Microsoft Excel 2016
Using PivotTables and PowerPivot
Course Notes

Chris Page

11 River Gardens, Shawbury, Shrewsbury, SY4 4LA
Tel 01939 251094
www.pagecommunication.co.uk

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COURSE OBJECTIVES

By the end of this course you will be able to

- Briefly describe the difference between an Excel Table and an Excel Range.

- Correctly create a row formula in an Excel table as specified, without reference to notes.

- Correctly create a specified PivotTable and PivotCharts, referring to notes if necessary.

- Correctly create Slicers and Timelines as specified, referring to notes if necessary.

- Correctly create relationships between tables as specified, without reference to notes.

- Accurately create a PivotTable that is connected to multiple tables, referring to notes if necessary.

- Correctly add data to the Data Model, without reference to notes.

- Briefly describe how to achieve date grouping in PowerPivot.

- Briefly describe how to use the Related DAX function in PowerPivot.

- Correctly create PowerPivot hierarchies, referring to notes if necessary.

- Accurately create a PivotTable that uses Key Performance Indicators, referring to notes if necessary.

MODULE 1 – TABLES, PIVOTTABLES AND PIVOTCHARTS

OBJECTIVES

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- Correctly create Slicers and Timelines as specified, referring to notes if necessary.

INTRODUCTION

This course looks at working with Excel Tables, PivotTables, PivotCharts and PowerPivot. It will see how these individual elements work and also how they can be all linked to created Dashboards. Dashboard reports allow managers to get high-level overview of the business. Excel dashboards are powerful, fairly easy to design and a great way to improve your Excel and data visualization skills.

EXCEL TABLES

A table is a feature in Excel that makes it easier to format and analyse a set of data points in a spreadsheet.

To convert a given range to a table

1. Select the range.

2. On the **Insert** tab of the Ribbon, in the *Tables* group, click the **Table** or, press Ctrl + T.

After the table is created, the Table Tools become available, and a Design tab is displayed. You can use the tools on the Design tab to customize or edit the table. Note that the Design tab is only visible when a cell in the table is selected.

To convert a given table to a range

1. Click in a cell of the table.

2. On the Table Tools **Design** tab of the Ribbon, in the *Tools* group, tick the **Convert to Range** button, then click on **Yes**.

To summarize a table

1. On the Table Tools **Design** tab of the Ribbon, in the *Table Style Options* group, tick the **Total Row** box. You will have a new row inserted just below the data set with the totals. Equally, you can select any cell in this row and choose from a number of aggregation options such as count, min, max etc.

To rename a table

You might want to rename the table (from the default of table_1 etc) to something more meaningful.

1. On the Table Tools **Design** tab of the Ribbon, in the *Properties* group, click in the table name box and create a new name. Do not use spaces.

2. Press Enter ↵ after typing the name.

To create row formulas

When entering a formula in a specific row that refers to a cell in another column use point and click to select the cell. You will notice that the reference is not a typical cell reference but instead the @ symbol followed by the column name. Therefore if you look at the formula

$$=[@Target]-[@Revenue]$$

it would subtract the current row value of the *Revenue* column from the current row value of the *Target* column. Once you complete the formula it is automatically copied for every row of the table.

PIVOTTABLES

Simply put, a PivotTable is nothing more than interactive table that contains summarised data. This is built around a core of data whose row and column headings can be moved around (pivoted) to provide different views of the data. This pivoting of row and column headings is where the PivotTable derives its name. PivotTables are particularly well suited for use in analysing large, lengthy lists. You can specify how you want the data in the PivotTable to be summarised. Analysing large lists with traditional methods could prove unwieldy. Instead, by using a PivotTable, the pertinent information is much easier to extract.

The source data can be in an Excel worksheet or even in another program. Although the data in the resulting PivotTable looks like any other worksheet data, you cannot directly enter or change it. The PivotTable itself is linked to the source data and the values in the cells are read-only amounts. You can, however, change the formatting, and use the PivotTables for charting, etc.

Creating a PivotTable

A PivotTable is created with the help of the PivotTable Wizard.

