EXCEL FORMULA BASICS

In this lesson we will start to take a look at what Excel does best and that is; **work with formulas**.

Excel is regarded by many as the number one spreadsheet package in the world today. In fact it has held this title for many years now and not without good reason. Once you become proficient in using Excel and become familiar with its capabilities, you too will no doubt wonder how you ever got by without it!

In this lesson we will look only at what is generally consider to be the bare minimum you should know about Excel and formulas. Once we have covered this we can move on to slightly more complex formulas and functions. You may or may not have heard the terms; formulas and functions used in reference to Excel before and wondered what the difference is? The truth is they are more often than not used out of context. This is no doubt because the difference is quite subtle, though simple.

Functions

Excel has over 300 built-in **Functions** installed by default (there are more, but 300 will do for now) which are divided into ten separate categories:

- Financial
- Date & Time
- Math & Trig
- Statistical
- Lookup & Reference
- Database
- Text
- Logical
- Information
- Engineering

Possibly two of the most popular **Functions** (and easiest to use) are the **SUM**, which is categorized under **Math & Trig** and the **COUNT**. The **SUM** function simply adds together numbers and returns the total sum of the numbers. The **COUNT** simply counts numbers in any given range of cells. So a Function is a single predefined formula that is built into Excel.

Formulas

Once we have used one of Excels functions on a Worksheet we have created a **formula**. As we become more confident in using Excel we can start to join functions together to create different formulas. For example we might use the **SUM** and the **COUNT** function together in the same cell to create what would then become a **formula**.

So in a nutshell we can use a Function or Functions to create what then becomes a Formula.

Formula and Function Rules

There are only two rules when using functions to create formulas in Excel and these are:

- All formulas and functions must begin with a = (equal sign).
- For every open parenthesis (brackets) there must be a closing parenthesis.

Don't confuse **point 2** as meaning all formulas must have open and closing parenthesis, as this not always true. What is does mean is, **all** of Excels built-in **Functions** use at least one set of open and closing parenthesis. These are the two rules that we **must** adhere to.

There is also a valuable tip that is good practice to get into also and that is that whenever you type in a function name, always type it in **lower case.** The reason for this is that if you have spelt the Function name correctly, Excel will automatically convert it to uppercase. Therefore you can use it as an error checking tool.

Cell References

More often than not when we create a formula using one of Excels built-in functions we will be referring it to a cell or range of cells. An example of a single cell reference would be **A1**. An example of a range of cells reference would be **A1:A10**. For the first example we are referring to the content of cell **A1** only, while in the second example we would be referring to the contents of cells **A1, A2, A3, A4, A5, A6, A7, A8, A9, A10**. Using the reference **A1:A10** is just a simple method that Excel will automatically recognize. If we use the reference **A1:C5** we are telling Excel to refer to the contents of cells **A1, A2, A3, A4, A5, B1, B2, B3, B4, B5, C1, C2, C3 C4, C5**.

Relative and Absolute Cell References

Relative

In Excel there are two types of cell references, these are **Relative** and **Absolute**. We will first look at **relative** cell references. All the examples in the **Cell References** paragraph are what are known as **relative** cell references.

Each cell on an Excel Worksheet has it's own unique address, e.g. **A1** is the **relative** address of the first cell on all Worksheets, while **IV65536** is the **relative** address of another cell on any Worksheet. The reason why they are called **relative** is because they are **relative** to the cell they are used in. This will be best explained by a simple example.

- In cell **A1** type the number **1** and in cell **A2** type the number **2**.
- Select cells **A1:A2** and use the Fill Handle to fill down to **A10**, so that we have the numbers **1** to **10** in cells **A1:A10**.
- In cell **B1** type this simple reference: **=A1** and push **Enter**.
- Select cell **B1** and do one of the following
    - Copy and then select **B2:B10** and paste.
    - Double click the Fill Handle.

You should now have the numbers **1** to **10** in both **A1:A10** and **B1:B10**. This because we typed a relative cell reference in cell **B1 (=A1)**, which is telling Excel to make cell **B1** equal the value of the cell one column to the left on the same row i.e. **A1**. So when we copy the reference in **B1** i.e. **=A1** and paste it into cell **B2** Excel is still going to reference the cell one column to the left on the same row i.e. **A2**. Copying the same cell (**B1**) and pasting it into cell **B3** again tells Excel to reference the cell one column to the left on the same row i.e. **A3**.

Lets now copy the content of cell **B1** and paste it into cell **D1**, this time we should get the result **0** (zero). If you click in cell **D1** and look in the Formula bar you will see the **relative** cell reference: **=C1**. *The reason we get the result of 0 (zero) is because the value of an empty cell is 0 (zero).*

Absolute

Ok, let's now look at what an **Absolute** cell reference is. Basically an absolute cell reference is a reference to a cell that does not change no matter where it is copied. Again this will be easier to see by using an example.

- Delete the contents of cells **B1:B10** and **D1**.
- In cell **B1** type the **absolute** cell reference **=$A$1** and push **Enter**.
- Select cell **B1** and either
    - Copy and then select **B2:B10** and paste.
    - Double click the Fill Handle

This time you should have the number **1** in cells **B1:B10** and if you select any cell in **B1:B10** and look in the Formula bar, they will all have the absolute cell reference **=$A$1**. This is because by using the **$** (dollar sign) we are telling Excel to always refer to the same cell no matter where we copy this reference to. The **$** in front of the **A ($A)** is telling Excel to make the **column** reference **absolute**, while the **$** in front of the **1 ($1)** is telling Excel to make the

row reference **absolute**. So the reference in its entirety is what is known as an **Absolute cell reference**.

When you have grasped this concept we can move on to what is known as a either an:

- **Absolute** row rela**t**ive column reference or;
- **Relative** row **absolute** column reference.

Again the best way to see this is by using a small example:

Relative Row Absolute Column Reference

Try this:

- Delete the contents of cells **B1:B10**.
- In **B1** type the **Relative** row **absolute** column reference: **=$A1** and push **Enter**.
- Select cell **B1** and either.
    - Copy and then select **B2:B10** and paste.
    - Double click the Fill Handle

You will have the numbers **1** to **10** in cells **B1:B10**. This is because the row portion of the reference (**1**) is relative. Now copy cell **B10** to cell **D1** and you should get the result **1**. This is because the column portion of the reference (**$A**) is absolute. If you click in any cell in the range **B1:B10** or **D1** and look in the Formula bar you will see that the row portion is always **relative** to the row the reference resides in, while the column reference is always **absolute**.

The same principle also applies to any reference that has an **absolute row relative column** reference. Again this can be best seen via the use of a small example.

Absolute Row Relative Column Reference

Try this:

- Delete the contents of cells **B1:B10** and **D1**.
- In **B1** type the **absolute** row **relative** column reference: **=A$1** and push **Enter**.
- Select cell **B1** and either;
    - Copy and then select **B2:B10** and paste.
    - Double click the Fill Handle.

You will have the number **1** in cells **B1:B10**. This is because the row portion of the reference (**$1**) is absolute. Now copy cell **B10** to cell **D1** and you should get the result **0**, this is because the column portion of the reference (**A**) is always relative to the column the reference resides in. If you click in any cell in the range **B1:B10** and look in the Formula bar you will see that

the row portion is always absolute. If you click in cell **D1** and look in the Formula bar you should see **=C$1**.

Avoid Typing Whenever Possible

In all the above examples we have always said to **type in** the reference to a particular cell. While this is fine when typing in very simple references it is **completely unnecessary**. What Excel allows us to do is to use the mouse pointer to type the reference for us. This is known as **the click and point** method. I strongly suggest forming this habit early on as good habits are as hard to break as bad ones! To see what we mean try this simple example:

- Delete the contents of cells **A1:B10** and cell **D1**.
- Type any data into cell **A1**.
- In cell **B1** type = and move your mouse pointer outside of **B1**.
- Place it over cell **A1** and left click then push **Enter**.

You will see that Excel has placed the cell address **=A1** in our cell for us. Using this method you are much less likely to make mistakes. From now on **this is the method we will use in all examples**.

There is one other way we can create a reference to another cell and this is via the **Paste Link** button on the **Paste Special** dialog box. We can see this method by simply selecting any cell then copying it and selecting the cell we wish to create the reference in, right click and select **Paste Special** then click the **Paste Link** button. If you look in the Formula bar you will see that Excel has created an **absolute** reference to the copied cell.

Toggle Through Absolute and Relative References

Another good habit to form is to use **Function key 4** (**F4**) to toggle through **absolute** to **relative** references. This again will save typing and help prevent errors.

Try this

- In cell **B2** type **=** and then move your mouse pointer over cell **A1** then select it.
- Now click within the **Formula bar** so the mouse insertion point is either
    - immediately before **A1**.
    - Between the **A** and the **1**.
    - Immediately after **A1**.
- Now push the **F4** button and your reference should change to absolute i.e. **$A$1**
- Push **F4** again and you will get a relative column absolute row reference i.e. **A$1**
- Push **F4** again as you will get an absolute column relative row reference; ie. **$A1**

- Push **F4** again and we will return to our original relative reference; ie. **A1**.

So as you can see, by pushing **F4** we can toggle through relative to absolute reference easily.

Referencing Other Worksheets

So far we have looked at how to reference a cell on the same Worksheet, but it is common to reference cells on other Worksheets. This method is again made very simple by using the point and click method. To reference a cell on another Worksheet do this:

- Type an **=** in any cell.
- Then using the mouse pointer click the name tab of another Worksheet (**Sheet2** in this case).
- Select the cell you wish to reference (**C7** in this case) then push **Enter**.

As you will see, Excel will place in the **Sheet** name and the **cell**. If you select the cell containing the reference and look in the Formula bar you will see a reference similar to: **=Sheet2!C7**. *Note Excel uses the ! (Exclamation mark) after the Worksheet name, this is how Excel knows that that **Sheet2** is the name of a Worksheet.*

Arguments and Syntax

Now we have been through the ways and means of referencing cells we can move on to the **SUM function** in Excel. Without doubt the **SUM** function is one of the most commonly used Excel functions. I will also use the **SUM** function to better explain what **Arguments** are in functions and what the Syntax of a Function is.

Arguments

Most of Excels functions need values of some sort to perform calculations and it is these values that are known as **arguments**. The **argument** for a function could be in the form of a number, text or logical value such as TRUE or FALSE. They could also be **error values** or **arrays**, but we won't go into this in Level 1.

Some functions will take only one argument while others can take up to 30. The **SUM** function for example takes up to thirty arguments, but only **requires** one. There are other functions that take 5 or 6 arguments and require that all the **arguments** have a value in them. Commas are always used to separate **arguments** in functions.

Syntax

The term **syntax** in Excel refers to the order in which arguments are accepted in functions. For example, if we have a function that takes two arguments and the first argument **must** be a number, while the second must be text we could not put the text value as the first argument and the number as the second. If we did we would have the wrong **syntax**

Now we have discussed **Arguments** and **Syntax** we can move on to creating a formula in Excel using the **SUM** function. The **SUM** function will add all the numbers in a range of cells. If there is text within the range the **SUM** function will ignore them. However the **SUM** function will not ignore text values **not** stored in cells (a text value is a number entered as text). I will use an example to show you what I mean by this statement.

- Type the numbers **1** to **5** in cells **A1:A5**.
- Now in cell **A11** type **=sum(**
- Click in cell **A1** and holding down the mouse button drag down to cell **A10**.
- Push **Enter** (*Excel will automatically add our closing parenthesis for us*).

You should get the result **15** and if you select cell **A11** and look in the formula bar you should see the formula **=SUM(A1:A10)**. If we now type the number **5** in cell **A6** we will get the result **20**. If we type the word **dog** in cell **A7** our result will not change. If we then type: "**5**" (including the quotation marks) the **SUM** function will again not change. This is because the **SUM** function will ignore text entered in cells.

To see what I mean by my previous statement "*However the SUM function will not ignore text values **not** stored in cells*" we will need to add another **argument**. Remember *Commas are always used to separate arguments in functions*, so we shall do is what is known as **edit** our formula. The easiest method to edit a simple function like the **SUM** is to do so from within the Formula bar.

- Select cell **A11** then place your mouse insertion point between the **A10** and the closing parenthesis.
- Type a **comma** (this tells Excel we are adding another argument) then type "**5**" (including the quotation marks)
- Push **Enter**.

This time our result in cell **A11** will change to **25**. This shows that while the **SUM** function **will** ignore text values stored in cells it does **not** ignore text values enter directly as an argument.

The range of cells that we use as an argument in the **SUM** function do not have to be adjoining as in the above example (**A1:A10**) they can be in non-adjoining ranges. This is the most likely reason we would use more than one argument.

- Delete the **SUM** formula in cell **A11**.
- Type the numbers **1** to **5** in cells **D1:D5**.
- Type **=sum(** in cell **A11** then select the range **A1:A10**.

- Type a comma (,) to start another argument.
- Select the range **D1:D5** and push **Enter**.

You should get the sum value of all numbers in the ranges **A1:A10** and **D1:D5**

We can make this task slightly easier by selecting the range **A1:A10** then holding down the **Ctrl** key, select range **D1:D5** and up to another **28** ranges if we wanted to.

If the numbers we wish to sum reside on another Worksheet, we would simply click the sheet name tab first then select the range on the Worksheet. If we want to sum numbers on both the Worksheets housing the sum formula and on another Worksheet, we could use the first argument for the current sheet and the second argument for the other sheet. If we wanted to sum the **same** range of cells on different Worksheets that are next to each other we could do so like this:

- Make sure you have five Worksheets in the Workbook you are using. To do this go to **Insert>Worksheet** as many times as needed.
- In cell **A1** type **=SUM(**
- Now select the first sheet, this is the sheet on the far left. Hold down your **Shift** key and select the name tab of the last Worksheet, this is the sheet on the far right.
- Now release the **Shift** key and select the range you wish the **SUM** function to sum.
- Push **Enter**.

Depending on the Worksheet names, order and range chosen, your formula should look something like: **=SUM(Sheet1:Sheet5!D1:G20)** If you now type any numbers within your chosen range on any of the Worksheets, they will affect the result of the **SUM** formula accordingly. We should also note that if we add another Worksheet anywhere between our chosen sheets it too will have the chosen range included (**D1:G20** in my example).

AutoSum

The **AutoSum** simply makes using the **SUM** function even easier, but only under the right conditions. Basically what the **AutoSum** will do is sum a range that is **visibly** directly **above** or to the **left** of the cell that we use it in (the default is above). It will include **all** of the **visible** range until the first blank cell or the first cell containing text. Try these examples.

- On a clean Worksheet put any numbers in the range **D5:D10** and **F5:J5**.
- Select cell **D15** and click the **AutoSum** icon on the Standard toolbar. It's the icon on the right of the globe that looks like a reversed Z.

You should get the formula **=SUM(D5:D14)**. Notice it starts at cell **D5**. This is because **D4** is the first blank cell. It includes the empty range **D11:D14** because it assumes we will want to add numbers within this range at some stage.

Now try this;

- **Delete** the **AutoSum** in cell **D15** then scroll down until cell **D10** is no longer visible. In other words row 11 should be our first visible row.
- Select cell **D12** and click the **AutoSum** icon
- You should see: **=SUM()** in cell **D12**. Push **Enter** and you will get an error message.
- Push **Esc** twice to cancel the operation.

The reason the AutoSum did not work is because there were no visible cells containing numbers above or to the left.

Try a similar exercise on the numbers in cells **F5:J5** and the same thing will happen. Although we could not enter the AutoSum in the second example, it did write the **=SUM()** formula for us and place the mouse insertion point between the opening and closing parenthesis. This means we could simply select any range that we wanted to sum.

AutoCalculate

There might be times when you wish to find out the sum of a range of numbers quickly without having to add a formula to the Worksheet. For these instances you should use the **AutoCalculate** feature of Excel.

To do this, select a range of cells containing the numbers you want to sum and look in the Status bar. If the Status bar is not visible go to **View>Status bar**. If the range of cells you wish to sum are non-adjoining, hold down the **Ctrl** key while selecting the ranges.

We are not restricted to only displaying the sum of our selected range! If you **right click** on the Status bar a shortcut menu will pop-up allowing us to choose one of six basic formulas.

