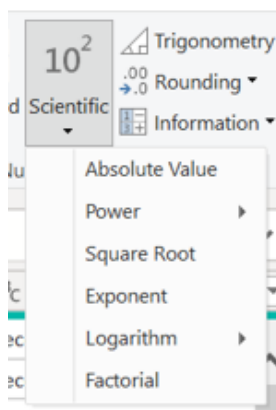
Numerical values:

Statistics help perform below:

Standard help update existing column values:

Scientific: if we need to fetch only Absolute values (Example price column cannon be -ve, if we need to increase the values to a higher range, bring them to normal range, exponents, Logarithm (Outliers), Factorial)

POWER BI Resource Guide

Trigonometry: Change to Sine, Cosine, Tangent, Arcsine, Arccosine, Arctangent (Advanced Calcs or manipulation)

Rounding: Round Up, Round Down, Round to specified digits

Information: Is Even, Is Odd, Sign (+ve or -ve)

Date fields:

Date: Age from current date, date only, Parse date, Extract year, start of the year end of the year,

Month, start of the month, end of the month, days in month, name of the month, Quarter, start of the quarter, end of the quarter, Week of the year, Week of the month, Start of the week, End of the week, Day, Day of week, Day of year, Name of day, Combine Date time, Earliest date within the column, Latest date within the column
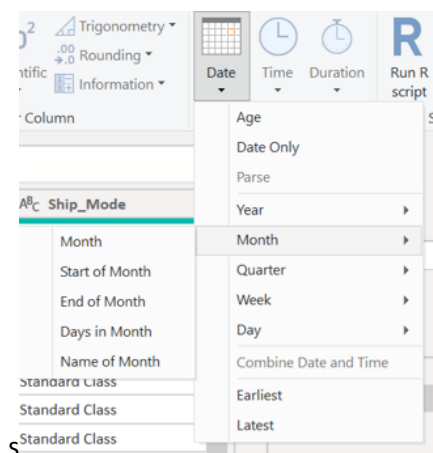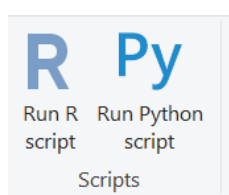

Time: Access Time Only, Local Time, Parse, Hour, Minutes, Seconds, Combine Date and time, Earliest time, latest time
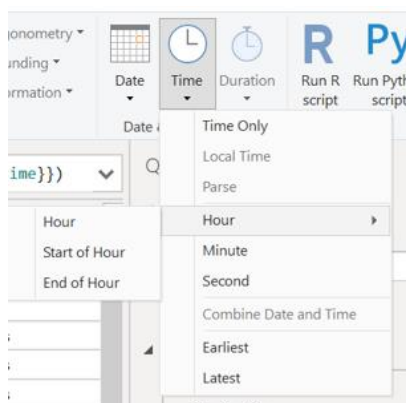
Duration: Format Duration values (Rarely used)

If we want to use external option R-script or Python-script we can achieve using below

POWER BI Resource Guide

Add Column

We have same option within Add Column, if we use this it will create a new column each time we perform a transformation using the options

Additionally, we can use

Column form example: this will auto detect what we are trying to do and fill the rest of the rows within the column using the login we have type in.

Custom Column: Creates a new column based on custom condition

Invoke a custom function: Best example will be Exchange rates for amount or Price column

Conditional Columns: (Case When statement)
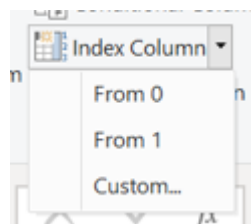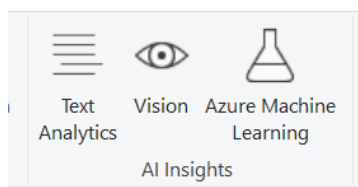

