



INTRODUCTION TO MS EXCEL

Part 2

[Abstract](#)

Part 2 of the training course covers Excel Formulas and Functions.

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Introduction to Microsoft Excel – Part 2

Formulas

We need formulas to calculate the Taxable Income by multiplying the Hourly Wage by the Hours Worked. Excel can do this for you.

The way that Excel does it might seem strange at first, but think about algebra that you did at school.

Remember $E=C \times D$

In Excel the operators are +, -, * and /

Click in E2

Type = 13.9*158, then Enter

E2 shows the result 2196.2

This is a bit manual. A better way is type the formula as cell references, Remember that the cell references are shown in the Name Box at the left hand top of the screen

For example in E2 type, =C2*D2, Enter.

Click on the Formula Bar, notice that Excel highlights the cells in colours

The difference now is that the formula is dynamic. If the input values change, then the result changes.

For example, if the hourly wage changes, then the result changes.

Another way of doing this is:

In E2 Instead of typing cell references:

Type =

Then click on cell C2, type *, then

Click on D2, hit Enter

It looks like the contents of cells E2, E3, etc are simple numbers, but the contents of the cell is a Formula.

Using the terms C2 and D2 are Relative cell references. This is useful because:

If you use the Autofill handle, you can Click and Drag the Formulas down the page.

The Formulas automatically adjust the cell references as you go down the page.

An even quicker way to do the same is to double click the Autofill handle in E2 and it will automatically populate the cells below it.

The formula is copied down the page for all the data that exists.

This demonstrates the benefit of Relative cell references.

Let's calculate the taxes to be paid for each person's wages.

Create a new column called Taxes to be Paid and also a new variable called Tax Rate in cell H1.

We will set the Tax Rate at 0.1

Let's create a Formula to calculate the taxes to be paid.

Click on cell F2

Type =E2 * H1, Type Enter

It correctly works out the tax for Row 2, but there is a problem.

You can't Autofill this formula because the formula is wrong for the lower cells.

The problem is the Relative cell references.

To fix the problem,

Click on cell F2

Go to the Formula bar to edit the formula.

We want to change the Relative reference H1 to an Absolute reference. To do this we put a \$ in front of the H and a \$ in front of the 1.

This forces Excel to always reference column H and row 1 in the formula, no matter how far down you extend it.

So, double click on any of the Autofill formulas and you will see that they all refer to cell H1 now.

This demonstrates the difference between Relative references and Absolute references.

As an interesting adjunct, it is possible to fix just one axis of the reference, so you can have H\$1, or \$H1 depending on what you want to refer to.

Errors

If you make a mistake, Excel will usually give you an error message. A typical problem is constructing a formula where you are trying to divide by zero #DIV/!

You may get a warning that Excel thinks that something is an error, this is typically if you type the formula wrong. Excel will explain the error and hopefully you will know what to correct.

Named Ranges

Excel lets you select a range of cells and give it a name. For example:

Select the cells having values in column F.

Go to the Name Box (Top left) currently showing F2, Click, then you can name that range of cells "taxesowed", click Enter. Notice that the name has no spaces in it. Excel doesn't like spaces.

To check your named range, click any cell in the range, then click the drop down arrow in the Name Box, it will show taxesowed.

Named Ranges are useful if you want to simplify formulas and it makes them more readable for the human.

For example, instead of referring to a cell by its cell reference, you could refer to it by name. The same applies to a range of cells. As an example:

Click on cells G2,

Type =taxesowed+1, Enter

You can Autofill the cells below and see the formula is repeated.

This probably isn't a great example, but does show the point.

Functions

Functions are preprogrammed calculations that make it easier to perform repetitive tasks. They are very useful and you will use them a lot once you understand how they work.

Formulas and Functions are often confused. Hopefully this section will help you to understand the differences.

The first Function I am going to show you is the SUM Function.

Let's say that we want to add up all the hours worked and all of the taxable income generated.

Let's move the cursor to the bottom of Column D – hours worked, last entry.

Click the next cell down,

Type =,

Then SUM, - this is our first Function.

Notice, as you start typing Excel recognises you are using a Function and starts to suggest various options.

As well as the straight SUM, you have SUMIF, SUMPRODUCT, plus a host of others, but we want just SUM.

Once you have typed your Function name, you type (, this is always true.

Excel gives you a pop up with suggestions of what it is expecting next. In this case, it is expecting numbers.

For example, to complete the formula, type 5,6 followed by), then Enter.

You will note that Excel adds 5+6 and gives the result as 11. This is fine for a single cell, but it's not very useful.

We want to add the entire column, how do we do that?

We type =SUM(D2:D71), Enter

This says to Excel we want to add the values in the cells D2 to D71.

We get the grand total of all the hours worked.

There is another way to do this.

Type =SUM(

Click and drag the range D2 to D71, then Enter.

You get the same result.

Another Function with the same result is called Autosum.

Go to the bottom of the column of data, click the next cell down,

Go to the Editing Ribbon and select the sigma symbol which is the Autosum function.

Type Enter and the result will appear.

To understand what we have been doing we can type TOTALS: in column C. Make it bold and right aligned.

To Autosum the Taxable Income, the easiest way is to Autofill the formula from column D to E.

We can also calculate the Averages.

Type Average: in Column C

Click on D73 and type =AVERAGE

Then type (

Then type D2:D71, Enter

Notice that Excel puts in the closing bracket for you. The average value is now displayed.

If you Autofill to the right, you will get the average taxable income

Now let's look at how Named Ranges work with functions.

Click on F72

Type =SUM(taxesowed, Enter

Excel recognises the Named Range and does the calculation.

You can use the same technique with the AVERAGE function

Click on F73

Type =AVERAGE(taxesowed, Enter

We are now going to look at the highest number of hours worked, lowest number of hours worked and count the total number of employees.

Type Highest: in cell C74,

Type Lowest: in Cell C75

Type No of employees: in cell C76.

To calculate the highest number of hours we use the Function MAX

Click in cell D74

Type =MAX(D2:D71, Enter

If you Autofill to the right, you get the highest income amount, then the highest taxes due.

For the lowest, we use the Function MIN.

Click in D75,

Type =MIN(D2:D71, Enter

This gives the lowest number of hours worked.

If you Autofill to the right, this gives the lowest taxable income and the lowest taxes due.

The next Function is COUNT.

Click in D76

Type =COUNT(D2:D71, Enter

This gives the total number of employees.