PIVOT TABLE

Pivot Table is a great tool for summarizing and analyzing data in Excel.
We can use a Pivot Table to perform calculations on our data based on certain criteria. For example – Sales per Store, Sales per Year, Average Discount per Region, and many more…
Here are some of the advantages of using Pivot Tables:

- There is no need to use formulas in order to perform calculations.
- We can perform complex calculations in a quick and simple way.
- The summarized data is dynamic and can easily be applied to different sets of data

Creating a Pivot Table

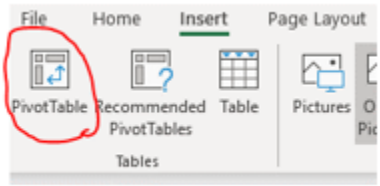
To create a new Pivot Table, we first need to select the data range which we would like to analyze, then click on one of the desired cells in our data range, then click Insert tab, then Pivot Table.

Let's assume we want to analyze a database of cars sold by a car vendor:

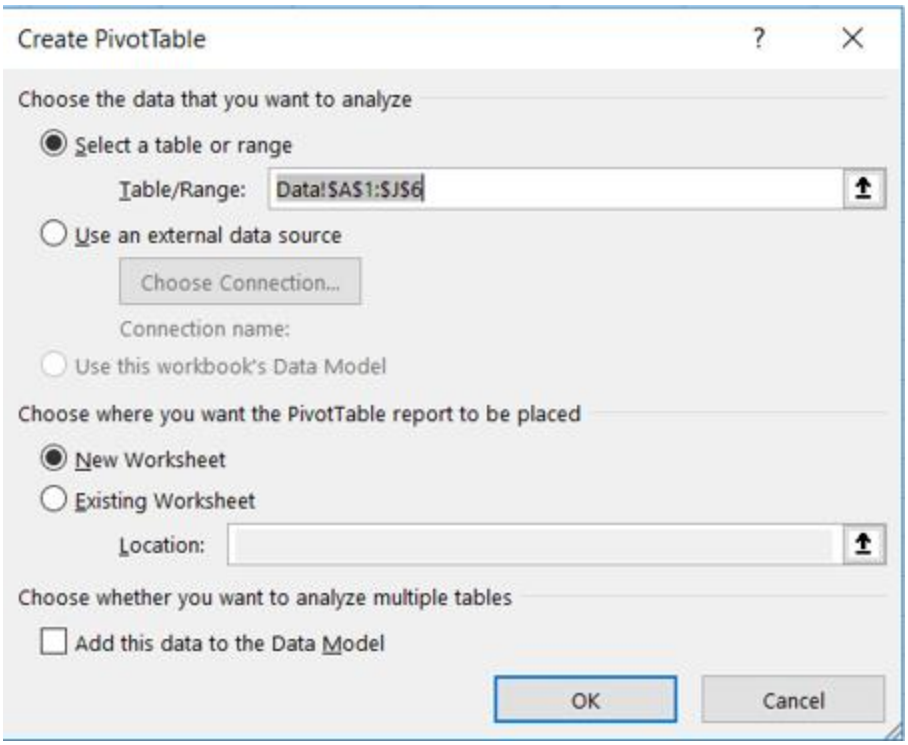
	A	B	C	D	E	F	G	H	I	J
1	Car Model	Year	Hand	Colour	Gear	Agency	Tag Price	Final Price	Arrival Date	Sale Date
2	Toyota Yaris	2015	3	Yellow	Automatic	London	9500	9400	25/04/2017	04/05/2017
3	Mini Cooper	2017	2	Blue	Manual	Birmingham	21000	19500	25/10/2017	26/10/2018
4	Hyundai Sonata	2018	4	Black	Manual	Birmingham	9700	9600	26/02/2018	18/11/2018
5	Ford Edge	2018	2	Blue	Manual	Manchester	22000	18600	13/12/2018	02/02/2019
6	Hyundai i25	2017	1	Red	Manual	Liverpool	14500	12100	04/05/2017	30/01/2018
7	Hyundai Sonata	2015	1	Yellow	Automatic	Manchester	9700	9200	20/02/2018	12/03/2018
8	Mini Cooper	2017	2	Yellow	Manual	Birmingham	21000	20300	25/09/2017	12/10/2017
9	Ford Edge	2018	2	Blue	Manual	Manchester	22000	21100	03/12/2018	03/03/2019
10	Hyundai i25	2018	2	Blue	Manual	London	14500	12000	02/05/2017	12/06/2017
11	Hyundai Sonata	2017	3	Black	Manual	London	9700	8600	24/01/2018	16/02/2018
12	Mini Cooper	2015	4	Black	Manual	Manchester	21000	18700	06/10/2017	06/11/2017
13	Hyundai i25	2017	1	Red	Manual	Liverpool	14500	12400	08/05/2017	06/08/2017
14	Hyundai Sonata	2018	1	Red	Automatic	London	9700	9500	02/02/2018	13/05/2018
15	Hyundai i25	2018	2	Red	Manual	London	14500	14400	20/04/2017	09/06/2017
16										

To create a new Pivot Table:

