

Exercises –

Ex1: import data from various sources

In this exercise you will try and import from different sources. You do not need to save the file at the end of the exercise

Importing from Excel

Open a new Power BI file.

In Power BI Desktop, expand Get Data, and then select Excel.

Navigate to **the Exercises folder** and double-click the Resellers.xlsx file.

In the Navigator, check Sheet1. The Navigator parses the Excel data and shows a preview of the data in Sheet1

While you're still in the Navigator, click the Transform button to open the Query Editor, and then change the query name in the Query Settings pane to Resellers.

Click Close and Apply

Importing Text Files

Expand Get data and Click CSV

Navigate to the Exercises folder and change to all files and choose Employees2.txt

Importing Dates

Get Data | CSV | AllFiles -> Exercises\DimDate.txt | Open | Change DimDate to Date

Importing form the web

Get Data | web | basic URL | https://en.wikipedia.org/wiki/Six_Nations_Championship |

(Anonymous)

Please note: there are underscores and it's case sensitive.

Choose the first table and load this.

Save the file as "exercise 1"

Exercise 2: Explore PowerBi desktop

Open report “Global Store_done.pbix” from Solution folder.

Explore and familiarise with the different areas

In report view click on every visual, try and understand which visualization has been used, try and change it. Explore the formatting menu for the existing visualizations

In table view, select each table and look at the data

In model view. Look at how the tables are related, click on Manage Relationship and explore the fields used to connect the tables:

- click on Manage relationships and look at the list of relationships
- click on one relationship from the list and notice the fields that are selected
- close Manage Relationship
- right click on one relationship and select Properties

If you change anything do not save or save with a different name

Exercise 3: Transforming Data

With the query editor, we can clean and transform data before we load it into the model.

Shaping and Cleansing Data

Here we’re going to take an Excel spreadsheet and load it into our model and clean it first.

Cleaning Excel

1. Open a new instance of Power BI Desktop. Save the .pbix file as Exercise3.
2. Expand the Get Data menu, and click Excel.
4. Navigate to the Exercise folder and select the **Vendor Parts.xlsx** file. Then click Open.
5. In the Navigator window, check Sheet1 to select it and preview its data. The preview shows how the data would be imported if you don't apply any transformations. As you see, there are many issues with the data, including mixed column content, pivoted data by month, and null values.

Sheet1

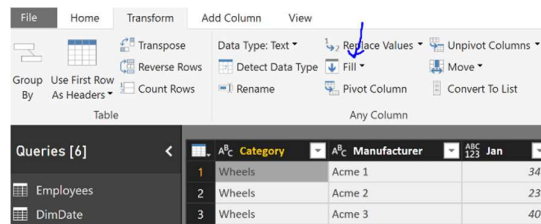
Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12
Vendor Parts - 2008		null	null	null	null	null	null	null	null	null	null
	null	null	null	null	null	null	null	null	null	null	null
Category	Manufacturer	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Wheels	Acme 1	341	442	703	699	772	697	555	518	539	
	null Acme 2	230	334	617	819	955	829	596	603	411	
	null Acme 3	407	665	1307	1511	1608	1317	1039	902	680	
	null Acme 4	202	293	545	520	504	419	356	364	310	
	null Acme 5	467	612	1320	1333	1453	1329	942	972	806	
	null Acme 6	4	6	10	7	13	11	11	9	4	
	null Acme 7	284	293	410	495	410	353	280	254	194	
	null Acme 8	18	27	74	64	67	75	51	45	33	
Mix Total		null	1953	2672	4986	5448	5782	5030	3830	3667	2977
	null	null	null	null	null	null	null	null	null	null	null
Category	Manufacturer	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Tires	Acme 1	13	26	31	42	18	10	20	25	18	
	null Acme 2	7074	8256	12808	14375	14495	11358	8724	9236	7588	
	null Acme 3	1854	2473	3479	3414	3257	2861	2552	2285	2073	
	null Acme 4	2	2	null	null	null	8	null	4	null	

6. Click the "Transform Data" button to open the Query Editor.

Removing Rows

First, let's remove the unnecessary rows:

1. Delete the first 1 or 2 rows (note if power BI has already promoted header and therefore there is only 1 row of nulls, remove only 1 row) using Remove Rows: Remove Rows-> remove top rows -> 1 (or 2, as needed so that the world Category is in the first row left)
2. Promote the first row as headers so that each column has a descriptive column name. To do so, in the ribbon's Transform tab, click the "Use First Row as Headers" button
3. Note that the first column (Category) has many null values. Select the column, and then, in the Transform tab, Click the, Fill -> Fill Down function. This fills the null values with the actual categories.



4. Let's remove rows that represent report subtotals. To do so, right-click a cell in the Category column that contains the word Category (normally row 11) Click Text Filters | "Does Not Equal" to remove all the rows that have "Category" in the first column. Notice that it's the row that get removed, not just the cell!!

5. Next, you will need to filter all the rows that contain the word "Total". Expand the column dropdown in the column header of the Category column. Click Text Filters | "Does Not Contain". In the Filter Rows dialog box, type "Total"(it is case sensitive), and then click OK.


6. Hold the Ctrl key and select the last two columns, Column15 and 2014 Total. Right-click the selection, and then click Remove Columns.

Un-pivoting Columns

Now that you've cleansed most of the data, there's one remaining task. Note how the months appear on columns. This makes it impossible to use the data properly. To solve this problem, you need to un-pivot the months from columns to rows.

1. Hold the Shift key and select all the month columns, from Jan to Dec.

2. Right-click the selection, and then click Unpivot Columns.
3. Double-click the column header of the Attribute column, and rename it to Month. Rename the Value column to Units.

4. if the column Units does not show  as data type (top left of the column), click on it and change the data type to Whole number

Adding custom columns

If you have a Date table in the model, you might want to join this data to it. As I mentioned, a Data table is at a day granularity. So that you can join to it, you need to convert the Month column to a date. Click the ribbon's tab Add Column, and then click "Add Custom Column".

1. In the "Add Custom Column" dialog box, enter FirstDayOfMonth as the column name. Then enter the following formula

```
= Date.FromText([Month] & " 1," & "2008")
```

Click OK. This formula converts the month value to the first day of the month in year 2008.

2. Assuming you need the month end date instead of the first date of the month, select the FirstDayOfMonth column. Click on "Column from Example", type 31 in the new first grey row in the column and then select Month | "End of Month" from the list of suggestions. Click Enter and then Click OK

4. Rename the new column to Date.

5. Make sure that the two new added columns have type date

Renaming Steps and Queries

Before loading the data, consider renaming the query to apply the same name to the new table. You can also rename transformation steps to make them more descriptive. Let's rename the query and a step:

1. In the Query Settings pane, rename the query to VendorParts. This will become the name of the table in the model.



The screenshot shows a data table with columns: Category, Manufacturer, Month, Units, and Date. The table contains 22 rows of data. To the right, the 'Query Settings' pane is open, showing the 'PROPERTIES' section with the name 'Vendor Parts' and the 'APPLIED STEPS' section with a list of steps including 'Renamed Column1'.

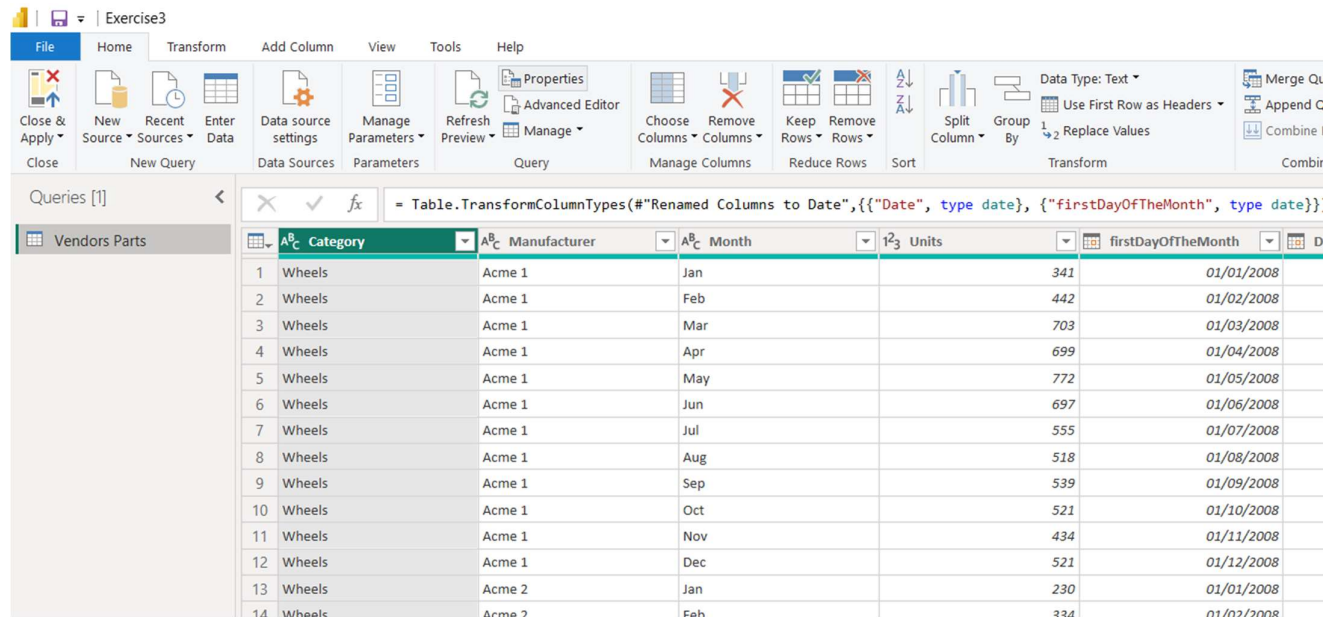
	Category	Manufacturer	Month	Units	Date
1	Wheels	Acme 1	Jan	341	31/01/2008
2	Wheels	Acme 1	Feb	442	29/02/2008
3	Wheels	Acme 1	Mar	703	31/03/2008
4	Wheels	Acme 1	Apr	699	30/04/2008
5	Wheels	Acme 1	May	772	31/05/2008
6	Wheels	Acme 1	Jun	697	30/06/2008
7	Wheels	Acme 1	Jul	555	31/07/2008
8	Wheels	Acme 1	Aug	518	31/08/2008
9	Wheels	Acme 1	Sep	539	30/09/2008
10	Wheels	Acme 1	Oct	521	31/10/2008
11	Wheels	Acme 1	Nov	434	30/11/2008
12	Wheels	Acme 1	Dec	521	31/12/2008
13	Wheels	Acme 2	Jan	230	31/01/2008
14	Wheels	Acme 2	Feb	334	29/02/2008
15	Wheels	Acme 2	Mar	617	31/03/2008
16	Wheels	Acme 2	Apr	819	30/04/2008
17	Wheels	Acme 2	May	955	31/05/2008
18	Wheels	Acme 2	Jun	829	30/06/2008
19	Wheels	Acme 2	Jul	598	31/07/2008
20	Wheels	Acme 2	Aug	603	31/08/2008
21	Wheels	Acme 2	Sep	411	30/09/2008
22	Wheels	Acme 2	Oct	272	31/10/2008

2. In the Applied Steps pane, right-click the step called "Renamed Column1" and click Rename. Change the step name to "Renamed Column to Date", and click Enter. If you have a step called "Changed Type 3", rename it as Changed Type to Date

Loading Transformed Data

Let's load the transformed data into a new table:

1. Click the Close & Apply button in the ribbon. Power BI Desktop imports the data, closes the Query Editor, and adds the VendorParts table to the Data pane.
2. In the ribbon's Home tab, click the Transform Data button. This brings you back to the Query Editor.



