dmu.ac.uk
DE MONTFORT UNIVERSITY
LEICESTER

Department of
Library Services

www.library.dmu.ac.uk

IT Training

Kimberlin Library
Tel: (0116) 257 7160
Fax: (0116) 257 7046
email: itskills@dmu.ac.uk

Office 2007

Excel

Advanced

December 2009

Contents

INTRODUCTION

These notes and exercises are aimed at those who want to expand their knowledge of Excel 2007.

Knowledge assumed

Excellent working knowledge of Excel and/or
attendance on the Spreadsheet Intermediate course
an understanding of using formulas and functions

Areas covered

using advanced filters
protecting worksheets and workbooks
creating pivot tables
introduction to macros
useful functions for serious Excel users

Document signposts

Instructions for you to type

Bold text

Shortcuts

Reminders

Notes

Exercises

FORMATTING DATA

Excel contains many standard formatting options, but there may be times when the formatting that you need to apply is not a ready-made option. On these occasions, you can create a custom format.

CUSTOM FORMATS

- Open the **Courses** workbook from the **ExcelAdvanced** folder on drive C
- Make each column wide enough so that all the data is visible

	A	B	C	D	E	F	G	H	I	J
1	Sequence	Date	Course ID	Course Name	Venue	No Sessions	Cost per session	Cost per course	VAT	Total
2	12789	08-Jan	759	Windows NT	Leics	2	£25.00	£50.00	£8.75	£58.75
3	12790	16-Jan	761	Intro Word	Leics	2	£29.95	£59.90	£10.48	£70.38
4	12791	11-Feb	764	Adv Word	Leics	2	£35.00	£70.00	£12.25	£82.25
5	12792	12-Mar	774	Adv Excel	Leics	2	£35.00	£70.00	£12.25	£82.25
6	12793	07-Mar	779	Adv Access	Leics	1	£35.00	£35.00	£6.13	£41.13
7	12794	04-Feb	767	Powerpoint	Leics	2	£29.95	£59.90	£10.48	£70.38
8	12795	13-Feb	765	Mail merge	Leics	1	£25.00	£25.00	£4.38	£29.38
9	12796	22-Jan	770	Intro Excel	Leics	3	£25.00	£75.00	£13.13	£88.13
10	12797	31-Jan	769	Intro Access	Leics	4	£35.00	£140.00	£24.50	£164.50
11	12798	14-Jan	760	Windows NT	Leics	2	£25.00	£50.00	£8.75	£58.75
12	12799	16-Jan	789	Windows NT	Bed	2	£25.00	£50.00	£8.75	£58.75
13	12800	30-Jan	785	Intro Word	Bed	2	£29.95	£59.90	£10.48	£70.38
14	12801	31-Jan	799	Intro Word	Leics	2	£29.95	£59.90	£10.48	£70.38
15	12802	18-Jan	762	Interm Word	Leics	4	£29.95	£119.80	£20.97	£140.77
16	12803	26-Mar	768	Powerpoint	Leics	2	£29.95	£59.90	£10.48	£70.38
17	12804	18-Mar	771	Intro Excel	Leics	3	£25.00	£75.00	£13.13	£88.13
18	12805	25-Feb	763	Interm Word	Leics	4	£29.95	£119.80	£20.97	£140.77
19	12806	10-Jan	780	Open training	Bed	1	£19.95	£19.95	£3.49	£23.44
20	12807	30-Jan	781	Open training	Bed	1	£19.95	£19.95	£3.49	£23.44
21	12808	10-Jan	775	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
22	12809	26-Feb	778	Intranet	Leics	2	£29.95	£59.90	£10.48	£70.38
23	12810	18-Feb	777	Frontpage 2000	Leics	3	£35.00	£105.00	£18.38	£123.38
24	12811	06-Feb	776	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
25	12812	22-Feb	782	Open training	Bed	1	£19.95	£19.95	£3.49	£23.44
26	12813	15-Mar	783	Open training	Bed	1	£19.95	£19.95	£3.49	£23.44
27	12814	06-Feb	776	Email	Leics	1	£15.00	£15.00	£2.63	£17.63

Formatting a number

The sequence numbers in column A are all five digit numbers. Your company wants the numbers to be displayed in the format: **12-789**

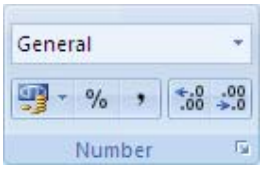
This is not one of Excel's built-in formats, so you will need to create a custom format to display the numbers in this form.

Formatting codes are used to create formats. These codes force Excel to make your data appear how you would like. The following table lists some of the codes that you can use to format numerical values.

Code	Description	Examples		
		Format	Value	Display
. (period)	This placeholder displays a decimal point in a number.			
#	Digit placeholder. This code does not display extra zeros when the number that you type has fewer digits on either side of the decimal point than there are # symbols.	###.##	3.5 29.568	3.5 29.57
0 (zero)	Digit placeholder. This code pads the value with zeros when the number has fewer digits on either side of the decimal point than there are zero placeholders.	##0.00	3.5 29.568 .6	3.50 29.57 0.60
?	Digit placeholder. This code leaves a space for insignificant zeros but does not display them.	???.??	3.5 29.568	3.5 29.57
/	Displays a number as a fraction.	# ??/??	3.5	3 ½
,	The comma is used as a thousands separator. It is also used to format a number as though it were divided by a thousand or a million.	##,### ##, ##,,	55555 5000 55555 5000000	55,555 5 56 5
( )	Formats negative numbers.	(##,###)	-55659	(55,659)
-	Places a hyphen in a number.	00-000	12345	12-345
" "	Specifies the use of a text string.	£### " per Kilo" ##,, " m"	3 5000000	£3 per Kilo 5 m

To display the sequence numbers in the format 12-345:

- Select the range **A2:A27**
- Click the **dialog box launcher** for the **Number** group on the **Home** tab



Dialog box launcher

The **Format Cells** dialog box is displayed.

From the **Category** list choose:

- **Custom**

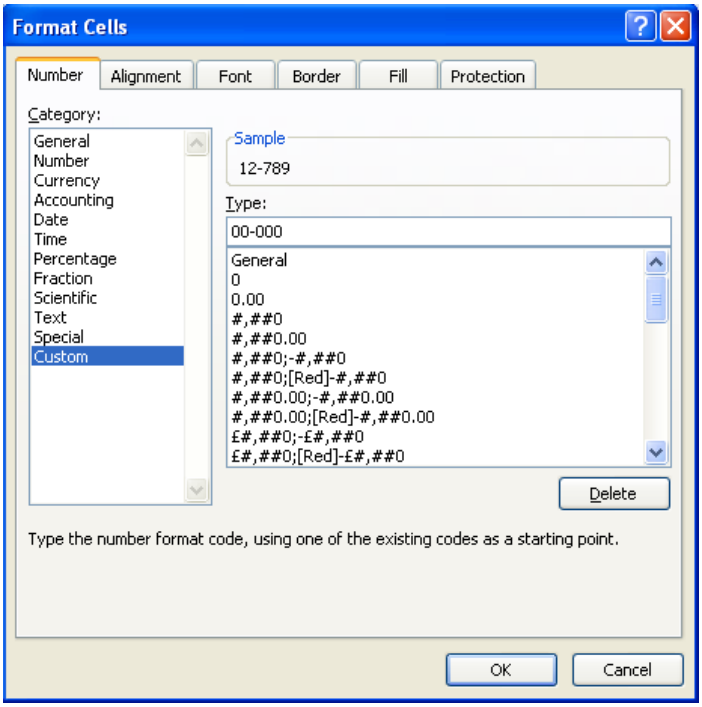
A list of custom format types is displayed. This includes any formats that you have previously customised. You need to choose a type from the list as the starting point for your new format.

From the list of types choose:

- **0**

In the **Type** box:

- Enter **00-000**



Type box

- Click **OK**

The sequence numbers are displayed in the new format.

	A
1	**Sequence**
2	12-789
3	12-790
4	12-791
5	12-792
6	12-793
7	12-794

Formatting a date

Date format codes include:

Code	Description	Examples		
		Format	Value	Display
m	Displays the month as ##	m	25/12/2008 7/4/1998	12 4
mm	Displays the month as 00	mm	7/4/1998	04
mmm	Displays the month abbreviated to three letters	mmm	25/12/2008	Dec
mmmm	Displays the name of the month in full	mmmm	7/4/1998	April
d	Displays the day as ##	d	25/12/2008 7/4/1998	25 7
dd	Displays the day as 00	dd	7/4/1998	07
ddd	Displays the name of the day abbreviated to three letters	ddd	25/12/2008	Thu
dddd	Displays the name of the day in full	dddd	7/4/1998	Tuesday
yy	Displays the year as 00	dd/mm/yy	7/4/1998	07/04/98
yyyy	Displays the year as 0000	mmm-yyyy	25/12/2008	Dec-2008

You are going to format the dates in column B so that the names of the months are shown in full.

- Select **B2:B27**
- Click the **dialog box launcher** for the **Number** group of commands
- Ensure that the **Custom** category is selected
- Select the Custom Type **dd-mmm-yy**
- Add an extra **m** to the month part of the format, producing **dd-mmmm-yy**
- Click **OK**

The months are now shown in full.

Date
08-January-01
16-January-01
11-February-01
12-March-01
07-March-01
04-February-01

General formatting codes

Code	Description	Examples		
		Format	Value	Display
General	The default general format.	General	26.347 Text	26.347 Text
£ - + / ( ) : space	These characters are displayed in the number. To display other characters, enclose the character in quotation marks or precede it with a backslash.			
\character	This displays the character you specify.	##,, \m	12345678	12 m
@	Text placeholder.			
*	This repeats the next character in the format to fill the column width.	General *. @ *.	1.23 Text	1.23 ..... Text .....
_ (underscore)	This skips the width of the next character. It is commonly used as "_)" to leave space for a closing parenthesis in a positive number format when the negative number format includes parentheses. This allows the values to line up at the decimal point.	See page 12		
[Black]	Specifies the colour Black for the format. (Can also use [Green], [White], [Blue], [Magenta], [Yellow], [Cyan], and [Red])			

- Open the **UsedCars** workbook from the **ExcelAdvanced** folder on drive C
- Format the range **A5:A10** so that the number **xxx** is displayed as **01-0xxx**. For example, 251 must be displayed as 01-0251

Ref No.
01-0251
01-0253
01-0254
01-0256
01-0257
01-0258

- Format the dates in **E5:E10** to display in the format **November 2009**

MOT
November 2009
June 2010
July 2010
October 2009
April 2010
March 2010

- Format the date in **A2** to display as **July 21, 2009 (Tuesday)**
- Format the values in **H5:H10** to display with the decimal points vertically aligned (without adding zeros to any of the numbers)

Fuel economy
6.84
26.349
12.6
103.7
42.
60.5

- The engine capacity values are given in cubic centimetres. Format **F5:F10** to display the units **cc** after each value

Engine capacity
4200 cc
2500 cc
3000 cc
750 cc
1300 cc
1200 cc

- Change the format of the range **F5:F10** to display as litres to one decimal place, so 4200 cc is to be displayed as 4.2 L and 750 cc as 0.8 L

Engine capacity
4.2 L
2.5 L
3.0 L
0.8 L
1.3 L
1.2 L

- On the **Petrol** worksheet, format **B6:B8** so that the decimal points are vertically aligned and the character **p** is added at the end to indicate that the price is in pence

- Format **A6:A8** to fill the column width with full stops after the text values

Type	Price
Unleaded.....	99.9 p
Super Unleaded.....	101.9 p
Diesel.....	103.9 p

- Save and close the UsedCars workbook

Separate codes for positive and negative numbers

The custom format of a cell can have up to four sections of code, separated by semicolons. These code sections define the format for positive numbers, negative numbers, zero values, and text, in that order.

<positive>;<negative>;<zero>;<text>

- Open the **Sales** workbook from the **ExcelAdvanced** folder on drive C
- Select **row 19**
- Format the row with the Custom Format:
  [Blue]£#,##0;[Red](£#,##0);0.00;"Sales "@

19	Sales PROFIT	(£277)	£381	£1,021	0.00	£940	£760

Observe that the positive values are formatted using the first part of the code; the negative value is formatted according to the second part; the zero value according to the third part; and the text was formatted using the fourth part of the code.

Format if positive Format if zero

[Blue]£#,##0;[Red](£#,##0);0.00;"Sales "@

Format if negative Format if text

With row 19 selected

- Change the third part of the custom format from **0.00** to **"Zero"**
  [Blue]£#,##0;[Red](£#,##0);"Zero";"Sales "@

The display for the zero value is changed.

19	Sales PROFIT	(£277)	£381	£1,021	Zero	£940	£760

- Change the value in **E4** to **635**

E19 now becomes a positive value and is formatted like the other positive profits.

19	Sales PROFIT	(£277)	£381	£1,021	£215	£940	£760

You do not have to include all code sections in your custom formats. If you specify only two code sections, the first section is used for positive numbers and zeros, and the second section is used for negative numbers. If you specify only one code section, it is used for all numbers.

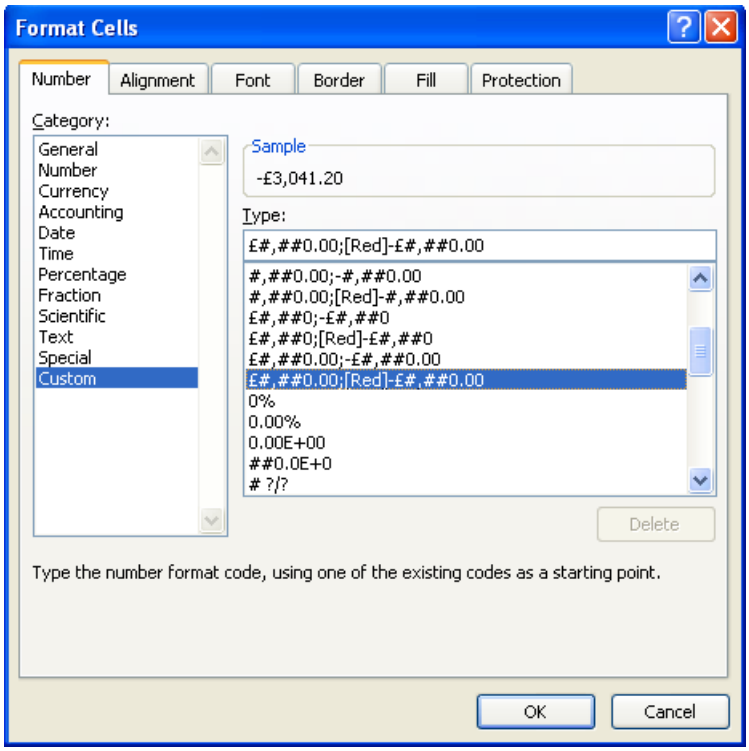
- Select the **Summary** worksheet

You will format the profit as sterling to two decimal places, with negative values shown in parentheses and formatted red.

- Select **B5:B10**
- Display the Custom Format list

The format that you need is not in the list.

- Select a format type that is close to the format needed; I chose **£#,##0.00;[Red]-£#,##0.00**



- Edit the format to: **£#,##0.00;[Red](£#,##0.00)**
- Click **OK**

3	Month	Profit
4		
5	Jan	(£3,041.20)
6	Feb	(£872.75)
7	Mar	£0.00
8	Apr	£2,864.32
9	May	£4,317.60
10	Jun	£10,328.18

The zero value is formatted the same as the positive values. Observe that the decimal points on the negative values are not aligned with those of the positive values.

To align the decimal points you need to change the code for the positive values, ensuring that space equivalent to a closing parenthesis is inserted to the right of the number. The code "_)" must therefore be added (see page 7).

- Ensure that **B5:B10** is still selected
- Display the Custom Format list
- Edit the format to: **£#,##0.00_);[Red](£#,##0.00)**
- Click **OK**

3	Month	Profit
4		
5	Jan	(£3,041.20)
6	Feb	(£872.75)
7	Mar	£0.00
8	Apr	£2,864.32
9	May	£4,317.60
10	Jun	£10,328.18

- Save and close the Sales workbook

SORTING DATA

As your worksheet grows larger, it is useful to remember that you can sort it at any time.

SINGLE LEVEL SORT

- Ensure that the **Courses** workbook is open
- Select any cell in the column containing the **Course Name**
- Click the **Sort & Filter** button in the **Editing** group on the **Home** tab
- Select **Sort A to Z**

The data is sorted by Course Name in ascending alphabetical order.

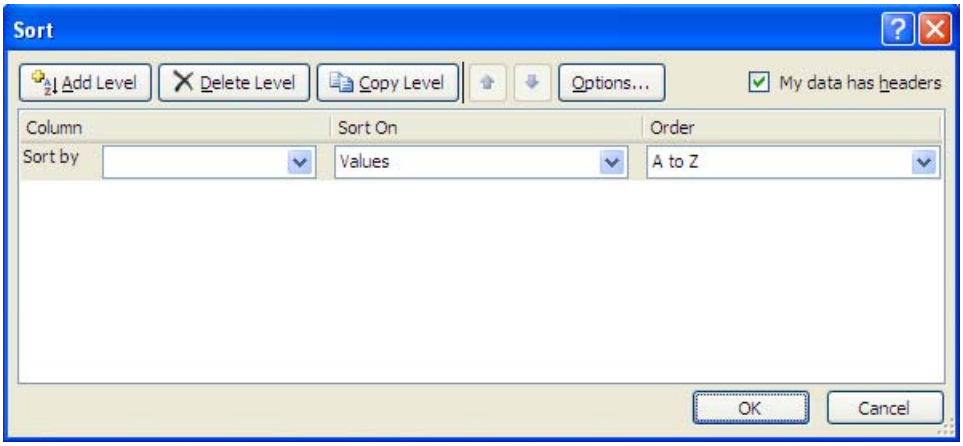
- Click **Undo**

MULTI LEVEL SORT

Next you will create a two level sort to sort the data by **Venue**, and for each Venue, sort by **Course Name**.

- Select any cell that contains data in the worksheet
- Click the **Sort & Filter** button in the **Editing** group on the **Home** tab
- Select **Custom Sort**

The **Sort** dialog box is displayed.



- Ensure that the **My data has headers** check box is ticked
- Click the **Options** button

The Sort Options dialog box enables you to refine the way the sort is executed.

For example, if the data was entered so that the headings were in rows not columns, you would choose to sort left to right instead of top to bottom.

- Click **Cancel** to close the Sort Options dialog box

From the drop-down list in the **Sort by** box choose:

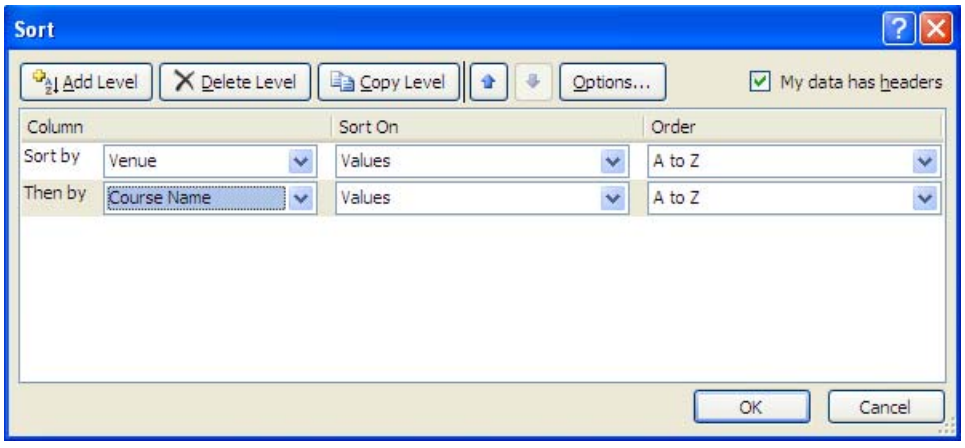
- **Venue**

You want to sort the **values** in ascending order (**A to Z**), so leave the other two boxes in the row unchanged.

- Click the **Add Level** button

From the drop-down list in the **Then by** box choose:

- **Course Name**



- Click **OK**

The sort is completed.

	A	B	C	D	E	F	G	H	I	J
1	Sequence	Date	Course ID	Course Name	Venue	No Sessions	Cost per session	Cost per course	VAT	Total
2	12-800	30-January-01	785	Intro Word	Bed	2	£29.95	£59.90	£10.48	£70.38
3	12-806	10-January-01	780	Open training	Bed	1	£19.95	£19.95	£3.49	£23.44
4	12-807	30-January-01	781	Open training	Bed	1	£19.95	£19.95	£3.49	£23.44
5	12-812	22-February-01	782	Open training	Bed	1	£19.95	£19.95	£3.49	£23.44
6	12-813	15-March-01	783	Open training	Bed	1	£19.95	£19.95	£3.49	£23.44
7	12-799	16-January-01	789	Windows NT	Bed	2	£25.00	£50.00	£8.75	£58.75
8	12-793	07-March-01	779	Adv Access	Leics	1	£35.00	£35.00	£6.13	£41.13
9	12-792	12-March-01	774	Adv Excel	Leics	2	£35.00	£70.00	£12.25	£82.25
10	12-791	11-February-01	764	Adv Word	Leics	2	£35.00	£70.00	£12.25	£82.25
11	12-808	10-January-01	775	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
12	12-811	06-February-01	776	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
13	12-814	06-February-01	776	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
14	12-810	18-February-01	777	Frontpage 2000	Leics	3	£35.00	£105.00	£18.38	£123.38
15	12-802	18-January-01	762	Interm Word	Leics	4	£29.95	£119.80	£20.97	£140.77
16	12-805	25-February-01	763	Interm Word	Leics	4	£29.95	£119.80	£20.97	£140.77
17	12-809	26-February-01	778	Intranet	Leics	2	£29.95	£59.90	£10.48	£70.38
18	12-797	31-January-01	769	Intro Access	Leics	4	£35.00	£140.00	£24.50	£164.50
19	12-796	22-January-01	770	Intro Excel	Leics	3	£25.00	£75.00	£13.13	£88.13
20	12-804	18-March-01	771	Intro Excel	Leics	3	£25.00	£75.00	£13.13	£88.13
21	12-790	16-January-01	761	Intro Word	Leics	2	£29.95	£59.90	£10.48	£70.38
22	12-801	31-January-01	799	Intro Word	Leics	2	£29.95	£59.90	£10.48	£70.38
23	12-795	13-February-01	765	Mail merge	Leics	1	£25.00	£25.00	£4.38	£29.38
24	12-794	04-February-01	767	Powerpoint	Leics	2	£29.95	£59.90	£10.48	£70.38
25	12-803	26-March-01	768	Powerpoint	Leics	2	£29.95	£59.90	£10.48	£70.38
26	12-789	08-January-01	759	Windows NT	Leics	2	£25.00	£50.00	£8.75	£58.75
27	12-798	14-January-01	760	Windows NT	Leics	2	£25.00	£50.00	£8.75	£58.75

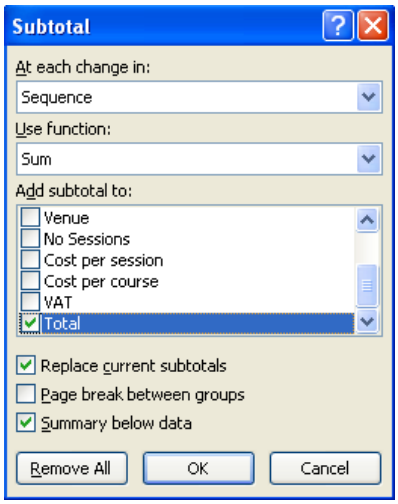
- Sort the data by **Course Name** in ascending alphabetical order in preparation for the next section

SUBTOTALS

For this exercise you will add subtotals to the worksheet that calculate the income from each course.

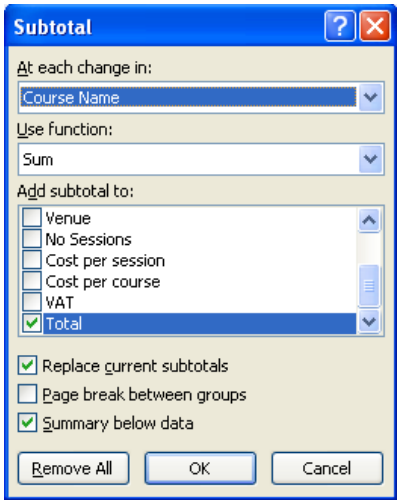
- Ensure that the data is sorted by **Course Name**
- Select any cell that contains data in the worksheet
- Click **Subtotal** in the **Outline** group of commands on the **Data** tab

The Subtotal dialog box is displayed.



You want the totals to be added to the page when the Course Name changes.

- In the **At each change in:** box click the down arrow and select **Course Name**



- Click the down arrow in the **Use function:** box to see the list of possible functions

You want the subtotal to display the sum for each of the different course names.

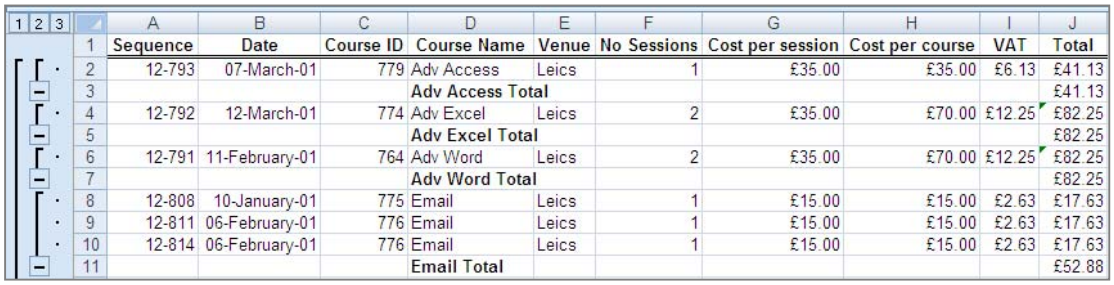
- Ensure that **Sum** is selected

You want the subtotal to appear in the **Total** column.

