Spreadsheets:
Advanced Data Analysis

How to Use this User Guide

This handbook accompanies the taught sessions for the course. Each section contains a brief overview of a topic for your reference and then one or more exercises.

Exercises are arranged as follows:

- A title and brief overview of the tasks to be carried out;

- A numbered set of tasks, together with a brief description of each;

- A numbered set of detailed steps that will achieve each task.

Some exercises, particularly those within the same section, assume that you have completed earlier exercises. Your teacher will direct you to the location of files that are needed for the exercises. If you have any problems with the text or the exercises, please ask the teacher or one of the demonstrators for help.

This book includes plenty of exercise activities – more than can usually be completed during the hands-on sessions of the course. You should select some to try during the course, while the teacher and demonstrator(s) are around to guide you. Later, you may attend follow-up Course Clinics at ITLP, where you can continue work on the exercises, with some support from IT teachers. Other exercises are for you to try on your own, as a reminder or an extension of the work done during the course.

Text Conventions

A number of conventions are used to help you to be clear about what you need to do in each step of a task.

- In general, the word **press** indicates you need to press a key on the keyboard. **Click**, **choose** or **select** refer to using the mouse and clicking on items on the screen. If you have more than one mouse button, click usually refers to the left button unless stated otherwise.

- Names of keys on the keyboard, for example the Enter (or Return) key, are shown like this: ENTER.

- Multiple key names linked by a + (for example, CTRL+Z) indicate that the first key should be held down while the remaining keys are pressed; all keys can then be released together.

- Words and commands typed in by the user are shown `like this`.

- Labels and titles on the screen are shown `like this`.

- Drop-down menu options are indicated by the name of the options separated by a vertical bar, for example `File|Print`. In this example you need to select the option `Print` from the `File` menu or tab. To do this, click when the mouse pointer is on the `File` menu or tab name; move the pointer to `Print`; when `Print` is highlighted, click the mouse button again.

- A button to be clicked will look `like this`.

- The names of software packages are identified *like this*, and the names of files to be used `like this`.

Software Used

Excel 2013

Windows 7

Files Used

Exam grades.xlsx

Invoice lookup.xlsx

Health Club Bookings.xlsx

Ria View Theatre Club

Index function.xlsx

Index Match Function.xlsx

Index Match Array.xlsx

Dependant Cascading dropdown lists.xlsx

Sales and Production.xlsx

Revision Information

Version	Date	Author	Changes made
1.0	15 July 2011	Ian Miller	Created
1.1	21 July 2011	Ian Miller	Update for Office 2010
1.2	16 November 2012	Ian Miller	Updates for IT Services
2.0	14 August 2015	Traci Huggins	Update for Office 2013

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Contents

Exercises

1   Introduction

Welcome to *Excel*: Working with lists and querying external data.

This booklet accompanies the course delivered by Oxford University IT Services, IT Learning Programme. Although the exercises are clearly explained so that you can work through them yourselves, you will find that it will help if you also attend the taught session where you can get advice from the teachers, demonstrators and even each other!

If at any time you are not clear about any aspect of the course, please make sure you ask your teacher or demonstrator for some help. If you are away from the class, you can get help by email from your teacher or from help@it.ox.ac.uk.

1.1. What You Should Already Know

This session is the fifth in a series that covers *Excel* from the basics to advanced techniques. We assume you have attended the earlier *Excel* courses and are familiar with opening files from particular folders and saving them, perhaps with a different name back to the same, or a different folder.

The computer network in IT Services may differ slightly to what you are used to in your College or Department; if you are confused by the differences ask for help from the teacher or demonstrators.

By the way, did we say that you can ask for help from the teachers or demonstrators ☺ !

1.2. What Will You Learn?

In this session we will cover the following topics:

- Implementing Add-Ins
- Advanced analysis formulas
  - o   Sumif
  - o   Countif
  - o   Sumifs
  - o   Countifs
  - o   Vlookup
- What-if analysis
  - o   Manual
  - o   Scenarios
- Data Validation
- Drop down boxes
- Index / Match Function
- Conditional Formatting
  - o   Highlight Cells Rules
  - o   Top/Bottom Rules
  - o   Data bars

- Colour Scales
- Icon Sets

1.3. Using Office 2013

If you have previously used another version of *Office*, you may find *Office 2013* looks rather unfamiliar. "Office 2013: What's New" is a self-study guide covering the ribbon, Quick Access Toolbar and so on. This can be downloaded from the ITLP Portfolio at http://portfolio.it.ox.ac.uk.

For anyone who prefers not to use the mouse to control software, or who finds a keyboard method more convenient, it is possible to control *Office* applications without using a mouse. Pressing ALT once displays a black box with a letter or character next to each visible item on the ribbon and title bar (shown in Figure 1).
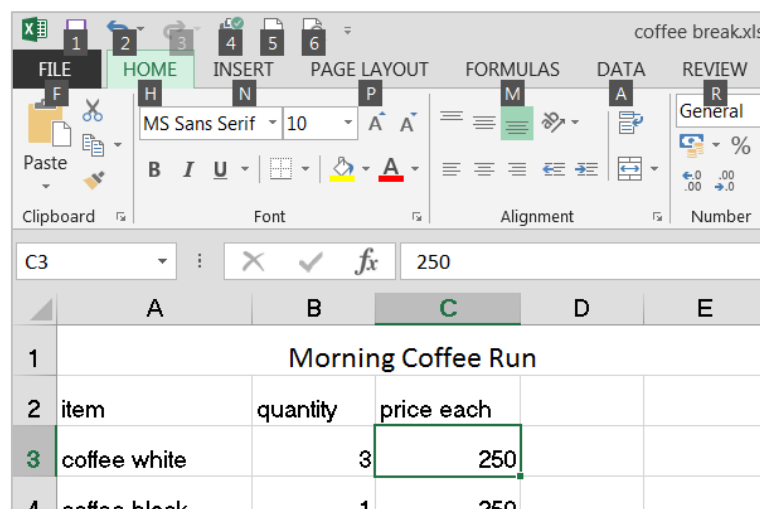
**Figure 1 Keystrokes to Control Ribbon Tabs and Title Bar
(Press ALT to Show These)**

After you have typed one of the letters/characters shown, the relevant ribbon tab or detail appears, with further letters/characters for operating the buttons and controls.

The elements of a dialog can be controlled, as usual with *Windows* applications, by using TAB to navigate between items or typing the underlined character shown beside an item.

1.4. What is Excel?

Rather like a calculator, spreadsheets were primarily designed to work with numbers. You would not expect to type a forty-page essay into a calculator, nor would you in a spreadsheet.

Spreadsheets are used for a variety of different purposes - so much so that to produce an exhaustive list of them is almost impossible. Spreadsheets are used in book-keeping, accounting, marketing, sales analysis, budgets, cash flow, business plans, project planning, and production. The spreadsheet program offers many powerful features to help solve complex numerical problems and to detail important areas of data.

1.5. Where Can I Get A Copy?

If you have a copy of *Microsoft Office 2013*, then you already have a copy of *Excel 2013*. If you are unable to find it on your computer, it may not have been installed and you should talk to your IT support contact (or the IT Services Help Centre).

If you are a member of staff, you can obtain a copy of *Microsoft Office 2013* from the IT Services online shop. Students can obtain a Microsoft Student Licence, but this must be bought through a Microsoft Authorised Education Reseller; the IT Services shop can direct you to a suitable reseller.

1.6. Add-Ins

In the following exercises you will be using functions and features that are not available by default. These can be added at run time. Please refer to **Exercise 1** for instructions.

2 Analysis formulas

Excel provides a variety of functions that summarise data meeting specified criteria. This is useful when analysing data.

2.1. SUMIF and COUNTIF Functions

SUMIF and COUNTIF are used to sum or count values within a range based on a logical test, similar to the IF function.

2.1.1. SUMIF

The SUMIF function allows you to sum values that meet a `single` criterion only. The general structure of the SUMIF function is shown below.

= SUMIF(range, criteria, sum_range)   where:

- `range` is the range to evaluate;
- `criteria` is the search value to be applied to the range;
- `sum_range` is the range containing values you want to summarise.

2.1.2. COUNTIF

The COUNTIF function allows you to count values that meet a `single` criterion only. The general structure of the COUNTIF function is shown below.

= COUNTIF(range, criteria)   where:

- `range` is the range to evaluate;
- `criteria` is the search value to be applied to the range

Exercise 2: Using SUMIF and COUNTIF functions

Now look at this exercise (page 44)

2.2. SUMIFS and COUNTIFS Functions

2.2.1. SUMIFS

The SUMIF formula allows us to find the sum of values meeting a single criterion condition. When you have more than one criterion this function cannot be used and you have to use other methods to sum values.

SUMIFS is simply a plural version of SUMIF and replaces the previous versions formula of DSUM. Using SUMIFS it is possible to find the sum of values in your data that meet multiple conditions. Up to 127 range/criteria pairs are allowed.

The general structure of the SUMIFS function is shown below.

= SUMIFS(sum range, criteria range 1, criteria 1)   where:

- `Sum range` are the actual cells to sum;
- `criteria range` is the range of cells you want evaluated of a certain condition;
- `criteria` is the condition or criteria in the form of a number, text or formula

The order of arguments for SUMIFS differs from the SUMIF function. The sum_range argument is the first argument in SUMIFS, but it is the third argument in SUMIF. Be careful if you are copying and editing these similar functions, make sure you put the arguments in the correct order, see **Error! Reference source not ound.**

=SUMIFS(D7:D256,B7:B256,"March",C7:C256,"Ohio")

| Sum Range | 1st Criteria Range - Criteria | 2nd Criteria Range - Criteria |
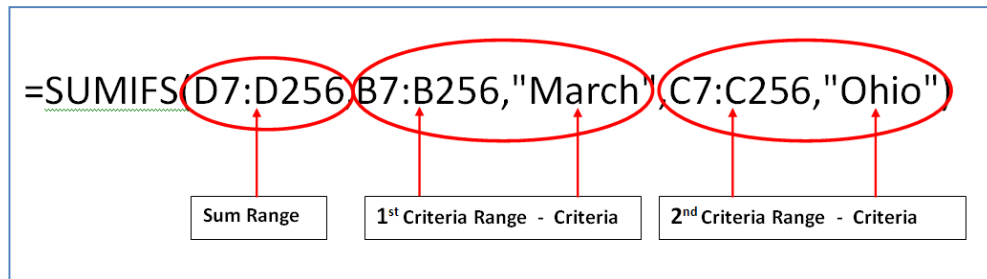
Reminder of SUMIF syntax

=SUMIF(range, criteria, sum_range)

2.2.2. COUNTIFS

The COUNTIFS function allows you to count values that meet a **multiple** criterion. The general structure of the COUNTIFS function is shown below.

= COUNTIFS(criteria range1, criteria1, criteria range2, criteria2…….)   where:

- **Criteria range** is the range of cells you want to evaluate for a particular condition;
- **criteria** is the search value to be applied to the range

Exercise 3: SUMIFs and COUNTIFs functions

Now look at this exercise (page 47)

3 Lookup Formulas

Vlookup searches for a value in the first column of a table and returns a value in the same row from another column in the table.

Syntax

`VLOOKUP(lookup_value,table_array,col_index_num,range_lookup)`

`Lookup_value` – The value to search in the first column of the table array. Lookup_value can be a value or a reference

`Table_array` – Tow or more columns of data. Use a reference to a range or a range name. The values in the first column of table_array are the values searched by the lookup value

`Col_index_num` – The column number in table_array from which the matching value must be returned. A col_index_num of 1 returns the value in the first column in table_array; a col_index_num of 2 returns the value in the second column in table_array, and so on.

`Range_lookup` – A logical value of either TRUE or FALSE, that specifies whether you want VLOOKUP to find and exact match or an approximate match.

If TRUE is omitted, an exact or approximate match is returned. If an exact match is not found, the next largest value that is less than lookup_value is returned. However the values in the first column of the table array must be placed in ascending sort order otherwise VLOOKUP may not give the correct value

If FALSE, VLOOKUP will only find an exact match. The values in the first column do not need to be sorted.

3.1. Vlookup – exact match

In the below worksheet cell **B6** has a vlookup formula in to locate the **Description** based on the **StockCode** from the lookup table which is located in a different worksheet.

The formula in cell **B6** would be **=VLOOKUP(A6,'Stock list'!$A$2:$E$19,2,FALSE)**

As the vlookup is exact (**False** has been input as the range_lookup) the lookup table does not need to be sorted

Figure 2 Lookup table

Exercise 4: Invoice vlookup – Exact Match

Now look at this exercise (page 41)

3.2. Vlookup – inexact match
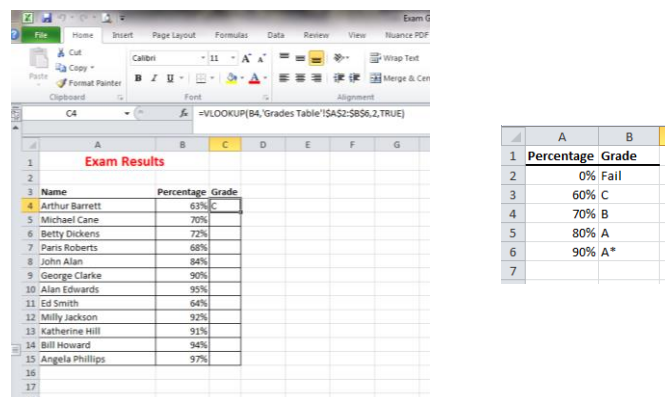
You will not always require an exact match and therefore an approximate one will suffice.

The formula in cell **C4** would be **=VLOOKUP(B4,'Grades Table'!$A$2:$B$6,2,TRUE)**

As the vlookup is inexact (**True** has been input as the range_lookup) the lookup table must be sorted. The percentage field has been sorted below from the smallest value.

When vlookup is performing an inexact match it will return an exact match if found or if not found it will return the largest value that is less than the lookup value. This is why it is essential to sort your lookup column in ascending order.

Therefore in the example below with a percentage value of **63%** the vlookup will locate the value of **60%** first in the lookup table and then move to the next value which is **70%**. As **70%** is greater than **63%** it will insert the result from the row above which is a grade **C**.

Figure 3 Percentage grades table

Exercise 5: Invoice vlookup – inexact Match

Now look at this exercise (page 54)

4 What-if Analysis

4.1. Manual What-If Analysis

Manual analysis is where the user changes one or more input cells that affect one or more of the key formula cells. The result of changing values in the input cells can be instantly viewed and evaluated.

Exercise 6: Manual What-If Analysis

Now look at this exercise (page 55)

4.2. What-If Analysis using Scenario Manager

Excel's **Scenario Manager** makes it easy to automate your What-If models. It is possible to store different sets of input values for any number of variables and give a name to each set. It is then possible to select a set of values by name, and Excel displays the worksheet by using those values.

From the **Data | Data Tools** tab click on the **What-If Analysis** button and select . The **Scenario Manager** dialogue box should then appear.
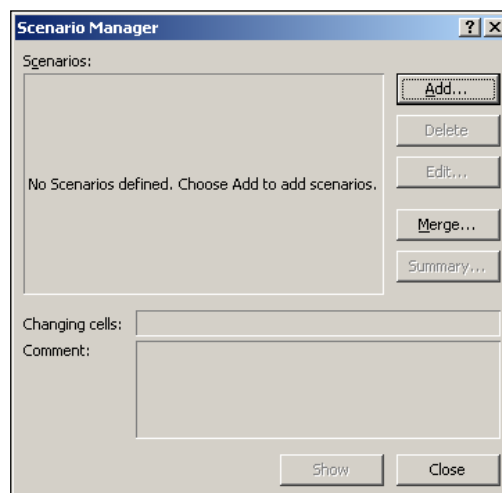
Figure 4 Scenario Manager

To create a new scenario click select **Add.**

The **Add Scenario** dialog box (**Error! Reference source not found.**) will appear, dd a **Scenario name** for example 'Best Case'

The **Changing cells** are the cells where the value will change. They are usually cells which have formulas dependent on them.

Select **OK**
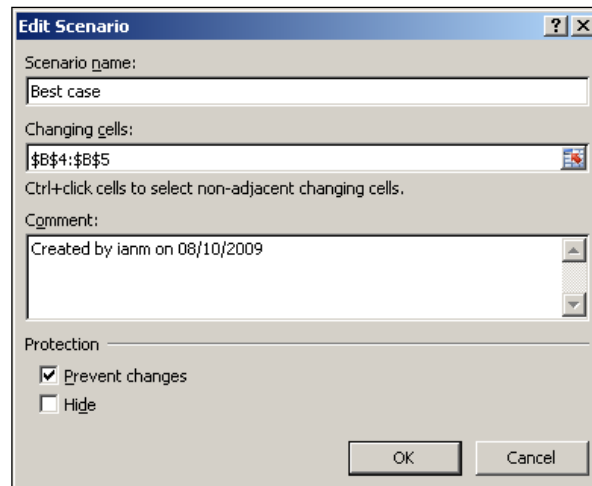
Figure 5 Edit Scenario dialog box

The below **Scenario Values** dialog box will appear. Enter the values required to achieve your scenario result.

