

Activity 2

Functions

There is a wide range of pre-written functions that can be used within a spreadsheet and some of this functionality has already been considered.

Create a table that names at least five text functions and five statistical functions, identifies their function type (e.g. text or statistical) and provides a brief description of what the function does.

Keep an electronic copy for reference.

Finding data

There are a number of functions that help you to find data in a spreadsheet. One of the most commonly used ones is the **filter function** that extracts all instances of records that contain the chosen filtering term, numbers or range.

In this example, we want to extract all items that have a price in a given range.

We begin by **selecting the heading cells** of the data, clicking on **the Data tab**, then on the **Filter icon**. This will activate the **AutoFilter** (Figure 42.64).

We will then need to choose the values we want to display. To do this you would need to click on the **Filter icon** to the right of Resale Price. Clicking on **Number Filters** will then let you choose the criteria (such as a range with a maximum and minimum value), on which to filter (Figure 42.65).

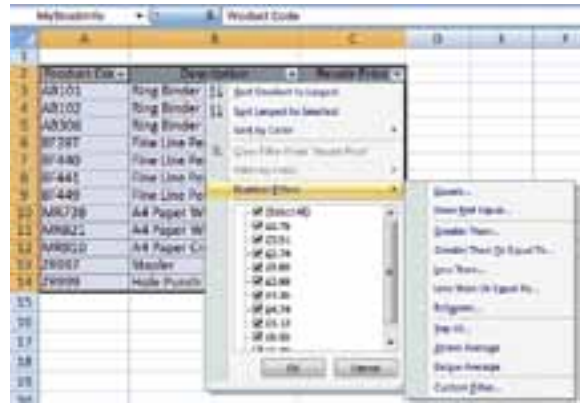


Figure 42.65 Custom Filter

42.2.5 Refine

This section will cover the following grading criterion:

M1

Make the Grade

M1

Showing that you can refine your spreadsheet is essential to achieve M1. You will need to demonstrate that you have improved the efficiency of your solution.

This could be achieved by the addition of **shortcuts** or other methods to **aid navigation**, as well as improving the **presentation** of your solution by adopting **consistent** and **appropriate formatting** techniques and **styles**.

Ultimately you must show that you have considered the development of your spreadsheet and that you can make it presentable and user friendly.

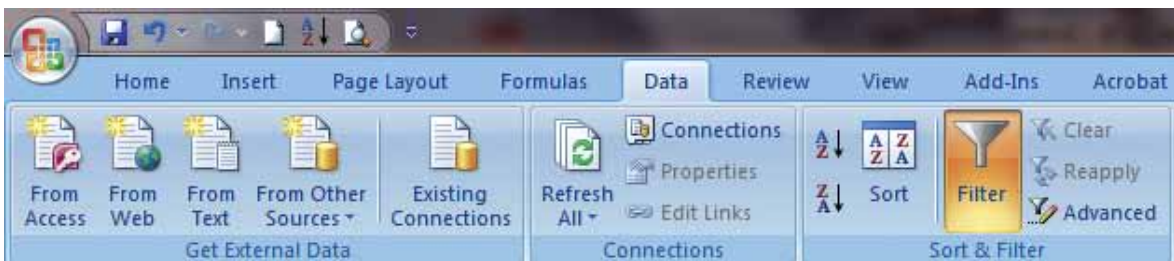


Figure 42.64 Filter

**Refining** a spreadsheet is essential to meet the Merit criteria in this unit. In order to do this you will have to show that you can improve the efficiency of your spreadsheet, format the data correctly and show that you can print selectively.

### Improving efficiency

#### Shortcuts

Efficiencies can be made in a number of areas including adding **shortcuts** (e.g. a button with a macro to print three copies of a particular area of the spreadsheet, rather than have to highlight the area and select to print three copies through the usual dialogue boxes).

```
Sub Macro1()
Macro1 Macro
Macro recorded 20/07/2010 by Bernie
Range("A1:A7,B3:B7").Select
'Choose these ranges
Selection.PrintOut Copies:=3,
Collate:=True 'Print three
copies
End Sub
```

This macro could then be placed on a button so that as the figures are changed, the user would have the option to print the same area again and again.

#### Aiding navigation

There are also a range of options that can be used to aid navigation around the spreadsheet. For example, cells can be **locked** to restrict the cells that the user can actually access (so using the tab key between cells moves to the next unlocked cell) – this is covered in more detail later in the unit.

Period Sales by Agent (South West Team)			
	January	February	March
John			
Cahit			
Mary			
Hamza			
Dominic			
Brian			
Alex			
Total Sales			

Figure 42.66 Input screen

Developers should also consider the **input order for data** to ensure that it is reflective of wherever the data is coming from. For example, there is little point in ordering the spreadsheet input boxes as shown in Figure 42.66 in preparation for data input if the data, when received, is ordered as shown in Figure 42.67.

Period Sales by Agent (South West Team)			
	January	February	March
Mary	19	5	18
Alex	28	9	6
Brian	17	21	14
Hamza	23	17	12
Cahit	17	22	8
John	15	19	15
Dominic	26	21	12
Total Sales	145	114	85

Figure 42.67 Source data

#### Formatting

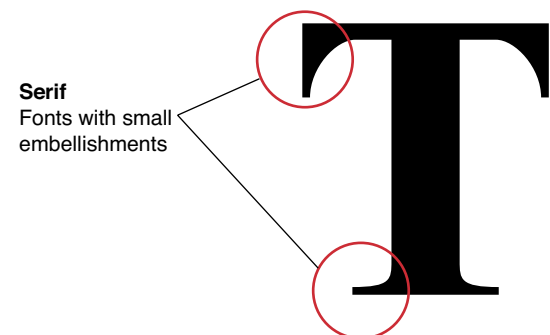
Professional spreadsheets reflect professionalism in their formatting and the way that they look to the reader. This is achieved through a range of formatting options, which are briefly explored here (although there are many others if you experiment).

#### Fonts

The key with fonts is not only the choice of font but also in being consistent with the use of the fonts (all headings in the same font, the main body of the text in the same font etc.).

Fonts come in two main types:

- Serif** Fonts with small embellishments
- Sans serif** Fonts without any embellishments



**Serif**  
Fonts with small embellishments

Figure 42.68 A font with serifs

'Sans', as you may be aware, is French for 'without', so sans serif literally means 'without serifs'. Some studies have indicated that text written in sans serif fonts is considered to be less formal and aids reading and recollection.

Figure 42.69 shows some examples. To be able to see the difference clearly, look at the capital T in each example.

## Serif Fonts

The cat sat on the mat

The cat sat on the mat

The cat sat on the mat

## Sans Serif

The cat sat on the mat

The cat sat on the mat

The cat sat on the mat

**Figure 42.69** Fonts

In addition, fonts are classified as **proportional** or **non-proportional**.

A proportional font uses up a different amount of space for each character – for example, an 'I', which is tall and thin would take up much less space than an 'M' (see Figures 42.70 and 42.71 for comparison).