Index Column From 0 will create a index start from 0, from 1 will create index from 1, custiomer we can enter the start and step (Identity Property in SQL)
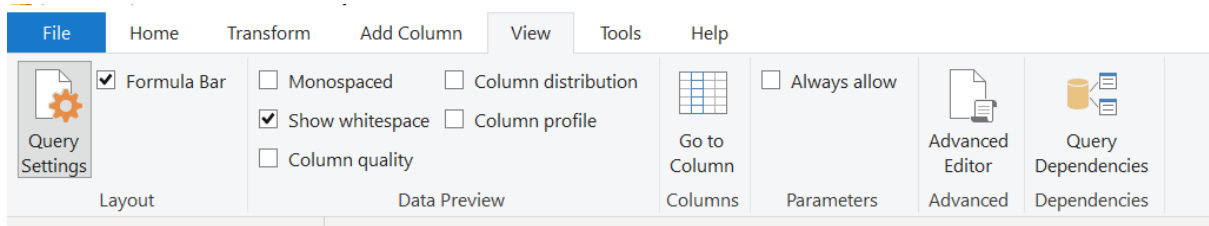
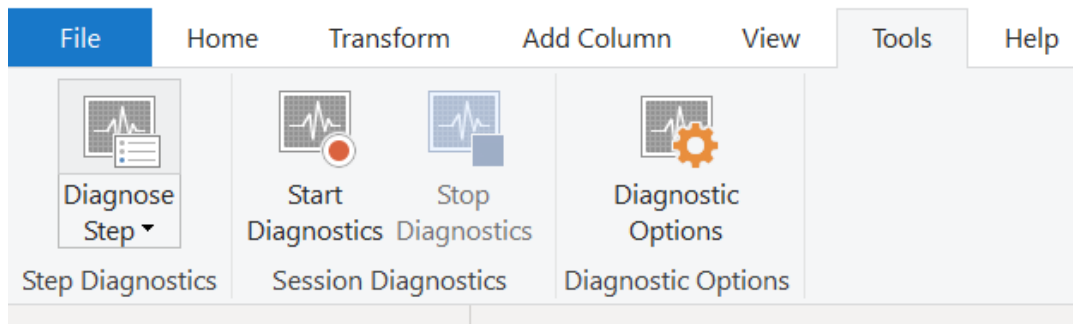

Duplicate Column: creates a duplicate

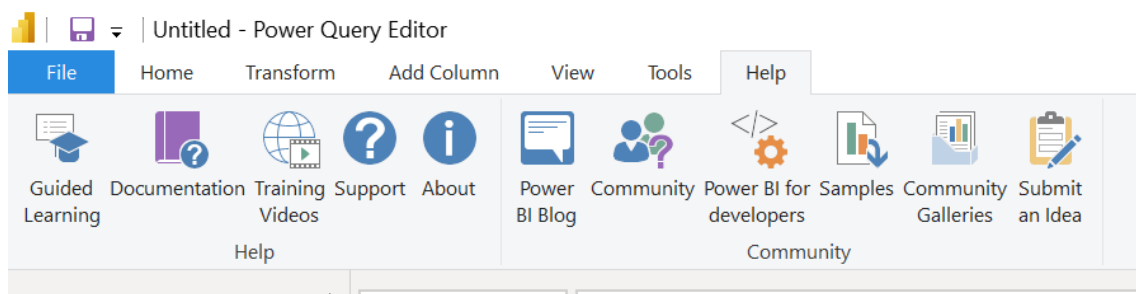We also have:

Under View Tab:

We can control the what is visible and what can be hidden based on development activity we are performing (Leave it to default)

Tools

Helps analyze the performance and execution time of specific transformations, making it a valuable tool for optimizing query performance.
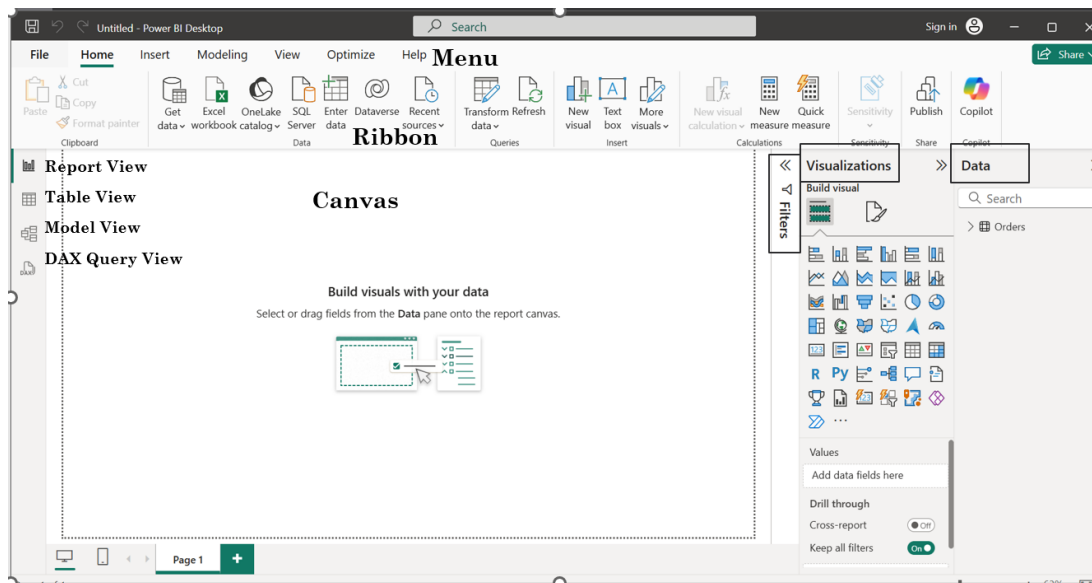