To add further scenarios select Add in the Scenario Values dialog box, once your scenarios have been added select OK
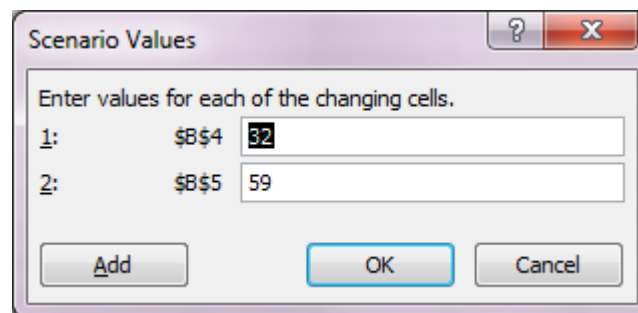
Figure 6 Scenario Values

Once your scenarios have been added they are available to view from the **What-If Analysis**, **Scenario Manager** window. Select the Scenario you would like to view and click Show.

You may need to move the Scenarios dialogue box to view the figures changing.
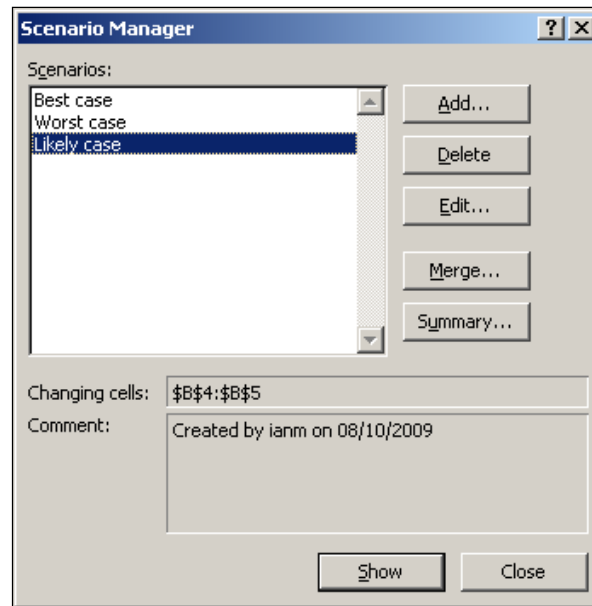
Figure 7 Completed Scenario Manager

Exercise 7: Using the Scenario Manager

Now look at this exercise (page 56)

4.3. Scenario Summary Reports

Scenario summary reports provide you with a single worksheet summary of the different scenarios you have created and displays not only the changing and resulting values for all the scenarios you have defined but also the current values in your worksheet.

To create the report, open the workbook which contains the scenarios you want to summarise and select the Data tab, Data tools, What-if Analysis, Scenario Manager. The below dialogue will appear.
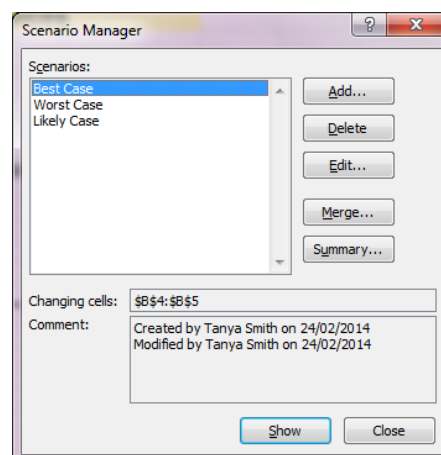
Figure 8 Scenario Manager dialog box

Select **Summary** the **Scenario Summary** dialogue box will appear as below.
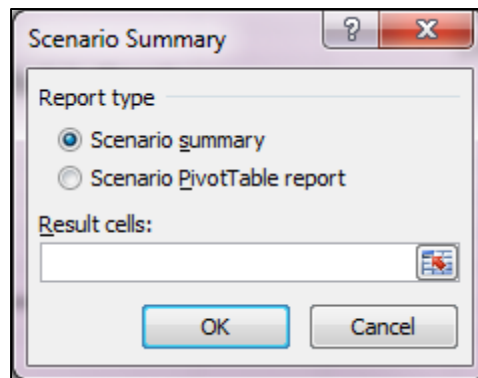
Figure 9 Scenario summary dialog box

Select **Scenario summary** report, ensure the **Result cells** value is blank and select OK

Your report will be created on a new worksheet named **Scenario Summary** as below.

Figure 10 Scenario report

Exercise 8: Use formula with the Scenario Manager

Now look at this exercise (page 58)

5 Data Validation

Data validation is a feature in Excel that allows you to define restrictions on exactly what data can or should be entered into a cell. You are able to configure data validation in Excel to prevent users from entering data into cells within a work sheet that are not valid.

There are lots of different ways of using data validation depending on the type of data required on an Excel worksheet. Data validation allows you to set user input messages (to let you know that a certain type of data is required for this cell) as well as error messages (to let you know that you have entered the wrong data into the cells), this helps eliminate user input error.

We are going to look at some examples of using data validation on a booking system, a sample of data from the bookings system is shown below;

Date	Name	Age	Group	Price	Discount	Total
05-Apr-15	Depp, Julia	22	Aerobics	22.00	12%	19.36
01-Apr-15	Nicholson, Johnny	23	Weight Training	9.00		9.00
12-Apr-15	Dickens, Bob	18	Aromatherapy	23.00	10%	20.70
15-Apr-15	James, Oliver	38	Weight Training	23.00	15%	19.55
01-May-15	Sutton, Kyle	26	Weight Training	23.00	10%	20.70
02-May-15	Winter, Max	24	Massage	34.00	15%	28.90
03-May-15	Vine, Sandy	42	Aromatherapy	23.00	10%	20.70

Figure 11 Booking system

5.1. Validating numerical data

On our booking form we are going to set validation to the ages with the following rules;

Age	
Minimum age	17
Maximum age	100

Figure 12 Age rule for booking system

To put a restriction on our age for the above rules, firstly highlight the cell range C7:C13. Then select **Data | Data Validation**
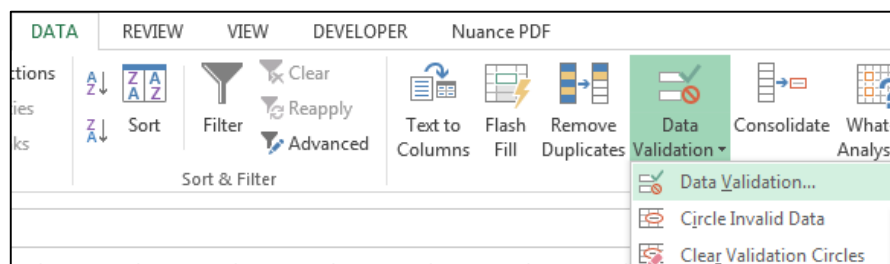
Figure 13 Data validation on the ribbon

You will then see all of the validation criteria available to you, you will also see tabs for Input Message (what the user will see before they enter any data) and an Error Alert (when users have input the wrong data);

Choose **Whole number** from the drop down arrow (right hand side, then choose **Between** from Data, either type in the ages Or use the cell picker on the right hand side and choose the actual cells from the spreadsheet for the Minimum and Maximum ages.
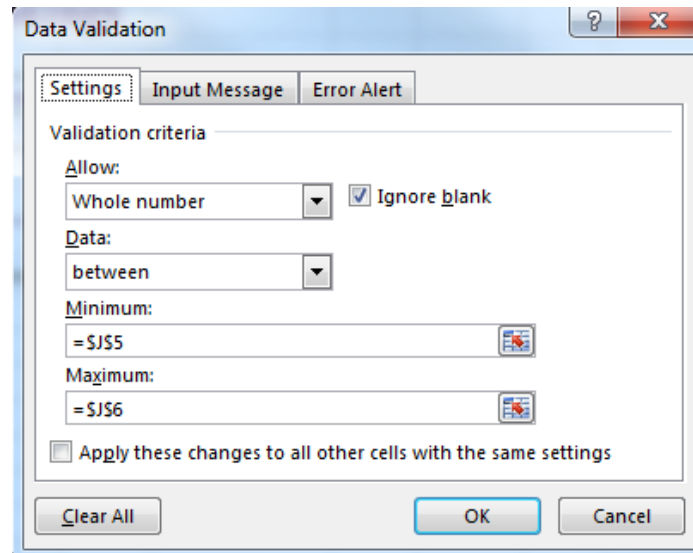
Figure 14 Validation criteria

Note: Ignore Blanks – means if you referenced say C7:C13 as you're "Source" for the list and only C7:C10 had entries, the blank cells would not be shown until such time as they have data in them. Very Handy, in most cases this would be left ticked (it is by default).

Click on the **Input Message** tab and type in the following;
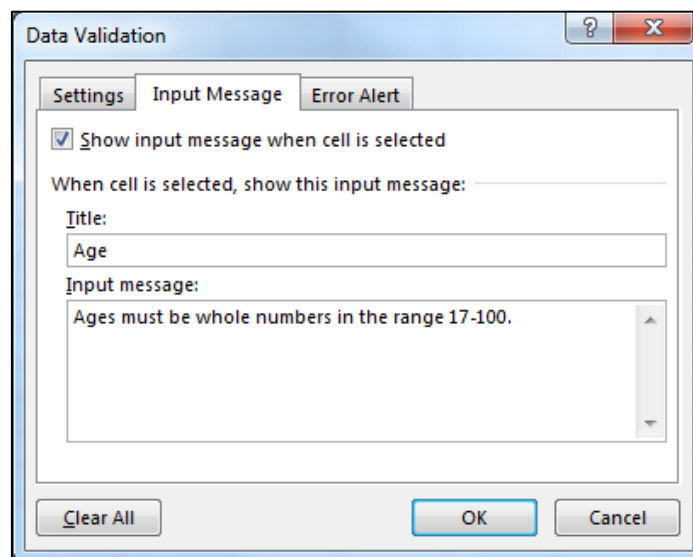
Figure 15 Age validation input message

Now select the **Error Alert** tab and type in the following;
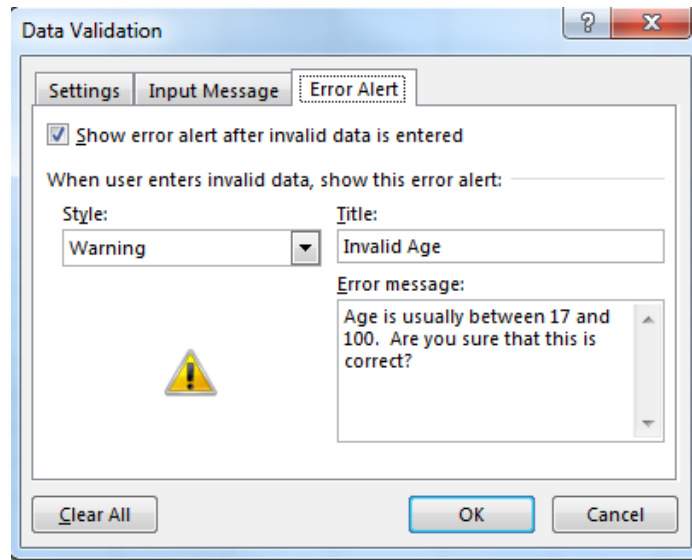
Figure 16 Error Alert Message
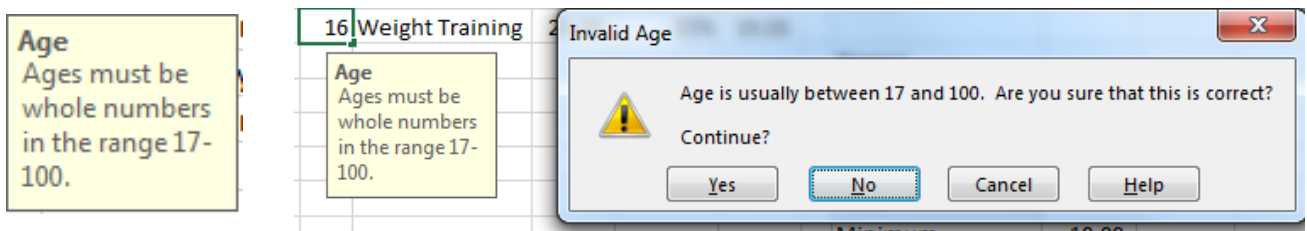
Figure 17 Input and Error messages the user sees

If you now click into one of the cells which contains the age you will see **the Input Message** telling you that ages must be in the range 17-100, you can now test the validation to check that it works correctly by changing one of the ages to either 16 or 101, if working correctly you should see the **Error Message** above.

Exercise 9: Numerical Validation

Now look at this exercise (pages 59-61)

5.2. Text Length

Validation rule can also be used on the Text length, you can set or exclude a range of lengths, or specify a minimum length or maximum length. If we consider using the rules opposite for names;

Names	
Min length	2
Max length	20

Select **Data | Data Validation | Choose Text length | Between**

You can then either type the Text Length into the Data Validation dialog box, **OR** you can refer to and select the cells that contain the value on your worksheet.
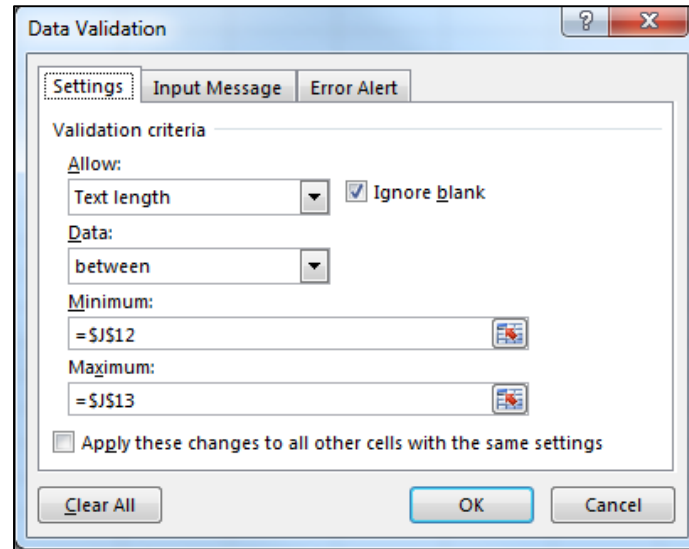
Figure 18 Text length validation rule

Exercise 9: Text Validation

Now look at this exercise (pages 59-61)

5.3. Date Validation

Instead of entering dates onto your worksheet, you could use a formula to set the start and/or end dates using validation.

Select the cells in column A under the heading date then select **Data | Data Validation | Choose Date | Greater than or equal to | =TODAY()**

The formula =TODAY() will ensure that Excel uses today's date in the cells if you wanted to have an end date instead of a start date you could use the following formula; **=TODAY()+6** this would calculate 6 days from today – the +6 can be changed to any number of days you require to be the end date from today.
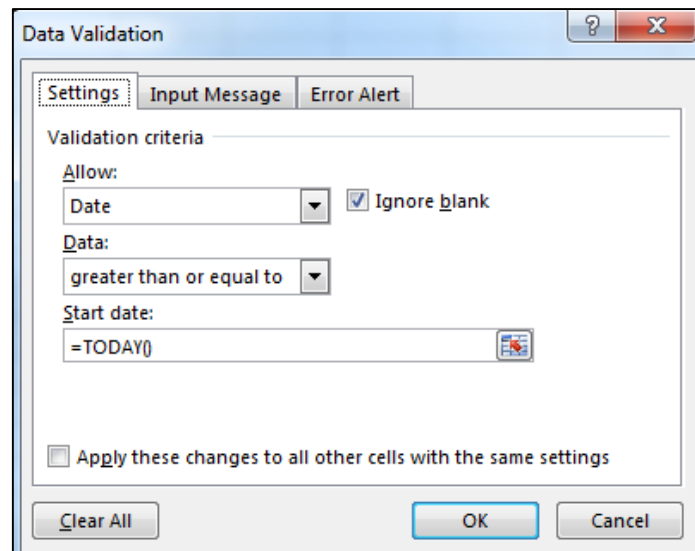
Figure 19 Date validation

Exercise 9: Date Validation

Now look at this exercise (pages 59-61)

5.4. List Validation

One of the most common ways of using data validation is to use a drop down list, allowing users to choose from a list, you would need to list your data somewhere else on your spreadsheet.

