Advanced Power BI (Data)

Sample manual - first two chapters

Manual 1238 - 166 pages –

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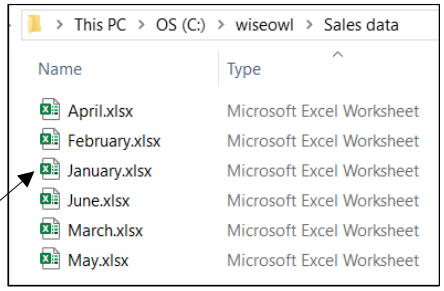
CHAPTER 1 - COMBINING QUERIES

1.1 Loading Multiple Files from a Folder

You can load multiple files from the same folder provided that they share the same structure.



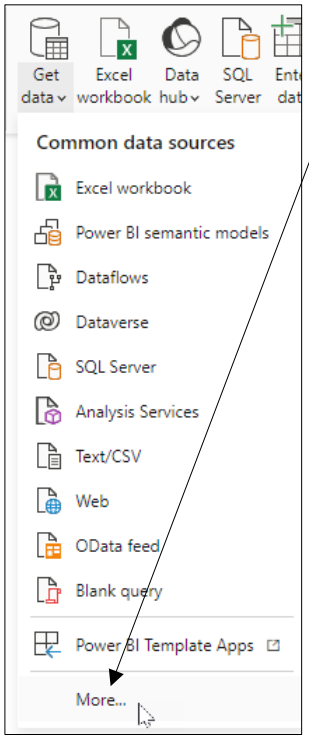
We'll load these 6 months of sales data from the **Sales Data** folder.

Wise Owl's Hint

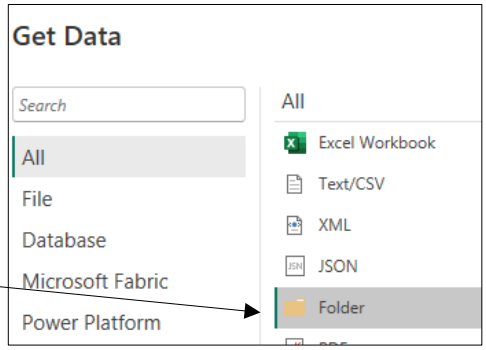
To get this to work all of the files have to be of the same type (in this case, Excel workbooks), and it helps if the columns have the same names and data types and appear in the same order in each workbook.

Setting the Folder

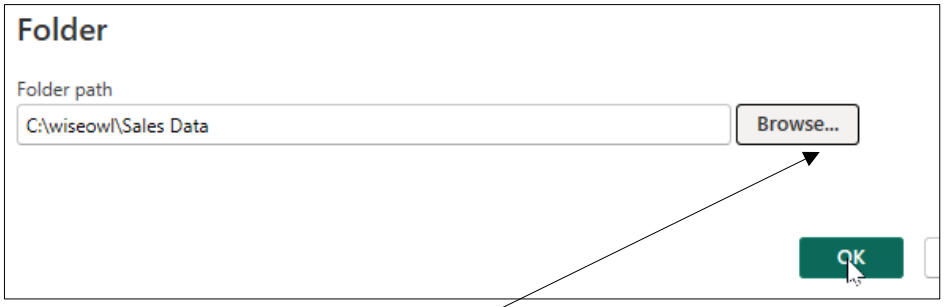
To start to load lots of files from the same folder:



a) Choose to get data, then choose to show **More…** possible data sources.



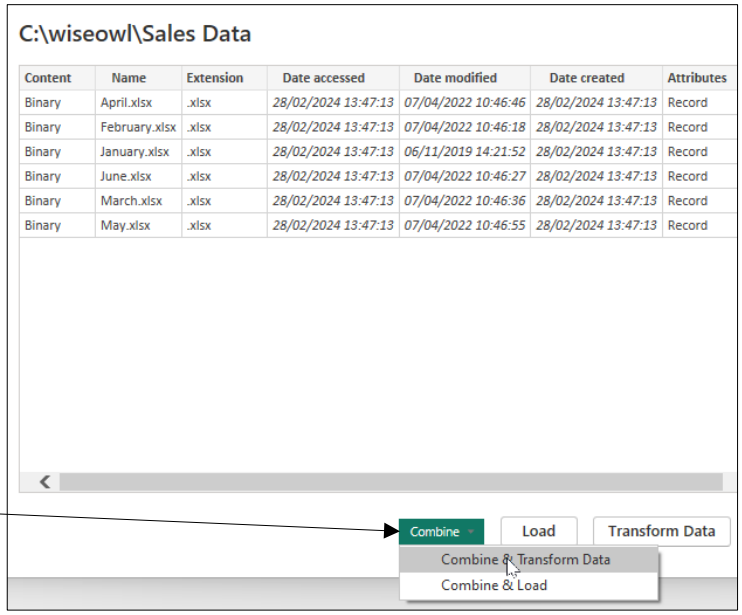
b) Choose to get data from a folder, and click on **Connect**.



b) Browse to the folder containing the files that you want to import, then choose OK and continue as shown overleaf.

Combining the Files

Power BI display a list of the files in the folder – you can now choose to combine these together:

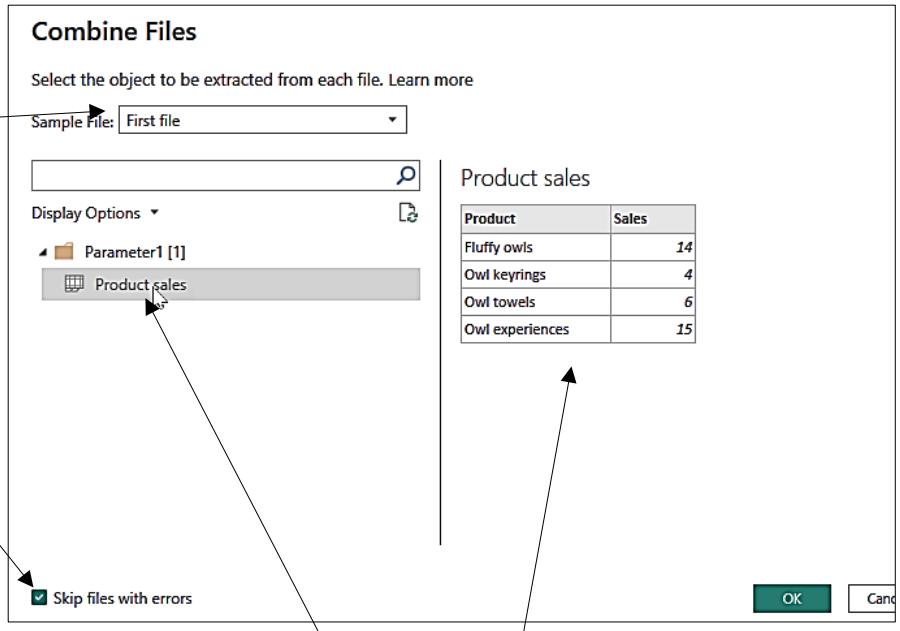


Choose this option to combine the files together and edit the results (because you've chosen to transform the data after combining it, you'll be taken into Query Editor rather than Power BI Desktop when you've finished).

Setting the Template for Import

You can now set which file Power BI should take its instructions from:

If all of your files are identical in format, it doesn't matter which one you use as a template (so you might as well leave this as the default, which is to take the first file in the folder).



If you've inadvertently left your shopping list file in this folder, you can tick this box to ensure that it won't be loaded (since it will cause errors, as its columns don't match the ones in the other workbooks).