Help:

Upon performing Data Transformations, click on Close and Apply

Data has been loaded into Power BI Desktop, table is accessible within the Table view

POWER BI Resource Guide

Power Bi Desktop:

Menu: We can access File, Home, Insert, Modeling, View, Optimize, Help

Ribbon: Contains commands for data import, visualization creation, formatting, and optimization.

Navigation Pane:

> **Report View** (default workspace for visual creation)

> **Table View** (raw data in tabular format)

> **Model View** (relationship mapping between tables)

> **DAX Query View:** Used for writing Data Analysis Expressions (DAX) queries

Canvas: Area where visuals are built

Filters Pane:

> **Visual Level Filter**: Applies to the visual we have selected

> **Page Level Filter:** Applies to all the visuals within the current page

> **Report Level Filter:** Applies to all the visuals and pages within the report

Visualization:

> Offers different types of charts, graphs, and maps.

> List of all the visual that we can use, along option to import visuals option

> Visual Formatting options to stream line visual appearance, shape & size

> Add analyses to visuals (If predictive analysis is done or want to enhance visual representations)

POWER BI Resource Guide

Data:

This is the place where we can access information all the datasets fields that have been loaded into Power BI Desktop

All the columns with respective Data categorization and Summation information

Any new measures or columns created will also appear within this section

If we need to create new measure or calculated column ensure we have selected the correct dataset before creating

First things before we start adding visuals / measure / calculated columns

Go to Table view: Review each column Data Category, Data Type , Summarization ensure these are correctly set

Example: City, State, Country set these accordingly

CategoryID, DepartmentID if these fields are numeric default summarization to Summarize ensure to change them to Don't summarize
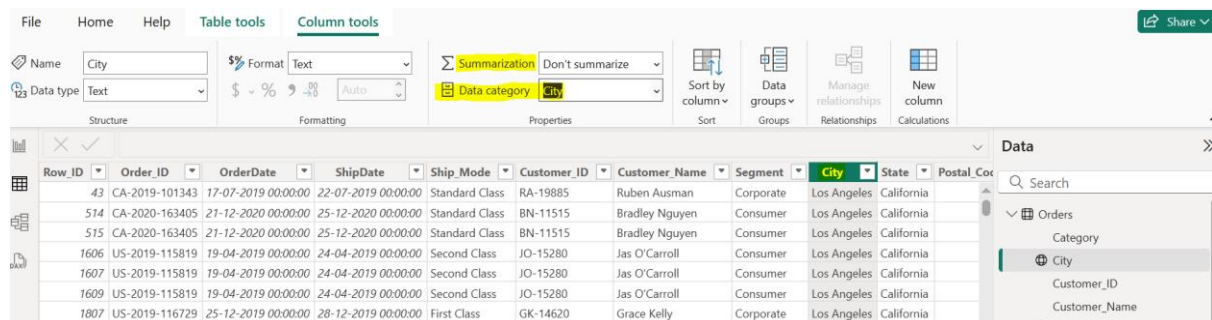
Go to Model view: Ensure relationships are rightly detected by Power BI, else you can add or manage by clicking on Manage Relationships, also review cardinality.