USEFUL FUNCTIONS & THE INSERT FUNCTION

Now we have covered the **SUM** function in detail and also covered **formula arguments** and **formula syntax** we will use half of this lesson to look at some of Excels easy to use **Functions**. Although these functions are among the easiest to use they are also arguably the most useful.

Once we have covered these functions we will go into some detail on Excels **Insert Function**. The Insert Function was known as the **Paste Function** in earlier versions of Excel. The **Insert Function** houses all of Excel's built-in functions under their appropriate categories and goes a long way to writing the chosen function for us. In case you are wondering why we don't just skip all the detail and go straight to the **Insert Function** and make life easier for us all, it is because I firmly believe that the most important aspects of Excel and it's functions and formulas is understanding them. I like to believe that by course completion I will have taught you Excel, not shown it to you!

The functions we shall look at first are:

- AVERAGE
- COUNT
- COUNTA
- COUNTBLANK
- COUNTIF
- MAX
- MIN
- SUMIF

We will start each description with what the function does, followed by its **syntax** and then the number of **arguments** it can accept. It is important to note that while some functions take more than one argument it is **not always** the case that they must all be supplied.

These arguments are known as **option arguments** and they are identified in the syntax description by not bolding the argument. For example the **SUM** function can take up to 30 arguments, but only **one** of the thirty **needs** to be supplied, so in this document these are shown as below, eg:

Syntax SUM(**number1**,number2,...) Meaning "number2,…. to number 30" are all optional arguments while "**number1**" must be supplied.

AVERAGE

The AVERAGE function is used to return the average of the arguments supplied.

Syntax

AVERAGE(**number1**,number2, ...)

The AVERAGE function can take up to 30 arguments.

The arguments supplied must be numeric or references to numeric values. Text and/or references to text are ignored. It is important to note that cells containing zeros are **NOT** ignored. This can give you unexpected results if you are not aware of it.

=AVERAGE(A1:A3) would equal 10 if A1:A3 contained 5, 10, 15 respectively

COUNT

The COUNT function is used to count numbers or references to numbers in a range.

Syntax

COUNT(**value1**,value2, ...)

The COUNT function takes up to 30 arguments and each argument can be a variety of data types, but only numbers are counted.

If the range reference supplied contains valid dates these will also be counted.

=COUNT(A1:A5) would equal 3 if cells A1:A5 contained 10, 12/12/2001, house, 0, dog

COUNTA

The COUNTA function is used to count non-empty cells.

Syntax

COUNTA(**value1**,value2, ...)

The COUNTA function takes up to 30 arguments and each argument should be a reference to a range. Cells within the range can be a variety of data types, but only non-empty cells are counted.

=COUNTA(A1:A5) would equal 4 if cells A1:A5 contained , 12/12/2001, house, 0, dog.

In other words **A1** is empty and so is not counted while all other cells are.

COUNTBLANK

The COUNTBLANK function is used to count empty cells. It is the opposite of the COUNTA function

Syntax

COUNTBLANK(**range**)

The COUNTBLANK function takes 1 argument and this argument should be a reference to a range. Cells within the range can be a variety of data types, but only empty cells are counted

=COUNTBLANK(A1:A5) would equal 1 if cells A1:A5 contained , 12/12/2001, house, 0, dog

In other words **A1** is empty and so is counted while all other cells are not.

COUNTIF

The COUNTIF function is used to count cells within a range that meet a specified criterion.

Syntax

COUNTIF(**range,criteria**)

The COUNTIF function takes two (2) arguments. The **range** argument is a reference to a range of cells, while the **criteria** argument is the criterion that should be met by the cells within range before they are counted. The criteria specified can be in the form of a number, text or an expression.

Number criteria

=COUNTIF(A1:A5,20) would equal 1 if cells A1:A5 contained 15, 22, 20, 0, dog

In other words **A3** is the only cell that meets the criteria of **20**

Text criteria

=COUNTIF(A1:A5,"dog") would equal 1 if cells A1:A5 contained 15, 22, 20, 0, dog

In other words **A5** is the only cell that meets the criteria of "**dog**"

Expression criteria

=COUNTIF(A1:A5,"<20") would equal 2 if cells A1:A5 contained 15, 22, 20, 0, dog.

In other words **A1** and **A4** are the only cells that meets the criteria of "**<20**".

MAX

The MAX function is used to return the largest number from a set of values.

Syntax

MAX(**number1**,number2,...)

The MAX function takes up to 30 arguments and will ignore text.

=MAX(A1:A5) would equal 10 if cells A1:A5 contained 9, 8, house, 10, -10

MIN

Opposite to Max, the MIN function is used to return the smallest number from a set of values.

Syntax

MIN(**number1**,number2,...)

The MIN function takes up to 30 arguments and will ignore text.

=MIN(A1:A5) would equal 1 if cells A1:A5 contained 9, 8, house, 10, 1.

SUMIF

The SUMIF function is used to return the sum value from a specified range that meets a criterion.

Syntax

SUMIF(**range,criteria**,sum_range)

The SUMIF takes up to 3 arguments. The **range** is the range of cells to evaluate to see if they meet the specified criteria. The criteria specified can be in the form of a number, text or an expression. The **sum_range** is the range of cells to sum, but only if the corresponding cells in the range meet the specified criteria. If **sum_range** is omitted then the cells within the range are summed.

=SUMIF(A1:A5,5) would equal 10 if cells A1:A5 contained 5, 8, house, 10, 5

In other words cells **A1** and **A5** would be summed as they meet the criteria and NO **sum_range** was supplied.

=SUMIF(A1:A5,5,B1:B5) would equal 20 if cells A1:A5 contained 5, 8, 1, 9, 5 and cells B1:B5 contained 10,1,3,8,10.

In other words cells B1 and B5 would be summed as the corresponding cells in A1:A5 have a value of 5.

=SUMIF(A1:A5,"Cat",B1:B5) would equal 15 if cells A1:A5 contained Cat, cat, Cat, 9, 5 and cells B1:B5 contained 5,5,5,8,11

In other words cells B1,B2 and B3 would be summed as the corresponding cells in A1:A5 contain the text "Cat" (not case sensitive).

=SUMIF(A1:A5,">5") would equal 34 if cells A1:A5 contained 10, 15, Cat, 9, 5 and In other words cells A1, A2 and A4 would be summed as they meet the criteria of being greater than 5.

Insert Function

Called the **Paste Function dialog** in older versions, but the **Insert Function dialog** in newer versions, this dialog box is used to **insert** or **paste** the selected function into the chosen cell. The big advantage to using this feature comes as you become more comfortable writing Excel

formulas. Initially it is most beneficial because it can be used as a step-by-step guide for each argument in a function. What this means is, if you are going to be using a simple function such as the SUM, MIN, MAX etc., it really serves no purpose. When writing slightly harder functions such as COUNTIF, SUMIF etc., it can aid greatly.

Let's display the **Insert Function** dialog and have a superficial look at it. There are three methods we can use to show this dialog box and which one you use is purely optional. The three methods are:

- Going to **Insert>Function**
- Push **Shift + F3**
- Click the **Insert Function** icon to the left of your Formula bar (***Fx***), or for older version users, click the Paste Function icon on your Standard toolbar.

Once activated you will see the Insert Function dialog pop up in front of you. Depending on which version of Excel you are using, these heading names may vary slightly in this dialog box.

Search for a Function

Type a brief description of what you want to do in this box, then click **Go** to view a list of appropriate Functions.

Or Select A Category

In this dialog box you will see the Category Names that the Functions are grouped in. Click **All** to see a list of **All** Functions displayed in the **Select A Function**: box in alphabetical order. Click **Most Recently Used** to see a list of the last **10** functions used in the **Select a Function**: box.

Help

In the bottom left hand corner you will see either Excels standard help button (question mark), or the words **Help on this Function**. If you click this you will be presented with a description of how the selected Function works from Excel's Help.

To see how this works, Select **All** Under **Or Select a Category:** then **Click** on **SUMIF** under **Select A Function.**

The help screen that is displayed will give you most of the relevant information for the selected function, in this case **SUMIF**. All function help descriptions are uniform in that they will show the **syntax**, a description of the **arguments** and an example. We strongly recommend that you familiarise yourself with the **Function Help** as it can be very helpful once you are aware of the terminology used, hence my explanations on arguments, syntax, ranges, text values etc.

Most Excel users shudder at the thought of using the help to get their answers, but this is most likely because they feel intimidated by the jargon Excel uses. Please do your utmost to not become one of these, as the Excel help will always be your best source of help. If there are any terms used by the Excel help you are uncertain of you can always ask us.

For now close the **SUMIF** help and click the Cancel on the **Insert Function** dialog box. Let's try this simple exercise to see how the **Insert Function** can help in writing a formula. The purpose of this exercise is more to show you how to use the **Insert Function** as opposed to the SUMIF function itself.

- Type the numbers 1, 5, 20, 40, 50, 100, 200 in cell **A1:A7** respectively
- Type the names Bill, Bob, Dave, John, Fred, Mary, Jill in cells **B1:B7** respectively.
- Select cell **H2** and go to **Insert>Function** or push **Shift+F3** this will display the Insert Function dialog box.
- Click the **Math & Trig** in the **Or Select a Cateogry:** box.
- Scroll down and select **SUMIF**. At the bottom of the **Select a Function**: box will be the **SUMIF** arguments and syntax as well as a brief description of what it does.
- Click the **OK** button to display the Function Arguments dialog for the **SUMIF**. You will notice there is one box for each argument and each box has the argument written to the left of its box. Notice the last argument (Sum_range) is not bold. This is because the argument is optional. Meaning, if we omit this argument, Excel will use the **Range** argument as the range to sum as well as the range to meet the **Criteria**.
- Your mouse insertion point should be within the **Range** argument box, if it's not then click in there. If you look near the bottom you will see a brief description of what the **Range** argument does, which is the range of cells to evaluate based on the **Criteria**.
- Look in your Formula bar and you will see **=SUMIF()** this is the **SUMIF** function with its opening and closing parenthesis. It is within these parentheses that the arguments will be placed.
- Click the small box on the right of the **Range** argument box; this is called the **collapse dialog button**. The **SUMIF** dialog will disappear. Click in cell **A1** and holding down the mouse button drag down to cell **A7**.

- Now click the small button again, this is now the **expand dialog button** and the **SUMIF** dialog will appear again. You should now have **A1:A7** as the **Range** argument.
- Click in the **Criteria** argument box and you will see a brief description of what the **Criteria** argument expects for its data. We are going to use an expression first.
- Type **">50"** (including quotations) and you will see **= 300** in the dialog box. This is the result of the Function, which in this case is the **SUMIF**. At the bottom of the dialog box you will see **Formula result = 300**. In this case the **Function** result and the **Formula** result will always be the same. There would only be a difference if we were doing what is known as **Nesting**. This is something we will look at in a later lesson.
- So the result **300** is what we would expect in this instance as the only numbers within our **Range** greater than 300 are **100** and **200**. There was no need to supply any data for the Sum_range in this case because we were using the **Range** as the cells to sum as well as the cells to match the **Criteria**.
- Delete the **">50" Criteria** and replace it with **"B*"**. You will notice both the Function result and Formula result **=0** This is because the **SUMIF** is trying to use the **Range** cells to match the **Criteria** and for the cells to sum.
- What we need to do now is have Excel look in a different **Range** to meet our Criteria, we also need to supply a **Sum_range** argument.
- Click on the collapse dialog button for the **Range** argument and select range **B1:B7**, click the expand dialog button. We should now have the range **B1:B7** as our Range argument. Again the result for both the **Function** and **Formula** will still be 0 (zero). Now we need to supply a **Sum_range** argument!
- Click on the collapse dialog button for the **Sum_range** argument and select range **A1:A7**, click the expand dialog button. We should now have the range **A1:A7** as our **Sum_range** argument. Click **OK** we will get the result of **6**.

This is because we have told the **SUMIF** to sum all cells in the range **A1:A7** if the corresponding cell in **B1:B7** has a word beginning with the letter **"B"**.

The method in which we used the **Insert Function** for the **SUMIF** is the same principle we would use for all Functions written by using the **Insert function** dialog. As I stated before we began the above steps, the point of the exercise was to demonstrate the way in which the **Insert Function** can aid us in writing formulas.

Naming Ranges

Excel allows us to give Worksheet ranges names that can make our formulas easier to read. For instance if we use the above example that we used for the **SUMIF** Function, we could

name our **Criteria** range (B1:B7) **"Names"** and our **Sum_range** (A1:A7) **"Amounts"**. This would make our formula a bit easier to read.

There are however some basic rules for naming cells that we must adhere to. These are listed below and are from the Excel help file.

Guidelines for naming cells, formulas, and constants in Microsoft Excel

- The first character of a name must be a letter or an underscore character. Remaining characters in the name can be letters, numbers, periods, and underscore characters.
- Names cannot be the same as a cell reference, such as Z$100 or R1C1.
- Spaces are not allowed. Underscore characters and periods may be used as word separators ¾ for example, First.Quarter or Sales_Tax.
- A name can contain up to 255 characters.
- Names can contain uppercase and lowercase letters. Microsoft Excel does not distinguish between uppercase and lowercase characters in names. For example, if you have created the name Sales and then create another name called SALES in the same workbook, the second name will replace the first one.

There are a couple of ways we can **name ranges** so let's jump straight in with an example.

- Delete the contents of cells **A1** and **B1** and type the word **Amounts** in cell A1 and **Names** in cell **B1**.
- Type 5, 20, 40, 50, 100, 200 in cell **A2:A7** respectively. Type the names Bob, Dave, John, Fred, Dick, Jill in cells **B2:B7** respectively, if they are not there already.
- Now either select the range **A1:B7** with the mouse, or push **Ctrl + Shift + *** this will make Excel select the **Current region**. *The Current region is defined as all the non-empty adjoining cells surrounding the active cell. The * (asterisk) must be the one on the same key as the **8**).*
- Go to **Insert>Name>Create**. This is the **Create names** dialog box and is used to create names based on the current region row and/or column headings. In this case we only have column headings so ensure that only the **"Top row"** check box is checked.
- What we have done by doing this is told Excel that we wish to name the range **A2:A7 Amounts** and the range **B2:B7 Names**. In other words use the headings in the top row to name the selected ranges directly below them. Click **OK**
- Now select cell **C8** and push **Shift + F3** or go to **Insert>Function**. Locate the **SUMIF** function either from within the category **Most recently used** or **Math & Trig** then click **OK**.

- Click the collapse dialog button on the **Range** argument box and select range **B2:B7**. You should see Excel place the name **Names** in the **Range** argument box. This is our named range **B2:B7**. Click the expand dialog button.
- Type **"D*"** in the Criteria argument box.
- Click the collapse dialog button on the **Sum_range** argument box and select range **A2:A7**. You should again see Excel place the name **Amounts**, this time in the **Sum_range** argument box. Click the expand dialog button. Now Click **OK**.

You should have the formula **=SUMIF(Names,"D*",Amounts)** giving the result of **120**.

Using the **Create names** dialog is the easiest method to use if we are going to be calling our ranges the same names as the column and/or row headings as it saves typing and typos. We could, if we wanted, type the names in ourselves, by typing them directly into the **Name box**. The **Name box** is on the left of the Formula bar. If we click the small drop arrow on the **Name box**, we should see both our named ranges **Amounts** and **Names**. If you select either one Excel will take you straight to the chosen named range and select it. It is in this box that we can type a name in directly.

To see what I mean select the range **A1:B7** and click in the **Name box**. Type the word **Data** and push **Enter**. Now select any cell outside of range **A1:B7** and select the name **Data** from the **Name box**, you will be transferred automatically to the **Data** selection.

The other thing we need to know when dealing with named ranges is how to delete them. This can only be done in one way and this is via the **Insert name** dialog box.

- Go to **Insert>Name>Define** or push **Ctrl + F3**. This will display our **Insert name** dialog box.
- You should see the three names we had created amongst the listing. Select the name **Amounts**.
- If you now look in the **Refers to** box you should see **=Sheet1!$A$2:$A$7**. The **Sheet1!** May be different if the Worksheet is called something else.
- All we need to do now is click **Delete** and the named range **Amounts** will be deleted.
- Do the same for **Data** and **Names** then click **OK**.