Select **Data | Data Validation | Choose List | use the cell reference of the list on your spreadsheet**
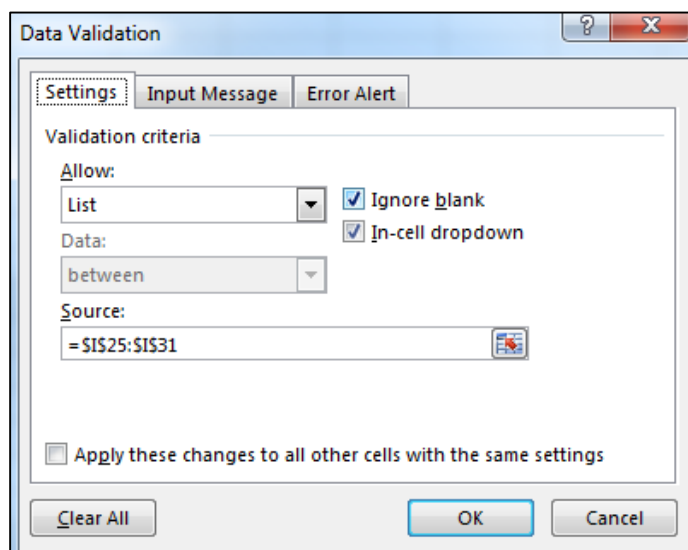
Figure 20 List validation

Exercise 9: List Validation

Now look at this exercise (pages 59-61)

5.5. Formula Validation

It is common to use formulas when creating validation rules, we could have a rule that offers discount only on orders for £10 or more;

Discounts	
Minimum price for discount	10.00

Select **Data | Data Validation | Choose Custom | =IF(E7<10,FALSE,TRUE)**
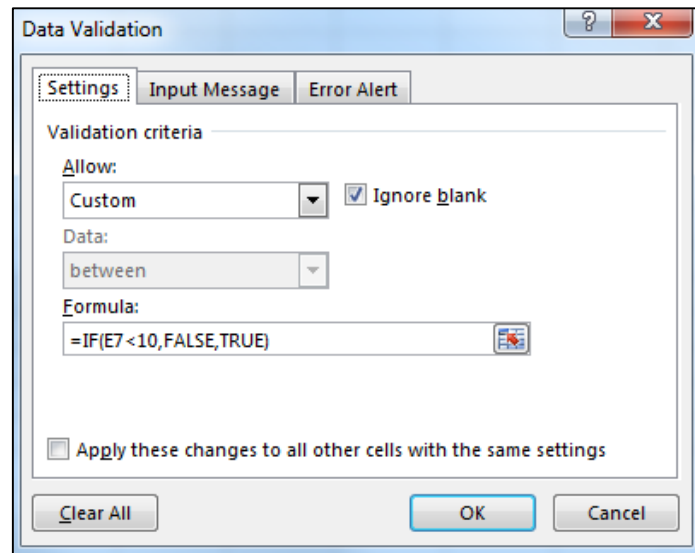
Figure 21 Data validation using a formula

Exercise 9: Formula Validation

Now look at this exercise (pages 59-61)

6 Conditional Formatting

Conditional formatting can help you to analyse and answer specific questions about your data by making it easy to highlight interesting cells or ranges of cells, emphasize unusual values or visualise data by using data bars, colour scales and icon sets.

A conditional format changes the appearance of a cell or range based on the condition or criteria set. If the condition is true, the cell or range is formatted based on that condition. It the condition is false the cell or range is not formatted.

It is only possible to conditionally format by referencing to cells in the same worksheet. It cannot reference to cells in other worksheets or workbooks.

Below are various types of conditional formatting.

6.1. Format a cell based upon the cell value

One of the simplest conditional formatting options is to apply a change of background colour of cells depending on their value.

Conditional formats can be applied to `values`, `dates` or `text`. Formatting `values` you can highlight values greater than or less than or between values. Formatting `text` you can highlight text that begins with, ends with or contain specific characters. For `dates` you can highlight cells such as today, tomorrow, in the last seven days, last week and this week. The format will be based upon the current date.

They can also be used to highlight cells which contain `duplicate values`.

All of these options are available to you on the `Home` tab on the ribbon in `Styles / Conditional Formatting / Highlight Cell Rules`, see Figure 22.
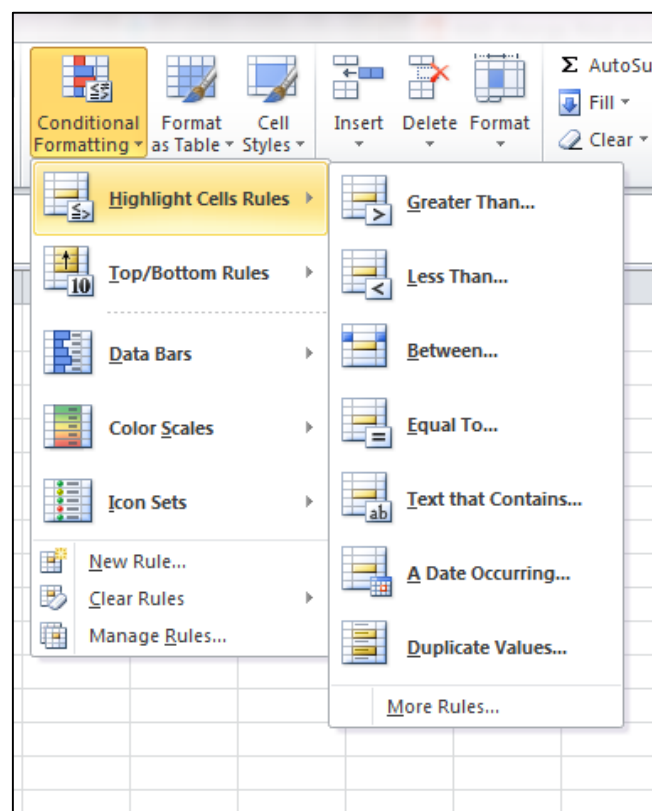
Figure 22 Highlight cell rules

Other conditional formats available for highlighting cells are **Top/Bottom Rules** which is located just below the **Highlight Cell Rules** located in **Error! Reference ource not found..** There are various options available which are shown below in
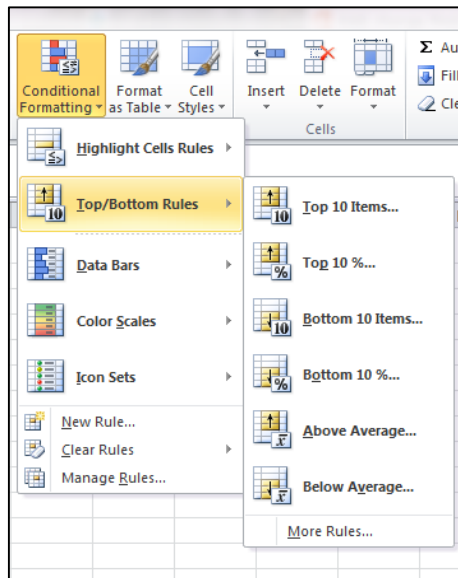
Figure 23 Top/Bottom Rules

When conditionally formatting cells, select the range of cells you would like to highlight with the rule you would like to apply. In the below worksheet the grades in cells B4 to B15 have been selected.

Figure 24 Selecting % cells

Select the **Conditional Formatting** menu from **Home | Styles | Conditional Formatting** and for this example **Top| Bottom Rules** has been selected followed by **Above Average.**

The following dialog box will then appear. Click on the drop down arrow and select an appropriate highlight colour. If there is not a suitable colour select **Custom Format** and create your own background colour. Then select OK
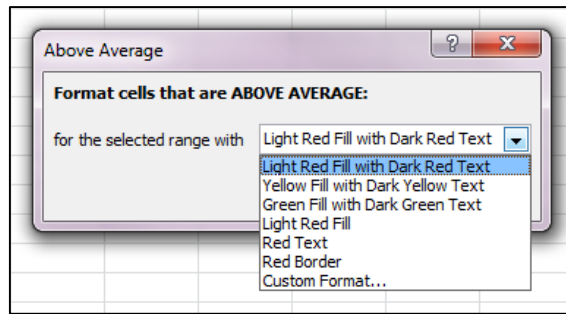
Figure 25 Formatting background colour

The cells which are above average will then be highlighted. See below.

Figure 26 Conditional Formatting results

6.2. Format duplicate values

Conditional formatting allows you to format duplicate values within a range of cells – this will allow duplicate values to be automatically picked up rather than have to look through reams of data.

Firstly highlight the column (or row) that you need to find duplicate values from. Then select the conditional formatting icon from the ribbon

Select Highlight Cells Rules

Then select Duplicate Values
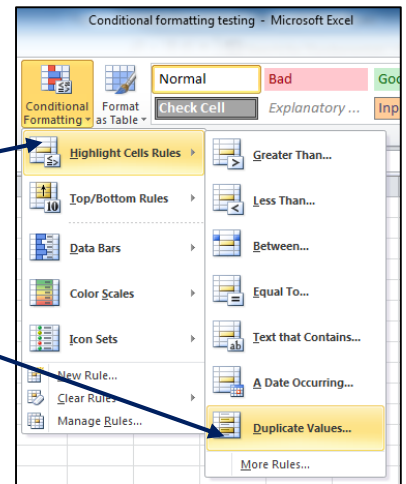
Figure 27 Lookup table

You will then see the following option box for you to choose in which way you would prefer to format your duplicate values.

Clicking on the dropdown box next to `values with`, will allow you to specify as to whether you would like both the numbers/text and the cell coloured or whether to choose to have either just the `numbers/text` or just the cells.
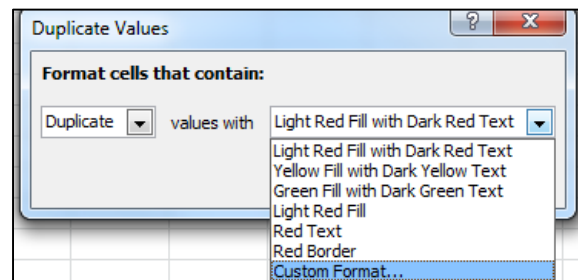
Figure 28 Cell or text colour

By selecting the `Custom Format` option it allows you to choose a more variety of `Colour | Fill | Fonts | Borders.`
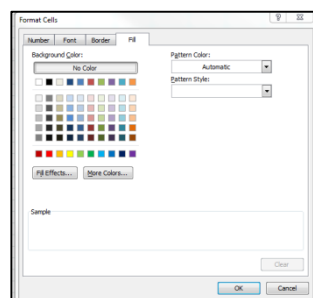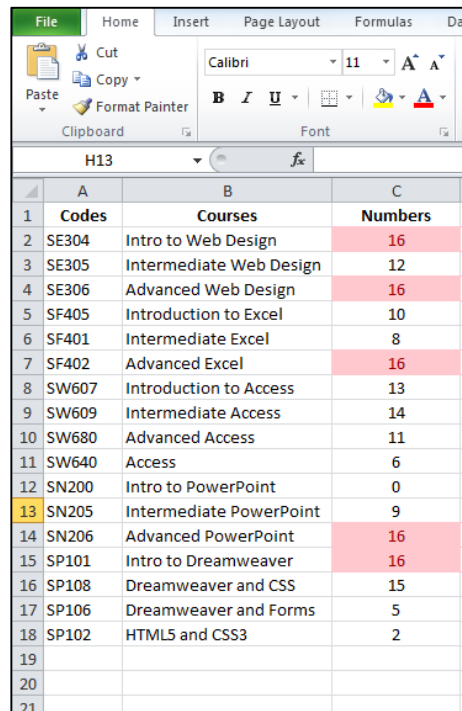
Figure 29 Custom format

When you have chosen the duplicate values option this is what will happen – as `Excel` will pick up that there are 5 duplicate values of 16 in this cell range.

Figure 30 Results

Exercise 10: Conditional formatting by highlighting cells

Now look at this exercise (page 62)

6.3. Visualisations

Visualisations are between raw data and charts. With a few clicks you can express numbers in a visual manner. Various visualisation options are available by selecting Home | Styles | Conditional Formatting | Data Bars or Colour Scales or Icon Sets. See Data Bars.
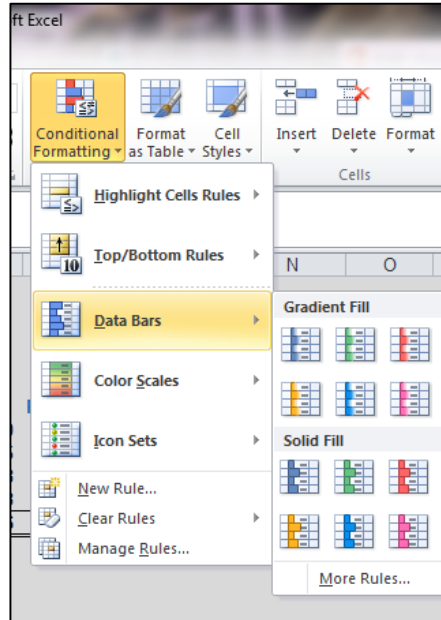
Figure 31 Data Bars

Exercise 11: Conditional formatting with visualisations

Now look at this exercise (page 63)

6.3.1. Data Bars

Data bars are a quick way to insert cell sized charts into your worksheet. They can either be displayed in addition to the value in the cell or you can just show the graph in the cell and remove the values.

In the below worksheet there are sales returns for each month and region. By selecting a range of cells you would like to compare, for example each month's sales return, you can insert Data Bars to show visually the lowest to highest sales return.

Select the cells in range D2:D7 for January sales and select Home | Styles | Conditional Formatting | Data Bars. See Data Bars above. Then from the options available select either a Gradient Fill or Solid Fill.

Each month can subsequently be selected and different colour Data Bars can be applied.

There is also an option to only display the data bars. This however can be meaningless unless the values are visible in a nearby cell. One way to overcome this is to refer to the cell next door by a formula eg =D8, then select the range of cells where you require Data Bars only to appear and select Home | Styles | Conditional Formatting | Data Bars and select More Rules ,which is located below the Data Bars menu.

The New Formatting Rule dialog box will appear, see New Formatting Rule dialog box. From the Edit the Rule Description / Format all cells based on their values select Show Bar Only tick box. Select a colour from the Bar Appearance section and select OK
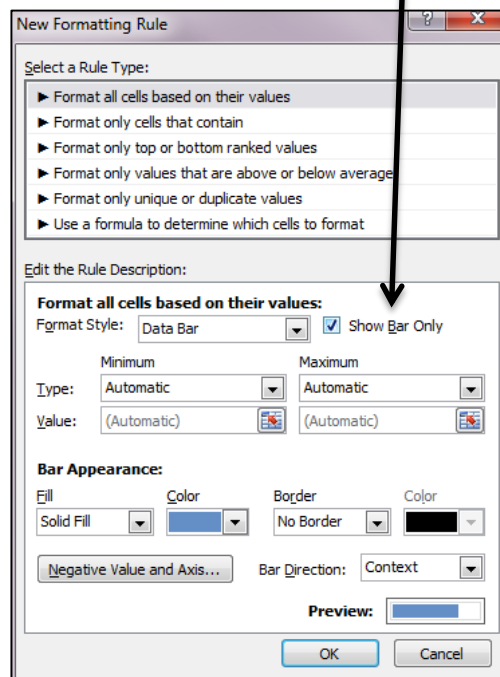
Figure 32 New Formatting Rule dialog box

The example below shows data bars in a different colour for each month, for example in the month of February it has Data Bars only visible by referring with a formula to the adjacent cells, for example E8 contains the formula =D8, cell E9 has a formula or =E9 and so on.

Figure 33 Results

6.3.2. Colour Scales

Colour scales are similar to data bars however they allow you to display varying colour scales to represent your cell values. For example the lowest number can be red, middle number amber and the top number green, depending on what you require. See below for some of the options.
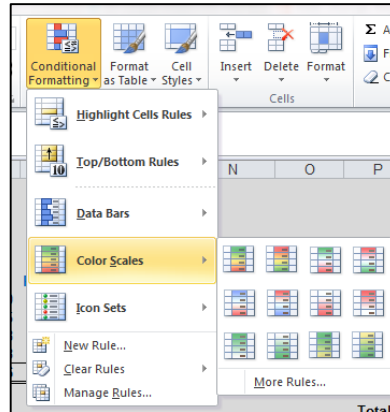
Figure 34 Lookup table

6.3.3. Icon Sets

Icon sets allow you to set a value for each icon.
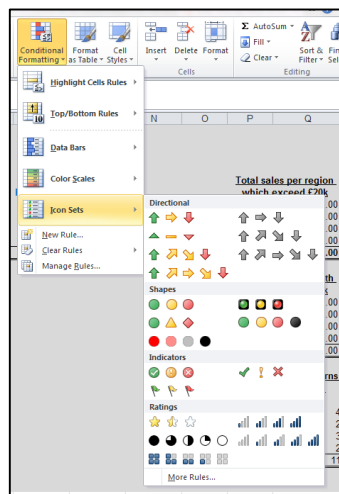
Figure 35 Icon Sets
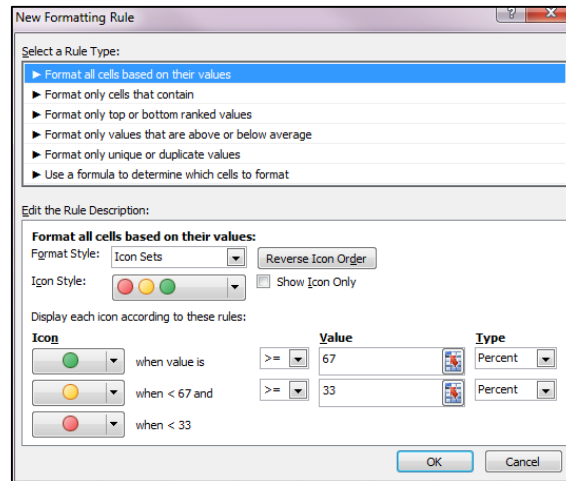
Figure 36 Icon Sets Values