**This font is Times New Roman (14) and it is a serif, proportional font as it uses less space for an 'I' than it does for an 'M' and it has embellishments.**

**Figure 42.70** Times New Roman

**This font is Courier New (14) and it is a serif, non-proportional font as it uses the same amount of space for an 'I' as it does for an 'M'. This**

**Figure 42.71** Courier New

### Activity 3

#### Fonts

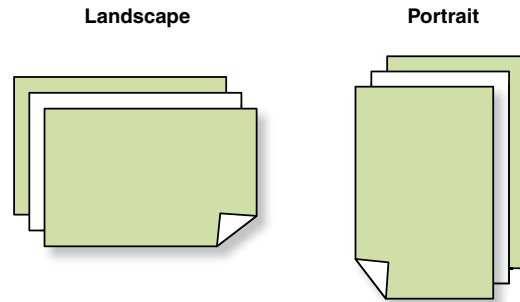
Investigate different font examples and identify five serif and five sans serif fonts.

In each case state whether the font is proportional or non-proportional.

Keep an electronic copy for reference.

## Page orientation

Paper can be used in two different ways (this is called its **orientation**): landscape and portrait (Figure 42.72).



**Figure 42.72**

Charts and graphs are often created in landscape view, particularly bar charts and trend charts, to ensure that the image is as clear as it can be. Printing on paper in the same landscape orientation will ensure that the information is fully legible. Squashing it into a portrait view could make some or all of the information illegible.

## Header and footer

Just as with Microsoft Word® documents, spreadsheets can be enhanced with headers or footers. A **header** appears in the white space at the top of a document or spreadsheet; a **footer** appears in the white space at the bottom. Inserting these is an option on the Insert tab, on the Text menu (see Figure 42.73).



**Figure 42.73** Header and footer

Activating the Text menu brings up an additional tab (in this case the Design tab), which contains an extensive list of header and footer options. If you have chosen to insert a header, the Header box appears and the cursor flashes for text entry.



Figure 42.74 Header and Footer Tools

### Print area

There will be instances where the user does not wish to print an entire spreadsheet, but instead decides to print a part of it. To do this, you need to highlight the area you want to print, then click on the **Page Layout** tab and the **Print Area** option. You can then set or clear a series of selected cells.



Figure 42.75 Setting the print area

### Use of colour

Colours can also be used to improve the appearance of the spreadsheet. In the example in Figure 42.76, we have changed the colour of the row and column headings and have also used a different colour to highlight the highest sales value for each region over the period. You can clearly see that the Midlands, South West and North had their best month in January, while for the South East it was February.

Period Sales Totals by Region				
	South West	North	Midlands	South East
January	145	201	150	187
February	114	94	172	199
March	85	175	102	134
Period Totals	344	471	449	520

Figure 42.76 Colours

## 42.3 Be able to automate and customise spreadsheet models

This section will cover the following grading criteria:

**P4** **M2**

### Make the Grade

**P4** **M2**

More practical use of a spreadsheet, P4 requires you to **create charts** and **graphs** from numeric data sets. This can be either the same data used to create different graphical images, or a number of different charts or graphs created from different data sets. You must make sure that your graphs and charts are **fit for purpose** and that they have **appropriate titles**, labels, axis scales and suitable colours, and that the chart or graph is of an **appropriate type**.

For M2 you will need to use the graphs or charts you have developed for P4 as a **method of analysing and interpreting data** from your spreadsheet model.

As an alternative you could be asked to use sub-totals or pivot tables, data sorting and data comparison (trends for example) techniques to analyse data.

Ultimately to achieve M2 you will need to **demonstrate** that you are using these techniques as **appropriate to the situation** to interpret the spreadsheet model.

### 42.3.1 Sorting and summarising data

#### Use of sub-totals and facilities

A **pivot table** is a tool that can be used to **summarise a data** set and allow the data users to see the data from **different perspectives**.

Using the data in Figure 42.77, we will use the pivot table facility to provide subtotals and different views of the data.

Activity 4

This activity will walk you through the creation of a pivot table.

Sorting data on multiple fields

- 1 To begin you will need to open a new spreadsheet and key in the data as shown below.

Date	Supplier Name	Quantity	Description	Price	Total
01/09/2018	Kanara Shirts	100	T-shirts Blue XL	4.22	422.00
01/09/2018	Raincoat	30	T-shirts Red L	3.44	103.20
04/09/2018	Stapleton Shoes	60	Assorted Denim joggs	0.88	52.80
04/09/2018	Kanara Shirts	200	T-shirts Black L	4.78	956.00
07/09/2018	Kanara Shirts	150	T-shirts Black XL	4.69	690.00
10/09/2018	Addressed Envelopes	100	T-shirts Blue L Long-sleeved	1.89	189.00
10/09/2018	Kanara Shirts	60	T-shirts Blue XL	4.52	271.20
21/09/2018	Stapleton Shoes	75	Assorted Denim joggs	0.88	66.00
22/09/2018	Kanara Shirts	60	T-shirts Red L	3.79	227.40
22/09/2018	Lanark Joggs	30	Assorted Denim joggs	0.79	23.70
22/09/2018	Raincoat	40	T-shirts Blue L Long-sleeved	0.35	14.00
25/09/2018	Kanara Shirts	100	T-shirts Blue XL	3.12	312.00
27/09/2018	Raincoat	60	T-shirts Red XL Long-sleeved	1.70	102.00
28/09/2018	Kanara Shirts	60	Assorted Denim joggs	1.83	109.80
30/09/2018	Raincoat	75	T-shirts Blue XL	4.49	336.75

Figure 42.77 Purchase data sorted by date only

- 2 To analyse the data we will now use the pivot table functionality. To access this we click on **Insert**, then on **PivotTable** (see Figure 42.78).

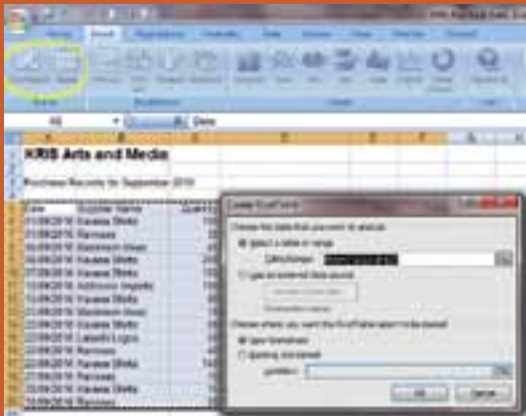


Figure 42.78 Accessing the functionality

Sorting data on multiple fields

The key issue with sorting data is ensuring that you select all the data across the rows and columns to be included when the records are moved. Failure to do this could result in data becoming mixed up and effectively useless.

In Figure 42.80 (on the next page) the data had been sorted in date order. We will now use the same data and sort it on multiple fields. See Activity 5 for details.

Having clicked on **OK** you now see a different dialogue box.



Figure 42.79 PivotTable dialogue box

- 3 You now **drag and drop** the fields you need in your pivot table over the spreadsheet.

In this example we want to analyse what was purchased from each supplier, so we will choose the **Supplier**, **Description** and **Quantity** data items.



Figure 42.80 The pivot table results

As with other spreadsheet tables, pivot tables can also be filtered, sorted and manipulated.