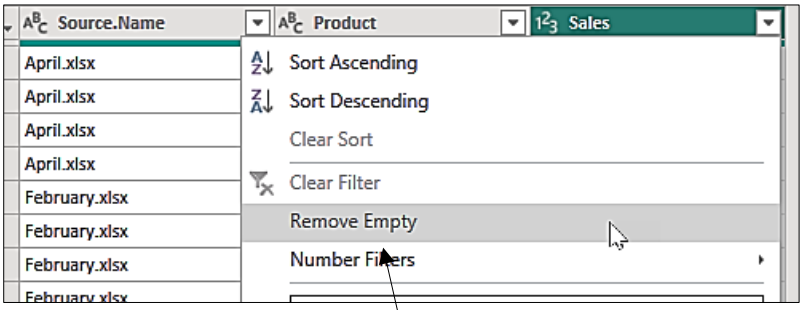
If you click on a worksheet you can see (and check its contents) on the right – but note the hint below.

Wise Owl's Hint

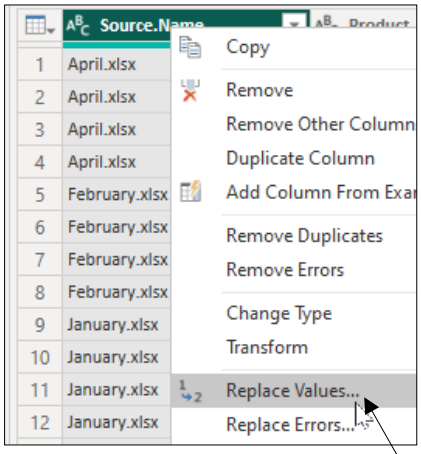
*In previous versions of Power BI you were able to load data from worksheets with different names provided that they shared the same file format, but there now seems to be an additional constraint that all of the worksheets you're combining together must have the same worksheet name (**Product sales** in our example).*

Tidying Up the Results

When you select OK to combine the files from a folder, Power BI will combine their data. Here are two suggested transforms you might want to apply before loading the data:



You could maybe click on the arrow next to one of the populated columns, and choose to remove null values from it (Power BI tends to import lots of extra blank rows at the bottom of Excel worksheets) ...

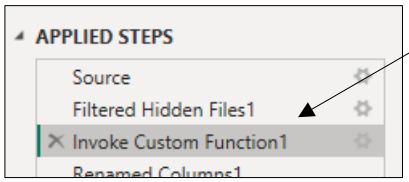


... and choose to replace **.xlsx** with an empty string in the source name (and rename the column) to get a more useful record of which month each row of data pertains to:

	Month	Product	Sales
1	April	Fluffy owls	14
2	April	Owl keyrings	4
3	April	Owl towels	6
4	April	Owl experiences	15
5	February	Fluffy owls	11

An Outline of How it Works

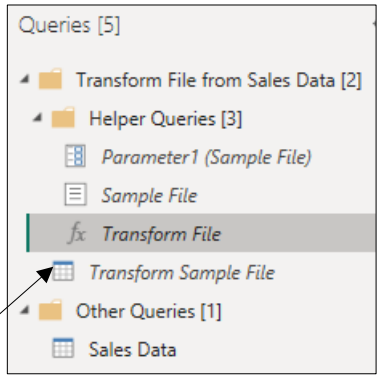
Curious how Power BI manages to get this all to work? The key is this stage:



The query includes this step to invoke something called a *custom function*.

```
= Table.AddColumn(#"Filtered Hidden Files1", "Transform File", each #"Transform
    File"([Content]))
```

The custom function is called **Transform file**, as shown in this M statement …



… and is listed on the left-hand side of the Query Editor window (although it probably won't make much sense at this stage – see the hint below).

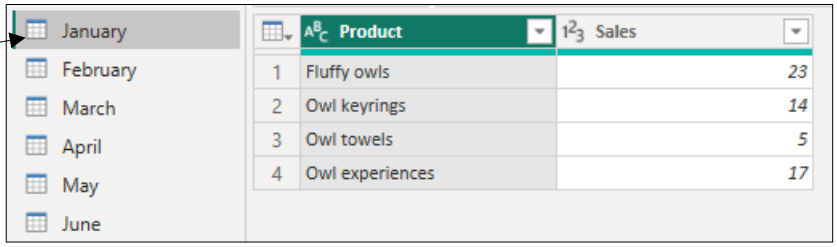
Wise Owl's Hint

To find out how this works in detail you'll need to learn first about parameters and also about custom functions, as covered in some depth in our two-day Advanced Power BI (Data) course.

1.2 Appending Queries

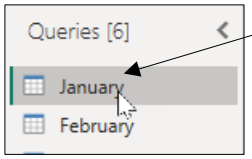
Suppose that you have imported 6 worksheets (one for each of the months January through to June), and you now want to combine these into a single table:

The 6 worksheets have the same structure, but contain different data.



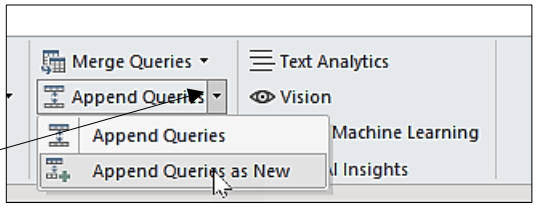
Combining Queries using Append

To combine queries together like this:



a) Select any one of your queries.

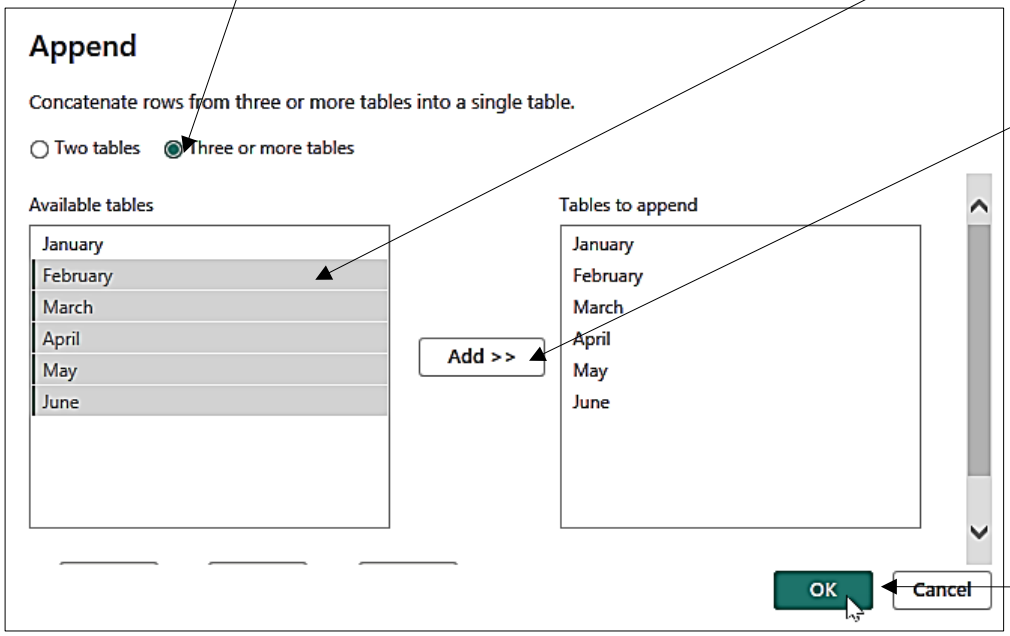
b) Choose to create a new query, appending data.



c) Choose this option, as here we have more than 2 tables.

d) Select each table whose contents you want to append (although here we've used the Ctrl key to select multiple tables in one go).

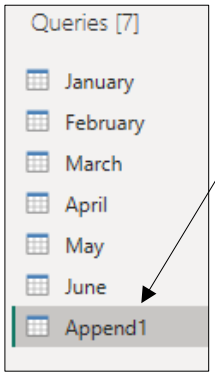
e) Click on this button to build up a list of the tables that you want to append.



f) Click OK to continue.