You will notice that our **SUMIF** formula is now retuning **#NAME?** This is Excels way of telling us the formula within the cell contains text is does not recognise. Delete the **#NAME?**

The **Insert name** dialog is also the only place we can edit named ranges. In the above example we could have altered the **Refers to** range for any of the names to another range.

For example we could have changed **=Sheet1!$A$2:$A$7** to **=Sheet2!$A$2:$A$7** and/or **=Sheet2!$L$1:$M$70** or any valid range address.

Constants

There is one other area of Naming we would like to cover and this is naming **CONSTANTS**. A constant is simply a value that is **not** the result of a formula. So if we type **10%** or **David** or **12/12/2000** into a cell these would all be constants, as their values would not change unless we changed them.

Quite often when setting up a spreadsheet some users will type a value or text that they will be using a lot into a cell and then refer to that cell in their formulas. For example let us say we are setting up a spreadsheet that will constantly be using the percentage **10%**. We could place this into a cell somewhere and then name this cell **TenPercent**. We could then use this named cell in all our calculations that require **10%**. Let's try this to see how it works.

- Type the value **10%** in any cell.
- With this cell selected go to the **Name box** and type in **TenPercent** and push **Enter**.
- Now in any other cell type **=100*TenPercent** and push **Enter**.

You should have the result **10**, which is what we would expect by multiplying **100 by 10%**. The biggest advantage to this method is that if we need to change **10%** to say **20%** we simply go to our named cell **TenPercent** and type in **20%**. All our formulas that are using **TenPercent** in their calculations will change accordingly. The down side to this method is that it is all too easy to accidentally delete the value in our named cell. A better method is the one below.

- Go to **Insert>Name>Define** (or push **Ctrl + F3**)
- Select **TenPercent** and then in the **Refers to** box type **10%** straight over the top of the cell address.
- Click **Add** then **OK**.

What we have now done is named a constant. This is a better method as it is very unlikely this could be accidentally deleted.

Paste Name Dialog

You may end up with a Workbook that has many **named constants** and it is a bit hard to remember them all! Not to worry as Excel has a feature called the **Paste name** dialog. This

can both insert a named constant or range and create a list of all our names within the Workbook. We can see this best if we create some named ranges and some more named constants. Do this using the methods above. When you have created 3 named constants and 3 named ranges try this.

- Type **0** in any cell then before pushing **Enter** push **F3** or go to **Insert>Name>Paste**.
- From the **Paste name** dialog box select **TenPercent** and click **OK**
- Excel will insert the name for you. This can be very handy when using named ranges and/or constants in formulas.
- On a new Worksheet select any cell and push **F3** and click the **Paste list** button. Excel will create a list of all named ranges and constants in the Workbook. The names will be in one column and what or where they refer to in the other. The only reason we suggested a new Worksheet is so that the list is not pasted over the top of existing data.

CALCULATIONS / COMMENTS

DRAWING TOOLBAR / EDIT REPLACE /

DELETE / CLEAR

In this lesson we will complete our session on Formulas and Functions by looking at how Excel calculates. After this we will take a break from the very important calculation side of things to look at some of Excels very handy features that can make setting up, using and editing a spreadsheet much easier.

How Excel Calculates

One of the fundamental things that you must know about Formulas and Functions is the method in which Excel performs calculations. We will not go into any great detail in this, but there are some basics all Excel users **need to know**.

The main function of Excel is obviously the number crunching side of things and a good spreadsheet is one that returns accurate results 100% of the time. So whilst we may have a spreadsheet that looks very pretty and is formatted to make it look a million dollars, it is the guts of the spreadsheet, or the nuts and bolts, that make it either a workable spreadsheet or an unworkable spreadsheet, not the visual appeal.

Operators that Excel Recognizes

The text below is from the Excel help file:

Calculation operators in formulas

Operators specify the type of calculation that you want to perform on the elements of a formula. Microsoft Excel includes four different types of calculation operators: arithmetic, comparison, text, and reference.

Arithmetic operators

To perform basic mathematical operations such as addition, subtraction, or multiplication; combine numbers; and produce numeric results, use the following arithmetic operators.

Arithmetic operator	Meaning	Example
+ (plus sign)	Addition	3+3
– (minus sign)	SubtractionNegation	3–1–1
* (asterisk)	Multiplication	3*3
/ (forward slash)	Division	3/3
% (percent sign)	Percent	20%
^ (caret)	Exponentiation	3^2 (the same as 3*3)

Comparison operators

You can compare two values with the following operators. When two values are compared by using these operators, the result is a logical value, either **TRUE** or **FALSE**.

Comparison operator	Meaning	Example
= (equal sign)	Equal to	A1=B1
(greater than sign)	Greater than	A1>B1
< (less than sign)	Less than	A1<B1
>= (greater than or equal to sign)	Greater than or equal to	A1>=B1
<= (less than or equal to sign)	Less than or equal to	A1<=B1
<> (not equal to sign)	Not equal to	A1<>B1

Text concatenation operator

Use the ampersand (&) to join, or concatenate, one or more text strings to produce a single piece of text.

Text operator	Meaning	Example
& (ampersand)	Connects, or concatenates,	"North" & "wind" produce "Northwind"

	two values to produce one continuous text value	

Reference operators

Combine ranges of cells for calculations with the following operators.

Reference operator	Meaning	Example
: (colon)	Range operator, which produces one reference to all the cells between two references, including the two references	B5:B15
, (comma)	Union operator, which combines multiple references into one reference	SUM(B5:B15,D5:D15)

End of MS Excel Help file

When Excel performs a calculation it does so in the following order:

- Exponentiation
- Multiplication and Division
- Subtraction and Addition

If a formula contained both a **multiplication** and a **division operator** Excel would calculate them from left to right. The same would apply for **subtraction** and **addition**. We can change the order in which Excel does its calculations by closing the relative function in parenthesis. Let's say we had the formula **=10-10*10** the result would be **-90** (negative 90). If we then used **=(10-10)*10** the result would be **0** (zero). In other words we have forced Excel to change its **natural order of calculation**. Excel is quite happy to do this.

Some examples of this would be:

- =5+5*5+5+5 would result in 40
- =(5+5)*5+5+5 would result in 60
- =(5+5)*(5+5)+5 would result in 105

So as you can see, we can manipulate any formula to calculate in the order we want, simply by placing the parenthesis in the appropriate places.

We will leave Formulas at this stage to allow you time to let what we have discussed to date sink in. If there are any questions you would like to ask or any particular formulas you would like explained you only need to ask. What we have shown you is what we consider the least you should know about Excel and formulas. Once you have gone over and fully understand these lessons on Excels functions and formulas you will have the foundations on which we can build. You may also discover that you will know the fundamentals of Excel formulas and functions better than a lot of so called experienced users!!

Let's now move on to some more light-hearted features of Excel that can make life that bit easier.

Cell Comments

Cell Comments, or notes as they are often called, were first introduced in Excel 97. They are basically the equivalent of sticky notes that have become so popular in offices throughout the world. They allow us to attach a comment to a cell to inform, remind or explain the content of a cell or range of cells. We must stress, however that they shouldn't be used too liberally as not only will they loose their impact but they can cause a file size to increase dramatically. As a rule of thumb we would recommend using no more than 50 or so per Workbook. As with most features in Excel, there are numerous ways we can insert a **cell Comment**, the method used is entirely up to the user.

To insert a **cell Comment**, do one of the following:

- Right click and select **Insert Comment**
- Go to **Insert>Comment**
- Push **Shift + F2**
- Display the **Reviewing** Toolbar. Go to **View>Toolbars>Reviewing** or right click on any visible Toolbar and select **Reviewing**. Once the **Reviewing** Toolbar is visible click the first icon on the left (**New comment**).

Whichever method we use Excel will:

- Insert the comment into the cell that is active at the time.
- Place in the user name for the PC being used at the time.
- Place the mouse insertion point within the comment ready for you to type. This is a cell Comments **Edit mode**.

The user name of your PC is determined by Excel under the **General** page tab of the **Options** dialog box. We can change this by going to **Tools>Options** and selecting the **General** page tab and typing whatever we like in the **User name** box situated at the bottom.

This will not affect any cell Comments that have already been inserted only new ones we insert after making the change.

Let's insert a cell Comment into any cell on any Worksheet using any of the above methods, we prefer the right click method. As mentioned before, you will be in **Edit** mode so we can simply type any text we like. Once you reach the edge of the **cell Comment**, Excel will automatically drop us down to the next line. This can also be done at any time by pushing **Enter**. If you keep typing until you reach the bottom edge of the cell Comment Excel will automatically push the top line out of sight and continue on.

Once you have finished typing and click out of the cell, the comment will automatically do what is known as **Hide** itself. If the comment is still fully visible you may need to do one or both of the steps below:

- Display the **Reviewing** Toolbar. Go to **View>Toolbars>Reviewing** or right click on any visible Toolbar and select **Reviewing**. Once the **Reviewing** Toolbar is visible click the fifth icon on the left (Hide All Comments) this is a **toggle** key.
- Go to **Tools>Options** select the **View** page tab and ensure the **Comment indicator only** check box is checked.

In fact it would be a good idea to have the **Reviewing** Toolbar visible while we go through cell Comments, so show it and then either drag and dock it, or double click the blue title bar. If you prefer you could also leave it as a floating Toolbar.

You will notice that the cell containing the **cell Comment** has a small red triangle in the top right corner. This is the **Comment indicator**, or **flag** as it is sometimes called. This simply lets us know that there is a comment in the cell. To read the comment simply hover your mouse pointer over the cell and it will display the comment. Once you move your mouse pointer away from the cell the comment will hide itself again.

Many books and other literature will tell you that you should select the cell to display a cell Comment and the cell being active is what displays the comment, this not technically true! A simple way to prove this is to click in the cell directly below the cell with the cell Comment, move your mouse pointer away from the cell and use the **Up arrow** on the keyboard to activate the cell. You will not see the comment until you hover your mouse pointer over the cell.

Edit A cell Comment

Once we have a comment in a cell we can **Edit** it in much the same way as we can format a cell and/or it's content. This means we can nominate the type of text, the color of the text and/or the comment itself, its size, its outline and even it's shape.

Most of these can be achieved via the **Format Comment** dialog box and are self explanatory, so we will only explain the little known ones. However, as with any part of Excel if you would like some detail, you only have to ask!

Ok, the easiest way to **Edit** a cell Comment is to click in the cell containing the cell Comment, right click and select **Edit comment**. This will put us in **Edit mode**, exactly as we were when we first inserted it. The first thing you may notice is the fuzzy outline around the cell Comment and the eight small white boxes or circles (depending on which version of Excel you are using). These white boxes are called the **Size handles** and are common to all shapes, textboxes, comments and charts etc. All you need to do is hover your mouse pointer over one of them until your mouse pointer changes to an up/down arrow, left click, then drag and release. If you use the **Size handles** in either corner of the cell Comment the height and width will change in accordance with each other.

Let's now display the **Format comment** dialog box. To do this, **double click** on the outer edge, or **right click** on it and select **Format comment**. Either way, Excel will display the **Format comment** dialog box. On this you should see eight page tabs and most of these are purely for visual effect with the exception of **Protection** and **Properties**. Protection is will explain is a later lesson. If there is any aspect of this dialog box you would like explained just let us know.

There are a few features of cell Comments that cannot be changed via the **Format comment** dialog box and these are the **shape** and **3d effect**. For both of these examples you will need to use the **Drawing Toolbar**. So if it is not visible go to **View>Toolbars>Drawing** or right click on any toolbar and select **Drawing**. By default the **Drawing** toolbar will dock itself at the bottom of your screen.

Change the Shape

- Select a cell that has a cell Comment, right click and select Edit Comment then select the outer edge.
- On the **Drawing** Toolbar go to **Draw>Change AutoShape**.
- Wave you mouse pointer over the sub menus to see your choices.

- Select any shape.

Now you will have a comment that has the shape of the **AutoShape** you chose.

Give a 3d Effect

- Select a cell that has a cell Comment, right click and select **Edit Comment** then select the outer edge.
- On the **Drawing Toolbar** go to **Draw>3-D**. This is the last icon on the right in the shape of a 3-D box. Select any 3-D setting

Now you will have a comment that has the 3-D effect that you have chosen.

Give a Shadow Setting

- Select a cell that has a cell Comment, right click and select **Edit Comment** then select the outer edge.
- On the **Drawing Toolbar** go to **Draw>Shadow** this is the second last icon on the right.
- Select any shadow setting

Now you will have a comment that has the shadow effect you chose.

That is about it for cell Comments, but please ask any questions that you may have.

Find and Replace

As with most Microsoft Office applications Excel has a **Find** dialog and a **Replace** dialog. These make it possible to quickly find a particular piece of text or a value in a Worksheet or Worksheets.

There are two rules that apply to both of these dialog boxes and these are:

- If we only have a single cell selected they search through the entire Worksheet.
- If we have more than one cell selected, they will search only through the selected range.

The **Find** dialog box and **Replace** dialog box are very closely related. They are more often than not used in conjunction with each other. Basically, if you opt for **Edit** you will be able to use the **Find** and/or the **Replace**. Our recommendation is to forget about the **Find** box

unless you are searching for text or values that reside in **cell Comments**. We will use cell Comments as our first example, but first we feel it is important to point out that the **Look in** box within the **Find** dialog box has three options; **Formulas, Values** and **Comments**. The Formulas and Values options can give very misleading results, so I recommend not using them. We will however, show you an alternative later.

The comments option of the **Find** dialog box does not have a **Replace** option and works like this:

- On a clean Worksheet, type the simple formula **=B1+2** in cell **A1**.
- In **A2**, type the number **2**.
- In **A3**, insert a cell Comment and type the number **2** inside it.
- In **A4**, type the word **Cat**, push the space bar and then type **cat**.
- In **A5**, insert another cell Comment and type the number **2**.
- In **A6**, type **=2+B6**
- With any single cell selected, either go to **Edit>Find** or push **Ctrl + F**
- Type the number **2** in the **Find What** box. You will notice that there is a **Search** box that contains the two options **By Rows** or **By Columns**. ***Note*** *- These options will have very little bearing on a Worksheet unless virtually every cell is filled with data, which is very unlikely! Even then, it will only make the difference of a second or two in the way it searches*
- Have **Comments** selected in the **Look In** box, then click **Find Next** and Excel will take you first to cell **A3**.
- Click **Find Next** again, and you will be taken to cell **A5**. ***Note*** *- If you keep clicking* ***Find Next****, you will toggle between* ***A3*** *and* ***A5****.*
- What you need to do from here should you wish to replace the number **2** within the cell Comment(s) is click **Cancel** and edit the comment as we discussed previously.

Let's now use the **Edit>Replace** dialog to replace text or values in our cells.

- Again, with any single cell selected, go to **Edit>Replace** or use **Ctrl + H**.
- Type the word cat (in lower case) in the **Find What** box, then type the word dog (lower case) in the **Replace With** box.
- Check the **Find Entire cells Only** box and click **Replace**. You should get a message come up telling you that Microsoft Excel cannot find a match. This is because we do not have the single word cat in a cell on its own, which is what the **Find Entire cells Only** option forces it to look for.
- Deselect (or uncheck) the **Find Entire cells Only** checkbox and click the **Match Case** checkbox. Now click the **Find Next** button and we should be taken straight to cell

A4, which contains the two words **Cat** and **cat**. One with the uppercase **C** and one with a lowercase **c**.

- Click the **Replace** button and our word cat (with the lowercase c) should be replaced with the word dog. The word Cat (with an uppercase C) will be left unchanged, even if you click the **Replace** button again.
- Click **Close**

We should note here that clicking the **Replace** button will only ever replace the text or value in the current active cell. Clicking the **Replace All** button will replace all matching text or values on the entire Worksheet, unless we had more than one cell or a range of cells selected before we activated the **Replace** dialog.

Let's now assume we want to replace the number 2, but only in cell **A1**, where it is part of our formula.