A. We will click on one of the cells in the data range.
B. We will go to the Insert tab and click on Pivot Table:

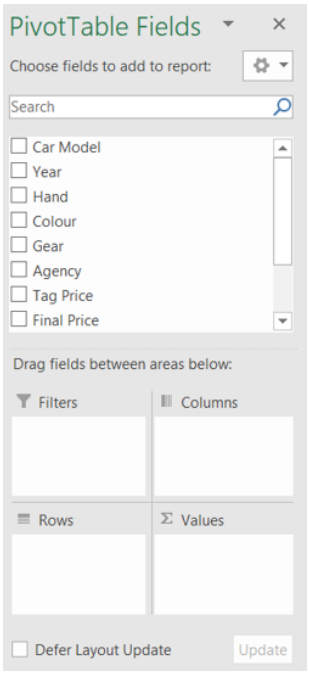


C. Next, we will confirm that the selected range is indeed the right range.



4. Last, we will select "New Worksheet" to create the Pivot Table in a new worksheet, or "Exisiting Worksheet", to place it in an existing worksheet.

After we decided to create a Pivot Table, we can see all the column headers – these are the fields from our database which we can work with:



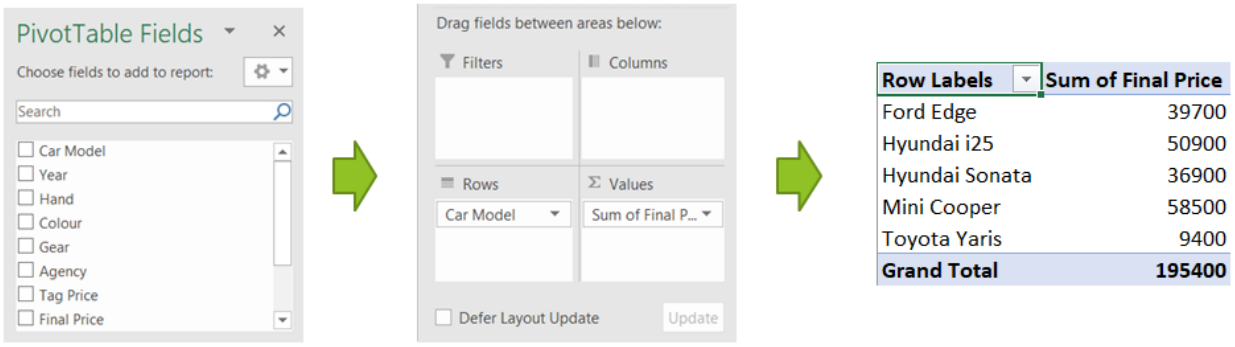
To start creating our Pivot Table, we can drag the different fields to the following areas:

- Rows – Here we will choose the field/s which we would like to base our Pivot Table rows upon.
- Columns – Here we will choose the field/s which we would like to base our Pivot Table columns upon.
- Filters – Here we will choose the field/s by which we would like to filter our data in the Pivot Table.
  i.e.- we would choose "Year" to filter by a specific year.
- Values – Here we will choose the field we want Excel to calculate and our desired calculation.

Creating a basic Pivot Table – Example

One of the most basic examples of using a Pivot Table is summing values of a specific field based on a criteria that appears in a different field.

In order to do so, we will drag the field which we would like to analyze into the "Rows" area or "Columns" if we would like to present the analysis in columns. We will the drag the field we want to sum into the "Values" area:

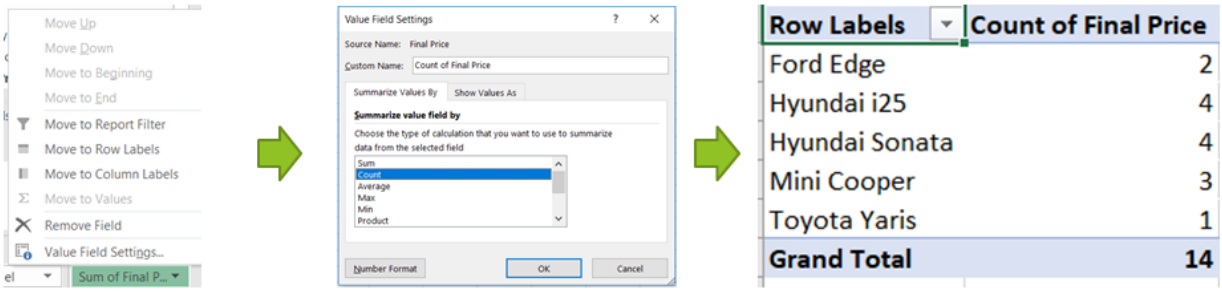


Row Labels	Sum of Final Price
Ford Edge	39700
Hyundai i25	50900
Hyundai Sonata	36900
Mini Cooper	58500
Toyota Yaris	9400
Grand Total	**195400**