1. Position in the range of data that you want your PivotTable to be based upon.

2. Select the **Insert** ribbon and in the *Tables* group click on the **PivotTable** button.

3. This brings up the *Create PivotTable* dialog box. This dialog prompts you to select the range of data that you want to include in the PivotTable. The range you positioned in should be highlighted. If not select the range of data within the spreadsheet.

4. In the lower half of the dialog choose to insert the PivotTable in a new worksheet, or the existing one (in which case you need to indicate the starting cell).

5. Click on **OK**.

6. Excel adds an empty *PivotTable* report – shown here - to the specified location.

7. Excel also displays the *PivotTable Fields* pane - shown here on the right - so that you can add fields, create a layout, and customize the PivotTable report.

    The layout of the *PivotTable Fields* pane can be changed by clicking on the settings drop-down button above-right of the field selection area. Choose whether or not you want the *fields section* only, the *area section* only or both.

8. To display a field in the PivotTable click on the field name in the *fields section*. A tick mark will appear in the box by the field name and it will normally appear under *Rows* in the *Area section* below. If the field holds a number value it will normally appear under *Values* in the *Area section* below – the area the fields appear in can easily be changed so do not worry if you initially appear to get the wrong summary or area set.

9. As fields are added to the *Area section* (also known as the drop-zone!) so the PivotTable gets drawn/re-drawn. You can move fields to different areas by dragging and dropping in to a different area section.

10. The order that fields appear in a PivotTable can be modified easily by dragging the fields within an area section in to a different order. Sometimes this can make a PivotTable easier to understand.
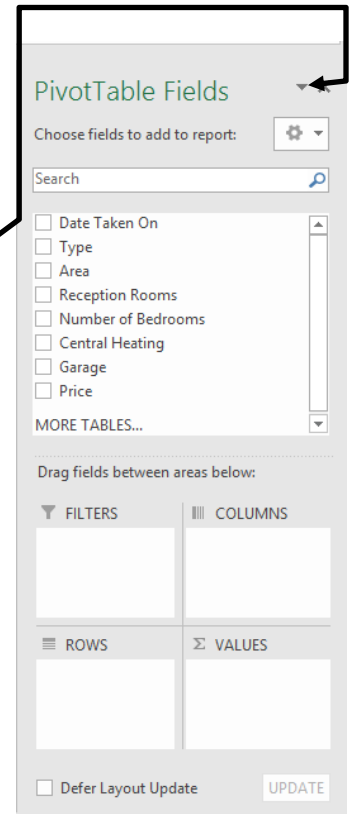
The *Filters* area provides a way to just view a subset of data. For example, if you had a field called Region that recorded values of North, South, East or West, then you could drag the Region field to the report filter area and then just show results for one or more of the region values.

Time for Exercise 1

Changing Summary Options and Number Formatting

By default the PivotTable will show the Sum of any numeric values without any formatting.

To change the values summary/number format

1. In the Values area of the *PivotTable Field* List click on the drop-down selector of the field whose values you want to change the summary of.

2. Select the *Value Field Settings* menu option.

3. Under the *Summarize Values By* tab, select the appropriate summary option. The *Show Values As* tab governs how the summarising is displayed, such as percentage of column total, grand total, etc. (See the table below.)

4. Set any formatting of any numbers by clicking on the **Number Format** button.

5. Finally, click on **OK**.
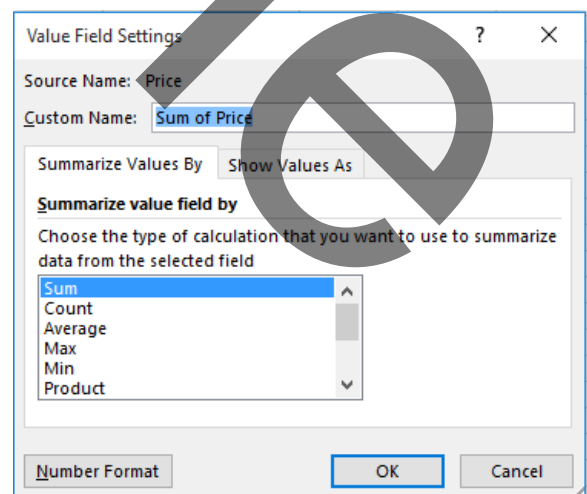
Function	Result
Normal	Turns off custom calculation.
Difference From	Displays data as the difference from the value of the Base item in the Base
% Of	Displays data as a percentage of the value of the Base item in the Base field.
% Difference From	Displays data as the percentage difference from the value of the Base item in the Base field.
Running Total in	Displays the data for successive items in the Base field as a running total.
% Of Row	Displays the data in each row or category as a percentage of the total for the row or category.
% Of Column	Displays all the data in each column or series as a percentage of the total for the column or series.
% Of Total	Displays data as a percentage of the grand total of all the data or data points in the report. Gives a good summary of individual performances.
Index	Calculates data as follows: ((value in cell) x (Grand Total of Grand Totals)) / ((Grand Row Total) x (Grand Column Total))