- Select any cell on your Worksheet other than cell **A1**.
- Push **F5** and click **Special** on the **Go To** dialog box. This will display what is known as the **Go To Special** dialog box.
- Check the **Formulas** option and leave all the sub-options below this, as it does not matter in this case.
- Click **OK**
- Now push **Ctrl + H** or go to **Edit>Replace**. Type 2 in the **Find What** box, and the number 3 in the **Replace With** box. Ensure the **Find Entire cells Only** option is not checked.
- Click **Replace All** and then **Cancel**.
- If you then click back in cell **A1** and look in your formula bar, you should now see the formula = **B1+3**. If you click in cell **A6** you should see =**3+B6** in your formula bar.

The reason the **Replace All** only replaced the number **2** in our formulas was simply because we had more than one cell selected, which is telling Excel to only replace the number **2** in the selected cells.

Different Methods of Clearing Cell Contents

Normally when working in Excel, if we want to remove a cell(s) contents we would simply push the **Delete** key on our keyboard. This would delete the contents of the cell. However, it will not delete the formatting of the cell in any way. What this means is, if we had a cell with a yellow background, blue font and formatted for currency, and the value $10.00 in the cell.

Pushing **Delete** would only remove the value 10. All the other cell attributes would remain intact.

Let's try just this so that you can see what we mean.

- In cell **A3**, type the value **10**. Format the cell for currency of any kind, make it yellow and make the font blue.
- Click in cell **A3** and push **Delete**.
- Now type any number in the cell and as you will see, you will still have a yellow cell with blue font and formatted for currency.
- This time, with cell **A3** selected, go to **Edit>Clear>All**
- Now type any number in cell **A3** and all you will have is the number in black font, with no formatting and no background colour.
- Click the **Undo** button to undo the **Clear All** action.
- Ensure **A3** is still your active cell. Go to **Edit>Clear>Formats** and cell **A3** should now only have the number **10** in the cell without any formatting of any kind.

While these differences may appear subtle, they can be very handy should you have a large range of cells which you have specifically formatted and you only want to clear the contents and not the formatting or vice versa.

MORE EFFECTIVE PRINTING

When you come to printing a Worksheet, it is essential that you know how to produce a finished product that a reader or user can easily relate to. It is definitely worth spending a small amount of time on getting your printer settings correct, rather than waste time and paper trying to do it quickly. Let's look at the printing function of Excel in more detail.

There are many different ways that you can print a Workbook. The three most common are:

- By going to **File>Print**.
- By selecting **Ctrl + P**.
- By selecting the **printer** icon on your **Standard Toolbar**.

If you print by selecting the printer icon, you must be aware that this option will by-pass the **Print** dialog box and print straight to your printer using its current print settings. Use this option only when you are sure of your print settings.

Let us now access the Print dialog box by using either the **File>Print** option or by selecting **Ctrl + P** and look at the essential functions of this dialog box in some more detail.

Printer

Name

In the white box next to **Name**, you will see the printer that your particular PC is connected to. If you can access more than one printer, selecting the downward pointing arrow to the right of the printer name will enable you to see the other printers you are connected to. If you wish to change printers to print (ie, if you are connected to both a black and white printer and a colour printer, you can decide which printer you wish to use by just clicking the desired printer with your left mouse button.

Status

This is telling you the status of the printer you have selected. The choices are either **busy** or **idle**.

Type

This is again telling you which type of printer you are connected to as your default

Where

This is identifying to you the location of your printer. If you are connected to a local printer it will display the port number of your computer. If you are connected to a network printer, it will display the location of the network printer.

Find Printer

Allows you to select a printer on your network that is not listed in your dialog box. Sometimes network administrators will bar you from entering this area, but if you have access, you can select the printer you want to use, click OK to return to this menu and print the document.

Properties

By pressing this button, you will be taken to a sub-menu of **Properties**. Let's look at the sheet tabs within this sub-menu. After making a selection on any of these sheet tabs, click **OK** and your changes will be accepted.

***Note**: Some of the options listed here may not be available to you, you may have extra options, or the option names may be slightly different. This is entirely dependent on the printer you are connected to.*

Paper

Paper Size

Under this heading you will see the various paper sizes available to your printer. Have a look at the paper sizes available to you by scrolling through with the horizontal scroll bar beneath the icon window. Clicking on the desired paper size will select it. You will note in this box that there is a custom icon. If you printer supports custom paper sizes, you can click this icon and specify the size you wish to use.

Paper Source

This box and its downward pointing arrow to the right specify where in your particular printer your paper resides. Different printers have different paper sources, such as upper tray, manual feed or lower tray and you may wish to change your source. For instance, in most business today you will find letterhead stored in an upper tray and followers (white) paper in a lower tray, or A3 paper stored in one tray, and legal in another.

Media Choice

This box and its downward pointing arrow to the right specify the type of mediums available to you. These could be in the range of standard, bond, special paper, or transparency. Note that if you select transparency, you must have a transparency in your paper tray, otherwise if you print on ordinary paper, the printer's ink will smear and waste not only ink but paper as well.

About

This will tell you nothing more than the copyright information unique to your particular printer.

Restore Defaults

Pressing this button will restore the defaults on this page tab to their original settings.

Graphics

Resolution

This option will only apply if you are using a laser printer and true-type fonts. It enables you to change the resolution of your printing. Basically, the higher the resolution, the better quality printing you will get.

Dithering

Dithering is used for colour printing and black and white printing. It blends pure colours into patterns to simulate a wider range of colours (such as blending red and yellow together to make orange) when used with a colour printer, and will produce grey shading in graphics for black and white printers.

None

Click **None** if you don't want any dithering.

Course

Click this if your resolution setting is 300 dots per inch or higher.

Fine

Click this option if your resolution setting is 200 dots per inch or less.

Line Art

Click this option if your graphics include well-defined borders between black, white and grey settings.

Error Diffusion

For printing pictures or photographs without well-defined or sharp edges.

Intensity

This option has a slide bar that can be dragged by holding down your left mouse button on the arrow and dragging towards either darkest or lightest. It will affect how dark or light the graphics in your document are printed.

Device Options

Print Quality

The options under this heading will be unique to your printer. Basically, you can change the type of quality you want to use depending on if you want to print a draft, a presentation or whatever.

Back onto the **Print Dialog Box** now and we will look at **Print Range**.

Print Range

There are two options under print range. **Select All** you would use if you wish to print your entire Workbook, or **Select Page(s)** if you wish to only print some of your Workbook. You can either type in the **From** and **To** boxes, or you can use the **spin button** (the tiny upwards and downwards pointing arrows to the right of these boxes) to make a selection. Then click OK.

Print What

There are three options under this heading.

Selection

By selecting this option, Excel will only print the range you have selected.

Active Sheet

If you select this option, Excel will print the active sheet. This is defined as going from the first cell containing data to the furthest right most cell containing data, and the furthest bottom cell containing data in your Worksheet.

Entire Workbook

This obviously will print the entire Workbook if selected.

Copies

You can either type the number of copies that you require in this box, or use the spin button to make a selection, then select OK.

Preview

By pressing this button, you will be able to view your document in **Print Preview** mode. More about this now.

Different Views

Excel provides you with lots of different settings that let you adjust the final appearance of the data that you wish to print. There are three different types of views that are available to you to help you see and adjust how the Worksheet will look when you print it. It is entirely up to you which view you work in, you can switch between the different views to view your work in different modes and see the effects before you print it.

The three views available to you are:

- Normal View
- Page Break Preview
- Print Preview

Normal View

Normal view is the default of Excel. It is the best option for working with your document and for on-screen viewing. This view is available through the **View** menu on the **Standard Worksheet** Menu Bar.

Page Break Preview

This preview will show you the page breaks of your data and will easily allow you to adjust your print area and page breaks. This view is available through the **View** menu on the **Standard Worksheet** Menu Bar and is not covered in this lesson.

Print Preview

If you set your view to **Print Preview**, you can easily see your columns and margins and adjust them in this mode. All you need to do is hover your mouse over the column handles (located right at the top of your page) until your mouse changes to a cross and drag in whichever direction you require to widen the column, or place your mouse on the margin lines and drag in the same way. This view is available by pressing the **Preview** button on your **Print dialog box**, by selecting the **Print Preview** icon located to the right of your **printer** icon on the **Standard Toolbar**, or by selecting **Print Preview** from the **File** menu.

Let us now have a look at printing a typical document.

Call up the attached Workbook **ExcLev1L07.xls** (NOTE: *you may have to extract it from the ZIP first !*)

- Try out the different views available to you. Remember, **Normal** view (which you should already be in since it is the default) and **Page Break Preview** are available through the **View** menu on the **Standard Worksheet** Menu Bar, whilst **Print Preview** is available to you by selecting the icon next to the printer icon, or by selecting **Preview** from the **Print** dialog box or by accessing **Print Preview** from the **File** menu.
- Let us now highlight the range that we wish to print to perform a print by Selection. Select the range **A3:J54** on the **Automatic Outline** worksheet.
- Now select **Print Preview** to have a look at your selected range in this mode by using one of the three methods described above.
- Notice down on the status bar at the bottom of your page you will see the text: **Preview: Page 1 of 2**. This is telling you that you are on page 1 of 2 pages.

At the top of your screen are 9 buttons. Let's have a look at some of these now.

Next and Previous

Selecting these buttons will take you through the number of pages you have on your screen. **Next** will take you forwards and **Previous** will take you to the previous page.

Zoom

By selecting this button, you will switch between a full-page view of a sheet and a magnified view. The Zoom feature will not affect the size of your printing. It is just an aid to assist with readability. You can switch between a full-page view and a magnified view of a sheet by clicking any area of the sheet. Notice your mouse will change to a magnifying glass when you

do this. Place your mouse over the part of the sheet that you wish to magnify and by clicking your mouse button it is magnified.

Margins

Select the button titled **Margins** (another toggle button), you will see lines pop up on your screen. Each line depicts a margin. You can change your margins by hovering your mouse over the lines until your mouse changes to a cross, then drag to either widen or shorten. Selecting the Margins button again will hide the margin lines.

Setup

If you select this button, your **Page Setup** dialog box will pop up in front of you.

This dialog box can also be accessed via the **File** menu. You will notice as we go through this box that a few options are greyed out. If you select **Page Setup** through the **File** menu, all options will be available to you, so it is a good idea to access it this way while you are learning. This is probably the most important box of the entire printing function, as it is here you make the necessary changes to print your document professionally.

Orientation

Orientation means the way in which your sheet of paper prints from the printer. **Portrait** means with the shorter edge at the top of your page and the longer edges at the sides, and the **Landscape** option means with the longer edges at the top of the page and the shorter edges down the sides.

Scaling

There are two options under this heading. The first option **Adjust to __%** of normal size will allow you to reduce or enlarge the print range you have selected. The range varies from shrinking your selection to 10% of normal size, to expanding your selection to 400% of normal size.

The second option under this heading is **Fit to __ page(s) high by __ page(s) tall**. This will make our selection to fit on however many pages we specify.

Let's now select **Portrait** under **Orientation** and **Fit to 1 page(s) wide by 1 page(s) tall** under **Scaling**. Now hit **OK** and you should be returned to Print Preview mode. You will notice that all our selected data now appears on one page.

If you hit the **Setup** button again, you will be returned to the **Page Setup** dialog box. Note here that under **Adjust to __%** of normal size you have **77%**. This is telling you that Excel had to reduce your selected data to **77%** of it's normal size to fit it all onto a page that is 1 page wide by 1 page tall.

Now select the **Landscape** button under **Orientation** and then select the **Adjust to __% of normal size** option and either type or use the spin button arrows to reach **100%**. Select **OK** again to accept your choice.

Again you will be returned to Print Preview mode and you will notice now that your selected data is again on two pages. If we wanted to, we could select the **Fit to 1 page(s) wide by 1 page(s) tall** option, to fit all of our data on a landscape page, but in this case we will print on 2 pages.

Paper Size

You can change your paper size here, as well as in your Print dialog box if you wish by selecting your downward pointing arrow to see the paper sizes available through your printer.

Print Quality

You can change your print quality here, as well as in your Print dialog box by also selecting the downward pointing arrow to see the ranges available to you.

First Page Number

The default here is Auto which means your printing will start at page 1. If you wish to print starting at another page number, you can type any number other than 1 in this box.

Margins

This sheet tab will show you the margins of your page and the margins of any headers or footers you may have. You can type your margins in if you wish, but it is far easier to change your margins using the **Margins** button in **Print Preview** mode, as discussed above.

Centre on Page

This option however, is a very handy feature not available in **Print Preview** mode. By selecting either **horizontal** or **vertical** you will center your selection on your page either horizontally or vertically.

Header/Footer

The definition of a Header or Footer is something that is required to appear on every page of your document. As the names suggest, a **Header** is something that will appear at the top of every page, and a **Footer** is something that will appear at the bottom of the page. In Excel, you can have only one Header and one Footer in each Worksheet. The Header/Footer Dialog box can be accessed through the **Page Setup** dialog box, or via the **View** menu on your **Standard Worksheet** menu bar.

Let us first create a **Header** for the data that we wish to print.

- Click on **Custom Header**.
- Click in the white box under **Centre Section**. As the title suggests, if you type in this box, your Header will be centered, Left Section will left align your text and Right Section will right align your text.
- Type in the words **FOUR YEAR FORECAST** in the **Centre Section** box.
- Now, highlight your text and click on the **A** icon above. You will now be familiar with the **Format Cells** dialog box, and what you are looking at now is a mini version of this.
- Select **Bold** under Font Style and **24** under Size. Click **OK**.
- You will now be taken back to your Header dialog box and you will notice that the words **FOUR YEAR FORECAST** are indeed bolded and size 24.
- Select **OK**.

Now you are back in your Page Setup dialog box, notice that your header is in the top white box, and also under the heading Header.

To the right of the second white box is a downward pointing drop down arrow. This contains some built-in headers. If you wanted to, you could select a build-in header, then go to **Custom Header** to use it for your Worksheet.

Footers work in exactly the same way so let's put a footer in now

- Click on **Custom Footer**.
- Click in the white box under **Left Section**.
- Select the second icon from the left with a green cross in it. You will notice **&[File]** appear in the Left Section. This will automatically insert the file name of your Worksheet into the Left Section of your Worksheet.
- The other icons here (apart from the **A** which is the mini version of your Format Cells dialog box) will insert information as follows:
    - **#** Will automatically insert the page numbers for you.
    - **++** Will automatically insert the number of pages in the active Workbook. This means that if you had Page # of ++ in your footer, you would actually have Page 1 of 12 (or however many pages you had).
    - **8/7** This will automatically insert the current date.
    - **Clock** Will automatically insert the current time.
    - **Green Cross** Will automatically insert the current file name.
    - **Blank Paper** Will automatically insert the sheet name of the current Worksheet.
- Now click in Right Section of your Footer, type the words **Printed** on then select the **Date** icon.
- Now select **OK** to return you to your Page Setup Dialog Box.

The last section of the Page Setup dialog box that we need to look at is under the **Sheet** heading

Sheet

The top area of this box is grayed out. If something is grayed out within Excel, this is because the options are not available in the area in which you are in. The options at the top of this box are only available if you access the **Page Setup** dialog box via the File menu as mentioned above.

The only options we need to look at here are the ones under Print.

Print

If you select **Gridlines** the gridlines of your Excel Worksheet will print.

If you select **Black and White**, your data will be printed in Black and white only (if you have color in it, it will appear as grey shading).

If you select **Draft Quality** your data will be printed in draft quality.

If you select **Row and Column Headings** then the row and column headings (A, B, C, 1, 2, 3 etc) will be printed.

Page Order

You have two options here; **Down then Over** and **Over then Down**. Selecting one of these options will control the way data is numbered and printed when it does not fit on one page.

Let us select **OK** now to return us to Print Preview mode to have a look at our nearly ready to print Worksheet.

You will notice that you can now see the Header and Footer that ypu placed in your Worksheet.

Now hit your **Next** button and you will notice that the row that appears at the top of page 1 (Jan, Feb, 1st Quarter etc) does not appear at the top of page 2. We can easily change this by doing the following.