Changing the way Values are calculated

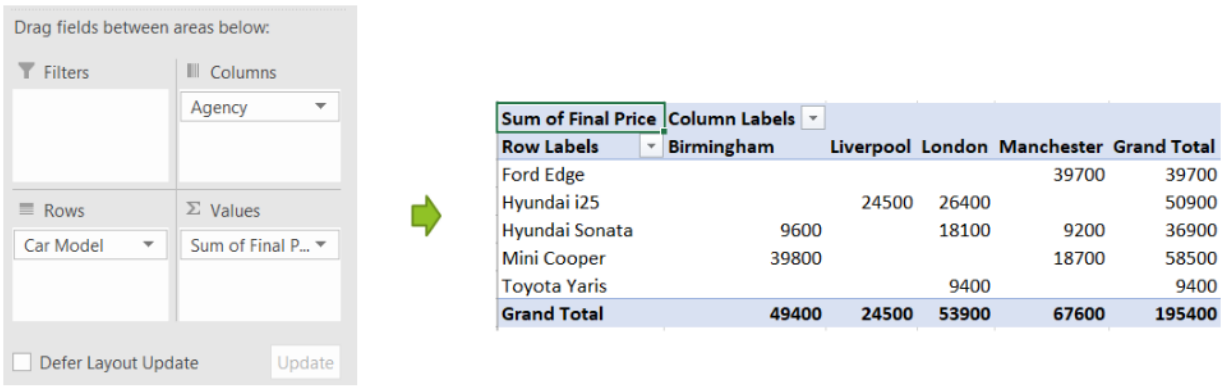
We will notice that most times, the basic calculation we will get when dragging a field to the "Values" area will be "Sum".

We can change the calculation by clicking the field after we dragged it into the "Values" area, then "Value Field Settings…", which will open a menu where we can choose to sum, count, average and many more calculations:



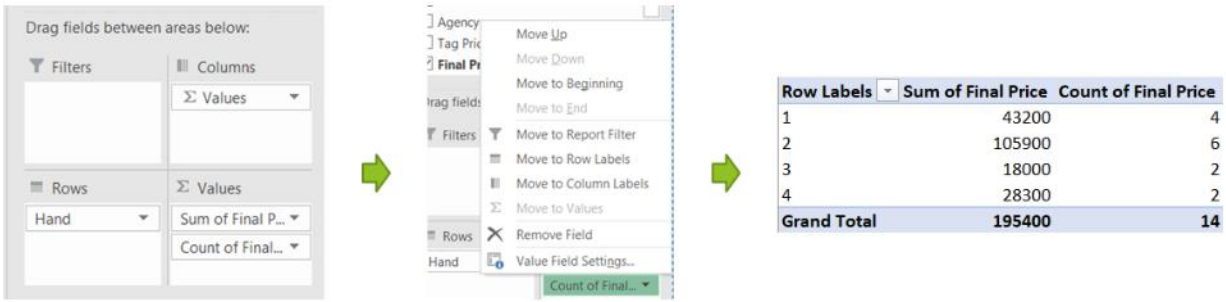
Segmentation to Columns and Rows

We can segment the data using rows and columns simultaneously by dragging fields to the "Rows" and "Columns" areas:



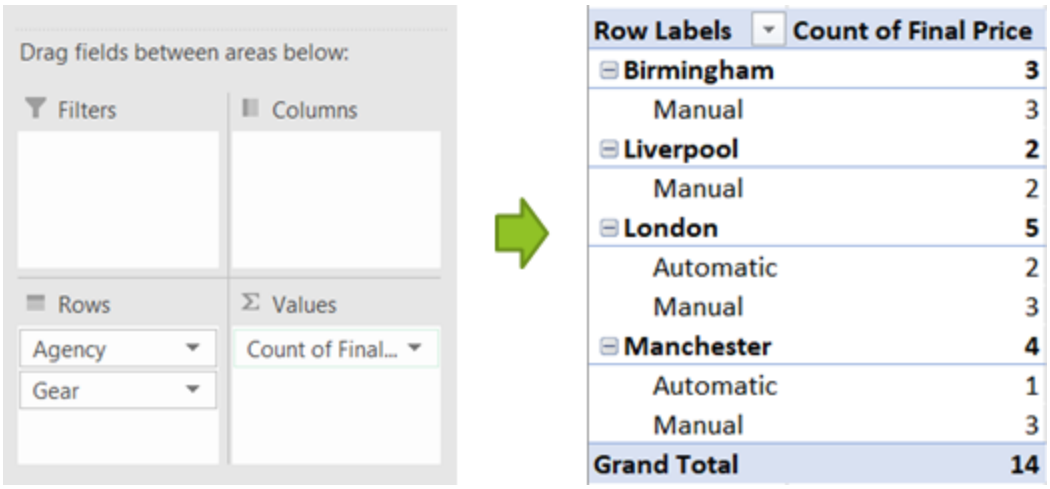
Performing multiple calculations on the same field

We can perform a number of different calculations on the same field by dragging the field several times to the "Values" area and changing the type of calculation in each of the columns:



Segmentation of more than one field

In the Pivot Table, we can segment based on more than one field by dragging several fields into the "Rows" area:

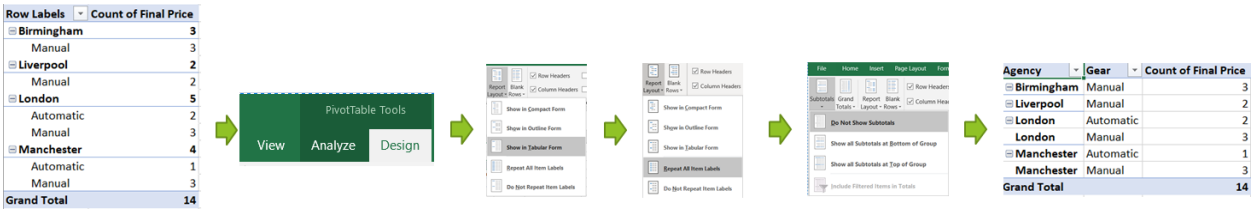


Designing a Pivot Table

Changing the Pivot Table design to a classic table design
In order to give the Pivot Table a "classic" look, where each field is presented in a different column, we will click the Pivot table, click on "design" and perform the following steps:

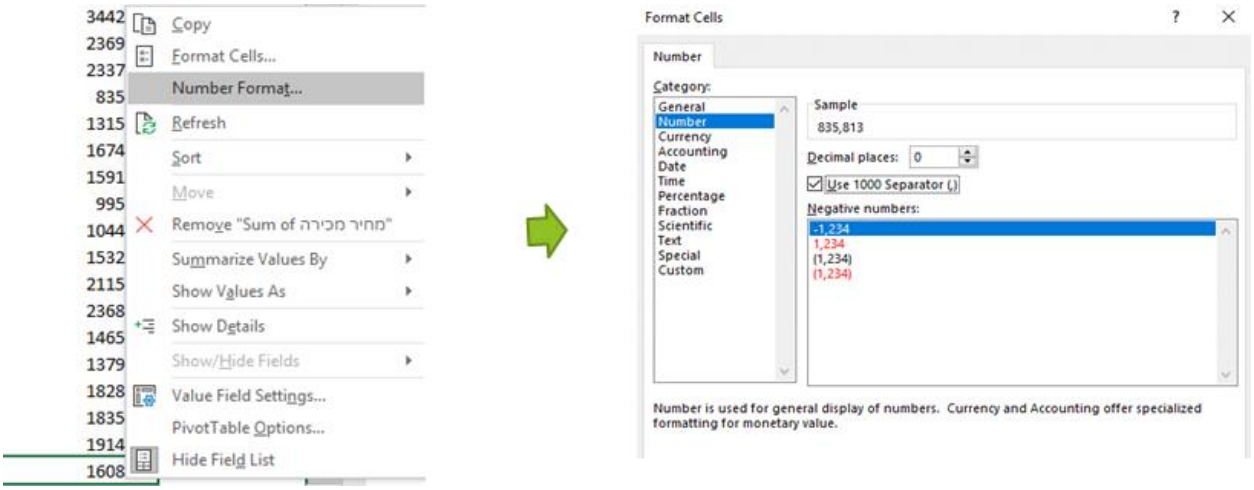
1. Click on Report Layout
2. Click on "Show in Tabular Form" to show the table in a classic format
3. Click on "Repeat All Items Labels" to show all item labels.
4. We can click on "Do Not Show Subtotals" to hide the subtotals in the newly created table.

This is the process and final result:



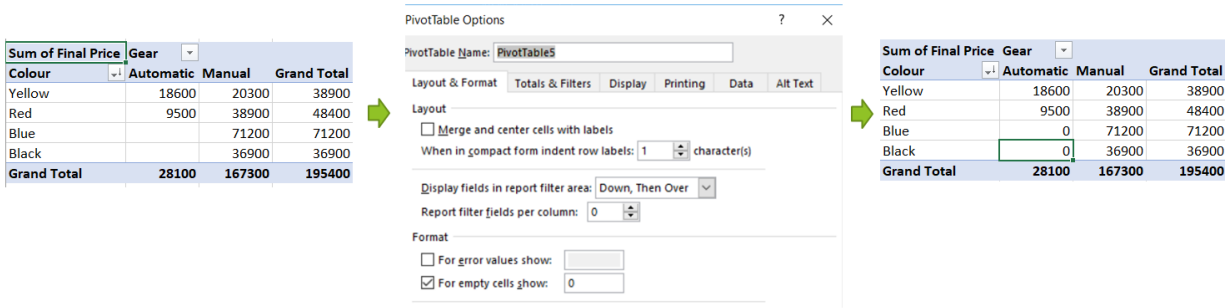
Formatting a Pivot Table field

We can quickly select the way we wish to format a certain value field, by right-clicking the field and then clicking on "Format Cells", or directly on "Number Format", if we wish to format the values as number and add 1000 separator (4,524,254 instead of 4524254):



Designing missing values and errors

We can control the way missing values (empty cells) or errors are presented in the Pivot Table by right-clicking one of the cells and clicking on "Pivot Table Options", then ticking "For error values shows" or "For empty cells show" (as shown in the following example)



Sum of Final Price	Gear		
Colour	Automatic	Manual	Grand Total
Yellow	18600	20300	38900
Red	9500	38900	48400
Blue		71200	71200
Black		36900	36900
Grand Total	28100	167300	195400

Sum of Final Price	Gear		
Colour	Automatic	Manual	Grand Total
Yellow	18600	20300	38900
Red	9500	38900	48400
Blue	0	71200	71200
Black	0	36900	36900
Grand Total	28100	167300	195400