- Scroll through the list in the **Add subtotal to:** box and ensure that there is a tick against **Total** but that no other items are ticked

- Click **OK**

Subtotals are added to the worksheet.



	A	B	C	D	E	F	G	H	I	J
1	Sequence	Date	Course ID	Course Name	Venue	No Sessions	Cost per session	Cost per course	VAT	Total
2	12-793	07-March-01	779	Adv Access	Leics	1	£35.00	£35.00	£6.13	£41.13
3				**Adv Access Total**						£41.13
4	12-792	12-March-01	774	Adv Excel	Leics	2	£35.00	£70.00	£12.25	£82.25
5				**Adv Excel Total**						£82.25
6	12-791	11-February-01	764	Adv Word	Leics	2	£35.00	£70.00	£12.25	£82.25
7				**Adv Word Total**						£82.25
8	12-808	10-January-01	775	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
9	12-811	06-February-01	776	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
10	12-814	06-February-01	776	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
11				**Email Total**						£52.88

PRINTING SUBTOTALS

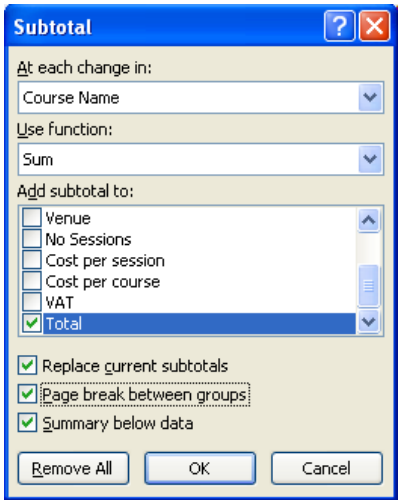
You can print data relating to each subtotal on a separate page.

- Click the **Subtotal** button on the **Data** tab

In the Subtotal dialog box:

- Select the **Page break between groups** option

Here



- Click **OK**

Broken lines are inserted in the worksheet to show the page break positions.

- Display the **Subtotal** dialog box
- Remove the tick from the **Page break between groups** option
- Click **OK**

GROUPING AND OUTLINES

When you add subtotals to a worksheet, you 'group' rows that hold information on the same data together. Now that these rows are grouped, you can use the Outlining feature to display selected information.

Notice that outline controls are displayed to the left of the worksheet. These enable you to view different levels of the outline. By using the outline you can quickly hide levels of detail leaving summaries of section headings showing on the worksheet.

At each subtotal row there is a minus (-) sign in the outline pane.

- Click the minus sign on the **Email Total** row

The Email group collapses and only the subtotal is displayed.

6	12-791	11-February-01	764	Adv Word	Leics	2	£35.00	£70.00	£12.25	£82.25
7				**Adv Word Total**						£82.25
11				**Email Total**						£52.88
12	12-810	18-February-01	777	Frontpage 2000	Leics	3	£35.00	£105.00	£18.38	£123.38
13				**Frontpage 2000 Total**						£123.38

- Click the plus (+) sign on the **Email Total** row to expand the group

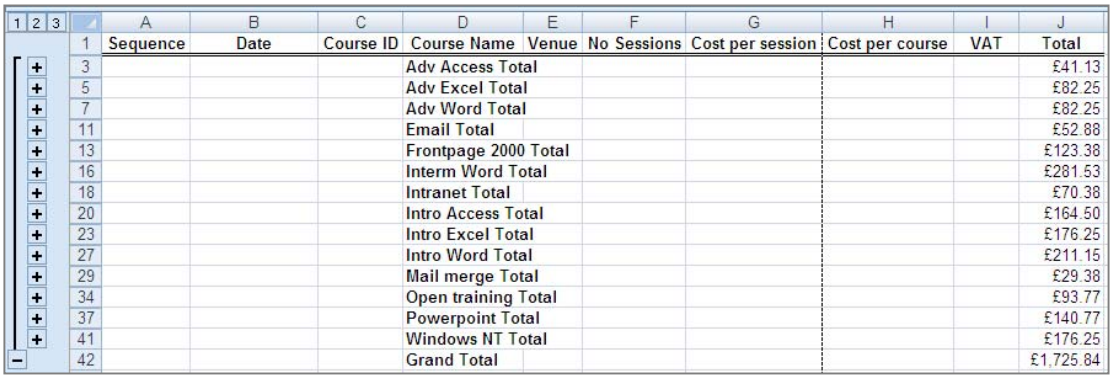
At the top of the outline pane there are three outline buttons labelled 1, 2, and 3. These correspond to the three levels of detail that can now be easily displayed.

Outline buttons

	A	B	C	D	E	F	G	H	I	J
1	**Sequence**	**Date**	**Course ID**	**Course Name**	**Venue**	**No Sessions**	**Cost per session**	**Cost per course**	**VAT**	**Total**
2	12-793	07-March-01	779	Adv Access	Leics	1	£35.00	£35.00	£6.13	£41.13
3				**Adv Access Total**						£41.13
4	12-792	12-March-01	774	Adv Excel	Leics	2	£35.00	£70.00	£12.25	£82.25
5				**Adv Excel Total**						£82.25
6	12-791	11-February-01	764	Adv Word	Leics	2	£35.00	£70.00	£12.25	£82.25
7				**Adv Word Total**						£82.25
8	12-808	10-January-01	775	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
9	12-811	06-February-01	776	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
10	12-814	06-February-01	776	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
11				**Email Total**						£52.88
12	12-810	18-February-01	777	Frontpage 2000	Leics	3	£35.00	£105.00	£18.38	£123.38
13				**Frontpage 2000 Total**						£123.38

- Click the Outline button numbered **2**

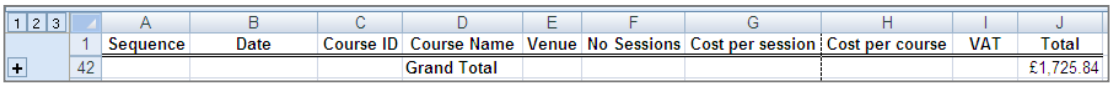
This displays the level 2 outline, with all the groups collapsed showing only the subtotals.



	A	B	C	D	E	F	G	H	I	J
1	Sequence	Date	Course ID	Course Name	Venue	No Sessions	Cost per session	Cost per course	VAT	Total
3				Adv Access Total						£41.13
5				Adv Excel Total						£82.25
7				Adv Word Total						£82.25
11				Email Total						£52.88
13				Frontpage 2000 Total						£123.38
16				Interm Word Total						£281.53
18				Intranet Total						£70.38
20				Intro Access Total						£164.50
23				Intro Excel Total						£176.25
27				Intro Word Total						£211.15
29				Mail merge Total						£29.38
34				Open training Total						£93.77
37				Powerpoint Total						£140.77
41				Windows NT Total						£176.25
42				Grand Total						£1,725.84

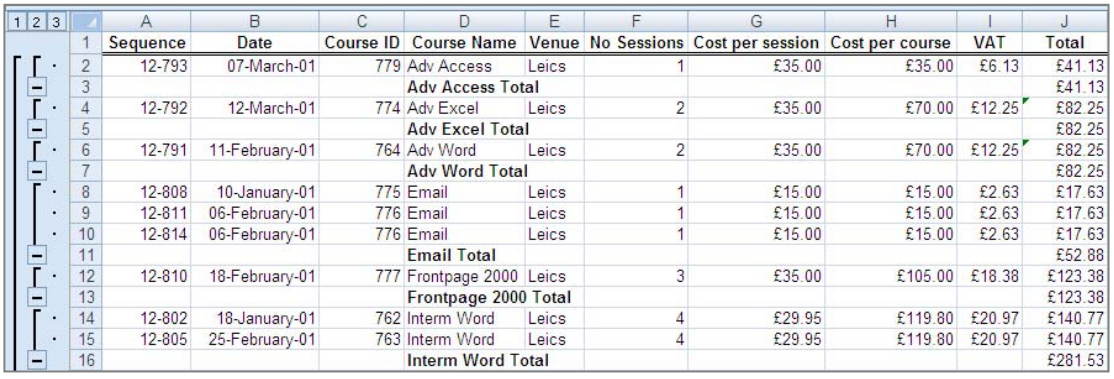
- Click the Outline button numbered **1**

The level 1 outline displays only the Grand Total.



	A	B	C	D	E	F	G	H	I	J
1	Sequence	Date	Course ID	Course Name	Venue	No Sessions	Cost per session	Cost per course	VAT	Total
42				Grand Total						£1,725.84

- Click the Outline button numbered **3** to expand all the groups



	A	B	C	D	E	F	G	H	I	J
1	Sequence	Date	Course ID	Course Name	Venue	No Sessions	Cost per session	Cost per course	VAT	Total
2	12-793	07-March-01	779	Adv Access	Leics	1	£35.00	£35.00	£6.13	£41.13
3				Adv Access Total						£41.13
4	12-792	12-March-01	774	Adv Excel	Leics	2	£35.00	£70.00	£12.25	£82.25
5				Adv Excel Total						£82.25
6	12-791	11-February-01	764	Adv Word	Leics	2	£35.00	£70.00	£12.25	£82.25
7				Adv Word Total						£82.25
8	12-808	10-January-01	775	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
9	12-811	06-February-01	776	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
10	12-814	06-February-01	776	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
11				Email Total						£52.88
12	12-810	18-February-01	777	Frontpage 2000	Leics	3	£35.00	£105.00	£18.38	£123.38
13				Frontpage 2000 Total						£123.38
14	12-802	18-January-01	762	Interm Word	Leics	4	£29.95	£119.80	£20.97	£140.77
15	12-805	25-February-01	763	Interm Word	Leics	4	£29.95	£119.80	£20.97	£140.77
16				Interm Word Total						£281.53

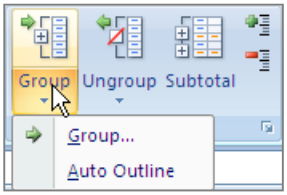
To remove the subtotals:

- Display the **Subtotal** dialog box
- Click the **Remove All** button

The subtotals and outline controls are removed.

The Grouping and Outlining feature can be used on any worksheet that contains formulae.

- Ensure that any cell containing data is selected
- Ensure that the **Data** tab is selected
- Click the **Group** down arrow in the **Outline** group of commands



- Select **Auto Outline**

Outline controls are displayed above the worksheet.

	A	B	C	D	E	F	G	H	I	J
1	Sequence	Date	Course ID	Course Name	Venue	No Sessions	Cost per session	Cost per course	VAT	Total
2	12-793	07-March-01	779	Adv Access	Leics	1	£35.00	£35.00	£6.13	£41.13
3	12-792	12-March-01	774	Adv Excel	Leics	2	£35.00	£70.00	£12.25	£82.25
4	12-791	11-February-01	764	Adv Word	Leics	2	£35.00	£70.00	£12.25	£82.25
5	12-808	10-January-01	775	Email	Leics	1	£15.00	£15.00	£2.63	£17.63
6	12-811	06-February-01	776	Email	Leics	1	£15.00	£15.00	£2.63	£17.63

As with the subtotals, you can click on the minus signs to collapse the display and then click on the subsequent plus signs to expand the display, or you can click on the numbered buttons 1, 2 or 3 to display the corresponding outline level.

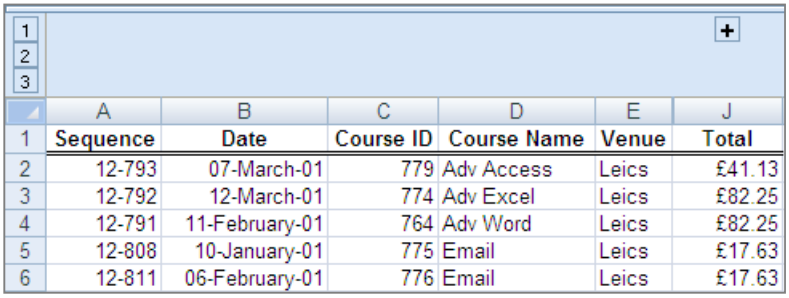
- Click the Outline button numbered **2**

Columns F and G that were used to calculate the Cost per course are both hidden.

	A	B	C	D	E	H	I	J
1	Sequence	Date	Course ID	Course Name	Venue	Cost per course	VAT	Total
2	12-793	07-March-01	779	Adv Access	Leics	£35.00	£6.13	£41.13
3	12-792	12-March-01	774	Adv Excel	Leics	£70.00	£12.25	£82.25
4	12-791	11-February-01	764	Adv Word	Leics	£70.00	£12.25	£82.25
5	12-808	10-January-01	775	Email	Leics	£15.00	£2.63	£17.63
6	12-811	06-February-01	776	Email	Leics	£15.00	£2.63	£17.63

➢ Click the Outline button numbered **1**

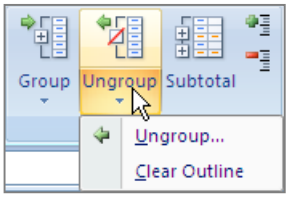
All the columns used to calculate the total cost are now hidden.



	A	B	C	D	E	J
1	Sequence	Date	Course ID	Course Name	Venue	Total
2	12-793	07-March-01	779	Adv Access	Leics	£41.13
3	12-792	12-March-01	774	Adv Excel	Leics	£82.25
4	12-791	11-February-01	764	Adv Word	Leics	£82.25
5	12-808	10-January-01	775	Email	Leics	£17.63
6	12-811	06-February-01	776	Email	Leics	£17.63

To clear the outline from the worksheet:

➢ Click the **Ungroup** down arrow in the **Outline** group of commands



➢ Select **Clear Outline**

FILTERING DATA

When working with large amounts of information, you will find it useful to use a filter to see only relevant records.

For example, you may want to see only those courses offered at a particular venue, or courses over a certain price, or those that are offered over a specified number of days. These criteria can be used in isolation or in combination.

The filtered data can be printed, providing a quick way to produce reports based on a portion of the data. Data that has been filtered can also be used to produce charts, but see the notes on pages 26 and 27.

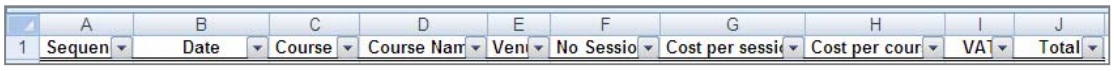
- Sort the data by **Sequence** number in ascending order

THE AUTOFILTER TOOL

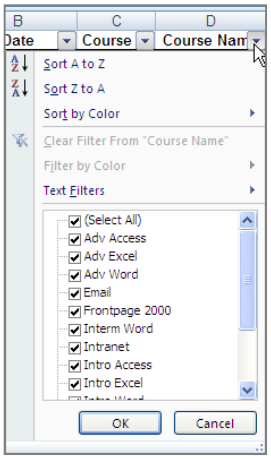
- Ensure that the selected cell is within the data
- Click the **Filter** button in the **Sort & Filter** group on the **Data** tab

This can also be achieved on the **Home** tab by clicking the **Sort & Filter** button in the **Editing** group and then choosing **Filter**.

A drop arrow is added to each column heading.



- Click the drop arrow in the **Course Name** column



All the course names are listed in the bottom pane and all are ticked, indicating that they all are being displayed.

To display the information for one course only, you will need to ensure that the course you want to be displayed is the only one ticked.

To display only the data for the Windows NT course:

- Click **(Select All)** to remove the ticks from all the course names
- Click **Windows NT**
- Click **OK**

Only the rows containing the Windows NT course name are displayed; all the other courses are hidden.

	A	B	C	D	E	F	G	H	I	J
1	Sequen	Date	Course	Course Nam	Ven	No Sessio	Cost per sessi	Cost per cour	VAT	Total
2	12-789	08-January-01	759	Windows NT	Leics	2	£25.00	£50.00	£8.75	£58.75
11	12-798	14-January-01	760	Windows NT	Leics	2	£25.00	£50.00	£8.75	£58.75
12	12-799	16-January-01	789	Windows NT	Bed	2	£25.00	£50.00	£8.75	£58.75
28										

To display all the records again:

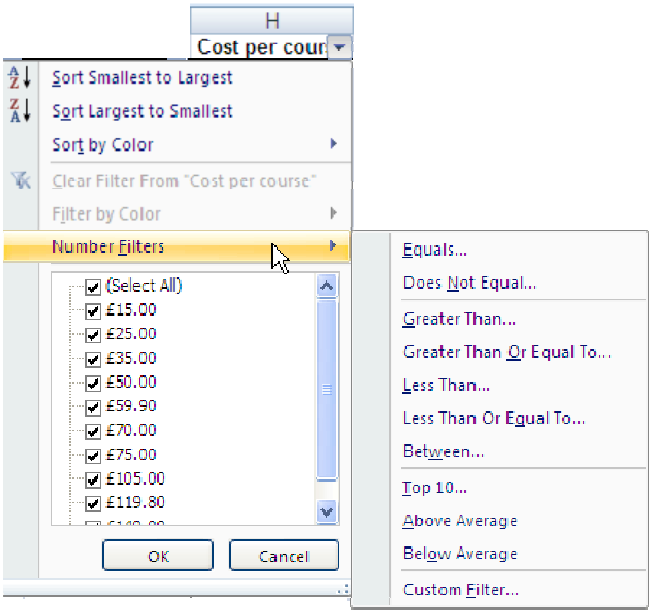
- Click the **Clear** button in the **Sort & Filter** group on the **Data** tab

Alternatively, you can click the drop arrow in the **Course Name** column, choose **(Select All)**, and click **OK**.

- Use the filter to display only the courses in **Leics**

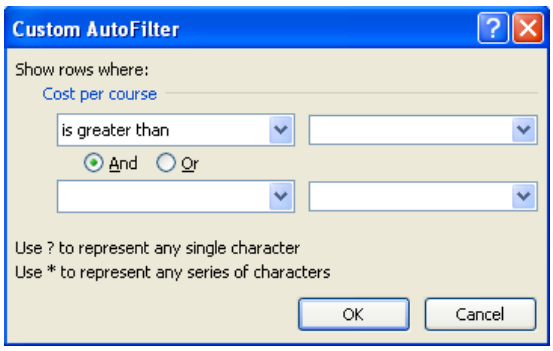
Now that you have filtered the Leics courses you will customise the selection to show only those courses that have a total cost of more than £73.50 (excluding VAT).

- Click the drop arrow in the **Cost per course** column
- Point to **Number Filters**



- Select **Greater Than...**

The **Custom AutoFilter** dialog box is displayed.



Type value here

The condition is that the Cost per course must be greater than £73.50.

- In the value box, type **73.5**
- Click **OK**

	A	B	C	D	E	F	G	H	I	J
1	Sequen	Date	Course	Course Nam	Ven	No Sessio	Cost per sessi	Cost per cour	VA	Total
9	12-796	22-January-01	770	Intro Excel	Leics	3	£25.00	£75.00	£13.13	£88.13
10	12-797	31-January-01	769	Intro Access	Leics	4	£35.00	£140.00	£24.50	£164.50
15	12-802	18-January-01	762	Interm Word	Leics	4	£29.95	£119.80	£20.97	£140.77
17	12-804	18-March-01	771	Intro Excel	Leics	3	£25.00	£75.00	£13.13	£88.13
18	12-805	25-February-01	763	Interm Word	Leics	4	£29.95	£119.80	£20.97	£140.77
23	12-810	18-February-01	777	Frontpage 2000	Leics	3	£35.00	£105.00	£18.38	£123.38
28										

The Intro Access course listed in row 10 will be reduced to 2 sessions.

- Change the value in **F10** to **2**

Now that the cost has changed you need to reapply the filter.

- Click **Reapply** in the **Sort & Filter** group on the **Data** tab

The filter is reapplied and now excludes the Intro Access course.

- Display all the records again

To turn off Autofilter:

- Click the **Filter** button in the **Sort & Filter** group

Be aware that if you use filtered data to produce a chart, when the filter is removed from the list, the chart updates to include the hidden data.

ADVANCED FILTER

The Advanced Filter allows you to filter records in situ or copy the filtered records to another sheet within the workbook. You will look at both of these methods.

Data that is copied to a different location can be used independently of the original worksheet.

A chart based on data copied to a different worksheet will not change.

To use the Advanced Filter you must first create a criteria range. This is a cell range that contains a copy of the data headings and is used to enter the filter specifications.

Showing the filtered data within the same sheet

For this exercise you will select courses that run over two sessions.

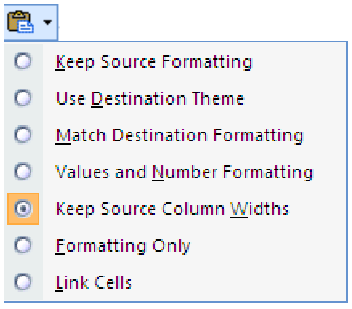
To create the criteria range:

- Copy the data headings from **A1:J1** to **L1:U1**

Tip

To also copy the size of the columns when copying data:
Immediately after the paste operation;

- Click the **Paste Options** button
  (the Paste Options button appears on the bottom right of the pasted range)
- Select **Keep Source Column Widths**

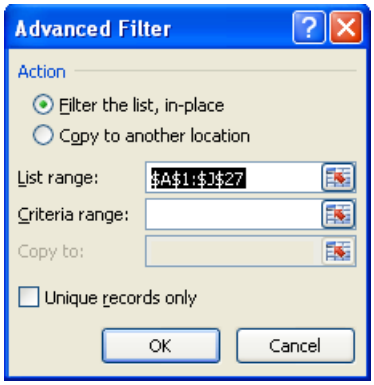


- For the criteria, type **2** into cell **Q2** (this should be 'No Sessions' and will filter courses that run over 2 sessions)

The cell range L1:U2 is now your criteria range.

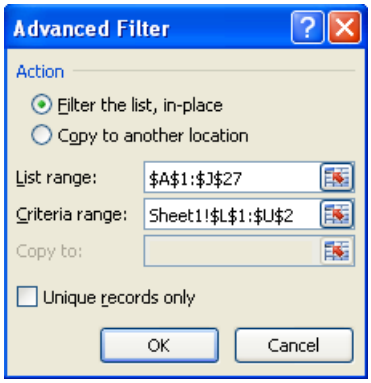
- Select any cell within the data that is to be filtered (this enables Excel to determine the range of cells to use for the filter operation)
- Click **Advanced** in the **Sort & Filter** group on the **Data** tab

The **Advanced Filter** dialog box is displayed showing the range of cells containing the data in the **List range** box (A1:J27).



Collapse Dialog

- Ensure that the radio button: **Filter the list, in-place** is selected
- Click the Collapse Dialog button in the **Criteria range** box and select **L1:U2**
- Click the Collapse Dialog button again to display the dialog box



- Click **OK** and the filter is applied to the data
- Look at the list of data to see that the filter has worked

To show all the records again:

- Click **Clear** in the **Sort & Filter** group

If you add two criteria in separate columns on the same row in the criteria range, Excel will filter records satisfying both criteria. This is an **AND** condition.

If you use two criteria on separate rows, Excel will filter records that match either criterion. This is an **OR** condition.

- Create an Advanced Filter for courses that run over **two** sessions **and** take place at **Bedford**. (Don't forget that this is shown as Bed in the data.)
- Show all the data again
- Create an Advanced Filter to display courses that run over **two** sessions **or** take place at **Bedford**. (Don't forget to increase the criteria range to include all the criteria rows.)
- Show all the data again

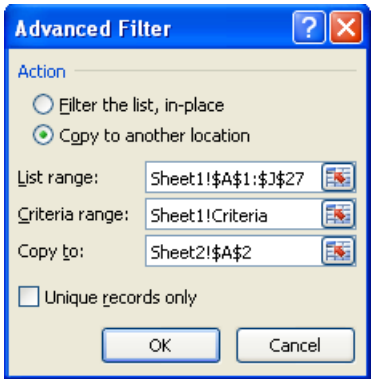
Using a filter to extract data to another sheet

In this exercise you will filter the data to display the courses taking place in Leicester that run for one session only, and put this data on Sheet2.

You will first edit the criteria range with these criteria.

- Type **Leics** into cell **P2** (criterion for the Venue)
- Type **1** into cell **Q2** (criterion for the number of sessions)
- Ensure that no other criteria are present in the criteria range
- Select **Sheet2** (this is because you need to select the sheet where you want to display the filtered results before starting the Advanced Filter process)
- Click **Advanced** in the **Sort & Filter** group on the **Data** tab
- In the **List range** box, click the Collapse Dialog button
- Select **Sheet1**
- Select the range **A1:J27**
- Click the Expand Dialog button

- In the **Criteria range** box, click the Collapse Dialog button
- On **Sheet1** select the range **L1:U2**
- Click the Expand Dialog button
- Select the **Copy to another location** radio button
- Using the **Copy to** box, choose to copy the data into cell **A2**



- Click **OK**
- Check that the filter has worked
- Close the workbook without saving

DATA MANAGEMENT

For this exercise you will use a workbook which details the working hours of the staff of the Jumble Sales Corporation. It contains several worksheets, some of which you will be using in the following exercises.

You have been asked to calculate bonus payments to staff who have worked for the company for 25 years or more (as at 1 January 2010).

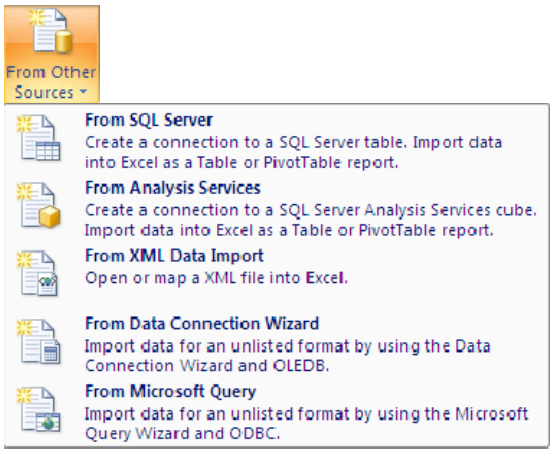
- Open the workbook named **JumbleSalesPay**
- Insert a new worksheet and rename it **Bonus Payments**

The current workbook contains salary details. The information relating to how long an employee has worked for the company is stored in the JumbleSalesStaff workbook. You will use a Microsoft Query to filter out the data you need from JumbleSalesStaff and copy it into the current workbook.