6.4. Manage multiple conditional formats

There are times when you may need to create more than one conditional formatting rule for a range of cells. This is done by firstly selecting the cell range you require to include in the formatting rule. Then selecting **Conditional Formatting | Manage Rules | New Rule.**
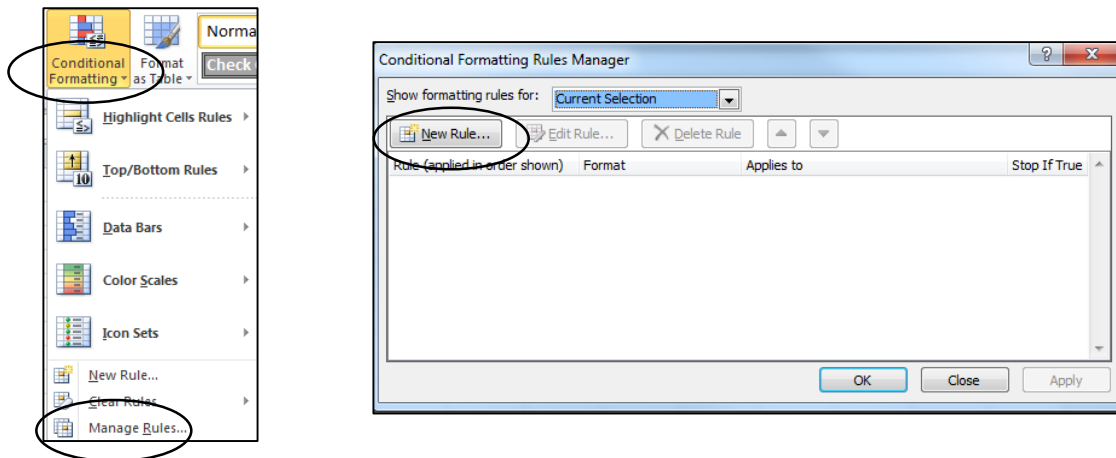
Figure 37 New rules

You now have the option to choose what formatting is required for the cells. Select **Format Only Cells that Contain.**
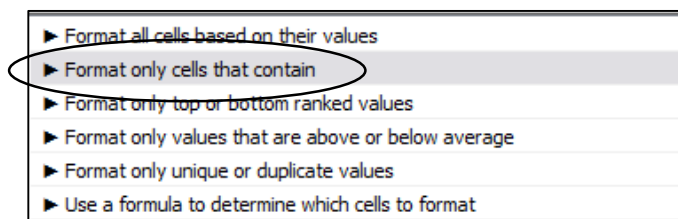
Figure 38 Types of rules

Conditional formatting gives you the option as shown below to format cells with a variety of actions. Select **Cell Value | Equal to | type in A***. Then you need to select **Format** to choose what colour you would like to format the cells to.
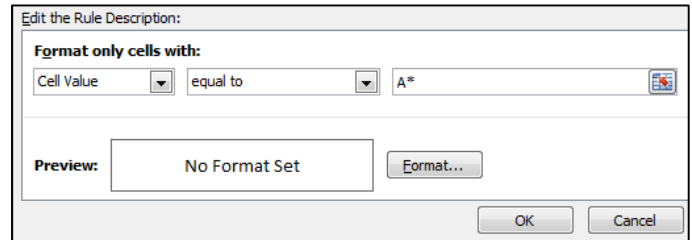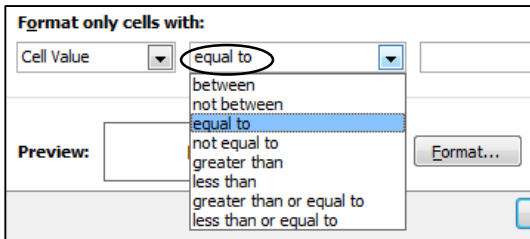
Figure 39 Formatting cells with actions

The Conditional Formatting Rules Manager as you can see from the diagram below allows you to add as many rules as required. It also allows you the option to **Edit Rule** and **Delete Rule.**
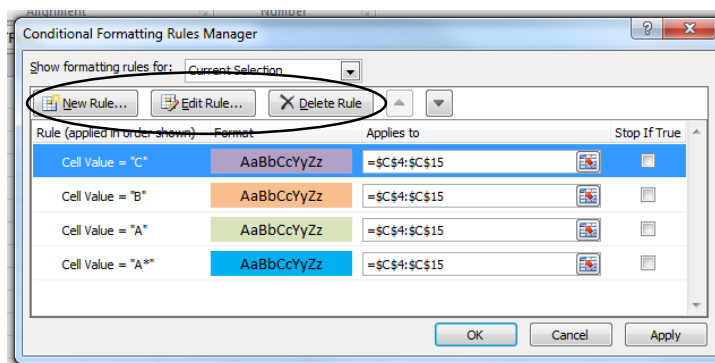
Figure 40 Edit rules

Exercise 13: Managing multiple conditional formats

Now look at this exercise (page 64)

6.5. Formula-driven formatting

As we have already seen there are many ways to use conditional formatting to quickly highlight important information. Sometimes however the built-in formatting does not go quite far enough. It is possible to add your own formula to a conditional formatting rule and give the spreadsheet the power to do what the built-in rules cannot do.

Formula-Driven formatting works in the following way; select the cell range that you want to add a formula driven conditional formatting to then select **Conditional Formatting | New Rule | Use a formula to determine which cells to format** as shown below: or

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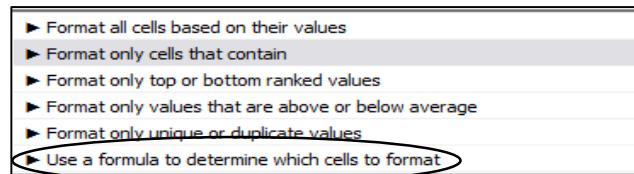
Figure 41 Formula driven

Support that we want to format all the percentage grades that are below average. To do this we need to add the formula =B4<AVERAGE($B$4:B:15) as shown below:
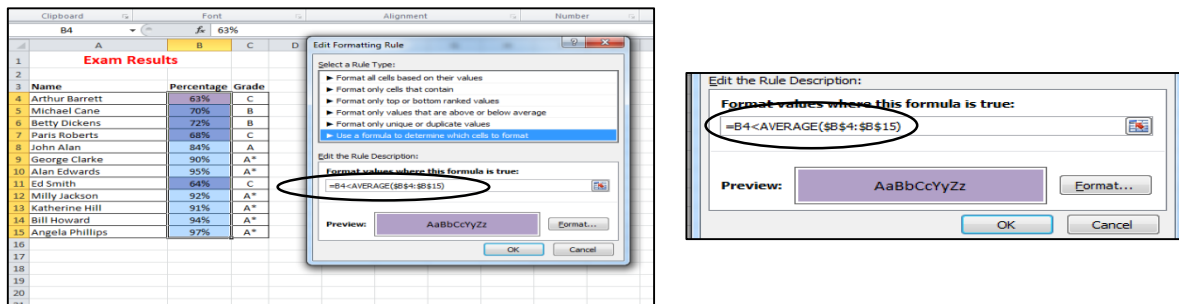
Figure 42 Using an average formula

Exercise 12: Formula driven conditional formatting

Now look at this exercise (page 64)

6.6. Clear conditional formatting rules

If you need to remove any conditional formatting you can either `Clear Rules / Clear Rules form Entire Sheet` or select the cells which you want to remove your formatting from and select the option to `Clear Rules / Clear Rules from Selected Cells` see Clear Conditional Formatting Rules
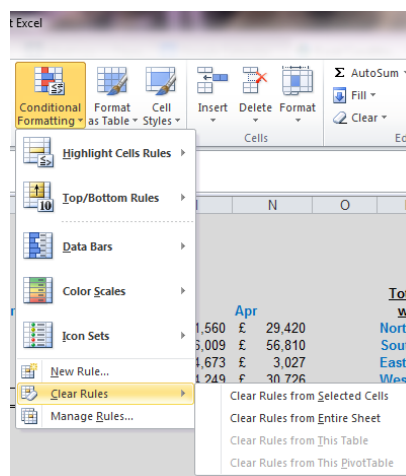
Figure 43 Clear Conditional Formatting Rules

7 Index Match Function

Index Match let you perform lookups from data that Vlookup cannot and run much faster on large spreadsheets than the Vlookup function. Index Match works very well if your lookup data is not in the first column, or you want to look to the left of the lookup data, rather than to the right (which is all Vlookup can do).

For many Excel users the Vlookup does just what they need, however there are three scenarios where Vlookup falls short, that is where Index Match comes in handy;

> ➢ Vlookup can only look from left to right
>
> ➢ Vlookup is prone to error, especially in big spreadsheets
>
> ➢ Vlookup slows down big spreadsheets

7.1. Index Function

The Index function has a very simple job – it looks in a column of data and returns a value from the row that you specify, an example of an Index function in action:

Figure 44 Index function

Here with have used the Index function to select the cell range A2:A8 (the countries) and we want it to return the 3rd value from this range, the actual result is; India

7.2. Match Function

The Match function also has a simple job – it looks in a column of data and returns the row number of a value that you specify, it is a bit more complicated than the Index function. Below is an example of how the Match function in action. Lets assume we have a column of names and we want to know which row Bridget is found in, we will assume that all names only appear once;

Figure 45 Match Function

The difference with this function compared to the Index function is that after we have selected the cell criteria and cell range we add a zero at the end of the function. By entering a zero as the last parameter in the formula we are telling Excel to look for an exact match.

7.3. Putting Index and Match together

Now that we have an understanding of how both Index and Match work on their own let's put them together to create an Index Match function that we can use in replace of Vlookup.

Firstly let's start with a simple example an use Index/Match to do something that the Vlookup function can also do – find the name of the person from France.

First let's look at the Vlookup function you would use to find this result: =VLOOKUP("France",A2:A8,0). This formula is "looking for France in column A nd if you find it, return the value from the second column in the same row, if you don't find France, return an error".

Figure 46 Using the Index/Match function together

The formula here asks "find the row that contains France in column A, and then get the value in that row in column B, if you don't find France, then return an error".

7.4. Using Index/Match to look from right to left

Using the Index/Match formula compared to the Vlookup does however result a longer formula and for that reason you might want to stay using the Vlookup However if we want to do a lookup from right to left instead of left to right i.e. we know the person's name but do not know what country they are from.

Let's look at how we can use Index/Match to do a lookup from left to right and find out the country a person is from.

	A	B
1	Country	Name
2	USA	Walter
3	UK	Julie
4	India	Rajesh
5	Germany	Bridget
6	France	Melody
7	New Zealand	Max
8	Australia	Andrew
9		
10	Formula	=INDEX(A2:A8,MATCH("Melody",B2:B8,0))
11	Country to look up	Melody
12	Result	France

Figure 47 Using the Index/Match to lookup from left to right

You can see from the formula that it is almost unchanged – the only difference is that the cell ranges have swapped places;

From **right** to **left**: =INDEX(B2:B8,MATCH("France",A2:A8,0))

From **left** to **right**: =INDEX(A2:A8,MATCH("Melody",B2:B8,0))

Exercise 14: Using the Index and Match functions

Now look at this exercise (page 66)

7.5. Index Match Array Formula

You can also use the **_Index Match Array Function_** to allow you to search values from two columns; this function is very flexible and works well with large amounts of data.

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	A	B	C	D	E	F
1	**First Name**	**Last Name**	**Salary**			
2	James	Smith	£64,901			
3	James	Anderson	£70,855		**First Name**	Mark
4	James	Clark	£188,657		**Last Name**	Reed
5	John	Lewis	£97,566		**Salary**	
6	John	Walker	£58,339			
7	Mark	Reed	£125,180			
8	Richard	Lopez	£91,632			
9	Max	Winter	£45,255			
10	Stella	Wiskin	£36,988			
11	Davey	Jones	£55,624			
12	Steve	Smith	£88,965			
13	Adam	Smith	£55,624			
14	Corey	Downs	£125,697			
15	Max	Philips	£88,954			
16	Andy	Donovan	£48,966			
17	Kyle	Sutton	£55,368			
18	Terri	Marsh	£66,325			

Figure 48 Index array formula

Firstly you need to select Insert Function from the toolbar and choose Index then click OK as shown below;
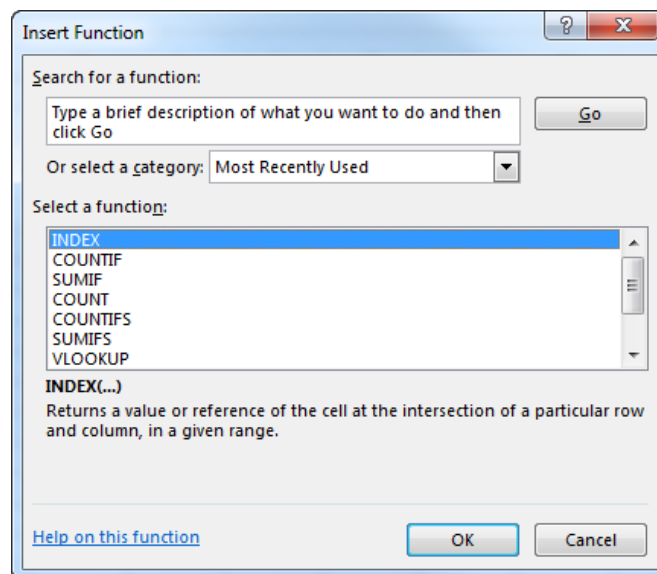
Figure 49 Inserting the Index function

From the **Select Arguments** dialog box choose **arry,row_num,column_num** and click OK. Then use the Cell Picker to select cells **C2:18** – then using the mouse click into the formula bar and place a comma after **C18** and type the word **Match** – Excel will then provide you with two red brackets and the Match dialog box will appear.

=INDEX(C2:C18,**Match**())
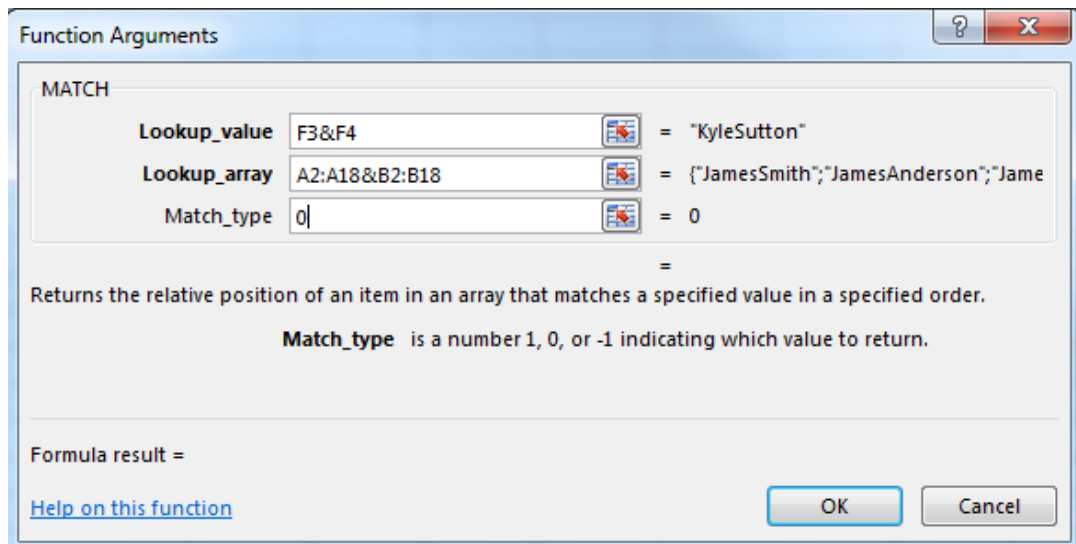
Figure 50 Match dialog box

In the **Lookup_value** type or select (using the mouse) cells **F3 & F4** (you must type the "&").

In the **Lookup_array** select using your mouse the cell range **A2:A18 & B2:B18**

Match_type type in the value **0** – this is because you require Excel to give you an exact match.

Then click OK.

The formula below is *indexing* from cells *C2-C18* (the Salary), it is then *matching* the values in *F2* and *F3* (Mark Reed) to his *First Name* in cells *A2:A18* (the First Name Mark) and *Last Name* in cells *B2:B18* (the Last Name Reed).

{=INDEX(C2:C18,MATCH(F3&F4,A2:A18&B2:B18,0))}

Figure 51 Index/Match array formula

<u>*Note*</u>*: please do not type in the curly brackets yourself;*

Once the formula is created/typed in you need to click into the formula bar and then press **CTRL+SHIFT+ENTER** at the same time which will insert the array function for you.

Exercise 15: Using Index/Match Array function

Now look at this exercise (page 67)

8 List and Combo Boxes

We have looked at using Data Validation to create drop down lists – Excel also has the a tab called the **Developer** tab which allows you to use controls – these controls give you the option to add *buttons, macros, spinners, check boxes and dropdown lists,* to name a few. The difference with the dropdown lists used by the Developer tab is that they are dependent on a cell and if you move the dropdown lists you have created you will also have to format the cell link.

Before you can use these controls you will firstly need to active the Developer tab, as by default it is not already available on the ribbon – see **Exercise 1 Add-Ins**.
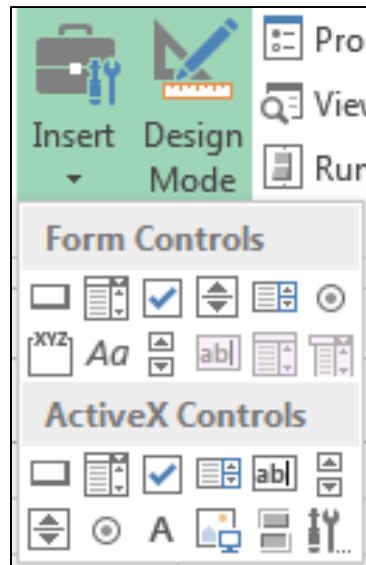
Figure 52 Form Controls on the Developer Tab

8.1. Creating a Combo Box

We are going to use the **Ria View Theatre Club** file to create a variety of *combo boxes* and *spinners* to make the booking form more user friendly as well as being less prone to errors. Using the **Search Facility tab**, place your mouse on the cell **B12** under the **ID**.

