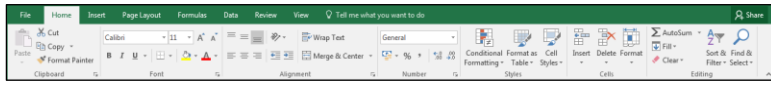


Data Analytics - Foundation

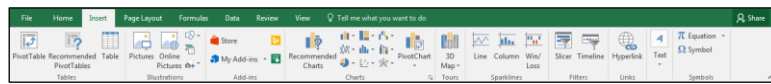
This quick reference is for Microsoft Excel 2016 and Microsoft Power BI on Windows 10.

Quick Reference

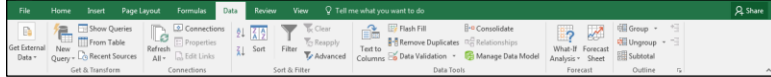
Excel 2016 Home Tab



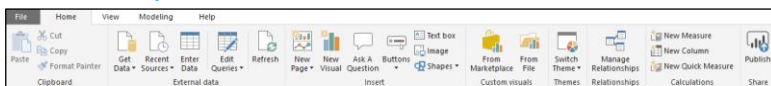
Excel 2016 Insert Tab



Excel 2016 Data Tab



Power BI Desktop Home Tab



Power BI Service Report Ribbon



Certification Test Goals

This module sets out foundational knowledge and skills in data analytics that can be used to get, prepare and analyse data to generate business intelligence that can be used to achieve business goals.

Successful candidates will be able to:

- Understand the key concepts relating to the application of data analytics in business.
- Understand and apply key statistical analysis concepts.
- Import data into a spreadsheet and prepare it for analysis using data cleansing and filtering techniques.
- Summarise data sets using pivot tables and pivot charts.
- Understand and apply data visualization techniques and tools.
- Create and share reports and dashboards in a data visualization tool.

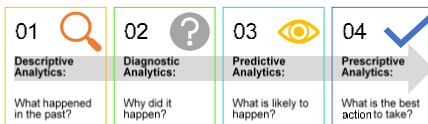
1 Concepts and Statistical Analysis

1.1 Key Concepts

1.1.1 Identify the main types of data analytics:

Data analytics refers to the techniques and processes used to collect, organise and examine data sets to create meaningful and useful information. Four types of data analytics are:

- **Descriptive analytics** - Used to find out what has happened in the past by summarising data from multiple sources.
- **Diagnostic analytics** - Used to determine why something happened in the past by looking at the data to understand root causes and contributing factors.
- **Predictive analytics** - Used to forecast the probabilities of future outcomes using the findings of descriptive and diagnostic analytics.
- **Prescriptive analytics** - Used to identify suitable actions to take now, for example, to eliminate future problems or take advantage of trends.



Two broad categories of data analytics are:

- **Quantitative analytics** - Used to analyse information that can be measured and written down with numbers, such as, profits, costs, and sales.
- **Qualitative analytics** - Used to analyse information that cannot be easily measured or expressed as numbers, such as attitudes, opinions and behaviours.

1.1.2 Outline the business benefits of data analytics:

- **Identifies patterns/trends** - Evaluating large sets of data containing varying types of data enables businesses to uncover hidden data patterns, market trends and customer preferences and behaviour.
- **Improves efficiency** - Insight gained by data analytics enables businesses to automate and optimize their business processes thus improving operational efficiency.
- **Supports decision making** - Access to large volumes of analysed data allows businesses to make better and more informed business decisions leading to more effective business strategies.
- **Presents information effectively** - Information presented in easy-to-understand formats such as tables, charts, maps, and combined in reports and dashboards, help businesses to better interpret and understand their data.

1.1.3 Identify the main phases of data analysis:

The phases vary depending on the type of analytics and the business implementation. The following phases relate to data mining, a type of analytics that explores large data sets and generates predictions:

- **Business understanding** - The aim of the first phase is to define the data analytics objectives and project plan to achieve the specified business goals.
- **Data understanding** - The aim of the second phase is to consider the data requirements, which includes collecting, exploring and assessing the quality of the data.
- **Data preparation** - The aim of the third phase is to complete the final data set, which includes acquiring, cleaning and transforming the data.
- **Modelling** - The aim of the fourth phase is to select and apply appropriate data modelling techniques.
- **Evaluation** - The aim of the fifth phase is to evaluate the model to ensure that the results are useful to the business.
- **Deployment** - The aim of the sixth phase is to deploy the model, which includes planning and monitoring the deployment of results.