- Press your **Close** button to close you out of your Print Preview mode and return you to your Worksheet.
- Now with your print range still selected, go to **File>Page Setup>Sheet.** You will notice in here that the top half of the box is now NOT greyed out, so all options are accessible. The top option **Print Area** allows you to select the range that you wish to print if you have not already done so. We have already selected our print area, so we do not need to use this option in our printing.
- We need to go to **Rows to Repeat at Top** under **Print Titles.** Let us press the collapse box (red arrow) to the right of this box, to collapse the dialog box and enable us to select the row we wish to repeat.
- All we need to do now is to select somewhere in row 3. This will place the reference **$3:$3** in the **Rows to Repeat at Top** box.
- Press your collapse box button again to expand the box. You will note the option here **Columns to Repeat at Left**. This works the same as for rows, except it will repeat the selected columns on each page. You can also note here that under the heading **Print** there is an option called **Comments**. This option is only available if you select your Page Setup dialog box via the File menu and is used to print what are known as **Comments** (discussed in Excel – Level 2)
- Select **OK**.

- Now we are happy with our Worksheet, we can print it by selecting the **Print** button in **Print Preview** mode.

Once a document has been saved with it's print settings, you only need to press the Print icon on the Standard Toolbar to print. This will by-pass Print Dialog box and send your Worksheet straight to the printer.

DATA SORTING / HIDE AND UNHIDE

AUTOFORMATS

Sorting

Data sorting is an extremely useful and versatile feature within Excel. The sorting feature is found by going to **Data>Sort** to access the Sort dialog box. Generally, sorting is performed on a list, which is defined as a contiguous (no blank cells) group of data where the data is displayed in columns and/or rows. Excel allows you to sort Worksheet data alphabetically, numerically or chronologically. You can sort by columns, by rows, in an ascending or descending order and from left to right. When you sort within Excel, it will rearrange the contents of the sort area according to the instructions that you give it. Excel will always sort blank cells to the bottom of a list.

There are a few basic rules that you need to follow when setting up your list in the first place. These are:

- Check that any numbers in your spreadsheet are in a numerical format.
- Cells containing both text and numbers need to be formatted as text.
- Dates and times must be formatted correctly.
- You must unhide any hidden rows or columns (we will cover hiding rows and columns later in this lesson).
- Make sure you have no leading spaces. This can happen when you push your Space bar before typing into the cell.
- Enter column labels in one row (use **Alt + Enter** to put a hard return in if you need to) or use the Orientation feature under **Format>Cells-Alignment.**

Excel has specific sort orders to arrange data within your Worksheet according to the value (not the format) of the data. If you performed an ascending sort, numbers would be sorted

from the smallest negative number through to the largest positive number. If you performed a descending sort, numbers would be sorted in reverse.

Sorting Alphanumeric Text

If you performed an ascending (lowest to highest) sort on alphanumeric text, Excel will sort your data from left to right, character by character. For example, if a cell contained the text B200, Excel will place the cell after a cell that contains the entry B2 and before a cell that contained the entry B22.

Text that includes numbers and normal text are sorted in the following order:

0 1 2 3 4 5 6 7 8 9 (space) ! " # $ % & ( ) * , . / : ; ? @ [\ ] ^ _ ` { | } ~ + < = > A B C D E F G H I J K L M N O P Q R S T U V W X Y Z Apostrophes (') and hyphens (-) are ignored, with one exception; if two text strings are the same except for a hyphen, the text with the hyphen is sorted last.

If you are sorting logical values, **FALSE** will always be sorted before **TRUE** and if you are sorting error values, they are all equal. We will be covering logical values in the last lesson when we look at the IF function.

As a tip, although it is not really necessary with the fabulous and very handy **Undo** feature, it is a good idea to save your Workbook prior to performing a sort, just in case.

Let's have a go at performing some different types of sorts.

Single Column Sort

- Open the Workbook **Data Sorting.xls**.
- Make sure you are on the **Sorting with Text** sheet tab.
- Click in cell **D5.**
- Go to **Data>Sort** to display the **Sort** dialog box. You will notice here that when you do this, your list will be highlighted (not including the headings). This is, because you are clicked in a cell within the list, Excel will search in all directions from your active cell for the end of the list. The end of the list is deemed to be the first blank cell encountered in all directions, up, down, left and right. If you manually highlight your data and Excel sees there is data immediately to the left, right, top of bottom Excel will ask if you wish to include the data.
- Notice in the top box **Sort By** you have the column heading **Staff Payroll No**. displayed.

- Click the drop down arrow to the right of the **Sort By** box and you will see the other column headings from your list.
- We wish to leave the default **Last Name** as our choice as this was the column that we have clicked in.
- Ensure the **Ascending** option box is ticked.
- At the bottom of the **Sort** dialog box under **My List has** make sure that **Header row** is selected. If you had **No header** row selected, Excel would include the headings in your list as part of the sort operation.
- Click on **OK** to sort your data by **Last Name**.

You will notice now that the **Last Name** column is sorted in alphabetical order, from the lowest value to the highest value.

Let's reverse the order from **Ascending** to **Descending**.

There are two ways you can do this.

- Stay clicked in cell **D5**.
- Go to **Data>Sort** to display the **Sort** dialog box.
- Ensure the **Descending** option box is ticked.
- Click on **OK** to sort your data by **Last Name** in **Descending** order.

OR

- Click the **Sort Descending** tool, which is the **Z** on top of the **A** next to a downward pointing arrow on your **Standard** toolbar.

By selecting this icon, you can effectively by-pass the **Sort** dialog box and perform a **Descending** sort. You will note that to the left of the **Sort Descending** icon is the **Sort Ascending** icon. If you have previously performed a sort on a list, Excel will remember the last sort that you did, but be aware that if you are uncertain of the last sort, your list data may not sort as you expect. In other words, if you are using a file or computer that is shared, it is always best to use the **Sort** dialog box.

Sorting by Multiple Columns

When you perform a **multiple column sort,** each column is sorted one at a time. The list will be sorted by the first column then Excel will check each of the entries to see if there are duplicates. If there are, then the duplicates will be sorted by the second column and so forth.

- Click in cell **E5**.
- Select **Data>Sort** to display the **Sort** dialog box.
- Click on the drop down arrow to the right of the **Sort by:** box to see the other column headings.
- Click on **Department**.
- Select the **Ascending** option.
- Select the drop down arrow to the right of the **Then By:** box.
- Select **Last Name** from the list.
- Select the **Ascending** option.
- Click on **OK**.

Now you have performed a sort on more than one column, let us have a look at sorting numbers. These will work just as efficiently as text when performing a sorting operation.

Sorting Numbers

Let's find out which Department generated the most income during the month of June.

- Click on the **Sorting with Numbers** worksheet tab.
- Click in cell **G5**.
- Select **Data>Sort**.
- Ensure that the **Sort By** box has **June** in it.
- Select **Ascending** order.
- Select **OK**.
- Now click in cell **A5** and we will sort the list by **Departments**.
- Select your **Descending** icon on your **Standard** Toolbar.

As you can see, sorting is a very simple operation to perform with either text or numbers. You can also sort from left to right in rows, this is a little trickier, but you will find it a very handy feature to know. Let's have a go at performing a left to right sort on our **Sorting with Numbers** Worksheet.

- Highlight the range **B5:G12**. *Quick way – click in **B5**, move the mouse over cell **G12**, hold down the shift key and press your left mouse button – quick and easy*.
- Go to **Data>Sort** to display the **Sort** dialog box.
- Click on the **Options** button to see a list of options available to you.
- Under **Orientation** select **Left to Right.**
- Click on **OK** to return you to the **Sort** dialog box.

- In the **Sort by** box, click on the downward pointing arrow to the right and select **Row 12.**
- Click **OK**.

As you can see, sorting, once mastered, can be a huge benefit to a user. Remember to set up your data in a list. That is with column headings (defined in some way, such as bolded and centered) and without any blank cells, rows or columns. If you don't, your sorting operation can turn into a nightmare! Remember the very handy **undo** key that you can use if you make an error, however, it is a good habit to get into to save your Worksheet first before performing a sort.

Hiding and Unhiding Rows and Columns

A very handy feature of Excel is its ability to hide rows and columns from a user without it affecting calculations in any way. This can be handy if you wish to hide calculations or certain information from a user. Hiding rows or columns can be performed in two ways, by **selecting** the row or column you wish to hide and going to **Format>Row (or Column) >Hide** or by **selecting** the row or column that you wish to hide, **right clicking** and selecting **Hide**.

Let's have a look at this now.

- On a new Worksheet, click in **B2** and type **100**. In **C2** type **100**, in **D2** type **100**, in **E2** type **100**, in **F2** type **100**.
- Click in **G2** and use the **AutoSum** feature on your **Standard** Toolbar to sum the range **B2:F2**.
- Select the entire column **D** by selecting the column reference (the D with the grey background).
- Go to **Format>Column>Hide**.
- You will notice now that column D has disappeared, but the result of your formula, 500 has not changed. This is because you have only hidden the column, not deleted it.

Lets unhide the column now.

- Highlight the entire columns **C** and **D** go to **Format>Column>Unhide**.
- Notice that you have now unhidden column **D**.

As mentioned above, you can also perform the hide/unhide operation by right clicking and selecting either **Hide** or **Unhide** from the shortcut menu. This is my preferred option, but it is up to you which one you use.

Lets have a go at hiding some rows, using the right click option.

- In **B3** type **100**, in **B4** type **100**, in **B5** type **100**, in **B6** type **100**, **B7** type **100**.
- In **B8** use the **AutoSum** feature to sum the range **B3:B7**.
- Now select the entire row **3** by selecting the row reference.
- Right click and select **Hide**.
- Select the entire row **5** by selecting the row reference.
- Right click and select **Hide**.

You should now have two rows hidden, but your formula result will still be 500.

Lets unhide the rows now.

- Highlight rows **2** to **7**.
- Right click and select **Unhide**.

You can also hide sheets using **Format>Sheet>Hide**. You need to be aware that the right click option is not available if you wish to hide a sheet. You must do it via **Format>Sheet**. As with hidden rows and columns you can still reference the hidden sheet via a formula and have it return the correct value. Of course though it is wise to reference the sheet while it is visible and use the mouse pointing method to build your reference and then hide it.

If you go to **Format>Sheet>Hide** and the **UnHide** is greyed out this means there are no Worksheets hidden within the Workbook. If there are sheets hidden the **Hide** will not be greyed out and selecting it will display the **Unhide** dialog box. Within this box will be the names of all hidden sheets, to unhide one simply select the sheet name from the box and clicks **OK** or **double** click it (the sheet name).

AutoFormats

Another very handy feature of Excel is it's ability to use its built-in **AutoFormats** on your data, and the flexibility that you have in changing these to suit your personal taste. There are many **AutoFormats** available to you and they are found under **Format>AutoFormat.** Lets have a look at how this would work with our previous Workbook **Data Sorting**.

- Open the Workbook **Data Sorting**.
- Click on the **Sorting with Text** sheet tab.
- Click on cell **D5** or any other single cell within your list.

- Select **Format>AutoFormat** and the **AutoFormat** dialog box will pop up in front of you. Note here that as when doing a sort operation, Excel will automatically highlight your whole table for you (it will only do this if there are NO blank columns or rows).
- Scroll through the list of formats available to you using the vertical scroll bar, or you can use the arrow keys on your keyboard if you prefer.
- Select List **2** by clicking on it, then select **OK**.

You should note that if you select more than one cell before going to **Format>AutoFormat** Excel will assume you only want to format the selected cells and not any surrounding data.

By using the **Options** button on the **AutoFormat** dialog box, you can make many more formats available to you. The options available to you through this button will be **Number, Border, Font, Patterns, Alignment, Width/Height**. Note however, that by default all options are selected, which means that all current formatting in your selected table or range will be overridden by the AutoFormats. By deselecting certain options, you will have the ability to go back into your range or table and manually apply the format attributes you have unchecked in the **Formats to Apply** box. However, we suggest only doing this if really necessary.

- Make sure you are still selected somewhere in your data.
- Go to **Format>AutoFormats.**
- Select **Options**.
- You will notice that the **AutoFormats** dialog box has now expanded to include **Formats to Apply**.
- Uncheck the **Number** option and see how the numbers now look. You will notice the most changes in the Accounting formats (Accounting 1, Accounting 2, Accounting 3, Accounting 4).
- By unchecking the **Border** checkbox, you are removing the outline of the cells as shown in the AutoFormats preview window.
- By unchecking the **Font** checkbox, you are unchecking the attributes to the font that are applied to the **AutoFormat** which basically includes font size, font type, colour and bolding, italics etc.
- By unchecking the **Patterns** checkbox you will remove the background colour and/or any patterns that may be applied.
- By unchecking the **Alignment** checkbox you will change the alignment of your text or number within the cells.
- By unchecking the **Height/Width** checkbox you are changing the height and width of the columns and rows. Basically, having this option checked means that your columns and rows are set to **AutoFit**, which is probably the best option to have.

Once you are happy with your selection, simply click **OK** to see exactly how your data will look.

If after applying an AutoFormat and adjusting accordingly, you decide you no longer want it, simply select any single cell within your data list, go to **Formats>AutoFormats** and use the scroll bar to scroll to the very bottom of the list and click **None** then **OK**.

Note however, that while applying an AutoFormat to your range will override any formatting you have previously applied, removing it does not return it to its original state.

CREATING A SIMPLE SPREADSHEET AND CHARTING

PASSWORD PROTECTION

Charts can add color and style to a presentation and allow the reader to easily identify the trends and patterns that you may wish to relay. Charts can be created in a number of ways, but if you have never created a chart before, the Chart Wizard within Excel is probably the best way to start. It will walk you through the process of setting up a chart prompting you for the information that you need to complete the process. Once you have created your chart, it can very easily be modified to suit your particular taste or needs.

Creating a Basic Spreadsheet

Let's look at creating and formatting a basic spreadsheet to chart the income of the various Departments within a small organization.

- Create a new blank Workbook.
- Click on cell **A2**.
- Type in the word **Department**.
- Click in cell **A3** and type in **Administration**.
- Click in cell **A4** and type in **Marketing**.
- Click in cell **A5** and type in **Finance**.
- Click in cell **A6** and type in **Stores**.
- Click in cell **A7** and type in **Total**. Notice here that the contents of the cells A2 and A3 spill over into cells B2 and B3. This is because cells B2 and B3 are empty. Once these adjacent cells have data in them, the data in cells A2 and A3 will appear to be cut off,

although this is not really so. If you were to have a formula result that is too wide for a column, the cell would display ####. This is telling you not that your formula is incorrect, just that your column is too narrow for your result to be seen.

- Click in cell **B2** and type in the month **January**.
- Click back in cell **B2** and using your **Fill handle**, fill to the right until you reach **December** (cell M2).
- Click in cell **B3** and type in **1000**.
- Click in cell **B4** and type **1500**.
- Click in cell **B5** and type **1750**.
- Click in cell **B6** and type in **2000**.
- Click in cell **C3** and type in **1750**.
- Click in cell **C4** and type **1600**.
- Click in cell **C5** and type **2300**.
- Click in cell **C6** and type in **1900**.
- Now highlight the range **B3:C6** and using your Fill handle, fill right until you reach December (column M).
- Let's put in the totals in for the months now, by clicking in cell **B7**, selecting the **AutoSum** icon (the backward Z on your standard toolbar) , then **Enter**.
- Click back on cell **B7** and using your **Fill handle**, fill the **AutoSum** formula to your right until you reach column **M** (December).

You will notice now that the Department names in cells A2 and A3 appear to be cut off, and the month September in J2 also seems to be cut off. If you click in either of these cells, you will note that the whole cell entry is still there as you can see it in your formula bar. Let's have a look at quickly best-fitting the width of these columns, so we can see their whole contents.

There are a few different ways to best fit a column. You can go via the **Format>Column** option on your **Worksheet** Menu Bar, following this method you can see the options available to you to widen or shorten your columns, or you can double click between the column references on your Worksheet. Let's try this as this is by far the easiest and quickest way of best-fitting a column.

- Wave your mouse on the cell border between the **A** and **B** column heading (black writing, grey background) until your mouse changes to a black cross with a left and right pointing arrow.
- **Double** click with your **left** mouse button.
- Now wave your mouse pointer on the cell border between **J** and **K** until your mouse changes to a black cross with a left and right pointing arrow.
- **Double** click with your **left** mouse button.

Pretty simple hey!!! If you wanted to stretch or shorten your columns, you could wave your mouse over the desired the column borders until it changes to a black cross, then holding your **left** mouse button down, drag either left or right to widen or shorten your column.