Next we need to choose a combo box from **Developer | Controls | Insert | Combo Box** click on the combo box icon and then draw this over the cell under the heading ID (in cell B12).

Figure 53 Creating a combo box

We next need to ensure that we add **form controls** to the *combo box*, right click on the on the newly drawn combo box until you have the menu box choose **Format Control.** The Format Control box has several tabs the one we need to use is the **Control Tab** (should be visible by default once the **Format Control** is open).

We need to choose an input range of data this can be found on the Members tab is –
Click into the **Members tab** and select the cell range **A2:A51**, the cell link is the cell
that you have just drawn your combo box in which is cell **B12**.

Then you need to click OK – you will then see if you deselect the combo box and then
click on the drop down arrow a list of Membership IDs to choose from.
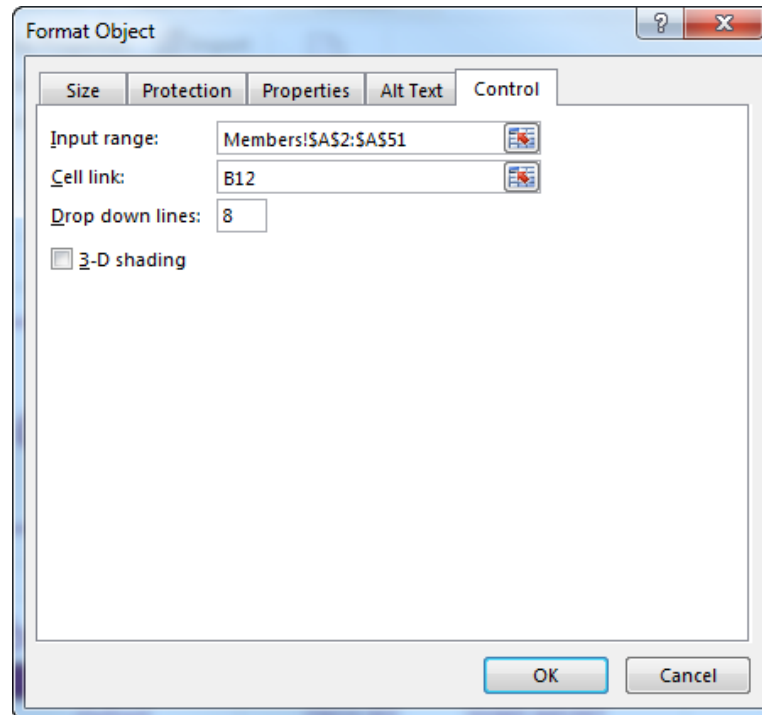
Figure 54 Formatting the combo box

We are now going to use an *Index formula* to enable us to pull through the results from
the **Members ID** tab. Using Index formula, click on the **Members tab** and select the
cell range **B2:B51** (the Titles), the Cell link will be cell **B12** which is where the combo
box has been drawn. (See formula below).

=INDEX(Members!B2:B51,$B$12)

Figure 55 Index formula for title

Repeat this process for Age, Forename and the rest of the details required for the
members, every time that you choose another **Members ID** all of the cells should
update with that **Members** details.

8.2. Creating a Spinner

To make the process easy for the user to change the amount of tickets
brought by the **Member** you can create a **spinner** for the **Booking
Form** (under No Tickets), choose spinner from **Developer | Controls |
Spinner** and draw this in cell **K18** between **No Tickets** and **Total Cost**.

Right click on the *spinner* and then choose **Format Control**, choose your Minimum value and Maximum value and the cell link is the cell that you have placed the spinner in which is **K18**, as shown below;
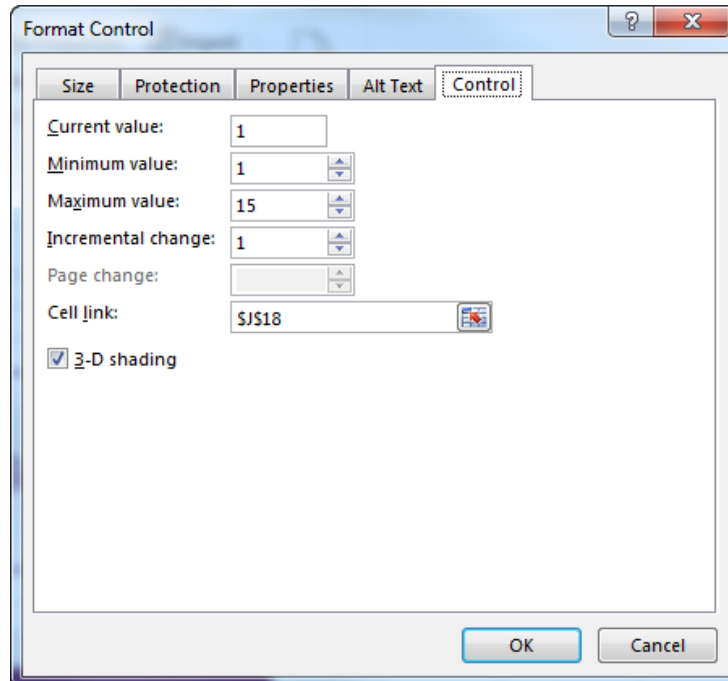
Figure 56 Choosing minimum and maximum value

Now you can use the spinner to decrease or increase the no of tickets brought by members;

Figure 57 Using a spinner to decrease or increase amounts

8.3. Creating a Check Box

We have a paid field in our **Booking form** and need to know whether or not **Members** have paid for their tickets, one of the easiest ways of being able to capture this is by inserting a **Check Box** (tick box).

To do this you firstly need to be on the **Booking form tab** then in cell **F14** under the Paid? heading draw a Check Box – **Developer | Controls | Insert | Check Box**

Figure 58 Check Boxes

Exercise 16: Creating Combo Boxes, Spinners and Check Boxes

Now look at this exercise (page 68)

8.4. How to create a simple cascading dropdown in Excel

Making dependant drop-down lists in Excel is easy, all you need is a few named ranges and the INDIRECT formula, this methods works with all versions of Excel 2007, 2010 and 2013.

We are going to create a cascading dropdown list on location to enable us to choose an employee. Before we begin creating the lists we first need to name the range of cells for the location and the employees;

	A	B	C	D
1	**Location**	**London**	**Birmingham**	**Bristol**
2	London	John	Fred	Harry
3	Birmingham	Jack	Philip	Paul
4	Bristol	Mark	Kate	Tim
5		Andy	Sarah	
6			Jason	
7				
8				
9	**Location:**	**Employees:**		
10				
11				

Figure 59 Cells to name

Highlight the cell range **A1:D6**, then select **Formulas | Defined Names | Create from Selection** ensure that the **Top row** remains ticked (this will then name each column from the top row of each column).
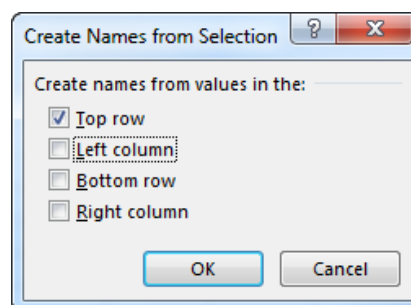
Figure 60 Creating named ranges from a selection

We next need to be in the cell below location (A10) and then select **Data | Data Validation** – you will then choose **List** and in the Source you will type =**location** (this is one of the ranges we have just named), then click OK – see figure 62.

You will then see the following drop down list appear in cell A10, which will allow you to choose a location. We now need to create another list in the Employees to link through to their location.

Figure 61 Drop down list
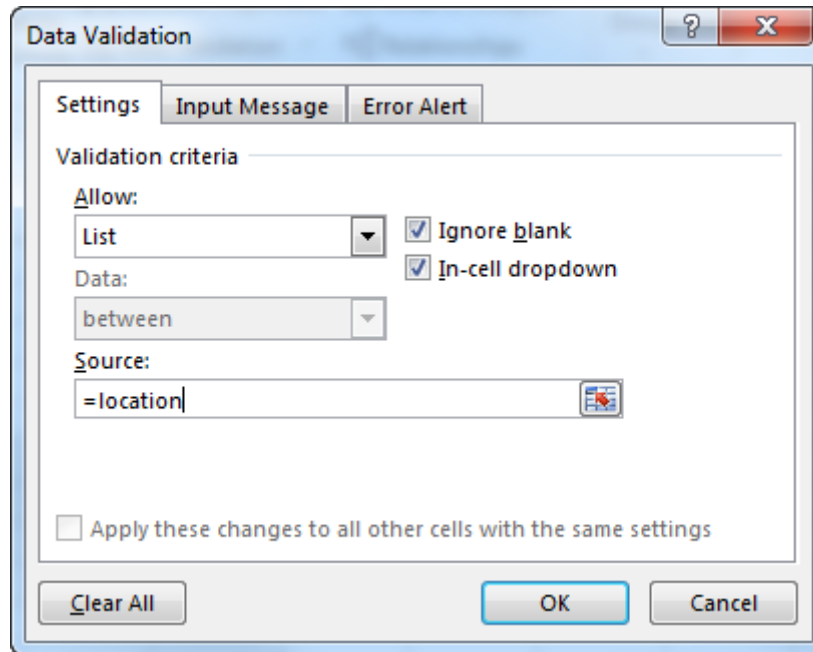
Figure 62 Using data validation to create a cascading list

Now in cell **B10** (underneath Employees) we need to also create a list using validation; **Data | Data Tools | Data Validation**, only this time we are going to use the **INDIRECT** formula;
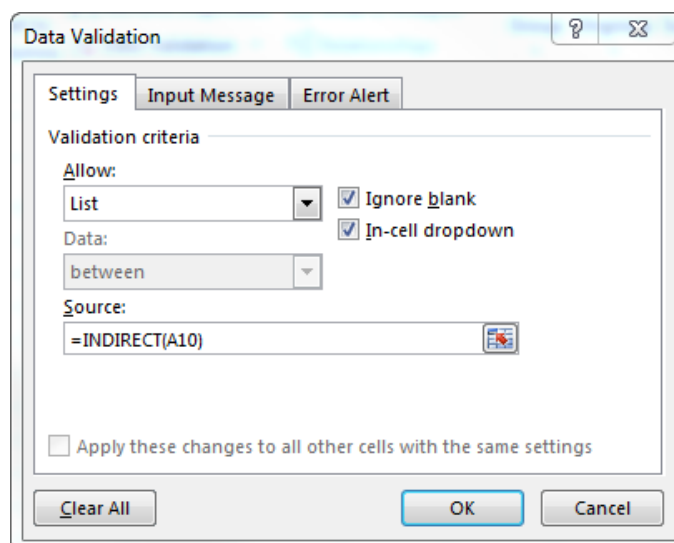
Figure 63 Using the INDIRECT formula

We will choose List as we did for our first list but for the source we are going to type the following; **=INDIRECT(A10)** – **A10** being the cell that the first list has been created. What Excel is doing here is it is checking the first list in the location and depending on the value of this list will then choose (from the named ranges you created earlier) for each location and will then display the appropriate matching list. See the results below in figure 64.

8			
9	**Location:**	**Employees:**	
10	Birmingham		▾
11		Fred	
12		Philip Kate	
13		Sarah	
14		Jason	

Figure 64 Dependent Cascading List

Exercise 17: Dependant cascading dropdown lists

Now look at this exercise (page 70)

9 What Next?

Courses offering training in citations management and related topics are described below. In all cases, please refer to the IT Learning Programme web page (via www.it.ox.ac.uk/courses/) for further details.

9.1. Further Spreadsheet Courses

Now that you have some Excel skills you may want to develop them further. The IT Learning Programme offers three other *Excel* courses.

Spreadsheets: Organising and Displaying Data

Spreadsheets: Summarising data using PivotTables

Spreadsheets: An introduction to working with statistics

9.2. Course Clinic

We encourage everyone to work at their own pace. This may mean that you don't manage to finish all of the exercises for this session. If this is the case, and you would like to complete the exercises while someone is on hand to help you, come along to one of the Course Clinics that run during term time. More details are available from www.it.ox.ac.uk/courses/

9.3. Further Help

It may be possible for you to use ITLP facilities in IT Services, Banbury Road to work through the exercises in this booklet after the course, or when you don't have access to the applications on your own computer. Contact us on courses@it.ox.ac.uk for details.

The IT Services Help Centre is a good place to get advice about any aspect of using computer software or hardware. For Help Centre opening times, visit www.it.ox.ac.uk/help/gettinghelp/ and follow links to the General Helpdesk, or contact them by email on help@it.ox.ac.uk.

9.4. Downloadable Course Materials – the ITLP Portfolio

These course materials are available through the ITLP Portfolio, at http://portfolio.it.ox.ac.uk .

Each course pack includes the course handbook in pdf form and a zip folder of the exercise files that you need to complete the exercises. Archive versions of the course book may also be useful if you use an earlier version of the software.

The ITLP Portfolio helps you find articles, videos, resources and weblinks for further IT study. For some resources, you will be asked for your Oxford (SSO) username and password.

Appendix: Student Exercises

Exercise 1 **Implement Add-Ins**	

- *Add-Ins*
- *Adding the Developer Tab*

Refer to page 29

Task 1	Step 1
Implement Add-Ins	Open any Excel file.
	Click the File tab then select Options in the left panel, see below;
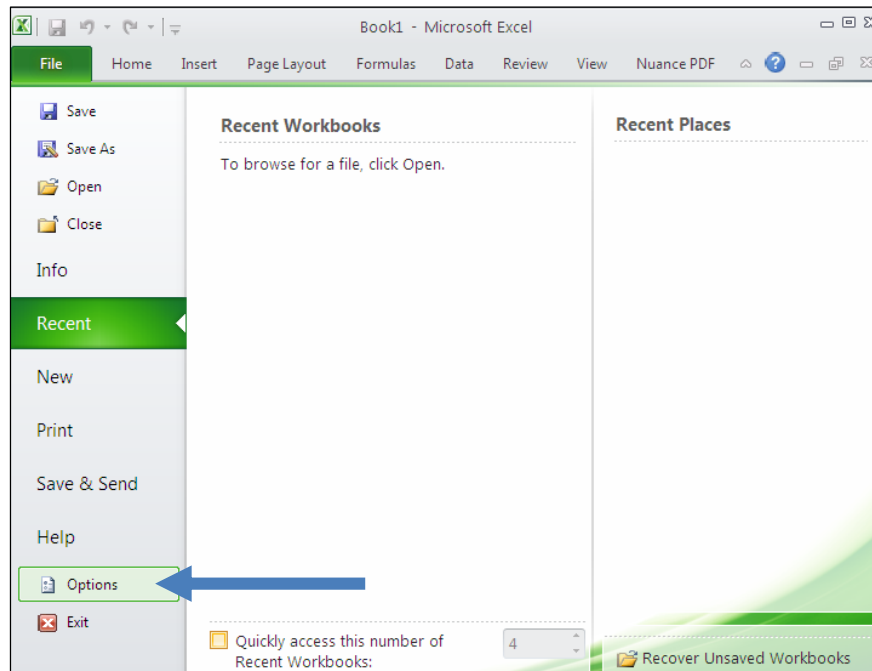
	Step 2
	Select Add-Ins and click Go shown at the bottom of the window below;
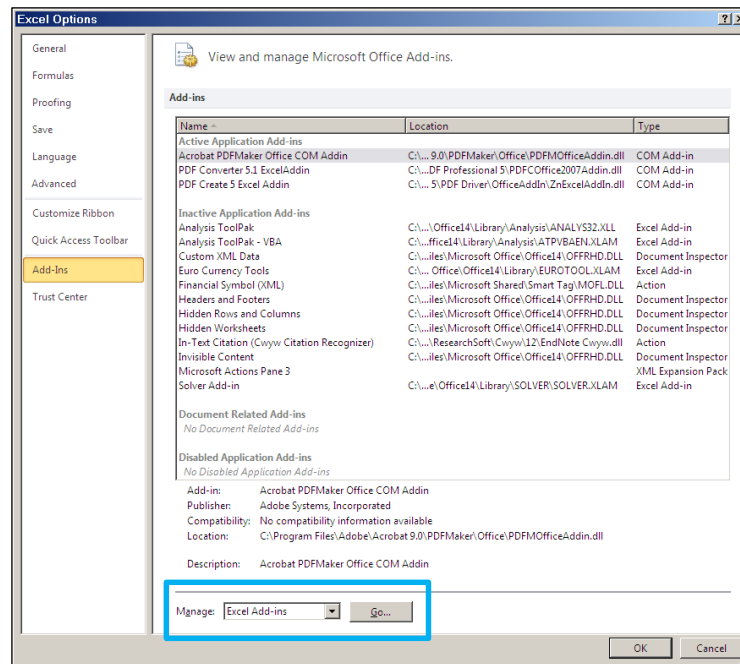
Step 3

Check all the Add-Ins available in the Add-Ins dialog box as shown below;