1.1.4 Recognise data protection considerations when analysing data like:

- **Anonymise personal data if possible** - If personal data is not needed to achieve data analytics objectives, then avoid the effort of complying with data protection laws by not collecting it or anonymising it. Anonymisation techniques include removing direct identifiers, such as names and addresses, and using aggregation to reduce details.
- **Comply with applicable data protection regulations** - Data protection regulations, which protect the privacy rights of individuals in relation to the processing of their personal data, vary across the world. Businesses should comply with applicable data protection regulations in the relevant jurisdiction or risk penalties for non-compliance.

1.2 Statistical Analysis

1.2.1 Describe measures of central tendency of a data set:

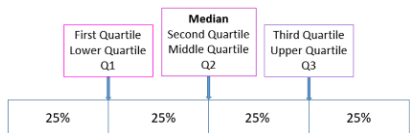
- **Mean** - This measure describes the average of a data set and is calculated by summing all the values in the data set and dividing by the number of values in the data set.
- **Median** - This measure describes the middle value in a data set distribution when it is arranged in ascending order. In a data set with an even number of values it is the average of the two middle values. In a data set with an odd number of values, it is the middle value in the data set.
- **Mode** - This measure is the value that occurs most frequently in a data set. There is no mode when all the values in a data set are unique.

1.2.2 Calculate the central tendency value of a data set using a function:

- **Mean** - To calculate the **mean**, the syntax is **AVERAGE(number1,[number2], ...)**
- **Median** - To calculate the **median**, the syntax is **MEDIAN(number1,[number2], ...)**
- **Mode** - To calculate the **mode**, the syntax is **MODE(number1,[number2],...)**

1.2.3 Describe measures of variation of a data set:

- **Quartiles** - These are values that divide the data set into quarters according to where the values fall on the number line.
- The 1st quartile is the median of the lower half of the data set, the 2nd quartile is the median of the data set, and the 3rd quartile is the median of the upper half of the data set.



- The formula to find a quartile, by determining the value in the appropriate position in a ranked discrete data set, are outlined below, where n is the number of values in the data set:

Quartile Position	Formula
First, Q1	$(n + 1) / 4$
Second, Q2 (the median)	$(n + 1) / 2$
Third, Q3	$3(n + 1) / 4$
Fourth, Q4	Maximum value

- **Variance** - This measure describes how far a data set is spread out by showing how representative the mean is of each value in the data set.
- The smaller the variance, the closer each value is to the mean; the greater the variance, the farther each value is from the mean; and a variance of zero indicates that there is no variation from the mean.
- Technically variance is the average of the squared differences from the mean.
- **Range** - This measure describes how the data is dispersed or spread out in a data set and is calculated by subtracting the minimum value from the maximum value.

1.2.4 Calculate the variation of a data set:

- **Quartile** - To calculate a **quartile**, the syntax is **QUARTILE(array,quart)**
The **array** argument is the range of cells containing the data set and the **quart** argument is the position of the required quartile to return (0: minimum, 1: first, 2: second, 3: third, 4: maximum).
- **Variance** - To calculate a **variance**, the syntax is **VAR.P(number1,[number2], ...)**

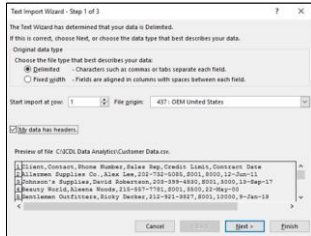
- **Range** - To calculate a range, the syntax is `MAX(number1,[number2],...)-MIN(number1,[number2],...)`

2 Data Set Preparation

2.1 Importing, Shaping

2.1.1 Import data into a spreadsheet application: .csv file.

- In a workbook, on the **Data** tab, in the **Get External Data** group, select **From Text**.
- Navigate to the location of the **.csv** file to import, select the **.csv** file and click **Import**.
- In the first dialog box of the **Text Import Wizard**, specify the data type as **Delimited**.



