Advanced Power BI (Data)

Sample manual - first two chapters

Manual 1238 - 159 pages –

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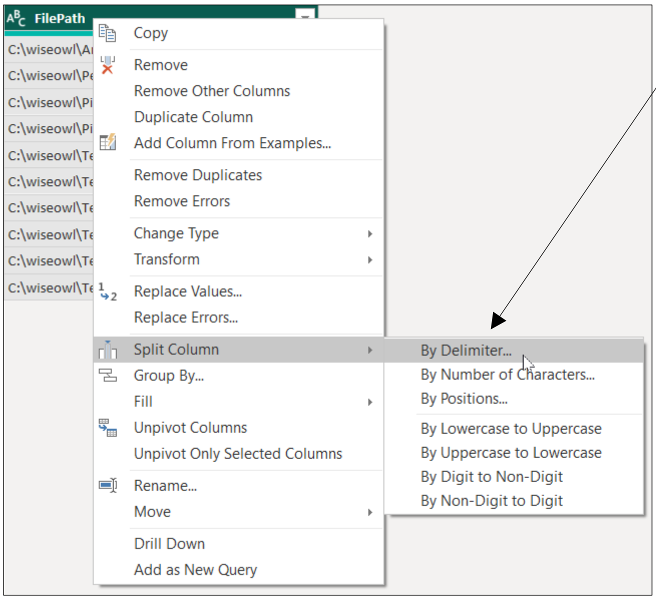
CHAPTER 1 - MANIPULATING COLUMNS

1.1 Splitting Columns

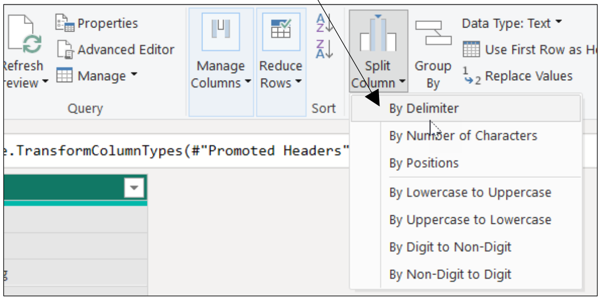
Accessing Split Column Menu

You can split columns using either the right mouse button menu or the ribbon:



Either right-click on a column that you want to split and choose one of these options …

… or select the column, then choose one of the options from the **Home** tab of the Query Editor ribbon.



The menu options are as follows:

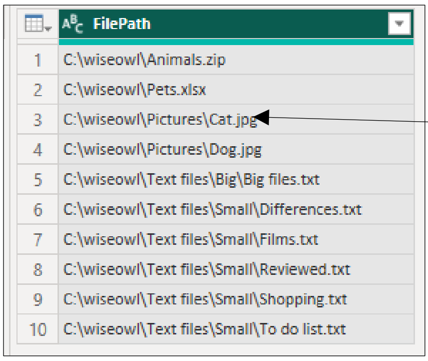
Option	What it does
By Delimiter…	Splits a string of text when Query Editor encounters a particular character.
By Number of Characters…	Splits a string of text after a given number of characters.
By Position…	Splits a string of text at certain pre-defined character positions.
By Lowercase to Uppercase *By Uppercase to Lowercase*	Splits a string of text whenever the case changes.
By Digit to Non-Digit *By Non-Digit to Digit*	Splits a string of text whenever it changes from numbers to letters or from letters to numbers.

Wise Owl's Hint

All of these options are shown – in this order – in the following pages, along with a couple of other column splitting methods as a bonus!

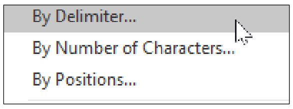
Splitting by Delimiter

For the example below, you might want to extract the file name or file path, so you'd probably split at the last \ character:



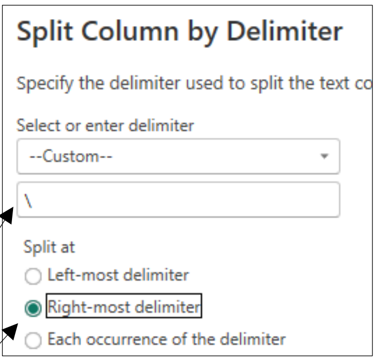
	FilePath
1	C:\wiseowl\Animals.zip
2	C:\wiseowl\Pets.xlsx
3	C:\wiseowl\Pictures\Cat.jpg
4	C:\wiseowl\Pictures\Dog.jpg
5	C:\wiseowl\Text files\Big\Big files.txt
6	C:\wiseowl\Text files\Small\Differences.txt
7	C:\wiseowl\Text files\Small\Films.txt
8	C:\wiseowl\Text files\Small\Reviewed.txt
9	C:\wiseowl\Text files\Small\Shopping.txt
10	C:\wiseowl\Text files\Small\To do list.txt

a) Select the column you want to split by, and choose to split by delimiter:



b) Choose a character to split by.

c) Choose the type of delimiter (see below for examples).



Split Column by Delimiter

Specify the delimiter used to split the text co

Select or enter delimiter

--Custom--

\

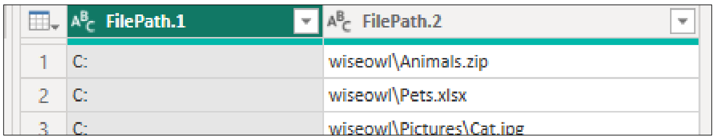
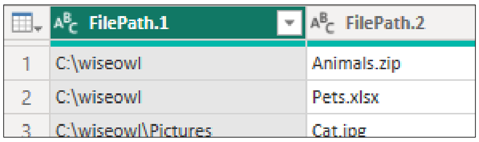
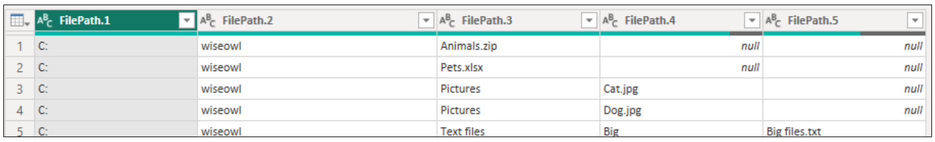
Split at

○ Left-most delimiter

● Right-most delimiter

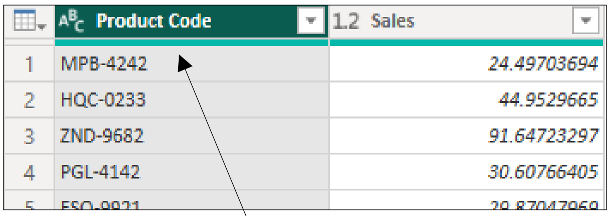
○ Each occurrence of the delimiter

Here are the first couple of rows you'd get for each of the 3 **Split at** options above:

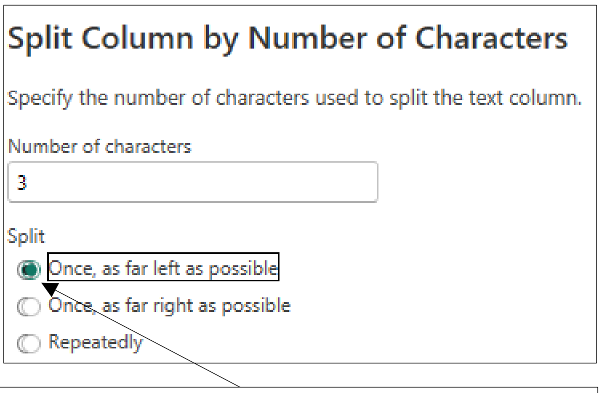
Option	Results	Notes
Left-most delimiter	 FilePath.1 FilePath.2 1 C: wiseowl\Animals.zip 2 C: wiseowl\Pets.xlsx 3 C: wiseowl\Pictures\Cat.jpg	Split by the first backslash
Right-most delimiter	 FilePath.1 FilePath.2 1 C:\wiseowl Animals.zip 2 C:\wiseowl Pets.xlsx 3 C:\wiseowl\Pictures Cat.jpg	Split by the last backslash
Each occurrence of the delimiter	 FilePath.1 FilePath.2 FilePath.3 FilePath.4 FilePath.5 1 C: wiseowl Animals.zip null null 2 C: wiseowl Pets.xlsx null null 3 C: wiseowl Pictures Cat.jpg null 4 C: wiseowl Pictures Dog.jpg null 5 C: wiseowl Text files Big Big files.txt	Split by every backslash

Splitting by Number of Characters

If you know how many characters you want to extract, you can use this method:



	Product Code	Sales
1	MPB-4242	24.49703694
2	HQC-0233	44.9529665
3	ZND-9682	91.64723297
4	PGL-4142	30.60766405
5	FSO-0921	29.87047969



Split Column by Number of Characters

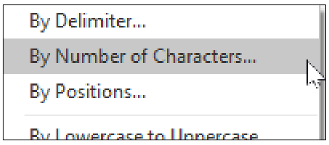
Specify the number of characters used to split the text column.