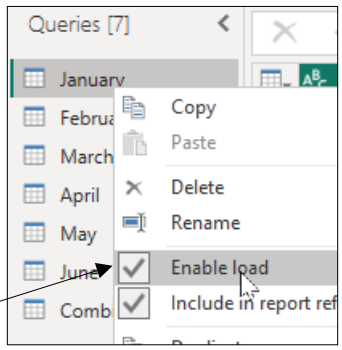
Tidying up your Results

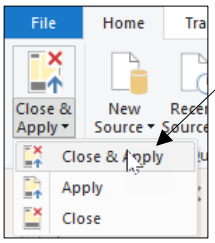
After combining tables together you can rename the final query, and prevent the source ones from loading:



a) Power BI appends the contents of the tables together, and puts the results (as you requested) in a new table, which you can then give a more sensible name:

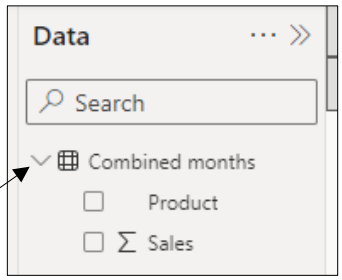
b) You could now right-click on each of the source tables and choose not to load it into your data model, since you will take all of your report's data from the single combined data table.





c) Close and apply to save your changes and return to Power BI.

d) Only the final query will appear in the field well or data view.



1.3 Merging Data

This section shows you how to combine tables together into a single set of data. The example we'll use is as follows:

	A	B	C
1	Title	Run Time	GenreId
2	Passengers	116	7
3	Rogue One: A Star Wars Story	133	7
4	Silence	159	4
5	Underworld: Blood Wars	91	1
6	Bad Santa 2	92	3
7	Moana	107	2
8	Fantastic Beasts	133	5
9	Doctor Strange	115	1
10	Jack Reacher: Never Go Back	118	8
11			

These two tables (of films and genres) can be linked together by each film's genre id to produce a list showing each film's details along with its genre name.

	A	B
1	GenreId	GenreName
2	1	Action
3	2	Animation
4	3	Comedy
5	4	Drama
6	5	Fantasy
7	6	Genre
8	7	Science Fiction
9	8	Thriller
10		

Loading the Tables to Merge

The first thing to do is to load the two sources of data (spreadsheets in this instance):

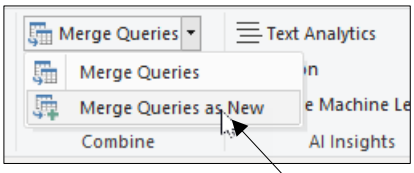
Load the two worksheets shown above to get two queries in Query Editor, one for each table of data.

Films
Genres

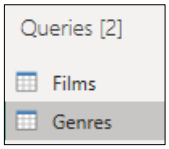
	GenreId	GenreName
1	1	Action
2	2	Animation
3	3	Comedy
4	4	Drama
5	5	Fantasy
6	6	Genre
7	7	Science Fiction
8	8	Thriller

Merging the Data

You can now merge the two tables together:



a) Select one of the tables (if you're choosing an inner join – see below – it doesn't matter which).



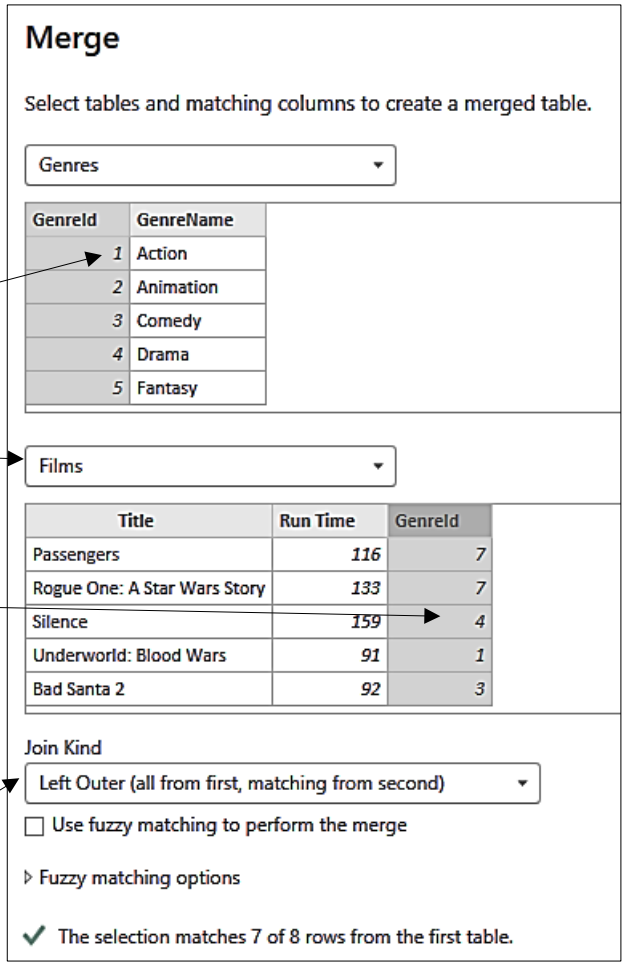
b) At the top right of the **Home** tab of the **Query Editor** ribbon, choose to merge the queries, keeping the old tables and creating a new one alongside them.

c) Click on the column in the first table that you want to use to match rows (here each genre's id number).

d) Choose which other table you want to merge with the one you have selected.

e) Choose which corresponding field you want to match to in the second table (here each film's genre id).

f) Choose whether you want to take all the rows from the top table (and matching ones from the second), as here, or whether you want to use an inner join. If you choose an inner join you will only get films and genres where the genre id number appears in both of the tables. Because the genre ids match for this case, it doesn't matter which you choose!



Here's a summary of what the different options would give for our example:

Choice	What it would show
Left Outer	All of the genres, and any films whose genre id matched any of these
Right Outer	All of the films, and any genres whose genre id matched any of these
Full Outer	All of the genres and all of the films, whether or not they had matching genre ids
Inner	Only those films and genres whose genre ids appeared in both tables
Left Anti	Only those genres which don't have any films with the corresponding ids
Right Anti	Only those films which don't have any genres with the corresponding ids

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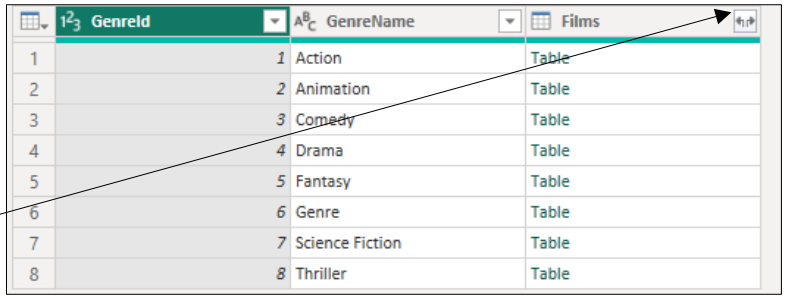
Flattening the Combined Table

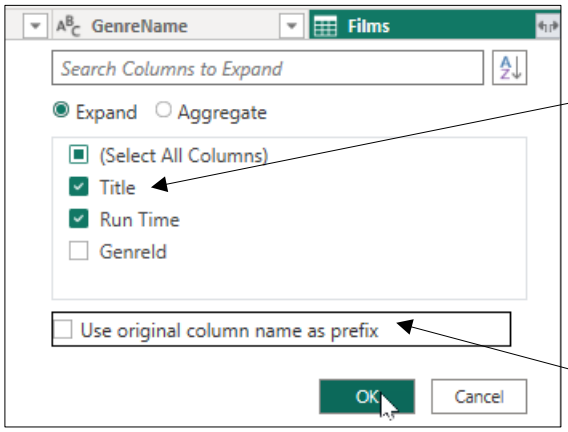
Power BI shows for each row of the first table all of the rows for the second table:



	Genreld	GenreName	Films
1	1	Action	Table
2	2	Animation	Table
3	3	Comedy	Table
4	4	Drama	Table
5	5	Fantasy	Table
6	6	Genre	Table
7	7	Science Fiction	Table
8	8	Thriller	Table

Click on this symbol to bring in the rows from the second table.