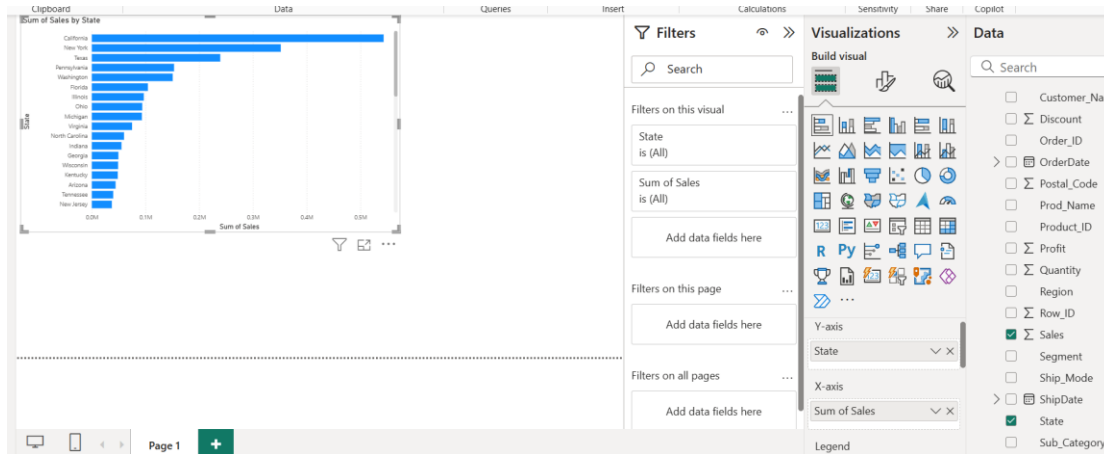Note: Cardinality and relations can be changed or managed during the development based on the requirement
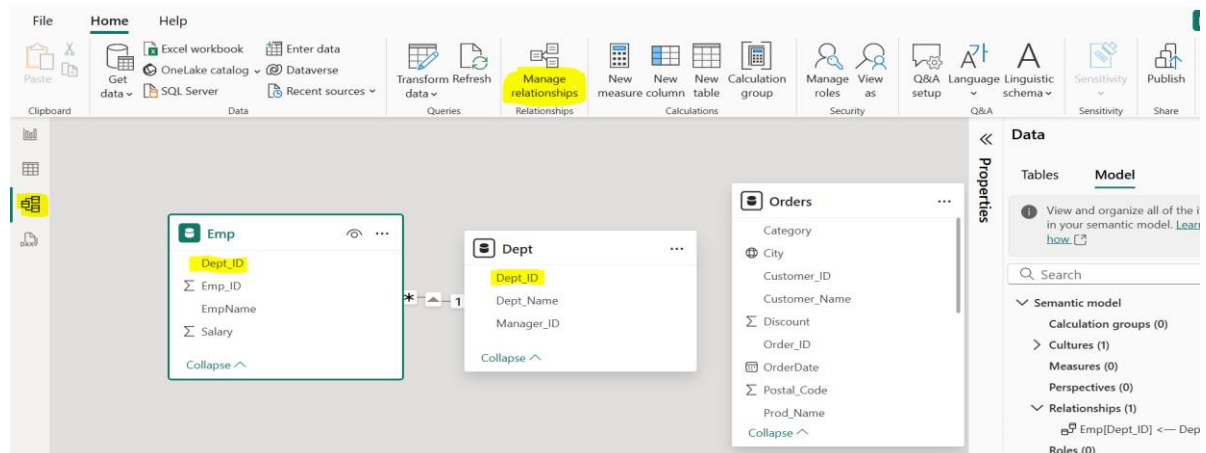
Upon following the above steps, we are now set to add Visuals, Measure and calculated columns based on the requirement.

Go to **Report View**:

Under visuals select the required visual, select the fields you want to represent

In order to enhance the visual representation, we can use Format options within the visual to adjust the Title, Headers, Axis, Data labels, Tool tips, Legend, Size, Position, and effects.

Format option will defer from visual to visual, explore options and adjust the visual to the best

We can create multiple visuals within the page or can create multiple pages and create a report or we can create a dashboard which is a collection of visuals which will help in data driven decision making.

Power BI has two majorly used features that help fetch insights and eases the process of data Analysis

Measures & Calculated Columns

Measures: These are calculations/Aggregations performed to store a scalar value and use it in visual to represent insights from the dataset.
These are not stored physically in the table hence better to optimize the performance

We can also use variables within a measure to avoid creation of multiple measures there be enhancing use of multiple calcs within a measure.