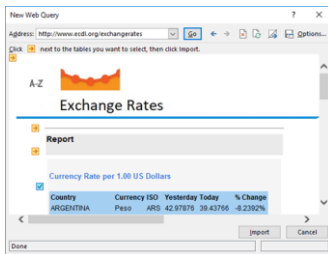
- Select the option **My data has headers**, if appropriate.
- Select **Next**.
- In the second dialog box of the **Text Import Wizard**, select the **delimiter** used in the **.csv** file.
- Select **Next**.
- In the third dialog box of the **Text Import Wizard**, set the required data format for each column by selecting each column and selecting the appropriate **Column Data Format** radio button.
- To specify that a column is not imported, select the column and select the **Do Not Import Column (Skip)** radio button.
- Select **Finish**.
- In the **Import Data** dialog box, select the location where you want the imported data to appear.
- Click **OK**.

2.1.1 Import data into a spreadsheet application: spreadsheet.

- In a workbook, on the **Data** tab, in the **Get External Data** group, click **Existing Connections**.
- In the **Existing Connections** dialog box, click **Browse for More**.
- Locate and click on the file name to be imported and click **Open**.
- In the **Select Table** dialog box, select the appropriate table.
- Click **OK**.
- In the **Import Data** dialog box, select the location where you want the imported data to appear.
- Click **OK**.

2.1.1 Import data into a spreadsheet application: website table

- In a workbook, on the **Data** tab, in the **Get External Data** group, click **From Web**.
- In the **New Web Query** dialog box, click in the **Address** text box and type the website address.
- Click **Go**.
- Click the **table selection arrow** next to the table to import.



- Click **Import**.
- In the **Import Data** dialog box, select the location where you want the imported data to appear.
- Click **OK**.

2.1.1 Import data into a spreadsheet application: database table.

- In a workbook, on the **Data** tab, in the **Get External Data** group, click **From Access**.
- Locate and click on the file name to be imported and click **Open**.

- In the **Select Table** dialog box, select the appropriate table.
- Click **OK**.
- In the **Import Data** dialog box, ensure **Table** is selected and select the location where you want the imported data to appear.
- Click **OK**.

2.1.2 Remove duplicate data.

- Select the data set.
- On the **Data** tab, in the **Data Tools** group, select **Remove Duplicates**.
- In the **Remove Duplicates** dialog box, select the columns with duplicates and click **OK**.
- In the message box, which shows how many duplicates were removed and how many unique values remain, click **OK**.

2.1.3 Validate that given values belong to a reference data set using the vlookup function.

- Select the cell to display the cross-check result, enter the appropriate **VLOOKUP** function and press **Enter**.
- The **VLOOKUP** syntax is: `VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])`.
- The **lookup_value** argument is the value or cell reference to look up (the given values to validate).
- The **table_array** argument is the name or address of the lookup table (the reference data set).
- The **col_index_num** is the column number in the lookup table (the reference data set).
- The **range_lookup** argument is optional and specifies whether the return value is an **exact match (FALSE)** or an **approximate match (TRUE)**.
- **VLOOKUP** in **exact match** mode is useful when looking for an exact match for a given value – for example, a country ID. If the given value exists in the reference data set, the function will return the value, otherwise it will return #N/A to indicate that the value is not found.

Imported Dataset	Lookup Table
1	
2	
3	
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8	
9	
10	
11	
12	
13	
14	
15	
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- **VLOOKUP** in **approximate match** mode is useful when looking for the best match for a given value – for example, the right commission rate for a sales figure.

2.1.4 Validate that given values belong to a specified range using one or more IF functions.

- Select the cell to display the result, enter the appropriate **IF** function or multiple (nested) **IF** functions and press **Enter**.
- The **IF** function syntax is `IF(logical_test, [value_if_true], [value_if_false])`
- The **logical_test** argument is a value or logical expression that can be evaluated as **TRUE** or **FALSE**. It can be simple or complex and can contain one or more logical functions.
- The **value_if_true** argument is optional and is the value to return when the **logical_test** evaluates to **TRUE**.
- The **value_if_false** argument is optional and is the value to return when the **logical_test** evaluates to **FALSE**.
- Multiple **IF** functions can be used together to create complex logical tests by adding **IF** statements to the **value_if_true** and **value_if_false** arguments. For example, to validate that the data in the range A4:B8 is within the minimum and maximum range specified in cells F4 and G4: in cell D4, enter `=IF(B16>=G16,"Error",IF(B16<=F16,"Error",IF(B16<=G16,B16)))`, press **Enter** and copy to D5:D8.