You can now choose what to display for each film (ie for each matching row):

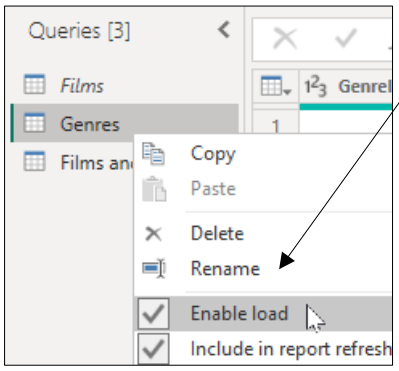


a) Choose which columns you want to display (there's no point including the **Genreld** as we already have this in the genre table, and by definition of how the join was constructed this **Genreld** will have the same value for each film).

b) You don't want to prefix each column with the original table's name (it's long enough already!).

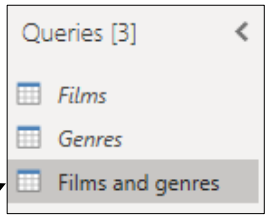
Final Touches

To complete the data extraction, mark the original tables as not to be loaded, and rename the merged query:

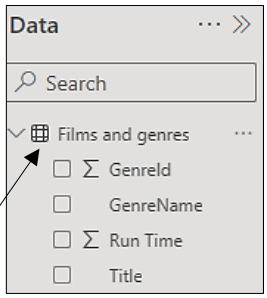


a) Click on each of the two original tables and untick this option to prevent Power BI loading their data.

b) Rename the final (merged) query to make its name more meaningful.



c) In Power BI you will get a single table of data imported.



1.4 Fuzzy Merging

Wise Owl are proud to have the original electronic copy of the first day's school register from Hogwarts, but unfortunately it contains lots of mistyped Hogwarts house names:

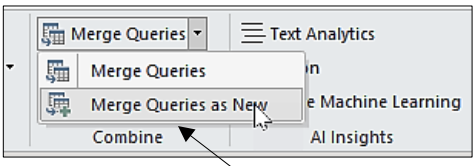
	A	B	C
1	First name	Last name	Hogwarts House
2	Hermione	Granger	Griffindor
3	Harry	Potter	Gryffindor
4	Ron	Weasley	Gryfindor
5	Draco	Malfoy	Slitherin
6	Millicent	Bulstrode	SLYTHERIN
7	Vincent	Crabbe	Slitherrin
8	Gregory	Goyle	Slytherin
9	Neville	Longbottom	gryffindor
10	Myrtle	Warren	ravenclore
11	Cho	Chang	Ravenclaw
12	Luna	Lovegood	Ravanclore
13	Padma	Patil	Ravenclaw
14	Hannah	Abbott	Hufflepuff
15	Cedric	Diggory	HUFFLEPUFF
16	Ernie	Macmillan	Huffelpuff

Although the students had already been sorted into their different houses, it appears they didn't all know how to spell them (even Hermione spelt **Gryffindor** wrongly).

Despite this, we'd like to get a merged table showing student's names and their head of house.

	A	B	C	D	E	
1	House	Emblem	Colours	House ghost	Head	Found
2	Gryffindor	Lion	Scarlet and gold	Nearly headless Nick	Minerva McGonagall	Godric
3	Slytherin	Serpent	Green and silver	The Bloody Baron	Severus Snape	Salaza
4	Hufflepuff	Badger	Yellow and black	The fat friar	Pomona Sprout	Helga
5	Ravenclaw	Eagle	Blue and bronze	The Grey Lady	Filius Flitwick	Rower

To do this, choose *fuzzy merging*:

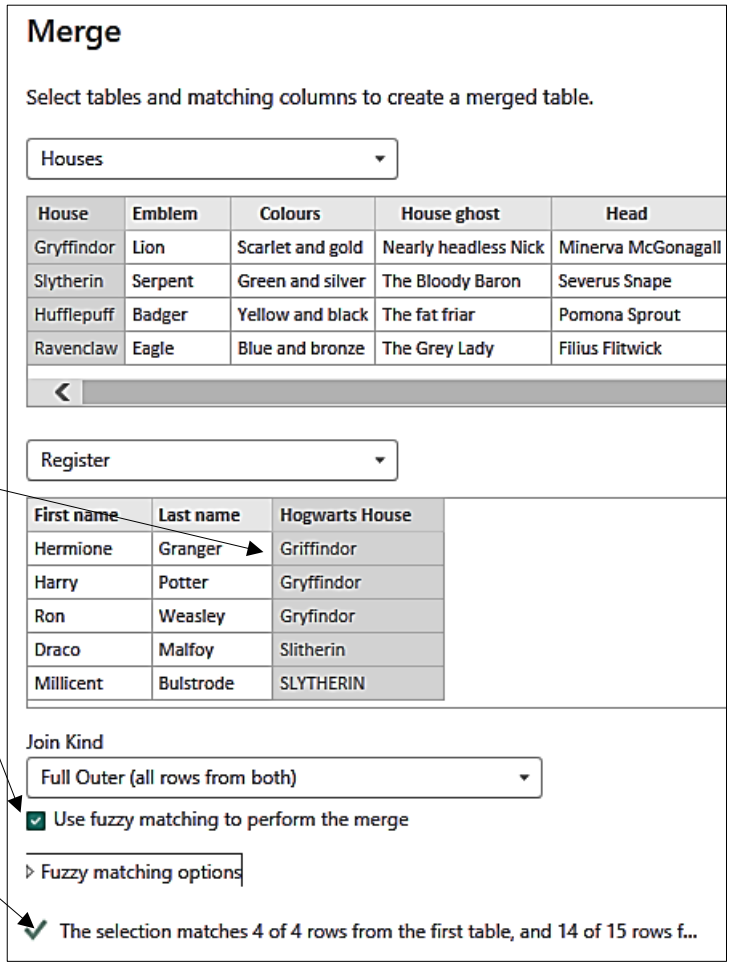


a) Choose to merge two tables together to create a new one, as in the previous section of this chapter.

b) Choose to match the list of houses with the list of pupils by their common field (the Hogwarts house name).

c) Tell Power BI to be more relaxed about what constitutes a match between two different values.

d) Query Editor is showing that we will get 14 of the 15 students. The exception is Luna Lovegood (**Ravanclore** and **Ravenclaw** are not sufficiently close by default, although see overleaf for ways to get round this).

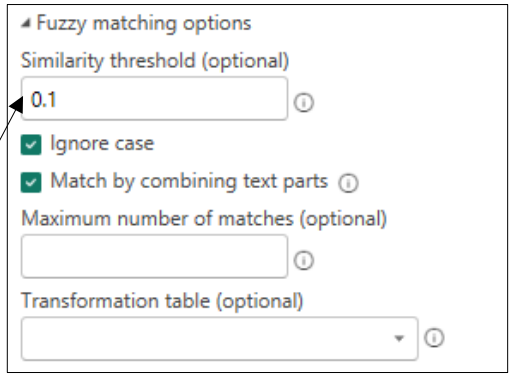


	House	Head	First name	Last name
1	Gryffindor	Minerva McGonagall	Harry	Potter
2	Gryffindor	Minerva McGonagall	Neville	Longbottom
3	Gryffindor	Minerva McGonagall	Hermione	Granger
4	Gryffindor	Minerva McGonagall	Ron	Weasley

e) After suitable further transforms you can derive a list showing who is in which house.

Setting a Similarity Threshold

You can set a *similarity threshold* to determine how fussy Query Editor needs to be about matching values: this can be any number from 1 (only exact matches accepted) down to 0 (anything goes).



In practice this threshold doesn't seem that sensitive. For our data anything between 0.0 and 0.8 misses out the match between **Ravanclore** and **Ravenclaw**, while taking the threshold up to 0.9 only adds one more mismatch (Myrtle Warren's **Ravenclore** no longer matches **Ravenclaw**).