Calculated Columns: These are physically store in the table, when we need to fetch information with in a table, row by row operations, create relationships between tables. We can create calculated column for further data analysis.

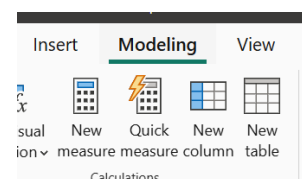Since Calculated Columns are stored, they consume more memory compared to measures.

Measures   New Column:
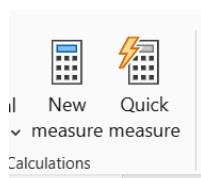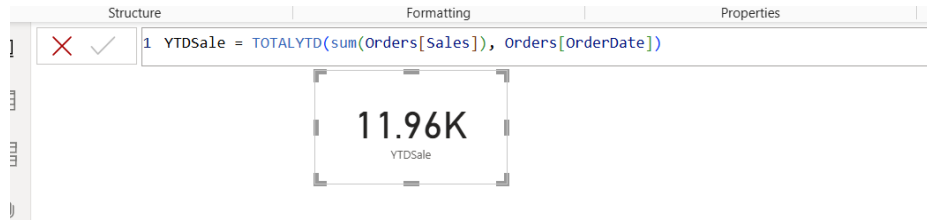

Home Tab   *Under Modeling Tab*

Created a New Measure to fetch YTD Sales

      YTDSale = TOTALYTD(sum(Orders[Sales]), Orders[OrderDate])

Use Card Visual to show the Ouput:

Create a New Column:

I have profit column within the dataset, want to show case how many values are above 0 (+ve values of profit) and how many are below 0 which will be (-ve values of profit) and represent using pie chart

Go to the table view for better understanding of the data and what we are trying to add, click on new column > Name of the column > Formula based on what you want to input as values within the column.

As per our requirement we can use below formula to achieve our task:

      ProfiKPI = if(Orders[Profit] > 0, "Positive", "Negative")

We can see a new column has been added to the dataset which is physically stored within the table
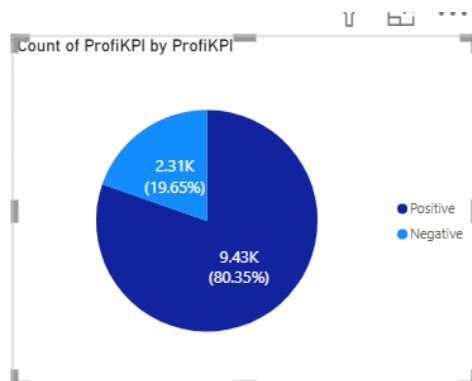
POWER BI Resource Guide

We have built in quick measures which are most commonly used data analysis or insights:

Average per category: Calculates Average value per category

Variance per category: Understand the distribution of the data per category

Max per category: Max value per category

Min per category: Min value per category

Weighted Average per Category: Gives more importance ("weight") to some values over others. Instead of treating every value equally, it considers how *significant* each value is.
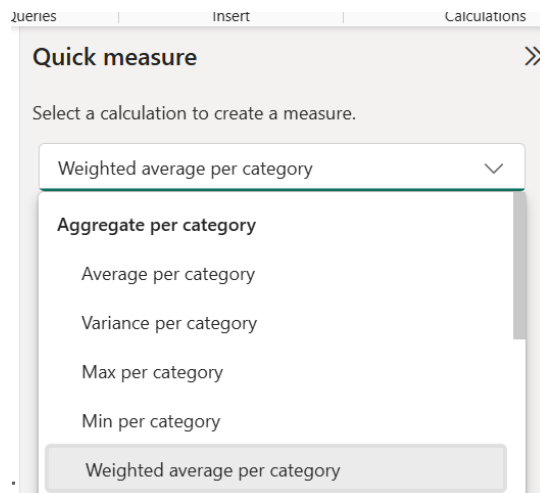
| Category	Average Sales	Weighted Average	Min Sales	Max Sales	Sum of Sales
Technology	447.22	593.90	0.99	22,638.48	9,74,501.79
Office Supplies	117.68	156.04	0.44	9,892.74	8,31,179.72
Furniture	365.83	503.34	1.89	4,416.17	9,11,654.78
Total	**310.25**	**311.07**	**0.44**	**22,638.48**	**27,17,336.29**