USING MICROSOFT QUERY

Microsoft Query is used to request filtered information from an external source.

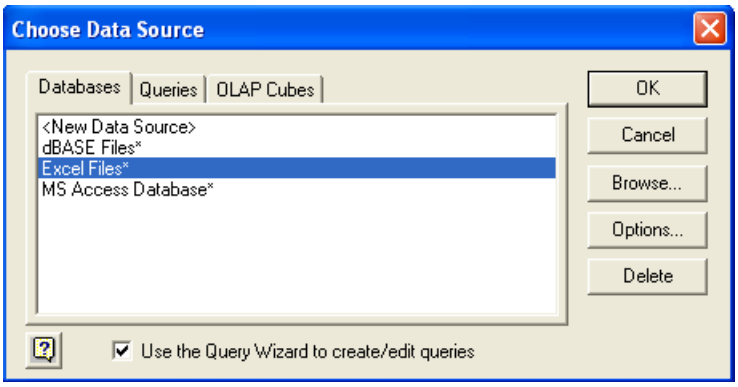
- Ensure that cell **A1** on the **Bonus Payments** worksheet is selected
- Click **From Other Sources** in the **Get External Data** group on the **Data** tab



- Select **From Microsoft Query**

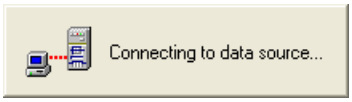
The Choose Data Source dialog box is displayed, listing the types of files you can use for your query.

- The data that you need is in an Excel workbook, so choose **Excel Files** from the list

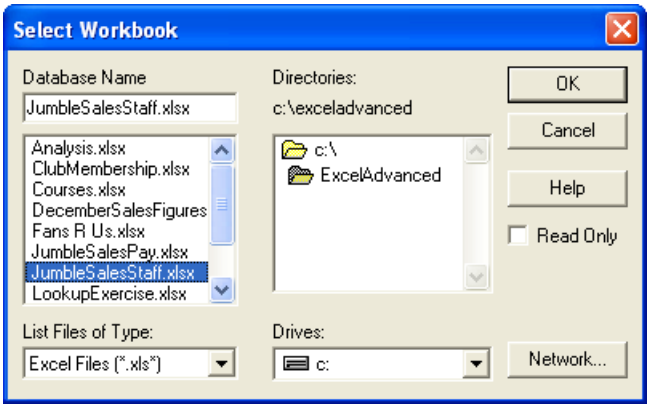


- Click **OK**

The Select Workbook dialog box is displayed, together with a Connecting to data source… message.

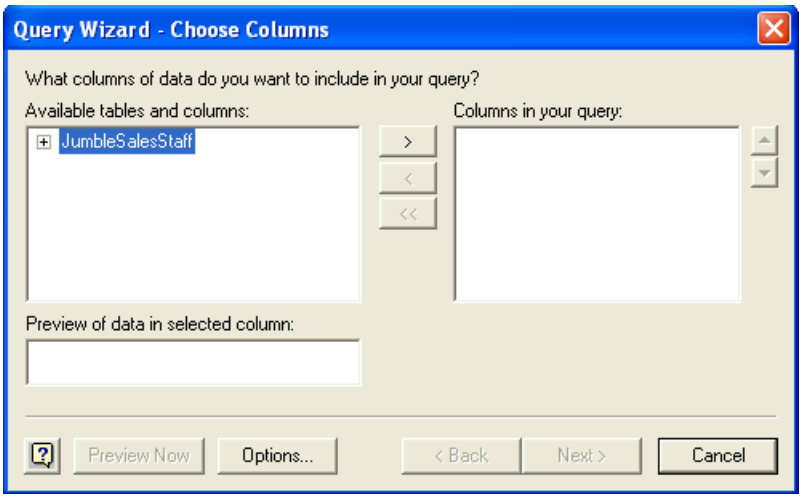


- Locate the **ExcelAdvanced** folder on drive **C**
- Select **JumbleSalesStaff**



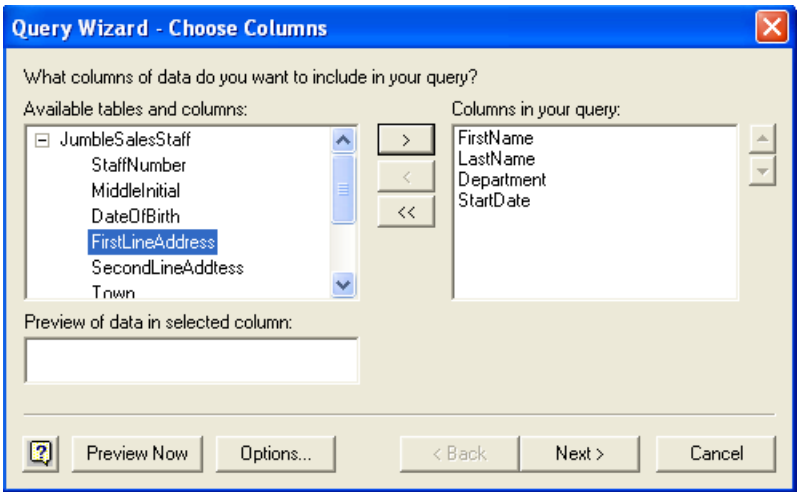
- Click **OK**

The Query Wizard asks you to select the columns that you want to import into the worksheet.



To see the column titles:

- Click the + sign next to **JumbleSalesStaff**
- Choose **FirstName** and click the arrow button to transfer the column name to the right hand window
- Repeat with **LastName**, **Department**, and **StartDate**

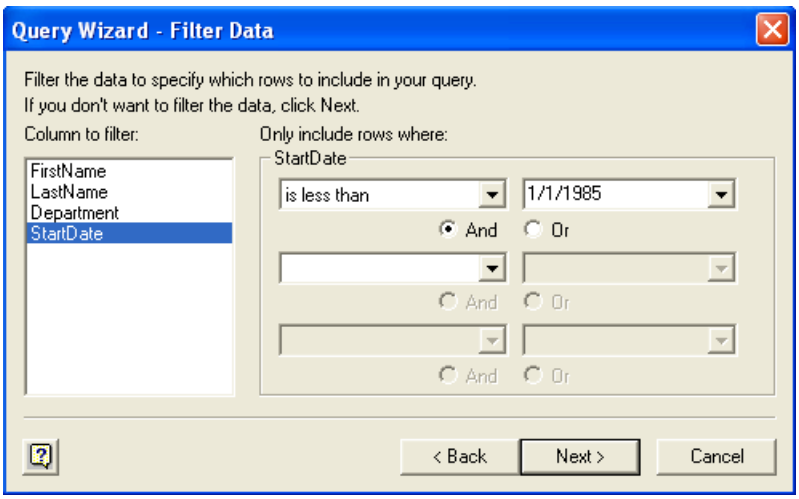


- Click **Next**

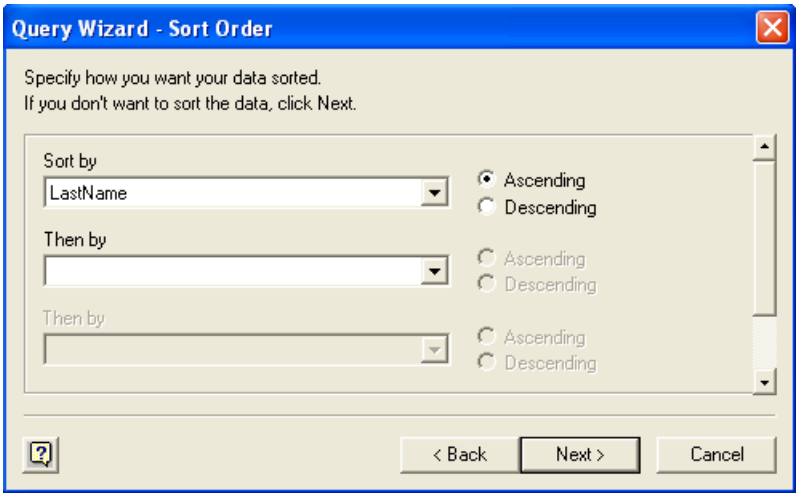
This step in the wizard enables you to filter the data to view particular rows.

As you require the names of only those staff who started working at Jumble Sales Corporation before 1 January 1985:

- In the **Column to filter** box select **StartDate**
- Use the drop list in the **StartDate** box to choose **is less than**
- Complete the criteria to select the records by typing **1/1/1985**

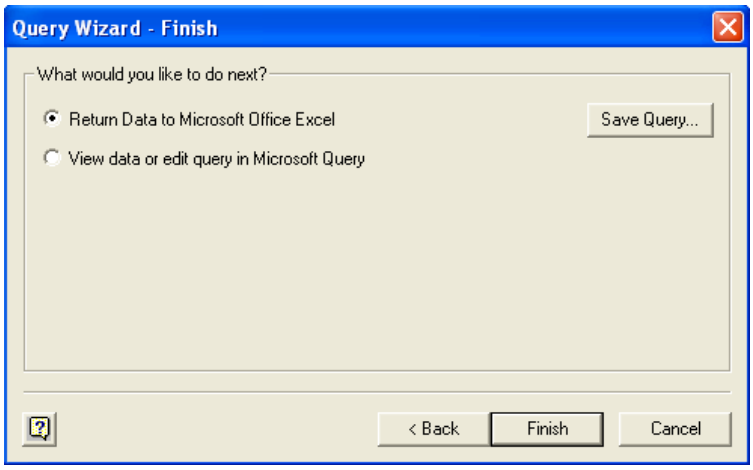


- Click **Next**
- Use the drop list to choose to sort by **LastName**



- Click **Next**

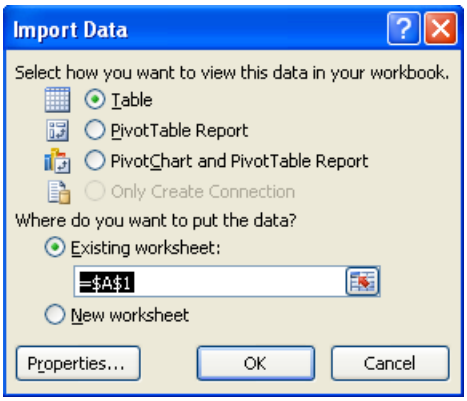
- Ensure that **Return Data to Microsoft Office Excel** is selected



- Click **Finish**

The Import Data dialog box is displayed.

- Ensure that **Table** is selected as the way to view the data
- Ensure that cell **A1** on the **Existing worksheet** is selected as the place to put the data



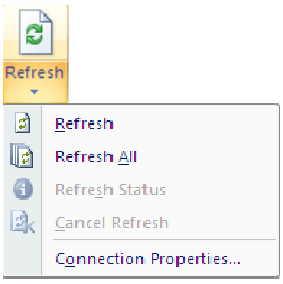
- Click **OK**

The data is imported.

	A	B	C	D
1	FirstName	LastName	Department	StartDate
2	Anthony	Bare	Representatives	10/02/1978 00:00
3	Roy	Barker	Executive	13/04/1968 00:00
4	Jasbir	Bonsal	Payroll	13/08/1983 00:00
5	Michael	Burns	Stock Control	04/08/1979 00:00
6	James	Colins	Finance	05/12/1971 00:00
7	Belinda	Miles	Administration	24/06/1982 00:00

By default the imported data is linked to the external source – the JumbleSalesStaff workbook – and can be set to update every time the workbook is opened.

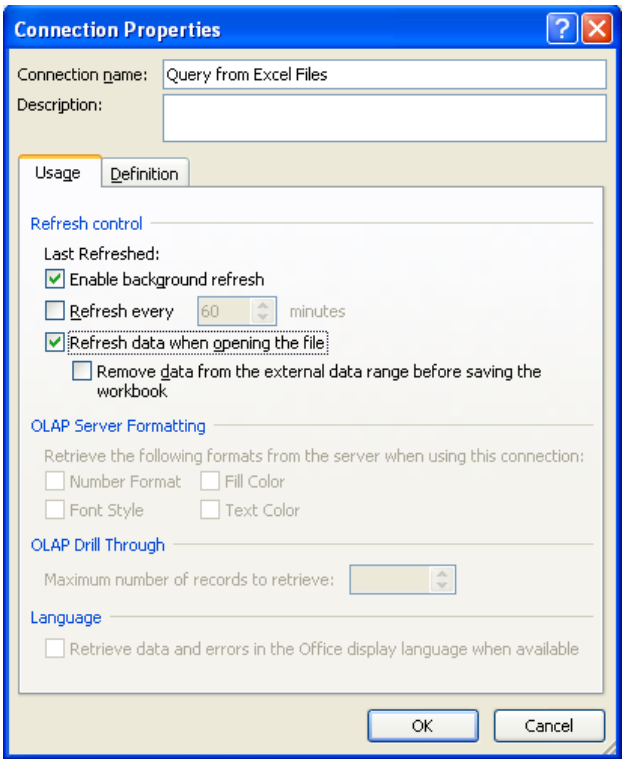
- Click on any cell within the imported data on the Bonus Payments sheet
- Click the **Refresh** down arrow in the **External Table Data** group on the **Design** Table Tools tab



- Select **Connection Properties**

The Connection Properties dialog box is displayed.

- In the **Refresh control** section of the dialog box, select the option to **Refresh data when opening the file**



- Click **OK**
- Save and close the workbook

In order to verify that the data updates when you reopen the workbook, you will edit the start date of one of the staff in the source spreadsheet.

- Open the workbook **JumbleSalesStaff**

Marie Kaur was not included in the imported list because her start date did not meet the criteria used. You will change her start date and then check that she is added to the list of extracted names.

- Edit the **StartDate** value for **Marie Kaur** (G14) to be **06/10/1980**

	A	B	C	D	E	F	G
1	StaffNumber	FirstName	MiddleInitial	LastName	DateOfBirth	Department	StartDate
2	P2586492	John	L	Markshaw	25/03/1951	Sales	01/09/2007
3	P6985621	Susan		Jones	21/02/1963	Reception	09/06/1998
4	P8459245	Nita	K	Sonhil	09/12/1973	Finance	06/05/1992
5	P5984525	Roy	P	Barker	18/02/1949	Executive	13/04/1968
6	P8036025	Anthony	T	Bare	16/12/1961	Representatives	10/02/1978
7	P9052512	Belinda	K	Miles	09/11/1950	Administration	24/06/1982
8	P8523695	Penelope	D	East	12/02/1985	Administration	13/04/2000
9	P8526954	Rupert		Marks	08/05/1973	Sales	06/05/2005
10	P8539842	James	T	Colins	15/10/1943	Finance	05/12/1971
11	P2548792	Sophie	S	Doige	29/06/1970	Administration	04/09/2002
12	P8562541	Michael	T	Burns	18/06/1951	Stock Control	04/08/1979
13	P8945564	Jasbir	K	Bonsal	21/11/1955	Payroll	13/08/1983
14	P7592543	Marie	M	Kaur	02/03/1958	Finance	06/10/1980

- Save and close the workbook
- Open the **JumbleSalesPay** workbook
- Look at the **Bonus Payments** sheet

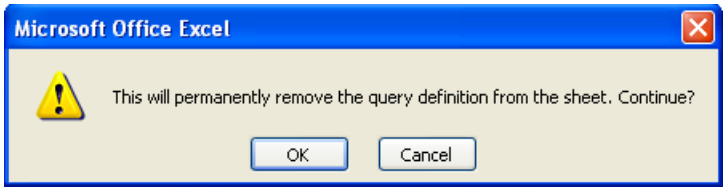
Notice that the imported data have been updated to include Marie Kaur.

	A	B	C	D
1	FirstName	LastName	Department	StartDate
2	Anthony	Bare	Representatives	10/02/1978 00:00
3	Roy	Barker	Executive	13/04/1968 00:00
4	Jasbir	Bonsal	Payroll	13/08/1983 00:00
5	Michael	Burns	Stock Control	04/08/1979 00:00
6	James	Colins	Finance	05/12/1971 00:00
7	Marie	Kaur	Finance	06/10/1980 00:00
8	Belinda	Miles	Administration	24/06/1982 00:00

You no longer need the imported data to be updated from the source, so you will break the link between them.

- Click on any cell within the imported data on the Bonus Payments sheet
- Click **Unlink** in the **External Table Data** group on the **Design** Table Tools tab

A message box warns you that this action is permanent.



- Click **OK**
- Save the workbook

THE CONCATENATE FUNCTION

When you are creating a worksheet, you should spend some time thinking about how you are going to use the data. For example, it is always a good idea to ensure that first names, last names, and titles are entered in separate cells. This makes it easy to sort by last name. Sometimes, however you may want to see the first and last names in the same cell and you can use the Concatenate function to join the data in different cells, and also add extra text.

You are going to add a cell to the imported data that reads:

'Anthony Bare works in the Representatives department.'

- In cell **F2** on the **Bonus Payments** sheet, type the following:

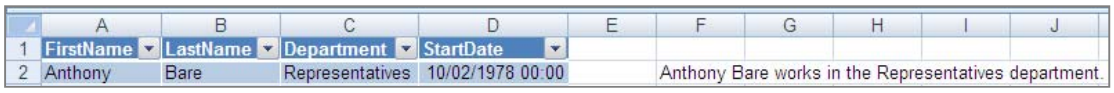
=CONCATENATE(A2," ",B2," works in the ",C2," department.")

Notice that text must be surrounded by speech marks – this includes spaces.

Here is an explanation of the function above.

=	All functions and formulae must start with the equal sign
Concatenate	The name of the function
(	The text and cell references are enclosed within braces
A2	The cell that holds the first name
" "	A space between the first name and last name – it must be within speech marks or Excel will ignore it
B2	The cell that holds the last name
" works in the "	Additional text including spaces within speech marks
C2	The cell that holds the name of the department
" department."	Additional text – notice that a space is included as the first character
)	The end of the function
,	Commas separate the cell references from text

- Press the **Enter** key



	A	B	C	D	E	F	G	H	I	J
1	FirstName	LastName	Department	StartDate						
2	Anthony	Bare	Representatives	10/02/1978 00:00		Anthony Bare works in the Representatives department.				

- Copy the function to the other members of staff on the sheet

JOINING CELLS WITHOUT THE CONCATENATE FUNCTION

An alternative method of joining values in different cells is to simply use an ampersand as the 'joining' character. For example:

=(A2&" "&B2)

The example shows a space within speech marks but you could add extra text also if you wanted to. For example:

=(A3&" "&B3&" works in the "&C3" department.")

There is no need to leave spaces within the command, except where one is required in the text.

- Delete the concatenate functions that you created in Column F
- In **F1** type the column label **Name**
- In **F2**, without using the Concatenate function, join the **first name** and **last name** of the first member of staff on the list
- Copy the formula to the other members of staff on the sheet
- Ensure that Column F is wide enough to display the names fully

	A	B	C	D	E	F
1	FirstName	LastName	Department	StartDate		Name
2	Anthony	Bare	Representatives	10/02/1978 00:00		Anthony Bare
3	Roy	Barker	Executive	13/04/1968 00:00		Roy Barker
4	Jasbir	Bonsal	Payroll	13/08/1983 00:00		Jasbir Bonsal
5	Michael	Burns	Stock Control	04/08/1979 00:00		Michael Burns
6	James	Colins	Finance	05/12/1971 00:00		James Colins
7	Marie	Kaur	Finance	06/10/1980 00:00		Marie Kaur
8	Belinda	Miles	Administration	24/06/1982 00:00		Belinda Miles

DATA VALIDATION

For this exercise you will use the data validation option in Excel to ensure your data is within specific limits.

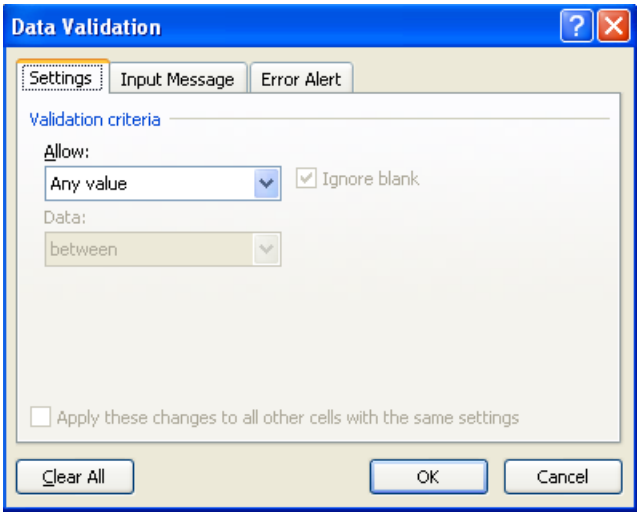
Staff who have been employed at Jumble Sales Corporation for more than 25 years will be paid a one-off bonus of 10 times their hourly pay. However there will be a minimum (£50) and a maximum (£100) acceptable payment.

- Ensure that **JumbleSalesPay** is open and that the **Bonus Payments** sheet is selected
- In **G1** type the column label **Bonus**

You are going to add the validation rule to the cells where it will be applied.

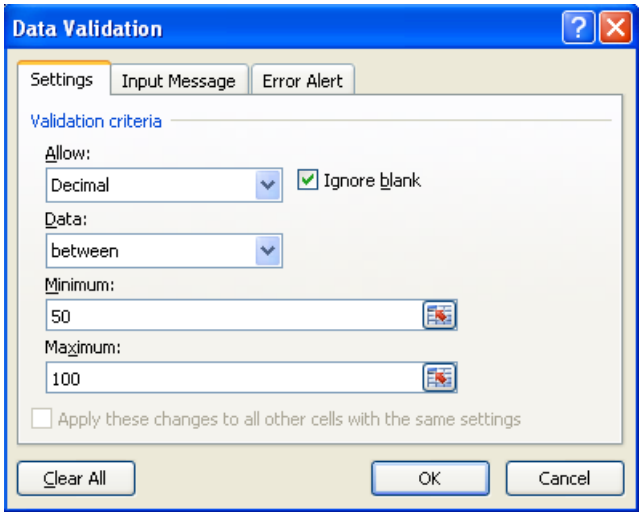
- Select the empty cells **G2:G8**
- Click **Data Validation** (not the down arrow) in the **Data Tools** group on the **Data** tab

The Data Validation dialog box is displayed.

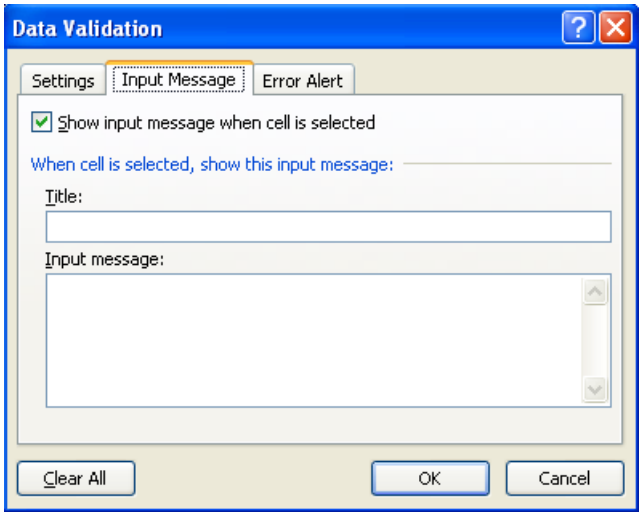


On the Settings tab:

- In the **Allow** box, use the drop list to choose **Decimal**
- In the **Data** box, use the drop list to choose **between**
- Type **50** in the **Minimum** box (the minimum payment)
- Type **100** in the **Maximum** box (the maximum payment)



- Select the **Input Message** tab

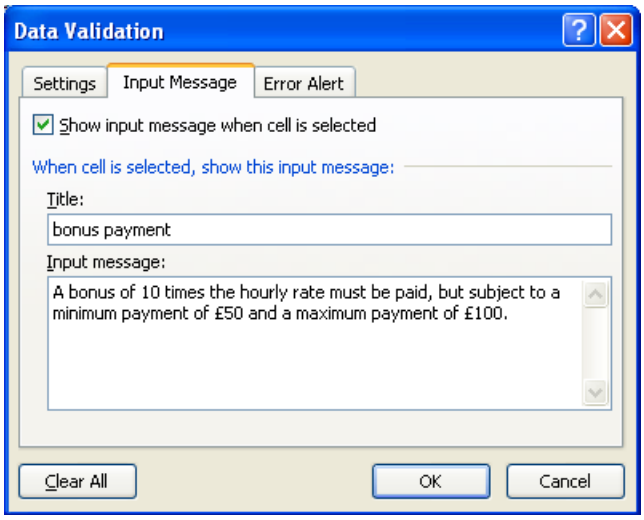


The message text that you specify here will display as a prompt when one of the cells holding the Validation criteria is selected.

- In the **Title** box type **bonus payment**

- In the **Input message** box type:

A bonus of 10 times the hourly rate must be paid, but subject to a minimum payment of £50 and a maximum payment of £100.



- Click the **Error Alert** tab

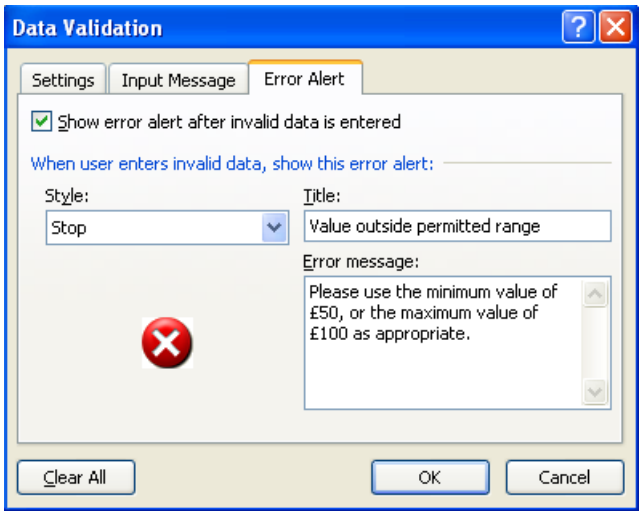
Using this tab, you can type a message that will be displayed if the Validation rule is broken.