Enforcing Case Sensitivity

If you untick the **Ignore case** box above, you get this:

	House	Head	First name	Last name
1	Gryffindor	Minerva McGonagall	Harry	Potter
2	Gryffindor	Minerva McGonagall	Neville	Longbottom
3	Gryffindor	Minerva McGonagall	Hermione	Granger
4	Gryffindor	Minerva McGonagall	Ron	Weasley
5	Slytherin	Severus Snape	Gregory	Goyle
6	Slytherin	Severus Snape	Draco	Malfoy
7	Slytherin	Severus Snape	Vincent	Crabbe
8	Hufflepuff	Pomona Sprout	Hannah	Abbott
9	Hufflepuff	Pomona Sprout	Ernie	Macmillan
10	Ravenclaw	Filius Flitwick	Cho	Chang
11	Ravenclaw	Filius Flitwick	Padma	Patil
12	null		null Millicent	Bulstrode
13	null		null Myrtle	Warren
14	null		null Luna	Lovegood
15	null		null Cedric	Diggory

Power Query will only now match values up if they have almost the same case and almost the same spelling: these are the people who now slip through this net.

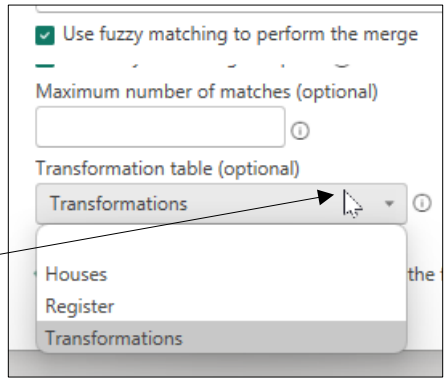
Using a Transformation Table

The safest way to ensure that your columns match up is to create a *transformation table*:

From	To
Gryffindor	Griffindor
Gryffindor	Gryfindor
Hufflepuff	Huffelpuff
Ravenclaw	Ravanclore
Ravenclaw	ravenclore
Slytherin	Slitherin
Slytherin	Slitherrin

a) Your transformation table must have a **From** and a **To** column.

b) Click on this arrow (it can be awkward scrolling to reach it) and choose the table containing acceptable mappings of (in this case) house names.



The transformation table above would ensure that we would get all 15 students in the final query.

CHAPTER 2 - MANIPULATION TRANSFORMS

2.1 Unpivoting Data

The **Unpivot** transform in **Query Editor** allows you to turn a two-dimensional matrix of data into a table (which you can then use for charting or other purposes):

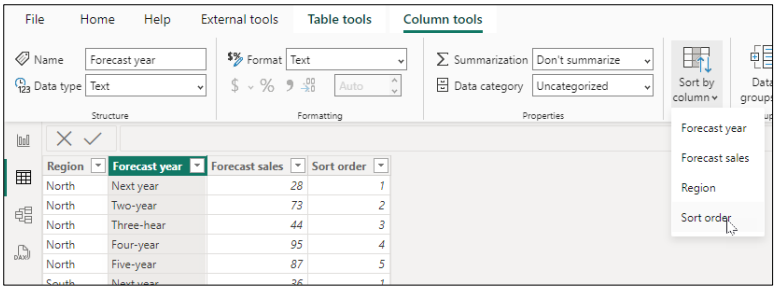
	A	B	C	D	E	F	G
1							
2			5-year forecast				
3			*Next year*	*Two-year*	*Three-year*	*Four-year*	*Five-year*
4		*North*	28	73	44	95	87
5		*South*	36	19	93	82	58
6		*East*	511	63	48	72	65
7		*West*	15	55	22	87	11

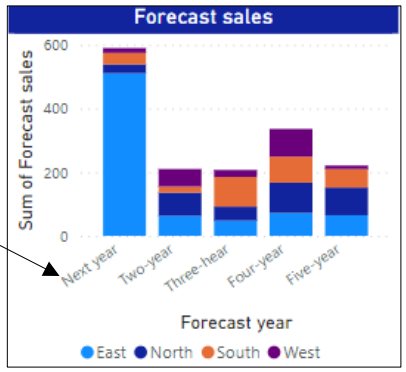
A typical data source – inconveniently, the data has already been pivoted.

Region	Forecast year	Forecast sales
North	Next year	28
North	Two-year	73
North	Three-hear	44
North	Four-year	95
North	Five-year	87
South	Next year	36

Our task is to get a table containing the forecast year and forecast sales for each region.

You could then use this unpivoted data to create visuals like this. Note that getting the years to appear in this order isn't easy (and isn't shown in this chapter), but for the curious here's a hint for one way to proceed:

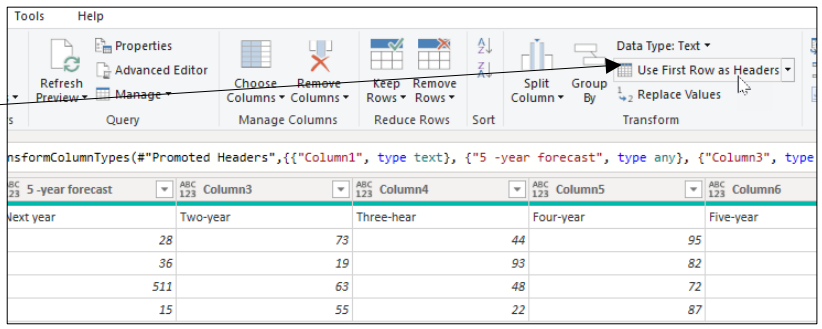




Loading the Original Data

The first thing to do is to load up the raw data:

a) After loading the data, for this example you'll need to use the first row as headers (you may also need to remove some top rows first if you have a gap at the top of your worksheet).



b) We've renamed the first column from **Column1** to **Region**.

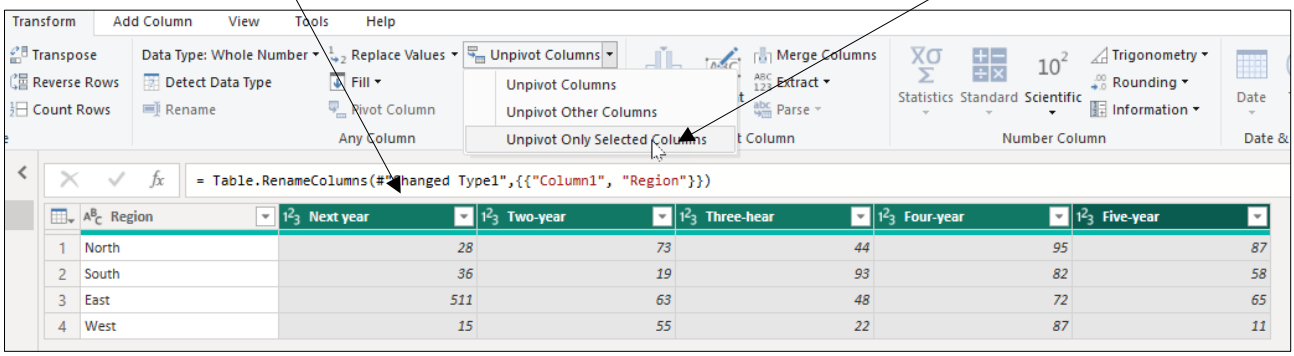
Region	Next year	Two-year	Three-hear	Four-year	Five-year
North	28	73	44	95	87
South	36	19	93	82	58

Unpivoting the Data

Choose to unpivot the columns going across the spreadsheet:

a) Select the columns containing the numbers going across the columns of your source file.

b) Choose to unpivot just these selected columns using this option on the **Transform** tab of the ribbon.



Renaming your Columns

You could now rename the columns created, to give them more sensible names:

	Region	Attribute	Value
1	North	Next year	28
2	North	Two-year	73
3	North	Three-hear	44
4	North	Four-year	95
5	North	Five-year	87
6	South	Next year	36

Initially Power BI creates two columns called **Attribute** and **Value**.

	Region	Forecast year	Forecast sales
1	North	Next year	28
2	North	Two-year	73
3	North	Three-hear	44
4	North	Four-year	95
5	North	Five-year	87
6	South	Next year	36

Here we've renamed these to **Forecast year** and **Forecast sales** respectively.