Number of characters: 3

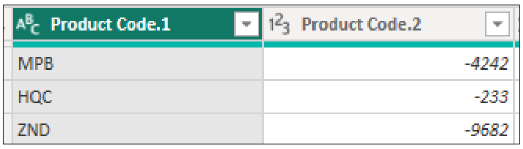
Split

● Once, as far left as possible
○ Once, as far right as possible
○ Repeatedly

a) Select the column that you want to split, and choose to split it by the number of characters:



b) Choose to take the first N characters, the last N characters or a series of N-character chunks. To get the first 3 letters in this case we would choose the first option (**Once, as far left as possible**).



Product Code.1	Product Code.2
MPB	-4242
HQC	-233
ZND	-9682

c) For this example Query Editor would create these two columns, which you could then rename.

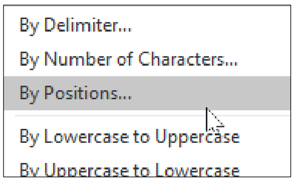
Wise Owl's Hint

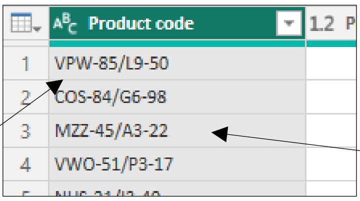
For the above example, you could instead split the product code by a delimiter (in this case, the - character) to get the letters and numbers separately.

Splitting by Positions

Use this method to extract a substring of text:

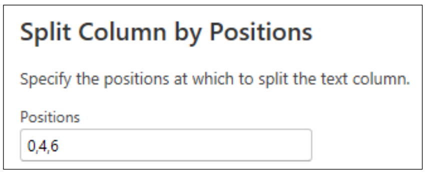
a) Choose this option to split this column by positions:


By Delimiter...
By Number of Characters...
By Positions...
By Lowercase to Uppercase
By Uppercase to Lowercase



	Product code	1.2 P
1	VPW-85/L9-50	
2	COS-84/G6-98	
3	MZZ-45/A3-22	
4	VWO-51/P3-17	
5	NHS-21/J3-49	

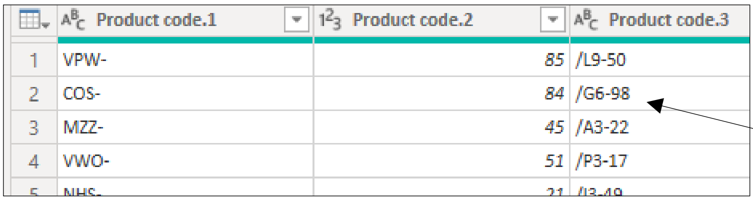
b) To extract the two-digit number after the first dash from each product code you could use this transform:



Split Column by Positions

Specify the positions at which to split the text column.

Positions: 0,4,6



	Product code.1	Product code.2	Product code.3
1	VPW-	85	/L9-50
2	COS-	84	/G6-98
3	MZZ-	45	/A3-22
4	VWO-	51	/P3-17
5	NHS-	21	/J3-49

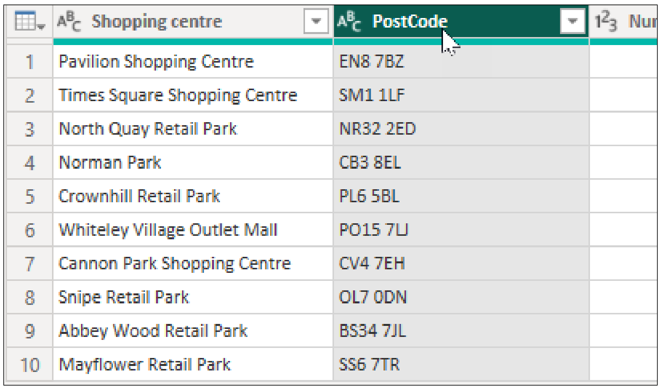
c) This would give these 3 columns (everything from character 0 to 3, 4 to 5 and 6 onwards).

Wise Owl's Hint

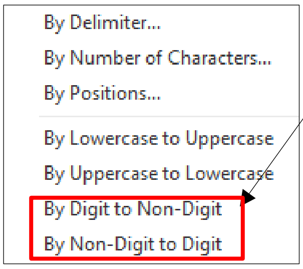
*As with most things in Power BI, characters are numbered from 0, not 1. To omit the first column you could just put **4, 6**, to start extracting characters at position 4.*

Splitting by Change in Case or Character Type

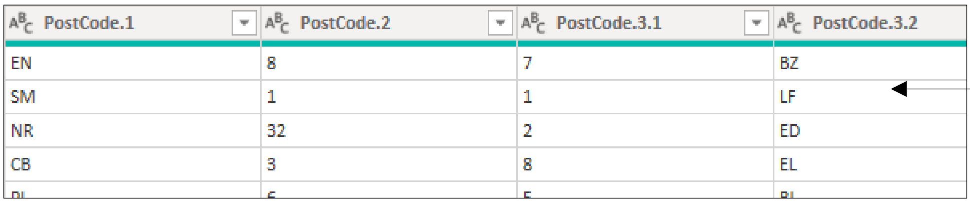
Codes are often divided into a predictable combination of letters and numbers (or of upper and lower case characters). Here's how to split up some well-behaved UK postcodes:



	Shopping centre	PostCode	Nur
1	Pavilion Shopping Centre	EN8 7BZ	
2	Times Square Shopping Centre	SM1 1LF	
3	North Quay Retail Park	NR32 2ED	
4	Norman Park	CB3 8EL	
5	Crownhill Retail Park	PL6 5BL	
6	Whiteley Village Outlet Mall	PO15 7LJ	
7	Cannon Park Shopping Centre	CV4 7EH	
8	Snipe Retail Park	OL7 0DN	
9	Abbey Wood Retail Park	BS34 7JL	
10	Mayflower Retail Park	SS6 7TR	


By Delimiter...
By Number of Characters...
By Positions...
By Lowercase to Uppercase
By Uppercase to Lowercase
By Digit to Non-Digit
By Non-Digit to Digit

By repeated application of these two transforms, for example …

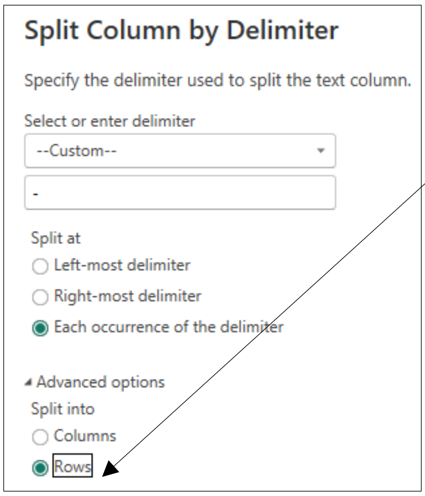


PostCode.1	PostCode.2	PostCode.3.1	PostCode.3.2
EN	8	7	BZ
SM	1	1	LF
NR	32	2	ED
CB	3	8	EL

… you could split each postcode into the letter(s) and number(s) before the space and the letter(s) and number(s) after it.

Splitting into Rows

Sometimes you may want to create one row for each constituent part of a string of text (although it's hard to think of an example!):



Split Column by Delimiter

Specify the delimiter used to split the text column.

Select or enter delimiter

--Custom--

-

Split at

○ Left-most delimiter

○ Right-most delimiter

● Each occurrence of the delimiter

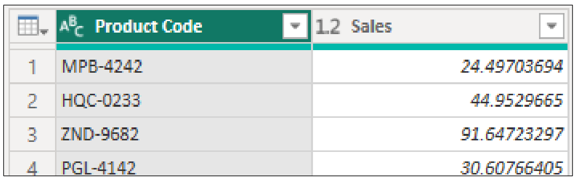
Advanced options

Split into

○ Columns

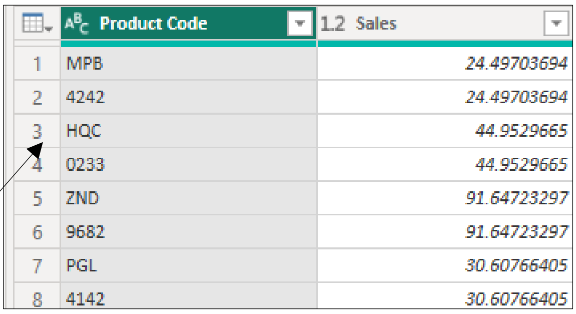
● Rows

If you expand the advanced options when splitting a column by delimiter and choose to generate extra rows, not columns for this example …



	Product Code	Sales
1	MPB-4242	24.49703694
2	HQC-0233	44.9529665
3	ZND-9682	91.64723297
4	PGL-4142	30.60766405

… you'll get multiple rows for each original one (notice that the values of the other fields - **Sales** in this case - will be duplicated for each of these rows, making the data hard to interpret in most cases).