Filters
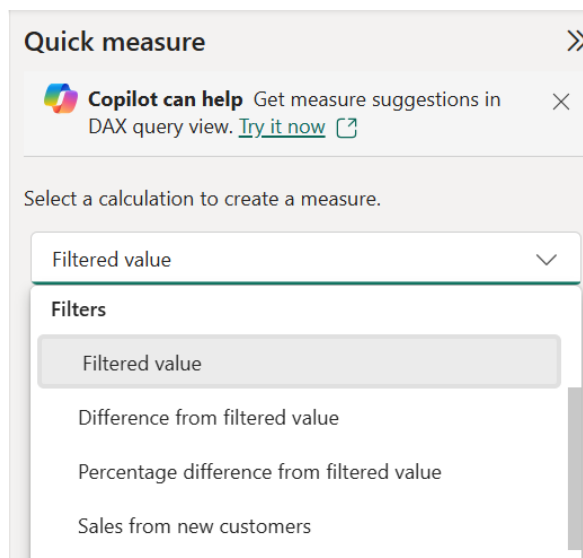
POWER BI Resource Guide

Filtered Value:

In case we are using a page level filter and we want to show case a visual that is applied on the filtered values within the page level then to avoid filtering on this visual we can use Filtered Value.

Example:

> We have removed central region from all the visuals, 2 card visuals represent the filtered visuals one represent the central region sales, and the other show cases sum of all the region sales.
>
> In this though we are using Page level filter we used Filtered value to exclude the filteration due to page level filter by using Filter Value Quick Measure
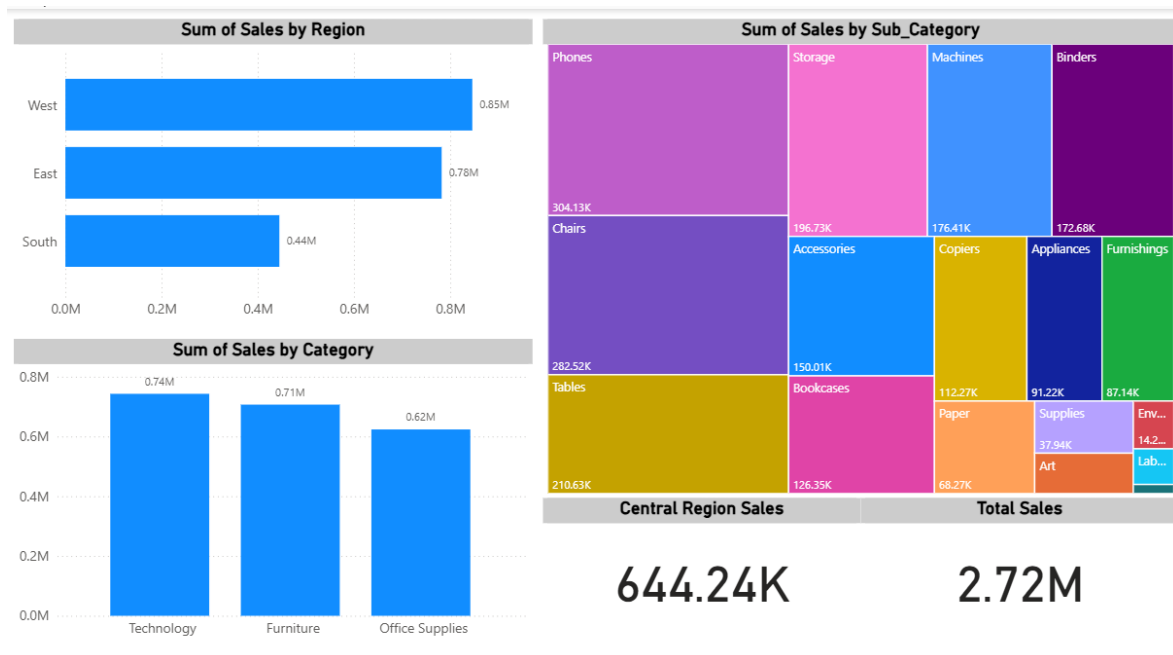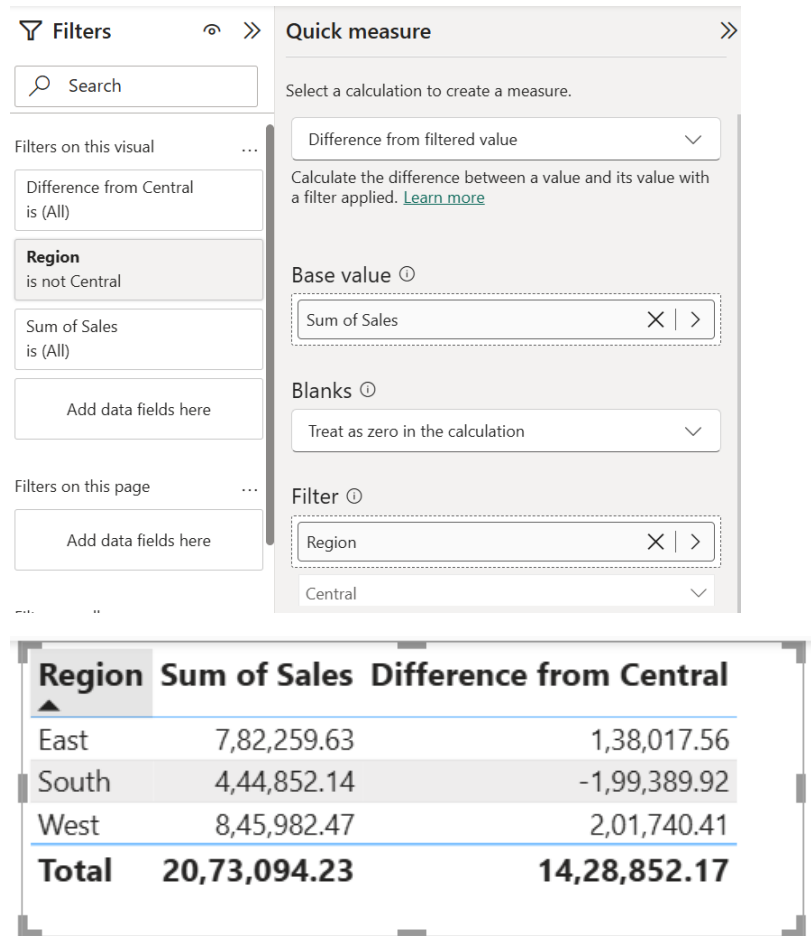