- In the **Title** box type:

Value outside permitted range

- In the **Error Message** box type:

Please use the minimum value of £50, or the maximum value of £100 as appropriate.

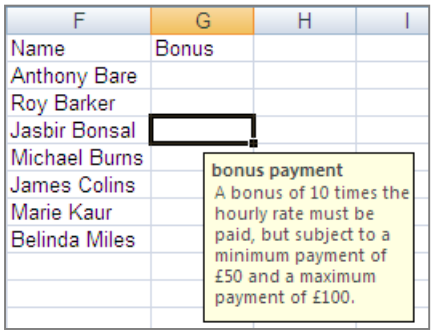


- Click **OK**

Now you will test the Validation rule.

- Format the range **G2:G8** as **Currency**
- Click into cell **G4**

The text that you entered in the Input Message tab is displayed as a prompt.



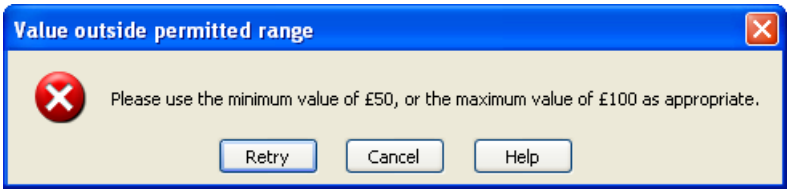
- Type in the formula **=10***
- Select the worksheet for **March**
- Select the cell that holds the hourly rate for Jasbir Bonsal (**C15**) and press Enter

A bonus of £75 is calculated for Jasbir.

F	G
Name	Bonus
Anthony Bare	
Roy Barker	
Jasbir Bonsal	£75.00

- Click into cell **G5**
- Insert a formula to calculate the bonus payment for Michael Burns

Ten times the hourly rate is £37.50, therefore the following message is displayed.



- Click **Cancel**
- Type **50** in **G5** for Michael Burns' bonus
- Calculate the bonus payments for the other members of staff
- Save and close the workbook

CREATING DROP LISTS

Drop lists make it easier and quicker to enter data into a spreadsheet. It also validates the data entry, ensuring that only the values listed will be accepted.

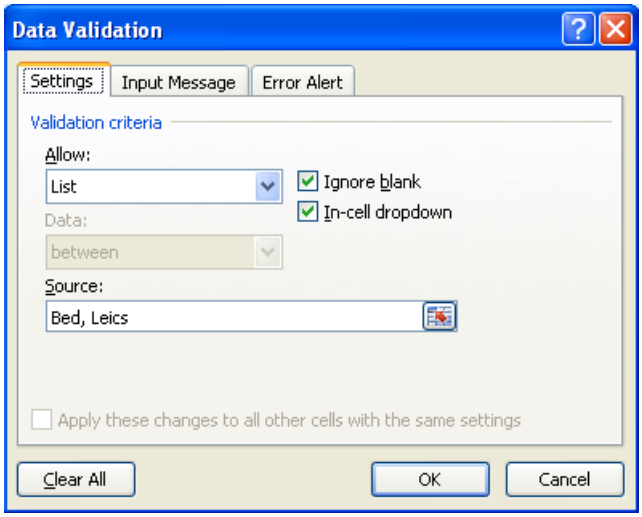
- Open the **Courses** workbook
- Select cell **E28** on **Sheet1**

You will create a drop list with the two possible venues – Bed and Leics.

- Click **Data Validation** from the **Data Tools** group on the **Data** tab

On the Settings tab:

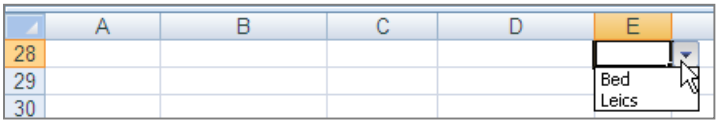
- In the **Allow** box, use the drop list to choose **List**
- In the **Source** box, type **Bed, Leics**



- Click **OK**

A drop list button is displayed next to the cell when it is selected.

- Click the drop list button to display the options



Next you will create a drop list in cell F28 that takes values from a given range.

To create the options list:

- In the range **W1:W4** type the values **1, 2, 3, 4** respectively

	W
1	1
2	2
3	3
4	4

- Click into cell **F28**
- Display the **Data Validation** dialog box
- In the **Allow** box, use the drop list to choose **List**
- In the **Source** box, click the Collapse Dialog button

Collapse Dialog

- Select the range **W1:W4**

The range is inserted in the Source box using absolute referencing.

- Click the Expand Dialog button

Expand dialog

- Click **OK**
- Check that the drop list displays the values 1 to 4

It is possible for the list of options to be on a different sheet, but you will have to type the appropriate code into the source box because you will not be able to use the mouse to select it.

You will use the values in the range A1:A16 on Sheet3 to create a drop list in cell D28 on Sheet1.

- Click into cell **D28**
- Display the **Data Validation** dialog box
- In the **Allow** box, use the drop list to choose **List**
- In the **Source** box, type:

  =Sheet3!$A$1:$A$16

- Click **OK**
- Check the drop list

Drop lists can be copied to other cells using the usual methods for copying values. For this to work correctly however, cell references must be absolute.

It is also possible to first select a range of cells and then use the Data Validation dialog box to set list options for the selected range.

- Using any of the methods described, create drop lists in **G28:G31** on Sheet1 to display the options: **15, 19.95, 25, 29.95, and 35**
- Clear the drop lists from **D28:G31** using the **Clear All** command in the Editing group on the Home tab
- Save the workbook

FORMS

A form is a document designed with a standard structure and format that makes it easier to enter, organise, and edit data.

DATA FORMS

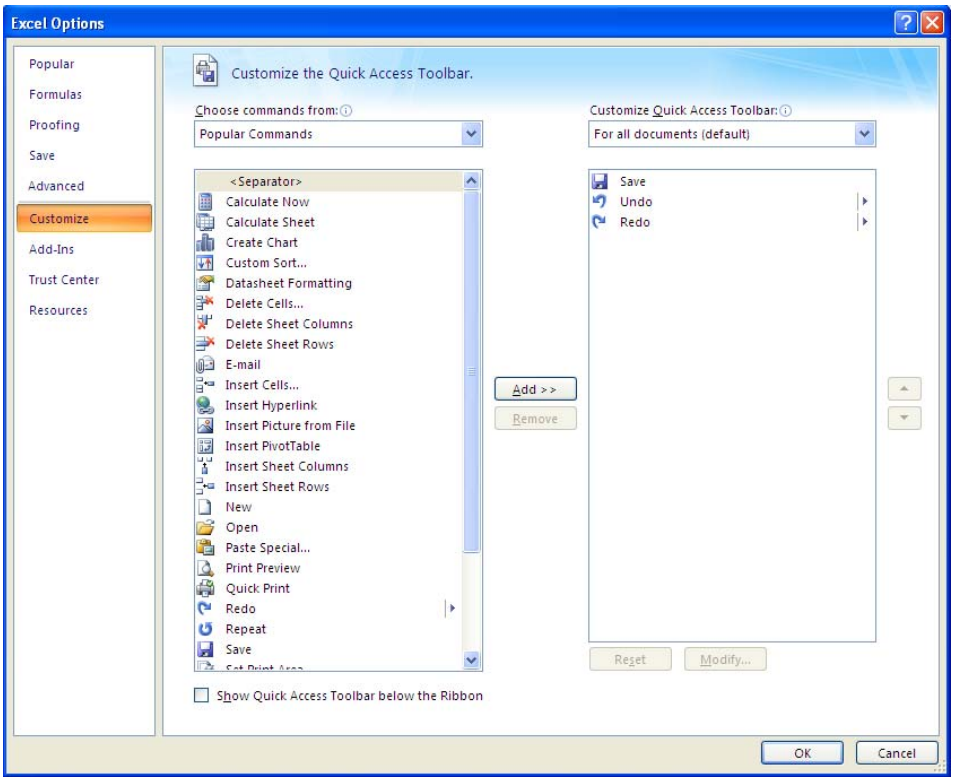
A data form is a dialog box that displays one complete record at a time. It therefore provides a convenient way to enter or display one complete row of data without scrolling horizontally.

You may find that using a data form can make data entry easier than moving from column to column when you have more columns of data than can be viewed on the screen.

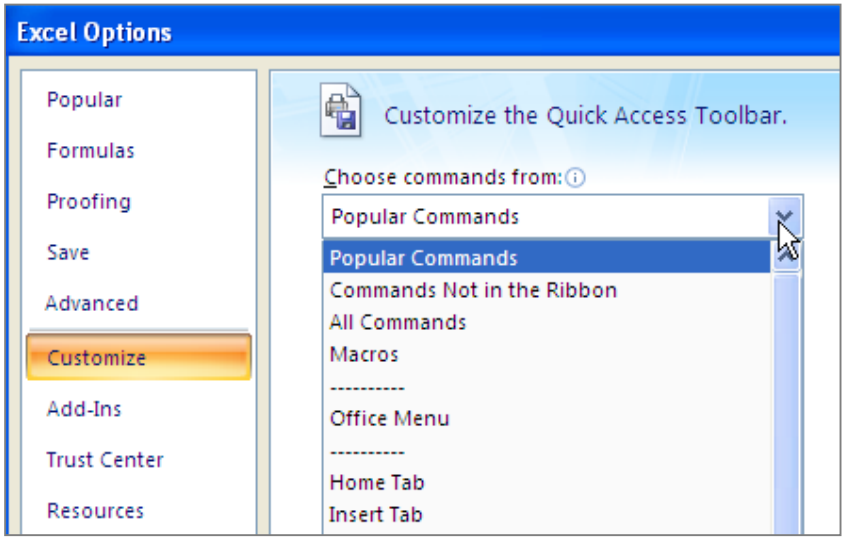
One possible drawback of using a form is that the AutoComplete feature is not available, and the user has to type all of the data. However, a bonus is that fields containing calculations are not accessible and, while the results of calculations can be seen in the form, the formulas cannot be edited.

Excel can automatically generate a built-in form for your table of data. The Form command, however, is not on the Ribbon and therefore it must be added to the Quick Access Toolbar before it can be accessed.

- Click the **Office Button**
- Select **Excel Options**
- Select **Customize** from the list of categories on the left

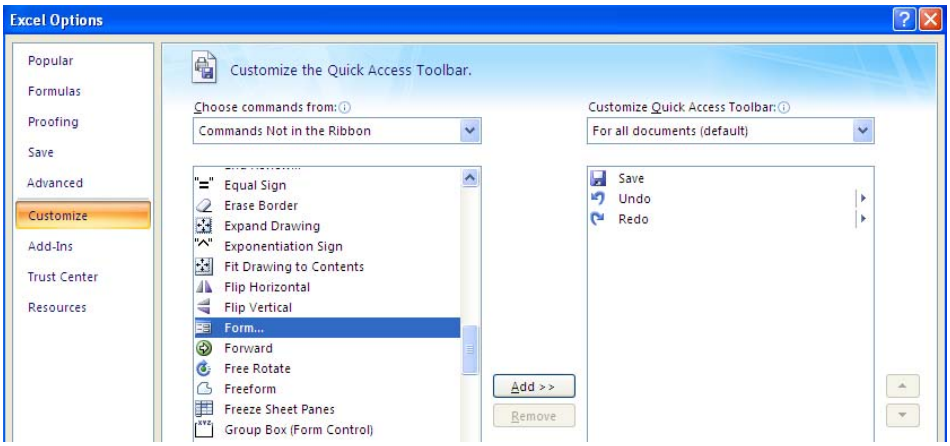


- In the **Choose commands from:** box, click the drop arrow



- Choose **Commands Not in the Ribbon**

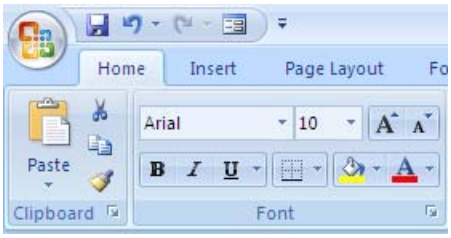
- Select **Form** from the list of commands



- Click the **Add** button
- Click **OK**

The Form command is now on the Quick Access Toolbar

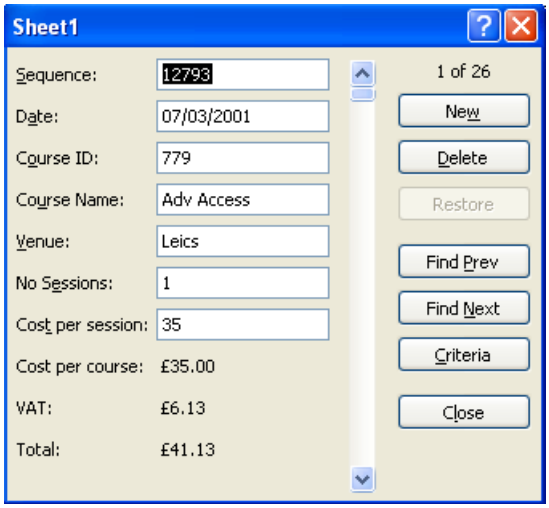
Quick Access Toolbar



Form command

- Ensure that the **Courses** workbook is open
- Select **Sheet1**
- Click on any cell within the table of data
- Click the **Form** command on the Quick Access Toolbar

A form is created and displays the first record of the table.



Buttons on the right of the form enable you to navigate and search the data.

- Click **Find Next** to go to the next record
- Click **New**

A blank form is displayed, ready for you to enter a new record.

- Type the following data in the appropriate fields (you can use the tab key to move from one field to the next)

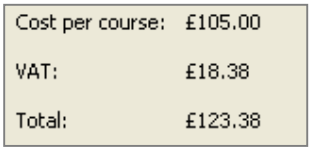
Sequence	Date	Course ID	Course Name	Venue	No Sessions	Cost per session
12815	**27/3/01**	**784**	**Adv Word**	**Leics**	**3**	**£35**

- Press **Enter**

The new row is added at the bottom of the data in Sheet1, and another blank form is displayed.

- Click **Find Prev** to view the record that you just typed in

Notice that the three calculations, at the bottom of the form, have been automatically performed.



- Use the scroll bar in the form to scroll to the top, displaying the first record

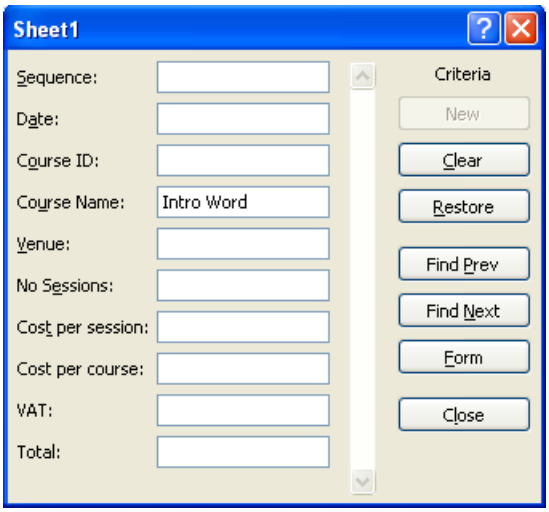
The data form provides a very useful method of searching for information.

You will use the form to search for all the courses named **Intro Word**.

- Click the **Criteria** button on the form

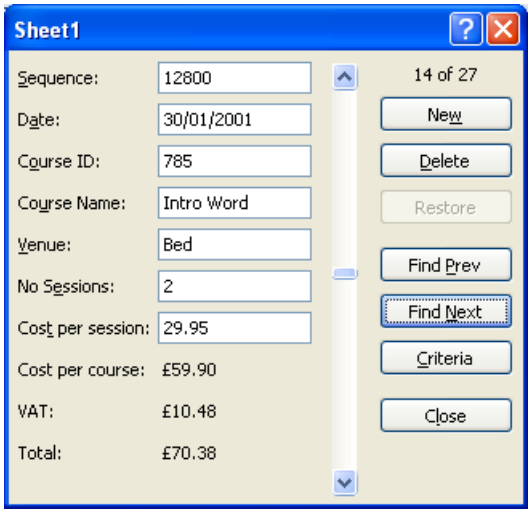
The criteria dialog box is displayed, resembling a blank form.

- Type **Intro Word** in the **Course Name** field



- Click the **Find Next** button

The form displays record number 14, the first Intro Word record.



- Click **Find Next**

A second Intro Word record is found – record 15.

- Click **Find Next**

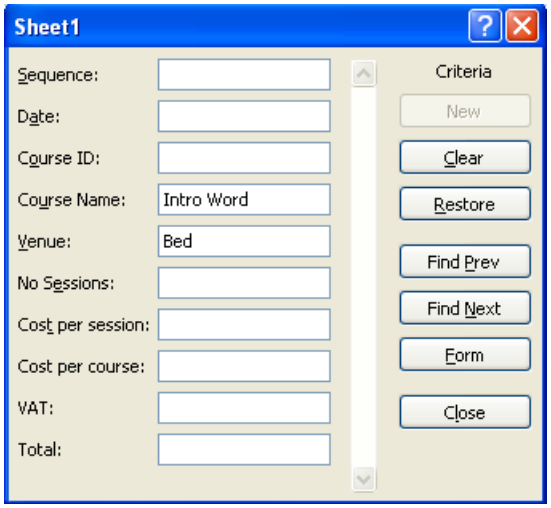
A third Intro Word record is found – record 16.

- Click **Find Next**

No other record satisfies the search criterion, so record 16 remains displayed.

You will now change the search to include a second criteria – You want to find all Intro Word courses at Bedford (Bedford is displayed as Bed in the Venue field).

- Use the scroll bar to display record 1 in the form
- Click the **Criteria** button
- In the Criteria dialog box, type **Bed** in the **Venue** field



- Click **Find Next**

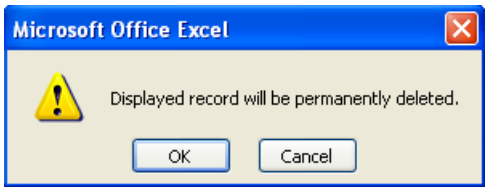
Record 14 satisfies both criteria and is displayed.

- Click **Find Next**

No other record satisfies both criteria, so record 14 remains displayed.

- Use the data form to search for the record with Course ID **784**
- With the record with Course ID 784 displayed, click the **Delete** button

A message is displayed warning that the action will be permanent.



- Click **OK**

The record is deleted.

- **Close** the data form
- Save and close the workbook

SHARING WORKBOOKS

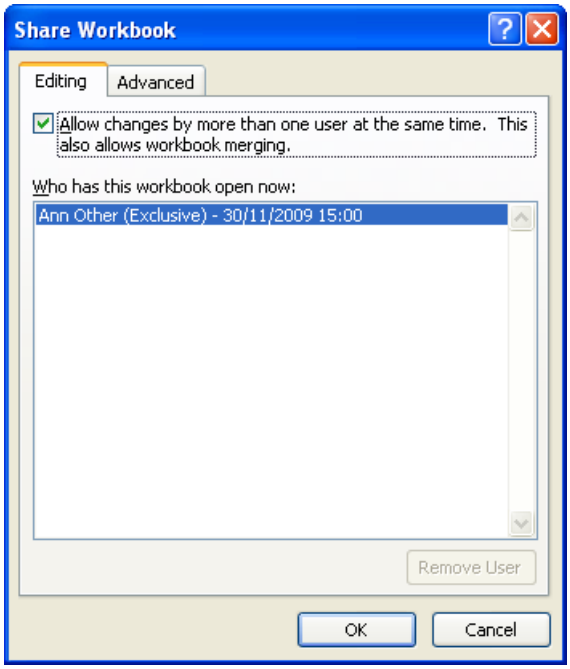
Workbooks can be shared by users who have access to the same network. Typically a shared workbook will contain data that is regularly updated by a group of people, and is stored on a server so that all concerned can gain access.

Features such as merged cells, conditional formats, data validation, charts, pictures, drawn objects, hyperlinks, scenarios, outlines, subtotals, PivotTables, and macros need to be included in the workbook before it is shared, as these types of changes cannot be made to shared workbooks.

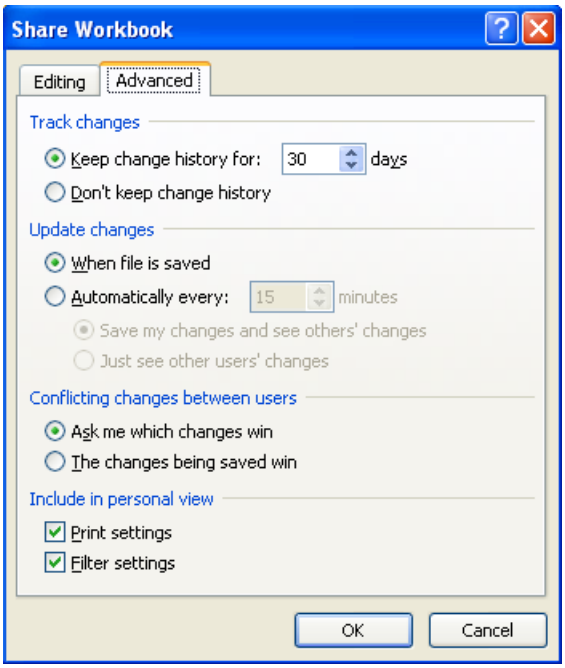
CREATING A SHARED WORKBOOK

Although during this training session you are not able to share a workbook over a network, by completing this exercise you will begin to understand how the process works.

- Open the workbook named **DecemberSalesFigures** from C:\ExcelAdvanced
- Select **Share Workbook** from the **Changes** group on the **Review** tab
- Tick the **Allow changes** box



- Click the **Advanced** tab



Consider the first three sections of the dialog box:

Track changes

With the **Keep change history** option selected, Excel will maintain information on changes made to the workbook based on elapsed time. When you share a workbook this is switched on automatically so that you can track changes made by other users. You can choose to specify the number of days the history is retained, or not to keep the history of the changes.

Update changes

If you are sharing over a network and choose to update the changes made to the workbook each time it is saved, then when a user saves the workbook, changes made by all the current users sharing the workbook will be saved. All changes will then be available to everyone.

You can choose to have the workbook show you the changes made by others at set intervals. With this option you can specify that Excel saves the changes automatically.

Conflicting changes between users

You can expect that, when several people are sharing the same workbook, some changes will conflict. This section of the dialog box enables you to specify whether **you** make the final decision on which change will be accepted, or whether the latest change is accepted automatically.

- Click **OK** to close the dialog box

A message indicates that the workbook will be saved.

- Click **OK**

PROCESSING CHANGES

Make the following changes to the data:

- Change the contents of cell **B5** to **50**
- Change the contents of cell **B15** to **16**

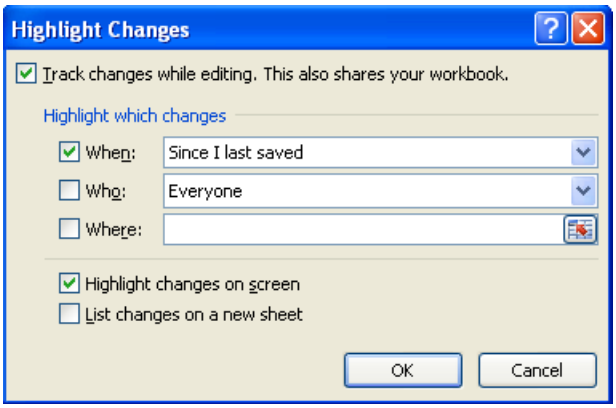
Excel automatically tracks the changes made in shared workbooks until the changes are either accepted or rejected. You can therefore highlight the cells that have been changed.

- Click **Track Changes** in the **Changes** group on the **Review** tab
- Select **Highlight Changes**

The Highlight Changes dialog box is displayed.

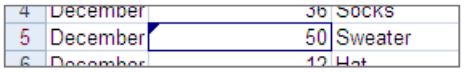
You can choose to highlight all the changes that are currently being tracked, or the changes made after a particular date, or the changes made since the file was last saved.

- In the **When** box choose **Since I last saved**



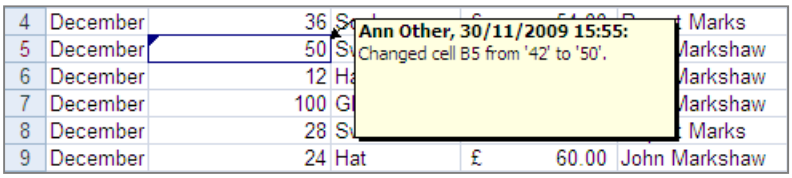
- Click **OK**

A coloured border indicates the cells that have been changed. Each user's changes are highlighted in a different colour.



- Hover the mouse pointer over cell **B5**

A comment is displayed advising the changes that have been made and who made them.



- Move the mouse pointer away from the cell to hide the comment

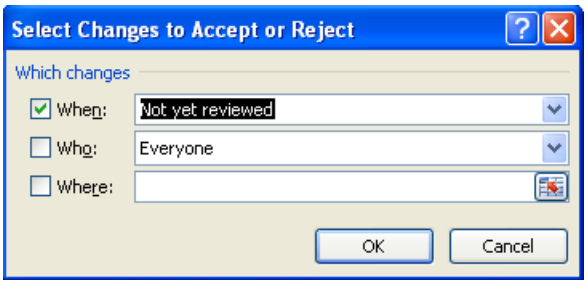
When a workbook is shared, someone must take responsibility for the final version.

On this occasion consider yourself to be the supervisor who will make the final decision on the changes.

- Click **Track Changes** in the **Changes** group on the **Review** tab
- Select **Accept/Reject Changes**

You are reminded that this action will save the workbook.

- Click **OK**

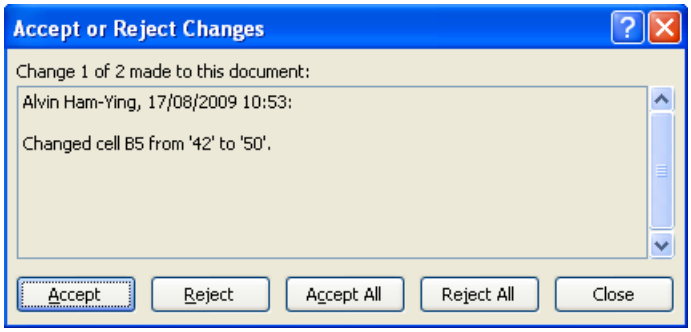


The **Select Changes to Accept or Reject** dialog box gives you the option to choose which changes you would like to review. You can see either those not yet reviewed, or those since a specific date.