Wise Owl's Hint

A final thought: as an alternative to all of this you could always go back to the original data provider and ask if you can import the source data, rather than the pivoted Excel final forecasts ...

2.2 Grouping Data

It's easy in Query Editor to group data by more than one column. Here's the example we'll use:

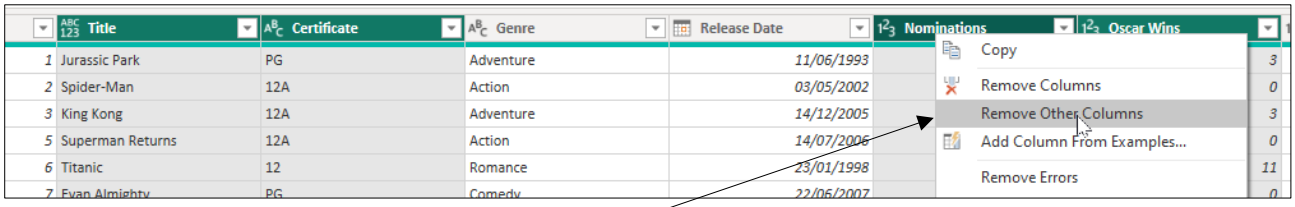
	ID	Title	Certificate	Genre	Release Date	Run Time
1	1	Jurassic Park	PG	Adventure	11/06/1993	126
2	2	Spider-Man	12A	Action	03/05/2002	121
3	3	King Kong	12A	Adventure	14/12/2005	187
4	5	Superman Returns	12A	Action	14/07/2006	154
5	6	Titanic	12	Romance	23/01/1998	194
6	7	Evan Almighty	PG	Comedy	22/06/2007	96
7	8	Waterworld	12	Adventure	28/07/1995	135

	Certificate	Number of films	Average Oscar Wins	Average nominations
1	PG	263	0.75	2.16
2	12A	180	0.37	1.27
3	12	67	0.51	1.6
4	U	141	0.98	3.16
5	15	349	0.5	1.7
6	18	189	0.38	1.41
7	Unknown	11	0	0

For this example we will group 1,200 films by certificate, showing for each certificate the number of films, average number of Oscars won and average number of Oscar nominations. Note that for the above results table we've also applied rounding transforms to get two decimal places for the averages.

Optional Step – Remove Excess Columns

Since you're not going to be using any columns but the film certificate, title, nominations and Oscar wins, it may make sense to remove the additional columns:



Select the columns that you want to keep, and right-click to remove all of the other columns in the query.

Wise Owl's Hint

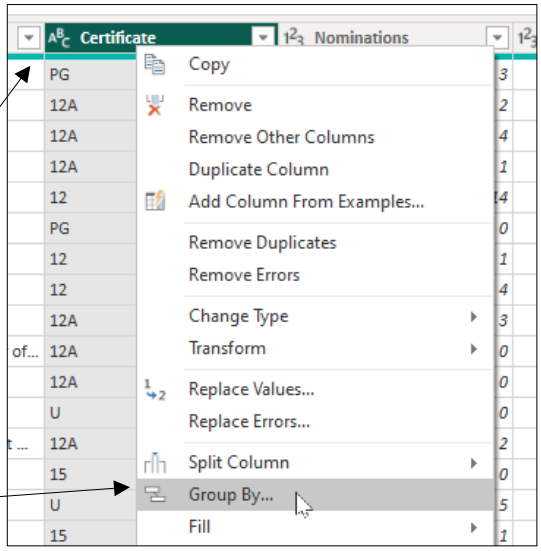
You don't need to do this: when you group by one set of columns and aggregate others, any columns not referenced in either the grouping or the aggregation will automatically be excluded from your query results.

Starting Grouping

Select the column or columns that you want to group by and choose to group them:

a) Select the column or columns you want to group by (here we're just aggregating data for each certificate).

b) Right-click on the selected column(s) and choose **Group By…**.



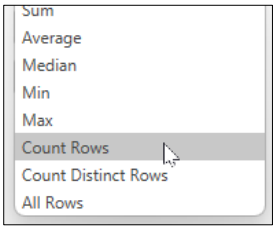
Specifying How to Group Data

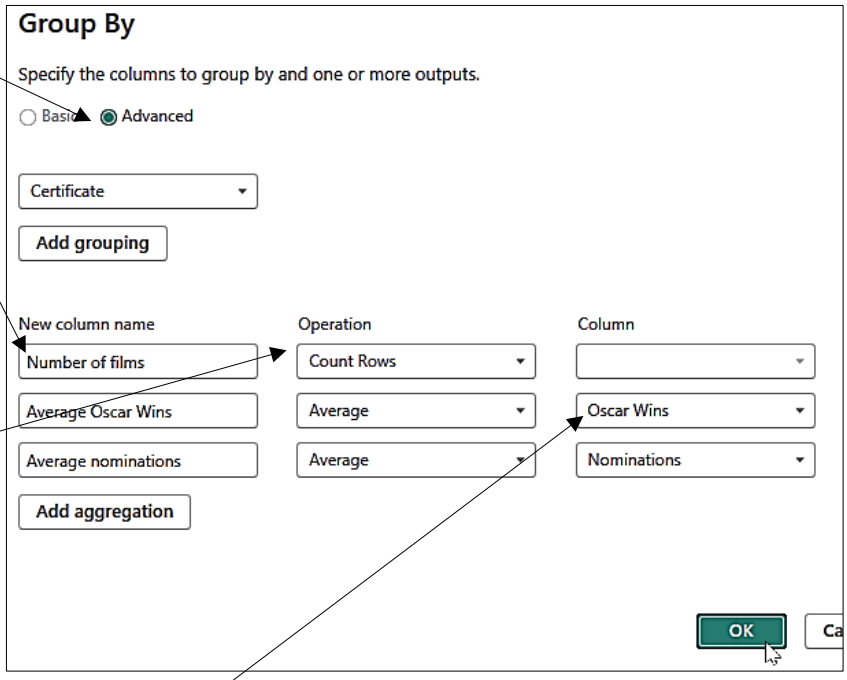
If you're just showing a single statistic you can use basic grouping, but for most cases you'll want **Advanced:**

a) Choose to set advanced grouping.

b) Type in a name for the first statistic you're showing.

c) Choose whether you're counting the number of films for this genre, or choosing some other statistic:





d) Unless you're counting rows you'll need to choose which (numerical) column you're aggregating for this statistic.

For each statistic that you want to show click on the Add aggregation button to add it and then repeat steps **b)** to **d)** above.

2.3 Pivoting Columns

You can pivot columns in Power BI, but should consider first whether you really need to!

Remember Matrices

If you want to create a pivot table in Power BI, the easiest and best way to do it is in a matrix:

Title	Release Date	Certificate	Run Time	Genre	Director
Jurassic Park	11/06/1993	PG	126	Adventure	Steven Spiel
Spider-Man	03/05/2002	12A	121	Action	Sam Raimi
King Kong	14/12/2005	12A	187	Adventure	Peter Jackso
Superman Returns	14/07/2006	12A	154	Action	Bryan Singer
Titanic	23/01/1998	12	194	Romance	James Came
Evan Almighty	22/06/2007	PG	96	Comedy	Tom Shadya

Suppose that you start with an Excel worksheet of films, and you want to show the average run time by genre and certificate. You could do this using an Excel pivot table or Power BI matrix as shown below.

	A	B	C	D	E
1					
2					
3	Average of Run Time				
4		12	15	18	12A
5	Action	125.8	112.0	110.2	127.0
6	Adventure	124.0	132.9	92.7	137.3
7	Animation		88.0		
8	Awful				121.2
9	Biography		130.2	160.7	132.4
10	Comedy	103.1	106.7	103.8	108.4
11	Crime	117.0	118.3	128.2	120.5

An Excel pivot table showing average run time by certificate and genre …

… and the same thing using a Power BI matrix.