Filtering data sets

With sorted or unsorted data there is also an **autofilter Function**. To activate the autofilter, highlight the headings at the top of the relevant data, click on **Data** and then on the **Filter icon**. The column headings will automatically become drop-down boxes. Selecting the drop-down menu beside Description, for example, will allow the user to choose which item to display and it will extract only those records from the list which match your

### Activity 5

This activity will walk you through sorting data on multiple fields.

- Using the same data as created for the previous activity, highlight the area to be sorted (this is all the data excluding the headings).

Date	Supplier Name	Quantity	Description	Price	Total
11/01/2010	Kanara Shirts	50	T-shirts Blue L	4.52	226.00
11/01/2010	Kanara	30	T-shirts Red L	3.44	103.20
14/01/2010	Maximum Ideas	45	Assorted Band logos	0.60	27.00
06/01/2010	Kanara Shirts	200	T-shirts Black L	4.70	940.00
17/01/2010	Kanara Shirts	150	T-shirts Black XL	4.63	694.50
19/01/2010	Address Imprints	180	T-shirts Blue L Long-sleeved	5.83	1049.40
10/01/2010	Kanara Shirts	60	T-shirts Blue S	4.52	271.20
11/01/2010	Maximum Ideas	15	Assorted Band logos	0.60	9.00
22/01/2010	Kanara Shirts	50	T-shirts Red L	3.70	185.00
22/01/2010	Lukas Logos	50	Assorted Band logos	0.70	35.00
22/01/2010	Kanara	40	T-shirts Blue L Long-sleeved	5.10	204.00
22/01/2010	Kanara Shirts	100	T-shirts Blue S	4.52	452.00
11/01/2010	Kanara	15	T-shirts Red XL Long-sleeved	5.10	76.50
18/01/2010	Kanara Shirts	15	Assorted Band logos	0.60	9.00
14/01/2010	Services	25	T-shirts Blue S	4.00	100.00

Figure 42.81 The data area

- We will now sort by Supplier and then Description. To do this we will activate both options simultaneously. We now click on **Data** menu then on **Sort** to bring up the sorting dialogue box, which appears as shown in Figure 42.82.

**Add Level** and select **Then by** and choose **Description**.

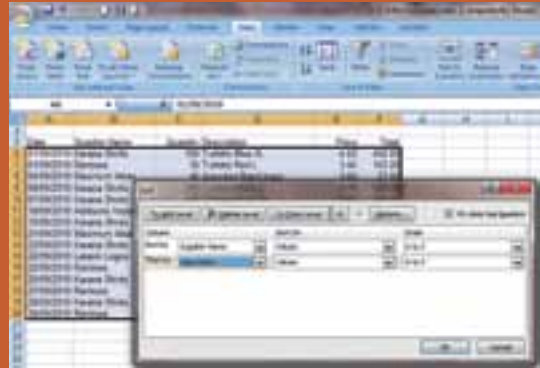


Figure 42.82 The sort interface

Once you have clicked on **OK** you will see the sorted list as shown in Figure 42.83.

- From the drop-down list choose to **Sort by Supplier name** then click to

Date	Supplier Name	Quantity	Description	Price	Total
10/01/2010	Address Imprints	180	T-shirts Blue L Long-sleeved	5.83	1049.40
22/01/2010	Kanara Shirts	15	Assorted Band logos	0.60	9.00
14/01/2010	Kanara Shirts	200	T-shirts Black L	4.70	940.00
17/01/2010	Kanara Shirts	150	T-shirts Black XL	4.63	694.50
22/01/2010	Kanara Shirts	100	T-shirts Blue S	4.52	452.00
19/01/2010	Kanara Shirts	100	T-shirts Blue XL	4.52	452.00
10/01/2010	Kanara Shirts	60	T-shirts Blue S	4.52	271.20
22/01/2010	Kanara Shirts	50	T-shirts Red L	3.70	185.00
22/01/2010	Lukas Logos	50	Assorted Band logos	0.70	35.00
14/01/2010	Maximum Ideas	45	Assorted Band logos	0.60	27.00
22/01/2010	Maximum Ideas	15	Assorted Band logos	0.60	9.00
22/01/2010	Services	40	T-shirts Blue L Long-sleeved	5.10	204.00
11/01/2010	Kanara	30	T-shirts Red L	3.44	103.20
27/01/2010	Kanara	10	T-shirts Red XL Long-sleeved	5.10	51.00

Figure 42.83 The sorted list

selection. To demonstrate this function, we click on Description, as suggested, and then deactivate the Select All option in the list and click only Assorted Band Logos (Figure 42.84).

The filtered list now shows **only** those suppliers from whom Kris Arts and Media have purchased that particular product. Notice that the drop-down icon on the Description column has now **changed** to a **Filter icon**. This is very useful to the user as he or she can immediately see **where** a filter has been applied (Figure 42.85).

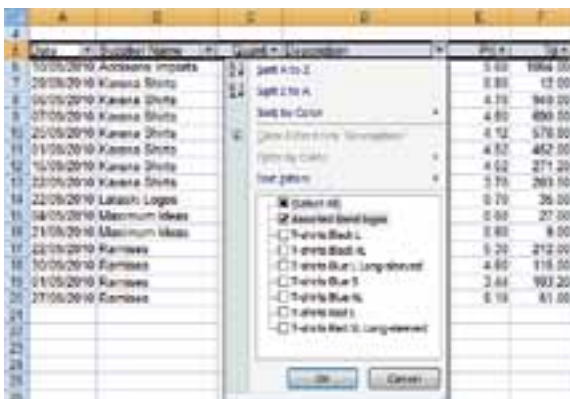


Figure 42.84 Using the autofilter to filter data

Quant	Description	Pr	Tot
15	Assorted Band logos	0.80	12.00
50	Assorted Band logos	0.70	35.00
45	Assorted Band logos	0.60	27.00
15	Assorted Band logos	0.60	9.00

Figure 42.85 Autofilter results

Similarly, you could choose to filter for all the records for one particular supplier or for goods purchased on a single date. Usefully, the autofilter function can be switched **on** or **off** on demand.

Using these features and facilities will enable you to produce professional spreadsheets that meet user needs. If in doubt about what is required on a spreadsheet or how the audience requires the data presented – **ASK!**

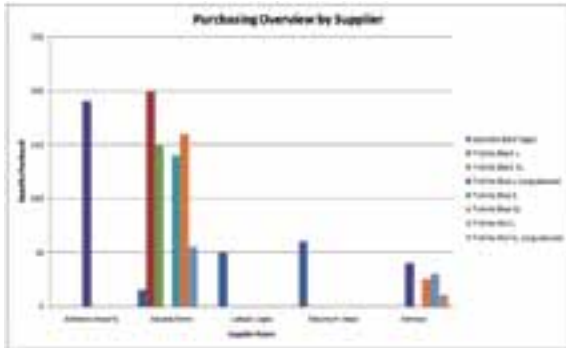
### 42.3.2 Tools

#### Charts and graphs

Being able to create charts and graphs is an important skill for anyone working with data through spreadsheets.