Country	Sales	Min	Max	Minimum Range	Maximum Range
France	795,000	795,000	800,000	250,000	800,000
Germany	820,000	Error			
Poland	500,600	500,600			
Greece	885,200	885,200			
Austria	475,600	475,600			

2.1.5 Extract values from a string using text functions:

- Select the cell to display the result, enter the appropriate **text function** or **combination of text functions** and press **Enter**:
- **LEFT** - Extracts a specified number of characters from the left side of a specified text string. If the number of characters is not specified 1 character is extracted by default. The syntax is `LEFT(text, [num_chars])`

- **RIGHT** - Extracts a specified number of characters from the right side of a specified text string. If the number of characters is not specified 1 character is extracted by default. The syntax is `RIGHT(text, [num_chars])`.
- **LEN** - Returns the length of a text string as a number of characters. The syntax is `LEN(text)`.
- **MID** - Extracts a specified number of characters from a specified starting position in a specified text string. The syntax is `MID(text, start_num, num_chars)`.
- **FIND** - Returns the position, as a number, of one text string from a specified starting position within another specified text string. If the starting position is not specified, the starting position in the text to search is 1 by default. The syntax is `FIND(find_text, within_text, [start_num])`.
- **LEFT** and **LEN** - Removes the last n characters from a text string. This is useful when there are values with variable lengths, and you want to remove a specified number of characters from the right. The syntax is `LEFT(text,LEN(text)-n)`
- **LEFT** and **FIND** - Extracts characters from the left side of a string up until a specified character. The syntax is `LEFT(text,FIND(character,text)-1)`

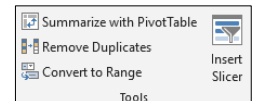
2.2 Filtering

2.2.1 Format a data set as a built-in table.

- In the workbook, click on any cell in the data set.
- On the **Home** tab, in the **Styles** group, click **Format as Table**.
- Select a **table style** from the drop-down menu.
- In the **Format As Table** dialog box, click **OK**.
- On the **Design** tab, check or uncheck the desired options in the **Table Style Options** group.

2.2.2 Insert table slicers.

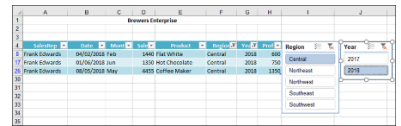
- Click on any cell in the table.
- On the **Table Tools, Design** tab, in the **Tools** group, click **Insert Slicer**.



- In the **Insert Slicers** dialog box, check the fields (columns) for which you want to create a slicer.
- Click **OK**.
- Position and resize the slicers created as required.

2.2.2 Use table slicers.

- In the slicer, click the items on which to filter.



- To select more than one item, press **CTRL** and then click the items.
- To clear the filter, select the **Clear Filter** button.

3 Data Set Summarisation

3.1 Pivot Table Data Aggregation

3.1.1 Change the method of aggregation for a value: sum, average, count, minimum, maximum.

- Click on any value cell in the **PivotTable**.
- On the **Analyze** tab, in the **Active Field** group, click **Field Settings**.
- Choose the required aggregation method listed under **Summarize value field by: Sum, Count, Average, Max, or Min**.
- If required, enter a new name in the **Custom Name** text box.
- If required, click on **Number Format**, set the format for the number and click **OK**.
- Click **OK**.

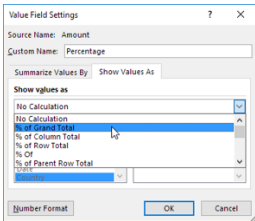
3.1.2 Display multiple aggregation values.

- Click on any cell in the **PivotTable**.
- In the **PivotTable Fields** pane, drag and drop the required fields, which can include multiple instances of the same value field, into the **Σ Values** area.
- To change the aggregation method of a value field, right-click any cell in the field and select **Summarize Values By**.
- Select the required aggregation method to change to: **Sum, Count, Average, Max, or Min**.
- To change the name of the value field, right click the field and select **Value Field Settings**.

- Enter a new name for the value field in the **Custom Name** text box.
- Click **OK**.