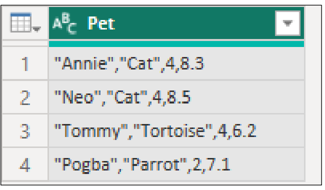


	Product Code	Sales
1	MPB	24.49703694
2	4242	24.49703694
3	HQC	44.9529665
4	0233	44.9529665
5	ZND	91.64723297
6	9682	91.64723297
7	PGL	30.60766405
8	4142	30.60766405

Retaining Quotation Marks

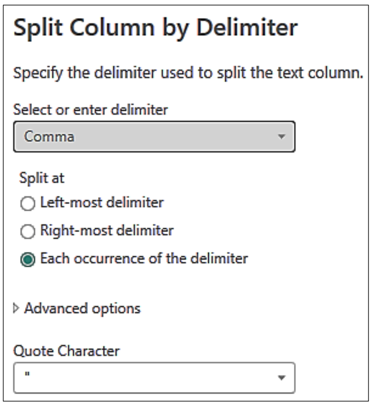
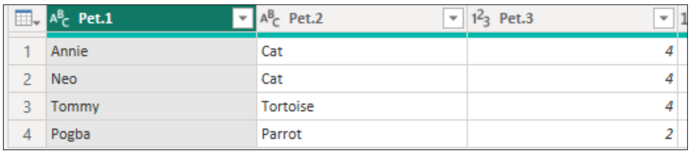
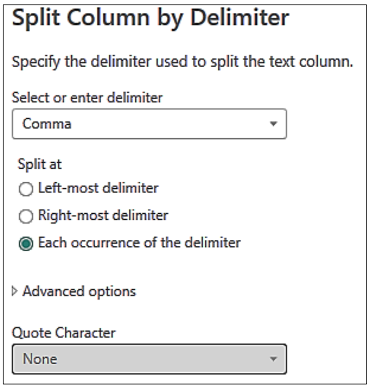
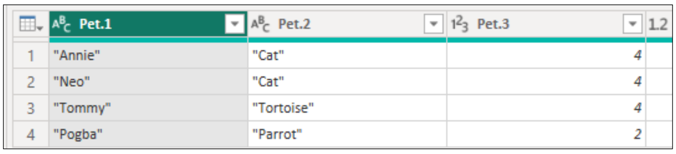
When splitting text, Power Query will automatically remove any quotation marks, but you can turn this option off as shown below.

The examples below use this as an example source query.



	Pet
1	"Annie","Cat",4,8.3
2	"Neo","Cat",4,8.5
3	"Tommy","Tortoise",4,6.2
4	"Pogba","Parrot",2,7.1

Here are the two options:

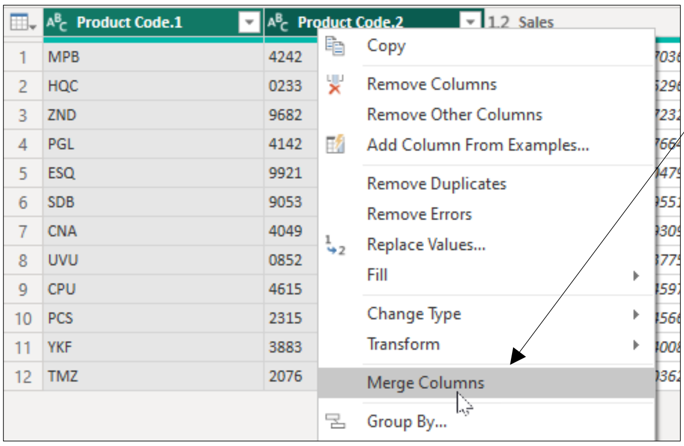
<table>
<tr><th>Option</th><th>Dialog box</th><th>Results for our example</th></tr>
<tr><td><em>Remove quote marks</em></td><td>
Split Column by Delimiter
Specify the delimiter used to split the text column.
Select or enter delimiter
Comma
Split at
○ Left-most delimiter
○ Right-most delimiter
● Each occurrence of the delimiter
Advanced options
Quote Character
"</td><td>
<table>
<tr><th></th><th>Pet.1</th><th>Pet.2</th><th>Pet.3</th><th>1</th></tr>
<tr><td>1</td><td>Annie</td><td>Cat</td><td>4</td><td></td></tr>
<tr><td>2</td><td>Neo</td><td>Cat</td><td>4</td><td></td></tr>
<tr><td>3</td><td>Tommy</td><td>Tortoise</td><td>4</td><td></td></tr>
<tr><td>4</td><td>Pogba</td><td>Parrot</td><td>2</td><td></td></tr>
</table></td></tr>
<tr><td><em>Keep quote marks</em></td><td>
Split Column by Delimiter
Specify the delimiter used to split the text column.
Select or enter delimiter
Comma
Split at
○ Left-most delimiter
○ Right-most delimiter
● Each occurrence of the delimiter
Advanced options
Quote Character
None</td><td>
<table>
<tr><th></th><th>Pet.1</th><th>Pet.2</th><th>Pet.3</th><th>1.2</th></tr>
<tr><td>1</td><td>"Annie"</td><td>"Cat"</td><td>4</td><td></td></tr>
<tr><td>2</td><td>"Neo"</td><td>"Cat"</td><td>4</td><td></td></tr>
<tr><td>3</td><td>"Tommy"</td><td>"Tortoise"</td><td>4</td><td></td></tr>
<tr><td>4</td><td>"Pogba"</td><td>"Parrot"</td><td>2</td><td></td></tr>
</table></td></tr>
</table>

Wise Owl's Hint

There doesn't seem to be any option for automatically removing single quotation marks.

1.2 Merging Columns

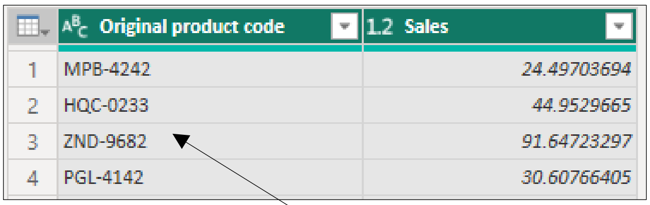
The opposite of splitting columns is *merging* them. Here's an example:



	Product Code.1	Product Code.2
1	MPB	4242
2	HQC	0233
3	ZND	9682
4	PGL	4142
5	ESQ	9921
6	SDB	9053
7	CNA	4049
8	UVU	0852
9	CPU	4615
10	PCS	2315
11	YKF	3883
12	TMZ	2076

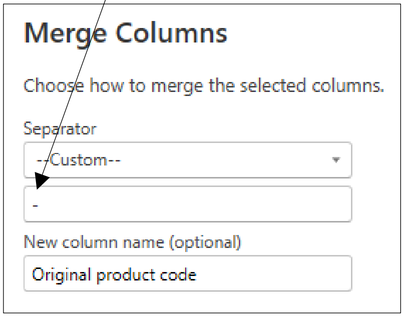
a) Suppose you want to join the parts of the product code that we split earlier in this chapter back together again! To do this, first select the columns that you want to join together, then right-click on them and choose **Merge Columns**.

b) Choose the glue you want to use to join the values together for each row (here we've gone for a dash).



	Original product code	Sales
1	MPB-4242	24.49703694
2	HQC-0233	44.9529665
3	ZND-9682	91.64723297
4	PGL-4142	30.60766405

c) Power Query has combined the columns together into a single column.



Merge Columns

Choose how to merge the selected columns.

Separator: --Custom--

-

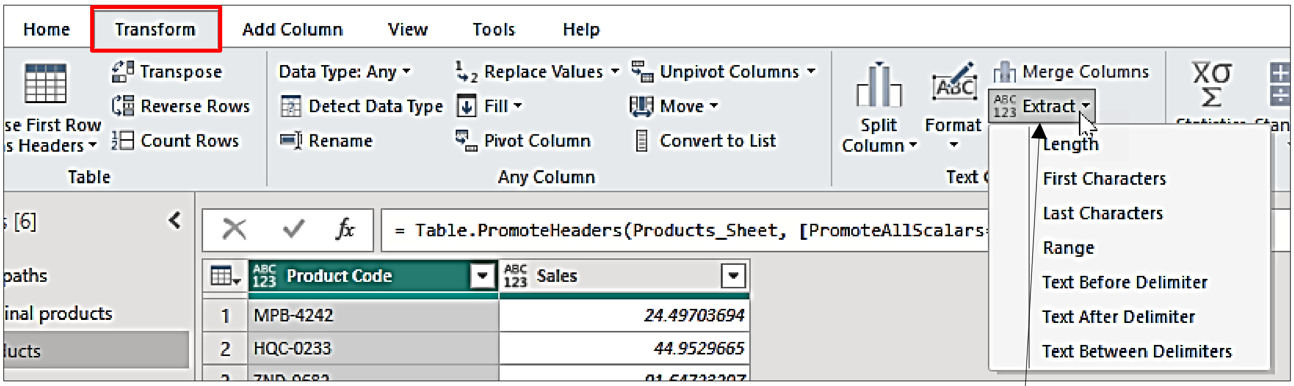
New column name (optional): Original product code

> *You're not limited to just two columns: you can merge as many columns as you like into a single one.*
>
> Wise Owl's Hint