The screenshot shows the Power BI Query Editor interface. The ribbon at the top includes tabs for File, Home, Transform, Add Column, View, Tools, and Help. The Home tab is active, showing options like Close & Apply, New Source, Recent Sources, Enter Data, Data source settings, Manage Parameters, Refresh Preview, Advanced Editor, Choose Columns, Remove Columns, Keep Rows, Remove Rows, Sort, Split Column, Group By, Data Type: Text, Use First Row as Headers, Replace Values, Merge Queries, Append Queries, and Combine Queries. The Queries pane on the left shows a single query named 'Vendors Parts'. The main area displays a table with the following data:

	Category	Manufacturer	Month	Units	firstDayOfTheMonth
1	Wheels	Acme 1	Jan	341	01/01/2008
2	Wheels	Acme 1	Feb	442	01/02/2008
3	Wheels	Acme 1	Mar	703	01/03/2008
4	Wheels	Acme 1	Apr	699	01/04/2008
5	Wheels	Acme 1	May	772	01/05/2008
6	Wheels	Acme 1	Jun	697	01/06/2008
7	Wheels	Acme 1	Jul	555	01/07/2008
8	Wheels	Acme 1	Aug	518	01/08/2008
9	Wheels	Acme 1	Sep	539	01/09/2008
10	Wheels	Acme 1	Oct	521	01/10/2008
11	Wheels	Acme 1	Nov	434	01/11/2008
12	Wheels	Acme 1	Dec	521	01/12/2008
13	Wheels	Acme 2	Jan	230	01/01/2008
14	Wheels	Acme 2	Feb	324	01/02/2008

Combining Datasets

Merging Queries

Click on Recent Sources, to import Vendor Parts again, and select the sheet Vendors.

Use first row as headers: Name, City and State.

Now I'd like to join the VendorParts query to the Vendors query so that I can add some columns from the Vendor query in the VendorParts table.

1. In the Queries pane, select the VendorParts query because this will be our base query.
2. In the ribbon's Home tab, click Merge Queries (in the Combine group) to the far right.
3. Configure the Merge window Add Vendors then select Name from Vendors and Manufacturer in Vendors parts

Merge

Select a table and matching columns to create a merged table.

Vendor Parts

Category	Manufacturer	Month	Units	Date
Wheels	Acme 1	Jan	341	31/01/2008
Wheels	Acme 1	Feb	442	29/02/2008
Wheels	Acme 1	Mar	703	31/03/2008
Wheels	Acme 1	Apr	699	30/04/2008
Wheels	Acme 1	May	772	31/05/2008

Vendors

Name	City	State
Acme 1	Atlanta	GA
Acme 2	Norcross	GA
Acme 3	Alpharetta	GA
Acme 4	New York	NY
Acme 5	Charlotte	NC


Join Kind
Left Outer (all from first, matching from second)

OK Cancel

The join should be a left outer join.

5. Click OK.

The Query Editor adds a new column to the end of the VendorParts query.

6. click on  at the top right of the columns,

Units Date NewColumn

Search Columns to Expand

Expand Aggregate

(Select All Columns)

☐ (Name)

☒ City

☒ State

☐ Use original column name as prefix

OK Cancel

If you select the above options, it adds two new columns from the merged queries.

Appending Queries

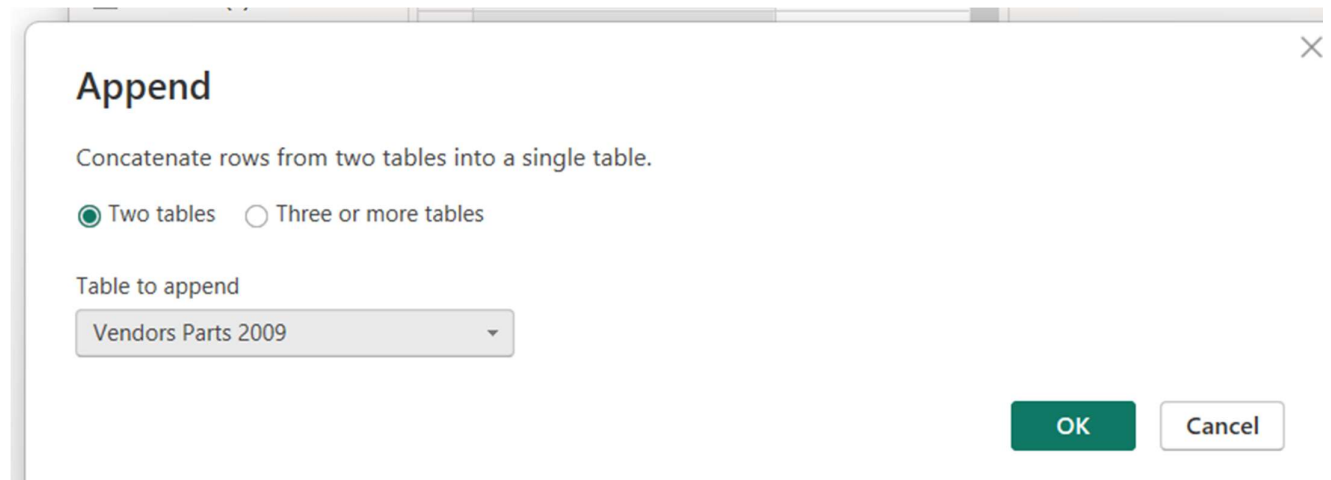
Suppose that some time has passed and you get another Vendors Parts report, for the year 2009. Instead of overwriting the data in the data model, which will happen if you refresh the data, you want to append the second dataset to the VendorParts table so you can analyse data across several years. If you are given a new file once a year, you can use the "Append Queries" feature to append queries manually.

In our exercise, to simulate a second dataset, you'll clone the existing VendorParts query.

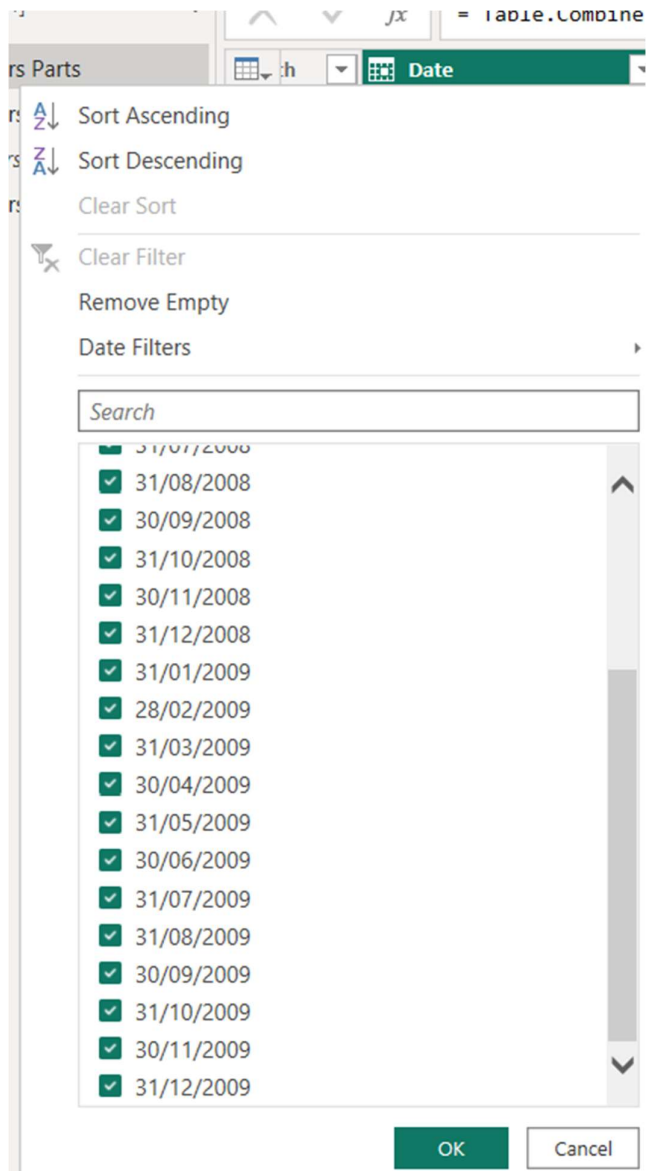
1. In the Queries pane, right-click the VendorParts query, and then click Copy.
2. Right-click an empty area in the Queries pane, and then click Paste. The Query Editor adds two queries: VendorParts (2) and Vendors (2). It clones the Vendors query because it discovers that VendorParts depends on it. Make sure you select Vendor Parts (2) only.
3. Open the settings of the "Added Custom" step by clicking on the cogwheel, and change the formula to use year 2009. You do this to simulate that this dataset has data for the year 2009. `Date.FromText([Month] & " 1," & "2009")`
4. In the Query Settings pane, rename the VendorsParts (2) query to VendorParts 2009.
5. Right-click VendorParts 2009 and turn off Enable Loading. Do the same for Vendors(2)

6. In the Queries pane, select the VendorParts query.

7. In the ribbon's Home tab, click Append Queries (in the Combine group). In the Append window, select the VendorParts 2009 query, and then click OK. The Query Editor appends VendorParts 2009 to VendorParts. As a result, the VendorParts query returns a combined dataset for years 2008 and 2009. As long as two queries have the same columns, you can append them.



Click ok. And then look at the Date Column to see if you have 2009



8. Click Close and Apply to load the data in PowerBI Desktop

Exercise 4 – From Spreadsheet to Scatter Chart

Import the three files PowerQuery1_BodyMassIndex.xlsx, PowerQuery2_GDP.xlsx, PowerQuery3_Population in three different datasets.

Transform each data set so that you end up with 3 columns each: year, country and BMI (or Population or GDP). Pay attention to the datatype of each column.