Grouping Items

If you group items you will have even more flexibility when analysing data. Grouping works well on any numerical data (including dates).

Note: Grouping is not available when using PowerPivot which is covered later in the course.

Grouping Items with Numeric Labels into Ranges

1. In the PivotTable (not the Field List areas) click on any of the row or column values that you would like to group by.

2. In the extra PivotTable tools ribbons, select the **Analyze** tab and in the *Group* group click on the **Group Field** button.

3. A dialog box displays Excel's guesses as to how you want to group the data. Either accept or enter new values in the Starting At, Ending At and By boxes.

4. Click on **OK**.

Copying a PivotTable

It is simple to copy a PivotTable. You might want to do this to set up different summary views without anyone else having to change fields around in the *Area section*, or drop-zones.

To copy a PivotTable

1. Click in a PivotTable then press [Ctrl] + A on your keyboard.

2. Now use the clipboard to copy the table, or press [Ctrl] + C on your keyboard.

3. Position in your worksheets where you want the new table to start.

4. Paste the copy. Each PivotTable is independent of the other so field changes in the areas section, or drop-zones, will only affect the PivotTable you are positioned in.
   Note: PivotTables cannot overlap each other and you will be warned if by moving fields around the resultant table will encroach upon another table in the same worksheet.

In a PivotTable, you can create calculated fields, using formulas that work with the sum of other pivot fields. There are some limitations to what a calculated field can do, but they let you add more power to your PivotTables.

Here are some of the features and limitations of calculated fields:

Features

- For calculated fields, the individual amounts in the other fields are summed, and then the calculation is performed on the total amount.
- Calculated fields are automatically available in all PivotTables that are based on the same pivot cache

Limitations

- Calculated field formulas cannot refer to the PivotTable totals or subtotals
- Calculated field formulas cannot refer to worksheet cells by address or by name.
- Sum is the only function available for a calculated field.
- Calculated fields are not available in an OLAP-based PivotTable.
- Calculated fields can be incorrect when grouping is applied.

To insert a calculated field

1. In the extra PivotTable tools ribbons, select the **Analyze** tab and in the *Calculations* group click on the **Fields, Items, & Sets** button.

2. Select the **Calculated Field** option.

3. Excel opens the *Insert Calculated Field* dialog box.
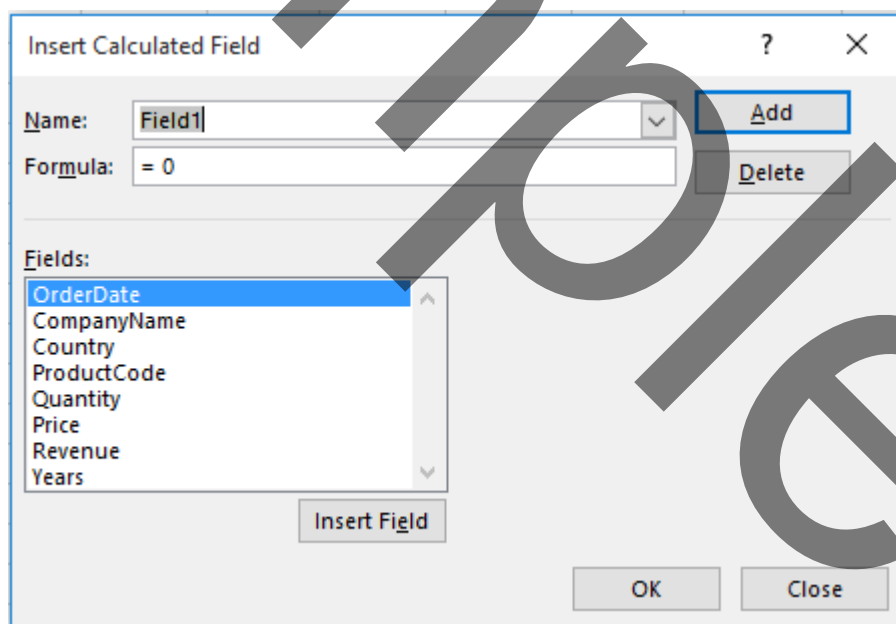
4. Type a name for the calculated field in the *Name* box.