1.3 Extracting Data

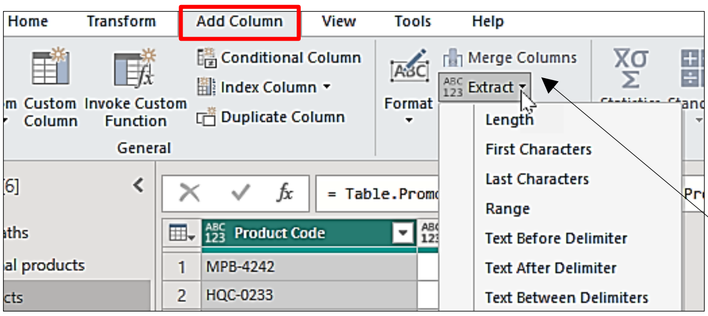
Replacing or Adding Columns

There are two versions of the **Extract** tool – be careful to choose the right one for your task:



= Table.PromoteHeaders(Products_Sheet, [PromoteAllScalars

	Product Code	Sales
1	MPB-4242	24.49703694
2	HQC-0233	44.9529665



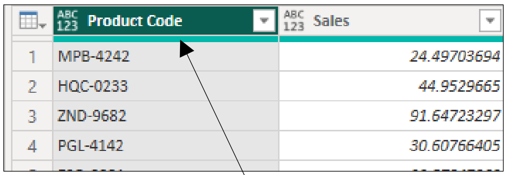
	Product Code
1	MPB-4242
2	HQC-0233

If you choose this version on the **Transform** tab of the ribbon you will replace a column …

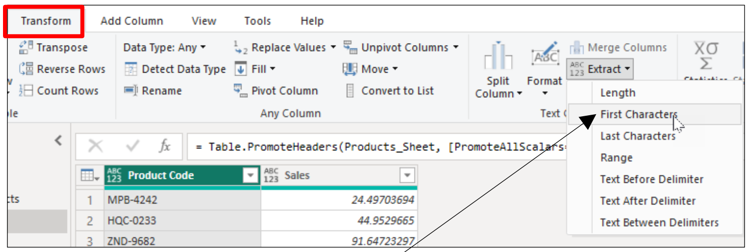
… whereas if you choose this version on the **Add Column** tab of the ribbon you will keep your existing column and add a new one to it.

An Example

The example below would extract the first 3 characters from a product code:



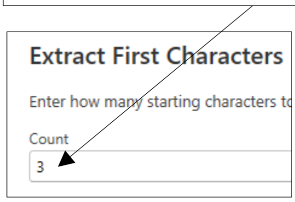
	Product Code	Sales
1	MPB-4242	24.49703694
2	HQC-0233	44.9529665
3	ZND-9682	91.64723297
4	PGL-4142	30.60766405



a) Select the column (or columns) from which you want to extract data.

b) Here we're choosing to get the first N characters, replacing the current column.

c) Specify how many characters you want to extract (here we've gone for the first 3).



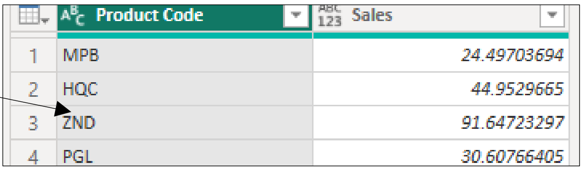
Extract First Characters

Enter how many starting characters t

Count

3

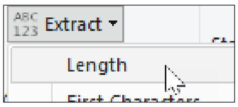
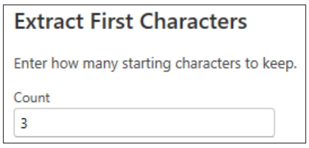
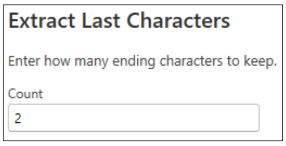
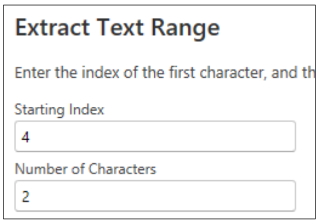
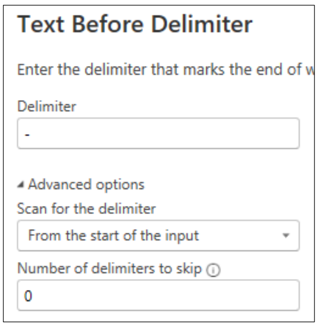
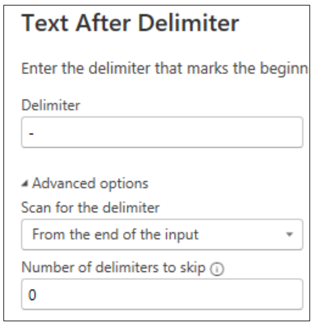
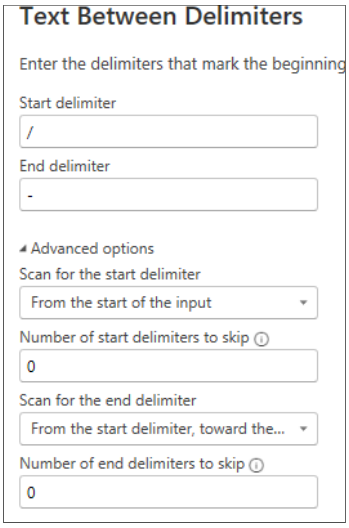
d) Power Query will replace your column with the first 3 letters for each product code.



	Product Code	Sales
1	MPB	24.49703694
2	HQC	44.9529665
3	ZND	91.64723297
4	PGL	30.60766405

The Possible Options

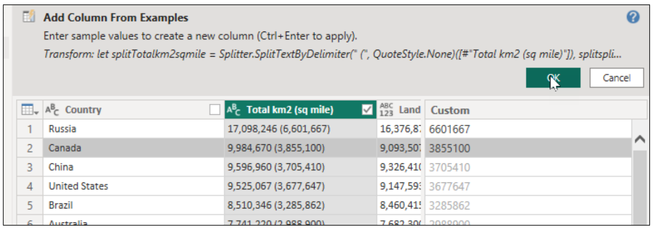
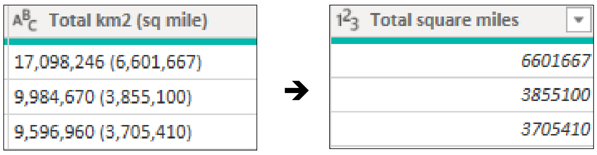
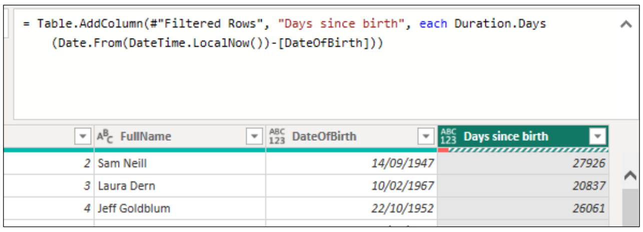
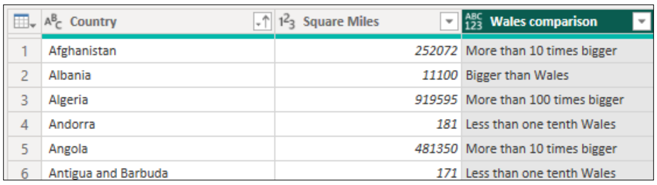
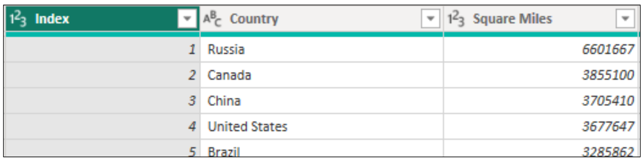
Here's what the options would give for a field containing the product code **VPW-85/L9-50**:

Option	Choices	Results	Notes
Length		12	This is a quick way to find how many characters there are for each value in a column.
First Characters *Last Characters*	Extract First Characters Enter how many starting characters to keep. Count 3 Extract Last Characters Enter how many ending characters to keep. Count 2	VPW 50	The (in this case) 3 left-most characters. The (in this case) 2 right-most characters.
Range	Extract Text Range Enter the index of the first character, and th Starting Index 4 Number of Characters 2	85	The 2 characters starting at position number 4 (remember that characters are numbered from 0, not 1).
Text Before Delimiter *Text After Delimiter*	Text Before Delimiter Enter the delimiter that marks the end of w Delimiter - ◢ Advanced options Scan for the delimiter From the start of the input Number of delimiters to skip ⓘ 0 Text After Delimiter Enter the delimiter that marks the beginn Delimiter - ◢ Advanced options Scan for the delimiter From the end of the input Number of delimiters to skip ⓘ 0	VPW 50	Notice that you can start scanning for a delimiter from the left or right with these options, and also choose not to take the first delimiter you find.
Text Between Delimiters	Text Between Delimiters Enter the delimiters that mark the beginning Start delimiter / End delimiter - ◢ Advanced options Scan for the start delimiter From the start of the input Number of start delimiters to skip ⓘ 0 Scan for the end delimiter From the start delimiter, toward the... Number of end delimiters to skip ⓘ 0	L9	This powerful option allows you to pick out text between any two (possibly different) characters. You can even do things like pick out the text between the second dash and fourth backslash from the end.