You can also select whose changes you review, and which range of cells you are going to look at.

- Ensure that **Not yet reviewed** is selected as the **When** option
- Click **OK**

The Accept or Reject Changes dialog box is displayed.



The dialog box indicates that two changes have been made, and displays the first change. You can either accept or reject changes individually or as a group.

- Accept the first change (B5)
- Reject the second change (B15)
- Save the workbook

Apart from sharing a workbook over a network, another possible use for a shared workbook is where you want to email a workbook to colleagues for review. Once they have made changes and emailed their copies back to you, you then need to merge the shared workbooks.

Imagine that you have two colleagues who are going to review the figures in a workbook. For the next exercise, you will save a separate copy of the shared workbook; make changes to both copies – simulating the work of two colleagues; then merge the changes into one document.

- Save the workbook with the new name **DecemberSalesFiguresCopy2**
- Make **two changes** of your own choice to the data
- Save and close the workbook
- Open the workbook named **DecemberSalesFigures**
- Make **two changes** of your own choice
- Save the workbook but do not close it

You will now merge the two copies of the workbook together.

- Using the **Customize** Option in the Excel Options dialog box, add the **Compare and Merge Workbooks** command to the **Quick Access Toolbar** (If you need help, see page 49)
- Click the **Compare and Merge Workbooks** button on the Quick Access Toolbar
- Select **DecemberSalesFiguresCopy2** to merge into the current workbook
- Click **OK**

The workbooks are merged.

To see the changes that have been made:

- Click **Track Changes** in the **Changes** group on the **Review** tab
- Select **Highlight Changes**
- In the **When** box, choose **All**
- Click **OK**

You should see five changes in all; one from the previous exercise.

Remember that, while the changes you have made are all shown outlined in the same colour, changes made by different users will be shown in different colours.

- Review the changes that have not yet been reviewed and accept them all

REMOVING A WORKBOOK FROM SHARED USE

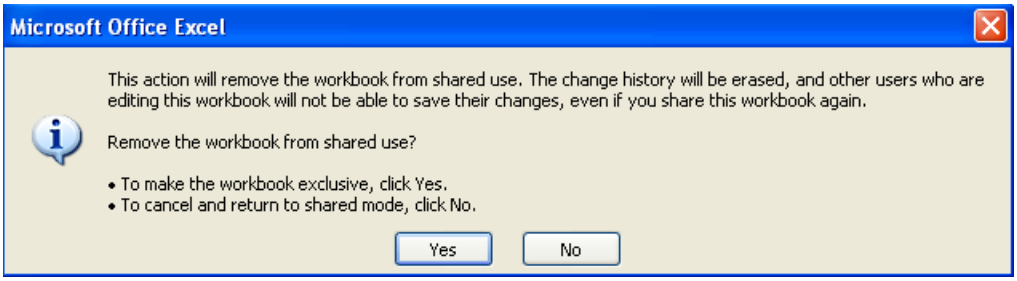
When work on the shared workbook has been completed, for security reasons it is advisable to remove it from shared use.

Before you do, make sure you tell your fellow collaborators who have been working on the workbook over the network that you are taking this action. If anyone is editing the workbook when you remove sharing, they will not be able to save any changes they may have made.

When you remove sharing it also cancels track changes and erases the track changes history. Even if the workbook is shared again, the current history will have been lost. Make sure you have finished with the history before sharing stops.

- Click **Share Workbook** in the **Changes** group on the **Review** tab
- On the **Editing** tab, remove the tick from '**Allow changes by more than one user at the same time**'
- Click **OK**

A warning message is displayed.



- Click **Yes** to remove the workbook from shared use

WORKBOOK SECURITY

It may sometimes be necessary to secure your workbooks to prevent unauthorised people from accessing them, or authorised users from making changes without agreement.

There are two general types of protection:
Worksheet protection and **Workbook** protection.

When you protect a worksheet or workbook, you have the option to include a password.

Should you choose to control access with a password, you must keep a note of it in a secure place – if you forget the password, you will not be able to open the file again.

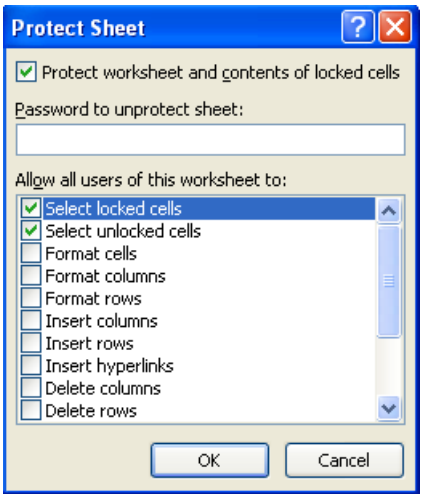
If you are undertaking the training during a scheduled session in the IT Training Room, please do not enter a password to protect a sheet or workbook unless specifically instructed to.

PROTECTING A WORKSHEET

You would choose to protect a worksheet if you wish to restrict editing of formatting, cell content, and objects that may be present on the worksheet.

- Ensure that the **DecemberSalesFigures** workbook is open
- Click **Protect Sheet** in the **Changes** group on the **Review** tab

The Protect Sheet dialog box is displayed.



The check box at the top of the dialog box is ticked by default and must remain ticked in order to protect the sheet and the contents of cells.

In the bottom section of the dialog box you are able to select options you want to enable for all users of the worksheet.

By default, users are allowed to select any cell on the sheet, whether locked or unlocked – this will be explained in the next section.

- Use the scroll bar in the dialog box to view all of the available options

The dialog box also enables you to set a password. If you specify a password, this will need to be used if you wish to unprotect and edit the sheet later. It also means that no one else will be able to change your protection settings unless you supply them with the password.

For this exercise, do not use a password.

- Click **OK**
- Click into a few different cells on the worksheet to verify that you can still select any cell

- Edit the data in one of the cells on the sheet

A message is displayed, explaining why the data cannot be changed. However, it also includes the steps to take to remove the protection should you want to.

- Click **OK**

To unprotect the sheet:

- Click **Unprotect Sheet** in the **Changes** group on the **Review** tab

Unlocking cells

By default, all cells on a worksheet have the locked property set, but it is only when you protect the sheet that it is activated.

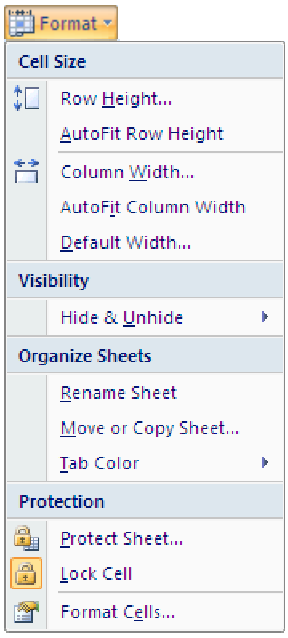
When you protect a worksheet however, there may be certain cells on the sheet that you do want users to access to enter or edit data. These cells need to be unlocked **before** the sheet is protected.

Let us assume that you want the users to be able to change the values in the Number Ordered column, and you want them to be able to select any of the other cells but not make any changes to them.

To set up this level of protection, you need to unlock the cells in the Number Ordered column before protecting the sheet.

- Select the cell range **B4:B22**

- Click **Format** in the **Cells** group on the **Home** tab



The highlighted lock icon next to the Lock Cell option indicates that the cells are locked. This option is used to toggle the lock property on and off. Notice that the Protect Sheet dialog box can also be accessed from here.

To unlock the cells:

- Click **Lock Cell**

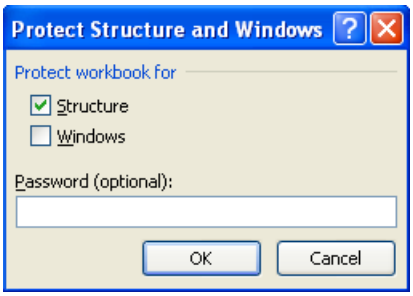
You will now protect the worksheet as before.

- Click **Format** from the **Cells** group on the **Home** tab
- Select **Protect Sheet**
- Click **OK**
- Check that the only changes you can make are to the numbers in column B
- Unprotect the sheet

This works in a similar way to protecting a worksheet. However, when you protect a workbook, you protect the structure and window, but not the data.

To protect the workbook:

- Click **Protect Workbook** in the **Changes** group on the **Review** tab
- Select **Protect Structure and Windows**



Like the previous exercise, protection will work without a password, but any user will be able to remove the protection.

If you choose to protect the Structure, a user will not be able to delete, move, hide, unhide, rename or insert new worksheets.

If you choose to protect the Windows, this prevents a workbook's windows from being moved, resized, hidden, unhidden, or closed.

- Click **OK**
- Try to delete **Sheet2**

You will see that the delete option is not available.

To unprotect the workbook:

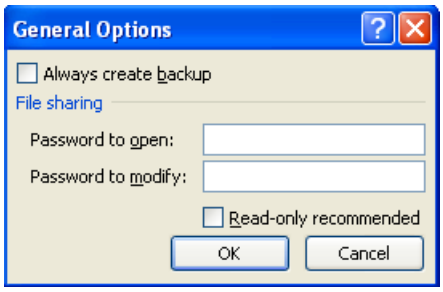
- Click **Protect Workbook** in the **Changes** group on the **Review** tab
- Click **Protect Structure and Windows**

You can protect a workbook to require a user to have a password(s) to open and/or modify it.

- Click the **Office Button**
- Click **Save As**

The Save As dialog box is displayed.

- Click the **Tools** button on the dialog box
- Select **General Options**



Entering a password in **Password to open** will result in a password being required before a user can open the workbook.

If you enter a password in **Password to modify**, anyone trying to save changes using the same filename will be asked for a password.

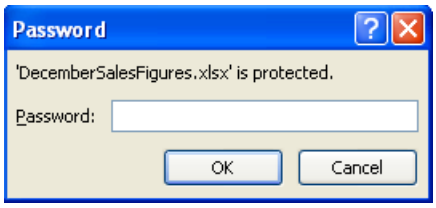
You are going to set up a password, view the result, and then remove the password.

In the Password to open box:

- Type **cl3matis**
- Click **OK**

You are asked to verify by typing it again.

- Type the password again
- Click **OK**
- Click **Save**
- Click **Yes** to replace the existing file
- Close the file
- Open the file



- Enter the password
- Click **OK**

The file opens.

If you set up a password to modify, the user sees a second dialog box.

In this case, the user can either enter the password or, if they do not know it, click the Read Only button.

To remove the password to open or modify the workbook:

- Click the **Office Button**
- Click **Save As**
- Click the **Tools** button on the Save As dialog box
- Select **General Options**
- Delete the password(s)
- Click **OK**
- Click **Save**
- Click **Yes** to replace the existing file

If you want to change a password, follow the steps to display the General Options dialog box. Enter a new password and resave the workbook.

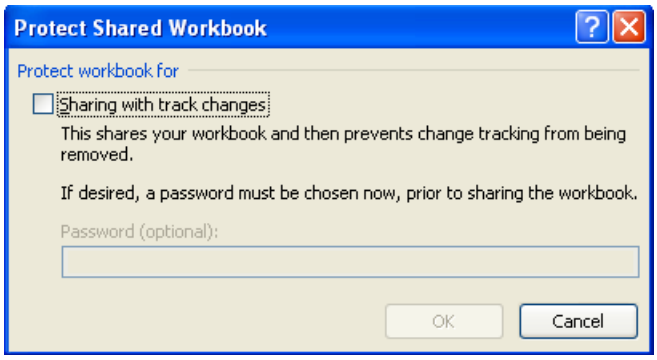
PROTECTING A SHARED WORKBOOK

When sharing work, it is critical that changes can be tracked to ensure the data is true. However, if the workbook is not protected, tracking options can be modified or disabled by any user.

To protect the tracking options when sharing a workbook:

- Click **Protect and Share Workbook** from the **Changes** group on the **Review** tab

The Protect Shared Workbook dialog box is displayed.



- Click **Sharing with track changes**
- Click **OK**

A message indicates that the workbook will be saved.

- Click **OK**

This protection allows some changes to the structure; users can insert, rename, or hide sheets, but sheets cannot be deleted.

Also, changes to the data will be tracked and can be highlighted (see page 58).

To unprotect the workbook:

- Click **Unprotect Shared Workbook** in the **Changes** group on the **Review** tab

This action removes the protection, but the workbook is still shared.

- Remove the workbook from shared use (see page 63)
- Save and close the workbook

PIVOT TABLES AND PIVOT CHARTS

A Pivot Table is an interactive way to summarise large amounts of data. You can use a Pivot Table to analyse numerical data. You can sort and filter the data, and also include totals and subtotals. A Pivot Table can therefore help you to answer unanticipated questions about your data.

CREATING A PIVOT TABLE

- Open the workbook **ClubMembership** from **C:\ExcelAdvanced**

Corporate Club Memberships

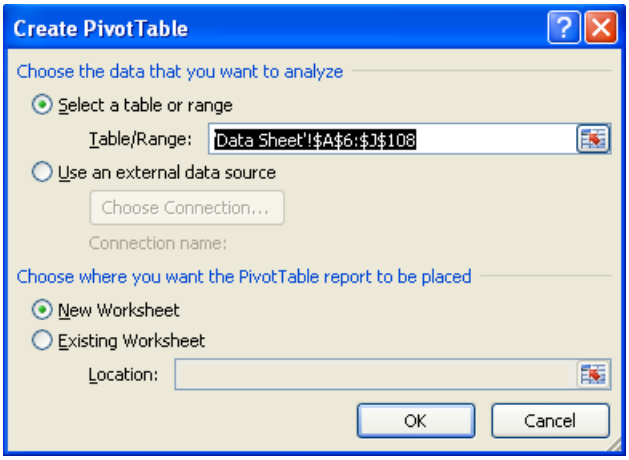
Renewals

No	First Name	Last Name	Joined	Years	Months	Department	Type	Annual Fee	Due
1	Roger	Wilson	12/1/88	21	7	Brokerage	Gold	1,125.50	January
2	Mary	Driscoll	23/2/98	11	6	Sales	Bronze	850.00	February
3	Kate	Fu	2/2/88	21	6	Brokerage	Silver	750.00	February
4	Julie	Gregory	5/2/88	21	6	Admin	Junior	55.00	February
5	Peter	Harrison	11/2/88	21	6	Transport	Bronze	850.00	February
6	Harold	Lowe	20/2/88	21	6	Support	Bronze	850.00	February
7	Oscar	Renn	24/2/88	21	6	Maintenance	Silver	750.00	February
8	Melinda	Wrill	27/2/88	21	5	Brokerage	Gold	1,125.50	February
9	Fred	Jackson	4/3/88	21	5	Brokerage	Life	55.00	March
10	Mary	Lewis	13/3/88	21	5	Communications	Gold	1,125.50	March
11	Katherine	Smith	17/4/89	20	4	Enterprise	Junior	55.00	April
12	June	Gregson	20/4/89	20	4	HR	Bronze	850.00	April
13	Auguste	Smythe	26/4/89	20	4	Insurance	Junior	55.00	April
14	Harry	Jones	5/5/89	20	3	Communications	Gold	1,125.50	May
15	Wilbur	Johnson	11/5/89	20	3	Support	Silver	750.00	May
16	Donald	Kendall	20/5/89	20	3	Maintenance	Silver	750.00	May
17	Shelly	Lewis	24/6/90	19	2	Finance	Life	55.00	June
18	Samantha	Martin	27/6/90	19	2	Transport	Silver	750.00	June
19	Louise	Vincenzo	3/7/90	19	1	Accounts	Gold	1,125.50	July
20	Martin	Pollard	9/7/90	19	1	Support	Silver	750.00	July
21	Bernard	Olinda	18/7/90	19	1	Finance	Junior	55.00	July
22	Brenda	Fredericks	22/8/91	18	0	Legal	Junior	55.00	August

The first step is to identify the data that will be used for the Pivot Table and choose where it will be created.

- Click on any cell within the table of data
- Choose **PivotTable** from the **Tables** group on the **Insert** tab

The Create Pivot Table dialog box is displayed.



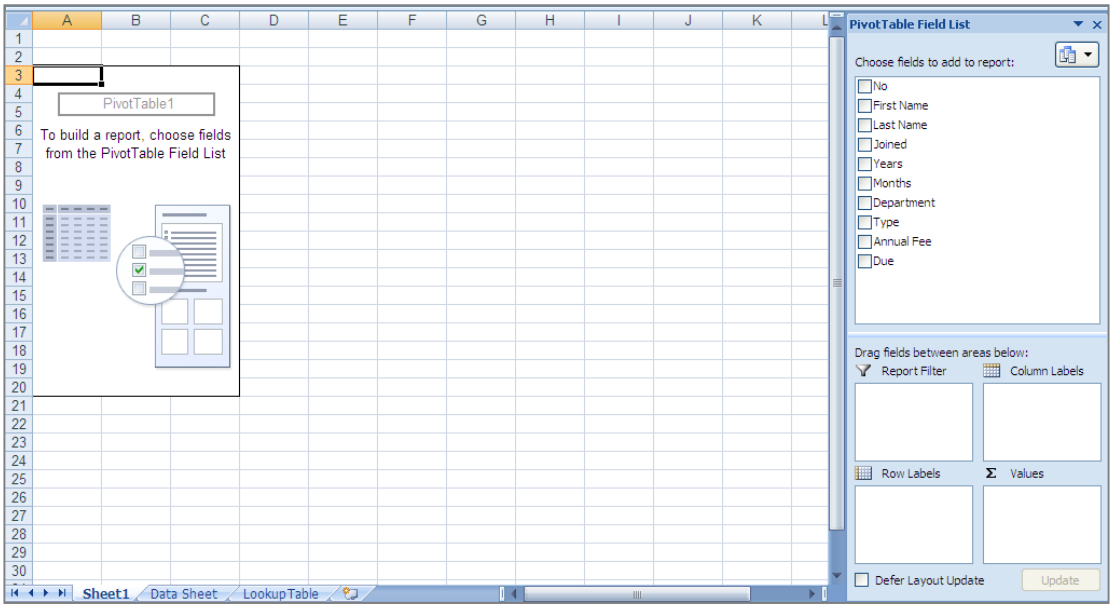
The Data Range is picked up automatically and displayed in the dialog box. At this point you can choose a different range, or specify an external data source.

- Check that the **Table/Range** text box displays **'Data Sheet'!$A$6:$J$108**

The Pivot Table can be created on a new worksheet or on an existing sheet.

- Ensure that the **New Worksheet** radio button is selected
- Click **OK**

You are presented with a new worksheet and two contextual tabs (Options and Design) appear that include tools to build and edit the Pivot Table.



The task pane on the right enables you to select the fields that you want to include in the table. Note that the field names are the column labels in the original data table.

The bottom half of the task pane enables you to control where and how the fields are displayed in the Pivot report.

- Click the **Close** button on the Pivot Table Field List task pane

To redisplay the task pane:

- Click **Field List** in the **Show/Hide** group on the PivotTable Tools **Options** tab

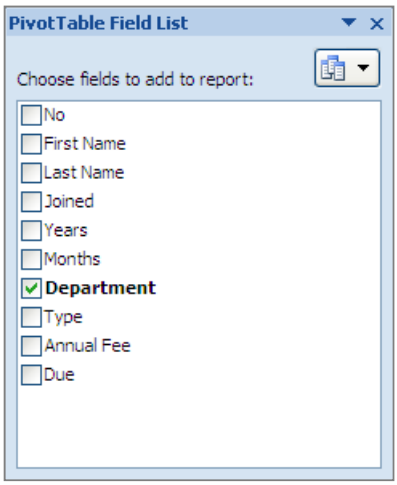
The rectangle on the left of the sheet represents the empty Pivot Table.

- Click outside the Pivot Table

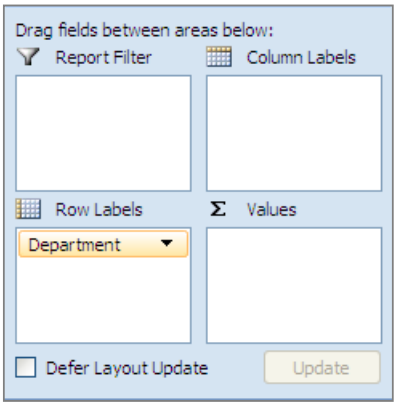
The task pane containing the field list is closed, and the PivotTable Tools contextual tabs are removed from the ribbon.

- Click back inside the Pivot Table to redisplay the task pane and the contextual tabs

- Click the **Department** check box in the Pivot Table Field List



When a field that contains text is selected, it is automatically added to the Row Labels box in the field layout area of the task pane.

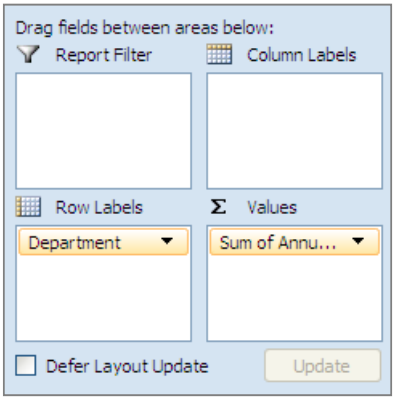


The values of the field are displayed in the Pivot Table as Row Labels.

	A	B
1		
2		
3	**Row Labels**	
4	Accounts	
5	Admin	
6	Brokerage	
7	Communications	
8	Enterprise	
9	Finance	
10	HR	
11	Insurance	
12	Legal	
13	Maintenance	
14	Resourcing	
15	Sales	
16	Support	
17	Transport	
18	**Grand Total**	
19		

- Click the **Annual Fee** check box in the Pivot Table Field List

When a numerical field is selected, it is automatically put into the Values box. By default values are summed, so **Sum of Annual Fee** is displayed.



The Pivot Table displays the Annual Fee values.

	A	B	C
1			
2			
3	**Row Labels**	**Sum of Annual Fee**	
4	Accounts	3575.5	
5	Admin	3916	
6	Brokerage	9918	
7	Communications	5186.5	
8	Enterprise	5416	
9	Finance	5936.5	
10	HR	4360	
11	Insurance	275	
12	Legal	4557	
13	Maintenance	7856	
14	Resourcing	9136.5	
15	Sales	5031.5	
16	Support	5650	
17	Transport	1600	
18	**Grand Total**	**72414.5**	
19			

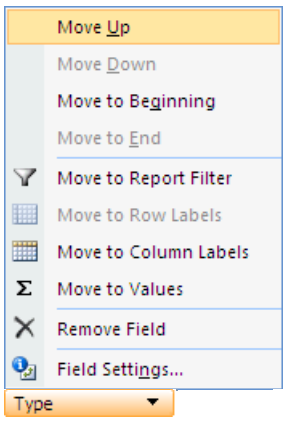
- Click the **Type** check box to add that field to the report

The field is added to the Row Labels section below the Department field, and the Pivot Table now looks like this:

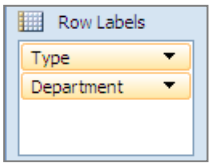
	A	B	C
1			
2			
3	**Row Labels**	**Sum of Annual Fee**	
4	**Accounts**	**3575.5**	
5	Bronze	1700	
6	Gold	1125.5	
7	Silver	750	
8	**Admin**	**3916**	
9	Gold	2251	
10	Junior	110	
11	Life	55	
12	Silver	1500	
13	**Brokerage**	**9918**	
14	Gold	6753	
15	Junior	55	
16	Life	110	
17	Silver	3000	
18	**Communications**	**5186.5**	
19	Bronze	1700	
20	Gold	3376.5	
21	Junior	110	
22	**Enterprise**	**5416**	
23	Gold	2251	
24	Junior	110	
25	Life	55	
26	Silver	3000	
27	**Finance**	**5936.5**	
28	Bronze	1700	
29	Gold	3376.5	

You will change the order of the fields in the Row Labels box to see the effect that this has on the report.

- Click the **Type** field button in the Row Labels box
- Select **Move Up**



The Type field is moved up above the Department field.

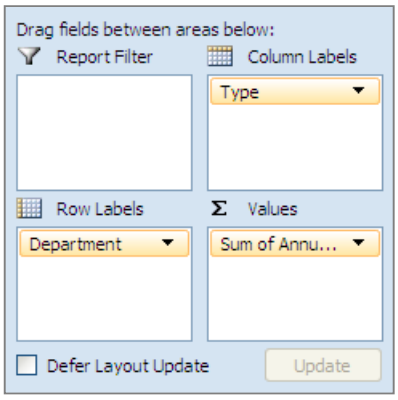


The groups and subgroups have swapped places in the report:

	A	B	C
1			
2			
3	Row Labels	Sum of Annual Fee	
4	**Bronze**	**20400**	
5	Accounts	1700	
6	Communications	1700	
7	Finance	1700	
8	HR	4250	
9	Maintenance	2550	
10	Resourcing	3400	
11	Sales	850	
12	Support	3400	
13	Transport	850	
14	**Gold**	**32639.5**	
15	Accounts	1125.5	
16	Admin	2251	
17	Brokerage	6753	
18	Communications	3376.5	
19	Enterprise	2251	
20	Finance	3376.5	
21	Legal	4502	
22	Maintenance	2251	
23	Resourcing	3376.5	
24	Sales	3376.5	
25	**Junior**	**935**	
26	Admin	110	

- Click the **Type** field button in the Row Labels box
- Select **Move to Column Labels**

> Alternatively you could drag the field from the Row Labels box to the Column Labels box.