Select OK, wait for Excel to finish configuring, then close the file
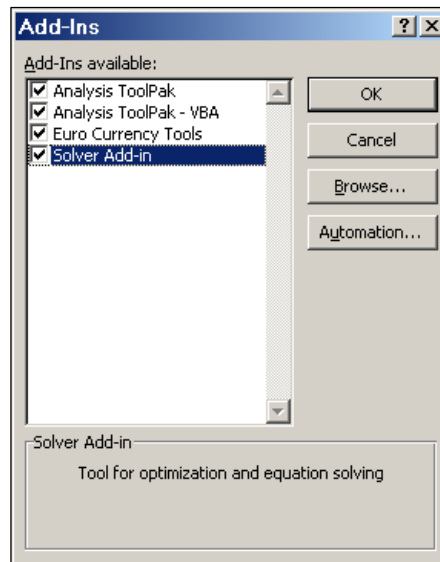
Task 2 Activating the Developer Tab	**Step 1** Select the File Tab on the ribbon. Choose **Options** Click on Customise Ribbon Put a tick in the empty box next to Developer on the Main tabs – as shown below then; Click OK.
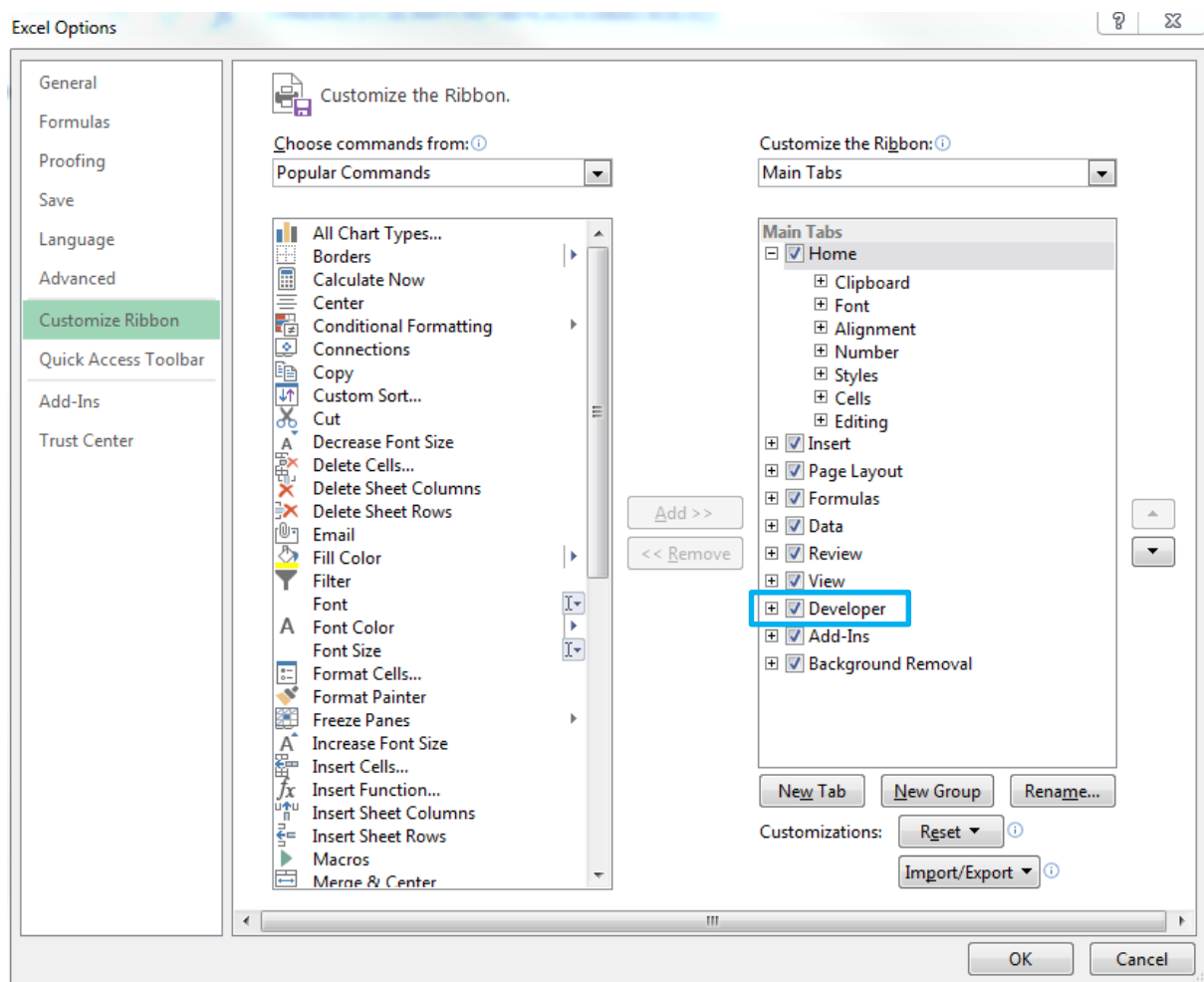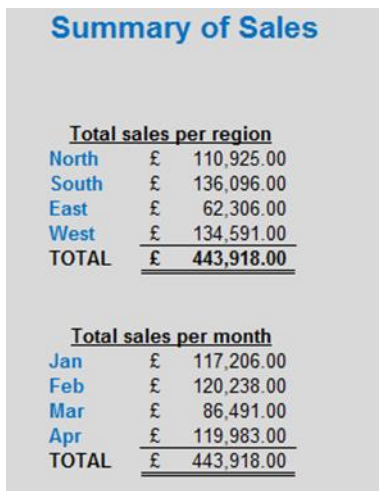
The Developer tab will now appear on the ribbon in between the View and the Nuance PDF tabs.	

Exercise 2	**Using SUMIF and COUNTIF functions**
	• *Use the SUMIF function to sum the value of orders by two different criteria*
	• *Use the COUNTIF function to count the number of orders by a criteria*
	Refer to pages 4-5

Task 1	**Step 1**
Using the SUMIF function sum the value of orders by region.	Open `SalesAndProduction.xlsx` and open the `Sales Returns` worksheet. Select cell **H4**
	Step 2 Using the SUMIF function, add up the total value of Sales Returns for each region. Your formula should look similar to below `=SUMIF($C$2:$C$31,G4,$D$2:$D$31)`
	Step 3 The **range** will be the Region, range `C2:C31` The **criteria** will be the name of the Region which you can use the cell content reference of `G4` for the first region The **sum range** will the range or cells which contain the values that you want to add if the criteria is met. This will be range of the Sales Returns `D2:D31`
	Step 4 It is advisable to make some of the cell references absolute so that the function can be copied down from G2 to G5. To achieve this press the **F4 key** after entering the cell ranges, C2:C31 and D2:D31. Cell F2 remains relative so when it is copied the new criteria is included in the new formula
	Step 5 Having made relevant cells absolute copy the formula down to the other regions.
	Step 6 Add a function in cell H8 to give a total regional summary.
	Step 7 Format the cells to currency.
	Step 8 Using the technique in Step 1 above, use the SUMIF function to add the total value of Sales Returns for each month. Select cell H11
	Step 9 Select Formulas | Insert Function button , select Category **All**, and select the **SUMIF** function to view the **Function Arguments** dialog box,

	Step 10 This time the range will be the Month, so range will be B2:B31
	Step 11 Your **Function Arguments** dialog box, should look like below.
Task 2	**Step 1** Insert any relevant absolute cell referencing and copy the results down to cells H12:H14
	Step 2 Add a function in cell H15 to give a total regional summary.
	Step 3 Format the cells to currency.
	Step 4 Your summary of sales will now look like below

Summary of Sales

Total sales per region

North	£	110,925.00
South	£	136,096.00
East	£	62,306.00
West	£	134,591.00
TOTAL	£	443,918.00

Total sales per month

Jan	£	117,206.00
Feb	£	120,238.00
Mar	£	86,491.00
Apr	£	119,983.00
TOTAL	£	443,918.00

Task 3 Using the COUNTIF function count the number of returns per month.	**Step 1** Select cell H18 This task can be completed in a similar way by entering the function, range and criteria directly. However there is help on the function if you use the **Formulas | Insert Function** button, select Category **All**, and select the **COUNTIF** function to view the **Function Arguments** dialog box.
	Step 2 The syntax is `=COUNTIF(range,criteria)`
	Step 3 The `range` is the range of cells from which you want to count nonblank cells, in this example the range are the month cells, range `B2:B31`.

	Step 4 The **criteria** is the condition in the form of a number, expression, or text that defines the cells to be counted. In this example the criteria is **"Jan"**. This can either be typed into the formula or a more efficient way is to refer to a cell with the criteria in it within your summary so for Jan this would be cell G18
	Step 5 Your Function Arguments dialog box will look like below.
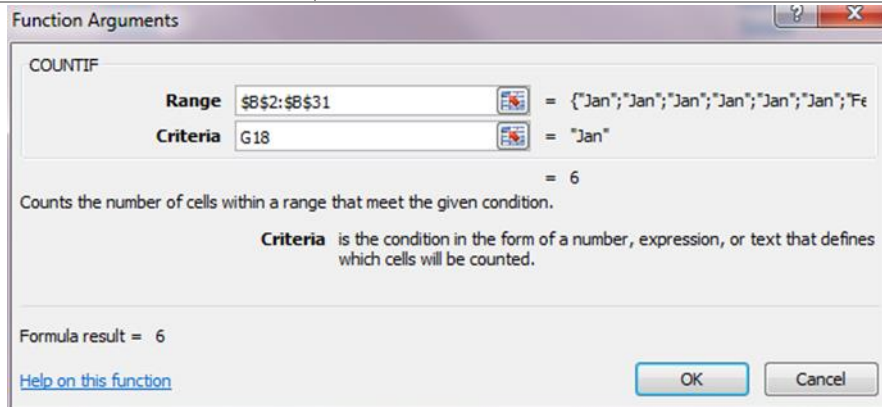
Task 4	**Step 1** Complete the task by counting the number of sales returns for the other three months, either by inserting the formula or copying it down after inserting any relevant absolute cell references. Your summary will now look like below Save the file

Number of sales returns per month

Jan	6
Feb	10
Mar	5
Apr	9
TOTAL	30

Exercise 3	**SUMIFS and COUNTIFS functions**

- *Use the SUMIFS formula to calculate sales returns per month and per region*
- *Use SUMIFS formula to calculate the total sales per region and per month which exceed £20k*
- *Use the COUNTIFS function to count the number of sales per month which exceeded £20k*

Refer to pages 4-5

Task 1	**Step 1**
Calculate the total sale returns per month and per region using the SUMIFS function	Open `SalesAndProduction.xlsx` or if you did not complete Exercise 2 open the file `SalesAndProduction Ex2 completed.xlsx`
	Select cell K4
	Step 2
	Insert the first SUMIFS function using two criteria to calculate the total sales for the `North` in `January`. The first criteria will be `Month =Jan` and `Region = North`
	Step 3
	The **sum range** will be the `Sales Return` column, **D2:D31**
	Step 4
	The **1st Criteria range** will be the `Month` column, range **B2:B31**
	The **criteria** for the 1st range will be **K3** or "Jan"
	Step 5
	The **2nd Criteria range** will be the `Region` column, range **C2:C31**
	The **criteria** for the 2nd range will be **J4** or "North"
	The formula is
	`=SUMIFS($D$2:$D$31,$B$2:$B$31,K3,$C$2:$C$31,J4)`
	Step 6
	If using the **Insert Function** button in the **Function Library** group on the **Formulas** tab it will look as below.
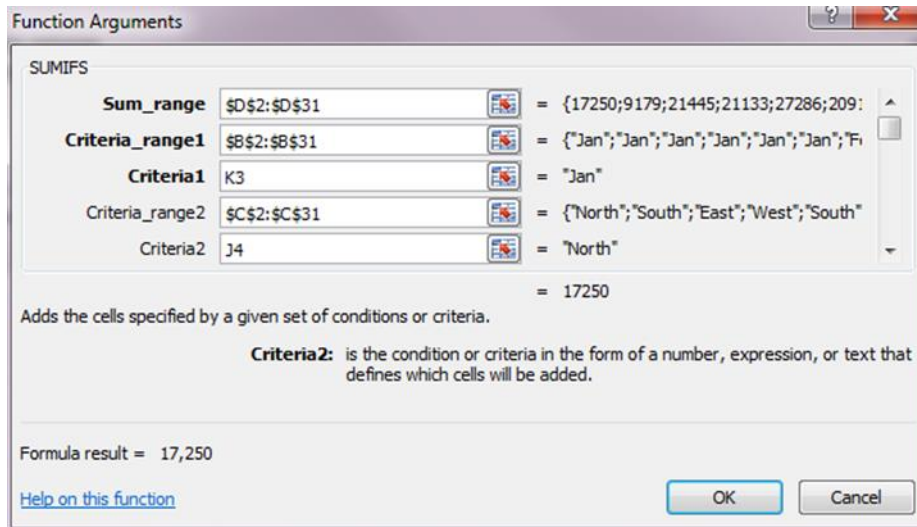
Task 2	Step 1
	Insert the functions for each month and each region. This can either be done by considering what absolute references to use or insert each individually.
	If you are considering using the absolute referencing consider which ranges or cells require which level to make absolute.
	Tip: You will need to make the ranges for Sales Returns, Month and Region absolute and Month criteria requires the row reference making absolute, so the $ sign needs inserting in front of the number only, e.g K$3. For the Region the column reference will be absolute, so the $ sign needs inserting in front of the column reference only e.g $J4. For example the formula for the month of January and the South region.
	=SUMIFS($D$2:$D$31,$B$2:$B$31,K$3,$C$2:$C$31,$J4)
	Step 2
	Format as Currency and Total each column total.
	Your Total Sales per Month, per region results will be as below

Total sales per month, per region	Jan	Feb	Mar	Apr
North	£ 17,250	£ 42,695	£ 21,560	£ 29,420
South	£ 36,465	£ 26,812	£ 16,009	£ 56,810
East	£ 42,358	£ 12,248	£ 4,673	£ 3,027
West	£ 21,133	£ 38,483	£ 44,249	£ 30,726
TOTAL	£ 117,206	£ 120,238	£ 86,491	£ 119,983

Task 3	
Calculate the total sale returns per region which exceed £20k, using the SUMIFS function	**Step 1** Using cells Q4, Q5, Q6 and Q7 insert the SUMIFS function to calculate the total **Sales Returns** for each **Region** that exceeds £20,000.
	Step 2 The formula for the **North** region will be **=SUMIFS($D$2:$D$31,$C$2:$C$31,P4,$D$2:$D$31,">20000")**
	Step 3 This time the criterion for the exceeding 20000 is not referring to a cell reference so needs to be inserted between quotation marks. You also do not need to include the £ sign or any commas between the thousands)
	Step 4 Copy down to the remaining regions
	Step 5 Insert a total and format to currency
	Step 6 Your results should be as follows

Total sales per region which exceed £20k	
North	£ 42,222.00
South	£ 75,037.00
East	£ 42,358.00
West	£ 87,357.00
TOTAL	£ 246,974.00

Task 4	**Step 1**
Calculate the total sale returns per month which exceed £20k, using the SUMIFS function	In cells Q11, Q12, Q13and Q14 insert the SUMIFS function to calculate the total **Sales Returns** for each **Month** that exceeds £20,000
	Step 2
	The formula for Jan will be
	=SUMIFS($D$2:$D$31,$B$2:$B$31,P11,$D$2:$D$31,">20000")
	Step 3
	Copy down to the remaining regions
	Step 4
	Insert a total and format to currency
	Step 5
	Your results should be as follows

Total sales per month which exceed £20k

Jan	£	90,777.00
Feb	£	42,637.00
Mar	£	65,809.00
Apr	£	47,751.00
TOTAL	£	246,974.00

Task 5	**Step 1**
Calculate number of sale returns per month which exceed £20k, using the COUNTIFS function	In cells Q18, Q19, Q20and Q21 insert the COUNTIFS function to calculate the total **Sales Returns** for each **month** that exceed £20,000
	Step 2
	The formula for Jan will be
	=COUNTIFS($B$2:$B$31,P18,$D$2:$D$31,">20000")
	Step 3
	Copy down to the remaining regions
	Step 4
	Insert a total
	Your results should be as follows

Number of sales returns per month which exceed £20k

Jan	4
Feb	2
Mar	3
Apr	2
TOTAL	11

Exercise 4	Invoice Vlookup – Exact match
• *Using the Vlookup function to complete an invoice* *Refer to pages 6-7*	

Task 1	Step 1
This task it to insert the **Vlookup** formula to complete the **Description**, **UnitSize** and **UnitCost** details in an invoice.	Open **Invoice lookup.xlsx** There are two worksheets in this workbook. One named **Invoice** and the other named **Stock list** Take a look at both worksheets and familiarise yourself with what they contain. Open worksheet **Invoice**.
	Step 2 In column **A** the **StockCode** column contains a validation list linked to the **Stock list** worksheet. By selecting a **StockCode** from the list will prevent errors when creating the remainder of the invoice, as only a valid **StockCode** can be selected. Column **F** the **Total** column also contains a formula which will calculate the total when a **StockCode** is inserted.
	Step 3 You are now going to insert **Vlookup** formulas to locate the **Description**, **UnitSize** and **UnitCost** based on the **StockCodes** you select. The **Num ordered** column will be input by you and the **Total** column will also calculate as it contains a formula.
	Step 4 Select **StockCode** J1F0 1179 from the validation drop down list.
Task 2 Enter the **Vlookup** formula for **Description**	**Step 1** In Cell B6 enter a vlookup formula to locate the Description.
	Step 2 To look up the **Description** in cell **B6** your formula will be as follows Your completed formula will be **=VLOOKUP(A6,StockTable,2,FALSE)** Your Invoice will now look as below

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	B6	▾	fx	=VLOOKUP(A6,StockTable,2,FALSE)			
	A	B		C	D	E	F
1	Customer Name	DW Electric					
2							
3	Invoice Number	101234					
4							
5	StockCode	Description		UnitSize	UnitCost	Num ordered	Total
6	J1F0 1179	Air Duster Cartridge					0
7							0
8							0

Task 3	**Step 1** Following the same process in Error! Reference ource not found. from Task 1 and insert a vlookup formula to complete the **UnitSize** in cell C6 for **Stock code** J1F0 1179.
	Step 2 To look up the **UnitSize** in cell **C6** your formula will be as follows Your completed formula will be =VLOOKUP(A6,StockTable,4,FALSE) Cell **C6** will now contain '**Single**'
Task 4 Enter the **vlookup** formula for **UnitCost** Consider the cell reference of **A6** in your vlookup formula in cell **C6** and make to an appropriate absolute cell reference which will then allow you to copy it to cell **D6**.	**Step 1** Previously you have typed in the **vlookup** formula however you can also copy it and amend the **column index num** to receive the correct return value, in order to save some time. Select cell **C6** and click into the formula bar, change the reference to cell **A6** from a relevant reference to an absolute cell reference. However consider where your $ needs to appear. If you click into the formula and select **A6**, press <F4> twice. This will insert a $ before the A but NOT before 6 so will show $A6. By doing this when the formula is copied across it will fix the reference to row A and when the formula is copied down the invoice it will amend the row number.
	Step 2 Copy the contents of cell **C6** over to **D6**
	Step 3 Your new formula in cell **D6** should now be =VLOOKUP($A6,StockTable,5,FALSE) Cell **D6** will now contain 5.06
Task 5	**Step 1** Enter a value of 30 in cell **E6** The total will calculate with the formula which has already been inserted.