	Country	Year	BMI
1	Afghanistan	1980	21.48678
2	Afghanistan	1981	21.46552
3	Afghanistan	1982	21.45145
4	Afghanistan	1983	21.43822
5	Afghanistan	1984	21.42734
6	Afghanistan	1985	21.41222
7	Afghanistan	1986	21.40132
8	Afghanistan	1987	21.37679
9	Afghanistan	1988	21.34018
10	Afghanistan	1989	21.29845
11	Afghanistan	1990	21.24818
12	Afghanistan	1991	21.20268

Merge the three datasets into one (use “Merge as a new table” and rename the table “AllData”, for the first two table, then merge “allData” with the third table) using Country and year as joining fields: the final result looks like this:

	Country	Year	GDP	BMI	Population
1	Afghanistan	2002	490	20.59848	24639841
2	Afghanistan	2003	590	20.58706	25678639
3	Afghanistan	2004	650	20.57759	26693486
4	Afghanistan	2005	750	20.58084	27614718
5	Afghanistan	2006	890	20.58749	28420974
6	Afghanistan	2007	970	20.60246	29145841
7	Afghanistan	2008	860	20.62058	29839994
8	Albania	1984	2550	25.27901	2891004
9	Albania	1985	2610	25.28669	2957390
10	Albania	1986	2750	25.29451	3033393
11	Albania	1987	2730	25.30217	3116009
12	Albania	1988	2720	25.3045	3194854
13	Albania	1989	3040	25.31944	3255859
14	Albania	1990	2820	25.32357	3289483
15	Albania	1991	2020	25.28452	3291695

Create a scatter chart using fields from “AllData” as in the following image:

Values

Country ▼ ×

X Axis

BMI ▼ ×

Y Axis

GDP ▼ ×

Legend

Add data fields here

Size

Population ▼ ×

Play Axis

Year ▼ ×

Tooltips

Add data fields here

In the format menu enable category labels:

> Category label On

And color by category (in Markers)

▼ Color

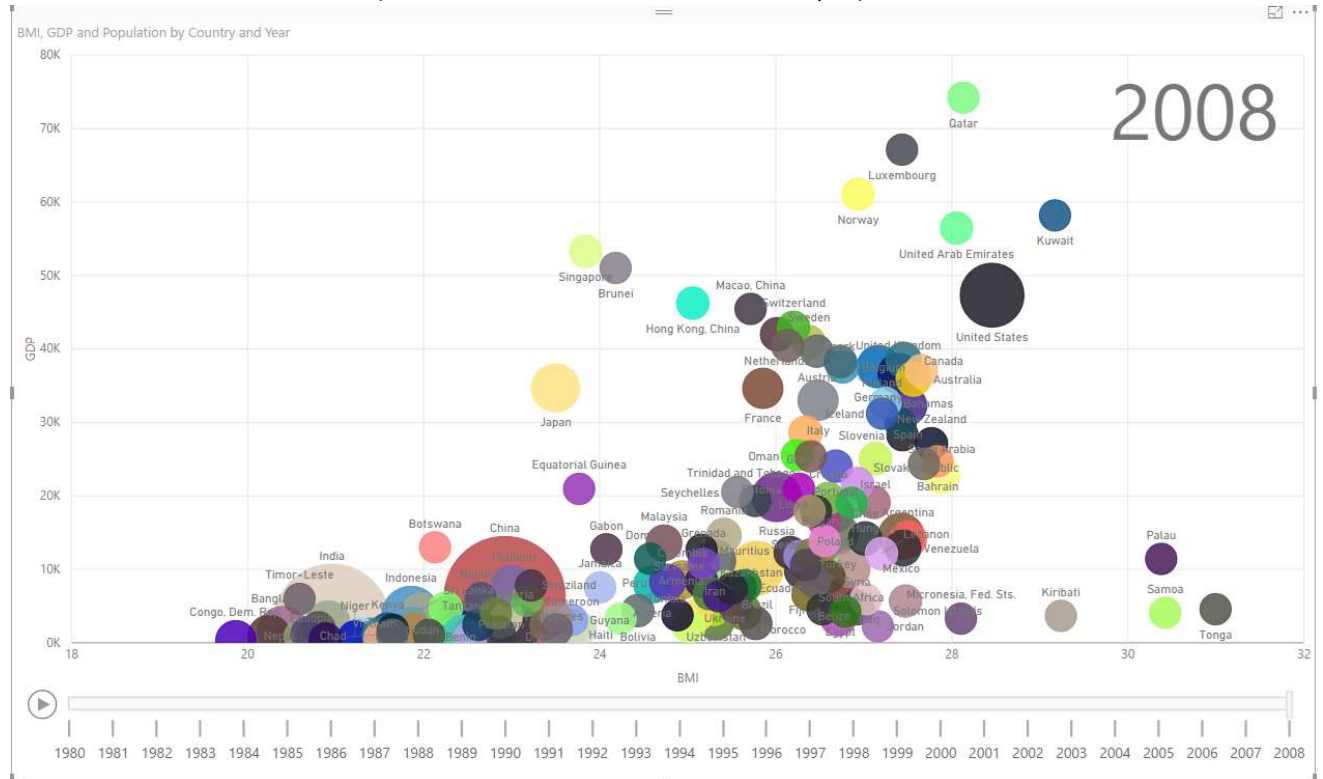
Color by category On

Default

■ ▼ *fx*

Show all Off

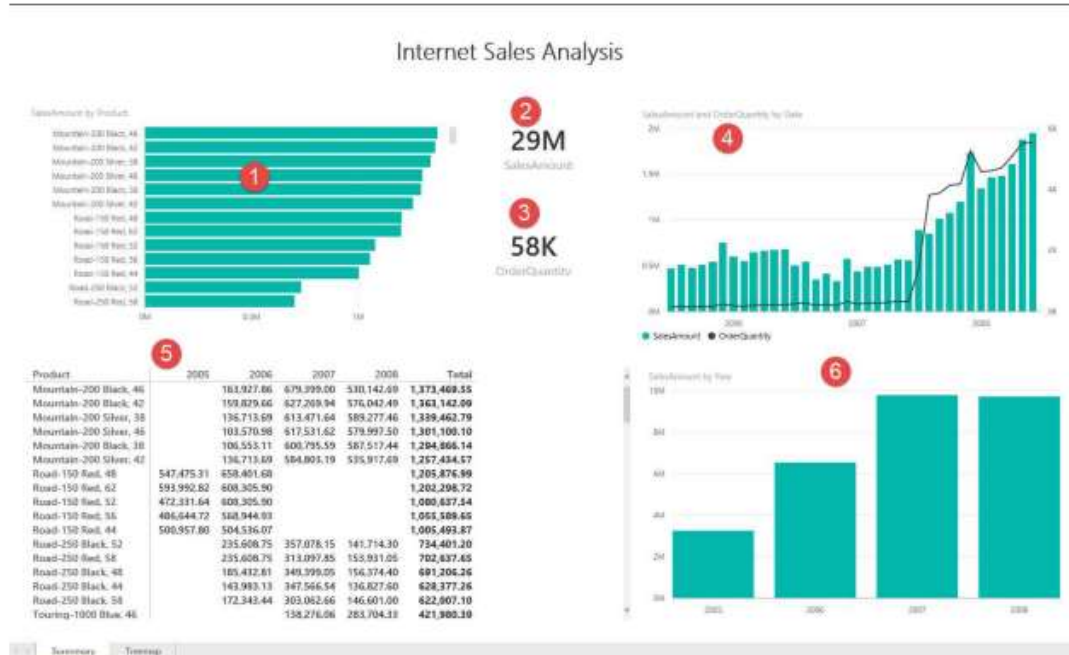
The final result will look like this (solution of the exercise is in BMIXGDP.pbix)



Click on the play button at the side of the year axis to see the evolution of the relation between measures, click on 1 single bubble to see how it has moved in time.

Ex 5- Getting started with report authoring

1. Open a new PowerBi desktop session -> get data -> excel -> from the Exercises folder select "InternetSales.xlsx", table1 only. Click on Load.
2. You will create a report **similar** to this:



3.

We will create two 2 pages, a summary page which has 6 visualisations and a tree map page.

Click the Text Box menu to create a text box for the report title and type "Internet Sales Analysis" and format as needed. Position the text box on top of the report.

Click the File | Save menu and save the report as Internet Sales Analysis. [Save regularly.](#)

In the Fields pane, check the SalesAmount field. Power BI defaults to a Clustered Column Chart visualisation that displays the grand total of the SalesAmount field.

Check the Product field. Power BI adds it to the Axis area of the chart.


In the Visualisations pane, click the Clustered Bar Chart icon to flip the Column Chart to a Bar Chart

Power BI sorts the bar chart by the product name by SalesAmount. Click on the ellipsis (three dots at the top left corner) , and change it to Sort by Product then back again to sort by sales Amount. Position the visual at the top left of the page.



Let's show the total sales amount and order quantity as separate card visualisations (items 2 and 3 in the starting point picture)

Click an empty space on the report canvas, outside the Bar Chart to deactivate it.

In the Field list, check the SalesAmount field. Change the visualisation to Card.  Position it middle top.

Repeat for Order Quantity.

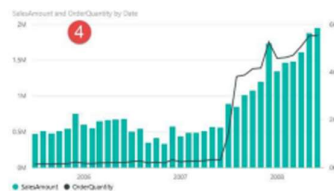


Next we will be built a combo chart visualisation and it shows how the sales amount and order quantity change over time:

Drag the SalesAmount field and drop it onto an empty area next to the card visualisations to create a Column Chart.

Drag the Date field and drop it onto the new chart on top of the bar. Switch the visualisation to "Line and Stacked Column Chart". This adds a new Line Values area to the Visualisations pane. Drag the OrderQuantity field and drop it on the Line Values area. Power BI adds a line chart to the visualisation and plots its values to a secondary Y-axis. To see visual like this you need to use the dropdown in the date field and disable hierarchy

Position the visual at the top right of the page.



Matrix - The fifth visualisation represent a crosstab report showing sales by product on rows and years on columns. Let's build this with the Matrix visualisation:

Drag the SalesAmount field and drop it onto an empty space on the report canvas to create a new visualisation. Change the visualisation to Matrix.

Check the Product field to add it to the visualisation on rows. Drag the Year field (from Date, Date hierarchy) and drop it on the Columns zone to pivot on Year on columns. Move and resize the visualisation as needed.

Click product or total headers to sort the visualisation interactively in an ascending or descending order.

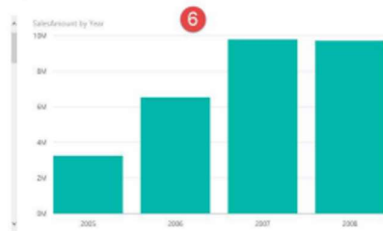


Product	2005	2006	2007	2008	Total
Mountain-200 Black, 46	161,927.86	679,399.00	130,142.69	1,373,469.55	
Mountain-200 Black, 42	159,829.66	627,269.94	576,047.49	1,363,142.09	
Mountain-200 Silver, 38	136,713.69	613,471.64	589,277.46	1,339,462.79	
Mountain-200 Silver, 46	101,570.98	617,531.62	579,997.50	1,301,100.10	
Mountain-200 Black, 38	106,553.11	600,795.59	587,517.44	1,294,866.14	
Mountain-200 Silver, 42	136,713.69	584,803.19	535,917.69	1,257,434.57	
Road-150 Red, 48	547,475.31	658,401.68		1,205,876.99	
Road-150 Red, 62	593,992.82	608,305.90		1,202,298.72	
Road-150 Red, 52	472,331.64	608,305.90		1,080,637.54	
Road-150 Red, 56	486,644.72	568,944.93		1,055,589.65	
Road-150 Red, 44	500,957.80	504,536.07		1,005,493.87	
Road-250 Black, 52	235,608.75	357,078.15	141,714.30	734,401.20	
Road-250 Red, 58	235,608.75	313,097.85	153,931.05	702,637.65	
Road-250 Black, 48	185,432.81	349,399.05	156,374.40	691,206.26	
Road-250 Black, 44	143,983.13	347,566.54	136,827.60	628,377.26	
Road-250 Black, 58	172,345.44	303,062.66	146,601.90	622,007.10	
Touring-1000 Blue, 46			138,276.06	283,704.33	421,980.39

The sixth visualisation listed shows sales by year:

Create a new visualisation that uses the SalesAmount field.