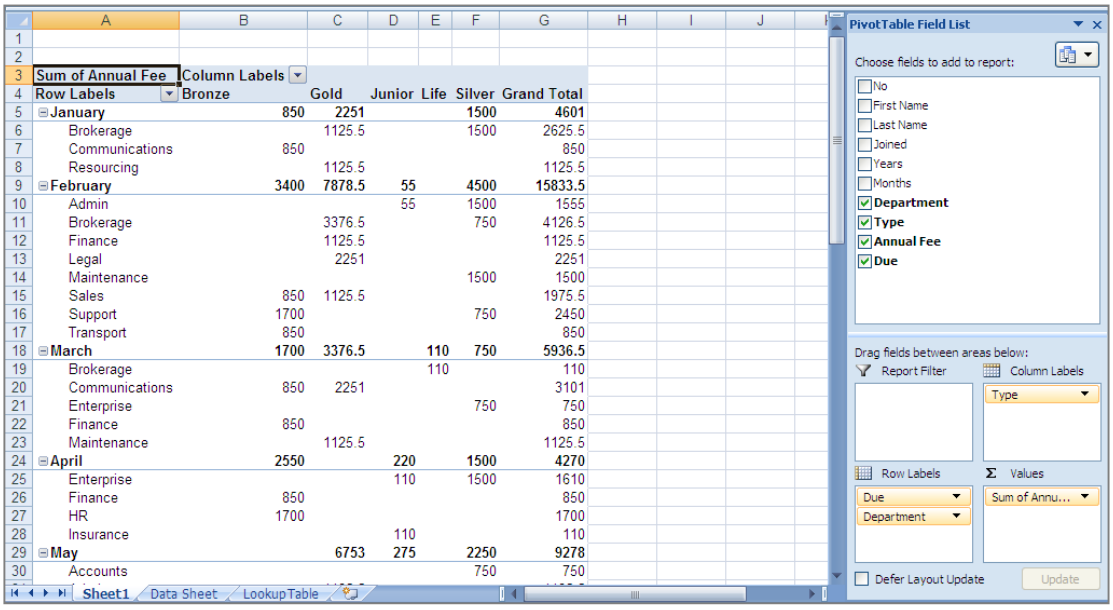


The report provides the same information, but it is now displayed in a manner that enables you to compare values more easily.

	A	B	C	D	E	F	G
1							
2							
3	Sum of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	Accounts	1700	1125.5			750	3575.5
6	Admin		2251	110	55	1500	3916
7	Brokerage		6753	55	110	3000	9918
8	Communications	1700	3376.5	110			5186.5
9	Enterprise		2251	110	55	3000	5416
10	Finance	1700	3376.5	55	55	750	5936.5
11	HR	4250		110			4360
12	Insurance			220	55		275
13	Legal		4502	55			4557
14	Maintenance	2550	2251	55		3000	7856
15	Resourcing	3400	3376.5		110	2250	9136.5
16	Sales	850	3376.5	55		750	5031.5
17	Support	3400				2250	5650
18	Transport	850				750	1600
19	**Grand Total**	**20400**	**32639.5**	**935**	**440**	**18000**	**72414.5**
20							

You can add as many fields to the Pivot Table as you need.

- Add the **Due** field to the **Row Labels** section and move it above the Department field



Sum of Annual Fee	Column Labels					
Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
January	850	2251			1500	4601
Brokerage		1125.5			1500	2625.5
Communications	850					850
Resourcing		1125.5				1125.5
February	3400	7878.5	55		4500	15833.5
Admin			55		1500	1555
Brokerage		3376.5			750	4126.5
Finance		1125.5				1125.5
Legal		2251				2251
Maintenance					1500	1500
Sales	850	1125.5				1975.5
Support	1700				750	2450
Transport	850					850
March	1700	3376.5		110	750	5936.5
Brokerage				110		110
Communications	850	2251				3101
Enterprise					750	750
Finance	850					850
Maintenance		1125.5				1125.5
April	2550		220		1500	4270
Enterprise			110		1500	1610
Finance	850					850
HR	1700					1700
Insurance			110			110
May		6753	275		2250	9278
Accounts					750	750

To remove a field from the report you simply remove the tick from the check box in the field list section of the task pane.

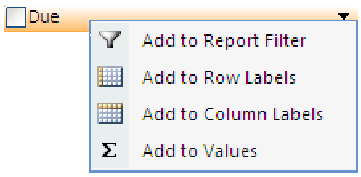
- Click the **Due** field check box to remove the tick

The field is removed from the Pivot Table.

Applying a filter to a Pivot Table

You will set the Due field as a filter field, and use it to change the display in the Pivot Table.

- Hover the mouse pointer over the **Due** field in the Field List and click the right mouse button

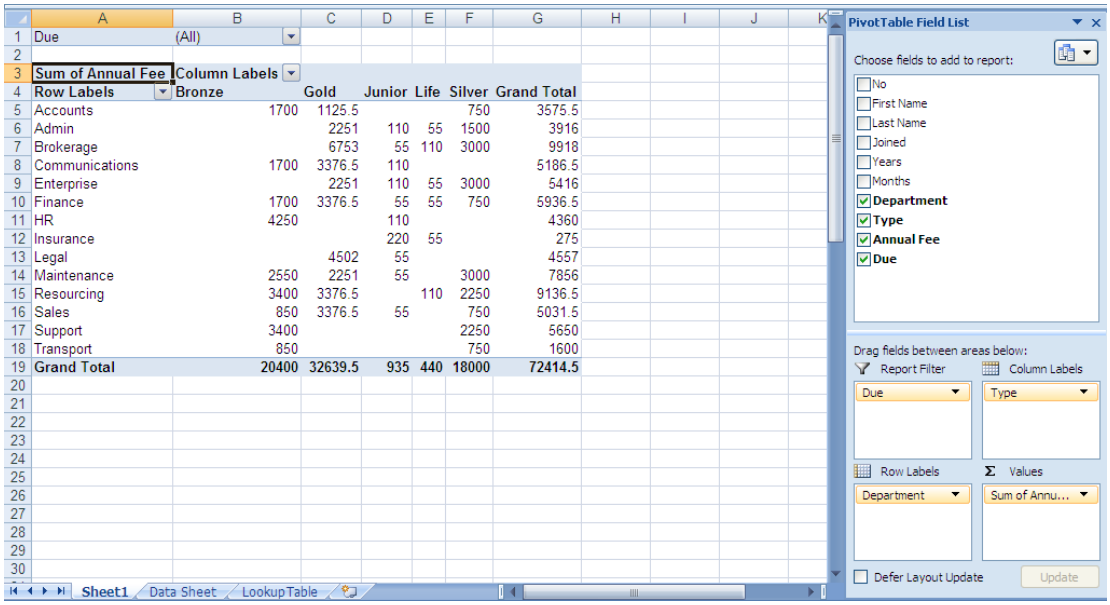


- Select **Add to Report Filter**

The Due field is added to the Report Filter box and is also displayed at the top of the Pivot Table report.

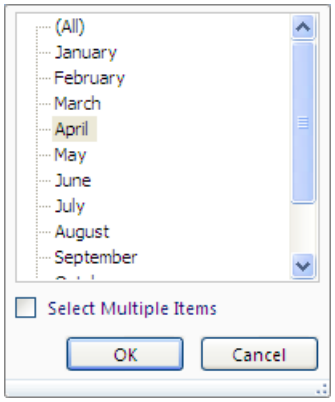
Alternatively, to add a field to the Report Filter box you can drag the field from the Field List to the Report Filter box.

Report Filter field

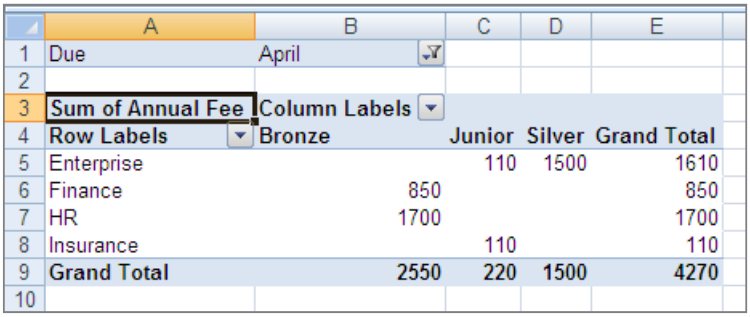


To show only the information for the membership renewals due in April:

- Click the down arrow in cell **B1** to see the possible options for the filter
- Select **April**



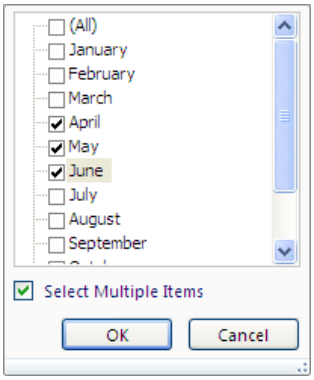
- Click **OK**



It is also possible to select multiple values from the filter list.

To view all the memberships due in the second quarter:

- Click the down arrow in **B1**
- Click **Select Multiple Items** to put a tick in the check box
- Click the check boxes for **May** and **June**



- Click **OK**

	A	B	C	D	E	F	G
1	Due	(Multiple Items)					
2							
3	Sum of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	Accounts					750	750
6	Admin		1125.5				1125.5
7	Brokerage		1125.5	55		750	1930.5
8	Communications		1125.5	110			1235.5
9	Enterprise			110	55	1500	1665
10	Finance	850	2251		55		3156
11	HR	1700					1700
12	Insurance			110			110
13	Maintenance			55		750	805
14	Resourcing				110	750	860
15	Sales		1125.5	55			1180.5
16	Support	1700				750	2450
17	Transport					750	750
18	**Grand Total**	**4250**	**6753**	**495**	**220**	**6000**	**17718**
19							

To remove the filter from the values:

- Click the down arrow in **B1**
- Select **All**
- Click **OK**
- Save the workbook

The following pivot table was created using the data from the Data Sheet worksheet.

	A	B	C	D	E	F	G
1	Department	Finance					
2							
3	Sum of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	February		1125.5				1125.5
6	March	850					850
7	April	850					850
8	May		2251				2251
9	June				55		55
10	July			55			55
11	November					750	750
12	**Grand Total**	**1700**	**3376.5**	**55**	**55**	**750**	**5936.5**
13							

- Select the **Data Sheet** worksheet and create this Pivot Table report on a new worksheet

Hint: The **Due** field was used for the row labels, the **Type** field was used for the column labels, the **Annual Fee** field was used for the values, the **Department** field was used as a report filter and the values filtered to show only the information for the **Finance** department.

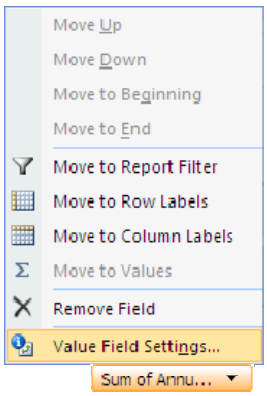
Changing the Pivot Table value settings

By default, fields that are added to the Values section on the Pivot Table Field List layout area are set to sum the data, thus displaying totals in the Pivot Table. You can, however, change the setting so that the Pivot Table displays different statistical results, such as a count of the data, or the average.

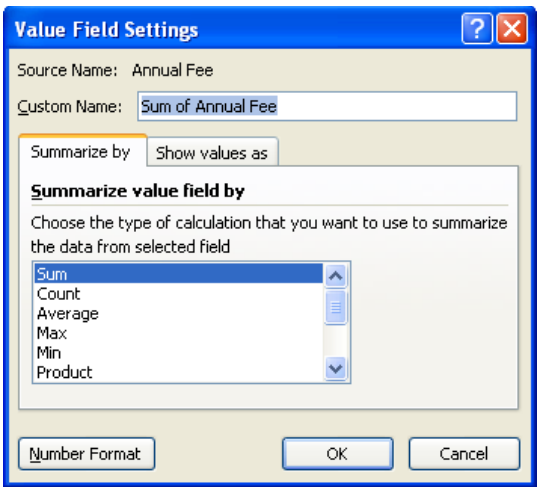
You will change the values displayed in the Pivot Table on Sheet1 from Sum to Count.

- Ensure that **Sheet1** is selected
- Ensure that a cell within the pivot table is selected
- Click on the **Sum of Annual Fee** in the **Values** area

- Select **Value Field Settings**



The Value Field Settings dialog box is displayed.



- Select **Count** from the **Summarize value field by** list
- Click **OK**

	A	B	C	D	E	F	G
1	Due	(All)					
2							
3	Count of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	Accounts	2	1			1	4
6	Admin		2	2	1	2	7
7	Brokerage		6	1	2	4	13
8	Communications	2	3	2			7
9	Enterprise		2	2	1	4	9
10	Finance	2	3	1	1	1	8
11	HR	5		2			7
12	Insurance			4	1		5
13	Legal		4	1			5
14	Maintenance	3	2	1		4	10
15	Resourcing	4	3		2	3	12
16	Sales	1	3	1		1	6
17	Support	4				3	7
18	Transport	1				1	2
19	**Grand Total**	**24**	**29**	**17**	**8**	**24**	**102**

- Change the values displayed in the Pivot Table from **Count** to **Average**

	A	B	C	D	E	F	G
1	Due	(All)					
2							
3	Average of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	Accounts	850	1125.5			750	893.875
6	Admin		1125.5	55	55	750	559.4285714
7	Brokerage		1125.5	55	55	750	762.9230769
8	Communications	850	1125.5	55			740.9285714
9	Enterprise		1125.5	55	55	750	601.7777778
10	Finance	850	1125.5	55	55	750	742.0625
11	HR	850		55			622.8571429
12	Insurance			55	55		55
13	Legal		1125.5	55			911.4
14	Maintenance	850	1125.5	55		750	785.6
15	Resourcing	850	1125.5		55	750	761.375
16	Sales	850	1125.5	55		750	838.5833333
17	Support	850				750	807.1428571
18	Transport	850				750	800
19	**Grand Total**	**850**	**1125.5**	**55**	**55**	**750**	**709.9460784**

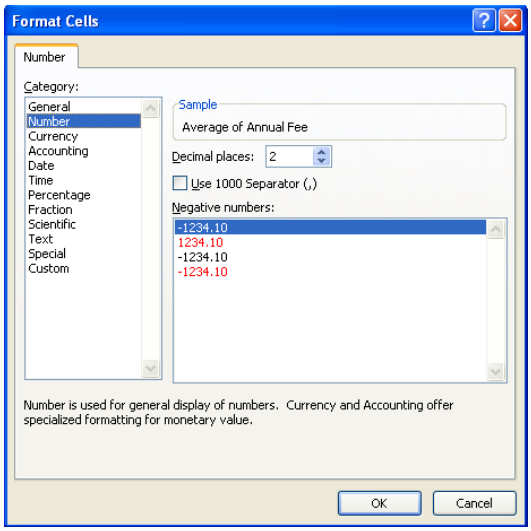
Formatting values

To format the values and set the number of decimal places to 2:

- Click on **Average of Annual Fee** in the **Values** area
- Select **Value Field Settings**
- Click on **Number Format**

The Format Cells dialog box is displayed enabling you to format the values in any way you wish.

- Click on **Number**
- Ensure **Decimal places** is set to **2**



- Click **OK** to close the Format Cells dialog box
- Click **OK** to close the Value Field Settings dialog box

	A	B	C	D	E	F	G
1	Due	(All)					
2							
3	Average of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	Accounts	850.00	1125.50			750.00	893.88
6	Admin		1125.50	55.00	55.00	750.00	559.43
7	Brokerage		1125.50	55.00	55.00	750.00	762.92
8	Communications	850.00	1125.50	55.00			740.93
9	Enterprise		1125.50	55.00	55.00	750.00	601.78
10	Finance	850.00	1125.50	55.00	55.00	750.00	742.06
11	HR	850.00		55.00			622.86
12	Insurance			55.00	55.00		55.00
13	Legal		1125.50	55.00			911.40
14	Maintenance	850.00	1125.50	55.00		750.00	785.60
15	Resourcing	850.00	1125.50		55.00	750.00	761.38
16	Sales	850.00	1125.50	55.00		750.00	838.58
17	Support	850.00				750.00	807.14
18	Transport	850.00				750.00	800.00
19	**Grand Total**	**850.00**	**1125.50**	**55.00**	**55.00**	**750.00**	**709.95**

- Change the formatting of the values to **Currency** with no decimal places

	A	B	C	D	E	F	G
1	Due	(All)					
2							
3	Average of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	Accounts	£850	£1,126			£750	£894
6	Admin		£1,126	£55	£55	£750	£559
7	Brokerage		£1,126	£55	£55	£750	£763
8	Communications	£850	£1,126	£55			£741
9	Enterprise		£1,126	£55	£55	£750	£602
10	Finance	£850	£1,126	£55	£55	£750	£742
11	HR	£850		£55			£623
12	Insurance			£55	£55		£55
13	Legal		£1,126	£55			£911
14	Maintenance	£850	£1,126	£55		£750	£786
15	Resourcing	£850	£1,126		£55	£750	£761
16	Sales	£850	£1,126	£55		£750	£839
17	Support	£850				£750	£807
18	Transport	£850				£750	£800
19	**Grand Total**	**£850**	**£1,126**	**£55**	**£55**	**£750**	**£710**

The values in two or more rows can be combined by grouping to give subtotals.

➢ Select **Sheet2**

The Pivot Table on Sheet2 shows the information for the Finance department.

➢ Display the information for all departments (see page 82)

	A	B	C	D	E	F	G
1	Department	(All)					
2							
3	Sum of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	January	850	2251			1500	4601
6	February	3400	7878.5	55		4500	15833.5
7	March	1700	3376.5		110	750	5936.5
8	April	2550		220		1500	4270
9	May		6753	275		2250	9278
10	June	1700			220	2250	4170
11	July	5100	5627.5	55		750	11532.5
12	August	850	3376.5	110	55		4391.5
13	September		1125.5		55	2250	3430.5
14	October	1700	1125.5	110		1500	4435.5
15	November		1125.5			750	1875.5
16	December	2550		110			2660
17	Grand Total	20400	32639.5	935	440	18000	72414.5

You will group the information to display the total figures for each quarter.

➢ Select **A5:A7** (January to March)

➢ Click **Group Selection** in the **Group** group on the **Options** tab

January, February and March are grouped under the heading Group1. Group headings are also created for each of the other months.

	A	B	C	D	E	F	G
1	Department	(All)					
2							
3	Sum of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	⊟Group1						
6	January	850	2251			1500	4601
7	February	3400	7878.5	55		4500	15833.5
8	March	1700	3376.5		110	750	5936.5
9	⊟April						
10	April	2550		220		1500	4270
11	⊟May						
12	May		6753	275		2250	9278

- Select **A9:A14** (April to June)
- Click **Group Selection** on the **Options** tab
- Select **A13:A18** (July to September)
- Click **Group Selection**
- Select **A17:A22** (October to December)
- Click **Group Selection**

The data is now split into four groups.

	A	B	C	D	E	F	G
1	Department	(All)					
2							
3	Sum of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	⊟Group1						
6	January	850	2251			1500	4601
7	February	3400	7878.5	55		4500	15833.5
8	March	1700	3376.5		110	750	5936.5
9	⊟Group2						
10	April	2550		220		1500	4270
11	May		6753	275		2250	9278
12	June	1700			220	2250	4170
13	⊟Group3						
14	July	5100	5627.5	55		750	11532.5
15	August	850	3376.5	110	55		4391.5
16	September		1125.5		55	2250	3430.5
17	⊟Group4						
18	October	1700	1125.5	110		1500	4435.5
19	November		1125.5			750	1875.5
20	December	2550		110			2660
21	Grand Total	20400	32639.5	935	440	18000	72414.5

To include a subtotal for each group:

- Click **Subtotals** in the **Layout** group on the **Design** tab
- Select **Show all Subtotals at Bottom of Group**

	A	B	C	D	E	F	G
1	Department	(All)					
2							
3	Sum of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	Group1						
6	January	850	2251			1500	4601
7	February	3400	7878.5	55		4500	15833.5
8	March	1700	3376.5		110	750	5936.5
9	Group1 Total	5950	13506	55	110	6750	26371
10	Group2						
11	April	2550		220		1500	4270
12	May		6753	275		2250	9278
13	June	1700			220	2250	4170
14	Group2 Total	4250	6753	495	220	6000	17718
15	Group3						
16	July	5100	5627.5	55		750	11532.5
17	August	850	3376.5	110	55		4391.5
18	September		1125.5		55	2250	3430.5
19	Group3 Total	5950	10129.5	165	110	3000	19354.5
20	Group4						
21	October	1700	1125.5	110		1500	4435.5
22	November		1125.5			750	1875.5
23	December	2550		110			2660
24	Group4 Total	4250	2251	220		2250	8971
25	Grand Total	20400	32639.5	935	440	18000	72414.5

The headings for the groups can be changed to show more meaningful titles.

- Click into **A5** (the title for the first group)
- Type **First Quarter** and press **Enter**

The group title and the label in A9 are changed.

	A	B	C	D	E	F	G
1	Department	(All)					
2							
3	Sum of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	First Quarter						
6	January	850	2251			1500	4601
7	February	3400	7878.5	55		4500	15833.5
8	March	1700	3376.5		110	750	5936.5
9	First Quarter Total	5950	13506	55	110	6750	26371
10	Group2						
11	April	2550		220		1500	4270
12	May		6753	275		2250	9278
13	June	1700			220	2250	4170
14	Group2 Total	4250	6753	495	220	6000	17718

- Change the other group titles to **Second Quarter**, **Third Quarter**, and **Fourth Quarter**

	A	B	C	D	E	F	G
1	Department	(All)					
2							
3	Sum of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	First Quarter						
6	January	850	2251			1500	4601
7	February	3400	7878.5	55		4500	15833.5
8	March	1700	3376.5		110	750	5936.5
9	First Quarter Total	5950	13506	55	110	6750	26371
10	Second Quarter						
11	April	2550		220		1500	4270
12	May		6753	275		2250	9278
13	June	1700			220	2250	4170
14	Second Quarter Total	4250	6753	495	220	6000	17718
15	Third Quarter						
16	July	5100	5627.5	55		750	11532.5
17	August	850	3376.5	110	55		4391.5
18	September		1125.5		55	2250	3430.5
19	Third Quarter Total	5950	10129.5	165	110	3000	19354.5
20	Fourth Quarter						
21	October	1700	1125.5	110		1500	4435.5
22	November		1125.5			750	1875.5
23	December	2550		110			2660
24	Fourth Quarter Total	4250	2251	220		2250	8971
25	Grand Total	20400	32639.5	935	440	18000	72414.5

To collapse each group and hide the figures for the individual months:

- Click the minus sign next to each group heading

	A	B	C	D	E	F	G
1	Department	(All)					
2							
3	Sum of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	First Quarter	5950	13506	55	110	6750	26371
6	Second Quarter	4250	6753	495	220	6000	17718
7	Third Quarter	5950	10129.5	165	110	3000	19354.5
8	Fourth Quarter	4250	2251	220		2250	8971
9	Grand Total	20400	32639.5	935	440	18000	72414.5

To expand each group and display the data for individual months:

- Click the plus sign next to each group heading

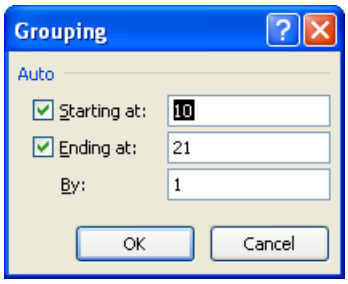
- Use the data on the Data Sheet worksheet to create a Pivot Table on a new sheet, using the **Years** field as the Row Labels, the **Type** field as the Column Labels, and a **Count of Annual Fee** for the Values

	A	B	C	D	E	F	G
1							
2							
3	Count of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	10	2	2	4		7	15
6	11	1	2		2	4	9
7	12	7	6		2		15
8	13	2	6	5			13
9	14	3	2			2	7
10	15	4				2	6
11	16		2			1	3
12	18		2	2	1	1	6
13	19		1	1	1	2	5
14	20	2	1	4		2	9
15	21	3	5	1	2	3	14
16	Grand Total	24	29	17	8	24	102

Since the Row Labels in this report are numerical values they can be grouped.

- Click into **A5** (any of the Row Labels could be selected for this procedure)
- Click **Group Field** from the **Group** group on the **Options** tab

The Grouping dialog box is displayed.



Excel inserts the smallest and largest values in the appropriate boxes automatically.

The **By** box enables you to indicate how many numbers will be in each group.

- Change the number in the **By** box to **5**
- Click **OK**

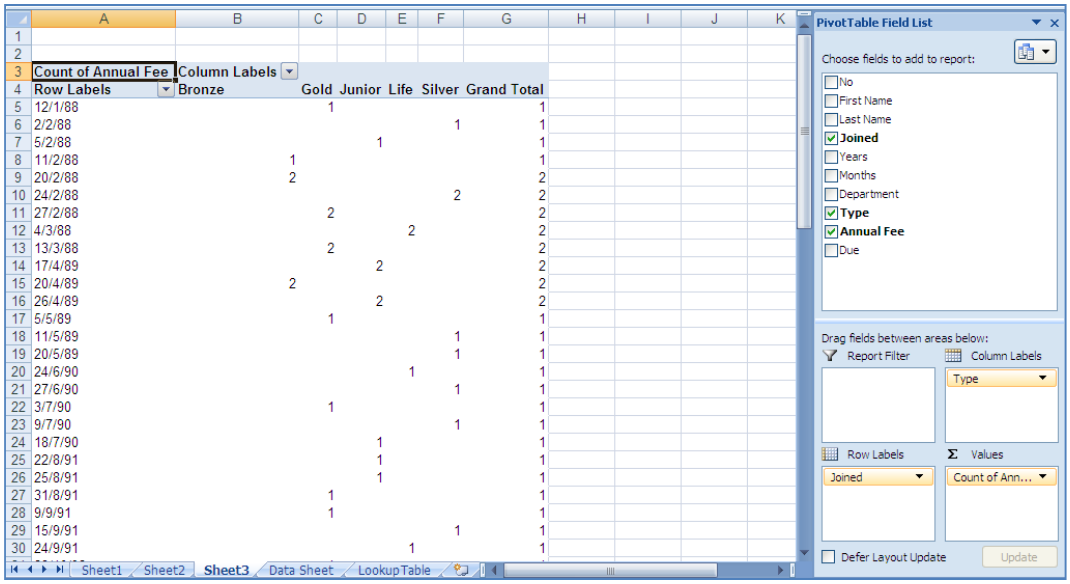
	A	B	C	D	E	F	G
1							
2							
3	Count of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	10-14	15	18	9	4	13	59
6	15-19	4	5	3	2	6	20
7	20-24	5	6	5	2	5	23
8	Grand Total	24	29	17	8	24	102

To remove the grouping:

- Click **Ungroup** in the **Group** group

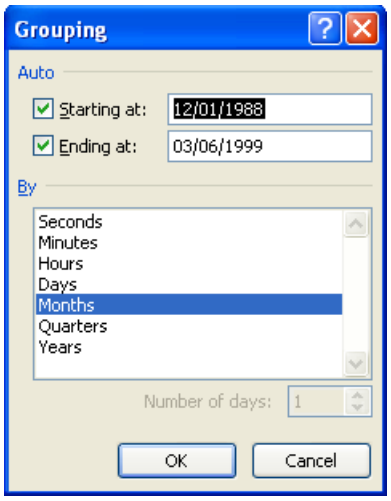
The next exercise is an example on grouping a date field.