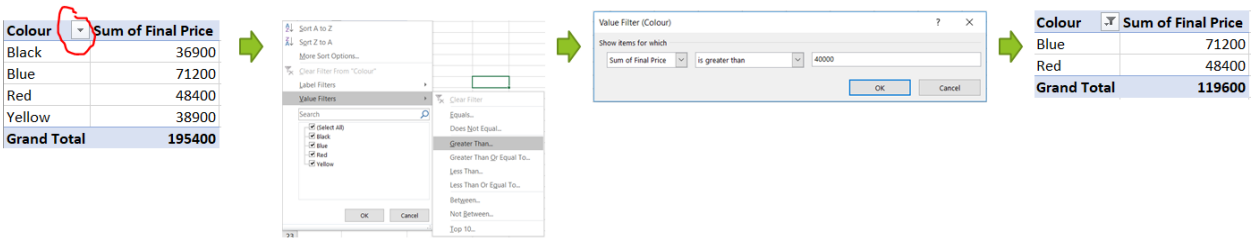
Filtering a Pivot Table

Filtering existing fields in a Pivot Table
We can filter data shown in the Pivot Table rows simply by clicking the corresponding button in the desired field. For example, to filter the "Gear" field, we simply have to click the button next to the field name:

Agency	Gear	Sum of Final Price
Birmingham	Manual	49400
Liverpool	Manual	24500
London	Automatic	18900
London	Manual	35000
Manchester	Automatic	9200
Manchester	Manual	58400
Grand Total		195400

Filtering values in a Pivot Table

What if we wanted to filter the values in our Pivot Table?
To do so, we can start our filtering by clicking the filter button in one of the fields, then click on “Value Filters”, following which we will be able to see the various value filtering options. Here’s an example of how to filter values greater than 40,000:

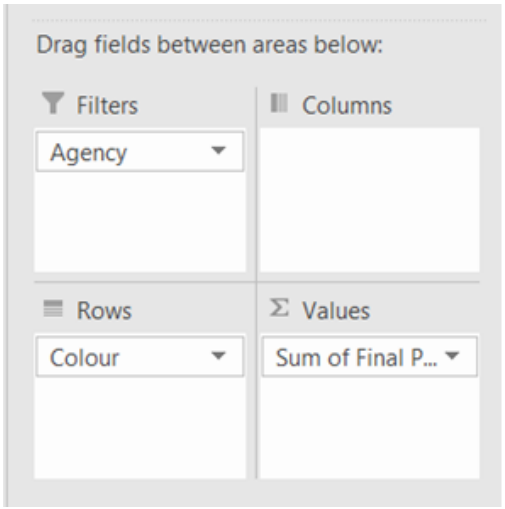


Colour	Sum of Final Price
Black	36900
Blue	71200
Red	48400
Yellow	38900
Grand Total	**195400**

Colour	Sum of Final Price
Blue	71200
Red	48400
Grand Total	**119600**

Adding an external filter to a Pivot Table

If we want to filter based on a field that is not currently in the Pivot Table, we could drag that field into the “Filters” area:

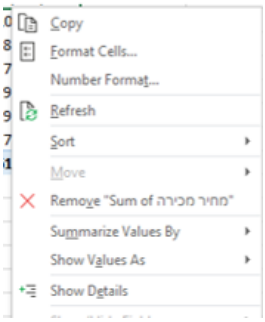


Agency	(All)
Colour	**Sum of Final Price**
Yellow	38900
Red	48400
Blue	71200
Black	36900
Grand Total	**195400**

Please note – we can add more than one field to the “Filters” area.

Sorting values in a Pivot Table

If we want to sort our fields, we just have to right-click on the desired field and click on “Sort”:

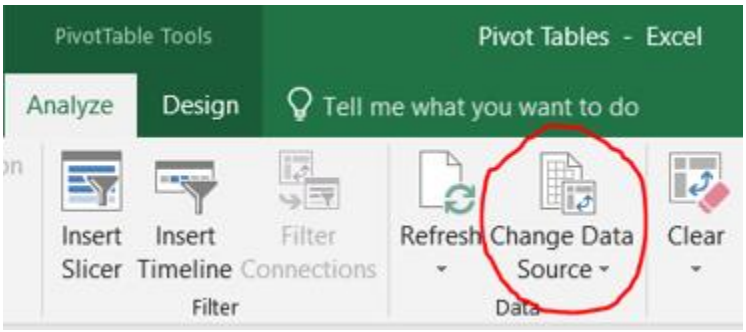


Updating and refreshing the Pivot Table data

After updating the source data, **we have to refresh the Pivot Table** in order for the new data to be reflected in the Pivot Table. We can do that by right-clicking the table and clicking on "Refresh" or by Refresh/Refresh all in the "Data" group

Adding new data at the end of the data range

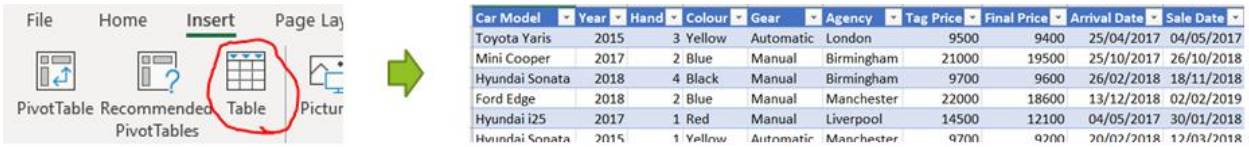
If we want to add new data to our Pivot Table that will be added at the end of the previously used data range, we need to update the source data's range by clicking on "Change Data Source" in the "Data" group:



Another way of dealing with this issue is by adding the new data in the middle of the previously used data range and then refreshing.