The same technique will work for widening rows, except that when you wave your mouse over the row border, the black arrow with the left and right pointing arrows will change to a black arrow with an up and down pointing arrow.

Formatting the Spreadsheet

Let's pretty up our Worksheet just a little now by using some basic formatting techniques. We will not go into this too deeply, as we stated earlier in the course, we believe it is far more important to get the "guts" of the spreadsheet correct, rather than having a pretty Worksheet that does not come up with the goods, so to speak! We will use some of the options on the **Formatting** toolbar in this case. Note that all of these options are available via the **Format** option on the **Worksheet** Menu Bar.

- Highlight the range **A2:M2**.
- Click the on the **B** on the **Formatting** Toolbar. This is your bold key and will bold our highlighted text.
- Although we have stated before that it is easier to work with text and numbers that are aligned correctly (that is numbers to the right and text to the left of a cell), if you were required to centre them for "looks" sake, you can do so easily.
- Keep the range **A2:M2** selected and select the **Center** icon on your Formatting toolbar. This will center the contents of your cell. The **Center** icon is normally four icons to the right of the **Bold** icon. Remember to wave your mouse over an icon to see what action it will perform if selected.
- Let us now select the range **A7:M7** and **bold** the totals of the months by selecting the **B** on the **Formatting** Toolbar.
- Now highlight the range **A3:A6** and select the **I** on the **Formatting** toolbar. This is your "italics" key and will italic the Department names for us.

Let's give our numbers a dollar value now.

- Highlight the range **B3:M7**.
- Select the **$** icon from your **Formatting** Toolbar.

You will notice that column L is full up with #####. Best fit this column using the technique described above.

When you give a range a dollar value within Excel, it, as a default, will place two decimal places within your cell. To remove them do the following:

- Select the range **B3:M7**.
- Click on the **Decrease Decimal Spaces** icon on your **Formatting** toolbar. This is the icon with the **.00** and **.0** and a blue right pointing arrow on it. If you click it once, you will remove one decimal place, and if you click it again, you will remove the next decimal place.
- Let us now put a heading on our table. Click in cell **A1**.
- Type in **CY2004 INCOME** and click **Enter**.
- Now click back in cell **A1**.
- Highlight the range **A1:M1**.
- Now select the **Merge and Center** icon on your **Formatting** toolbar. This will merge and center the words **CY2004 INCOME** across the cells that you highlighted.

Note here that it is NOT a good idea to use **Merge and Center** on anything that you may wish to use in a calculation. My advice is to use it to format a heading only. You will run into all sorts of problems if you try to do calculations with a merged cell(s).

Let us now bold our heading and change the font size and cell alignment.

- Click in cell **A1** (note here that your range A1:M1 has now all become cell A1 as indicated by the **Name Box.**
- Bold your heading using the toolbar icon.
- Now change the font to a font of your choice by selecting the appropriate font name from the **Font** drop down box to the left of the bold icon on your **Formatting** Toolbar.
- Once you have selected a font, change it's size to 26, by selecting this number from the **Font size** box (located immediately to the left of the bold icon on your **Formatting** Toolbar, and to the right of the Font Name Box).

Now let's put some borders on our data.

- Highlight your whole table.
- Select the drop down arrow to the right of the **Borders** icon on the **Formatting** Toolbar. As a default, the borders icon is the third from the left on your **Formatting** Toolbar.
- Select the icon named **All Borders** with your left mouse button.

If you wished to use different types and widths of lines for your borders, or change the colours of them, you will need to do this via the **Format>Cells/Borders** option which has a much wider range for you to choose from.

Charting the Data

OK, now we are ready to create our chart. We will only create a basic chart in this lesson, as we go into much more detail during the Excel – Level 2 training course.

Creating a simple chart is easily done by following these steps.

- We should firstly save our file, so let's do that now and save it as **Charting.xls**.
- Highlight the range **A2:M7**.
- Select the **Chart Wizard** icon (the one with the blue, yellow and red bars on the **Standard** Toolbar.
- The Chart Wizard dialog box should pop up in front of you and you should be on **Step 1 of 4**.
  Notice here the different categories of charts available to you under the heading **Chart Type:** to the left of the dialog box. To the right of the dialog box are the different chart sub-types. If you wanted a preview of how your data would look in different types of charts, click on the particular chart that you like and click the button **Press and Hold to View Sample** with your left mouse button. This will give you a basic preview of how your data will look if that particular type of chart were selected.
- We are actually going to select **Column** under **Chart Type:** and we want to have the **first** sub-type selected under **Chart Sub Type**:
- Select the **Next** button to move on to **Step 2 of 4** of the Chart Wizard.
- You should have the **Data Range** sheet tab in front of you. We need to make sure that **Rows** are selected under **Series In:**
- Select the **Next** button to take you to **Step 3 of 4** of the **Chart Wizard**.
- **Step 3** is where you would put in a title to your Chart, so let's type **CY2004 Income** in the **Chart Title** box.
- Under **Category (x) Axis** type the word **Months**. Your **X** axis is defined as the horizontal axis at the bottom of a chart.
- Under **Category (y) Axis** type the word **Dollars**. Your **Y** axis is defined as the vertical axis to either the left or right (or both) or your chart.
- We don't need to make any further changes in our simple chart, so lets select the **Next** button to move on to the final step of the Chart Wizard dialog box.
- In **Step 4 of 4** of the Chart Wizard you have two choices. You can select either **As a New Sheet**, which will place your graph on a new Worksheet and call it Chart1 (you may

change this name if you wish), or you can select **As an Object In** which will place your graph over your data as an object that you can move to its desired location. We are going to select **As a New Sheet** and Type **CY2004 Income** where it currently says Chart1.

- Click **Finish**.

Your chart should be produced on a separate Worksheet called **CY2004 Income**. They really are very easy to create and just as easily they can be modified. One thing of great importance to note with charts is that if you change your source data, your chart will update to reflect these changes.

If you wish to modify any part of a chart, you need to select that particular part, then double click to see the options available to you in the particular area that you have selected. For example if you double click on the maroon bars, you will see the option **Format Data Series** where you can change the colour of your bars, **Chart Type** where you can change the type of chart you have selected, ie from a bar chart to a pie chart, **Source Data** which is where, if you wanted, you could change your source data. **Add Trendline** which obviously will give you a trend line, and **Clear** which when selected will delete the particular series you have highlighted.

Let's have a look at creating a simple pie chart from non-contiguous data (data not joined together) now. This is done in much the same way as charting from contiguous data.

Let's chart the **Total Income** for the year by **Department**

- Click in cell **N2**.
- Type the word **Total**.
- Click in cell **N3** and select the **AutoSum** icon from the **Standard** toolbar, then select **Enter**.
- Click back in cell **N3** and then using the **Fill handle**, fill down to cell **N7**.
- Format the **Total** column so that its formatting is the same as the rest of the table.
- Click in cell **A3** and select the range **A3:A6**.
- Holding down your **Ctrl** key, select the range **N3:N6**.
- Select the **Chart Wizard** icon from your **Standard** Toolbar.
- Select **Pie** under **Chart Type** and select the **second** pie chart under **Chart Sub-type**.
- Click the **Next** button to take you through the Wizard to step 2.
- No changes to make here, so lets select the **Next** button to move on to step 3.
- Under **Chart Title** type in the heading **CY2004 Income by Department**.
- Select the **Next** button to take you to the 4th and final step of the **Chart Wizard**.
- Let's select **As an Object In**, then select **Finish**.

- **Save** your Workbook.

You now have a pie chart embedded in your data as an object. This chart can be moved or sized easily. If you wish to move an object, click inside the object (in this case a pie chart) so that it becomes active. You will know it is active when you see 8 handles (squares or circles depending on which version you are using) around the edge of the pie chart. If you then hold your left mouse button down until your mouse pointer changes to a cross with four arrow heads, you can move your pie chart to it's desired location.

You can also change the size of it easily, by selecting any of the 8 handles around the outside of your object until your mouse changes to a double headed arrow, then drag in the desired direction. Note here that if you select a corner handle, your object will be sized relatively, in other words the width will change relative to the height and vice versa as you drag.

Pie charts can be modified in exactly the same way as all other charts, by double clicking to select the part of the chart you wish to modify. Note as with all other charts, if you make a change to your source data, your pie chart will update to reflect the changes.

Worksheet Protection

In this day and age of computers where we now have many files that have multiple users, you can **protect** all or part of a Workbook easily. Protecting Workbook data makes it very difficult for specific cell values to be changed, either accidentally or deliberately. Some reasons for protecting your data could be:

- To direct others to specific cells that they can input into by making it impossible for them to enter data anywhere else on a Worksheet.
- To prevent accidental deletion, or modification of essential values within a Worksheet that may be needed to perform specific calculations.
- To prevent accidental deletion, or modification to essential and sometimes very complicated formulas within a Worksheet.

Worksheet protection is a very valuable and useful tool, but using it can sometimes seem a little confusing, as there are actually two separate processes that must be followed to protect data.

The first step is to unlock any cells that will require editing. The second step is to apply Worksheet Protection.

Enabling Worksheet Protection

Let's have a look at how we would apply Worksheet protection to the file **Charting.xls** that we used previously, and how we would unlock the **December** figures for each Department, so that they can type their own figures in there.

As a default, all cells within Excel are locked by default. However, you can still change or edit these cells because the Worksheet or Workbook is unprotected. The first step to using data protection is to unlock the cells that need to be changed when we apply Worksheet Protection.

- Open the file **Charting.xls** if it is not already open.
- If you need to, move your pie chart out of the way using the technique described above so that you can see the range **M3:M6**.
- Highlight the range **M3:M6** with your mouse, then go to **Format>Cells** which will display the **Format Cells** dialog box, and select the **Protection** tab.
- You have two options within this box. The first option **Locked**, if selected, will prevent a user from changing, moving, resizing or deleting the selected cells. The second option **Hidden**, if selected, will hide the formulas within your Worksheet so that if a cell containing a formula is selected, you will not be able to see what the formula is in the formula bar. Let's select the **Locked** option until it appears without a tick., then click on **OK** to unlock our selected cells (M3:M6).

Now we have unlocked our cells, we can apply **Worksheet Protection** to our data.

- Select **Tools>Protection/Protect Sheet** and the **Protect Sheet** dialog box will appear.
- Depending on which version of Excel you are using, the options may be slightly different in the Protect Sheet dialog. We do not wish to use a password at this stage, and we will just accept the defaults as they are in this case, so just click **OK**.

OK, let's have a go at using our protected Worksheet.

- Click in cell **L3** and type the number **1234**. You will notice that as soon as you start to type, Excel will display a message that tells you the cell or chart you are trying to change is protected and therefore read-only.
- Now click in cell **M3** and type **1234**, then Enter. This time your entry will be allowed, as would any entry that you typed in **M4, M5,** or **M6**.

You will note that when you make a change to either M3, M4, M5, or M6, that the formula in M7 will update. This is because locked cells that contain formulas will still change in accordance with the data that is used to calculate them.

Disabling Worksheet Protection

You can unprotect a Worksheet in the same way that you protected it in the first place.

- Go to **Tools>Protection**.
- As the Worksheet is already protected, your sub-menu will contain a command to unprotect your Worksheet, so let's select **Unprotect Sheet**.

OK, so we have looked now at Worksheet Protection. However anyone with a working knowledge of Excel, could figure out how to unprotect a sheet if they wanted to, so Excel offers you the ability to use a password to protect your Sheet. Passwords are case-sensitive. One thing you MUST be aware of when using a password is that if you lose or forget your password, it cannot be recovered, so it might be a good idea to write down your passwords somewhere and the Worksheets that they relate to and store them in a safe place. It is also a good idea when using a password to use a combination of letters, numbers and symbols.

- Select **Tools>Protection/Protect Sheet**.
- Click in the **Password** box and type in the word **password** then click **OK**.
- Excel will ask you to confirm your password by retyping it, so lets retype in the word password then select **OK**.
- Now click in **N3** and type in **1234** as before you cannot make a change here, and a message box will pop up telling you so.
- Now click in **M3** and type in **5678** and click **Enter**. As before, no warning will appear and you are able to change cell **M3**.

Let's try and unprotect our sheet now.

- Select **Tools>Protection/Unprotect Sheet**.
- You must now type in the correct password for your sheet to be unprotected. Type in the word **passwording**, then click on **OK**.
- You will get an error message from Excel advising you that the password that you typed is incorrect. You will also get a hint from Excel, that maybe the caps lock key could be on, just in case you have typed the right password in the wrong case.
- Click on **OK** and we will try again.
- Select **Tools>Protection/Unprotect Sheet** and type in the correct password (**password**).
- Select **OK** and your Worksheet will now be unprotected again.

So remember, if you want to use the **Protect** facility, you must remember to **unlock** the cells that you wish to be changed before your apply sheet protection. You can protect a Worksheet with or without a password, but remember that the password does not prevent access to the data, but instead prevents the worksheet being unprotected. Once the protection system is in place, it is impossible for a user to edit, change or delete the contents of a locked cell.

THE IF FUNCTION AND CONNECTING ARGUMENTS

In this lesson we are going to look at one of Excels most useful Functions, the **IF** Function.

The **IF** Function is categorized under the **Logical** category in the **Insert Function** dialog box *(Note: In earlier versions of Excel, this was known as the **Paste Function** dialog box).* While its uses can vary greatly, the structure of the Function itself is very simple, in that it will return either **TRUE** or **FALSE**. This is certainly the most important aspect of this Function. More often than not, the use of the **IF** Function is reserved for Level 2 in Excel and beyond. It is however our belief, that it should also be a part of Level 1 as its use is so versatile, but more importantly its structure is an excellent introduction into the logic of Excel and formulas.

When to Use IF

The **IF** Function can be used whenever we want the ability to return a particular result that is dependant on another. For example we may want a formula to SUM a range of cells if the value of a particular cell is greater than 100, but if the value of this particular cell is less than 100 we may wish to perform another calculation altogether. This is often referred to as a **What-If** analysis. **What if** this were … that value or **what if** this was another value? While the **IF** Function can be used on its own, it is often combined with another Function. This combining of Functions in Excel is what is known as **Nesting**.

Connecting Arguments - Nesting

The term **nesting** in Excel means using the result of one Function as the argument of another. As you may recall, most (not all) of Excels Functions take what are known as arguments. The

SUM Function can take up to 30 arguments. These arguments must be number(s), a reference to number(s) or a text value, e.g. "20". The numbers that are used for one or more of these arguments could be derived from the result of another Function, if they were, it could be that we have nested another Function or Functions as the argument for the **SUM** Function.

Lets use a simple example to see how this works. Assume we have two columns of numbers, one column of numbers is within the range A1:A10 and the second column of numbers is within the range B1:B10. Now assume we need to find out the **SUM** of the largest numbers in each of these columns. To do this we could nest two **MAX** Functions (MAX is the Function used to find the largest number in a range) into the **SUM** Function, as shown below.

=SUM(MAX(A1:A10),MAX(B1:B10))

What we have done here is nested two **MAX** Functions within the **SUM** Function. The reason it is considered nested is because the result of **MAX(A1:A10)** is used as the first argument of the **SUM** Function and the result of **MAX(B1:B10)** is used as the second argument of the **SUM** Function. The Functions in their entirety makes up a formula!

In case you have forgotten the syntax for the SUM Function is

SUM(number1,number2,…..**)** and up to number30.

So in the above example we have used **MAX(A1:A10)** as **number1** and **MAX(B1:B10)** as number2.

You will probably find the hardest thing about nesting Functions is knowing where to place all the brackets. Thankfully we can have the **Insert Function** dialog box do this for us! Lets use the nested **SUM** and **MAX** Function to see this.

- Place the number1 in cell **A1**, **2** in **A2**, **11** in **B1** and **12** in **B2**.
- Now highlight cells **A1:B2** and use the **Fill Handle** to drag down to row **10**.
- This should give you **1** to **10** in **A1:A10** and **11** to **20** in **B1:B10**.
- Now select cell **C10** and push **Shift + F3** to display the **Insert Function** dialog box.
- Select **Math & Trig** from **Or Select a Category:** and **SUM** from the **Select a Function:** box and click **OK**.
- You will notice that Excel has assumed we want the range **A10:B10** as our **number1** argument. This is wrong in this case, so delete it.
- If you look to the immediate left of the **Formula Bar** you will see a box where the Name Box is usually placed with **SUM** written on it and a drop arrow on its right. Click this arrow!

