

How to... Create calculations in Excel 2010

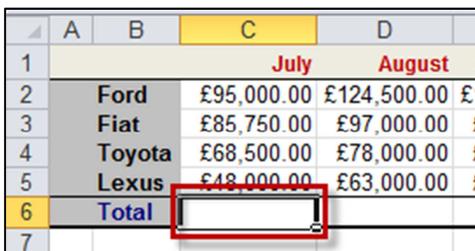
Overview

Excel can be used in a number of ways – as a tool for charting, for storing lists of data, for analysing “What if...” scenarios and more. But perhaps the most common use of Excel is simply to perform calculations on data in a way which is reliable, flexible and simple.

In this guide, we will take a look at how to go about creating calculations, and lay the foundations to ensure that your calculations do what you want them to do first time, every time!

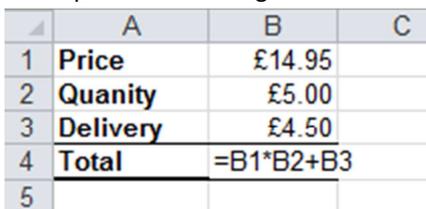
Where to begin

1. When you want to perform any calculation in Excel, begin by selecting the cell in which you want the answer to appear (C6 in the example below).



	A	B	C	D
1			July	August
2		Ford	£95,000.00	£124,500.00
3		Fiat	£85,750.00	£97,000.00
4		Toyota	£68,500.00	£78,000.00
5		Lexus	£48,000.00	£63,000.00
6		Total		
7				

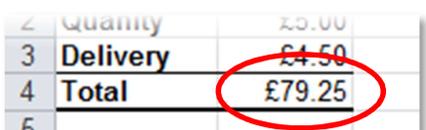
2. Next, type the equals sign in this cell – you are telling Excel “This cell doesn’t hold a typed value – it *equals* some other calculation”
3. Then enter the remaining parts of the calculation – a combination of *cell references* and *operators*.
4. A **cell reference** is a reference to the address of a cell (eg C2) rather than the value in the cells (eg 95000). Using cell references ensures that if the values in the cells change, so will the results of your calculations.
5. Between the cell references, you will use one or more **operators**. An operator is simply a symbol, such as plus +, minus -, multiply *, or divide /.
6. A complete formula might look like this:



	A	B	C
1	Price	£14.95	
2	Quantity	£5.00	
3	Delivery	£4.50	
4	Total	=B1*B2+B3	
5			

In this example, the calculation in cell B4 multiplies the quantity (in B2) by the price (in B1), then adds the delivery charge (in B3).

7. When you’re finished, hit the Enter (or Return) key. Excel will display the result of the calculation.



2	Quantity	£5.00	
3	Delivery	£4.50	
4	Total	£79.25	
5			

A note on “The order of operations”

When you perform a calculation with several steps, the results of that calculation will differ depending on the order in which you perform those steps.

Take a relatively simple example such as $2 + 3 * 4$.

Is the answer 20: $2 + 3$ equals 5, then $5 * 4$ equals 20?
Or is it 14? $3 * 4$ equals 12, then $2 + 12$ equals 14...

It can be seen that the order in which the steps are performed makes a real difference to the answer we get. So which order does Excel do things in? It follows the same rule as mathematicians have for many centuries. The rule can be summed up with the acronym **BODMAS**:

Brackets come first – so to ensure the answer 20 above, we could write the calculation as $(2 + 3) * 4$

Of – or more precisely, *powers of* – such as 3^2 . Next is

Division, along with

Multiplication. Then lastly come

Addition and

Subtraction

So, the answer to our above calculation is actually 14: 3 times 4 equals 12, then $2 + 12$ equals 14.

From formulas to functions

What we’ve done above is to create a formula. But Excel has a number of keywords, used as shortcuts for common calculations. These keywords are called *functions*.

Perhaps the most common of these is **SUM**. This function is used to add values, instead of using plus, as follows:

1. Once again, select the cell where the answer should appear
2. Type **=SUM(.....)**
3. Between the brackets, put references to the cells you want to add. This can be done in several ways:
To add individual cells, type their addresses, separating each one with a comma, for example **=SUM(A1, B3, E9)**

If you want to add a block (or *range*) of cells, type the first cell in the range, then a colon, then the last one: **=SUM(A1 : B10)**

Alternatively, type the first part of the function, including the opening bracket, then use the mouse to select the cells you want to add. Excel will enter the cell references as though you had typed them – you just close the brackets and hit Enter.