3.1.3 Display values as: % calculation, difference from specific values, running total, ranked.

- Click on any value cell in the **PivotTable**.
- On the **Analyze** tab, in the **Active Field** group, click **Field Settings**.
- Select the **Show Values As** tab.
- Select the **Show values as** drop-down list.
- Select the required display value.
- Depending on the display value selected, select appropriate options in the **Base field** and **Base item** lists.
- If required, enter a new name in the **Custom Name** text box.



- If required, click on **Number Format**, set the format for the number and click **OK**.
- Click **OK**.

3.2 Pivot Table Frequency Analysis

3.2.1 Automatically group data.

- Click on any date/time or numeric value cell in the **PivotTable**.
- On the **Analyze** tab, in the **Group** group, click **Group Field**.
- If grouping **date/time** values, in the **Grouping** dialog box, in the **By** list, select the period of time to group by. If grouping by **Days**, set the **Number of days**.
- If grouping **numeric** values, in the **Grouping** dialog box, in the **By** text box, type the **interval** to group by.
- If required, adjust the **Starting at** and **Ending at** values. By default, these are the first and last dates or the lowest and highest values in the pivot table.
- Click **OK**.

3.2.2 Manually group data.

- In the **PivotTable**, select the items to add to the group. (To select multiple non-contiguous items, press **CTRL** and click on the items.)
- On the **Analyze** tab, in the **Group** group, click **Group Selection**.

3.2.1 Rename groups.

- In the **PivotTable**, click on a **group name**.
- Type a **new name**.
- Press **Enter**.

3.2.2 Ungroup data.

- In the **PivotTable**, select a **group label**.
- On the **Analyze** tab, in the **Group** group, click **Ungroup**.

3.3 Filtering Pivot Tables

3.3.1 Use the report filter.

- Click on any cell in the **PivotTable**.
- To insert a report filter, drag and drop the required fields to the **Filters** area in the **PivotTable Fields** panel.
- To use the report filter to display items in the **PivotTable**, select the **report filter** drop-down arrow and select the item or items to display and click **OK**.
- To separate the report into different worksheets based on the specified filter field, on the **Analyze** tab, in the **PivotTable** group, click the **Options** down-pointing arrow.
- Click **Show Report Filter Pages**.
- In the **Show Report Filter Pages** dialog box, select the required filter field listed and click **OK**.
- To clear the filter from the **PivotTable**, select **All** from the **report filter** drop-down list and click **OK**.
- To remove report filters from the **PivotTable**, remove the fields from the **Filters** area.

3.3.2 Insert and use slicers to filter single pivot tables.

- Click on any value in the **PivotTable**.
- On the **Analyze** tab, in the **Filter** group, click **Insert Slicer**.
- Choose the required **field** from the list of fields in the **Insert Slicer** dialog box and
- Click **OK**.

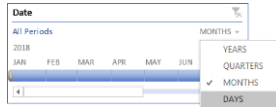
- Click on the items shown in the slicer to filter the table according to the items selected.
- To clear the filter, click the **Clear Filter** icon at the top right of the slicer.
- To delete the slicer, click on the slicer and press **Delete**.

3.3.2 Insert and use slicers to filter multiple pivot tables.

- Select the required **slicer**.
- On the **Options** tab, in the **Slicer** group, click **Report Connections**.
- In the **Report Connections** dialog box, select the **pivot tables** to connect to the slicer.
- Click **OK**.
- Click on the **items** shown in the slicer to filter the tables according to the items selected.

3.3.3 Insert and filter a timeline.

- Click on any value in the **PivotTable**.
- On the **Analyze** tab, in the **Filter** group, click **Insert Timeline**.
- In the **Insert Timelines** dialog box, select the **field** on which to base the timeline.
- Click **OK**.
- Click the **time level down arrow** and select the **time level** to display on the timeline (**YEARS, QUARTERS, MONTHS, DAYS**).

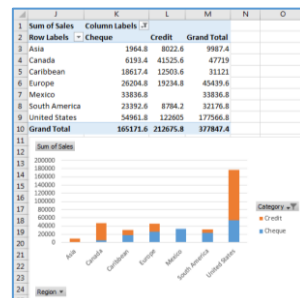


- To select the time period to display, click a **period tile** and drag at either end of the tile to include the time range required.