CHAPTER 2 - CREATING COLUMNS

2.1 Ways to Create New Columns

There are a variety of ways of creating columns in Power Query, including the following (covered in this chapter):

Method	What it does	Example
Column from Examples	Use AI to guess what formula you want to apply to all rows of a table based on one or two sample training values.	
Built-up Columns	Use built-in Power Query transforms in sequence to produce complicated effects (you can then delete any intermediate columns created).	
Custom Columns	Return the value - for each row of a table - of an expression using the M Power Query Formula language.	
Conditional Columns	Use rules to divide rows up into a finite number of discrete categories.	
Indexing Columns	Apply numbering to the rows in a table.	

Add Column From Examples

Enter sample values to create a new column (Ctrl+Enter to apply).

Transform: let splitTotalkm2sqmile = Splitter.SplitTextByDelimiter(" (", QuoteStyle.None)([#"Total km2 (sq mile)"]), splitspli...

	Country	Total km2 (sq mile) ☑	Land	Custom
1	Russia	17,098,246 (6,601,667)	16,376,87	6601667
2	Canada	9,984,670 (3,855,100)	9,093,507	3855100
3	China	9,596,960 (3,705,410)	9,326,410	3705410
4	United States	9,525,067 (3,677,647)	9,147,593	3677647
5	Brazil	8,510,346 (3,285,862)	8,460,415	3285862
6	Australia	7,741,220 (2,988,900)	7,682,300	2988900

Total km2 (sq mile)
17,098,246 (6,601,667)
9,984,670 (3,855,100)
9,596,960 (3,705,410)

➔

Total square miles
6601667
3855100
3705410

```
= Table.AddColumn(#"Filtered Rows", "Days since birth", each Duration.Days
    (Date.From(DateTime.LocalNow())-[DateOfBirth]))
```

	FullName	DateOfBirth	Days since birth
2	Sam Neill	14/09/1947	27926
3	Laura Dern	10/02/1967	20837
4	Jeff Goldblum	22/10/1952	26061

	Country	Square Miles	Wales comparison
1	Afghanistan	252072	More than 10 times bigger
2	Albania	11100	Bigger than Wales
3	Algeria	919595	More than 100 times bigger
4	Andorra	181	Less than one tenth Wales
5	Angola	481350	More than 10 times bigger
6	Antigua and Barbuda	171	Less than one tenth Wales

Index	Country	Square Miles
1	Russia	6601667
2	Canada	3855100
3	China	3705410
4	United States	3677647
5	Brazil	3285862

Wise Owl's Hint

Columns that you create in Power Query will take up more space in your model (since all of the row values have to be pre-calculated when you load your data), but will run more quickly thereafter (since Power BI doesn't need to calculate DAX columns on the fly). In practice you're unlikely to notice the difference!

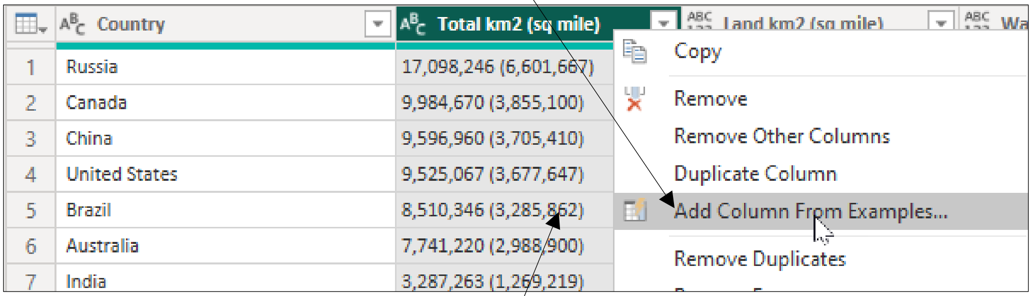
2.2 Columns from Examples

Power BI has got an excellent feature called *Columns from Examples*, which allows you to create formulae by typing in a few results. To create a column like this follow the numbered steps below.

Step 1 – Start the Feature

Begin by selecting the column or columns which contain the raw data from which Power Query can deduce the formula you want to apply, then right-click and choose this menu option:

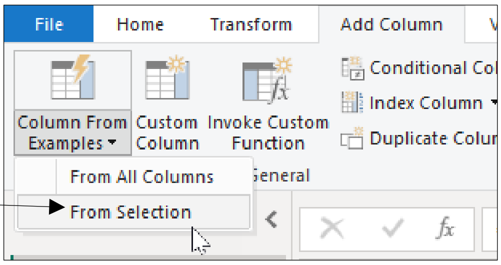
For this example we want to show the total area of each country (the list comes from Wikipedia) in square miles. So for Russia this should give **6601667**, the figure in brackets.



	Country	Total km2 (sq mile)
1	Russia	17,098,246 (6,601,667)
2	Canada	9,984,670 (3,855,100)
3	China	9,596,960 (3,705,410)
4	United States	9,525,067 (3,677,647)
5	Brazil	8,510,346 (3,285,862)
6	Australia	7,741,220 (2,988,900)
7	India	3,287,263 (1,269,219)

Start by selecting the column or columns upon which Power Query should base its formula, then right-click and choose to add a column by showing some examples.

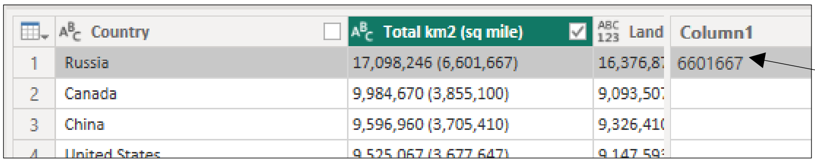
Note that you can also do this from the ribbon:



You can do the same thing by clicking on the drop-down next to the **Column From Examples** button on the **Add Column** tab of the Power Query ribbon.

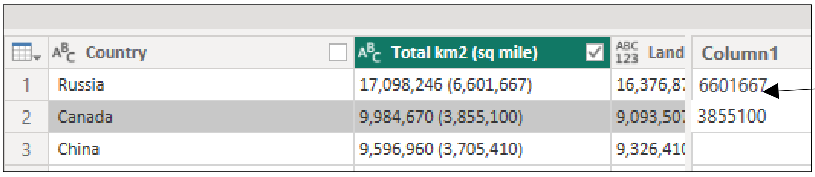
Step 2 – Show some Examples

You can now train the Power BI column formula generation algorithm:



	Country	Total km2 (sq mile)	Land	Column1
1	Russia	17,098,246 (6,601,667)	16,376,87	6601667
2	Canada	9,984,670 (3,855,100)	9,093,507	
3	China	9,596,960 (3,705,410)	9,326,41(	
4	United States	9,525,067 (3,677,647)	9,147,593	

a) Type in the value you would expect a Query Editor formula to return for your first row of data, then press Ctrl + Enter.

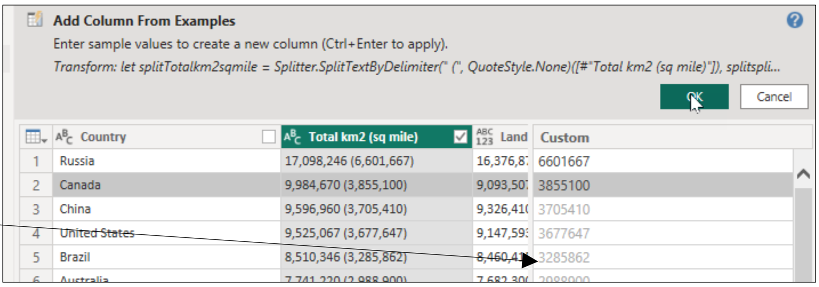


	Country	Total km2 (sq mile)	Land	Column1
1	Russia	17,098,246 (6,601,667)	16,376,87	6601667
2	Canada	9,984,670 (3,855,100)	9,093,507	3855100
3	China	9,596,960 (3,705,410)	9,326,41(	

b) If you don't get any results for the first value, try a second (and even a third) until Power BI gets what you're trying to do, pressing press Ctrl + Enter each time.

Step 3 – Confirm the Formula

If you're happy with what Power BI has created, select OK; otherwise, choose Cancel:



Add Column From Examples

Enter sample values to create a new column (Ctrl+Enter to apply).

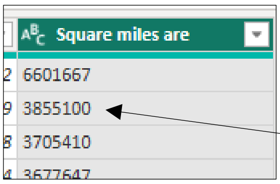
Transform: let splitTotalkm2sqmile = Splitter.SplitTextByDelimiter(" (", QuoteStyle.None)([#"Total km2 (sq mile)"]), splitspli...