Using another pivot table, prepared to show the items purchased and the quantities as totals only, we now create a column chart.

When you use the data in a pivot table to create the chart or graph, once the Wizard has been used to create the base chart (in the first instance a column chart), the interface is slightly different as it offers you the pivot table choices as menus and buttons which means you can easily change which pieces of data are used to make up the chart or graph (see Figure 42.86). The user can now draw conclusions based solely on the information in the chart – for example: long-sleeved T-shirts have not been purchased from Kavana Shirts (there is no pink or purple column against this supplier).



**Figure 42.86** A chart made from a pivot table

As always, the title will need to be added, labels will need to be included or removed as required, the X-axis (across) will require a title (in this case **Supplier Name**) and the Y-axis (up and down) will require a title, which in this instance could be **Quantity Purchased**.

Similarly, as with all charts, an appropriate general title will be required.

In all charts created in Microsoft Excel® the **chart area** can be formatted and the background colours changed. Similarly, annotation can be added.

#### Select appropriate chart type for data type

A range of chart types exist, some of which will now be explored.

#### Pie charts

**Pie charts** are generally used where you want to represent data visually as part of a whole. Had we chosen a pie chart instead of a column chart in Figure 42.86, each column would have been represented by a slice of the pie. The larger the slice, the more it represents of the whole.

The pie chart you will see most often when working with computer systems is in the properties of a destination drive (such as your hard disk or a flash memory device) (see Figure 42.87).



**Figure 42.87** Pie chart used to display free and used disk space

#### Column charts

As shown in Figure 42.86, **column charts** contain vertical bars (upright). This is probably the most commonly used chart type and is usually offered as the default (or first choice) by the Wizard. Column charts are useful for allowing users to visually compare columns of data.

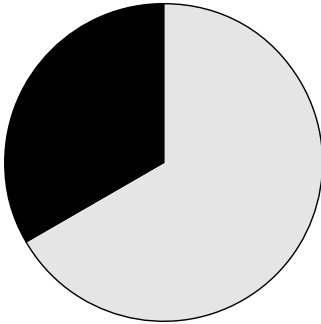
#### Bar charts

With horizontal bars (flat), **bar charts** are often used for comparing distances, for example. Many people, however, use the term “bar chart” regardless of whether the bars are vertical or horizontal.

#### Line graphs

**Line graphs** are good for comparing trends, as with the spreadsheet included at the beginning of this unit.

When using any chart or graph, users must make certain that the chart will actually mean something to the data user. Consider the pie chart in Figure 42.89. What is it telling you?



**Figure 42.88** Pie chart without annotation

In fact, this pie chart is not very useful. As it has no title and no key or legend, the user is unlikely to understand what it is actually intended to present! This is a very common error made by users in creating such charts.

### *Justify choices*

When creating charts and graphs, be prepared to explain your choices to users or managers. To avoid errors in this respect, always make sure you fully understand what you are trying to achieve in using this medium to present information.

## 42.3.3 Presenting

### *Combining information*

Professionally presented information is usually a combination of tables of data or information, charts or graphs and textual commentary that explains the images. In some cases, the images are used to provide a better understanding of the text. Using combined information to support arguments will become easier with experience. As a general rule, always try to provide evidence to support both sides of an argument before drawing a conclusion.

### *Maintaining data*

This topic has already been covered in section 42.1.1 earlier in this unit.

You should just remember that any links established between worksheets, workbooks or files are

dynamic, and changing the source value will lead to all those values reliant on the source value automatically being updated. Remember that when re-opening a file that creates a dynamic link, you will be asked whether you wish to update the file when it is opened or not.

## 42.3.4 Analysing and interpreting data

One of the biggest advantages of using spreadsheet tools to help you to analyse data is that you can manipulate the data in many ways to give you different perspectives and help you to identify information that otherwise might be difficult to spot. The following section gives some examples.

### *Converting data*

Creating charts in different formats from the same data can highlight unusual events.

### *Lists*

These can be sorted – for example, sales values from particular representatives could be ordered highest to lowest at the touch of a button. This would show immediately the ranked order of successful sales for staff.

Similarly the data could be filtered, to exclude any records that have a particular value. One example would be to filter a stock table to show just those items that have a stock of fewer than 10 items (for reordering purposes).

### *Trends and patterns*

Using charts, graphs, lists and so on, you should quickly be able to spot any trends or patterns in the data. Comparing year 1 sales with year 2 sales will show, for example, if a particular month shows high or low sales. In this instance, the data could then be interrogated to find out why that particular event occurred (was it the weather, was the product out of season, etc).

### *Data analysis and results*

The data itself will be analysed in different ways, making use of different tools to produce the results of the analysis. At this stage no conclusion is drawn from this information – the data simply says that this is so and it is up to the data user (or spreadsheet user in some cases) to find the facts.

**Conclusions**

Conclusions are now drawn – the data is interpreted and meaning is found in the results. This gets easier with experience. Although novice data/spreadsheet users are unlikely to have to draw these conclusions, to learn how conclusions are drawn from information following a data analysis, ask the data user to share his or her conclusions with you.

**42.3.5 Customisation**

This section will cover the following grading criterion:

**P5**

**Make the Grade** **P5**

For P5 you will carry out further work on your spreadsheet model.

In this instance you will need to **use tools and techniques to customise the spreadsheet model.**

Examples of customisation include restricting data entry, for example hiding information, protecting worksheets and cells, modifying toolbars and menus, checking data, for example data validation, range checking, not NULL and displaying error messages.

**Restricting data entry**

Hiding columns and rows of data in a spreadsheet to prevent access by particular users is a simple procedure.

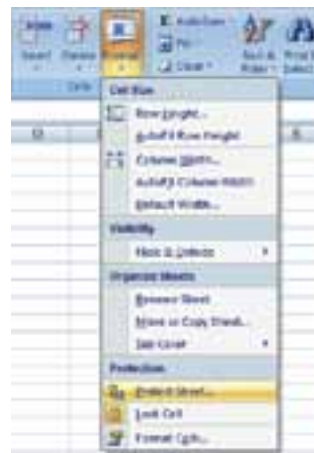
Simply select the columns you wish to hide, then right click and choose **Hide** (this can be seen in Figure 42.89). The same technique is used for hiding rows.

This will not prevent the user accessing them if needed. To **Unhide**, the user simply highlights the columns to the left and right of where the column or columns are missing, and then right clicks and chooses **Unhide**.

**Protecting** the contents of rows or columns requires slightly reversed thinking! When protecting a whole sheet, the developer will simply click on the Home tab, then find the Cells submenu, and under the Protection options choose to **Protect Sheet** (see Figure 42.90).



**Figure 42.89** Hiding columns



**Figure 42.90** Protecting the worksheet

Sheet protection can be safeguarded using a password, effectively locking the whole worksheet and preventing users from being able to change any values.

On more modern versions of Microsoft Excel®, however, it is now also possible to give specific levels of worksheet access to users as can be seen in Figure 42.91.



**Figure 42.91** Selecting protection

The developer might, on the other hand, wish to protect the important parts of the spreadsheet, such as headings and totals, and only enable (or leave accessible) those areas that are safe for a novice user to use.