5. In the *Formula* box, type the formula you want for the calculation. If you want to refer to a field name select it in the *Fields* list in the dialog and click on the **Insert Field** button.

6. Click **Add** to save the calculated field, and then click on **Close**.

EXERCISE 1

1. Open the file called **Stationery**

2. On this sheet convert the list of data into an Excel table.

3. Rename the table as **StationeryOrders** (note no space!)

4. Create a new calculation in the first blank column based on *Cost* multiplied by *Units*.

5. Name this new column *OrderValue*.

6. Now using this table create a Pivot Table on a new worksheet.

7. On this Pivot Table display data to show the sum of the *OrderValue* broken down by *Product* and *Region*. Put *Product* in Rows and *Region* in Columns. What is the overall value of all orders placed for this period?

   The answer should be 19333.79.

8. Modify the Pivot Table to show *Order Status* in the Columns area as the only field. How much of our grand total is cancelled orders?

   The answer should be 1470.79.

9. Which rep is achieving the highest value of orders? What would you have in the Rows drop-zone to show this information?

   The answer is Andrews with 5474.19 although part of this is 111.44 of cancelled orders. We only need the *Rep* field.

10. Close and save the changes. We will use this file again in the next exercise.

1.   Open the file called **Stationery** and view the Pivot Table.

2.   Your Pivot Table should look like this from the last exercise, if not make changes so it does.

Sum of OrderValue	Column Labels				
Row Labels	Backorder	Cancelled	Pending	Shipped	Grand Total
Andrews	404.19	111.44	1946.04	3012.52	5474.19
Gill	229.54	475.33	158.47	1404.26	2267.6
Howard	1339.78	299.4	272.07	1113.81	3025.06
Jardine	125.58	59.8	1037.56	1066.45	2289.39
Parent	2033.68		862.46	498.69	3394.83
Sorvino	550	524.82		1807.9	2882.72
Grand Total	4682.77	1470.79	4276.6	8903.63	19333.79

3.   Change the *Value field settings* to show a summary as a percentage of the Grand Total. Which salesperson has the highest percentage of cancelled orders?

        The answer is Sorvino with 2.71%.

4.   Restore the *Value Field Settings* back to *No Calculation*, and apply a number format of *Accounting* showing 2 decimal places.

5.   Place the *Date* field on the columns drop-zone (make it the only one there).

6.   Now create a calculated field (Pivot Table Tools, **Analyze** tab, *Calculations* group, **Fields, Items & Sets** button). Give the new field the name of *Sales*. Use the formula =*Cost * Units*.

7.   Drag your new *Sales* field from the field list onto the *Value* drop-zone and see how it is the same number as our *OrderValue* field.

        So to summarise, back in the previous exercise you created a calculated field in the table called *OrderValue* which was *Cost * Units*. You have now created a calculated field in the Pivot Table called *Sales* which is *Cost * Units*. They both show the same sum values.

        Now we will see one disadvantage of Pivot Table calculated fields.

8.   Click on one of the dates in the Pivot Table, and then apply grouping by month only.

        Examine the values for *Sum of OrderValue* and *Sum of Sales*. *Sum of OrderValue* is correct!

9.   Delete the *Sales* calculated field so it does not appear in the Field List, then close the file and save the changes.