	Country	Total km2 (sq mile)	Land	Custom
1	Russia	17,098,246 (6,601,667)	16,376,87	6601667
2	Canada	9,984,670 (3,855,100)	9,093,507	3855100
3	China	9,596,960 (3,705,410)	9,326,41(	3705410
4	United States	9,525,067 (3,677,647)	9,147,593	3677647
5	Brazil	8,510,346 (3,285,862)	8,460,41	3285862
6	Australia	7,741,220 (2,988,900)	7,682,30(	2988000

Incredibly, Power BI seems to have worked out exactly what you want to do.

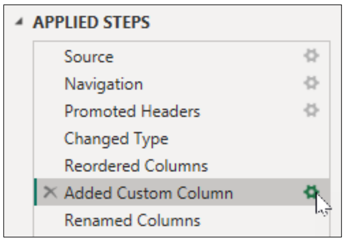
Step 4 – Review your Formula

You can now have a look at the M formula created for your new column:



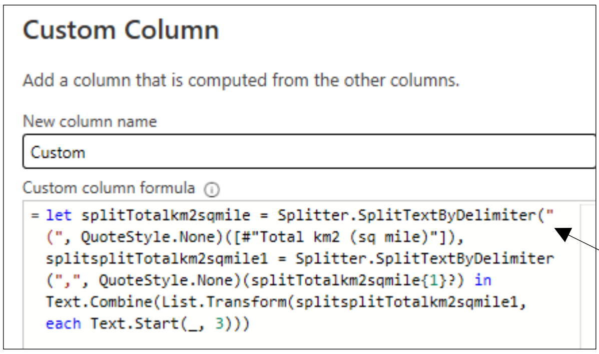
Square miles are
6601667
3855100
3705410
3677647

a) Here we've renamed the column too. You can view the details of the transform step by clicking on the gear icon next to it:



APPLIED STEPS

- Source
- Navigation
- Promoted Headers
- Changed Type
- Reordered Columns
- Added Custom Column
- Renamed Columns



Custom Column

Add a column that is computed from the other columns.

New column name: Custom

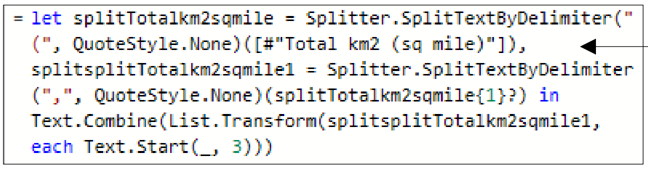
Custom column formula

```
= let splitTotalkm2sqmile = Splitter.SplitTextByDelimiter("
  (", QuoteStyle.None)([#"Total km2 (sq mile)"]),
  splitsplitTotalkm2sqmile1 = Splitter.SplitTextByDelimiter
  (",", QuoteStyle.None)(splitTotalkm2sqmile{1}?) in
  Text.Combine(List.Transform(splitsplitTotalkm2sqmile1,
  each Text.Start(_, 3)))
```

b) This would show this formula, which is explained overleaf!)

Step 5 – Understanding your Formula

The big disadvantage of creating columns by example is that you may find it hard to understand (and amend) the resulting formula.



```
= let splitTotalkm2sqmile = Splitter.SplitTextByDelimiter("
  (", QuoteStyle.None)([#"Total km2 (sq mile)"]),
  splitsplitTotalkm2sqmile1 = Splitter.SplitTextByDelimiter
  (",", QuoteStyle.None)(splitTotalkm2sqmile{1}?) in
  Text.Combine(List.Transform(splitsplitTotalkm2sqmile1,
  each Text.Start(_, 3)))
```

For our example, here's our formula.

Here's a rough breakdown of what this does:

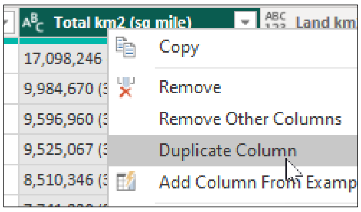
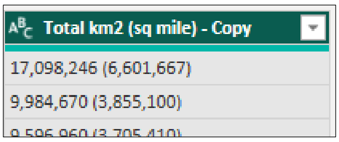
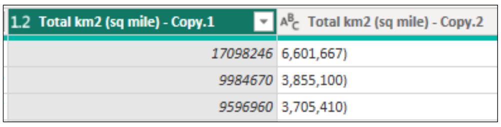
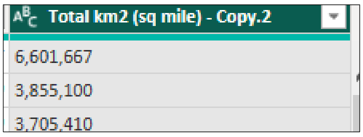
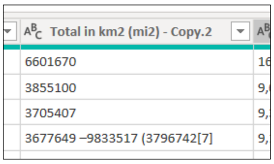
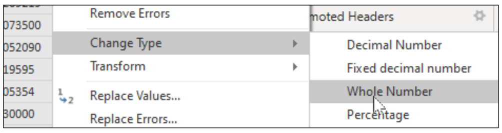
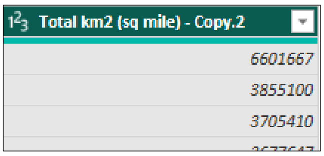
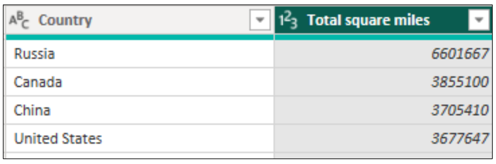
Stage	What it does	Returns for row 1
Before any formulae applied		**17,098,246 (6,601,667)**
`let splitTotalkm2sqmile = Splitter.SplitTextByDelimiter(" (", QuoteStyle.None)([#"Total km2 (sq mile)"])`	Creates a variable with a long unwieldy name (**splitTotalkm2sqmile**) to take the column called **Total km2 (sq mile)** and split it at the first (character. This will return a list of items.	A list containing two items: **17,098,246 (** and **6,601,667)**.
`splitsplitTotalkm2sqmile1 = Splitter.SplitTextByDelimiter(",", QuoteStyle.None)(splitTotalkm2sqmile{1}?)`	Takes the second element returned in this list of items (list elements are numbered from 0, so [1] means the second element), which is the bit after the (character, and splits this by the , character.	A list containing the items **6**, **601** and **667)**.
`let … in Text.Combine(List.Transform(splitsplitTotalkm2sqmile1, each Text.Start(_, 3)))`	Takes this list of numbers, and for each one picks out the first 3 characters. Combines this list of miniature strings of text into a single string.	**6601667**

Wise Owl's Hint

The above shows two things: that the M language won't be that intuitive to learn, and that (like all Microsoft wizards) the formulae created for columns by example are not always written in the simplest way!

2.3 Built-up Columns

An alternative to using columns by example is to create a new column one bit at a time. For our example (getting each country's total land area in square miles) this could be as follows:

Transform	How	Result
Duplicate column	Right-click on the total land area column and choose **Duplicate Column** to take a copy of it, so we don't lose the original.  Total km2 (sq mile) Land km Copy Remove Remove Other Columns Duplicate Column Add Column From Examp 17,098,246 9,984,670 (3 9,596,960 (3 9,525,067 (3 8,510,346 (3	 Total km2 (sq mile) - Copy 17,098,246 (6,601,667) 9,984,670 (3,855,100) 9,596,960 (3,705,410)
Split by bracket	Right-click on this duplicated column and choose **Split Column** > **By Delimiter…**, then choose a (as your delimiter.	 Total km2 (sq mile) - Copy.1 | Total km2 (sq mile) - Copy.2 17098246 | 6,601,667) 9984670 | 3,855,100) 9596960 | 3,705,410)
Remove the end bracket	Right-click on the second column generated and choose **Replace Values…**, then replace every) with nothing.	 Total km2 (sq mile) - Copy.2 6,601,667 3,855,100 3,705,410
Remove the commas	Repeat the above step, replacing each , with nothing.	 Total in km2 (mi2) - Copy.2 6601670 3855100 3705407 3677649 –9833517 (3796742[7]
Change the value to a number	Right-click on the column and choose to change the type to a number:  Remove Errors Change Type Transform Replace Values... Replace Errors... moted Headers Decimal Number Fixed decimal number Whole Number Percentage	 Total km2 (sq mile) - Copy.2 6601667 3855100 3705410
Tidy up the columns	Delete any intermediate columns generated, reorder your columns and rename this one.	 Country | Total square miles Russia | 6601667 Canada | 3855100 China | 3705410 United States | 3677647

Wise Owl's Hint

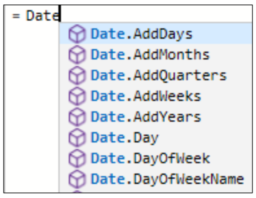
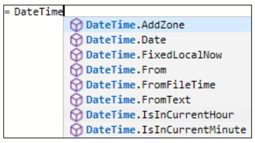
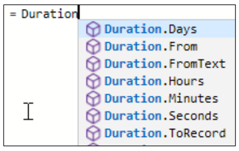
The great advantage of this approach is that you can understand how you got from A to B, reproduce the stages and even modify them should you require.