Enter a value for number ordered and copy the vlookup formula to the bottom of the invoice,	**Step 2** Select cells **B6** to **D6** and hover your mouse over the bottom right corner of the cell range. The Autofill + sign should appear.
	Step 3 Click and hold the left mouse button and drag the Autofill down to row 23 and release the mouse. Your invoice will now look as follows.

	Step 4 Insert a new record to your invoice for **StockCode J5D0AL 1003** with the Num ordered being **20** Your invoice will now look like below

Task 6 Enter a formula to remove the error message of #N/A	**Step 1** There are currently errors in cells B8:D23. This is owing to the **StockCode** being blank and the **VLOOKUP** formula cannot locate a result for Description, **UnitSize** or **UnitCost**. To prevent this you can insert a formula to bring back a blank cell if this happens. Insert the following *IFERROR* formula in the cell range **B8:D23** by first selecting cell **B8** and inserting the below formula. I have emboldened the additional part. **=IFERROR**(VLOOKUP(A8,StockTable,2,FALSE)**,"")**
	Step 2 Copy the formula down from **B8** to **B23**.

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	Step 3 Select cell **C8** and insert the same additional formula and copy down to cell **C23**.
	Step 4 Repeat this again for cell **D8** and copy down to **D23**.
	Step 5 All errors should now appear and it is also advisable to test your formula by inserting a new stock code and double checking it is correct to the **Stock list**.
	Step 6 Save and close your file.

Exercise 5	**Invoice Vlookup – Inexact match**
• Using the Vlookup function to complete an invoice *Refer to pages 6-7*	

Task 1 This task it to insert the **Vlookup** formula to complete the **Grade** for Exam Results based on the percentage the student achieves.	**Step 1** Open **Exam Grades.xlsx** There are two worksheets in this workbook. One named **Results** and the other named **Grades** Take a look at both worksheets and familiarise yourself with what they contain.
	Step 2 You are now going to insert **Vlookup** formulas to locate the **Grade**, based on the percentage achieved. Look at the percentage results in column **B** of the **Results** worksheet. The percentages here contain values like **63%, 90%** and **84%.**
	Step 3 Now take a look at the worksheet **Grades** The grades are based on the below percentages. <table><tr><td>Percentage</td><td>Grade</td></tr><tr><td>0%</td><td>Fail</td></tr><tr><td>60%</td><td>C</td></tr><tr><td>70%</td><td>B</td></tr><tr><td>80%</td><td>A</td></tr><tr><td>90%</td><td>A*</td></tr></table> With this in mind an inexact vlookup formula will be required to obtain the correct grade. Please refer back to Section **Error! Reference source not found.** for recap.
Task 2	**Step 1** Select cell **C4** in worksheet **Results**

	Step 2
	To look up the **Grade** for cell **C4** your formula will be as follows
	Your completed formula will be
	=VLOOKUP(B4,GradeTable,2,TRUE)
Task 3	**Step 1**
	Copy the formula down from cell **C4** to the bottom of the results in cell **C15**
	Your completed exam results will look as follows
	Save and close the file.
	Step 2
	Save and close your file.

Exercise 6	**Manual What-If Analysis**

- Manually inserting values to cells to see the changes in profit

Refer to pages 8-11

The company produce three types of units. Company profit is determined by changing the two variables in B4 (Hourly Rate), and B5 (Materials Cost).

Task 1	**Step 1**
Change the Hourly Rate and Materials Cost to see the change in Total Profit and Total Profit per model	Open **SalesAndProduction.xlsx**. Open the **Production Costs** worksheet.
Task 2	**Step 1**
Using the Options in the range H5:I7 as a guide establish the possibilities for Total Profit by changing the Hourly Rate and Materials Cost in cells B4 and B5.	Select cell **B4** and insert the Best case Hourly Rate of 30 and the Materials Cost of 57. The profit should change to £17,988
	Step 2
	Select cell **B4** and insert the Best case Hourly Rate of 38 and the Materials Cost of 62. The profit should change to £7,482
	Step 3
	Select cell **B4** and insert the Best case Hourly Rate of 34 and the Materials Cost of 59. The profit should change to £13,008
	Step 4
	Re-insert your original values. The Hourly Rate was 32 and the Materials Cost was 59

Your next exercise will look at an efficient way of showing these different results and also save the original values by using **Scenario Manager**. You can subsequently view each case when the file is opened in the future.

Save your file

Exercise 7   **Using the Scenario Manager**

- *Adding scenarios*
  Refer to pages 8-11

Task 1	**Step 1**
In this task you will add four scenarios using the scenario manager to insert the original values, best case, worst case and likely case.	Open **SalesAndProduction.xlsx** or if you did not complete the previous exercise open the file **SalesAndProductionEx3 completed.xlsx**
	Step 2 From the **Data | Data Tools** tab click the **What-If Analysis** button and choose **Scenario Manager** Select Add.
	Step 3 In the **Add Scenario** dialog box, in **Scenario name:** add **Original.**
	Step 4 In **Changing cells:** text field add cells which contain the amounts for hourly rate, cell B4 and material cost, cell B5. Changing cells will contain $B$4:$B$5.
	Step 5 Select OK
	Step 6 In the **Scenario Values** dialog box the Hourly Rate should contain **32** and Material Cost will contain 59 as these are the current values Select Add in the Scenario Values dialog box.
Now insert your next scenario by selecting Add from the Scenario Manager dialog box.	**Step 7** In the **Add Scenario** dialog box, in **Scenario name:** add **Best case**
	Step 8 In **Changing cells**: text field add cells which contain the amounts for hourly rate, cell B4 and material cost, cell B5. Select OK.
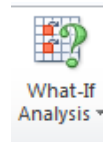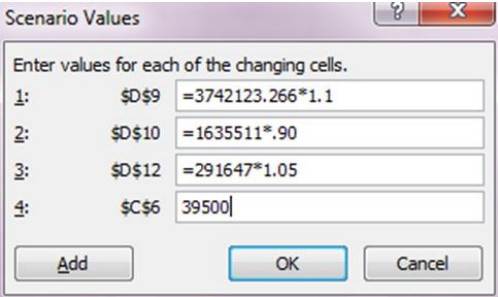
	Step 9 In the **Scenario Values** dialog box add Hourly Rate as **30** and Material Cost as **57** Select Add in the Scenario Values dialog box.
	Step 10 Complete the **Add Scenario** dialog box adding the remaining cases, Worst and Likely with the necessary data. On entering the lase set of Scenario values for the Likely case select OK When all scenarios have been inserted, select a scenario from the Scenario Manager dialog box and select Show.
Task 2 View each scenario	**Step 1** To view the three scenarios and see how the Total Profit Changes. You may need to move the Scenarios dialogue box to view the figures changing. Once the Scenario Manager window has been closed you can view the scenarios again by selecting the **Data | Data Tools |What-If Analysis | Scenario Manager** then select the scenario name and select **Show.**
Task 3 Create a scenario summary report	**Step 1** Select **Data | Data Tools | What-If Analysis | Scenario Manager | Summary**
	Step 2 The Scenario Summary dialog will appear. The Result cells should contain the value of **B6**. Select OK

Exercise 8	**Use formula with the Scenario Manager**

- *Adding scenarios and using formula*
  Refer to pages 8-11

The worksheet you will now be working in contains the operating profit for the company.

You will be required to change some of the Overhead Costs and the Average Customer visits either by a percentage of their current value or changes the value directly, to see the worst case and best case of the Operating Profit.

Task 1	Step 1
Add three scenarios using formulas in scenario manager.	Open **SalesAndProduction.xlsx** or if you did not complete the previous exercise open the file **SalesAndProductionEx5 completed.xlsx** Open the worksheet **Operating Profit**
	Step 2 Select **Data | Data Tools | What-If Analysis | Scenario Manager**
	Step 3 In the **Add Scenario / Scenario Name** insert **Original**.
	Step 4 The Changing cells are $D$9,$D$10,$D$12,$C$6 Select OK
	Step 5 In the **Add Scenario / Scenario Name** insert **Operating Profit (worst case)**
	Step 6 The Changing cells are the same as before so should still be in the changing cells box as D$9,$D$10,$D$12,$C$6 Select OK
	Step 7 **In the Scenario Values** dialog box enter the values as shown for the **Best Case** scenario below. It is important to add an = sign for formulas. When all four scenario values have been entered Select Add.
	Step 8 The warning dialog box shown below indicates that the formula entered will be turned to values. Select OK
Now add the **Worst Case** scenario	**Step 9** Your Scenario values should look like below. Select OK
	Step 10 Once again acknowledge the conversion into values by selecting OK

	Step 11 The `Scenario Manager` dialog box will appear again. Select a Scenario and use the `Show` button to view the results of the three scenarios The **original** operating profit was **£11,621,306** The **best case** operating profit should be £12,322,299.03 The **worst case** operating profit should be £12,111,037.10
	Step 12 Create a Scenario Summary Report with the Result cells as **D16**.

Exercise 9   **Data Validation**

- *Validating numerical data*
- *Validation text length*
- *Validating Dates*
- *Using validation lists*
- *Using formula to create validation rules*
Refer to pages 12-17

Task 1 Validating numerical data – we are going to add a validation rule to the ages on the booking form.	**Step 1** Open the file **HealthClubBookings.xlxs**
	Step 2 Highlight all of the cell range for column **B**.
	Step 3 Select **Data | Data Validation** Choose **Whole Number** from the **Allow** drop down box.
	Step 4 Using the **Rules** on the spreadsheet for Age using your mouse select cell J5 which is the **Minimum** Age allowed (the value 17)
	Step 5 For the maximum amount select cell **J6** (which is the value 100 – maximum age).
Insert an Input message for users	**Step 6** Click on the **Input Message** tab Give it a **Title** of **Age** with the following Input Message; ***Ages must be whole numbers in the range of 17-100.***

Inserting an Error Alert Message	**Step 7** Click on the **Error Alert** tab. Select the Style you require; choose either *Warning, Stop* or *Information*. Title: **Invalid Age** Error Message: ***Age is usually between 17 and 100. Are you sure this is correct.***
	Step 8 Click OK.
Checking validation works	**Step 9** Check that the validation has worked by changing **Kyle Suttons'** age to **16**.
Task 2 Using validation to specify a minimum and maximum length.	**Step 1** Continue to use Health Club Bookings file
	Step 2 Highlight all of the cell range for column **B**.
	Step 3 Select **Data | Data Validation | Choose Text Length | Between | Minimum J12 | Maximum J13.**
Add an Error Alert Message	**Step 4** Add the following **Error Alert Message**; Names must be at least two characters and not more than twenty characters. Click OK.
	Step 5 Check the validation rule works correctly by entering a new entry into the bookings form.
Task 3 Inserting a validation rule to control dates are not before today's date.	**Step 1** Continue to use **Health Club Bookings file**
	Step 2 Highlight all of the cell range for column **A**.
	Step 3 Select **Data | Data Validation | Choose Date | Greater than or equal to** Then type in the following formula =**TODAY()**
	Step 4 Enter an appropriate **Input Message**
	Step 5 Enter an appropriate **Error Alert Message** Click OK

	Step 6 Check that the validation is working correctly by trying to add a new entry with the date 20th June 2015.
Task 4 Creating a validation list for users to choose from a drop down list.	**Step 1** Continue to use **Health Club Bookings file**.
	Step 2 Highlight cells **D7:D20** Then select **Data | Data Validation | Choose List** For the Source using your mouse select the cell range; **J25:J30.**
Add an Input Message	**Step 3** Now add an appropriate **Input Message.**
Add an Error Message Alert	**Step 4** Now add an appropriate **Error Message Alert**. Click OK.
	Step 5 Check that the validation is working correctly by trying to add a new entry and choose from the list.
Task 5 Use a formula to create a validation rule for a discount.	**Step 1** Continue to use **Health Club Bookings file**.
	Step 2 Highlight of the cell range for column **F**. Then select **Data | Data Validation | Choose Custom** Then add the following formula: **=IF(E7<10,FALSE,TRUE)**
Add an Input Message	**Step 3** Add an appropriate **Input Message** for users.
Add an Error Message Alert	**Step 4** Add an appropriate **Error Alert Message** for users. Click OK.
	Step 5 Check the Validation is working correctly by entering either a new entry or changing the Price on a booking already in your booking form.
Task 6	**Step 1** Save and Close the file.

Exercise 10	**Conditional formatting by highlighting cells**
• *Using conditional formatting to highlight cells which are of above average grade* *Refer to pages 18-28*	

Task 1 Use conditional formatting to highlight cells which are above average grade.	**Step 1** Open **Exam Grades.xlsx** or if you did not complete the previous exercise open **Exam Grades Ex11 completed.xlsx**
	Step 2 Select cells **B4:B15.**
	Step 3 Click on the **Conditional Formatting | Top Bottom Rules | Above Average | Green Fill with Dark Green Text** from Styles.
	Step 4 Click **OK.** Save and close the file.

Exercise 11	**Conditional formatting with visualisations**

- *Using conditional formatting to insert data bars for each months sales returns*
  Refer page 23

Task 1	**Step 1**
Open January's sales. Use a formula to request data in different colours to illustrate the values.	Open **SalesAndProduction.xlsx** or if you did not complete this exercise use the file **SalesAndProduction Ex8 completed.xlsx**
	Open worksheet **Sales Returns.**
	Step 2
	To insert Data Bars first we are going to create a formula in the cell adjacent to the values in cells **D2:D31**
	Click into cell **E2**
	Type the following formula =**D2**
	Step 3
	Now copy this formula down for the rest of the cells – do this by placing your mouse on the black square in the right hand corner of the cell you have just created the formula in and dragging down. £ 17,250.00
	Step 4
	Select cells **E2:E7.**
	Click on the **Conditional Formatting | Data Bars | More Rules |** from styles.
	Step 5
	Put a tick in the box **Show Bar Only**
	For Bar Appearance choose **Fill | Gradient Fill | Border | No Border.**
	Click OK.
Task 2	**Step 1**
Insert data bars with a different colour for February.	Continue working with the **SalesAndProduction.xlsx**
	Select cells for Feb **E8:E17.**
	Step 2
	Click on the **Conditional Formatting | Data Bars | More Rules |** from Styles.
	Put a tick in the box **Show Bar Only**
	Step 3
	For Bar Appearance choose **Fill | Gradient Fill | Border | No Border** Choose a different gradient colour from Jan
	Click OK.
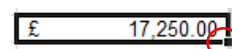
	Step 4
	Now repeat the above process for each month, with different colours for each of the months.
	Save and Close.

Exercise 12   Formula driven conditional formatting

- *Using formulas to conditional format cell ranges*
  Refer to page 27

Task 1	Step 1
To create conditional formatting using a formula.	Open **Exam Grades Ex11.xlsx** and open the worksheet Results
	Select Cells **B4:B15**.
	Step 2
	Click on the `Conditional Formatting | New Rule | Use a formula to determine which cells to format` from Styles.
	In the **Format values where this formula is true** add the following formula;
	=B4<AVERAGE($B$4:$B$15).
	Step 3
	Then select the format button
	Choose Fill and select a colour to fill the cells that are below average
	Click `OK.`
	Step 4
	Now re-visit the formula and change the below (less than sign <) to a above (more than >sign) and see how this affects the results of the percentage grades
	Save and close the file.