In the Fields pane, check the Year field to place it in the Axis area of the Column Chart.

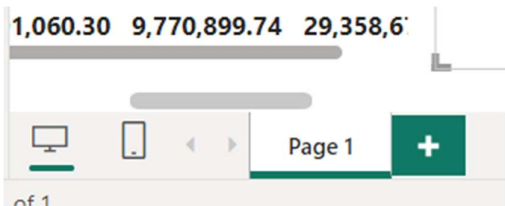


Creating a Treemap

Let's add a second page to the report that will help you analyse product sales using a Treemap visualisation. The Treemap visualisation helps you analyse product sales.

Rename the 1st page to Summary at the bottom tab.

At the bottom of the report, click the plus sign to add a new page.



Rename the page in place to Treemap. Go to the Treemap page.

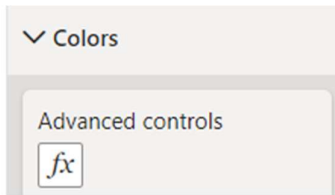
In the Fields list, check the SalesAmount and Product fields. Change the visualisation type to Treemap.



Make the visualisation as big as the page.



To change the colours to a degrading range, click on Advanced controls on Colors in the Formatting menu.



Select Gradient from the Format Style dropdown.

Check the Add Middle Color checkbox, select Sales amount in the “What field shall we base it on?” drop down.

You can use the Minimum, Center, and Maximum fields to fine tune the ranges or change the colours to your pleasure.

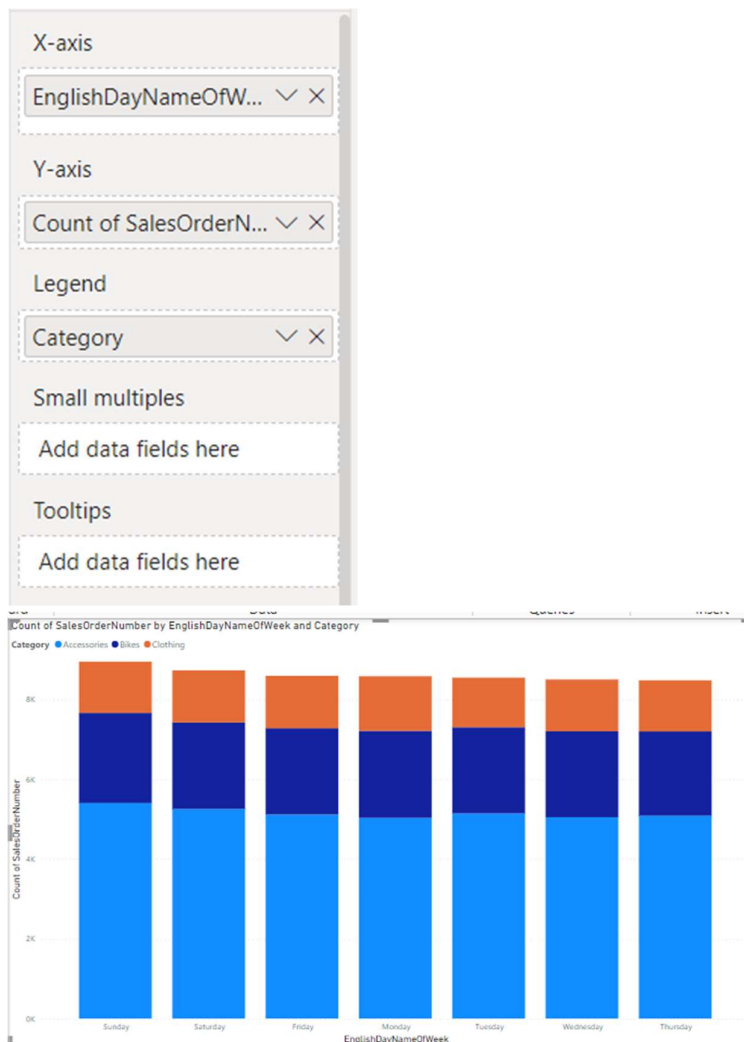
Click OK to close the Advanced colour window.

Select data labels, change the data labels to black. And save the report.

Ex6– Create Visuals in Power Bi Desktop

Open AdventureWorks_complete.pbix, from Exercise folder:

- 1) Create stacked column chart with these fields



2) Using Dimgeography table create map EnglishCountryRegionName and Sales Amount in bubble size

3) Create the following table

SalesTerritoryGroup	EnglishCountryRegionName	Count of SalesOrderNumber
Europe	France	5558
Europe	Germany	5625
Europe	United Kingdom	6906
North America	Canada	7620
North America	United States	21344
Pacific	Australia	13345
Total		60398

- 4) Add a slicer based on sales territory group, make it Single Select. Test your slicer with different selections.
- 5) Name the page Analysis by Geography
- 6) Add a page to your report, name it analysis by Category
- 7) Add a clustered columns chart based on Product Category Hierarchy created in class, and salesAmount; test drilling up and down
- 8) Add card with total sales (SalesAmount from FActInternetSales)
- 9) Add new page, name it analysis by customer
- 10) Create a funnel chart using EnglishOccupation from Customers and Sales Amount from internet sales; order by sales amount
- 11) Add a pie with Sales by gender and a doughnut by maritalStatus, change the colours so that the visuals use different colours
- 12) Add a chart (select the one you want), using Geography and SalesAmount from Internet sales. Try to change the chart and find what you think is the best.

You can check your answers opening the file Exercise6_CreateVisuals.pbix from the exercise folder.

Ex 7 (optional) - Conditional formatting and alternating rows

Open power BI desktop and open the file AdventureWork_complete.pbix

Create a matrix using productHierarchy (or use Product category and EnglishProductname) on rows (un-check product name, if you used the hierarchy), SalesTerritoryCountry on columns and SalesAmount (from InternetSales) as value

Click the field SalesAmount in the value area to show the menu and select conditional formatting, choose background colour.

The screenshot displays the Power BI Desktop interface. On the left, the 'Fields' pane shows the 'SalesAmount' field selected in the 'Values' area. The 'Visualizations' pane on the right shows the 'Conditional Formatting' menu open for the 'SalesAmount' field, with options like 'Sum', 'Average', 'Minimum', 'Maximum', 'Count (Distinct)', and 'Count'. The main area shows a matrix visualization with 'ProductCategory' on the rows and 'SalesTerritoryCountry' on the columns. The matrix displays sales data for various product categories across different countries, with the 'SalesAmount' field used for the values.

In the formatting window click diverging, select Number in the Minimum drop down, set the minimum to 1,000 and select a shade of red; set the Center as Number, 50,000, yellow and Maximum as Number, 100,000, green. (see picture below).

Conditional formatting

Format cells based on their values.

Base value: SalesAmount

Format blank values: Don't format

☒ Diverging

Minimum: Number, 1000, [Red color box]

Center: Number, 50000, [Yellow color box]

Maximum: Number, 100000, [Green color box]

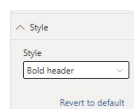
OK Cancel

Click ok to close the window

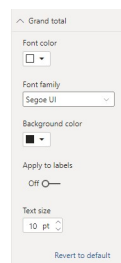
Your matrix will look similar to this:

ProductCategory	ProductSubcategory	Australia	Canada	France	Germany	United Kingdom	United States	Total
Accessories	Bike Racks	\$12,406,704	\$17,495,188	\$21,426,824	\$19,225,964	\$18,865,488	\$26,325,116	\$197,736,156
	Bottles and Cages	\$362,274	\$1,356,880	\$654,070	\$799,744	\$540,347	\$3,741,492	\$7,476,606
	Clews	\$177,111	\$2,107,880	\$1,546,755	\$899,880	\$875,817	\$5,611,426	\$11,188,172
	Helmets	\$4,896,032	\$57,269,616	\$18,764,693	\$11,043,404	\$16,398,647	\$160,348,263	\$298,712,933
	Hydration Packs	\$8,708,793	\$12,388,152	\$3,814,528	\$7,095,822	\$6,277,876	\$30,221,492	\$65,518,748
	Locks		\$4,210,24	\$1,282		\$719	\$13,223,98	\$16,225,22
	Pumps		\$1,135,479	\$1,071,248		\$707,646	\$8,830,517	\$13,514,687
	Tires and Tubes	\$8,818	\$181,880	\$196,424	\$31,588	\$76,944	\$461,604	\$825,2076
Bikes	Total	\$23,947,5301	\$116,127,3489	\$48,031,7274	\$35,083,0651	\$42,593,8284	\$383,515,2279	\$571,297,9278
	Mountain Bikes	\$118,933,555	\$4,720,796,516	\$1,015,485,978	\$1,919,718,952	\$1,294,198,4164	\$1,782,10,441,862	\$26,492,684,3765
	Road Bikes	\$2,830,050	\$3,714,211,143	\$1,393,443,8885	\$174,323,778	\$1,286,327,3425	\$22,704,796,7887	\$29,358,206,9687
	Touring Bikes	\$1,280,915,1600	\$1,198,372,6400	\$1,156,721,7296	\$1,156,610,2360	\$893,271,965	\$6,807,205,9581	\$18,451,490,2198
	Total	\$1,323,826,7334	\$11,636,380,5943	\$3,568,665,6452	\$1,543,815,6494	\$3,405,747,2859	\$44,832,751,7288	\$66,392,381,557
Clothing	Bit-Shorts		\$40,831,8127	\$10,758,9329		\$1,879,7919	\$186,823,6079	\$166,739,7086
	Caps	\$1,216,9938	\$7,181,1984	\$1,802,8888	\$1,428,798	\$1,892,8886	\$18,278,3099	\$31,541,3461
	Gloves	\$2,808,4249	\$43,756,2648	\$13,583,2964	\$5,369,2072	\$14,701,4305	\$126,734,5944	\$287,775,1742
	Jerseys	\$21,182,4578	\$118,587,7826	\$43,184,2194	\$16,938,0811	\$42,679,8257	\$117,793,3896	\$579,368,7084
	Shorts	\$4,871,306	\$73,937,484	\$25,453,97	\$7,027,488	\$22,839,4296	\$208,773,1012	\$342,202,717
	Socks		\$3,746,8888	\$880,878	\$471,8235	\$648,838	\$19,212,6098	\$24,638,8081
	Tights		\$47,723,9172	\$11,781,6876		\$9,345,8057	\$132,361,4278	\$201,833,006
	Vests	\$13,826,6284	\$42,196,5881	\$20,946,777	\$20,368,424	\$18,388,1958	\$107,079,1534	\$223,801,3707
Components	Total	\$42,915,8819	\$376,947,6336	\$128,092,2217	\$71,619,4348	\$118,826,7878	\$1,037,436,9473	\$1,777,840,8391
	Bottom Brackets	\$4,397,836	\$8,195,024	\$4,959,808	\$2,891,79	\$4,200,444	\$28,823,03	\$51,806,374
	Brakes	\$1,659,3	\$10,186,8806	\$7,824,2488	\$2,3884	\$3,687,1	\$34,621,6806	\$66,018,711
	Chains	\$450,08	\$1,341,836	\$1,231,8026	\$522,192	\$660,348	\$4,972,0046	\$9,377,7182
	Cranksets	\$16,839,372	\$30,745,4484	\$24,647,314	\$10,995,464	\$13,791,994	\$105,718,0708	\$293,942,6182
	Derailleurs	\$7,328,336	\$11,200,6409	\$6,925,6849	\$3,946,782	\$5,290,011	\$34,339,864	\$70,269,4958
	Forks		\$16,611,584	\$4,678,806		\$5,802,494	\$31,238,6056	\$77,931,6896
	Handlebars	\$2,810,964	\$30,464,3408	\$8,718,3878	\$6,448,842	\$11,332,461	\$111,618,5408	\$178,591,3289
	Headsets		\$14,196,8888	\$2,882,882		\$3,707,1995	\$40,156,2231	\$60,942,1984
	Mountain Frames	\$35,496,364	\$896,302,9918	\$316,420,2071	\$57,718,24	\$281,875,8564	\$3,138,330,5878	\$4,713,672,1489
	Pedals	\$1,762,080	\$28,241,9588	\$12,189,7	\$4,918,682	\$9,806,468	\$81,526,48	\$147,483,9098
	Road Frames	\$316,889	\$828,116,5884	\$273,684,8261	\$38,001,196	\$18,891,5112	\$2,315,781,7781	\$3,848,853,3438
	Saddles	\$2,276,818	\$10,885,5711	\$8,134,286	\$3,258,898	\$4,218,039	\$30,277,9731	\$55,829,3882
Total	Touring Frames	\$1,26,383,1879	\$218,320,0936	\$179,495,8229	\$106,071,824	\$1,89,377,7596	\$777,898,4101	\$1,642,577,6882
	Wheels		\$128,306,3877	\$31,885,224		\$38,334,9138	\$473,238,2688	\$679,070,0654
Total	Total	\$283,451,3893	\$2,244,470,0197	\$870,748,3407	\$334,269,888	\$711,839,7945	\$7,434,097,3062	\$11,799,076,6584
		\$1,594,335,3767	\$14,577,925,5965	\$4,607,517,935	\$1,983,988,0373	\$4,279,008,8266	\$53,687,801,7182	\$80,458,596,9823