- You will see a list of the last **10** used Functions. Click **More Functions…** and our **Insert Function** dialog box will display again.
- Select **Statistical** from the **Or Select a Cateogry:** and **MAX** from the **Select a Function:** box and click **OK**.
- Our **SUM** Function will now have been replaced with the **MAX** Function. If you look in your formula bar you will see **=SUM(MAX(A10:B10))**.
- So Excel has already nested the **MAX** Function as the first argument of the **SUM** Function. Which is what we want, but the range is wrong, simply delete it.
- Click the collapse dialog button on the right of the **number1** argument box and highlight range **A1:10** and then click the expand dialog button.
- Now we have the range **A1:A10** as the first argument of the **MAX** Function and the result of this MAX Function is being used for the first argument of the **SUM** Function.
- What we need to do now is use another **MAX** Function as the second argument of the **SUM** Function. This means we have to activate the SUM Function again, at the moment the **MAX** Function is the active Function.
- To do this simply click on the word **SUM** within the Formula bar, and you will see: **=SUM(MAX(A1:A10))** and the **SUM** Function will again be the active Function.
- Click within the **number2** argument box and then to the left of the name box you will see the **MAX** Function, click on this. If it does not say **MAX** simply click the drop arrow and select **MAX**.
- This will place the **MAX** Function into the number2 argument of the **SUM** Function and in the Formula bar you will see **=SUM(MAX(A1:A10),MAX(A10:B10))** . Delete the **A10:B10** and then using the collapse dialog button and highlight the range **B1:B10** and click **OK**.

You should now have the formula: **=SUM(MAX(A1:A10),MAX(B1:B10))** and the result of **30**. This same principle applies to any Functions that we need to nest (connect) together.

There are two rules that apply whenever we nest Functions and these are:

- The Function that we nest within the argument of another Function must return the data type expected by that argument. This means we could not use a Function that only returned text as the argument of a Function that can only accept numeric values.
- We can only nest Functions up to seven levels deep. This is explained quite well in the Excel help under: **About multiple Functions within Functions, or nesting** as it is what we have discussed above.

By now you are probably asking yourself "what has this to do with the **IF** Function?" We have used the above example as a sort of primer as we have discussed the **SUM** and **MAX** Function

before. The other reason is that the **IF** Function very often has other Functions as its arguments, in other words it is very common to nest Functions when using the **IF** Function. But before we do nest another Function within it let's look at the **IF** Function itself.

IF

The IF Function, as mentioned above, can be found under **Logical** in the **Or Select a Category:** area of the **Insert Function** Dialog Box. The syntax of the **IF** Function, is as shown below:

=IF(logical_test,value_if_TRUE,value_if_FALSE)

In a nutshell, the **IF** Function returns one value if a chosen condition is **TRUE** and another value if a chosen condition is **FALSE**. As you can see by the syntax, the **IF** Function can take three arguments. But it only requires the **logical_test** argument and at least one of the other two; that is **value_if_TRUE** or **value_if_FALSE**. While it may seem a bit confusing by looking at the syntax for the IF Function, it really is a very simple formula to use and apply once you have a basic understanding of it.

Let's use a small example to demonstrate what I mean.

- In cell **A1** type the number1.
- Click in any other cell and **type =IF(A1>0,2)** and push **Enter**.

You will get the result of 2. The reason why we are getting the result of 2 is simply because our first argument, (**logical_test** which is **A1>0**) is TRUE and so our **IF** Function is evaluating to **TRUE** and so returns the argument for **value_if_TRUE** which is **2**. So in plain English, we are saying **IF** cell **A1** contains a value greater than **0**, return the value **2**. So in this instance, we have used two of the three arguments for the **IF** Function. The next logical question should probably be "what value will be returned if cell **A1** does not have a value greater than 0?" The easiest to see what value it would return is to:

- Type the value **–1** in cell **A1**.

Your IF Function now should be returning the word **FALSE**. The reason it is returning **FALSE**, is simply because our logical test no longer evaluates to **TRUE**, but to **FALSE** and as we have not supplied an argument for the **value_if_FALSE** Excel will by default use the word **FALSE**.

Let's now go in and edit our **IF** Function and make it return another value other than FALSE. The way we show you how to edit the **IF** Function here, can be used on any Function and is an easy way to Edit Formulas and also troubleshoot them.

- Click in the cell that contains the **IF** Function.
- On the Formula bar, wave your mouse pointer over the ***Fx*** sign to the left of your Formula bar until the words *Insert Function* appear in a Tooltip. *(Note: The **Fx** sign may be an = sign in earlier versions of Excel. If so the words Edit Formula will appear instead of Insert Function)*
- Simply left click on the sign and Excel will automatically display the **IF** Function dialog box.
- Using this dialog box, we can now type in a value for our **IF** Function to return if our logical test is FALSE. Before you do, if you look down the very bottom of this dialog box, you will see the words **Formula result = FALSE**.
- Type the number 5 in the **Value if FALSE** argument box and this should immediately change to say **Formula result = 5**. It is not necessary for our Value_if_TRUE or our Value_if_FALSE argument to return a numeric value. We can, if we wish, have it return text or even an entire sentence if we wanted.
- Click in the **Value_if_TRUE** argument box and type **Yes**.
- In the **Value_if_FALSE** argument box type **No**.
- Click the **OK** button.

You will now see that by changing the value in **A1** to values less than and greater than **0**, your **IF** Function cell with return either **Yes** or **No** to reflect the change.

This is basically all there is to the IF Function, it will do one thing if a logical test is TRUE and another if it is FALSE. Obviously, the example we have used here would be of no practical value to anybody.

So let us now use a more realistic example and also incorporate what we have learnt about nesting.

- Place the numbers **1 - 10** in cells **A1:A10**. We will assume that if the **SUM** value of these 10 numbers exceeds 100, we would like to return the actual **SUM** value of the numbers. If on the other hand the **SUM** value does not exceed 100, we would like to return only the **MAXIMUM** number within the range.
- Click in cell **A11**, push **Shift + F3**.
- Click **Logical** within the **Or Select a Category:** area**.**
- Click **IF** within **Select a Function:** and click **OK**.

- Ensure your mouse insertion point is within the **Logical_test** argument box.
- Click on the small drop arrow to the left of your Formula Bar. This is where the Name Box would normally be.
- As we have used the **SUM** Function previously, it should be part of the list already. But if not, simply click **More Functions** and locate it from within the **Math & Trig** area under **Or Select a Cateogry:** and click **OK**.
- By default Excel should automatically have selected the range **A1:A10** for you as the first argument of the **SUM** Function. If not, click the collapse dialog box button highlight the range **A1:A10** and click the expand dialog box button.
- If you now look in your formula bar you should have **=IF(SUM(A1:A10))**.
- Now click back on the **IF** within the Formula bar to activate our **IF** Function again, and we should have for our **logical_test SUM (A1:A10)**. At present the **logical_test** will be evaluating to **TRUE**.
- Within the **logical_test** argument box, click immediately to the right of **SUM(A1:A10)**, so your mouse insertion point is immediately outside the closing parenthesis.
- Simply type **> 100**. Now our logical test will evaluate to **FALSE**.
- Click within the **Value_if_TRUE** argument box and select the **SUM** Function again from the box immediately to the left of your formula bar. Again, by default, Excel will automatically place **SUM(A1:A10)** so within your Formula Bar now, you should have **=IF(SUM(A1:A10)>100,SUM(A1:A10))**.
- Again activate the **IF** Function by clicking on the word **IF** in the Formula Bar and you will see we now have **SUM(A1:A10)** in the **Value_if_TRUE** argument box.
- Click in the **Value_if_FALSE** argument box, click the drop arrow to the left of the Formula bar and select **MAX.** If it is there, it not select **More Functions** and locate it under the category **Statistical**.
- Again, by default Excel should automatically use the range **A1:A10** as the first argument for the **MAX** Function.
- If you now look in the Formula Bar, you should see **=IF(SUM(A1:A10)>100,SUM(A1:A10),MAX(A1:A10))**

Looking at the formula like this is certainly not very easy to read, let alone decipher what its intention is. By far the easiest way to find out what it is supposed to do is to again activate the **IF** Function by clicking on the word **IF** in the Formula Bar. Then looking at the structure of the Formula like this, you should see quite clearly what its intention is. Click the **OK** button.

In plain English, you could say that the formula reads:

If the sum of A1:A10 is greater than 100 return the sum of A1:A10. Otherwise, if not, return the maximum number of A1:A10. The final result of our formula, of course, is 10. If you now change any one of the numbers within the range **A1:A10** so that the **SUM** value of these numbers is greater than **100**, you will see that our **IF** Function is evaluating to **TRUE** and so returns the **SUM** value of the numbers.

Another very common outcome of the **IF** Function is to use empty text as a result. This is often used in very complex formulas (or what look like very complex formulas) and works like this:

- Click back in the cell that contains the **IF** Function.
- Click in the Formula Bar to the right of the last bracket and backspace out **MAX(A1:A10))** in your Formula.
- In its place, type in "", so your formula now should read **=IF(SUM(A1:A10)>100,SUM(A1:A10),"")**
- Click **Enter**.
- So the logic of our formula now is **If the sum of A1:A10 is greater than 100 return the sum of A1:A10. Otherwise, say nothing.**

Two Other Useful Functions

There are two other very useful Functions in Excel that take no arguments at all. These are the **TODAY** function and the **NOW** function. The **TODAY** Function will return the current date, while the **NOW** Function will return the current date and time. These can be very useful for a spreadsheet that requires having the current date and/or time. These functions are a bit different than most other Excel Functions in two ways.

- They are what's known as volatile.
- They take no arguments.

Volatile

When the term **volatile** is applied to an Excel Function it means that the Function is recalculated whenever Excel calculates. To understand this we need to know how, or rather when, a normal Function in Excel calculates. Most Functions in Excel will recalculate whenever any cell on which they are dependent changes. By this we mean if we have the function **=SUM(A1:A10)** in a cell and we changed the value of any cell within the range **A1:A10** our **SUM** function will recalculate to reflect the change. If there was another formula in a cell that was referencing **B1:B10** then it would **not** recalculate if we changed a cell within the range

A1:A10. A volatile Function on the other hand, will recalculate whenever **any** formula within the entire Workbook recalculates, regardless of cell references. A workbook will also recalculate whenever we **open** or **save**.

No Arguments

As you are now aware, most of Excels Functions take at least one argument and others take up to 30 arguments. The **TODAY** and the **NOW** Function can take no arguments at all. What this means to the user is we simply add them to a spreadsheet like:

=TODAY()

=NOW()

In other words we enter them with empty parenthesis. As an alternative to these Functions, if you only need the current date or time then you can these shortcut keys:

Enter the date CTRL+; (SEMICOLON)

Enter the time CTRL+SHIFT+: (COLON)

This will enter the date or time as a static value. In other words they will not update, unlike **TODAY** and **NOW**. If you are creating a spreadsheet, try not to use too many volatile Functions as this can slow down recalculation. As an alternative, using the **NOW** Function as an example, you could place the function into a cell somewhere and then reference that cell with a simple reference like: **=A1**.

We can also control the way Excel calculates by going to **Tools>Options** and selecting the **Calculation** tab. Having said this though be very careful when doing this as you can easily inadvertently feed yourself false information. This is particularly true with the option **Precision as displayed**. My advice is to only change from **automatic calculation** if you really need to and then only if you are fully aware of the consequences.

Dates and Times

Dates and times are a very important part of a lot of spreadsheets and as such it is very important you understand how Excel interprets them. **Excel for Windows** uses the **1900** date system. **Excel for the Macintosh** uses the **1904** date system. The **1900** system can be changed by going to **Tools>Options\Calculation** and checking the **1904** date system. If you are using Windows there is no need to change this.

The **1900** date system starts from **1 January 1900** and has a numeric value of **1**. This is how Excel sees dates, as numbers. You can see this by typing the date **19-Dec-2004** in any cell. Now format the cell as a **General** number format, it will display the value **38340**. This simply means that **19-Dec-2004** is exactly **38340** days from **1-Jan-1900**. By using this method Excel can perform calculations on dates. The term that is used to describe these numbers is **serial numbers**.

We now know that Excel uses what is known as **serial numbers** to store dates. It also uses a very similar system to store times. Instead of using serial numbers, Excel uses what is known as **decimal fractions**. In Excel 24 hours is equal to the whole number one. 12 hours is equal to 0.5 and six hours equal to 0.25. So Excel stores times as a portion of one, with one being equal to 24 hours. Again you can see the decimal fraction of a time by typing any time in any cell and formatting it as **General**.

To now combine this we can see how Excel would interpret a date and time in a cell. Lets stick with the **19-Dec-2004** example and modify it to also include a time, let's say **12:00**. We would enter this into a cell as: **19-Dec-2004 12:00**. If we now format this cell as **General** we will see: **38340.5** with **.5** representing the time portion.

Once you understand Excels method of storing dates and times it should no longer be a mystery on how Excel uses dates and times in calculations. While it is a very simple method it is also very effective.

A common problem that people run into working with times is when they need to use hours greater than 24. Let's say in cells **A1:A5** you have the hours **8:00 , 8:00, 10:00, 7:00, 7:30** respectively. These hours represent the hours worked in one week for an employee. We need to know the total hours worked for that week, so in cell **A6** we put: **=SUM(A1:A5)**. You will see that we do not get the result we expected, we end up with: **16:30**. Why does Excel do this? Well when you use a formula that references other cells our result cell will automatically take on the format of the cell(s) it is referencing. Excel sees that we have times in cells **A1:A5** and so assumes we want the same in our result or total cell and so formats it as **h:mm**. More often than not Excel gets it right, but as you can see in this instance it hasn't. But why the result of **16:30**? Let us step through this to explain why.

- If you add **A1** and **A2** (8:00+8:00) together you get **16:00**.
- If you now add this **16:00** to cell **A3** (10:00) you don't get **26:00** you actually get **2:00**.
- What happens is, if you add **8:00** of the **10:00** hours to **16:00** you would get **0:00** (Midnight). If you then add the remaining two hours you of course end up with **2:00**, the result we got initially.

- So we now know that when Excel adds **8:00+8:00+10:00** we get **2:00**
- If we now add the remaining times **7:00 + 7:30** we get **14:30**.
- Finally we add **2:00** to **14:30** and we get the result that Excel got, ie; **16:30**

Ok this is all fine, but we don't want that, we want to force Excel to keep going once it reaches 24:00 hours. We can do this by using a Time format of **37:30:55** or a **Custom** format of **[h]:mm**. We then get our expected result of **40:30:00.**

Errors

Without doubt, as you write formulas you will at times generate an **error** as a result, instead of your expected result. Knowing what the **error** means will go a long way to helping you identify the problem.

The types of errors you can expect are:

#DIV/0!

#N/A

#VALUE!

#REF!

#NUM!

#NULL

#NAME?

Lets look at each of these in turn and see what they are trying to tell us!

#DIV/0!

This one is nice and simple, it tells us we are trying to divide a number by zero. This is a no no in math. You would get this if you tried to divide a number by an empty cell, as well as a cell containing zero. This is because an empty cell has a value of zero.

#N/A

This is a very common error in Lookup formulas, eg; **VLOOKUP, HLOOKUP** etc. It is telling us that no match can be found. You will also get this error if the list or table you are looking in contains **#N/A**.

#VALUE!

This one will occur if you have used the wrong type of argument in a Formula. If cell **C4** contained a text entry then using **=2+C4** would result in a **#VALUE!** error. This is because Excel was expecting an number and not text.

#REF!

This one will occur when or if a cell reference in not (or no longer) valid. Let's say you have a simple formula like: **=A10** in any cell. You then deleted the cell (not the content) you would end up with the **#REF!** error.

#NUM

This one is not so common and is similar to the **#VALUE!** error. In other words you have used the wrong type of argument for a formula.

#NULL

The **#NULL** error will occur when you have used the intersection of two areas that do not intersect. For example: **=SUM(A1:B10 D10:D10)** Would result in **#NULL** as we have forgotten the **comma**, which is used as our **union operator**.