Exercise 13   Managing multiple conditional formats

- *Using formulas to conditionally format cell ranges*
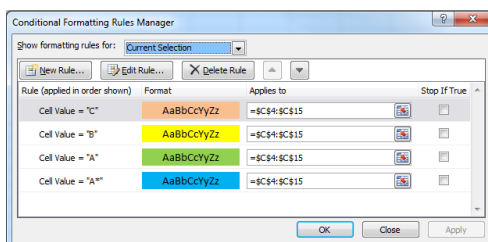 *Refer to pages 26*

Task 1	Step 1
To create conditional formatting using multiple rules to display different colours for the different conditions;	Open Exam Grades Ex11.xlsx and open the worksheet Results
	Select Cells C4:C15

	Step 2 Click on the **Conditional Formatting | New Rule | Format only cells that contain** from rule type. In the Format only cells with; Select Equal to from the drop down box Type A* in the next box.
	Step 3 Then select the format button Choose Fill and select a colour to fill the cells that are below average. Then select OK.
	Step 4 Repeat the above process for A, B, C.
	Step 5 Save and Close the file.
Task 2 Clear or Edit Conditional Formatting	**Step 1** To edit conditional formatting rules, use the exercise you have just completed setting conditions for the exam results; Firstly select the cells which contain the conditional formatting rules Then select **Conditional Formatting | Manage Rules**
	Step 2 You will then see the following dialog box, this details all the conditions you have set for those cells. This dialog gives you three options **New Rule, Edit Rule and Delete Rule.**
	Step 3 To simply clear the conditional formatting from cells or the entire work sheet try the following; Select the cells containing the formatting and then select **Conditional Formatting | Clear Rules.**
	Step 4 **Then you have two options** Clear rules from Selected Cells **and** Clear Rules for Entire Sheet **Save and close the file.**
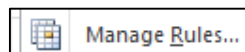
Exercise 14	**Index and Match Functions**

- *Create an Index Function*
- *Create a Match Function*
- *Combine Index and Match*

Refer to pages 29-31

Task 1 Using the Index function to find the result in row 3.	**Step 1** Open the file **Index and Match.xlsx**
	Step 2 Click into cell B10 on the ribbon select **Formulas | Insert Function | Index** Choose **array,row_num,column_num**
	Step 3 In the **Array** using the cell picker select the cell range **A2:A8.** In the **Row_num** using the cell picker and select cell **B11**. Click OK.
	Step 4 Excel will then return the value of "India".
Task 2 Using Match to find Bridget from the list.	**Step 1** Continue to use the file **Index and Match.xlsx**.
	Step 2 Click into cell B14 on the ribbon select **Formulas | Insert Function | Match**
	Step 3 In the **Lookup_value** use the cell picker to select the value in cell **B15**. In the **Lookup_array** use the cell picker to select the cell range **B2:B8** In the **Match_type** type the value zero (this is for an exact match). Then click OK.
	Step 4 Excel will then return the value of **4** which is exactly the cell that "**Bridget**" is in.
	Step 5 Save and close the file.
Task 3	**Step 1** Open the file **Index and Match together.xlsx**.

Using Index Match together to return a person and their country.	**Step 2** Click into cell **B10** on the ribbon **Formulas | Insert Function | Index** In **Array** use the cell picker and select cell range **B2:B8**.
	Step 3 Now click into the formula bar after **B8** and place a comma and then type the word **MATCH** and an **open bracket.** This will then open up the MATCH function arguments.
	Step 4 In the MATCH function arguments **Lookup_value** type the word **France**. In the **Lookup_array** use the cell picker and select the cell range **A2: A8**. In the **Match_type** type a **zero** for an exact match. Click OK.
	Step 5 Excel should now return the value **Melody**. Save and close the file.

Exercise 15	**Using the Index Match Array Function**
	• *Use the Index Match Array function*
	Refer to page 31

Task 1 You are going to use the Index Match Array function to search for values from two columns. In this case we are going to be looking for the salary of staff.	**Step 1** Open the file **Index Match Array.xlsx**.
	Step 2 Click into cell **F5** on the ribbon select **Formulas | Insert Function | Index.** Choose **array,row_num,column_num** and click OK.
	Step 3 In the **Lookup_value** use the cell picker to select the value in cells **C2:C18**. Then using the mouse click into the formula on the formula bar and put a comma after **C18** and type the word **Match** – Excel will then provide you with two *red brackets* and the **Match function arguments** will open.

	Step 4 In the **Lookup_value** type or select cells **F3&F4** (you must type the "&" sign). In the **Lookup_array** select using the mouse the cell range **A2:A18 & B2:B18** (again make sure you type the "&" sign) In the **Match_type** enter a **zero**. Then click OK.
	Step 5 Once you have created the formula to ensure it works as an array function you will need to add curly brackets – you must not type these in by hand! Use the mouse and click into the formula on the formula bar then press CTRL+SHIFT+ENTER at the same time which will then insert the curly brackets for you. Your function should now work correctly.
	Step 6 Test the function works correctly by typing in another First Name and Last Name

Exercise 16	**Lists, Spinners and Combo Boxes**

- *Create Combo Box (drop down) lists to choose options*
- *Use Spinners to change the number on the page*
- *Creating a Check List for payment*
- *Refer to pages 34-36*

Task 1 You are going to add some features to booking and search form	**Step 1** Before you can begin this exercise you will need to have completed Exercise 1 – adding the Developer Tab. Open file **Ria View Theatre Club.xlsx.**
	Step 2 Open the **Search Facility Tab** and place your mouse on the cell **B12**. Select **Developer | Controls | Insert | Combo Box** then draw this combo box over the cell **B12**.
	Step 3 We no need to add *form controls* to this combo box; Right click on the combo box you have just drawn and choose **Format Control**.

	Step 4 For the **Input Range** click on the cell picker and go to the members page and select the cell range A2:A51 In the **Cell Link** type in **B12** (which is the cell where the combo box has been placed). Click OK.
Task 2 Using the Index formula to link the combo box to the data on the Members tab.	**Step 1** On the **Search Facility** page select cell **C12**. **Either;** Use the **Formula tab** on the ribbon and choose **Index** **Formulas | Insert Function | Index | array,row_num,column_num** then the following; **Array** – use the cell picker and select the cell range B2:B51 from the Members page **Row_num** – B12 (the cell where the combo box is placed on your search facility page). Click OK. **OR** Type in the following formula **=INDEX(Members!B2:B51,B12)**
	Step 2 Complete the steps above for **Age, Forename, Surname, Town, Postcode** and **Contact Number**
Task 3 Checking the Index formula works.	**Step 1** Use the combo box to change the **ID** of the members to ensure that the index formula is working correctly.
Task 4 Create a Spinner to increase or decrease the amount ordered.	**Step 1** Continue to use the **Ria View Theatre Club.xlsx** file. Open up the **Booking Form** tab and in between the cells **No Tickets** and **Total Co**st (cell K18) insert a Spinner from the **Developer tab**; **Developer | Controls | Insert | Spinner**
	Step 2 Right click on the spinner then choose **Format Control**. Leave the **current value** as **zero**. *Minimum* value as **1**. *Maximum* value as **15** Cell link J18 (which is the cell before the spinner as that is where you want it to display the values). Then click OK.

	Step 3 Test the **spinner** works by clicking on it to either *increase* or *decrease* the value of the order.
Task 5 Creating a Check Box for whether members have paid or not.	**Step 1** Continue to use the **Ria View Theatre Club.xlsx** file. Continue with the **Booking Form** tab and in the cell F14 underneath the Paid? cell you are to insert a **Check Box** from the **Developer tab**; **Developer | Controls | Insert | Check Box**
Task 6 Adding Validation to the **Date of Booking**.	**Step 1** In the cell underneath Date of Booking use a validation rule so that dates cannot be entered before today.
	Step 2 Make sure that you use appropriate **Input** and **Error Alert** messages for the user. Test the validation works by changing the dates.
Task 7 Enter a validation list for the **Method of Payment**.	**Step 1** In cell **G14** (underneath the Method of Payment) create a validation list for the different methods of payment. **Data | Data Validation**
	Step 2 In the **Allow** – choose **List** In the **Source** – use the cell picker to navigate to the *Method of Payment page* and select the cell range **A2:A5** Click OK.
	Step 3 Make sure that you use appropriate **Input** and **Error Alert** messages for the user. Test the validation works by changing the method of payment.

Exercise 17	**Creating a dependent cascading list**
	• *Create a dependent cascading list* *Refer to page 37*

Task 1 You are going to create a dependant cascading drop down list to choose an employee from their location.	**Step 1** Before you can begin this exercise you will need to have completed **Exercise 1** – adding the Developer Tab. Open file **Dependent cascading dropdown lists.xlsx.**

Step 2

Before we begin to create the lists we first need to make sure that we have named the ranges of cells in our worksheet.

Select all cells **A1: D6**

Formulas | Create from Selection

Put a **tick** in the *Top row* only

Click OK.

Step 3

Click into cell **A10** underneath the heading Location.

Data | Data Validation

In **Allow** choose **List**

In **Source** type =**Location**

Click OK.

Step 4

Next click into cell B10 (underneath Employees).

Data | Data Validation

In **Allow** choose **List**

In **Source** type =**INDIRECT(A10)**

Click OK.

Step 5

Test that they both work by first clicking on the drop down box under location and choose **Bristol**.

Then click onto the list under employees and check that you have the list of three names for Bristol; **Harry, Paul and Tim**.

Step 6

Save and close the file.

Excel Advanced Data Analysis
and Modelling

Traci Huggins

UNIVERSITY OF
OXFORD

IT Learning Programme

Today's arrangements …..

Your teacher is: Traci Huggins

Your demonstrator is:

We finish at:

This is a hands-on session so get stuck in and have fun – don't be afraid to experiment!

Your comfort is important

The toilets are along the corridor just outside the teaching rooms

The rest area is where you registered;
it has vending machines and a water cooler

The seats at the computers are adjustable

You can adjust the monitors for height,
tilt and brightness

Add-Ins …….

During this session you will be using functions and features that are not available by default.

These functions and features need to be added into Excel – to activate the Add-Ins;

File | Options | Add-Ins |

Then select the Add-Ins available – Instructions in *Exercise 1 (page 41) …*

What we will cover today …..

➢ SUMIF & COUNTIF
➢ SUMIFs & COUNTIFs
➢ VLOOKUP
  ✓ Inexact Match
  ✓ Exact Match
➢ Scenarios
➢ Summary Reports

➢ Goal Seek
➢ Solver
➢ Conditional Formatting
  ✓ Criteria
  ✓ Data Bars
  ✓ Colour scales
  ✓ Icon Sets

Excel 2010: A Quick Tour/Refresher

The Ribbon/Toolbar: where the menus are
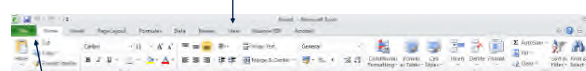
The File Tab: called 'Backstage view' – where you go for printing, saving and creating new files
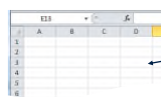
The Grid/Data Sheet: where your data goes, in columns and rows

Quotation marks in formula/Refresher

IMPORTANT: Any text criteria of any criteria that includes logical or mathematical symbols must be enclosed in double quotation marks ("). If the criteria is numeric double quotation marks are not required.

Examples:

=SUMIF(A2:A5,">160000",B2:B5) – Quotation marks are needed here because we have the more than sign included in the formula.

=SUMIF(A1:A7,"Fruits",C1:C7) – Again quotation marks are needed as we are using text in the formula.

=SUMIF(A2:A5,300000,B2:B5) – Quotation marks _not_ needed here as the criteria is a numerical only.

SUMIF and COUNITIF Functions

SUMIF

Allows you to sum values that meet a single criteria

=SUMIF(range, criteria, sum_range)

Range: is the range to evaluate

Criteria: is the search value to be applied to the range

Sum_range: is the range containing values you want to summarise

Lets look at an example of how this works;

SUMIF example ….

COUNTIF – *Example….*

COUNTIF works the same as the **SUMIF,** however COUNTIF _counts_ the criteria you require rather than adds them up

SUMIFs …….

Both the SUMIFs and COUNTIFs allow you to find the sum of values in your data that meets multiple conditions see below;

=SUMIFS(sum range, criteria range 1, criteria 1, Criteria range 2, criteria 2) where;

Sum Range: are the actual cells to sum
Criteria Range: are the range of cells you want evaluated of a certain condition
Criteria: Criteria: is the condition or criteria in the form of a number, text or formula

=SUMIFS(B2:E2, B3:E3, ">3%", B4:E4, ">=2%")

SUMIFs example ….

COUNTIFs ……

As with the SUMIFs the COUNTIFS allow you to count values that meet certain multiple criteria;

=COUNTIFS(criteria range1, criteria1, criteria range2, criteria2…..)

Criteria range - is the range of cells you want to evaluate for a particular condition
Criteria - is the search value to be applied to the range

=COUNTIFS(B2:B5,"=Yes",C2:C5,"=Yes")

criteria range1   criteria1   criteria range2   criteria2

COUNTIFs example …

=COUNTIFS(B2:B11,">0", D2:D11,">0")

F2 : × ✓ fx =COUNTIFS(B2:B11,">0", D2:D11,">0")

	A	B	C	D	E	F
1	Product	Sold	In Stock	Delivered		
2	Product 1	14	0	12	Sold and Delivered >0	7
3	Product 2	4	2	4		
4	Product 3	17	0	15		
5	Product 4	11	10	11		
6	Product 5	0	0	0		
7	Product 6	1	19	0		
8	Product 7	14	1	14		
9	Product 8	3	7	3		
10	Product 9	12	5	12		
11	Product 10	0	9	0		

criteria_range1   criteria_range2

Lookup Formulas …….

Vlookup – *Exact match*
=VLOOKUP(A6,'Stock list'!$A$2:$E$19,2,FALSE)

Vlookup – *Inexact match*
=VLOOKUP(B4,'Grades Table'!$A$2:$B$6,2,TRUE)

What IF Analysis ……..

What-**if analysis** is the process of changing the values in cells to see how those changes will affect the outcome of formulas on the worksheet.

Three kinds of what-**if analysis** tools come with **Excel**: **Scenarios, Data Tables and Goal Seek.**

We will look at each one of these in turn

Scenario Manager …….

The **Scenario Manager** makes it easy to automate your What-If models.

Its possible to store different sets of input values for any number of variables and give a name to each set.
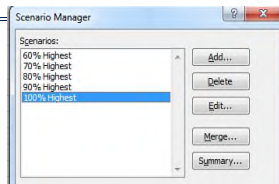

Scenario Manager …….

Book Store

	Total number of books	% sold for the highest price	
	100	60%	

	Number of books	Unit profit
Highest price	60	£50.00
Lower price	40	£20.00
Total Profit		£3,800.00

Summary Reports ……..

Example;

Exercises – SUMIF, COUNTIF, VLOOKUP & Summary Reports/Scenario…

Complete Exercises 1- 7

Your files are on **H:**

Start at Student Exercises, page 41 ………….

Please ask for help if needed!

Data Validation …….
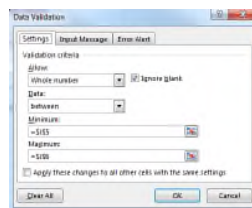
Use Data validation to set rules on individual or a range of cells

Use the Input Message and Error Alert to inform users of what is expected to be in the cells …
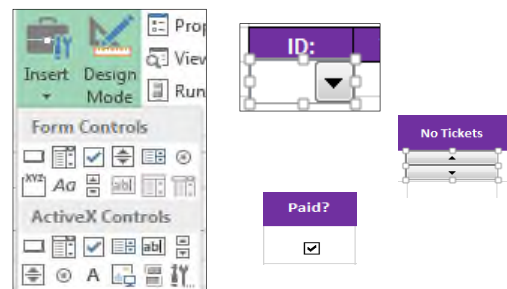
Conditional Formatting …….

Below are the various types of conditional formatting;

➢ Format a cell based upon the cell value
➢ Format duplicate Values
➢ Visualisations
➢ Data Bars
➢ Colour Scales
➢ Icon Sets
➢ Formula Driven

Index / Match …….
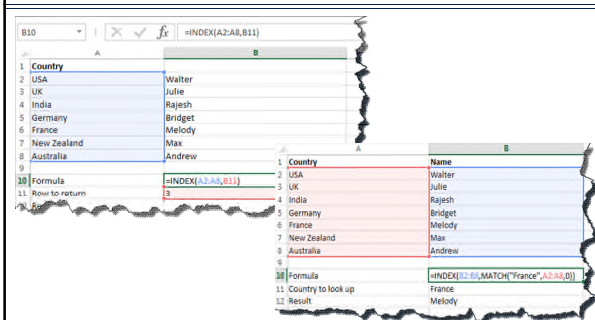
Using the Developer Tab …….

Exercises – Scenario's and Conditional Formatting

Complete Exercises 59-71

Your files are on **H:**

Start at **Student Exercises, page 59 ....**

Please ask for help if needed!

Other Spreadsheet Courses ....

Excel : Analysing your spreadsheet data with pivot tables

Excel : 3D formulas, charts and securing your data

Excel : Working with lists and querying external data

Excel: Checking and Managing Data

Other Courses ....

• Course Clinic

• Office Fundamentals

ITLP Portfolio;

   http://portfolio.it.ox.ac.uk/

iT services UNIVERSITY OF OXFORD

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