Go to format menu and open the Style area; select bold Header as a style



Open Grand total in the format menu: select font colour white and background black.



Your matrix should look similar to this:

ProductCategory	ProductSubcategory	Australia	Canada	France	Germany	United Kingdom	United States	Total
Accessories	Total	\$23,947,5301	\$198,127,5489	\$48,031,7234	\$35,083,0651	\$42,583,8284	\$383,515,2279	\$571,297,5278
Bikes	Mountain Bikes	\$118,815,5322	\$4,722,796,8128	\$1,212,488,9329	\$193,871,8322	\$1,256,148,8194	\$18,215,441,3422	\$26,492,684,3765
	Road Bikes	\$2,852,022	\$5,714,211,1432	\$1,393,493,8885	\$174,332,7729	\$1,288,327,3425	\$22,794,779,7322	\$29,358,298,9607
	Touring Bikes	\$1,221,813,1822	\$1,198,372,6425	\$1,194,731,7788	\$1,174,811,2122	\$283,271,4425	\$4,827,332,5881	\$10,451,490,2198
	Total	\$1,323,826,7334	\$11,636,386,5943	\$3,540,663,6452	\$1,543,015,6494	\$3,405,747,2659	\$44,832,751,7288	\$66,302,381,557
Clothing	BD- Shorts		\$40,831,8127	\$12,758,9522		\$8,823,7351	\$136,329,4072	\$166,739,7886
	Caps	\$1,214,9938	\$7,131,1184	\$1,822,8938	\$1,429,7329	\$1,862,3368	\$18,278,3285	\$31,541,3461
	Gloves	\$2,508,4249	\$43,754,2448	\$13,383,2364	\$5,989,2072	\$14,721,4325	\$126,318,1854	\$287,775,1742
	Jerseys	\$21,182,4579	\$119,995,7925	\$42,184,2156	\$36,836,0811	\$43,639,8257	\$317,750,3356	\$579,308,7884
	Shorts	\$4,871,204	\$73,937,454	\$22,453,57	\$7,227,488	\$22,439,4294	\$208,278,1812	\$342,202,717
	Socks		\$3,746,8288	\$18,878	\$471,3235	\$948,858	\$18,212,8288	\$24,638,8881
	Tights		\$47,732,8172	\$11,781,8878		\$9,345,9827	\$132,361,4375	\$201,833,886
	Vests	\$12,828,8234	\$42,188,5951	\$22,948,377	\$22,883,424	\$18,346,1958	\$127,078,1854	\$223,881,3797
	Total	\$42,915,8819	\$378,947,6536	\$128,042,2217	\$71,619,4348	\$118,838,7978	\$1,837,436,9475	\$1,777,840,8391
Components	Bottom Brackets	\$4,387,838	\$8,350,324	\$4,339,808	\$2,391,773	\$4,229,444	\$28,023,03	\$51,826,374
	Brakes	\$5,589,3	\$10,186,9628	\$7,826,2498	\$2,939,4	\$3,887,1	\$34,021,8829	\$66,018,711
	Chains	\$850,08	\$1,141,328	\$7,231,8526	\$522,182	\$663,245	\$4,872,0294	\$9,377,7182
	Cranksets	\$16,829,372	\$32,743,6484	\$24,647,514	\$12,999,484	\$11,391,984	\$126,118,6182	\$203,942,6182
	Derailleurs	\$7,328,334	\$11,235,8428	\$8,826,6649	\$8,544,742	\$8,380,07	\$34,339,884	\$78,209,4958
	Forks		\$18,411,584	\$4,878,888		\$3,822,494	\$31,228,8256	\$77,831,8896
	Handlebars	\$2,810,864	\$32,484,3428	\$8,718,3878	\$4,448,842	\$11,332,481	\$111,875,5487	\$178,191,3208
	Headsets		\$14,186,888	\$2,682,382		\$3,727,1885	\$40,158,2231	\$68,942,1984
	Mountain Frames	\$35,496,364	\$892,182,8918	\$215,422,0371	\$57,718,04	\$283,875,8364	\$8,135,832,8872	\$4,713,672,1469
	Pedals	\$1,722,396	\$28,241,9958	\$12,889,7	\$4,316,682	\$8,628,684	\$31,321,48	\$147,483,9098
	Road Frames	\$334,888	\$839,116,884	\$271,844,922	\$36,061,384	\$189,881,8312	\$2,513,781,7781	\$3,849,853,3438
	Saddles	\$2,276,818	\$10,885,5711	\$3,134,298	\$3,254,888	\$4,218,028	\$38,277,8722	\$55,829,3882
	Touring Frames	\$126,329,1279	\$218,322,0388	\$178,829,8228	\$286,271,524	\$149,337,7888	\$777,818,412	\$1,642,327,6862
	Wheels		\$135,394,4407	\$31,885,224		\$36,334,9138	\$475,258,2481	\$679,870,0654
	Total	\$283,851,3883	\$2,244,476,8197	\$878,748,3487	\$334,769,888	\$711,839,7945	\$7,434,897,5962	\$11,798,876,4584
Total		\$1,594,133,3787	\$14,377,925,5965	\$4,682,537,935	\$1,083,988,8773	\$4,779,008,8266	\$53,687,881,2182	\$88,458,556,9823

If you don't like the colours or the style fell free to change them: now you know how!!

Add a barchar into the columns:

Select conditional formatting in the format menu, enable data bars. Bar colour can be changed clicking on Advanced Colour.

Conditional formatting

SalesAmount

Background color

Off

Font color

Off

Data bars

On

Advanced controls

Exercise 8 (optional): import custom visual

Open AdventureWorksComplete.pbix or continue with the file you are working on.

Go to the “Insert”, click “more visuals”, “from app source” (you need to sign in, if you have not yet).

Select a visual and add it to your visual collection.

Create a report using the imported visuals and AdventureWork data.

Some ideas:

- wordClouds with product and sales
- Chiclet slicer with Calendar years

Dax exercises

Use AdventureWorks_complete.pbix

1) Concatenate Text

- Click the Data View. Click Employee.
- In Modelling, click New Column.
- Add the formula;
 - FullName = [FirstName] & “ ” & [LastName]

2) Performing Arithmetic Operations

1. Another way to add a calculated column is to use the Fields pane. In the Fields pane, right-click the FactInternetSales table, and then click New Column.

2. In the formula bar, enter the following formula and press Enter. Use intellisense (=use suggestions, if what you look for is not in the list of suggestions, something has gone wrong).

Line total = FactInternetSales[UnitPrice] * FactInternetSales[OrderQuantity]

3) Ranking Values

Suppose you want to rank each customer based on the customer's overall sales. The RANKX function can help you implement this requirement:

1. In the Fields pane, right-click the Customer table and click New Column.
2. In the formula bar, enter the following formula:

`SalesRank = RANKX(DimCustomer, SUMX(RELATEDTABLE(FactInternetSales), [SalesAmount]),,, Dense)`

This function uses the RANKX function to calculate the rank of each customer, based on the customer's overall sales recorded in the InternetSales table. Similar to the previous example, the SUMX function is used to aggregate the [SalesAmount] column in the InternetSales table. The Dense argument is used to avoid skipping numbers in the rank.

4) Advanced Calculated Columns

Implementing a Lookup Column

Suppose you want to calculate the net profit for each row in the InternetSales table. For the purposes of this exercise, you'd calculate the line item net profit by subtracting the product cost from the line item total.

1. To calculate the net profit as a variance from the line total and the product's standard cost, create a **new column** and type the expression as follows:

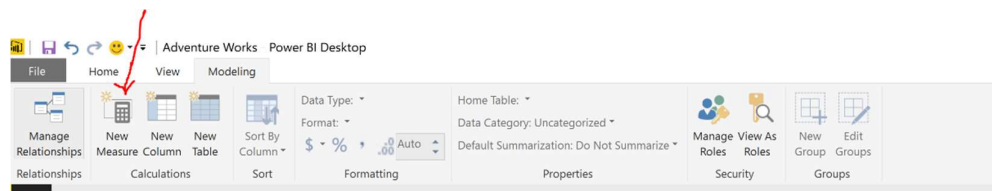
`NetProfit = [Line Total] - RELATED(DimProduct[StandardCost])`

Note that when the line item's product cost exceeds the line total, the result is a negative value.