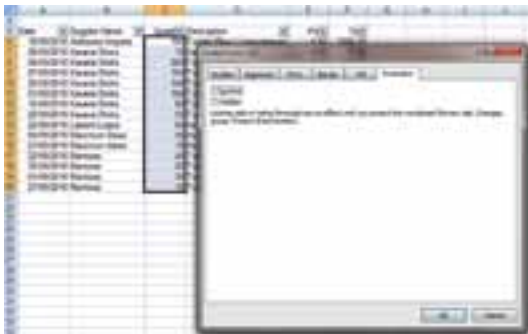
To do this the developer will need to unlock (make accessible) those areas that the user is free to access, prior to protecting the worksheet.

In Figure 42.92, the area that the user will be able to key into has been identified.



**Figure 42.92** Identifying the user access area

If the user now right clicks on the identified cells, then clicks on Format Cells and finally on Protection, the dialogue box shown in Figure 42.93 will become visible. The user unchecks the Locked box in order to unlock those cells when the rest of the sheet becomes protected.



**Figure 42.93** Unlocking cells

You will also notice that cells to be hidden can be identified in the same way.

Once the cells to be kept active have been unlocked, the sheet is protected in the usual way (see Figures 42.90 and 42.91).

### Modifying toolbars and menus

Having already considered how data can be hidden or locked and how whole worksheets can be protected, you might also wish to **limit the functionality** that a user has access to by **removing buttons or menus**.

### Data validation, range checking and error messages

Customising your spreadsheet to provide some data validation functionality is essential to maintain the integrity of your data and some suggestions for this activity have already been covered in section 42.2.1, including validation, range checking and the use of customised error messages.

## 42.3.6 Automation

This section will cover the following grading criteria:

P6

M3

### Make the Grade

P6

M3

For P6 you should develop the spreadsheet model further by implementing automated features, such as macros, ActiveX® controls, Control Toolbox or Microsoft Visual Basic®.

M3 builds on P6 by requiring you to **compare different automation methods** including macros, ActiveX® control, Control Toolbox and Visual Basic®.

This can be most efficiently achieved by using a simple table of comparison.

### Macros

**Macros** are mini programs that automate chosen functions in a spreadsheet. They can be stored within a particular workbook or stored globally so that they can be accessed by all workbooks.

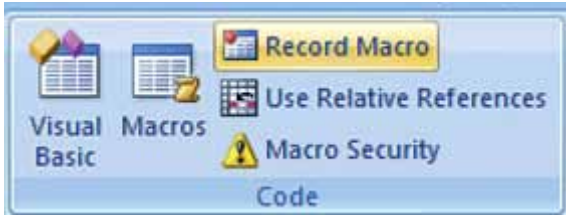
Recording a macro is a very straightforward process. You can either select the **View** tab and then the **Macro** submenu, or you can use the **Developer** tab which contains many of the macro functions. This is not visible by default and may need to be added.

To add the Developer tab, click on the Microsoft Office® icon, Excel® Options and check the box as shown in Figure 42.94.



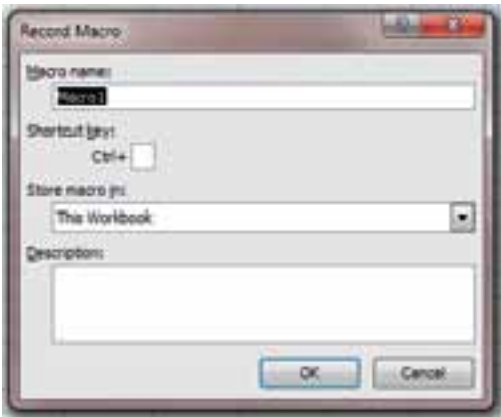
**Figure 42.94** Adding the Developer tab

When you click on the Developer tab, you can then choose to Record a new macro (Figure 42.95).



**Figure 42.95** Recording a macro

As soon as **Record New Macro** has been selected, the dialogue box shown in Figure 42.96 will appear. Here you will have to give the macro a name, and you will select whether the macro **will be visible** to the workbook open at the time it was created, a new workbook not yet created, or whether it should be placed in a **Personal Macro Workbook**. This is what effectively makes the macro global because the Personal Macro Workbook is visible to all spreadsheets. This is called '**scoping**'.



**Figure 42.96** Scoping the macro

Once you click on OK, the macro will begin recording and every action you undertake will be logged, until you click on the Stop Recording button as shown in Figure 42.97.



**Figure 42.97** Stop recording

Once the recording has been stopped, you can then add a button to the spreadsheet to activate the macro.

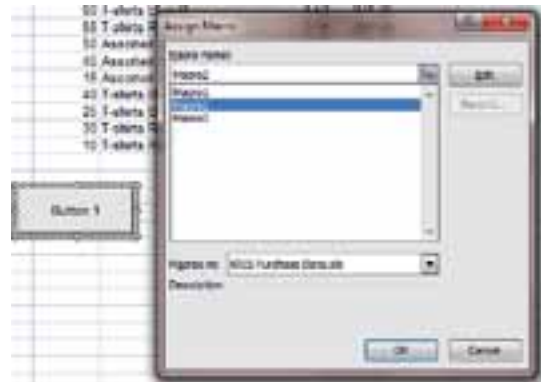
To do this you must select the **Developer tab**, click on the **Controls submenu**, click on **Insert** and then from the **Form Controls** click on the **button icon**.



**Figure 42.98** Adding a button

Draw a button on your spreadsheet and when you release the mouse the **Assign Macro** dialogue box will appear. **Choose** the macro you wish to assign. You can also change the **caption** on the button to **describe** what the button does (e.g. Print).

Macros you might like to record to enhance your spreadsheet could include:



**Figure 42.99** Assign a macro

- a print macro to always print a specific number of copies of a whole spreadsheet
- a macro to select a specific area in a spreadsheet for printing
- a macro that ensures that all columns are of the correct width to accommodate the data

- a macro that ensures that all numeric columns have two decimal places.

The list of possible options is **extensive** and would fill an entire book of its own! What you must ensure, however, is that you choose a macro that is going to be useful to the user, rather than just creating one to prove you can!

**ActiveX® controls and Control Toolbox**

These are objects that can be downloaded, written by the spreadsheet developer or imported from other software applications and which can be made available to different programs as well as different files in the system.

They can also be embedded into particular files to carry out pre-defined functions. These controls are reusable and can be accessed through the ActiveX® Controls, More Controls option as shown in Figure 42.100. Some examples are shown in Figure 42.101.