Average run times					
Genre	12	12A	15	18	PG
Action	125.75	127.04	111.98	110.17	113
Adventure	124.00	137.27	132.92	92.71	113
Animation			88.00		95
Awful		121.20			
Biography		132.38	130.22	160.67	173
Comedy	103.14	108.38	106.69	103.80	103
Crime	117.00	120.50	118.30	128.23	106
Disaster		132.50	165.00		118
Documentary	89.50	98.00			
Drama	126.17	129.67	129.18	124.95	127

Pivoting: Creating the Necessary New Columns

Suppose that you want to pivot sales data by the quarter in which each sale occurred (overleaf is one example of why you might want to do this). To do this, first create the columns you need:

Custom Column

Add a column that is computed from the

New column name

SaleQuarter

Custom column formula

```
= Date.QuarterOfYear([SaleDate])
```

Create a custom column giving the quarter for each sale …

… and another giving the year for each sale.

Custom Column

Add a column that is computed from th

New column name

SaleYear

Custom column formula

```
= Date.Year([SaleDate])
```

Hide any other columns apart from these two and the quantity:

	SaleQuarter	SaleYear	Quantity
1	4	2017	1
2	4	2017	1
3	4	2017	1
4	4	2017	1
5	4	2017	1
6	4	2017	1

We're now ready to pivot by this column!

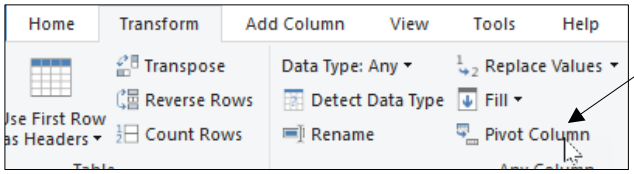
Pivoting by Columns

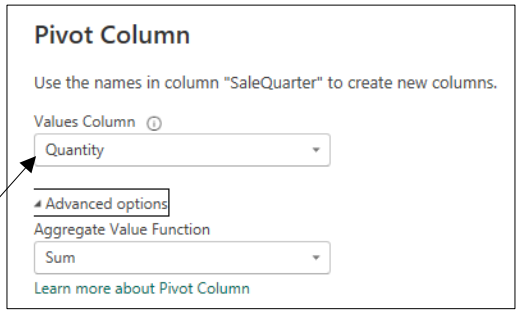
To pivot by a column, choose this transform:

	SaleQuarter	SaleYear	Quantity
1	4	2017	1
2	4	2017	1
3	4	2017	1
4	4	2017	1
5	4	2017	1

a) Select the column you want to pivot by.

b) On the **Transform** tab, choose to pivot by this column.





c) Choose what column you want to aggregate and (in the advanced options) how you want to aggregate it. Here we want to show the total quantity for each quarter.

	SaleYear	4	1	2	3
1	2017	8	null	null	null
2	2018	3035	272	1182	2703
3	2019	2238	5218	2636	2488
4	2020	2801	2215	2198	3247
5	2021	3820	3550	3403	3564
6	2022	3831	3921	4766	4993
7	2023	null	5091	6250	985

d) Power Query creates a new column for each value in the **SaleQuarter** column.

Using our Pivoted Columns

Why would you want to do this? As one example, you could now divide sales into odd and even quarters:

```
1 Even quarters = [2] + [4]
```

SaleYear	1	2	3	4	Odd quarters	Even quarters
2017				8		8
2018	272	1182	2703	3035	2975	4217
2019	5218	2636	2488	2238	7706	4874
2020	2215	2198	3247	2801	5462	4999
2021	3550	3403	3564	3820	7114	7223
2022	3921	4766	4993	3831	8914	8597
2023	5091	6250	985		6076	6250

This column sums quarters 2 and 4 (although you could have done this in a fair few other, simple ways!).

Wise Owl's Hint

Like almost every other example you can think of to do with pivot columns, this would be better solved with a matrix and a bit of DAX!

2.4 Transposing Data: Replacing Text

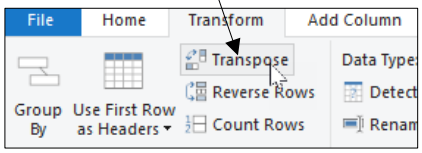
Suppose that you have a set of data, and want to replace some text within certain rows:

	A	B	C	D	E
1	Date	Course	Delegate	Feedback	Rating
2	11-Mar	SQL	Bill Smith	Wise Owl were OK, I guess.	6
3	14-Mar	Power BI	Tanya Brown	Another fantastic course from Wise Owl.	9
4	18-Mar	Excel	Jo Jones	This Wise Owl course was superb.	10
5	29-Mar	Excel	Salim Khan	Wise Owl are rubbish - regret booking course.	2
6	04-Apr	Power BI	Dave Robinson	My first Wise Owl course, but not my last Wise Owl one.	8
7	06-Apr	Power Automate	Alec Fox	A good course.	7
8	08-Apr	SQL	Wendy Tang	Would I book another Wise Owl course? Not sure.	6

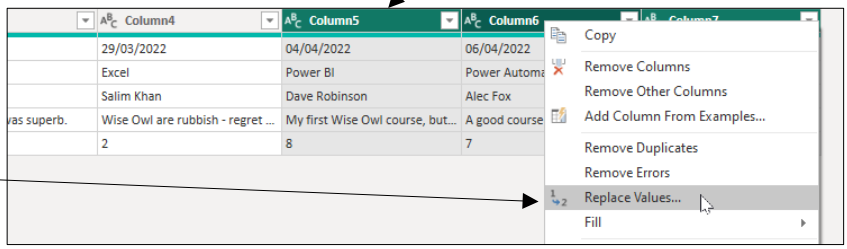
For this example assume that Wise Owl changed our name on 1st April to **Silly Wren**. We want to change the company name in feedback for courses from this date onwards.

You can't replace text within selected rows, but you can within columns. Here's an outline of how to do this:

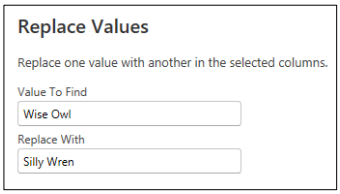
a) Choose this button on the **Transform** tab of the ribbon to transpose your table.

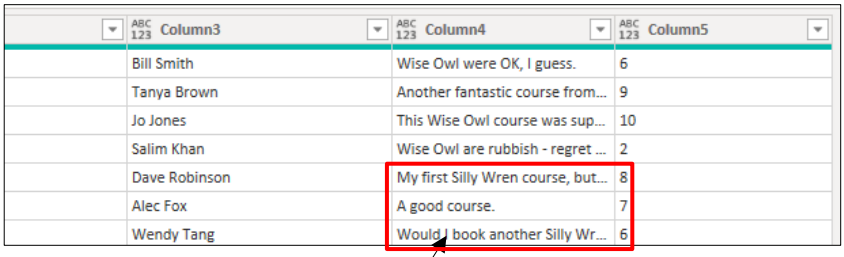


b) Select the columns on or after 1st April 2022 within which you want to replace text (making sure that they have the correct column type – see hint below).



c) Right-click to replace all values of **Wise Owl** in the selected columns:





d) Transpose the data back again to get the required results in rows after April 1st only, with your changes made.

Wise Owl's Hint

Be sure to convert the type of any columns to text before replacing any values in them, otherwise this sequence of transforms will have no effect.

2.5 Transposing Data: Joining Rows Together

There's no easy way to join rows together in Power BI, but you can join columns instead!

	A	B	C
1	Q1 - News	Q2 - Pets	Q3 - Washing
2	Where do you get your news?	What pets do you have?	What shower soup do you us
3	A - BBC	A - Cat(s)	A - Bar of soap
4	B - TV	B - Dog(s)	B - Hanging tube
5	C - Other	C - Both	C - Bottle
6		D - Neither	D - I don't wash
7	A	B	B
8	C	D	B
9	B	C	A

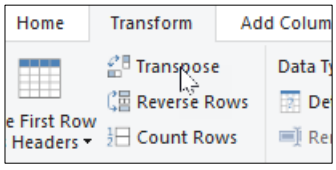
In this (poorly-designed) questionnaire, the titles for each question spill over several columns. How can we join them together? One way is to transpose the data, join what will then be columns 1-6 together and then transpose the columns back into rows.