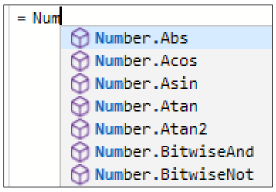
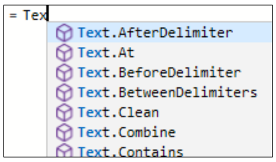
2.4 Custom Columns in M

Even if you don't know the M formula language you can sometimes guess your way round using it to create formulae for new columns based on existing ones.

M Prefixes

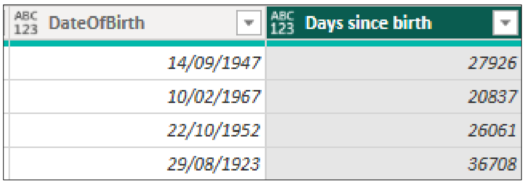
Here are some good prefixes to try in Intellisense:

Prefix	What it gives	Example
Date	Functions to do with dates	 = Date Date.AddDays Date.AddMonths Date.AddQuarters Date.AddWeeks Date.AddYears Date.Day Date.DayOfWeek Date.DayOfWeekName
DateTime	Functions to do with dates/times	 = DateTime DateTime.AddZone DateTime.Date DateTime.FixedLocalNow DateTime.From DateTime.FromFileTime DateTime.FromText DateTime.IsInCurrentHour DateTime.IsInCurrentMinute
Duration	Functions giving the duration of time	 = Duration Duration.Days Duration.From Duration.FromText Duration.Hours Duration.Minutes Duration.Seconds Duration.ToRecord

Prefix	What it gives	Example
Number	Functions giving things you can do to numbers	 = Num Number.Abs Number.Acos Number.Asin Number.Atan Number.Atan2 Number.BitwiseAnd Number.BitwiseNot
Text	Functions to do with text	 = Tex Text.AfterDelimiter Text.At Text.BeforeDelimiter Text.BetweenDelimiters Text.Clean Text.Combine Text.Contains

Our Example – Elapsed Days

Suppose you have a table of actors, and want to find out how many days have elapsed since each was born:

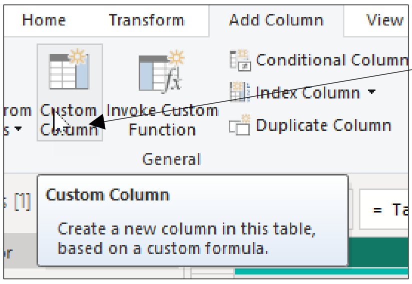


DateOfBirth	Days since birth
14/09/1947	27926
10/02/1967	20837
22/10/1952	26061
29/08/1923	36708

To understand how to create this formula, ask the question a different way: you want to take the duration in days of the period between the **[DateOfBirth]** column in this table and the current local date/time, expressed as a date.

Creating a Custom Column

Here's how to create a column like this:



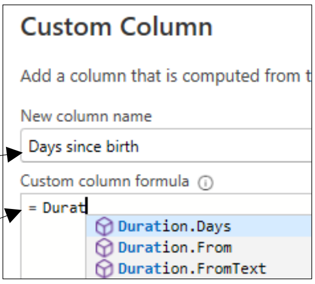
Custom Column

Create a new column in this table, based on a custom formula.

a) Click on tis icon on the **Add Column** menu to add a custom column to your query.

b) Give your new column a name.

c) Begin to create a formula.

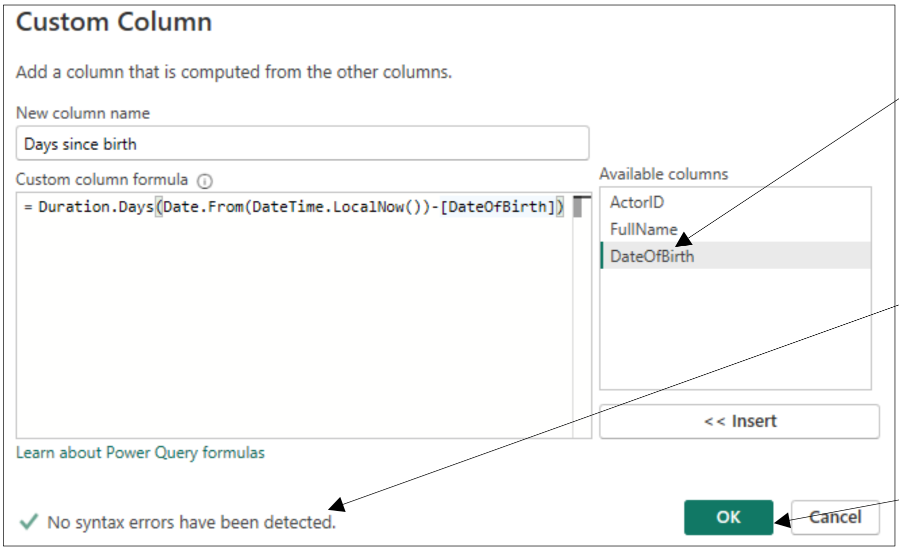


Custom Column

Add a column that is computed from t

New column name: Days since birth

Custom column formula: = Durat



Custom Column

Add a column that is computed from the other columns.

New column name: Days since birth

Custom column formula:

```
= Duration.Days(Date.From(DateTime.LocalNow())-[DateOfBirth])
```

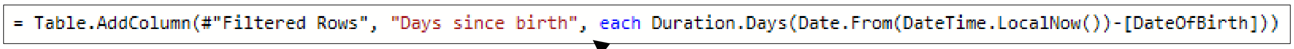
Available columns: ActorID, FullName, DateOfBirth

✓ No syntax errors have been detected.

d) Double-click on any column to insert it into your formula at any stage.

e) You won't be able to continue until you see this message confirming that your syntax is plausible.

f) When you've finished your formula, press OK to confirm it.



```
= Table.AddColumn(#"Filtered Rows", "Days since birth", each Duration.Days(Date.From(DateTime.LocalNow())-[DateOfBirth]))
```

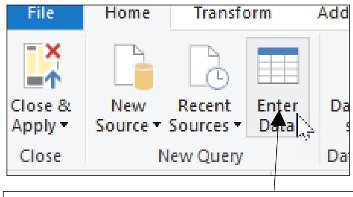
g) Power Query will incorporate this in a new query step (in this case showing for each row in the given table the number of days between each actor's birth date and today's date).

Wise Owl's Hint

What the above example shows is that it's not easy to guess your way round the M language. Who would have thought it would be so hard to get at today's date, for example?

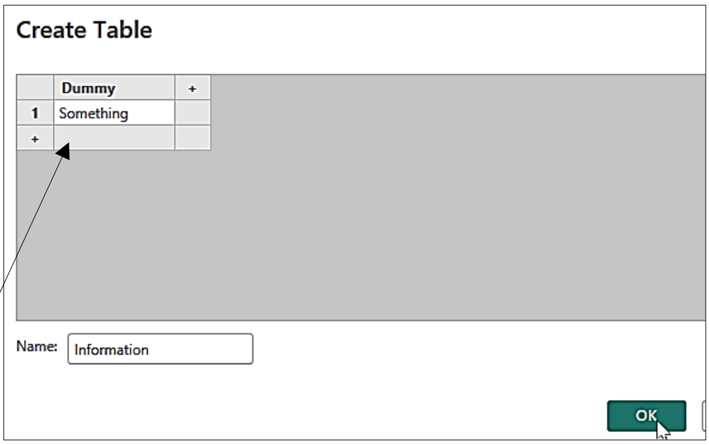
2.5 Special Case - Last Refresh Date/Time

This pages shows a way to show the last date/time when a report was refreshed:



a) In Power Query, choose to create a new table by entering data for it.

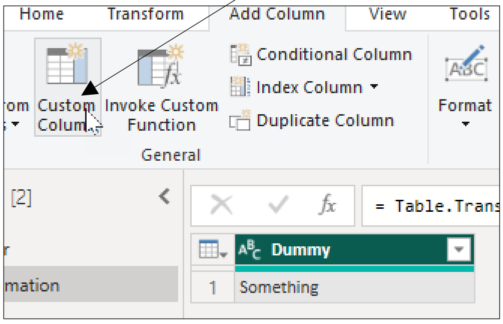
b) Make sure your table has one row in, since you want it to contain one bit of information only (it doesn't matter what this column is called, nor what it contains).


Create Table

	Dummy	+
1	Something	
+		

Name: Information

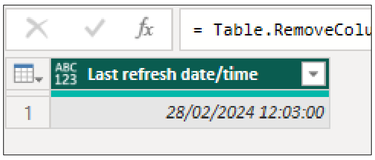
c) Choose to add a custom column from the **Add Column** tab of the ribbon.