Figure 42.100 Controls

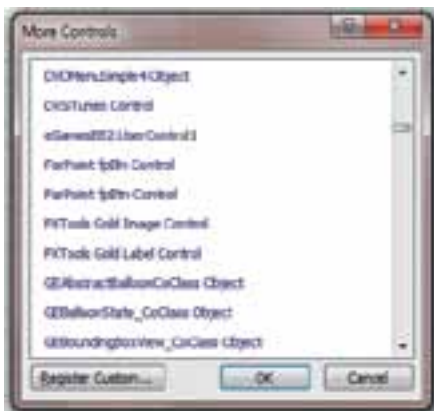


Figure 42.101 ActiveX® options

**Visual Basic® for Applications (VBA)**

Visual Basic® is the programming language used to support automated processes in most Microsoft® applications. Shown below is the macro that was introduced earlier in this unit:

```
Sub Macro1()
Macro1 Macro
Macro recorded 20/07/2010 by Bernie
Range("A1:A7,B3:B7").Select
'Choose these ranges
Selection.PrintOut Copies:=3,
Collate:=True 'Print three
copies
End Sub
```

Amending the print range or the number of prints is achieved by simply changing the relevant values in the code:

```
Sub Macro1()
Macro1 Macro
Macro recorded 20/07/2010 by Bernie
Range("A1:A12,B3:B12").Select
'Choose a different range
Selection.PrintOut Copies:=6,
Collate:=True 'Print six copies
End Sub
```

42.4 Be able to test and document spreadsheet models

This section will cover the following grading criteria:

- P7
- D2

**Make the Grade** P7 D2

For P7 you will need to check and test your spreadsheet to ensure that it is fit for purpose. You will **test for accuracy** and **functionality** and you will need to **evidence** that you have **checked** the spreadsheet model in terms of the required **functionality, accuracy of calculations, data validation**, and ensured that the results of calculations and so on, are displayed with an

**appropriate level of detail** (columns for example to two decimal places). Evidence should be in the form of test plans and screen captures.

D2 builds on P7 by requiring you to **evaluate your spreadsheet model** incorporating **feedback from others**. You should be able to **reflect on your own performance** in building a spreadsheet model and consider what **hurdles you had to overcome** to achieve the desired result. Questions you should pose to focus the evaluation could include:

- Did the spreadsheet model meet the given requirements?
- What did other people think of the spreadsheet model?
- Was there any functionality that could be included or aspects that could be improved?

Reviewing the answers to these questions will also enable you to include some sensible recommendations for improvements.

- that the **tab order** of any inputs follows the natural progression of any input forms
- that any **user prompts are complete** and in place
- **spelling** of any labels.

**Validation**

Validation routines should be checked to ensure that **good values are accepted** and that **bad values are rejected**, with the **correct error message displaying as needed**.

Collecting or creating relevant test data is covered in the next section.

**Layout**

Firstly, columns should be made wide enough to accommodate all headings and the numbers themselves. If columns are not wide enough to accommodate the data within them, the numbers are shown as hashes. Widening the column will bring the actual values back into view (Figure 42.103).

**42.4.1 Test**

There are three main reasons for testing your spreadsheet. This would be to:

- confirm the spreadsheet has the correct functionality
- confirm the spreadsheet calculations and so on are correct
- confirm the spreadsheet is simple to use (shortcuts, data forms etc.).

**Formulae and functions**

Those formulae and functions created by the spreadsheet developer need to be carefully checked.

Formulae, for example, should be checked to make sure that they include all the values in a range. The order of precedence in any formulae should also be checked (don't forget that incorrect use of BODMAS will still give an answer, it just won't be the right answer).

Similarly, any functions should be checked carefully, using manual methods to confirm the answers (the use of pen, paper and calculator is the most common)!

**Data entry forms**

The checks on data entry forms will largely consist of visual checks of the following:

- **completeness**
- **presence** of all the required functionality

	A	B	C	D	E	F
4						
5	Date	Supplier Name	Description	Price	Tax	
6	10/01/2010	Addison Imports	## T-shirts Blue L Long-sleeved	5.60	####	
7	20/01/2010	Kavara Shirts	15 Assorted Band logos	6.00	####	
8	30/01/2010	Kavara Shirts	## T-shirts Black L	4.70	####	
9	07/01/2010	Kavara Shirts	## T-shirts Black XL	4.60	####	
10	25/01/2010	Kavara Shirts	## T-shirts Blue S	4.12	####	
11	31/01/2010	Kavara Shirts	## T-shirts Blue XL	4.52	####	
12	16/01/2010	Kavara Shirts	60 T-shirts Blue XL	4.52	####	
13	27/01/2010	Kavara Shirts	55 T-shirts Red L	3.70	####	
14	27/01/2010	Latechis Logos	30 Assorted Band logos	9.70	####	
15	04/01/2010	Maximum Ideas	45 Assorted Band logos	6.60	####	
16	21/01/2010	Maximum Ideas	15 Assorted Band logos	6.60	9.60	
17	22/01/2010	Ramzee	40 T-shirts Blue L Long-sleeved	5.20	####	
18	30/01/2010	Ramzee	25 T-shirts Blue XL	4.60	####	
19	31/01/2010	Ramzee	20 T-shirts Red L	3.44	####	
20	27/01/2010	Ramzee	10 T-shirts Red XL Long-sleeved	6.70	####	

**Figure 42.102** Spreadsheet showing missing data hashes

**Values**

As part of the development of a spreadsheet, the results of calculations should also be carefully checked. Using **alternative means** of calculating the answers, such as a **pen and paper** or a **calculator**, is necessary to test the spreadsheet formally and thus ensure that formulae and functions are working as they should.

In addition, developers need to make decisions about the **level of detail** required in the numbers that are displayed.

With spreadsheets containing British currency, for example, there may be little point in displaying numbers to three decimal places – £15.947 – because no physical currency exists for 0.7 of a pence.

On the other hand, there will be instances where it is **appropriate** to display values to five or more decimal places (e.g. scientific measurements).

**Suitability for client**

Although your tutor may not be a paying customer, he or she is still the person for whom the spreadsheet is being created.

Clearly it is necessary to ask him or her for **feedback** on the **suitability** of the final solution. This process can be **formalised** (maybe with a feedback interview), but will more likely involve user testing (see below).

**User testing**

If the spreadsheet is going to be used by one or more users, you would ordinarily ask the users to test it. This can be very useful for checking the robustness of the spreadsheet. For example, if you have error trapping to trap incorrect numeric values, have you tested it by inputting a character or symbol? A real user could very easily make these kinds of mistakes!

Usually the user is given a form or some sort of feedback document to complete.

**Test plans using normal, extreme and erroneous data**

Data selected for testing purposes should cover the following range:

- **Normal data** – the program needs to be tested with data that is within a sensible range. This is

the data that is expected to be input when the system is being used normally.

- **Extreme data** – the program should also be tested with data that, though still within a sensible range, is **less likely** to be input. For example, an age over 115 is not impossible, it's just unlikely!
- **Erroneous data** – this is data that is neither normal nor sensible! It is data that is blatantly incorrect. The data will contain values **outside valid ranges** and **incorrect types** of values (e.g. characters where numbers are expected and vice versa).

**42.4.2 Feedback**

Receiving feedback for any IT project is **essential** to ensure that a) the client or user is happy that he or she is getting the expected solution and b) there is confirmation that the system works as it should.

The methods used for obtaining feedback in this situation tend to be surveys, questionnaires and interviews. As these techniques support the investigation phase of the systems life cycle, they are explained in full in Unit 11 section 11.2.1.