If you want to compute the gross margin not as a value, but as a percentage of the sales amount, first, you can create a very simple **calculated column** on the internet sales table, containing this expression:

`GrossMargin = FactInternetSales [SalesAmount] - FactInternetSales [TotalProductCost]`

Now you will have to add a calculated measure



Use this expression:

`GrossMargin % = SUM (FactInternetSales[GrossMargin]) / SUM (FactInternetSales[SalesAmount])`

When you add this measure to the Matrix, you will notice that it is represented as a decimal number instead of a %. Select the measure and change the data format to % as indicate below:

Adventure Works - Power BI Desktop

File Home View Modeling

Manage Relationships New Measure New Column New Table Sort By Column

Relationships Calculations Sort Formatting Properties

Data Type: Format: Percentage

Home Table: InternetSales Data Category: Uncategorized Default Summarization: Do Not Summarize

GrossMargin % = SUM (InternetSales[GrossMargin]) / SUM (InternetSales[SalesAmount])

FiscalYear	2009			Total			
Color	Sum of GrossMarginPct	GrossMargin	GrossMargin %	Sum of GrossMarginPct	GrossMargin	GrossMargin %	
Black	924.59	£14,302.5527	62.60%	924.59	£14,302.5527	62.60%	
Blue	138.35	£5,736.8367	62.60%	138.35	£5,736.8367	62.60%	
Red	82.01	£3,494.0402	62.60%	82.01	£3,494.0402	62.60%	
Multi	50.08	£1,752.296	62.60%	50.08	£1,752.296	62.60%	
Silver	43.47	£1,277.2153	23.00%	43.47	£1,277.2153	23.00%	
Yellow	16.90	£929.4399	62.60%	16.90	£929.4399	62.60%	
White	13.57	£732.6443	23.00%	13.57	£732.6443	23.00%	
Total	1,284.62	£28,365.7176	55.79%	1,284.62	£28,365.7176	55.79%	

5) [Create Date Table \(optional\)](#)

Creating a Calendar Table Using DAX

File Home View Modeling

Manage Relationships New Measure New Column New Table Sort By Column

Relationships Calculations Sort Formatting Properties

Data Type: Format: Home Table: Data Category: Default Summarization:

DateTable = CALENDARAUTO()

1 2 3 4

Date

1/1/2010 12:00:00 AM
1/2/2010 12:00:00 AM
1/3/2010 12:00:00 AM
1/4/2010 12:00:00 AM
1/5/2010 12:00:00 AM
1/6/2010 12:00:00 AM
1/7/2010 12:00:00 AM

Fields

Customers
DateTable
Date
Products
Sales

Using the 'CALENDARAUTO' function, it will automatically create the table with a field 'Date' based on the Min and Max values in your existing dataset.

Instead of the function CALENDARAUTO(), the function CALENDAR can be used

Calendar = CALENDAR ("01-01-2016", "12-31-2016")

A table with all the dates between the two specified dates will be created.

Then use the DAX formulas as illustrated below:

Just use the first 3-4 formula to try, you can have the rest as a reference.

Also note that the formula for fiscal year should have your first month of the fiscal year instead of F, so if your fiscal year starts in April it should read:

FiscalYear = if([MonthNo]<=3, [Year]-1,[year])

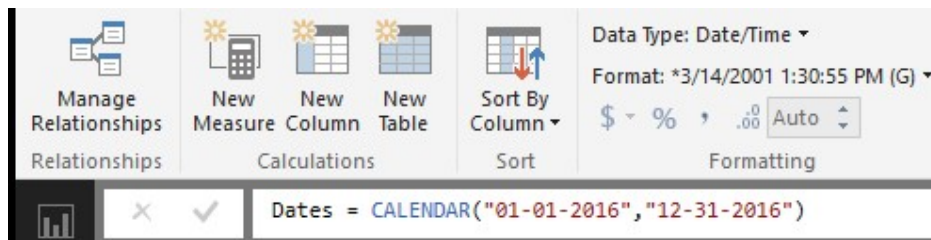
Or a similar formula based on how you calculate fiscal year.

How to calculate date table columns

Year	=YEAR([Date])	
MonthNo	=MONTH([Date])	
QuarterNo	=INT((([MonthNo]+2)/3))	
Quarter	= "Qtr " & [QuarterNo]	Sort by [QuarterNo]
Month	=FORMAT([Date], "MMMM")	Sort by [MonthNo]
FiscalYear	=IF([MonthNo] <= [F], [Year], [Year] + 1)	
FiscalMonthNo	=IF(MOD([MonthNo] + [FiscalYearEndMonth], 12) > 0, MOD([MonthNo] + [FiscalYearEndMonth], 12), 12)	
FiscalQuarterNo	=INT((([FiscalMonthNo]+2)/3))	
FiscalQuarter	= "Qtr " & [FiscalQuarterNo]	
FiscalMonth	=FORMAT([Date], "MMMM")	Sort by [FiscalMonthNo]
FiscalYYYY-MM	=FORMAT([FiscalYear], "0000-") & FORMAT([FiscalMonthNo], "00")	
MMM-YYYY	=FORMAT([Date], "MMM-YYYY")	
FiscalYYYY-QQ	=FORMAT([FiscalYear], "0000") & "-Q" & FORMAT([FiscalQuarterNo], "0")	
DayOfWeekNo	=WEEKDAY([Date])	
DayOfWeek	=FORMAT([Date], "DDDD")	Sort by [DayOfWeekNo]
Day	=DAY([Date])	

Depending on the number of new columns you created, you could end up with a table like this:

Date	Year	MonthNumber	Month	YYYY-MM	DayOfWeekNumber	DayOfWeek	Quarter
Tuesday, January 1, 2013	2013	1	January	Tuesday, January 1, 2013	3	Tuesday	Q1
Wednesday, January 2, 2013	2013	1	January	Tuesday, January 1, 2013	4	Wednesday	Q1
Thursday, January 3, 2013	2013	1	January	Tuesday, January 1, 2013	5	Thursday	Q1
Friday, January 4, 2013	2013	1	January	Tuesday, January 1, 2013	6	Friday	Q1
Saturday, January 5, 2013	2013	1	January	Tuesday, January 1, 2013	7	Saturday	Q1
Sunday, January 6, 2013	2013	1	January	Tuesday, January 1, 2013	1	Sunday	Q1
Monday, January 7, 2013	2013	1	January	Tuesday, January 1, 2013	2	Monday	Q1
Tuesday, January 8, 2013	2013	1	January	Tuesday, January 1, 2013	3	Tuesday	Q1
Wednesday, January 9, 2013	2013	1	January	Tuesday, January 1, 2013	4	Wednesday	Q1
Thursday, January 10, 2013	2013	1	January	Tuesday, January 1, 2013	5	Thursday	Q1
Friday, January 11, 2013	2013	1	January	Tuesday, January 1, 2013	6	Friday	Q1
Saturday, January 12, 2013	2013	1	January	Tuesday, January 1, 2013	7	Saturday	Q1
Sunday, January 13, 2013	2013	1	January	Tuesday, January 1, 2013	1	Sunday	Q1
Monday, January 14, 2013	2013	1	January	Tuesday, January 1, 2013	2	Monday	Q1



6) Building a calendar table using the Query Editor (optional)

The Query Editor has useful functions for manipulating dates, such as for extracting date parts (day, month, quarter), and so on. The code uses many of these functions.

1. Start by creating a new blank query. To do so, in the Query Editor, expand the New Source button (the ribbon's Home tab) and click Blank Query. Rename the blank query to GenerateDateTable.
2. In the Queries pane, right-click the GenerateDateTable query and click Advanced Editor.
3. In the Advanced Editor, replace the existing code by pasting the code that you can copy from the GenerateDateTable.txt file in the Exercise folder. Click done
4. Use 1/1/2014 and 31/12/2015 in the parameter panel and click include

Enter Parameters

StartDate

Example: 21/03/2012

EndDate

Example: 21/03/2012

Culture (optional)

Example: abc

Invoke

Clear

```
function (StartDate as date, EndDate as date, optional Culture as nullable text) as table
```

This code creates a GenerateDateTable function that takes three parameters: start date, end date, and optional language culture, such as "en-US", to localise the date formats and correctly interpret the date parameters. The workhorse of the function is the List.Dates method, which returns a list of date values starting at the start date and adding a day to every value.

The function then applies various transformations and adds custom columns to generate date variants, such as Year, QuarterOfYear, and so on. If you want to regenerate the table with a different range of values, simply delete the "Invoked Function Generate Date Table" step in the Applied Steps list, and then invoke the function again with different parameters.

8) Using the DAX time intelligence

Create a new blank report page in the Adventure Works file. For this exercise we will be using two tables, FactInternetSales and Date.

Firstly, to use DAX Time Intelligence Functions, you need a *Calendar Table* (or Date Table).

Most essentially a calendar table must have a date column, and this column must have one row for every day for each year included in the table.

In this model you have DimDate, make sure that DimDate is marked as a DateTable by right clicking and Selecting “Mark as a date table”

Go to InternetSales table and add a new measure.

And in the formula bar, type:

SumofSales = SUM(InternetSales[SalesAmount]).

As the name denotes, this is a basic sum of the values in the ‘SalesAmount’ column, which can serve both as the basic re-usable measure and as a guide for checking correctness of our YTD Sales calculation.

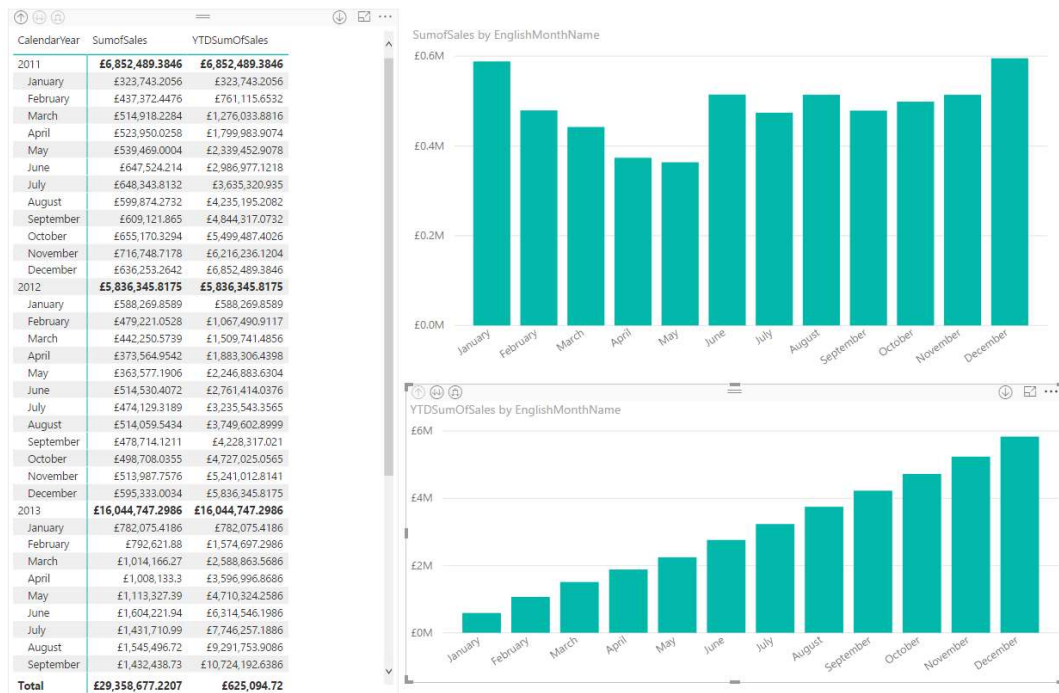
Our desired year-to-date field will then be another measure based on [SumOfSales], create a new measure with the following formula.

YTDSumOfSales = CALCULATE([SumofSales],DATESYTD(DimDate[FullDateAlternateKey]),
all(dimdate))

Note that the date fields must come from the date table

First create a matrix using year and EnglishMonthName on rows, SumOfSales and YtdSum of sales on values. Expand all the matrix to see the YTD vale increasing in the months.

Now create two bar charts, one with EnglishMonthNames and SumOf Sales, the other with YTDSumOfSales. Filter each charts on year 2012.