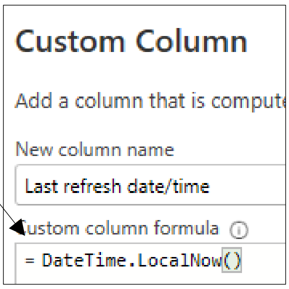
= Table.Trans

	Dummy
1	Something

d) Create an expression giving the current date/time. You can then delete the original column to give your final table:


= Table.RemoveColu

	Last refresh date/time
1	28/02/2024 12:03:00


Custom Column

Add a column that is compute

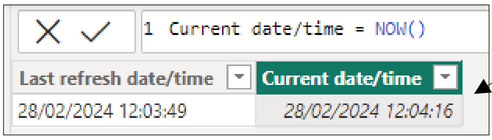
New column name

Last refresh date/time

Custom column formula

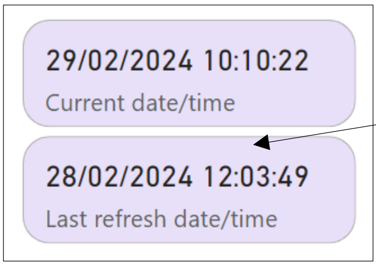
= DateTime.LocalNow()

After loading your table, you could create a calculated column in it to show the current date and time, using the DAX **NOW()** function, then display both bits of information side by side:


1 Current date/time = NOW()

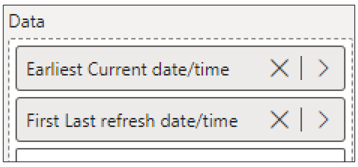
Last refresh date/time	Current date/time
28/02/2024 12:03:49	28/02/2024 12:04:16

You could add a column to your table in Power BI to show the latest date/time.


29/02/2024 10:10:22
Current date/time

28/02/2024 12:03:49
Last refresh date/time

The card on the top is showing the date/time now; the one on the bottom is showing the date/time when you last refreshed your data (both shown below before we renamed them to remove the messy statistic prefix):


Data

Earliest Current date/time

First Last refresh date/time

2.6 Conditional Columns

You can use conditional columns to divide data up into discrete bands. In the following example we express each country's land area in units of the size of Wales (about 8,023 square miles).

Wise Owl's Hint

In an ideal world the provider of your data would add this column into the underlying data source, to prevent you having to calculate it as you load the data.

To create a conditional column like this:

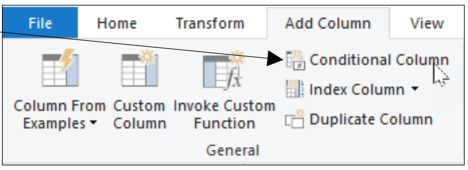
a) On the **Add Column** tab select to create a conditional column.

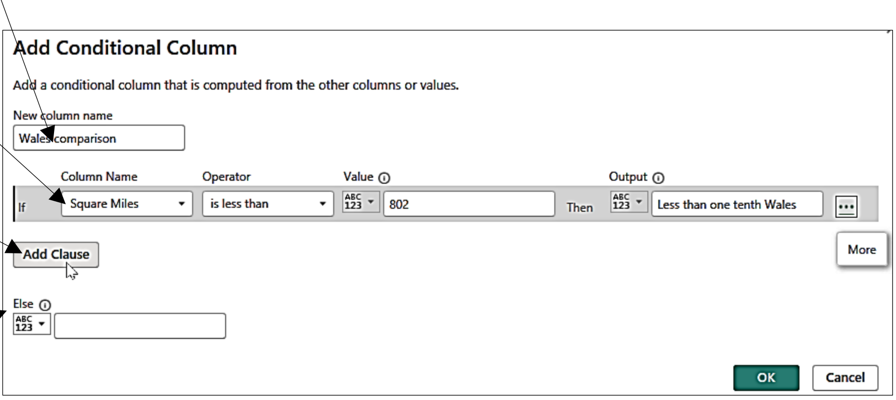
b) Give your new column a name (here we've called it **Wales comparison**).

c) Create your first condition.

d) Click here to add other conditions.

e) Put here what should happen if all of the other conditions fail.





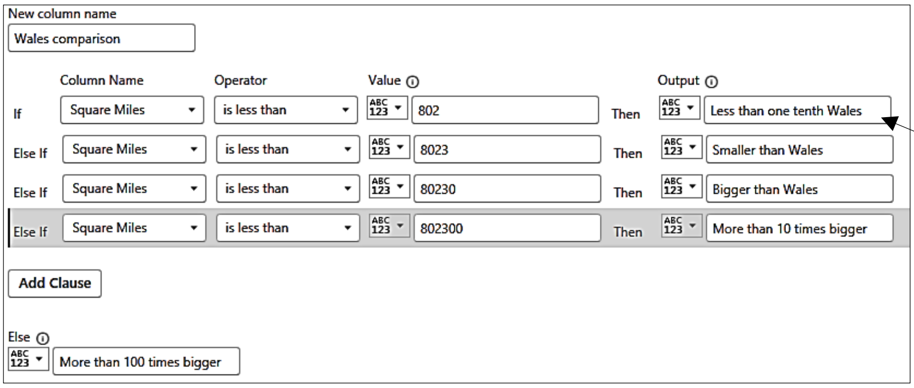
Add Conditional Column

Add a conditional column that is computed from the other columns or values.

New column name: Wales comparison

	Column Name	Operator	Value		Output
If	Square Miles	is less than	802	Then	Less than one tenth Wales

Continue adding conditions to get the final column:

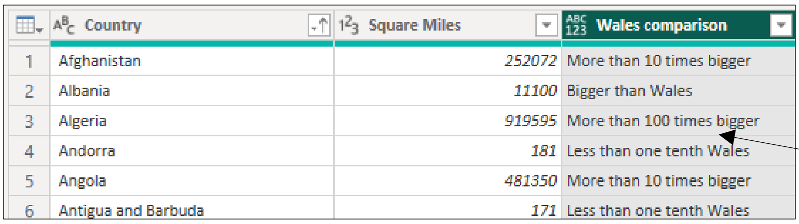


New column name: Wales comparison

	Column Name	Operator	Value		Output
If	Square Miles	is less than	802	Then	Less than one tenth Wales
Else If	Square Miles	is less than	8023	Then	Smaller than Wales
Else If	Square Miles	is less than	80230	Then	Bigger than Wales
Else If	Square Miles	is less than	802300	Then	More than 10 times bigger

Else: More than 100 times bigger

Note that when writing numerical or date comparison conditions, you should start with the smallest/earliest number/date and work your way up (as here), or start with the biggest/latest one and work your way down.

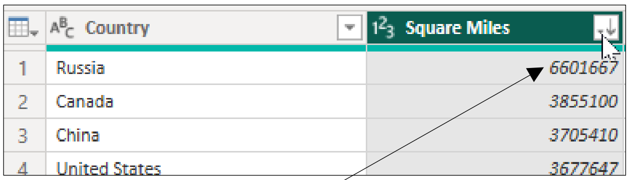


	Country	Square Miles	Wales comparison
1	Afghanistan	252072	More than 10 times bigger
2	Albania	11100	Bigger than Wales
3	Algeria	919595	More than 100 times bigger
4	Andorra	181	Less than one tenth Wales
5	Angola	481350	More than 10 times bigger
6	Antigua and Barbuda	171	Less than one tenth Wales

The first few countries listed in alphabetical order. The UK is more than 10 times bigger than Wales, if you're interested.

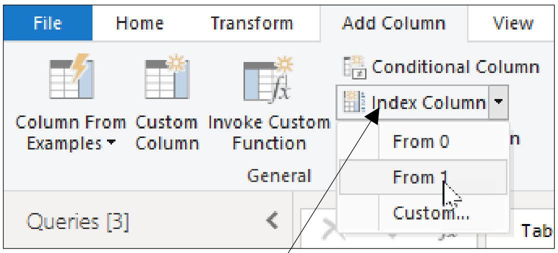
2.7 Indexing Columns

You can number rows in a table using an *index column*:

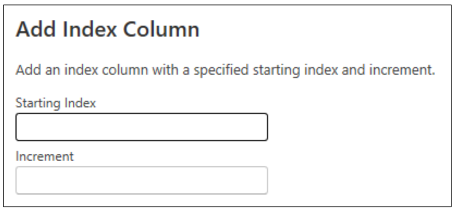


	Country	Square Miles
1	Russia	6601667
2	Canada	3855100
3	China	3705410
4	United States	3677647

a) Sort your rows in the order in which you want them to be ordered (in this case, we'll order them by size, with the largest country first).



b) Add an index column from the **Add Column** menu, choosing to order the rows from 1, not 0. Note that you could instead choose **Custom…** to create any arithmetic series:

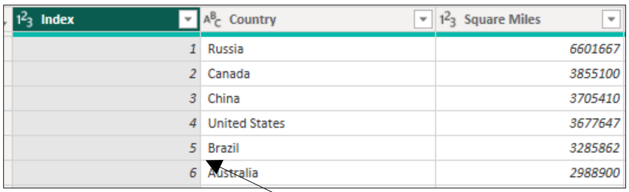


Add Index Column

Add an index column with a specified starting index and increment.

Starting Index

Increment



Index	Country	Square Miles
1	Russia	6601667
2	Canada	3855100
3	China	3705410
4	United States	3677647
5	Brazil	3285862
6	Australia	2988900

c) You can now use this column to show the original sort order (and to revert to it should you need to).

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	Visual C#	✓	✓	✓
	VB programming			✓
	MySQL	✓		
	Python	✓	✓	✓

Wise Owl Training