3.4 Using Pivot Charts

3.4.1 Insert a pivot chart for an existing pivot table.

- Click on any cell in the **PivotTable**.
- On the **Analyze** tab, in the **Tools** group, click **PivotChart**.
- Select the chart type and variant in the **Insert Chart** dialog box and click **OK**.
- To customise the appearance and layout, click on the **PivotChart** and select the **Chart Elements** button or the **Chart Styles** button to set their respective options as required.
- To show or hide the field buttons, on the **Analyze** tab, in the **Show/Hide** group, select or deselect the **Field Buttons** in the **Field Buttons** drop down menu as required.



3.4.2 Create a pivot chart from fields in a data set.

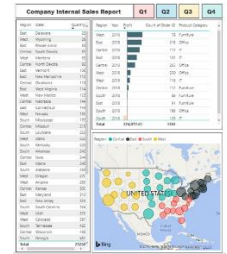
- Select any cell in the table.
- On the **Insert** tab, in the **Charts** group, click **PivotChart**.
- In the **Create PivotChart** dialog box, select where to locate the pivot chart and click **OK**.
- Drag and drop the **fields** as required to the **Filters, Legend (Series), Axis (Categories),** and **Values** areas in the **PivotChart Fields** panel.
- To change the default chart type, on the **Design** tab, in the **Type** group, click **Change Chart Type**, select the required **chart type** and **variant** in the **Change Chart Type** dialog box, and click **OK**.
- To customise the appearance and layout, click on the **PivotChart** and select the **Chart Elements** button or the **Chart Styles** button to set their respective options as required.
- To show or hide the field buttons, on the **Analyze** tab, in the **Show/Hide** group, select or deselect the **Field Buttons** in the **Field Buttons** drop down menu as required.

4 Data Visualization

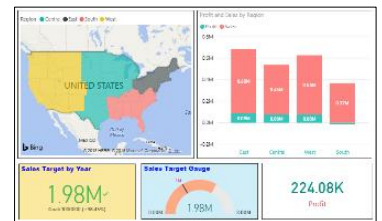
4.1 Concepts and Setup

4.1.1 Understand the concept of data visualization using reports and dashboards.

- **Data visualization** provides a visual way to access data – for example, by displaying summary information or trends and patterns within data in a visual form.
- There are many types of visualizations to choose from, depending on the data and what you want to present or find out.
- Data visualizations can provide a visual snapshot of data and can be interactive for ongoing analysis and querying.
- **Reports** include data visualizations and results of the data analytic process. A report can consist of one or more pages of visualizations. They can provide summary information and key insights from business data and can also include interactive features. They provide a visual format to create and share business intelligence.



- **Dashboards** combine multiple visualizations to organise and display key information and metrics on a single screen that can be viewed at a glance. They are useful for monitoring changes and gaining business insights in real-time. Visualizations are pinned (added) to dashboards from reports.



4.1.1 Outline common visualizations like:

- **Charts** - Useful for conveying numerical data across categories or time scales, visually revealing similarities, differences and trends among multiple values. Column, line, pie/donut and bar charts are popular types.
- **Key performance indicators (KPIs)** - Useful for highlighting critical data and measuring performance or progress towards a goal using predefined conditions. KPIs and gauge charts are popular types, which show the current status, the goal to be achieved and the distance from the goal.
- **Maps** - Useful for presenting quantitative information according to location to give an overview of data distribution across geographic locations. They give an insight into data sets by visually highlighting the best and worst performing areas, trends and outliers. Bubble maps and filled maps are popular types, where bubble size and shading, respectively, show how values differ in proportion across geographical locations.

4.1.2 Recognise common data visualization tools.

- **Tableau Public**: A free web-based platform for creating data visualizations, which are uploaded to its public website for sharing.
- **Microsoft Power BI**: A suite of tools consisting of **Power BI Desktop**, a free desktop application and **Power BI service**, an online platform with different licensing options.

4.1.2 Recognise common data visualization tools' functions like:

- **Visualise data** - Data visualization tools allow you to connect to a wide range of data sources to analyse data sets, through the use of data visualizations, to find and visually present business intelligence in reports and dashboards.
- **Publish and share business intelligence** - Data visualization tools allow you to publish and share business intelligence online in reports and dashboards. In **Microsoft Power BI** the sharing functionality and creation of dashboards is available in the online platform, **Power BI service**, only. Reports can be created in **Power BI Desktop** or **Power BI service** but those created in **Power BI Desktop** need to be published to **Power BI service** for sharing.