Step 1 – Transposing the Data

To execute this idea, start by transposing your data:

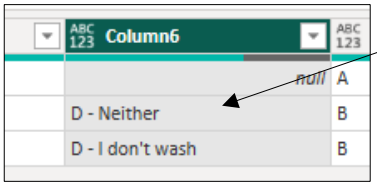
	Column1	Column2	Column3
1	Q1 - News	Q2 - Pets	Q3 - Washing
2	Where do you get your news?	What pets do you have?	What shower soup do you use?
3	A - BBC	A - Cat(s)	A - Bar of soap
4	B - TV	B - Dog(s)	B - Hanging tube
5	C - Other	C - Both	C - Bottle
6	*null*	D - Neither	D - I don't wash
7	A	B	B
8	C	D	B
9	B	C	A

a) Select the loaded query and from the **Transform** tab choose to transpose it:



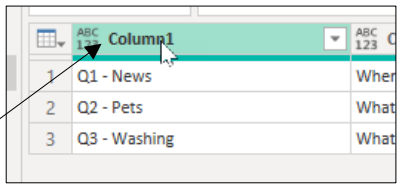
Step 2 – Reversing your Columns

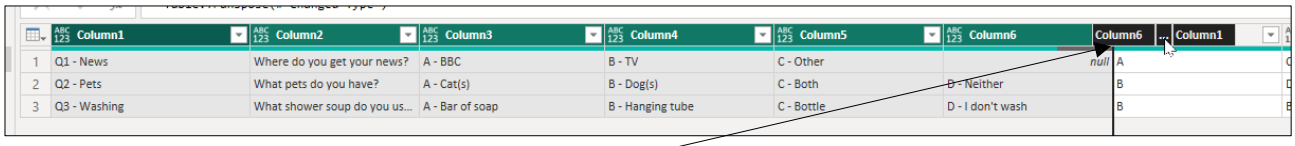
You now want to merge the first 6 columns to construct your questions. However for some reason merging works from right to left, so you need to reverse the column order first:



a) Select the last of the columns you want to merge.

b) Hold down the Shift key and click on the first column to be merged.

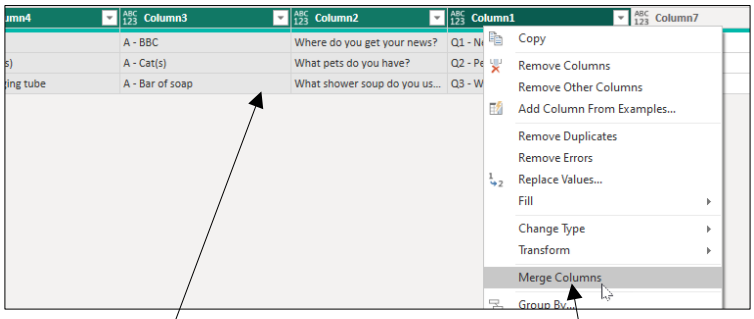


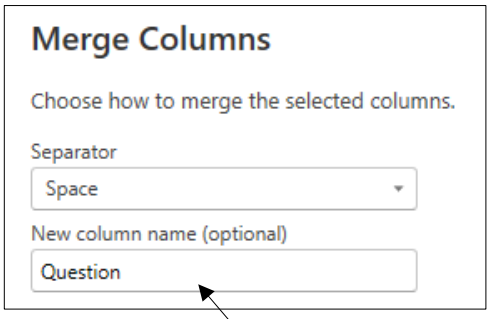


c) You now have the 6 columns selected. Click and drag the first column over to the end of the columns as shown: this will reverse the column order.

Step 3 – Merging your Columns

You can now select the columns you want to combine, and merge them:





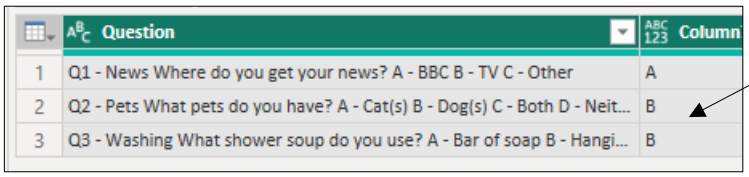
a) Select the (now reversed) columns that you want to combine.

b) Right-click and choose this option to merge the columns together.

c) Choose to merge the columns (here we've inserted a space between each).

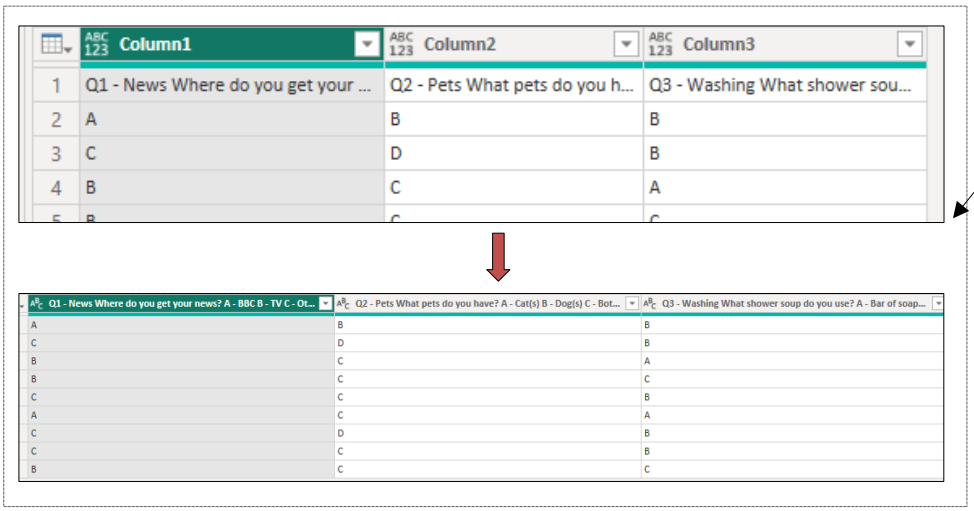
Step 4 – Transposing Back

Finally, you can transpose your data back again:



	Question	Column
1	Q1 - News Where do you get your news? A - BBC B - TV C - Other	A
2	Q2 - Pets What pets do you have? A - Cat(s) B - Dog(s) C - Both D - Neit...	B
3	Q3 - Washing What shower soup do you use? A - Bar of soap B - Hangi...	B

c) You now have each question in one column, and can transpose the data back again.



	Column1	Column2	Column3
1	Q1 - News Where do you get your ...	Q2 - Pets What pets do you h...	Q3 - Washing What shower sou...
2	A	B	B
3	C	D	B
4	B	C	A
5	B	C	C

Q1 - News Where do you get your news? A - BBC B - TV C - Ot...	Q2 - Pets What pets do you have? A - Cat(s) B - Dog(s) C - Bot...	Q3 - Washing What shower soup do you use? A - Bar of soap...
A	B	B
C	D	B
B	C	A
B	C	C
C	C	B
A	C	A
C	D	B
C	C	B
B	C	C

d) You'll now need to promote the first row of data to be column headers to get your final questionnaire, with each question's text occupying just the title row.

What we do!

		Basic training	Advanced training	Systems / consultancy
Office	Microsoft Excel	✓	✓	✓
	VBA macros	✓	✓	✓
	Office Scripts	✓		
	Microsoft Access			✓
Power BI, etc	Power BI and DAX	✓	✓	✓
	Power Apps	✓		
	Power Automate (both)	✓	✓	
SQL Server	SQL	✓	✓	✓
	Reporting Services	✓	✓	✓
	Report Builder	✓	✓	✓
	Integration Services	✓	✓	✓
	Analysis Services	✓		
Coding and AI	Visual C#	✓	✓	✓
	VB programming			✓
	AI tools	✓		
	Python	✓	✓	✓

Wise Owl Training