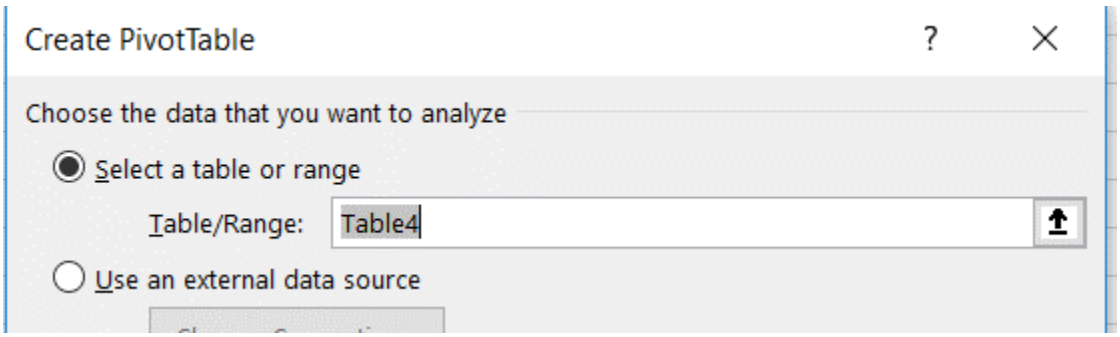
Automatically update Data Source Range when adding new rows by using Tables

Another way to save time if we are planning to update the data source range often is changing the data source range to a table by clicking in "Table" in the "Insert" tab or by clicking CTRL+T



Car Model	Year	Hand	Colour	Gear	Agency	Tag Price	Final Price	Arrival Date	Sale Date
Toyota Yaris	2015	3	Yellow	Automatic	London	9500	9400	25/04/2017	04/05/2017
Mini Cooper	2017	2	Blue	Manual	Birmingham	21000	19500	25/10/2017	26/10/2018
Hyundai Sonata	2018	4	Black	Manual	Birmingham	9700	9600	26/02/2018	18/11/2018
Ford Edge	2018	2	Blue	Manual	Manchester	22000	18600	13/12/2018	02/02/2019
Hyundai i25	2017	1	Red	Manual	Liverpool	14500	12100	04/05/2017	30/01/2018
Hyundai Sonata	2015	1	Yellow	Automatic	Manchester	9700	9200	20/02/2018	12/03/2018

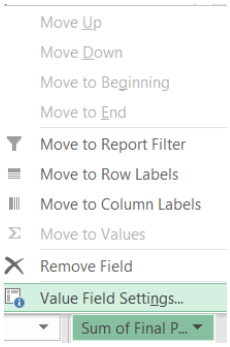
Now we can create/update the Pivot Table that will use the table as the source data, and when the table will be updated- the Pivot Table's source data range will be updated as well. Here's how our Data Source looks like:

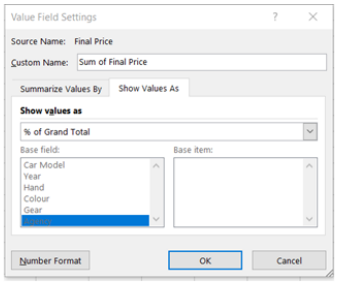


Show Values As

We can present the calculated values in the "Values" area in different ways, i.e. a percentage of total, by clicking the desired value in the "Values" area, then clicking on "Value Field Settings" and then on "Show Value As":

Agency	Sum of Final Price
Birmingham	49400
Liverpool	44100
London	53900
Manchester	67600
Grand Total	**215000**





Agency	Sum of Final Price
Birmingham	22.98%
Liverpool	20.51%
London	25.07%
Manchester	31.44%
Grand Total	**100.00%**

Presenting a breakdown of a value in a Pivot Table

Whenever we like, we can present all the items that are calculated in a certain cell in the Pivot Table by double-clicking that cell. This will result in a new sheet opening:

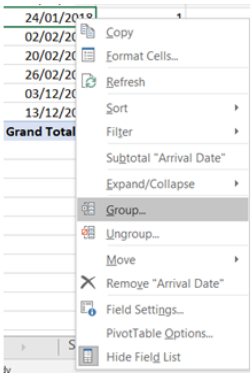
Sum of Final Price	Gear		
Colour	Automatic	Manual	Grand Total
Yellow	18600	20300	38900
Red	9500	38900	48400
Blue	0	71200	71200
Black	0	36900	36900
Grand Total	**28100**	**167300**	**195400**

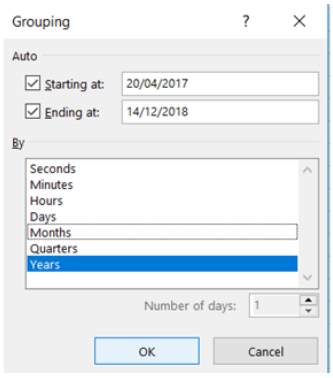
Car Model	Year	Hand	Colour	Gear	Agency	Tag Price	Final Price	Arrival Date	Sale Date
Hyundai i25	2018	2	Blue	Manual	London	14500	12000	02/05/2017	12/06/2017
Mini Cooper	2017	2	Blue	Manual	Birminghar	21000	19500	25/10/2017	26/10/2018
Ford Edge	2018	2	Blue	Manual	Mancheste	22000	21100	03/12/2018	03/03/2019
Ford Edge	2018	2	Blue	Manual	Mancheste	22000	18600	13/12/2018	02/02/2019