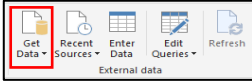
4.1.3 Understand good design practice in reports and dashboards like:

- **Clean and uncluttered layout** - Include only the most relevant data on reports and dashboards so the reader can easily see the key insights.

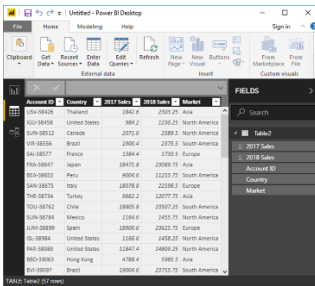
- **Descriptive titles** - Use descriptive titles to ensure data visualizations are easy to understand. Add labels using text boxes to describe the page, grouping of visuals, or describe an individual visual.
- **Consistent fonts and colour** - Use one or two font types and up to three font sizes to create visual hierarchy among the content (titles, labels, data).
- **Use of colour for emphasis and understanding** - Use mainly natural colours and keep bright or dark colours for highlighting outliers or critical data; use colour shades or gradients to show the spread of values across data; and use colour to highlight variance around a central value, for example, green to show positive values and red to show negative values.

4.1.4 Import a data set from a spreadsheet into a data visualization tool and save the file.

- Double-click on the **Power BI Desktop** app icon to launch the application.
- On the **Home** tab, in the **External Data** group, click **Get Data**.



- Select **Excel** in the dropdown menu.
- Locate and select the required **Excel** file and click **Open**.
- Check the required data table under **Display options** in the **Navigator** window and click **Load**.
- In the **Report View**, the **Fields** pane displays all the column headings in the data set and the report canvas page is empty.
- Click the **Data View** icon on the left to view the data set that has been imported.

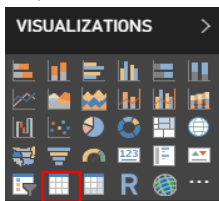


- Click **File** and choose **Save**.
- Type the name of the file in the **File name** box in the **Save As** dialog box.
- Click **Save** to save the data as a **Power BI** file.

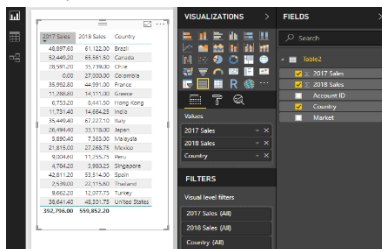
4.2 Visualization

4.2.1 Create tables in a report.

- In **Power BI Desktop**, select **File** and select **Open**.
- Select the relevant **Power BI** file and click **Open**.
- In **Report view**, click on the **Table** icon in the **Visualizations** pane.



- Select the required fields to add to the table in the **Fields** pane.



- Select the table on the report canvas page and click the **Format** icon.
- Format the table as required using the formatting options.
- Click outside the table on the report canvas page and add additional visualizations, as required, to the report.
- **Save** and **close** the report.

4.2.2 Visualize data as a chart: column, bar, line, pie.

- In **Report view** in **Power BI Desktop**, click on the appropriate chart icon in the **Visualizations** pane.



- Select the required fields to add to the chart in the **Fields** pane.
- For the **line** chart, also select the time scale to display by deselecting the options not required.
- Click the **Format** icon and format the chart as required using the formatting options.

4.2.3 Apply font and background conditional formatting to show: high/low values, above/below average values.

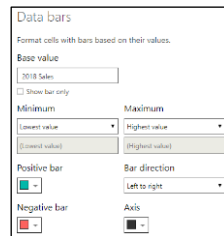
- In **Report view** in **Power BI Desktop**, select the relevant visualization.
- Click the down arrow next to the relevant field in the **Values** area in the **Visualizations** pane.
- Select **Conditional Formatting**.
- Choose **Font color** or **Background color**.
- To set a colour for the lowest value and the highest value, set a colour in the **Minimum** area and the **Maximum** area respectively and click **OK**.
- To set rules, choose the **Format by Rules** option, set one or more value ranges and related conditions in the **Rules** area by entering the relevant **If value condition**, and **value condition** and related **colour**, and click **OK**.

4.2.3 Edit font and background conditional formatting to show: high/low values, above/below average values.

- To edit font and background conditional formatting, select the down arrow next to the relevant field, select **Conditional Formatting**, click **Font color** or **Background color**, as appropriate, and edit as required.
- To remove font and background conditional formatting, select the down arrow next to the relevant field, select **Remove Conditional Formatting**, and select **All**, **Font color** or **Background color**, as appropriate.