- Remove the **Years** field from the report
- Add the **Joined** field to the Row Labels section of the report



Each row represents an individual date. The report would be more usable if the dates were grouped.

- Click into **A5** (any of the Row Labels could be selected for this procedure)
- Click **Group Field** on the **Options** tab



Excel recognises the start and end dates and automatically puts these in the appropriate boxes.

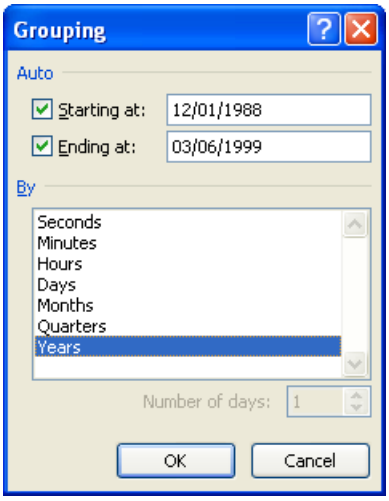
- Ensure that **Months** is the only option selected
- Click **OK**

	A	B	C	D	E	F	G
1							
2							
3	Count of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	Jan	1	2			2	5
6	Feb	4	7	1		6	18
7	Mar	2	3		2	1	8
8	Apr	3		4		2	9
9	May		6	5		3	14
10	Jun	2			4	3	9
11	Jul	6	5	1		1	13
12	Aug	1	3	2	1		7
13	Sep		1		1	3	5
14	Oct	2	1	2		2	7
15	Nov		1			1	2
16	Dec	3		2			5
17	Grand Total	24	29	17	8	24	102

To change the date groups to Years:

- Ensure that **A5** is selected (any one of the row labels could be used)
- Click **Group Field** on the **Options** tab

- Click **Months** to deselect it
- Click **Years** to select it



- Click **OK**

	A	B	C	D	E	F	G
1							
2							
3	Count of Annual Fee	Column Labels					
4	Row Labels	Bronze	Gold	Junior	Life	Silver	Grand Total
5	1988	3	5	1	2	3	14
6	1989	2	1	4		2	9
7	1990		1	1	1	2	5
8	1991		2	2	1	1	6
9	1992		2			1	3
10	1993	3					3
11	1994	1				2	3
12	1995	3	2			2	7
13	1996	2	6	5			13
14	1997	7	6		2		15
15	1998	3	2	4	2	6	17
16	1999		2			5	7
17	Grand Total	24	29	17	8	24	102

The labels and headings in the Pivot Table can be edited without affecting the data or headings in the original table.

It is usually more helpful and informative to change the text 'Row Labels' and 'Column Labels' to something more meaningful.

- Click into **B3**
- Type **Type of Membership**
- Press **Enter**
- Click into **A4**
- Type **Year**
- Press **Enter**
- Change the width of column B so that the text you typed is fully displayed

By default, text values are left aligned within the cells, and numerical values are right aligned. This misalignment is most obvious in the Bronze column, but you will change the alignment of all the column labels.

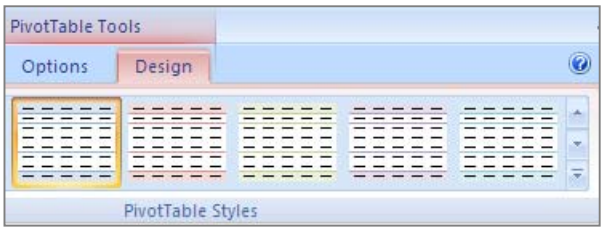
- Select the column labels in **B4:G4**
- Click the **Align Text Right** button in the **Alignment** group on the **Home** tab

	A	B	C	D	E	F	G
1							
2							
3	Count of Annual Fee	Type of Membership					
4	Year	Bronze	Gold	Junior	Life	Silver	Grand Total
5	1988	3	5	1	2	3	14
6	1989	2	1	4		2	9
7	1990		1	1	1	2	5
8	1991		2	2	1	1	6
9	1992		2			1	3
10	1993	3					3
11	1994	1				2	3
12	1995	3	2			2	7
13	1996	2	6	5			13
14	1997	7	6		2		15
15	1998	3	2	4	2	6	17
16	1999		2			5	7
17	Grand Total	24	29	17	8	24	102

Changing design options

Various Pivot Table styles are available to enhance the design of the report.

- Select **Sheet2**
- Click the **More** button on the **PivotTable Styles** group on the **Design** tab



More button

The full list of styles is displayed.

- Hover the mouse pointer over some of the styles to see the effect on the Pivot Table
- Select **Pivot Style Medium 2** from the **Medium** category

- Click on **Grand Totals** in the **Layout** group
- Select **On for Columns Only**
- Click on **Report Layout** in the **Layout** group
- Select **Show in Tabular Form**
- Click on the checkbox for **Banded Columns** in the **PivotTable Style Options** group so that a tick appears in the box

	A	B	C	D	E	F	G
1	Department	(All)					
2							
3	**Sum of Annual Fee**		Type				
4	Due2	Due	Bronze	Gold	Junior	Life	Silver
5	First Quarter	January	850	2251			1500
6		February	3400	7878.5	55		4500
7		March	1700	3376.5		110	750
8	**First Quarter Total**		5950	13506	55	110	6750
9	Second Quarter	April	2550		220		1500
10		May		6753	275		2250
11		June	1700			220	2250
12	**Second Quarter Total**		4250	6753	495	220	6000
13	Third Quarter	July	5100	5627.5	55		750
14		August	850	3376.5	110	55	
15		September		1125.5		55	2250
16	**Third Quarter Total**		5950	10129.5	165	110	3000
17	Fourth Quarter	October	1700	1125.5	110		1500
18		November		1125.5			750
19		December	2550		110		
20	**Fourth Quarter Total**		4250	2251	220		2250
21	**Grand Total**		20400	32639.5	935	440	18000

- Use the data on the **Data Sheet** worksheet to create the following Pivot Table report on a new worksheet (Hint: the **Annual Fee** field was used in the **Values** section)

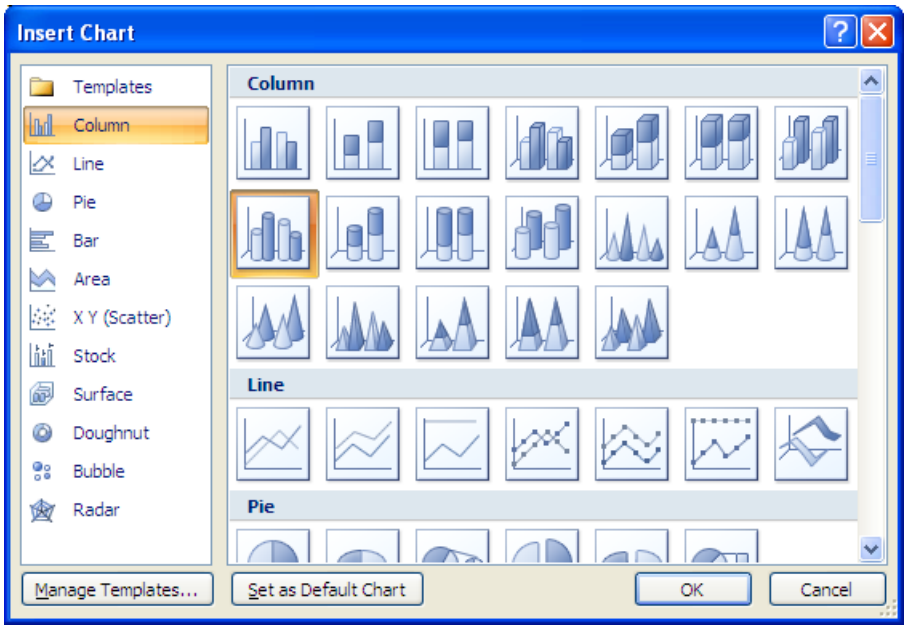
Department	Brokerage
Type	Gold
Year Joined	**Number of members**
1988	3
1996	2
1998	1
Grand Total	**6**

CREATING A PIVOT CHART

A Pivot Chart is a graphical representation of a Pivot Table.

- Select **Sheet3**
- Ensure that a cell in the Pivot Table is selected
- Click **PivotChart** from the **Tools** group on the **Options** tab
- Click on **Clustered Cylinder** (second row, first column)

Clustered Cylinder



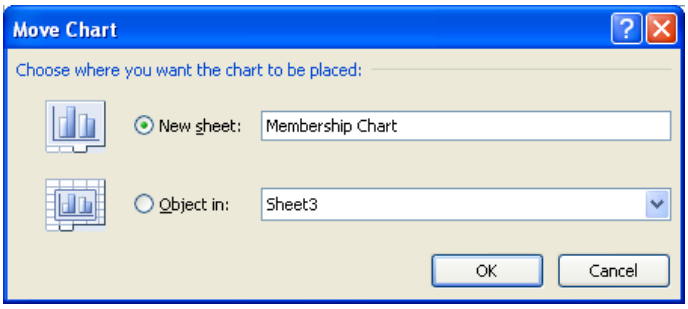
- Click **OK**

A chart is displayed on the worksheet together with a PivotChart Filter Pane.

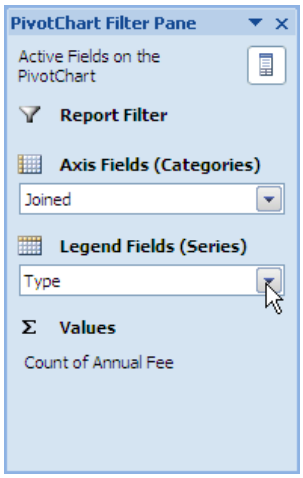
- Click **Move Chart** in the **Location** group on the **Design** tab

In the Move Chart dialog box:

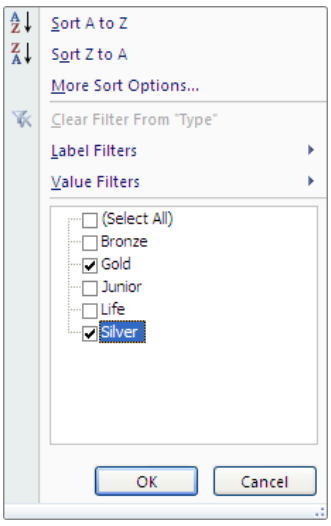
- Select **New Sheet**
- Change the name from Chart1 to **Membership Chart**



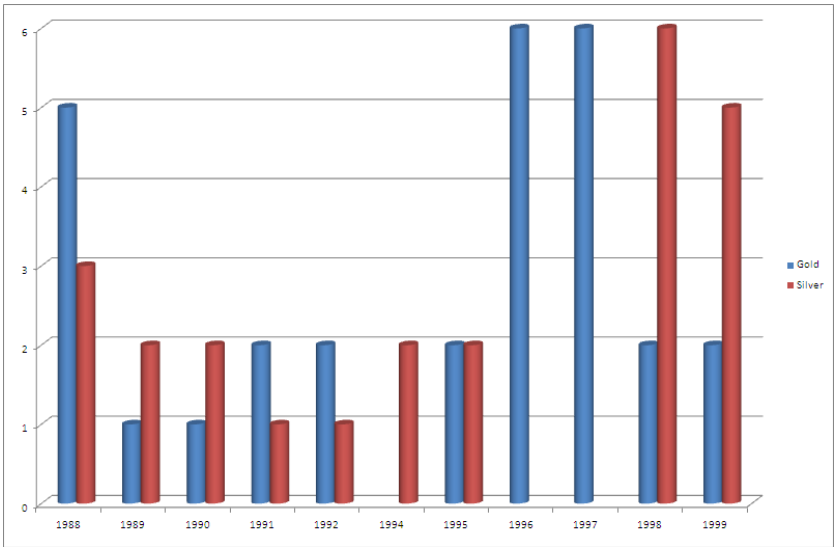
- Click **OK**
- Click the down arrow on the **Legend Fields (Series)** box in the PivotChart Filter Pane



- Click on **(Select All)** to remove all the ticks
- Click on **Gold** and **Silver**



- Click **OK**



Changes made to the underlying Pivot Table will be reflected in the Pivot Chart.

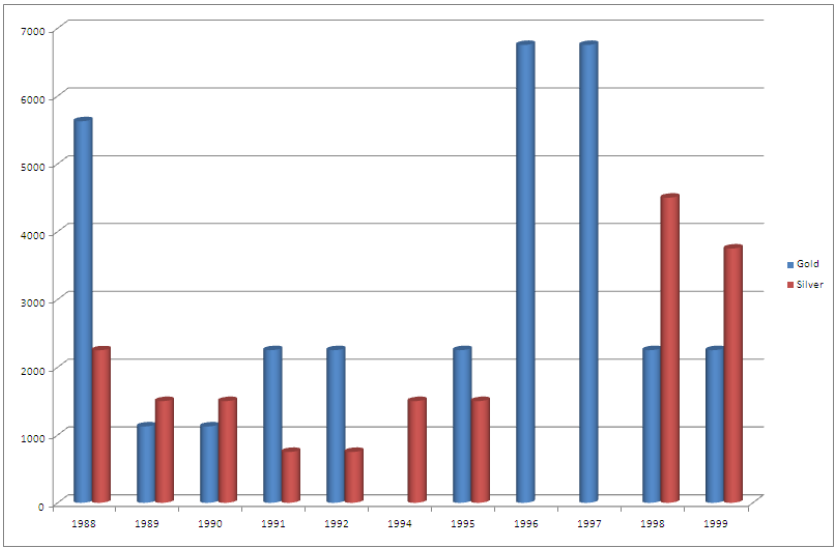
It is not necessary to close the PivotChart Filter Pane. It will be hidden when you click on an area outside the chart and reappear when the chart is selected.

If you do close the Filter Pane, to display it again:

- Click **PivotChart Filter** from the **Show/Hide** group on the **Analyze** tab

➢ Change the **Count of Annual Fee** to **Sum of Annual Fee** in the **Values** section of the PivotTable Field List pane

The chart is changed to reflect the new values.



➢ Save and close the **ClubMembership** workbook

FUNCTIONS

This section assumes that you are familiar with functions such as SUM, AVERAGE, COUNT and IF, and introduces you to a few more functions that Excel users find most useful.

LOOKUP

LOOKUP enables you to find information from a list without having to scroll through the list yourself. It finds a value in one row (or column) of values that are stored in ascending order and then returns the value from the same position in a different row (or column).

A LOOKUP table can contain two or more rows or columns – in the example that follows, the data is in columns. The first column contains the value you want to look up.

- Open a new blank workbook
- Enter the following data

	A	B	C
1	2	Blue	23
2	3	Green	45
3	5	Grey	65
4	6	Orange	34
5	9	Pink	67

The LOOKUP values (the values in the first column) must be in ascending order a-z or 1-10.

There are two formats for the syntax of the function.

Let's say that you need to know the colour that matches number 3.

1. In cell **A7**, enter the following:

   =lookup(3,A1:A5,B1:B5)

In this case the answer is **Green**.

Explanation:

LOOKUP is the name of the function
3 is the value you want to find
A1:A5 is the range in which to look for the value '3'
B1:B5 is the range from which to take the answer to be returned

The value '3' is found in the second row of A1:A5, therefore the value in the second row of B1:B5 is returned as the answer.

Using this syntax, you specify the range of cells holding the values you are looking up and the range of cells that contain the values for the result. These individual ranges must be single columns (or single rows).

This format is very flexible and could be used even if the two ranges are in different areas of the worksheet. You must remember, however, that the ranges must have the same length since the number of LOOKUP values must equal the number of possible results.

2. In cell **A8**, enter the following:

   =lookup(3,A1:B5)

The result is again **Green**.

With this syntax you specify just one range of cells. Excel will assume that the values to look up are in the first column (or row) and that the answers should be taken from the last column (or row).

- Edit the formula in **A8** to read:

  =lookup(3,A1:C5)

The result is now **45**, because the answer is taken from the last column of the given range – column C.

HLOOKUP AND VLOOKUP

These two functions do a similar job to the LOOKUP function in that they use a value that you supply in order to pick out the corresponding value from a given range.

VLOOKUP is used when you need to search through a column to find a specific value and HLOOKUP when you need to search a row.

As with the LOOKUP function, the column (or row) that contains the lookup list must be in alphabetical or numerical order.

- Add the column labels to the worksheet and include the data in column D

	A	B	C	D
1	Item No	Colour	Cost	Price
2	2	Blue	23	99
3	3	Green	45	65
4	5	Grey	65	90
5	6	Orange	34	67
6	9	Pink	67	87

You want to know the **price** of item number **6**.

You need to lookup the value 6 in column A, so you will use VLOOKUP.

- In cell **A10**, type the following:

  =vlookup(6,A2:D6,4)

The answer is **67**.

Explanation:

VLOOKUP	is the name of the function
6	is the value you are looking up
A2:D6	is the range containing both the lookup and results columns. The lookup column is always the first column in the range.
4	indicates that the fourth column in the range holds the results

- Amend the formula to find the **Cost** of item number **2**

It is also possible to find the price of item number 6 using HLOOKUP.

You will use HLOOKUP to lookup the word **Price** in the row of column labels. First you will change the label in column A to ensure that the column labels are in alphabetical order.

- Change the label in **A1** to **Article No**

	A	B	C	D
1	Article No	Colour	Cost	Price
2	2	Blue	23	99
3	3	Green	45	65
4	5	Grey	65	90
5	6	Orange	34	67
6	9	Pink	67	87

- In cell **A11**, type the following:

  =hlookup("price",A1:D6,5)

The answer is **67**

Explanation:

HLOOKUP	is the name of the function
"price"	is the value you are looking up. It is enclosed in inverted commas because it is text.
A1:D6	is the range containing the lookup and results rows. The lookup row is always the first row in the range.
5	specifies that the result is in the fifth row of the range

For the next exercise, assume that you work in a shop selling goods from the Jumble Sales Corporation. When you receive an order, the only information you have about the product is the Product Number. A LOOKUP table will be used to find the Product Name and the Unit Cost.

- Open the **LookupExercise** workbook from C:\ExcelAdvanced

- Ensure that the **Products** worksheet is selected

	A	B	C	D	E
1			Product Number	Product Name	Unit Cost
2	Enter Product Number		1	Woollen Gloves	£1.25
3			2	Thermal Gloves	£2.25
4	Product Name:		3	Felt Hat	£2.50
5	Unit Cost:		4	Woollen Hat	£1.75
6			5	Long Woollen Socks	£2.25
7			6	Short Cotton Socks	£1.50
8			7	Cashmere Sweater	£60.00
9			8	Woollen Sweater	£40.00
10					

You need to write a formula in B4 that will pull out the product name for any product number entered in cell B2.

- In cell **B4**, type the following:

  =vlookup(B2,C2:E9,2)

You get the error **#N/A** since there is not a value in B2 to lookup.

- In **B2**, enter **3**

B4 displays the name of Product Number 3.

	A	B	C	D	E
1			Product Number	Product Name	Unit Cost
2	Enter Product Number	3	1	Woollen Gloves	£1.25
3			2	Thermal Gloves	£2.25
4	Product Name:	Felt Hat	3	Felt Hat	£2.50
5	Unit Cost:		4	Woollen Hat	£1.75
6			5	Long Woollen Socks	£2.25
7			6	Short Cotton Socks	£1.50
8			7	Cashmere Sweater	£60.00
9			8	Woollen Sweater	£40.00

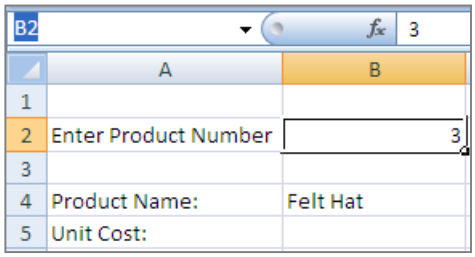
Naming ranges

You are going to name cells so they can be used in the lookup formula. A named area can be a single cell or a range. Using names rather than cell references can be easier when entering functions and formulas into a worksheet.

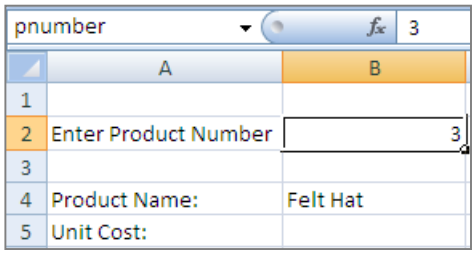
- Select cell **B2**

- Click in the Name Box

Name Box



- Delete the cell reference and type **pnumber**



- Press **Enter**
- Select cells **C2:E9** and name the range **products**
- In cell **B5**, type the following:

  =vlookup(pnumber,products,3)

- Press **Enter**

£2.50 is displayed as the Unit Cost.

How it works:

You named two areas of the worksheet as 'pnumber' and 'products'.

VLOOKUP	is the function name
pnumber	is the name of the cell (B2) that holds the value you are looking up
products	is the name of the range of cells (C2:E9) that contains both the lookup and results columns
3	specifies that the result is in the third column of the range

- Type different Product Numbers in **B2** and check that the Product Name and Unit Cost are displayed correctly each time

In the next exercise you will create lookup formulas to return the insurance value of different vehicles.

- Select the **Vehicles** worksheet

	A	B	C	D	E
1	*Vehicle Type*	*Insurance Band*			
2		**a**	**b**	**c**	**d**
3	**HGV**	£50	£65	£80	£95
4	**Motor Car**	£20	£30	£40	£50
5	**Van**	£25	£32	£43	£54
6					
7	The cost of insurance is:	this item is not in the list.			

- In **C7**, use the VLOOKUP function to find the cost of insuring a **Van** in insurance band **c** (remember that a text lookup value must be encased in double quotes.)
- Edit the function to find the cost of insuring an **HGV** in band **b**
- Select the **Insurance** worksheet

	A	B	C	D	E
1	*Vehicle Type*	*Insurance Band*			
2		**a**	**b**	**c**	**d**
3	**HGV**	£50	£65	£80	£95
4	**Motor Car**	£20	£30	£40	£50
5	**Van**	£25	£32	£43	£54
6					
7	**Type of vehicle**	HGV			
8	**Band**	a			
9					
10	The cost of insurance is:		£50		

To display the cost of insuring a **Van** in band **c**:

- In cell **B7**, type **Van**
- In cell **B8**, type **c**
- Press **Enter**

C10 displays the cost of the insurance.

	A	B	C
7	**Type of vehicle**	Van	
8	**Band**	C	
9			
10	The cost of insurance is:		£43

- In **B7**, create a drop list with the options **HGV**, **Motor Car**, and **Van**
- In **B8**, create a drop list with the options **a**, **b**, **c**, and **d**
- Using the drop lists, display the cost of insuring a **Motor Car** in band **d**

To investigate the formulas on this sheet:

- Click into cell **C10**

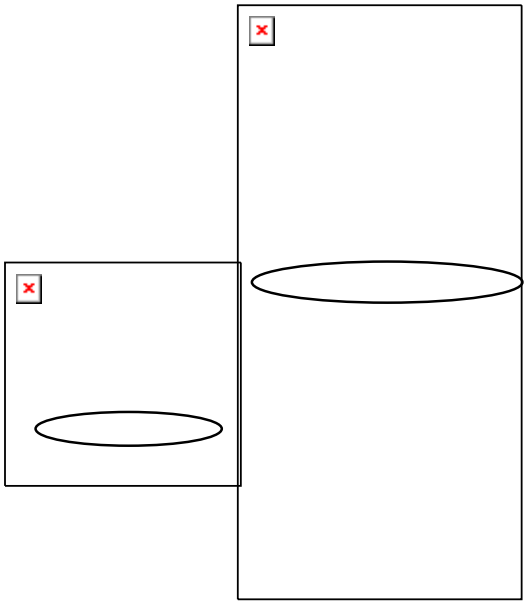
The formula displayed in the formula bar is **=VLOOKUP(B7,A2:E5,G8)**

This uses the VLOOKUP function to lookup the value of cell **B7** in the first column of the range **A2:E5**. The formula then looks at **G8** to decide which column to take the result from.

It will be useful to see what is in G8, but columns G and H are hidden.

To unhide columns G and H:

- Select columns **F** to **I**
- Click **Format** in the **Cells** group on the **Home** tab
- Move the mouse pointer to **Hide & Unhide**



- Select **Unhide Columns**

➢ Now select cell **G8**

The formula displayed in the formula bar is **=VLOOKUP(B8,G2:H5,2)**

This uses the VLOOKUP function to lookup the value of cell **B8** in the first column of the range **G2:H5** and displays the result from the second column of the range.

We noted earlier that the formula in C10 used the value in G8 to decide which column in the range A2:E5 it needed to look for the insurance cost. G8 was therefore set up to convert the insurance band codes to a column number.

➢ Hide columns **G** and **H**

Exact match and approximate match

So far, all the values that you looked up were found in the lookup table. However, if the value is not in the lookup table, then by default the function finds an approximate match. It takes a smaller value from the table that is closest to the value specified.