**Analyse results and make recommendations**

Once received, feedback should be **carefully collated** and **analysed** and any errors or problems fixed in the short term. In the medium term, any additional functionality could also be added to improve the spreadsheet.

**Activity 6**

Complete the following test plan to reflect testing for normal, extreme and erroneous data. In each case, suggest at least two values!

Test	Normal data	Extreme Data	Erroneous data
Age is between 18 and 21			
Height is between 1.5 and 2.2 metres			
Quantity (must not be 0)			
Price (must be more than 0, but less than £20.00)			
Choice must be A, B, C, D or E			
Hours worked (must be greater than 0, but less than 50)			

### 42.4.3 Alternative formats

This section will cover the following grading criterion:

**P8**

In addition, you will have a **copy of the original file** and the **converted file** and to fully evidence the criterion, you could open the converted file and send it to print.

## Make the Grade

**P8**

A practical task, the P8 criterion requires you to **export** the contents of a spreadsheet model to an **alternative format**. This does not necessarily mean that you need to export the entire contents of a spreadsheet, but you will need to choose a **sensible section** of the spreadsheet and save it as a smaller file if you decide not to export the whole thing.

When the conversion is carried out, a **witness statement** could be used to record the activity.


For the occasions when you might want to export an entire spreadsheet file, Microsoft Excel® offers you the opportunity to save the files in different formats. To save in a different format, you merely need to choose a different file type when going through the **Save As...** dialogue.

A range of common formats is explored in Table 42.03.

Remember that each of the formats will present the file in the file management system with a different icon.

What you should notice is that as the file extensions are different for each format, the file name can actually remain the same!

**Table 42.03**

Format choice	Description																																																																																										
xls	An eXcel Spreadsheet and the default format applied when you save a spreadsheet in Microsoft Excel 97~2003®. This format is still supported in newer versions of Microsoft Excel®.																																																																																										
csv	<p>This stands for <b>comma separated value</b>. If you save a spreadsheet in this format, the cells are separated by commas, and a new line denotes the beginning of a new line in the spreadsheet.</p> <p>The spreadsheet in Figure 42.104 is saved in xls format.</p> <div style="text-align: center;">  <table border="1" style="margin: 10px auto; border-collapse: collapse; font-size: 8px;"> <thead> <tr style="background-color: #d9e1f2;"> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>1</td> <td colspan="4">Ice Cream Sales for 2010</td> </tr> <tr> <td>2</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>Month</td> <td>£000s</td> <td></td> <td>Percentage of total sales</td> </tr> <tr> <td>4</td> <td>January</td> <td>1597</td> <td></td> <td>7</td> </tr> <tr> <td>5</td> <td>February</td> <td>1438</td> <td></td> <td>6</td> </tr> <tr> <td>6</td> <td>March</td> <td>1499</td> <td></td> <td>7</td> </tr> <tr> <td>7</td> <td>April</td> <td>1957</td> <td></td> <td>9</td> </tr> <tr> <td>8</td> <td>May</td> <td>1586</td> <td></td> <td>7</td> </tr> <tr> <td>9</td> <td>June</td> <td>2417</td> <td></td> <td>11</td> </tr> <tr> <td>10</td> <td>July</td> <td>2683</td> <td></td> <td>12</td> </tr> <tr> <td>11</td> <td>August</td> <td>2751</td> <td></td> <td>12</td> </tr> <tr> <td>12</td> <td>September</td> <td>2100</td> <td></td> <td>9</td> </tr> <tr> <td>13</td> <td>October</td> <td>1414</td> <td></td> <td>6</td> </tr> <tr> <td>14</td> <td>November</td> <td>1563</td> <td></td> <td>7</td> </tr> <tr> <td>15</td> <td>December</td> <td>1866</td> <td></td> <td>8</td> </tr> <tr> <td>16</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>17</td> <td>Total</td> <td>22871</td> <td></td> <td>100</td> </tr> </tbody> </table> </div> <p><b>Figure 42.103</b> .xlsx format</p>		A	B	C	D	1	Ice Cream Sales for 2010				2					3	Month	£000s		Percentage of total sales	4	January	1597		7	5	February	1438		6	6	March	1499		7	7	April	1957		9	8	May	1586		7	9	June	2417		11	10	July	2683		12	11	August	2751		12	12	September	2100		9	13	October	1414		6	14	November	1563		7	15	December	1866		8	16					17	Total	22871		100
	A	B	C	D																																																																																							
1	Ice Cream Sales for 2010																																																																																										
2																																																																																											
3	Month	£000s		Percentage of total sales																																																																																							
4	January	1597		7																																																																																							
5	February	1438		6																																																																																							
6	March	1499		7																																																																																							
7	April	1957		9																																																																																							
8	May	1586		7																																																																																							
9	June	2417		11																																																																																							
10	July	2683		12																																																																																							
11	August	2751		12																																																																																							
12	September	2100		9																																																																																							
13	October	1414		6																																																																																							
14	November	1563		7																																																																																							
15	December	1866		8																																																																																							
16																																																																																											
17	Total	22871		100																																																																																							

Format choice	Description
<p>csv</p>	<p>If the file is now been saved as a .csv file and imported into Microsoft Word®, it will look like this:</p> <pre data-bbox="387 330 926 777"> Ice Cream Sales for 2010,,, Month,£000s,,Percentage of total sales January,1597,,7 February,1438,,6 March,1499,,7 April,1957,,9 May,1586,,7 June,2417,,11 July,2683,,12 August,2751,,12 September,2100,,9 October,1414,,6 November,1563,,7 December,1866,,8  Total,22871,,100                     </pre> <p><b>Figure 42.104</b> .csv format</p>
<p>txt</p>	<p>This format is a simple <b>text</b> file. The same ice cream sales data has now been saved in this format and the new file imported into Microsoft Word®. This is how the content of the file looks now:</p> <pre data-bbox="387 986 926 1393"> Ice Cream Sales for 2010  Month£000s      Percentage of total sales January    1597          7 February   1438          6 March     1499          7 April     1957          9 May       1586          7 June      2417         11 July      2683         12 August    2751         12 September 2100          9 October   1414          6 November  1563          7 December  1866          8  Total 22871      100                     </pre> <p><b>Figure 42.105</b> .txt format</p> <p>In this instance, the commas are missing and an attempt has been made by the software to align the information using <b>default tabs</b>. Text files are perhaps the <b>most flexible</b> and most basic format to save data because the majority of applications and operating systems will be able to read them.</p>
<p>pdf</p>	<p>This popular format will enable the user to export the spreadsheet as an Adobe Acrobat® portable document format file, to be read with the freely downloadable Adobe Acrobat Reader® application.</p>
<p>xlsx</p>	<p>An eXcel Spreadsheet XML workbook and the default format applied when you save a spreadsheet in Microsoft Excel 2007®.</p>
<p>html</p>	<p>The <b>hypertext markup language</b> format option prepares the data to be used in the creation of web pages, exporting it in a web browser-friendly format.</p>

## 42.4.4 Documentation

This section will cover the following grading criteria:

P9

M4

### Make the Grade

P9

M4

For P9 you will need to produce **user documentation** with instructions for users on **how to use** the spreadsheet model, especially when navigating the user interfaces. This can be achieved as a formal document or equally as a series of web pages.