4.2.4 Apply data bars.

- In **Report view** in **Power BI Desktop**, select the relevant visualization.
- Click the down arrow next to the relevant field in the **Values** area in the **Visualizations** pane.
- Select **Conditional Formatting** and choose **Data bars**.



- The default range for the data bars is the **Lowest value** in the data set for **Minimum** and **Highest value** for **Maximum**.
- Change the option below **Minimum** and **Maximum** to **Number** and specify a value for each option, to set the range of the data bars.
- Set colours for **Axis**, **Positive bar**, and **Negative bar** and **Bar direction** as required.

4.2.4 Edit data bars.

- To edit data bars, select the down arrow next to the relevant field and select **Conditional Formatting**, click **Data bars** and edit as required.
- To remove data bars, select the down arrow next to the relevant field, select **Remove Conditional Formatting** and select **Data bars**.

4.2.5 Apply, edit visual level filters.

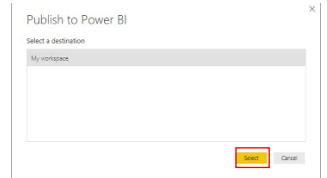
- In **Report view** in **Power BI Desktop**, select the relevant table visualization.
- The value fields selected in the visualization are included automatically under **Visual level filters** in the **Filters** pane.
- To add other fields for filtering, click the items under the **Field** pane or drag and drop the **Field** items under **Visual level filters**.
- Click on the down arrow next to the relevant field under **Visual level filters** to display the visual level filter options for that field.

- For numerical values, select the items to display by setting rules (for example, is less than or equal to) and specifying values as required.
- For qualitative values, select and deselect the items to display from the items displayed under **Basic filtering**.
- Toggle between selecting all items and unselecting all items by checking and unchecking **Select All**.

4.3 Publishing and Sharing

4.3.1 Publish a report.

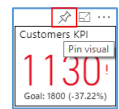
- To publish reports from **Power BI Desktop** to **Power BI service**, first setup **Power BI service** with a **Power BI Pro license**.
- In **Power BI Desktop**, save the report to publish and click the **Publish** icon.
- Select **Publish to Power BI**.
- Sign in to your **Power BI** account.
- Select **My workspace** as the destination to publish the report and click **Select**.



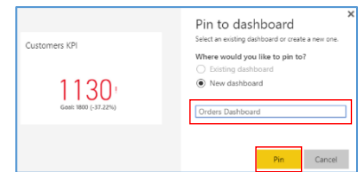
- To open the report in your **Power BI** site, click the link received or click **Got It** to continue working in **Power BI Desktop**.

4.3.2 Create a dashboard.

- Go to <https://app.powerbi.com> and sign in to your **Power BI** account.
- Select **My Workspace** on the left menu pane, select the **Reports** heading and select the report containing the visualizations to add to the dashboard.
- Hover over the required **visualization** in the report and click on the **pushpin** icon.



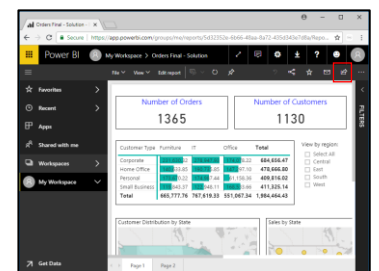
- In the **Pin to dashboard** window, select **New dashboard**.
- Type the name of the new dashboard in the text box and click **Pin**.



- Pin more visualizations, as required, to the **Existing dashboard**, from this report or other reports.

4.3.3 Share a report, dashboard using a link.

- In an open **report** or **dashboard** in **Power BI service**, select **Share** in the menu bar.



- Under **Grant access to**, enter the email addresses of other users and click **Share**.
- Or under **Report Link**, copy the link to send via email or another communication tool.
- Reports and dashboards can only be shared with users with **Power BI Pro** licenses.

4.3.3 Share a report to web.

- In an open report in **Power BI service**, select **File** in the menu bar and select **Publish to web**.
- Click on **Create embed code** and click **Publish**.
- In the **Success** pane, copy the link that can be sent in email or the HTML that can be pasted directly into your web page or blog, and click **Close**.

For more information, visit: www.icdl.org