The above is to fetch Central region sales, we can achieve total sales by selecting all the regions within the filter: Region > Select all options available.
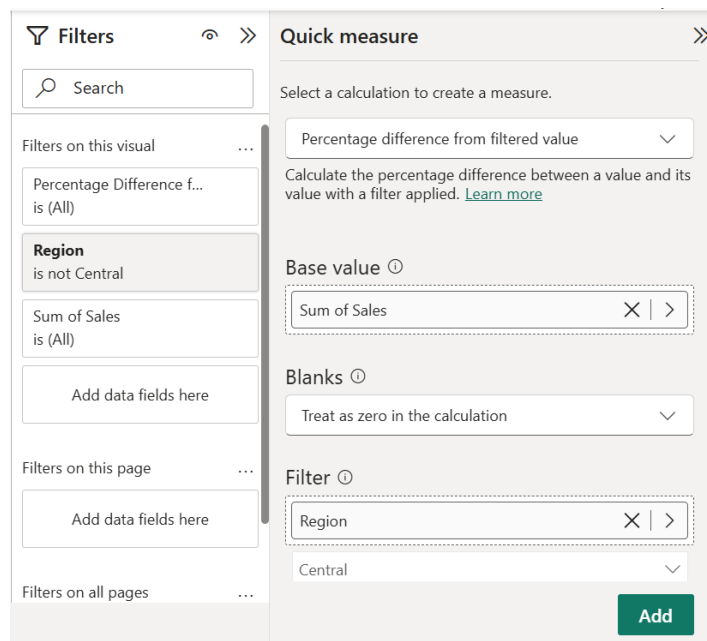
Difference from filtered value:

Below we have applied page visual level filter to the table and then used Difference from Filtered value to measure difference of each region with central to compare performance

Region	Sum of Sales	Difference from Central
East	7,82,259.63	1,38,017.56
South	4,44,852.14	-1,99,389.92
West	8,45,982.47	2,01,740.41
Total	**20,73,094.23**	**14,28,852.17**