M4 builds on P9 by requiring you to add **technical documentation**, which includes **the required hardware** and **software resources, instructions** and an **explanation of calculations** used in the spreadsheet model.

Again this could be a completely separate document or could be additional pages in a web-based help file. Screencast videos (see Unit 6, section 6.2.1 'Writing documentation') could also be used.

In order to make sure that any IT solution can be **properly maintained** (repaired if problems arise or enhanced if new functionality is needed) a range of documentation will need to be created that **explains the solution** from a number of perspectives. The same will be true for a spreadsheet solution. The documents created may be printed, could be held electronically in a .doc file, or as a series of web pages for users to access when needed (e.g. on an organisation's intranet).

### User documentation

This documentation should be developed from a user perspective. It should contain:

- a **guide** on the overall purpose of the spreadsheet
- **instructions** on how to use the spreadsheet, in particular how to execute specific tasks
- **troubleshooting** information on what the user should do if the spreadsheet does not function correctly.

### Technical documentation

The technical documentation may be a section in the user documentation or could be a completely separate document or series of web pages. This information will focus on:

- **Hardware resources** – this will usually specify any particular hardware requirements that are needed to run the spreadsheet successfully.
- **Software resources** – it is likely that the spreadsheet solution will have been created in a particular version of Microsoft Excel® and this should be recorded. This is because the spreadsheet might not be compatible with earlier versions of the software.

### Instructions

Although modern software largely has electronic help files, many people still prefer books to support the general use of software. The following URL provides a link to a series of Microsoft Excel® books that can be purchased on [www.amazon.co.uk](http://www.amazon.co.uk):

[http://www.amazon.co.uk/s/ref=nb\\_sb\\_noss?url=search-alias%3Dstripbooks&field-keywords=excel&x=14&y=17&fsc=-1](http://www.amazon.co.uk/s/ref=nb_sb_noss?url=search-alias%3Dstripbooks&field-keywords=excel&x=14&y=17&fsc=-1)

### Calculations

All calculations and functions used or created should be recorded. With spreadsheet solutions it is useful if the holding cell (cell where the formula is written), the formula itself and a description of the formula or function is included (a print of the spreadsheet in formula view could also be included).

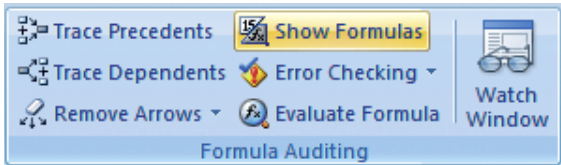
#### Formula

Cell A15    =A14\*20%    This formula calculates VAT.

#### Functions used

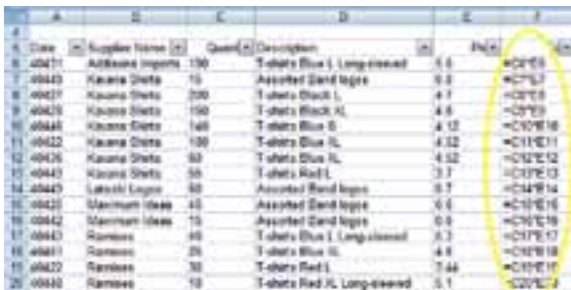
Cell A14    =SUM(A1:A13)    This function adds together the values on the invoice to provide a pre-VAT subtotal.

To display the formula view of a spreadsheet, click on the Formula tab, then on the Formula Editing sub-menu choose Show Formulas (see Figure 42.106).



**Figure 42.106** Show Formulas

On the view tab click the Formulas Checkbox in the Window options section. The screen will now appear as shown in Figure 42.107.



**Figure 42.107** Formula view

**Validation procedures**

All validation routines and procedures should be recorded, stating what the validation routine is set

to check and annotating any error messages that will be displayed.

**Macros and Visual Basic® code**

All macros and Visual Basic® code should be described and annotated with simple comments that tell the reader what the line of code does (rather than describing the actual commands used).

```
Sub Macro1()           'Print Macro
for Sales Report
'Macro1 Macro
'Macro recorded 20/07/2010 by
Bernie
    Range("A1:A7,B3:B7").Select
'Chooses the range to print
    Selection.PrintOut Copies:=3,
Collate:=True         'Specifies the
                        number of copies
End Sub
```

The key to working successfully with spreadsheets is to make any spreadsheet solution look professional, make sure it is as efficient as possible and check that any calculations, validation and macros work correctly.

**Unit link**

Unit 42 is a **specialist optional** unit for all qualifications and pathways of this Level 3 IT family.

Qualification (pathway)	Mandatory	Optional	Specialist optional
Edexcel BTEC Level 3 National Certificate in Information Technology			✓
Edexcel BTEC Level 3 National Subsidiary Diploma in Information Technology			✓
Edexcel BTEC Level 3 National Diploma in Information Technology			✓
Edexcel BTEC Level 3 National Extended Diploma in Information Technology			✓
Edexcel BTEC Level 3 National Diploma in IT (Business)			✓
Edexcel BTEC Level 3 National Extended Diploma in IT (Business)			✓
Edexcel BTEC Level 3 National Diploma in IT (Networking and System Support)			✓

Qualification (pathway)	Mandatory	Optional	Specialist optional
Edexcel BTEC Level 3 National Extended Diploma in IT (Networking and System Support)			✓
Edexcel BTEC Level 3 National Diploma in IT (Software Development)			✓
Edexcel BTEC Level 3 National Extended Diploma in IT (Software Development)			✓

### Achieving success

In order to achieve each unit, you will complete a series of coursework activities. Each time you hand in work, your tutor will return this to you with a record of your achievement.

This particular unit has 15 criteria to meet: 9 Pass, 4 Merit and 2 Distinction.

For a Pass: You must achieve all 9 Pass criteria.

For a Merit: You must achieve all 9 Pass and all 4 Merit criteria.

For a Distinction: You must achieve all 9 Pass, all 4 Merit and both Distinction criteria.

Hart-Davis, G. – *How to Do Everything with Microsoft Office Excel 2003* (McGraw-Hill Education, 2003) ISBN 0072230711

Heathcote, R. – *Further Excel 2000–2003* (Payne-Gallway Publishers, 2004) ISBN 1904467768

Koneman, P. – *Advanced Projects for Microsoft Excel 2000* (Prentice Hall, 2000) ISBN 0130885444

Simonn, J. – *Excel Data Analysis, 2nd Edition* (Hungry Minds Inc US, 2005) ISBN 0764597809

Zapawa, T. – *Excel Advanced Report Development* (Hungry Minds Inc US, 2005) ISBN 0764588117

### Further reading

Day, A. – *Mastering Financial Mathematics with Excel* (Financial Times Prentice Hall, 2005) ISBN 0764597809

### Websites

[www.office.microsoft.com/en-us/excel/default.aspx](http://www.office.microsoft.com/en-us/excel/default.aspx)

[www.support.openoffice.org/index.html](http://www.support.openoffice.org/index.html)

[www.free-training-tutorial.com](http://www.free-training-tutorial.com)