Create another time intelligence measure using SAMEPERIODLASTYEAR:

SalesSamPeriodLY = CALCULATE(sum(FactInternetSales[SalesAmount]),
SAMEPERIODLASTYEAR(DimDate[FullDateAlternateKey]), all(DimDate))

Add it to your matrix.

CalendarYear	SumofSales	YTDSumOfSales	SalesSamPeriodLY
2011	£6,852,489.3846	£6,852,489.3846	
January	£323,743.2056	£323,743.2056	
February	£437,372.4476	£761,115.6532	
March	£514,918.2284	£1,276,033.8816	
April	£523,950.0258	£1,799,983.9074	
May	£539,469.0004	£2,339,452.9078	
June	£647,524.214	£2,986,977.1218	
July	£648,343.8132	£3,635,320.935	
August	£599,874.2732	£4,235,195.2082	
September	£609,121.865	£4,844,317.0732	
October	£655,170.3294	£5,499,487.4026	
November	£716,748.7178	£6,216,236.1204	
December	£636,253.2642	£6,852,489.3846	
2012	£5,836,345.8175	£5,836,345.8175	£6,852,489.3846
January	£588,269.8589	£588,269.8589	£323,743.2056
February	£479,221.0528	£1,067,490.9117	£437,372.4476
March	£442,250.5739	£1,509,741.4856	£514,918.2284
April	£373,564.9542	£1,883,306.4398	£523,950.0258
May	£363,577.1906	£2,246,883.6304	£539,469.0004
June	£514,530.4072	£2,761,414.0376	£647,524.214
July	£474,129.3189	£3,235,543.3565	£648,343.8132
August	£514,059.5434	£3,749,602.8999	£599,874.2732
September	£478,714.1211	£4,228,317.021	£609,121.865
October	£498,708.0355	£4,727,025.0565	£655,170.3294
November	£513,987.7576	£5,241,012.8141	£716,748.7178
December	£595,333.0034	£5,836,345.8175	£636,253.2642
2013	£16,044,747.2986	£16,044,747.2986	£5,836,345.8175
January	£782,075.4186	£782,075.4186	£588,269.8589
February	£792,621.88	£1,574,697.2986	£479,221.0528
March	£1,014,166.27	£2,588,863.5686	£442,250.5739
April	£1,008,133.3	£3,596,996.8686	£373,564.9542
May	£1,113,327.39	£4,710,324.2586	£363,577.1906
June	£1,604,221.94	£6,314,546.1986	£514,530.4072
July	£1,431,710.99	£7,746,257.1886	£474,129.3189
August	£1,545,496.72	£9,291,753.9086	£514,059.5434
September	£1,432,438.73	£10,724,192.6386	£478,714.1211
Total	£29,358,677.2207	£625,094.72	£28,733,582.5007

You can check you solution with the file AdventureWorks_completewithDax.pbix in the Solution folder.

Extra DAX exercises- (optional)

Open theDAXExtraExercise.

You want to prepare a report that shows yearly sales.

Your task is to create a measure that computes the sales amount.

1. Start creating a calculated column that computes the sales amount, by multiplying [Quantity] and [Unit Price]. Name it [Sales Amount] Solution: 1

2. Create a measure that sums the SalesAmount column, name it [TotalSales] and create a report with years and TotalSales.

Solution: 2

3. Try to create the same measure sales amount with just one calculation.

Analyze sales in the same city

The City column is present in Store and in Customer. You want to divide sales made to customers in the same city of the store, against sales to customers in a different city, evaluating customers buying in different cities.

1. Create a calculated column, in Sales, that checks if the city of the customer is the same as the city of the store. If it is the same city, it returns "SAME CITY", otherwise it returns "DIFFERENT CITY". (use RELATED)

Solution: 4

Analyze Discounts

In the Sales table there are [Unit Price] and [Unit Discount] columns. Build a report like the following one

* the discount category is based on different discounts applied at each row,

* the total discount is the total discount applied as a currency value,

* total discount % is the percentage of the total discount against the total sales.

Calendar Year	DiscountCategory	TotalSales	TotalDiscount	Total Discount %
CY 2007	FULL PRICE	\$3.714.587,92	\$0,00	0,00%
	LOW	\$955.437,29	\$47.771,86	5,00%
	MEDIUM	\$3.713.769,34	\$332.709,35	8,96%
	HIGH	\$4.073.616,29	\$766.983,51	18,83%
	Total	\$12.457.410,85	\$1.147.464,73	9,21%
CY 2008	FULL PRICE	\$2.987.151,12	\$0,00	0,00%
	LOW	\$711.422,64	\$35.571,13	5,00%
	MEDIUM	\$3.172.256,63	\$302.485,36	9,54%
	HIGH	\$4.160.595,91	\$765.786,81	18,41%
	Total	\$11.031.426,30	\$1.103.843,31	10,01%
CY 2009	FULL PRICE	\$3.780.326,36	\$0,00	0,00%
	LOW	\$653.033,85	\$32.651,69	5,00%
	MEDIUM	\$2.632.415,22	\$240.967,14	9,15%
	HIGH	\$3.135.535,93	\$573.877,66	18,30%
	Total	\$10.201.311,36	\$847.496,49	8,31%
Total		\$33.690.148,51	\$3.098.804,53	9,20%

1. Build one calculated column that computes the discount, as a percentage Solution: 6

2. Using the previous calculated column, create a new one (named DiscountCategory) in the Sales table, which should have for each row:

o FULL PRICE if the discount is zero

- o LOW if the discount of the sale is less than or equal to 5%
 - o MEDIUM if the discount of the sale is between 5% and 10%
 - o HIGH if the discount percentage is higher than 10% Solution: 7
3. One measure that computes the total discount percentage Solution: 8

Solutions on page 31

Exercise 8 : Creating and Modifying Tiles on Dashboards

Try not to add too many tiles on a dashboard: it should stay within ONE screen.

Here we use the Internet Sales Analysis report we created from the previous Exercise, you can use any of the reports you have created during the course.



Open report(s) in desktop, make sure you are signed in, and click publish

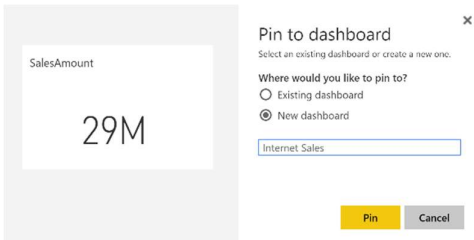
Once you have one or more report published, open it on the server (www.powerbi.com, logging in with the same credentials you have used to publish)

If you use the Internet Sales Analysis report , hover on the SaleAmount card and click the pin button, if you use another report, just chose one of the visualizations and click on the pin icon at the

top left of the visual :

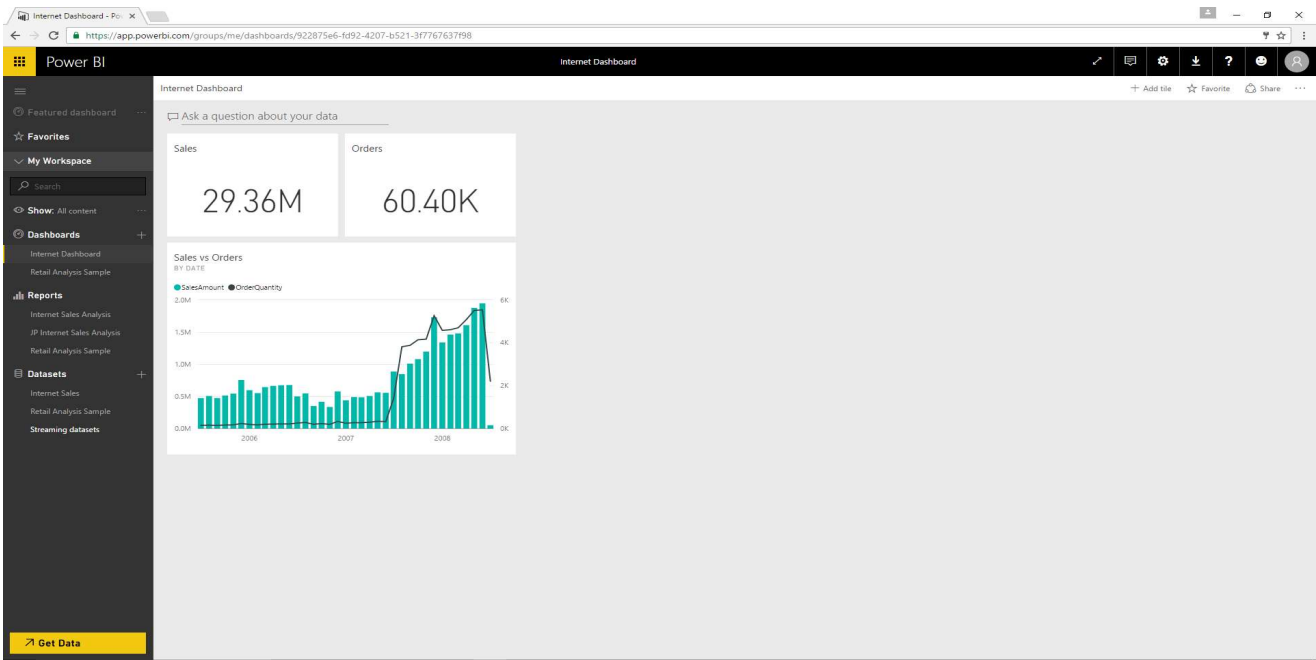


Choose new Dashboard, and call it Internet Sales.



In the Internet Sales Analysis report, pin also the OrderQuantity Card and the "SalesAmount and OrderQuantity by Date" Combo Chart but this time pin them to the Internet Sales existing dashboard.

Go to the dashboard, click Ellipsis on Sales Amount and Click the Pencil rename it to Sales. Change the 2nd card and rename it to orders. Configure the other tile to be Sales vs Orders and BY DATE as a sub-title and add the last refresh time.



The ellipsis reveals the tile settings...it has a resize handle in the bottom right hand corner.

Focus Mode | Related Insights | Pin Visual – you can pin from a dashboard to another dashboard!

From the elipses of one tile, go to edit details and select “Display last refresh time”

Dax exercise solutions:

- 1 - Sales[SalesAmount] = Sales[Quantity] * Sales[Unit Price]
- 2 - TotalSales := SUM (Sales[SalesAmount])
- 3 - TotalSales := SUMX (Sales, Sales[Quantity] * Sales[Unit Price])
- 4 - Sales[SaleType] = IF (RELATED (Customer[City]) = RELATED (Store[City]), "SAME CITY", "DIFFERENT CITY")
- 5 - Sales[SaleTypeSort] = IF (RELATED (Customer[City]) = RELATED (Store[City]), 1, 2) Then, use "Sort By Column" to sort SaleType by SaleTypeSort.
- 6 - Sales[DiscountPct] = DIVIDE (Sales[Unit Discount], Sales[Unit Price])
- 7 - Sales[DiscountCategory] = IF (Sales[DiscountPct] = 0, "FULL PRICE", IF (Sales[DiscountPct] <= 0.05, "LOW", IF (Sales[DiscountPct] <= 0.1, "MEDIUM", "HIGH")))
- 8 - TotalDiscount := SUMX (Sales, Sales[Unit Discount] * Sales[Quantity]) [Total Discount %] := DIVIDE ([TotalDiscount], [TotalSales])

Basic Course Project

We will complete this project during the two days of basic PowerBI course. You will find a complete solution in the solution folder.