Percentage Difference from Filtered Value:

This will help us know the difference in percentage with the filtered value:

Region	Sum of Sales	Percentage Difference from Central
South	4,44,852.14	-31%
East	7,82,259.63	21%
West	8,45,982.47	31%
Total	**20,73,094.23**	**222%**

Time Intelligence:
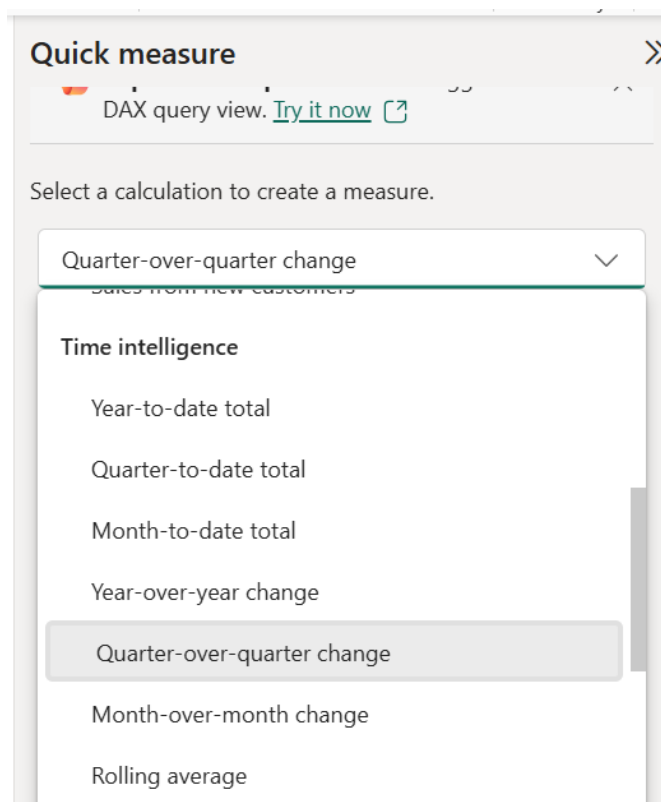
YTD: Calculates sales or selected values from start of the Year till date

QTD: Calculates sales or selected values from start of the Quarter till date

MTD: Calculates sales or selected values from start of the Month till date

YOY Change: Calculates change in values Year over Year

QOQ change: Calculates change in values Quarter over Quarter

MOM Change: Calculates change in values Month over Month

Rolling Average: Helps calculate rolling average values

YTD Sales

11.96K

(Blank)
Sum of Sales QTD

Year	Sum of Sales	Sum of Sales YoY%
2017	4,84,247.50	
2018	4,70,532.51	-3%
2019	6,09,205.60	29%
2020	7,96,579.21	31%
2021	81,696.07	-90%
2022	85,151.95	4%
2023	80,645.53	-5%
2024	97,313.99	21%
2025	11,963.94	-88%
Total	**27,17,336.29**	**0%**

Year	Quarter	Sum of Sales	Sum of Sales QoQ%
2020	Qtr 4	3,10,034.82	42.89%
2021	Qtr 1	16,217.60	-94.77%
2021	Qtr 2	20,921.56	29.01%
2021	Qtr 3	21,405.68	2.31%
2021	Qtr 4	23,151.22	8.15%
2022	Qtr 1	21,752.47	-6.04%
2022	Qtr 2	11,186.59	-48.57%
2022	Qtr 3	26,661.22	138.33%
2022	Qtr 4	25,551.67	-4.16%
2023	Qtr 1	22,455.89	-12.12%
2023	Qtr 2	11,471.09	-48.92%
2023	Qtr 3	33,091.66	188.48%
2023	Qtr 4	13,626.89	-58.82%
2024	Qtr 1	25,448.62	86.75%
2024	Qtr 2	28,470.84	11.88%
2024	Qtr 3	25,660.77	-9.87%
2024	Qtr 4	17,733.76	-30.89%
2025	Qtr 1	11,963.94	-32.54%
2025	Qtr 2		-100.00%
Total		**27,17,336.29**	**0.00%**

Note: Toy dataset in use doesn't hold values within the current quarter/month hence its blank, added to show case we can do Month to date & Quarter to date calcs using Quick Measures.

Please read - Dashboard & Reporting Guide to explore DAX expressions for Data insights and BI