Grouping Data

We can group data presented in the Pivot Table's rows and columns with "Group" and reverse it with "Ungroup" by right-clicking one of the cells:

Arrival Date	Count of Gear
20/04/2017	1
25/04/2017	1
02/05/2017	1
04/05/2017	1
08/05/2017	1
25/09/2017	1
06/10/2017	1
25/10/2017	1
24/01/2018	1
02/02/2018	1
20/02/2018	1
26/02/2018	1
03/12/2018	1
13/12/2018	1
Grand Total	**14**



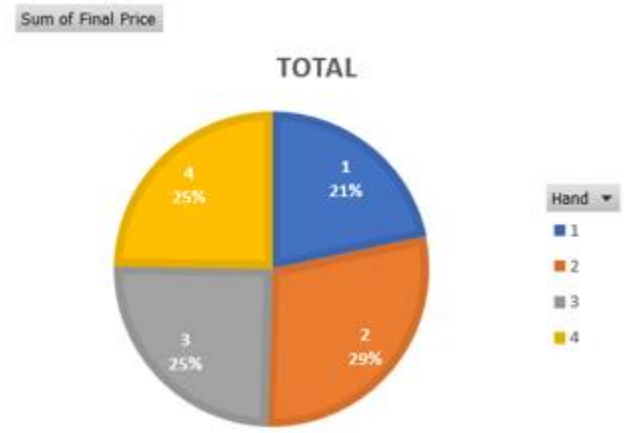


Arrival Date	Count of Gear
2017	8
2018	6
Grand Total	**14**

Date data will usually be grouped automatically to months/years
We can also group numerical data (i.e 1-100, 101-200, etc.)

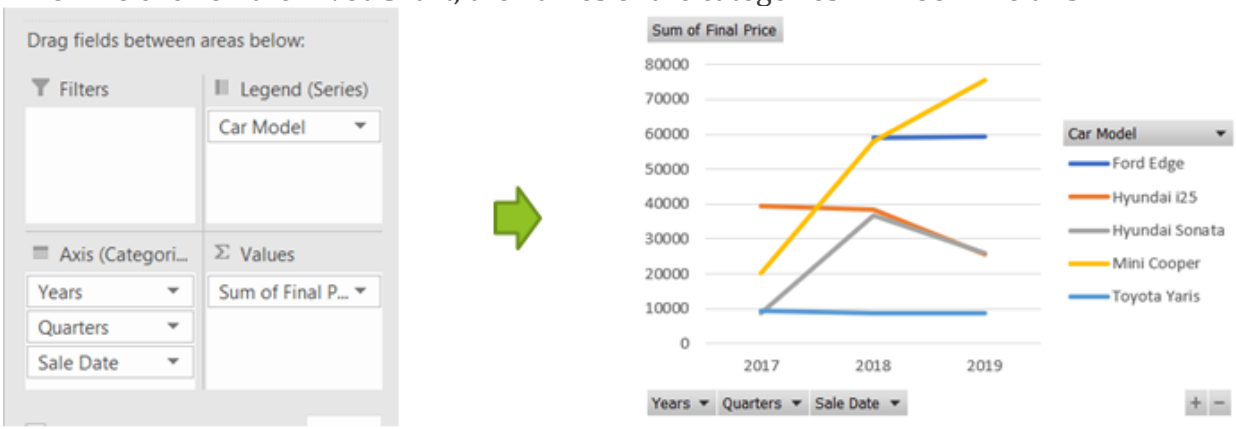
Creating Pivot Charts

We can add charts to existing Pivot Tables or create new charts based on a new Pivot Table.

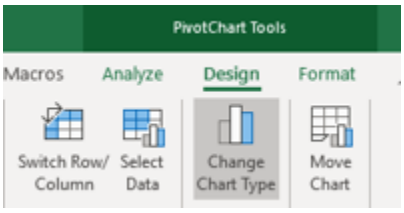


- Existing Pivot Table – We will click on the "Analyze" tab and then on "Pivot Chart" in the "Tools" group (we have to select a cell in the Pivot Table before doing this)
- Creating a new Pivot Table – "Insert" tab -> "Pivot Chart" in the "Charts" group (we have to select the desired source data before doing this)

When we click on the Pivot Chart, the names of the categories will look like this:



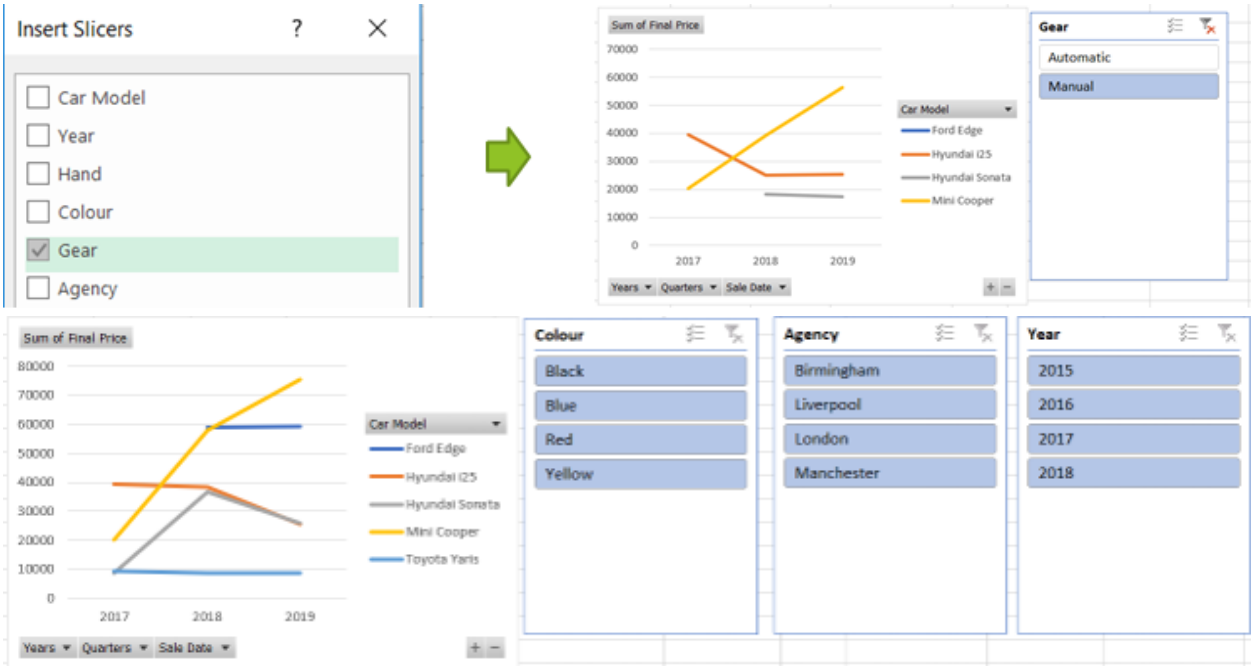
Like any other chart, we can control the axis' directions and the chart type by clicking on the "Design" tab. We can, for example, replace the X and Y axis by "Switch Row/Column" in the "Design tab". We can also change the Chart type:



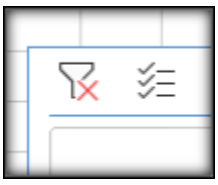
Adding Slicers / Timelines to a Pivot Table

Adding Slicers to a Pivot Table

- We can add Slicers to our Pivot Table / Chart, which will enable visually filtering the field, by clicking on the “Analyze” tab and then on “Insert Slicer”. Here’s how it looks:

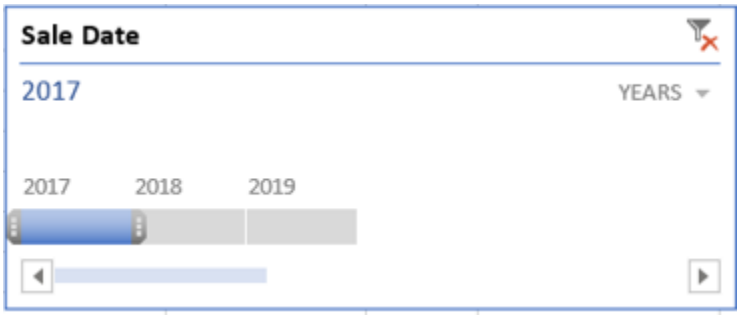


- We can select several values in the Slicer by using CTRL/ SHIFT.
- To cancel the filtering of a Slicer, we will click on this button at the top of the Slicer:



Adding a Timeline to a Pivot Table

For date fields, we can add a Timeline by clicking on the “Analyze” tab and then on “Insert Timeline”:

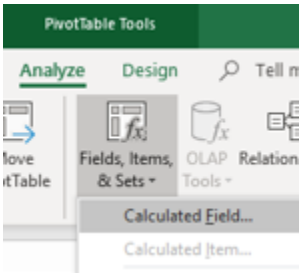


Pivot Table Calculated Fields

We can perform calculations within the Pivot Table itself, Instead of creating calculation columns in the source data. For that, we can use a "Calculated Field".
A Calculated Field is calculated based on the **sum** of a certain field.

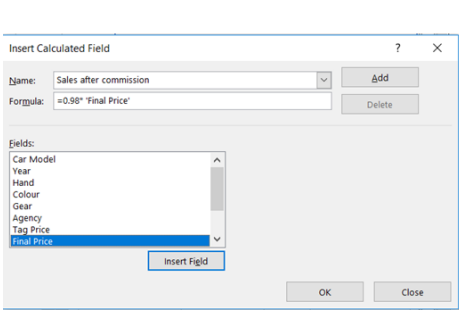
We will add a Calculated field by clicking on:

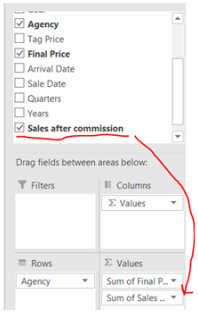
Analyze tab -> Fields, Items & Sets -> Insert Calculated Fields:



We will name each Calculated Field and write the desired formula for it (you can insert the desired field by double-clicking it).

Here's an example of calculating the Sales amount after a 2% commission:





Row Labels	Sum of Final Price	Sum of Sales after commission
Birmingham	121900	119462
Liverpool	128800	126224
London	106000	103880
Manchester	117000	114660
Grand Total	**473700**	**464226**