Start by opening a new empty powerBI.

Using “get data”, import data from all 3 sheets of Excel file globalsuperstore.xls (in the exercise folder), and perform the following transformations in the query editor:

Query Editor

In the Orders table:

- Promote first rows to headers
- Duplicate column OrderDate
- Create an “Index” column starting from 1
- Duplicate column Sales
- Rename new column to "Sales w/o decimal"
- Change to Whole Number

Now, we want to separate all the geographic information into a new table “Locations” table. To do so, duplicate the Orders table, then apply the following transformations to the new table:

- Remove all columns except City, State, Country, Postal Code, Market Region
- Rename new table to “Locations”
- Add custom column “City-State” containing the concatenation of the values in the columns City and State
- Remove duplicates values in the new column
- Create same concatenated column in table Orders
- In the Orders table, delete the columns City, State, Postal Code, Market and Region

In the tables Returns and People:

- Promote first row to headers

We now want to create a separate “Dates” table to use to navigate the data chronologically (for instance, to drill up and down the Year / Quarter / Month hierarchy). To do so, we will run a script that populates this table automatically, by executing the following steps (still from the Power Query Editor):

- Click New Source / Blank Query
- Open the file GenerateDateTable.txt
- Copy and paste the file’s content into advanced query editor’s field
- Click Done
- Insert 01/10/2013 as start date, 31/12/2020 as end date and “en” as culture
- Click on Invoke
- Rename the newly created table to “Dates” us
- Make sure that the date type for the columns: Year, Quarter, Month Number and Day is set to whole numbers

Now close the Query Editor clicking on Close and Apply.

Relationship and report formatting:

Go to the Relationship panel and create the following relationship (when not otherwise specified, as one-to-many relationships):

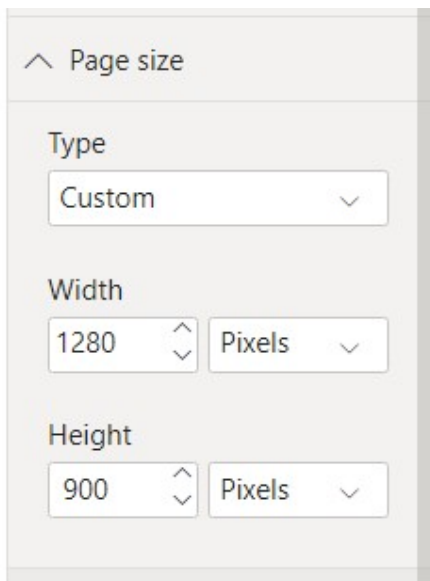
- Between Orders and Locations, based on the concatenate field City& State
- Between Location and People, based on the field Region
- Between Orders and Returns, based on the field orderID (many-to-many)
- Between Orders and Dates, based on the fields orderDat and Date

Create a title: go to the Report panel, click on Add Text Box (in the Home menu), add the tile “Superstores Global Sales”, in white text on black background, font 28. Format it to be 100 pixel height and as wide as the whole page.

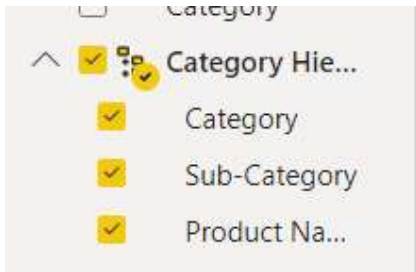
Add the image “logoSuperstore” (from the Exercises folder) into the title area.

Still from the Home menu, click on Switch Theme and select Tidal.

Set page size like this:



Still in the Report panel, locate the field Category in the Orders table, right click on it and select Create Hierarchy, then move to the Sub-Category, right click and select Add to Hierarchy / Category Hierarchy. Repeat the same process for Product name. The resulting hierarchy will look as follows:



Visuals

Now we will need to add visuals to the page.

First, we will need to create a Map:

Use country, city in location field; sales in size; apply a filter on the visual on market = EU

Add 2 slicers: year (rename order year), category (rename Product Category). Move the slicer on to the title bar. Move the slicers into the title area.

Add bar chart below map, use city and sales, apply a filter on city: top 5 EU cities by sales, use formatting menu to add labels inside

Create measures:

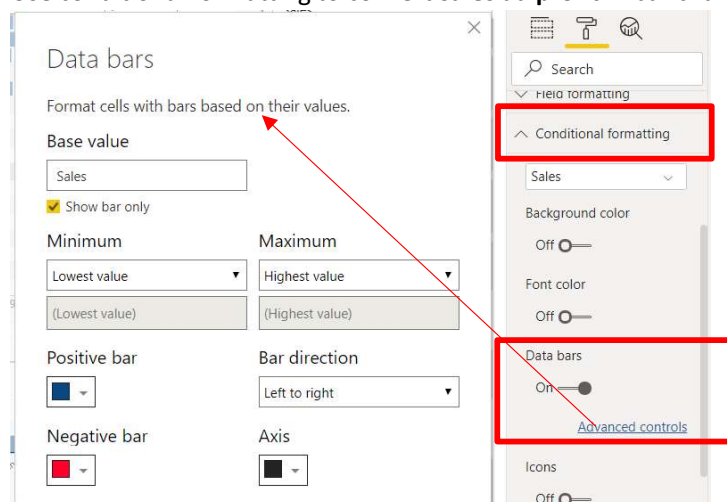
- Total sales -> format as currency £
- Total profit -> format as currency £
- Profit ratio (profit divided by sales) -> format as a percentage

Create cards at the top left of the report, edit interaction so that these cards are never filtered by other visuals. This process will have to be repeated everytime you add a new visual.

Create table visual:

Add subcategory, total sales, sales, total profit, profit, Profit ratio.

Use conditional formatting to convert **sales** and **profit** in bar charts



Your table should look like this:

Subcategory, total sales (in number), sales as a bar, total profit (number), profit (bar), sales ratio

Sub-Category	total sales	Sales	total profit	Profit	profit ratio
Copiers	1,509,436.27	<div></div>	£258,567.55	<div></div>	17.13%
Phones	1,706,824.14	<div></div>	£216,717.01	<div></div>	12.70%
Bookcases	1,466,572.24	<div></div>	£161,924.42	<div></div>	11.04%
Appliances	1,011,064.30	<div></div>	£141,680.59	<div></div>	14.01%
Chairs	1,501,681.76	<div></div>	£140,396.27	<div></div>	9.35%
Accessories	749,237.02	<div></div>	£129,626.31	<div></div>	17.30%
Storage	1,127,085.86	<div></div>	£108,461.49	<div></div>	9.62%
Binders	461,911.51	<div></div>	£72,449.85	<div></div>	15.68%
Paper	244,291.72	<div></div>	£59,207.68	<div></div>	24.24%
Machines	779,060.07	<div></div>	£58,867.87	<div></div>	7.56%
Art	372,091.97	<div></div>	£57,953.91	<div></div>	15.58%
Furnishings	385,578.26	<div></div>	£46,967.43	<div></div>	12.18%
Envelopes	170,904.30	<div></div>	£29,601.12	<div></div>	17.32%
Supplies	243,074.22	<div></div>	£22,583.26	<div></div>	9.29%
Labels	73,404.03	<div></div>	£15,010.51	<div></div>	20.45%
Fasteners	83,242.32	<div></div>	£11,525.42	<div></div>	13.85%
Tables	757,041.92	<div></div>	-£64,083.39	<div></div>	-8.46%
Total	12,642,501.91	£12,642,501.91	£1,467,457.29	1,467,457.29	11.61%

Time intelligence:

(mark date table as a date, order monthName column by monthOfYear column)

Create hierarchy: year, MonthName

Create two measure:

sales YTD: calculate([total sales], DATESYTD((Dates[Date])))

sales Same period last year: CALCULATE([total sales], SAMEPERIODLASTYEAR(Dates[Date]))

Create bar chart with month name, YTD sales, filtered on year 2016, call it YTD sales for 2016

Create table with YearHierarchy, sales, salesLY.

Create a measure YonYgrowth as TotalSales – SalesLTY, this measure is going to be used for formatting.

Conditional format sales so that font is red when YonYgrowth is less than 0; add conditional formatting icon to sales:

Icons - Sales

Format by **Rules** [Learn more](#)

Based on field

YonYGrowth

Icon layout

Left of data

Icon alignment

Top

Style

Custom

Rules

Reverse icon order

+ New rule

If value	is greater than or equal to	-100000	Number	and	is less than	0	Number	then	↓	↑ ↓ ×
If value	is greater than or equal to	0	Number	and	is less than	100000	Number	then	→	↑ ↓ ×
If value	is greater than or equal to	100001	Number	and	is less than or equal to	1000000	Number	then	↑	↑ ↓ ×

Remove totals from the table. Your final table should look like this:

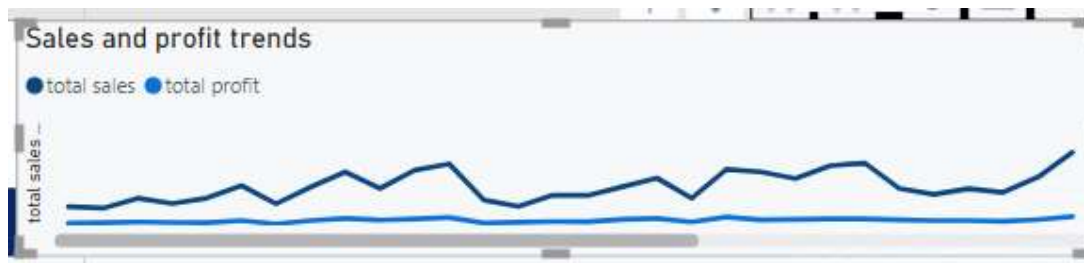
Year	MonthName	Sales	samePeriodLY
2016	November	£555,279.03	373,989.36
2016	December	£503,143.69	405,454.38
2016	September	£481,157.24	376,619.25
2016	August	£456,619.94	326,488.79
2016	October	£422,766.63	293,406.64
2015	December	£405,454.38	338,256.97
2016	June	£401,814.06	396,519.61
2015	June	£396,519.61	256,175.70
2015	September	£376,619.25	289,389.17
2015	November	£373,989.36	323,512.42
2014	December	£338,256.97	333,925.73
2013	December	£333,925.73	

Add other two visuals to fill the remaining space.

I have used a matrix with Category Hierarchy

Category	Quantity	total profit	profit ratio
Furniture	34954	£285,204.72	6.94%
Office Supplies	108182	£518,473.83	13.69%
Technology	35176	£663,778.73	13.99%
Total	178312	£1,467,457.29	11.61%

And a line chart showing sales and profit trends:



Fell free to use different visuals according to your choice.

Save your Project to be published on line.

Publish Report:

Sign in to Power BI with your id or using a school id.

From the home page of your report, in desktop, click publish and select a Workspace to publish your report.

Go to Power BI on line and vie your report.

Create a dashboard pinning 4 or 5 visuals, add the logo and a title to the dashboard.

Share your dashboard with one of the other attendees.

When you receive the email from your colleague, click on the link and view the dashboard.