Common functions in Excel

SUM, which adds cells, is perhaps the most common of all Excel's functions. But there are well over a hundred others at your disposal. Among the most common are:

MAX – shows the highest value in a range of cells

MIN – shows the lowest value in a range of cells

AVERAGE – shows the mean average of a range of cells

COUNT – shows how many cells in a range are numeric.

Each of these functions works in the same way – simply type **=AVERAGE** or **=MAX** or **=MIN** or **=COUNT** followed by the opening bracket, the range of cells to analyse, then the closing bracket.

Remember – you don't have to type the cell names, you can just select them by clicking with the mouse on the first one, then dragging to the last one. If you want to work with several ranges, such as A1:A10 and also C1:C10, select the first range, then hold CTRL on the keyboard as you select the other range or ranges.

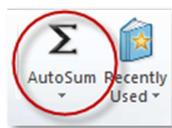
	July	August	September	October	November	December
July	£95,000.00	£124,500.00	£110,000.00	£104,000.00	£113,000.00	£120,000.00
August	£85,750.00	£97,000.00	£86,000.00	£82,000.00	£89,950.00	£92,500.00
Vota	£68,500.00	£78,000.00	£72,500.00	£75,750.00	£80,000.00	£87,500.00
Kus	£48,000.00	£63,000.00	£52,000.00	£51,000.00	£44,000.00	£38,000.00
Total	£297,250.00	£362,500.00	£320,500.00	£312,750.00	£326,950.00	£338,000.00

Average for July and Sept	=average(C5:C8,E5:E8)
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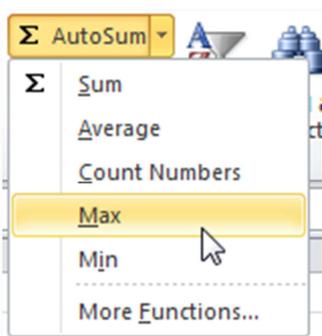
Selecting multiple ranges – note the blue and green dashes around the July and September figures.

Tools to help with functions

If you need to create a function, rather than typing it yourself, you can simply select it from the ribbon. This can be done by using the AutoSum button either on the Home tab (on the left below), or the Formulas tab (on the right).



By default, this will insert **=SUM** and the brackets – you just need to select the cells to be added. But by clicking the arrow next to AutoSum, **MAX**, **MIN**, **AVERAGE** and others can be selected.



Copying formulas and functions

Having created a calculation, you'll often want to copy it elsewhere. For example, if you've added up one column, you may want to also add up the next columns too.

Rather than needing to re-type your formula, you should use the "Autofill handle" – the black dot in the bottom right corner of the selected cell – to copy your calculation.

	£85,750.00	£97,000.00	£86,000.00
Vota	£68,500.00	£78,000.00	£72,500.00
Kus	£48,000.00	£63,000.00	£52,000.00
Total	£297,250.00		

The pointer becomes a cross when over the autofill handle

Hover with the mouse over the autofill handle until the pointer becomes a black cross. Then drag to the right, left, up or down, to copy your formula into adjacent cells.

Of course, you're not actually *copying* the formula – after all, if you were just copying it, you'd get an identical answer in every cell, and autofill is a bit smarter than that.

Autofill dynamically updates your references to cells, so that they will always work. So, if you have a reference to cells A1:C1, this will change as you fill your formula – if you fill it downwards, the references will automatically change to A2:C2, then A3:C3 and so on. If you fill across to the right, A1:C1 will become B1:D1, with the column letters updating relative to your new location. These are known as "relative references".

	C	D	E	F
7	68500	78000	72500	75750
8	48000	63000	52000	51000
9	=SUM(C5:C8)	=SUM(D5:D8)	=SUM(E5:E8)	=SUM(F5:F8)
10				

Using Absolute references

Usually, Excel automatically updating your cell references relative to the formula's location is good news – as we've seen, it ensures the right answer appears every time.

But what if you don't want a cell to update if you autofill a calculation? What if you want to multiply each column by VAT, and VAT is in cell J10? If we updated our above formulas like this: **=SUM(C5:C8)*J10** then as we fill across, not only will C5:C8 become D5:D8 (good), but also J10 will become K10... (not good!)

The solution is to tell Excel "This value is absolute. It is fixed. Do not change it. Ever." To do this, we put a pair of dollar symbols – one before the J, one before the 10, to lock the column and row respectively. So, to make J10 an "absolute reference", we re-write our formula as **=SUM(C5:C8)*\$J\$10**. Now although C5 and C8 can become D5 and D8, J10 will always be fixed as J10.