#NAME?

This will occur when Excel does not recognize the text in a formula. In most case it is telling you that you have misspelt the name of a function.

At times we may expect to receive errors in our functions, but we do not want to view them as they are not very pleasing to the eye and on top of that they can cause errors in other cells that may have them included in their reference.

We can suppress the errors returned by a formula by using one of Excels **Information** functions. These functions are generally used to determine the content of a cell or range of

cells BEFORE performing a particular function. We would nest our formula within one of the **Information** functions.

Let's say we know that cell **A1** could at times be empty or have a zero in it, so we want to be able to suppress the **#DIV/0!** error we would get if we try to divide cell **A1** into another cell or number.

We could use:

=IF(ISERR(20/A1),"",20/A1)

the **ISERR** will return **TRUE** for any error type, except **#N/A**. To return **TRUE** for any error type we could use:

=IF(ISERROR(20/A1),"",20/A1)

Making use of the error type functions is certainly not the only way we can prevent errors. For instance for this particular case we can also use:

=IF(AND(ISNUMBER(A1),A1<>0),20/A1,"")

Here we have used the **ISNUMBER** function together with **<>** (the "not equal to" sign) nested within the **AND** function, which in turn is nested within the **IF** function. In all examples we have replaced any possible errors with **""** (Empty text). If your formula was one of the **Lookup and Reference** type you should only suppress the **#N/A!** error. You would do this by nesting your lookup formula with the **ISNA** error function. Remember through, if you suppressed all errors you may never know if you have a problem

A word of warning if you decide to suppress errors. Leave this to the end, otherwise you may spend a lot of time trying to track down any other errors that you are **not** expecting. When you do finally suppress errors (or possible errors) try and limit it to what you expect, don't be tempted to take a blanket approach and suppress all errors. Remember the error is trying to tell you something, so use them to your advantage

SPECIFIC WORKSHEET FORMULAS

In this lesson we will look at some specific Worksheet formulas and how they could be nested together to return a desired result.

We now know how Excel performs its calculations and how we can nest functions together so we can use the result of one function as the argument of another. We have also shown you what we believe to be a good way to break down a complicated formula into bite size chunks and then join them together. We also know how to step through a nested formula so we can track down a possible error within it or simply to see how it has obtained its result.

We have mentioned that there are over 300 functions available to Excel. A simple fact of life is you will not use anywhere near this many when producing a spreadsheet. In fact you will most likely find yourself using the same set of functions over and over again. The only difference will probably be the order in which you nest them together. What we would like to show you now is some of what we believe to be Excels most useful and popular functions.

Add-ins

The first thing we should tell you about Excels functions is that they are not all at your disposal by default. The reason for this is simply because most users do not use them and have no need. Remember that **most** users use Excel is a very expensive note book.

The other functions and features that are available to Excel are stored as what are called **add-ins**. These are nothing more than Excel Workbooks with a **.xla** extension instead of a **.xls** extension. These **add-ins** contain the code to allow the other functions and features to work. When an **add-in** is opened it opens as a hidden Workbook that can only be seen in what is called the **Visual Basic Environment.** We will certainly not go into any more detail than this on add-ins as it would be far beyond the scope of this lesson. We only mention this fact so that you realize there are even more features and functions at your disposal should you need them. The reason they are not **all** installed by default is so the file size of Excel is not blown out unnecessarily. We would also imagine it prevents the 'normal' user from becoming intimidated by Excel. So let's install some Excels **add-ins**.

What you need to do is this:

Go to **Tools>Add-ins** and check these **add-ins**

- Analysis Toolpak
- Conditional Sum Wizard
- Lookup Wizard

(If you are working with Excel 2007, go to the Office icon at the very top left of your workbook, click Excel Options. Select Add-ins. To install an add-in, click the Add-in if it available or click Manage > Go).

Now click **OK**. You will have noticed that there are other add-ins available, but we are only interested in these ones because they can be used as tools for learning. The **Analysis Toolpak** will make available some extra functions which can be useful, in particular some **Date and Time** functions. The **Conditional Sum Wizard** can be used to help write **Sum** formulas that need to meet a set condition. The **Lookup Wizard** can be used to help write **Lookup** formulas that need to meet a set condition.

Specific Formulas

Let's look at some specific formulas. Below are some examples of the most popular formulas. In the syntax examples any **bolded** font will mean the argument **must** be supplied, while any non bolded font means the argument is **optional**. The examples I have supplied here are not meant to be of any practical use, they are simply to help you understand them.

ABS

Syntax =abs(number)

This function is used to return a number without it's sign.

An example of this would be: **=ABS(-25)** This would return **25**

Address

Syntax =address(row_num,column_num,abs_num,a1,sheet_text)

Used to return a cell address as text.

It requires that the **row_num** and **column_num** are supplied to it. The other arguments are optional.

An example of this would be: **=ADDRESS(1,1)** This would return **$A$1**. Notice that as we have **not** supplied any optional arguments and as so the default is for an **Absolute** address. The optional values for the "abs_num" argument are as below:

Abs_num	Returns this type of reference
1 or omitted	Absolute
2	Absolute row; relative column

3	Relative row; absolute column
4	Relative

If we used **=ADDRESS(1,1**,3) It would return **$A1**

The fourth argument, **a1**, will take either **1** or **TRUE** for the A1 style reference. **0** or **FALSE** for the R1C1 style reference. The default (or if it is omitted) is **TRUE (1)**.

The **sheet_text** argument is the Sheet tab name of a Worksheet.
=ADDRESS(1,1,,,"Sheet2") and would return:

Sheet2!$A$1 (Notice the commas for the omitted arguments). The **sheet_text** would generally only be used in an external reference.

The **ADDRESS** function is not of much use on it's own and is generally used nested with another function or has another function nested within it.

CHOOSE

Syntax =choose(index_num,value1,value2,...)

This function will choose an action or value determined by the **index_num**.

It can take up to 29 arguments (not including **index_num**) with **value1** being compulsory.

An example of this would be: **=CHOOSE(3,"dog"**,"cat","rat") This would return "rat" as it is the third **index_num** or **value**.

This function is very handy when working with an ordered list of text or numbers. It is also generally used nested with another function or has another function nested within it.

DATEVALUE

Syntax =datevalue(date_text)

Converts a **text** entry that represents a **date** to a **numeric** entry that Excel will recognise as a **true date** (serial number).

=DATEVALUE("22/12/2005") would return **38708** the numeric value of the date **"22/12/2005"**. This function is good for working on those horrid spreadsheets that have

dates entered as text. This often happens to dates that are imported into Excel from another Application.

EDATE

Syntax =edate(start_date,months)

Returns the serial number of the date that is before or after **start_date** as set by **months**.

=EDATE("22/12/2005",1) would return **38739** the numeric value of the date **"22/01/2006"**.

In other words it has added **one** month to the **start_date**.

The formula **=EDATE("22/12/2005",-1)** would return **38678** the numeric value of the date **"22/11/2005"**.

**In both cases the cell would need to be formatted to the required date format. **

EOMONTH

Syntax =eomonth(start_date,months)

Returns the serial number of the last day of the month before or after **start_date** as set by **months**.

=EOMONTH("22/12/2005",1) would return **38748** the numeric value of the date **"31/01/2006".**

In other words it has added **1** month to the **start_date** and then returned the **last** day of that month.

Again cells would need to be formatted to the required date format.

You should note that for **EDATE and **EOMONTH** if the **start_date** supplied is not a text date, then it would need to be the serial number of the date. I prefer the text method as you can tell at a glance the date being used**

FIND

Syntax =find(find_text,within_text,start_num)

Finds one text string within another and returns position number of the found string.

=FIND("e","Excel") would return the number 4 as "**e**" is the fourth letter within the text "Excel".

As you can see the function **is** case sensitive as it has **not** returned **1** (the position number of "**E**").

If the **start_num** argument is omitted as in the example the default is **1**.

This means it will start looking from the first letter of **"within_text"**

HLOOKUP

Syntax =hlookup(lookup_value,table_array,row_index_num,range_lookup)

Looks for a value in the **first row** of the **table_array** you nominate and returns the value from the **same column** in a row you specify by **row_index_num**.

=HLOOKUP("Cost",A1:D10,5,FALSE) Would return the value **500** if the word **"Cost"** was within the range **A1:D1** (the first row of **table_array**) and the number **500** was in same column as "**Cost**" but in the **fifth** row.

The optional argument "range_lookup" can take either **TRUE** or **FALSE**, if omitted it is considered **TRUE.**
By using "FALSE" we are telling it to find an exact match (but not case sensitive).

When the **lookup_value** is **text**, "FALSE" is nearly always used.

If the **lookup_value** is a **numeric** value then using "TRUE" or omitting the argument will result in the argument **lookup_value** returning the column of the closest match.

For this reason if TRUE is used when **lookup_value** is a number, the first row of your **table_array** should be sorted in **Ascending** order.

INDEX

This function has what is known as **multiple argument lists**. In other words it can be used in two different ways.

Method 1

Syntax =index(array,row_num,column_num)

Returns a value or the reference to a value from within a table or range.

=INDEX(A1:B10,5,2) This would return the value of cell **B5** because we have told it to return the firth row down (**5**) and the second column (2) from the range **A1:B10**.

If the **array** had been **A1:A10** we could have omitted the "column_num" argument and the return value would have been the value in cell **A5**.

As we have used a 2 column range for the **array** argument, we **must** supply the "column_num" argument.

Method 2

Syntax =index(reference,row_num,column_num,area_num)

Returns a value or the reference to a value from within a table or range

=INDEX((A1:B10,D1:E10**),5**,2,2)

This would return the value of cell **E5**.

We have nominated two separate **reference** arguments (**A1:B10**,D1:E10). When two separate ranges are used as the **reference** argument we **must** enclose them in parenthesis.

We have nominated the fifth row (**5**) as our row_num argument.

We have nominated the second column (2) as our "column_num" argument.

We have nominated the second area (2) for our "area_num" argument.

So the fifth row in the second column of the second area (D1:E10) is cell **E5**

The **INDEX** function is nearly always used nested with another function. It is particularly handy when a lookup is required to the **left** of a nominated range. The help in Excel has a lot of detail on this function and I would recommend you read this as it explains it quite well. I have tried to keep it reasonably simple here so it can be understood.

INDIRECT

Syntax =indirect(ref_text,a1)

Returns a reference specified by a text string.

=INDIRECT(A1) would return the value of cell **B1** if **A1** had the text **"B1"** written in it.

In other words it is indirectly returning cell **B1**.

The "A1" is either TRUE (or omitted) or FALSE and determines the reference style used.

If cell **A1** had the text "R1C2" in it we would need to use **=INDIRECT(A1**,FALSE) to obtain the same result.

The **INDIRECT** is often used nested within another function as the reference argument of that function.

LARGE

Syntax =large(array,k)

Returns the k-th largest value in a set of values.

=LARGE(A1:A10,2) would return the second (**2**) largest value in the range **A1:A10**

LEFT

Syntax =left(text,num_chars)

Returns the left most character(s) as nominated by "num_chars"

=LEFT("bullet") This would return the text "b". As you can see, if the "num_chars" argument is omitted the default is **1 =LEFT("bullet",2)** This would return the text "bu".

MATCH

Syntax =match(lookup_value,lookup_array,match_type)

Returns the relative position of a value in an array that matches a specified value in a specified order.

=MATCH("dog",A1:A10,0) would return the number **2** if the text "dog" was in cell **A2**. This is because "dog" is in the second row of the range **A1:A10**.

The optional argument "match_type" is defined as shown below from the Excel help.

Match_type is the number -1, 0, or 1. Match_type specifies how Microsoft Excel matches lookup_value with values in lookup_array.

- If match_type is 1, MATCH finds the largest value that is less than or equal to lookup_value. Lookup_array must be placed in ascending order: ...-2, -1, 0, 1, 2, ..., A-Z, FALSE, TRUE.
- If match_type is 0, MATCH finds the first value that is exactly equal to lookup_value. Lookup_array can be in any order.
- If match_type is -1, MATCH finds the smallest value that is greater than or equal to lookup_value. Lookup_array must be placed in descending order: TRUE, FALSE, Z-A,...2, 1, 0, -1, -2,..., and so on.
- If match_type is omitted, it is assumed to be 1.

MAX

Syntax =max(number1,number2,...)

Returns the maximum value in a range of values.

=MAX(A1:A10) would return the number **50** if **50** was the maximum number in the range **A1:A10**

=MAX(A1:A10,D1:D10) This would return the number **100** if the number **100** was the maximum value in the two ranges A1:A10 and D1:D10.

The **MAX** function can take up to **30** arguments

MID

Syntax =mid(text,start_num,num_chars)

Returns a nominated amount of characters from a text string, starting from the position as stated by **start_num**

=MID("Hello",2,3) This would return the text "ell". It has extracted three (**3**) text characters as specified by **num_chars** from within the text "**Hello**" Starting from the second (**2**) character as specified by **start_num**

MIN

Syntax =min(number1,number2,...)

Returns the minimum value in a range of values.

=MIN(A1:A10) would return the number **10** if **10** was the minimum number in the range **A1:A10**

=MIN(A1:A10,D1:D10) would return the number **5** if the number **5** was the minimum value in the two ranges **A1:A10** and D1:D10. The **MIN** function can take up to **30** arguments.

PROPER

Syntax =proper(text)

Capitalizes the first letter of each word(s) in the specified text.

=PROPER("hi my name is david") This would return a text result of: **"Hi My Name Is David"**

RIGHT

Syntax =right(text,num_chars)

Returns the right most character(s) as nominated by "num_chars"

=RIGHT("bullet") This would return the text "**t**".

As you can see, if the "num_chars" argument is omitted the default is **1**

=RIGHT("bullet",2) This would return the text "**et**".

SMALL

Syntax =small(array,k)

Returns the k-th smallest value in a set of values.

=SMALL(A1:A10,2) would return the second (**2**) smallest value in the range **A1:A10**

SUMIF

Syntax =sumif(range,criteria,sum_range)

Sums a range of cells as set by the **criteria** you specify

=SUMIF(A1:A10,">10",B1:B10) would sum all the cells in the range B1:B10 only if the cell on the same row in column **A** or **C** is greater than **10**.

=SUMIF(A1:C10,">10") would sum all the cells in the range **A1:C10** that are greater than **10**. As you can see if the "sum_range" argument is omitted the default sum range is the **range** argument.

VLOOKUP

Syntax =vlookup(lookup_value,table_array,col_index_num,range_lookup)

Looks for a value in the **first column** of the **table_array** you nominate and returns the value from the **same row** in a column you specify by **col_index_num**.

=VLOOKUP("Dog",A1:E10,3,FALSE) Would return the value **300** if the word "Dog" was within the range **A1:A10** (the first column of **table_array**) and the number **300** was in same row as "Dog" but in the third column.

The optional argument "range_lookup" can take either **TRUE** or **FALSE**, if omitted it is considered **TRUE**.

By using **FALSE** we are telling it to find an exact match (but not case sensitive).

When the **lookup_value** is **text**, **FALSE** is nearly always used.

If the **lookup_value** is a **numeric** value then using **TRUE** or omitting the argument will result in the argument **lookup_value** returning the row of the closest match. For this reason if TRUE is used when **lookup_value** is a number, the first column of your **table_array** should be sorted in **Ascending** order.

END OF EXAMPLES

All of the above functions are only a very small portion of the functions available to Excel. We have shown examples of what we believe to be the most popular functions. We have based this on the many years we have spent helping other Excel users all over the world. As we stated at the start of the examples they are not necessarily very practical examples, we have done this as we believe it is far more important to understand how the functions work as opposed to being able to copy and paste a useable example into a Workbook. We urge you to read the help files on any function that you may need. We realize fully that the help in Excel can seem a bit daunting at times, but it is important that you become familiar with it, as it will **always** your best and most **accessible** source of help.

You will find that these will often write what is known as **array formulas** this will be a good lead into our next lesson where we can look at ways and means to extract information from a table or database. This will cover arrays and the database functions (which we have purposely omitted in the above examples). Make use of the help in Excel to learn about the two wizards. You will find that using the wizards without any prior knowledge will make you think. Be careful you do not become reliant on them though.