➢ Select the **Products** worksheet

➢ Change the Product Numbers in column C to: **1,2,3,4,10,12,19,25**

	A	B	C	D	E
1			Product Number	Product Name	Unit Cost
2	Enter Product Number	3	1	Woollen Gloves	£1.25
3			2	Thermal Gloves	£2.25
4	Product Name:	Felt Hat	3	Felt Hat	£2.50
5	Unit Cost:	£2.50	4	Woollen Hat	£1.75
6			10	Long Woollen Socks	£2.25
7			12	Short Cotton Socks	£1.50
8			19	Cashmere Sweater	£60.00
9			25	Woollen Sweater	£40.00

➢ In **B2**, enter **9**

The Product Number 9 does not exist, so VLOOKUP returns the Product Name and Unit Cost for the Product Number 4, which is the value less than 9 that is closest to it.

	A	B	C	D	E
1			Product Number	Product Name	Unit Cost
2	Enter Product Number	9	1	Woollen Gloves	£1.25
3			2	Thermal Gloves	£2.25
4	Product Name:	Woollen Hat	3	Felt Hat	£2.50
5	Unit Cost:	£1.75	4	Woollen Hat	£1.75
6			10	Long Woollen Socks	£2.25
7			12	Short Cotton Socks	£1.50
8			19	Cashmere Sweater	£60.00
9			25	Woollen Sweater	£40.00

This behaviour is very useful in some situations.

For example, if you are converting percentage scores to grades, the lookup table only needs to specify the minimum score for each grade.

- Select the **Grades** worksheet

	A	B
1	Grade Boundaries	
2	% Score	Grade
3	0	U
4	25	E
5	40	D
6	50	C
7	65	B
8	80	A

This lookup table will convert to grade 'U' any score from zero up to but not including 25. Any score from 25 up to but not including 40 will be converted to grade 'E', etc.

- In **E3**, type **40**
- In **E4**, create a lookup formula to convert the value in **E3** to a grade, using the lookup table **A3:B8**

From the table, the correct grade for 40% is D.

- Change the value in **E3** to **78**

78 is not a value in the table, so VLOOKUP goes to the closest value in the table that is smaller than 78 and returns a grade of B in E4, which is exactly what you wanted.

This default behaviour of VLOOKUP is not always desirable.

- Select the **Vehicles** tab
- Edit the formula in **C7** to lookup the cost for a **Mini Van** in band **c**

  =VLOOKUP("mini van",A2:E5,4)

A cost of £80 is displayed even though 'Mini Van' is not one of the vehicle types in the lookup table. This is because it looks at the next value that is lower in alphabetical order, HGV, and returns the cost for that value. This can fool you into thinking that the table includes the cost for a mini van.

In the above situation, to avoid confusion and misinterpretation, it would be useful to tell the function to look for an exact match. This is done by using a fourth argument in the function. This argument can take one of two values: TRUE or FALSE.

TRUE has the same effect as omitting the fourth argument (it looks for an approximate match)
FALSE returns an error message if an exact match cannot be found

- In **C7**, edit the formula as follows:

  =VLOOKUP("van",A2:E5,4,FALSE)

The function finds an exact match for 'van' and returns the correct cost of £43.

- In **C7**, edit the formula as follows:

  =VLOOKUP("mini van",A2:E5,4,FALSE)

This time the function does not find an exact match for 'mini van' and therefore displays the error message: #N/A.

This is better than giving an incorrect value, but it is still not ideal. Later on (page 148) you will look at a method for handling this type of error.

- Save and close the **LookupExercise** workbook

PROJECTING VALUES USING PMT AND FV

This section gives you practice in using the PMT (Payment) and FV (Future Value) functions.

PMT

Using PMT you can calculate the payments on a loan given that the interest rate is stable and the monthly payments are the same throughout the loan period.

For this exercise, we will presume that the directors of Jumble Sales Corporation are considering taking a loan to buy new machinery. However, they are concerned about the monthly payments they would be making. To help them decide which loan would be the most suitable, you will work out the repayments on £5,000, £10,000 and £15,000 over one, two and three year periods.

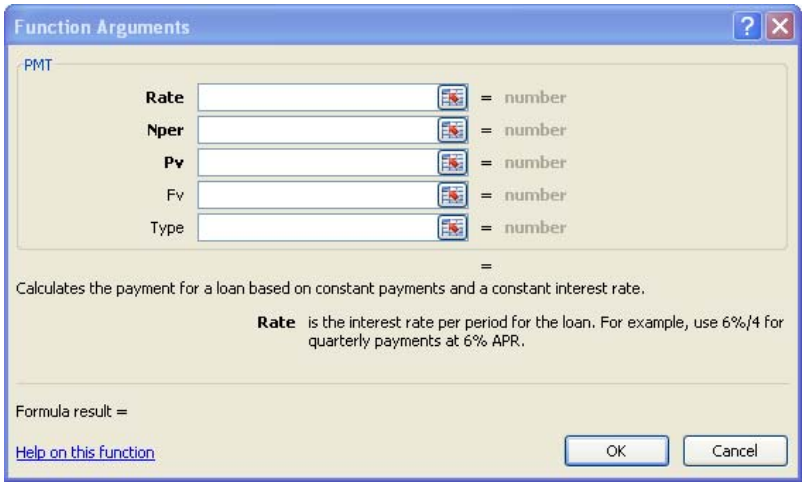
- Open the **PMTExercise** workbook from C:\ExcelAdvanced

	A	B	C	D
1	Payments on the loan		Interest rate	10%
2				
3	length of the loan in years	Amount Borrowed		
4		£5,000.00	£10,000.00	£15,000.00
5	1			
6	2			
7	3			

You will first calculate the repayment on £5,000 over one year.

- Click into cell **B5**
- Click **Financial** in the **Function Library** group on the **Formulas** tab
- Select **PMT** from the list of Financial functions

The Function Arguments dialog box for PMT is displayed.



- Click in each argument box in turn to see a brief explanation for each one

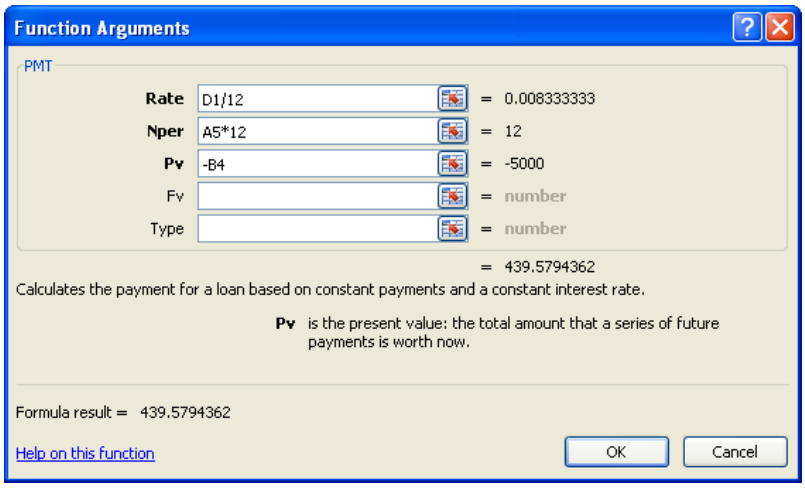
For this calculation you need the first three arguments only:

Rate the rate of interest (per payment period)
Nper the number of payments the loan covers
Pv the present value (the initial loan entered as a negative figure)

The interest rate shown in D1 is an annual rate. Since the repayments are monthly, the **Rate** argument must be D1 divided by 12.

The number of monthly repayments (**Nper**) is the length of the loan in years multiplied by 12.

- Enter the arguments as shown below



- Click **OK**

	A	B	C	D
1	Payments on the loan		Interest rate	10%
2				
3	length of the loan in years	Amount Borrowed		
4		£5,000.00	£10,000.00	£15,000.00
5	1	£439.58		
6	2			
7	3			

So for a loan of £5,000 over one year, the Jumble Sales Corporation will have to make 12 monthly payments of £439.58.

To copy this formula to other cells you will need to change the cell references in the formula to absolute and mixed references.

- Ensure that **B5** is selected

The formula displayed in the formula bar is **=PMT(D1/12,A5*12,-B4)**

- Click into the formula bar and make the following changes

Change **D1** to **$D$1** (this keeps the reference fixed when the formula is copied down or across)
Change **A5** to **$A5** (this allows the reference to change when you copy down, but remain fixed when you copy across)
Change **-B4** to **-B$4** (this allows the reference to change when you copy across, but not when you copy down)

The formula should now be **=PMT($D$1/12,$A5*12,-B$4)**

- Copy the formula down to years 2 and 3

- Copy the formulas across to see all the alternatives for each loan over the three years

The results should be as shown below.

	A	B	C	D
1	Payments on the loan		Interest rate	10%
2				
3	length of the loan in years	Amount Borrowed		
4		£5,000.00	£10,000.00	£15,000.00
5	1	£439.58	£879.16	£1,318.74
6	2	£230.72	£461.45	£692.17
7	3	£161.34	£322.67	£484.01

After looking at the figures, the directors of the Jumble Sales Corporation decide that instead of borrowing the money they will invest £5,000 over one year in a savings account that pays them a fixed rate of 5% interest.

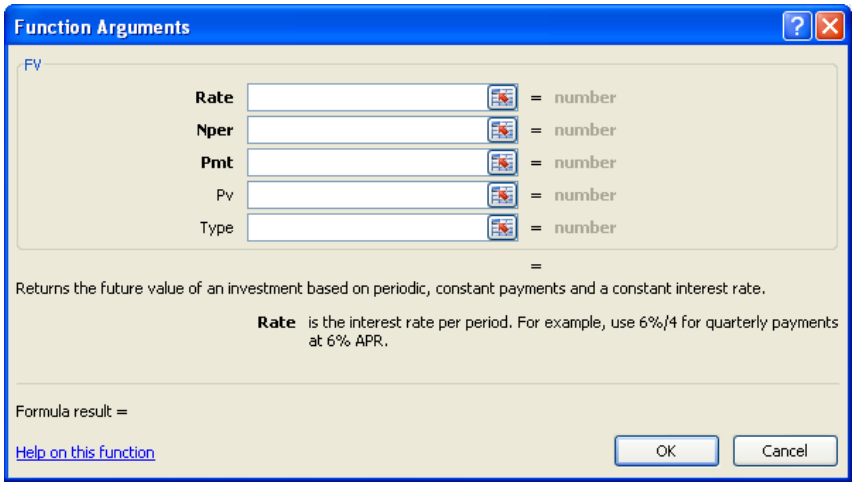
They will divide the investment into 12 equal monthly payments and would like to know what the future value of this investment will be.

- Using the same workbook, include the additional information shown below

	A	B	C	D
1	Payments on the loan		Interest rate	10%
2				
3	length of the loan in years	Amount Borrowed		
4		£5,000.00	£10,000.00	£15,000.00
5	1	£439.58	£879.16	£1,318.74
6	2	£230.72	£461.45	£692.17
7	3	£161.34	£322.67	£484.01
8				
9	Investment		Interest rate	5%
10				
11	1			
12	2			
13	3			

- Click into cell **B11**
- Display the list of **Financial** functions from the **Function Library** group on the **Formulas** tab
- Select **FV**

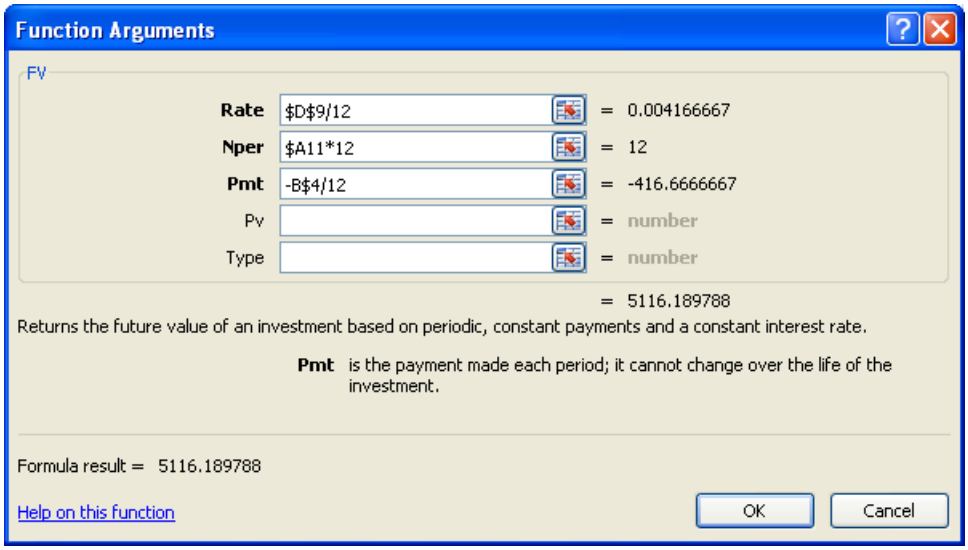
The Function Arguments dialog box for FV is displayed.



The Rate and Nper arguments are the same as the PMT function.

Rate the rate of interest (per payment period)
Nper the number of payments the investment covers (years multiplied by 12)
PMT the payment made each period

- Enter the arguments as shown below



- Click **OK**

	A	B	C	D
1	Payments on the loan		Interest rate	10%
2				
3	length of the loan in years	Amount Borrowed		
4		£5,000.00	£10,000.00	£15,000.00
5	1	£439.58	£879.16	£1,318.74
6	2	£230.72	£461.45	£692.17
7	3	£161.34	£322.67	£484.01
8				
9	Investment		Interest rate	5%
10				
11	1	£5,116.19		
12	2			
13	3			

After one year they can expect the account to hold £5,116.19.

- Copy the formula both across and down to see all the alternatives for each investment over one to three years

	A	B	C	D
1	Payments on the loan		Interest rate	10%
2				
3	length of the loan in years	Amount Borrowed		
4		£5,000.00	£10,000.00	£15,000.00
5	**1**	£439.58	£879.16	£1,318.74
6	**2**	£230.72	£461.45	£692.17
7	**3**	£161.34	£322.67	£484.01
8				
9	Investment		Interest rate	5%
10				
11	**1**	£5,116.19	£10,232.38	£15,348.57
12	**2**	£10,494.13	£20,988.27	£31,482.40
13	**3**	£16,147.22	£32,294.45	£48,441.67

- Save and close the workbook

SUMIFS AND COUNTIFS

SUMIFS

The SUMIFS function is used to sum data in a selected range when specified conditions are met.

- Open the **ClubMembership** workbook from C:\ExcelAdvanced
- Select the **Data Sheet** worksheet

The standard SUM function can be used to calculate the total Annual Fee, but if you need to calculate the total Annual Fee for the Maintenance department, or the total Annual Fee for the Maintenance staff who joined after 1995, then SUMIFS is the function to use.

The syntax for the SUMIFS function is:

=SUMIFS(sum range, criteria range, criteria,...)

Where:

sum range	is the range you want to sum
criteria range	is the range where you want to look for a specific condition
criteria	is the value or condition to look for in the criteria range

Sum range and criteria range must have equal length and shape.

SUMIFS allows you to have multiple criteria range and criteria pairs which enables you to sum data that satisfies many different criteria.

For the first example you will calculate the total Annual Fee for the Sales department.

- In **L3**, type **Annual fee for the Sales department**
- In **L4**, enter the following:

=SUMIFS(i7:i108,g7:g108,"sales")

The answer is **5031.5**

Explanation:

i7:i108	is the sum range (the range of cells to be summed)
g7:g108	is the criteria range (the range in which to look for the criteria)
"sales"	is the criterion to look for in g7:g108 (non numeric criterion must be enclosed within double quotes)

Next you will calculate the total Annual Fee for members of the Brokerage department who joined after 1995.

- In **L6**, type **Annual Fee for Brokerage staff who joined after 31/12/1995**
- In **L7**, enter the following:

=SUMIFS(i7:i108,g7:g108,"brokerage",d7:d108,">31/12/1995")

The answer is **4181.5**

Explanation:

i7:i108	the sum range
g7:g108,"brokerage"	first pair of criteria range and criteria
d7:d108,">31/12/1995"	second pair of criteria range and criteria

The function sums the cells in the sum range for the rows that satisfy both conditions.

COUNTIFS

The standard functions that are used to count cells in a range are COUNT, COUNTA and COUNTBLANK.

COUNT(range)	counts the cells in the range that contain numbers
COUNTA(range)	counts the non empty cells in the range
COUNTBLANK(range)	counts the empty cells in the range

The COUNTIFS function enables you to count only the cells that satisfy specific criteria.

The syntax is:

=COUNTIFS(criteria range, criteria,...)

Where:

criteria range	is a specified range
criteria	is the condition or value that cells in the specified range must satisfy in order to be counted

The next example shows how to count the number of Gold memberships.

- In **L9**, type **Number of Gold memberships**
- In **L10**, enter the following:

  =countifs(H7:H108,"gold")

The number of Gold memberships is **29**.

COUNTIFS can take multiple pairs of criteria range and criteria.

To find the number of staff in the Brokerage department with Gold memberships:

- In **L12**, type **Number of Gold memberships in Brokerage**
- In **L13**, enter the following:

  =countifs(H7:H108,"gold",G7:G108,"brokerage")

The answer is **6**.

The above formula counts the number of rows where gold is present in column H **AND** brokerage is present in column G.

- Save and close the workbook

SUMPRODUCT

SumProduct was designed to calculate the sum of the product of two or more arrays of numbers.

For example, consider the following data:

	A	B	C
1	**Product**	**Unit Price**	**Quantity**
2	pork pies	£3.50	5
3	longlife tofu	£8.00	2
4	marmalade	£2.25	4
5	dried fruits	£2.75	5
6	veggie-spread	£1.40	3
7	crab meat	£4.60	2

One method for calculating the total cost of all items would be to create a fourth column in the table in order to calculate and store the total cost of each product and then sum this column.

The SumProduct function can be used to calculate the total cost of the order without the need for an additional column.

The syntax for the function is:

=SUMPRODUCT(range 1, range 2, ...) for two or more ranges of equal length.

For example:

=SUMPRODUCT(A1:A4,B1:B4)

Will evaluate (A1*B1)+(A2*B2)+(A3*B3)+(A4*B4)

- Open a blank workbook
- Copy the data from the above table into cells **A1:C7**
- In cell **C8**, enter the formula:

=SUMPRODUCT(B2:B7,C2:C7)

This calculates (B2*C2)+(B3*C3)+(B4*C4)+(B5*C5)+(B6*C6)+(B7*C7) which is precisely the formula needed to calculate the total cost.

The answer is **69.65**

To verify that this is indeed the correct answer:

- In cell **D2**, enter: **=B2*C2** to calculate the cost of the pork pies
- Replicate this formula down column D for the other products
- In **D8**, use the sum function to add the values in the range **D2:D7**

The answer is **£69.65**, which agrees with the answer using the SumProduct function.

INDEX

The Index function returns the contents of a specified location within a given range. The location is specified by giving the row number and column number relative to the top left corner of the range.

The syntax for the function is:

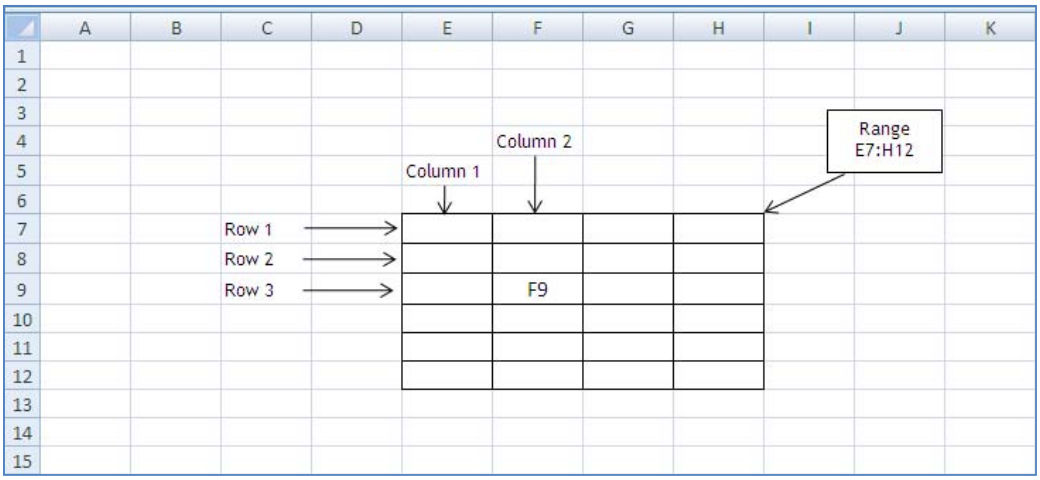
=INDEX(range, row number, column number)

Where:

range identifies the area where the function should look for values
row number specifies which row in the range to look at
column number specifies the column to look at

Example:

=INDEX(E7:H12,3,2) will return the value found in the 3rd row and 2nd column of the range E7:H12. i.e. the contents of cell F9.



- Open a blank worksheet
- Copy the following data into cells A3:B6

	A	B	C
1			
2			
3	T-Shirt	£6	
4	Jeans	£15	
5	Jacket	£35	
6	Pyjamas	£10	
7			

- In **B8**, enter the following formula:

  =INDEX(A3:B6,3,2)

This picks out the value in the third row and second column within the range A3:B6, giving an answer of **35**.

MATCH

The Match function returns the position of a specific value in a given list of values. The values can be listed in a single column range or in a single row.

The syntax for the function is:

=MATCH(value, range, match type)

Where:

value is the value to search for
range is a one-dimensional range in which to look for a match for value
match type is the single digit 0, 1 or -1

Three possible values may be used for the match type:

0	=	Find the first value that is an exact match
1	=	Use the next lower value if an exact match is not found (the range must be in ascending order of size)
-1	=	Use the next higher value if an exact match is not found (the range must be in descending order of size

Example:

In the list of items that you typed earlier:

	A	B	C
1			
2			
3	T-Shirt	£6	
4	Jeans	£15	
5	Jacket	£35	
6	Pyjamas	£10	
7			

If you needed to find out where 'Jacket' was in the list, you could use the following formula:

=MATCH("Jacket",A3:A6,0)

This is equivalent to asking which position in the range A3:A6 has a value exactly equal to 'Jacket'.

- In **D2**, enter the following formula:

  =MATCH("Jacket",A3:A6,0)

The answer is **3**, since Jacket is the third item in the list.

Combining INDEX and MATCH

When used together, the Index and Match functions become a powerful tool for extracting data from a table.

The syntax for the Index function is:

=INDEX(range, row number, column number)

The Match function can be used to calculate the row number value and/or the column number value that is needed for the Index function.

For example, given this data:

	A	B	C
1			
2			
3	T-Shirt	£6	
4	Jeans	£15	
5	Jacket	£35	
6	Pyjamas	£10	
7			

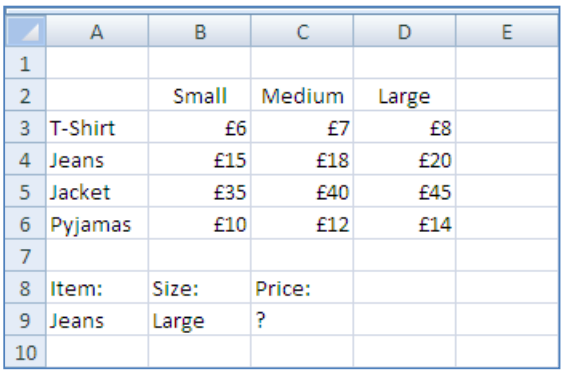
To find the cost of the Jacket, you will use the Match function to find out how far down the list you need to go to find 'Jacket' and then use this in the Index function to pick out the appropriate cost.

- In **B9**, enter the following formula:

  =INDEX(A3:B6,MATCH("Jacket",A3:A6,0),2)

  - The Match function finds 'Jacket' to be the third item in the list
  - The Index function picks out this third item in the second column in the specified range A3 to B6
  - The answer given is 35

- Enter the following data on the worksheet:



	A	B	C	D	E
1					
2		Small	Medium	Large	
3	T-Shirt	£6	£7	£8	
4	Jeans	£15	£18	£20	
5	Jacket	£35	£40	£45	
6	Pyjamas	£10	£12	£14	
7					
8	Item:	Size:	Price:		
9	Jeans	Large	?		
10					

- In cell **C9**, use the Index function with the range **B3:D6** to pick out the price of a large pair of Jeans

One possible formula is:

=INDEX(B3:D6,2,3)

since the price of a large pair of Jeans is stored in the second row and third column of the specified range B3:D6.

- Now change the formula in **C9** so that it will automatically update to give the price for whatever item is specified in cell A9
  (Hint: use the Match function to work out in which row the Index function should look for the price)

- Type Pyjamas in cell **A9** and check that C9 gives the correct answer automatically

The formula you should now have in **C9** is:

=INDEX(B3:D6,MATCH(A9,A3:A6,0),3)

- Now change the formula in **C9** so that it will automatically update to give the price for whatever size is specified in cell B9
  (Hint: use the Match function to work out in which column the Index function should look for the price)

- Change **A9** and **B9** to **T-Shirt** and **Small** respectively

- Check that **C9** gives the correct answer of **6**

The formula you should now have in C9 is:

=INDEX(B3:D6,MATCH(A9,A3:A6,0),MATCH(B9,B2:D2,0))

- Open the **LookupExercise** workbook from C:\ExcelAdvanced
- Select the **Insurance** worksheet
- In **D10**, use the Index and Match functions to calculate the cost of insuring the vehicle type specified in B7 and Insurance band specified in B8

The answer should be the same as C10.

- Save and close the LookupExercise workbook
- Close any other open workbook without saving

WHAT-IF ANALYSIS TOOLS

What-if analysis is carried out to study the variation of the output to changes in the input variable.

Tool	Description
Goal seek	Use this when you know what result you are looking for from a formula, but not the value that the formula requires in order to calculate the answer.
Data table	This is a range of cells that shows how changing one or two variables in your formula will affect the results of the formula. Data tables provide a shortcut for calculating multiple results in one operation and a way to view and compare the results of all the different variations together on your worksheet.

GOAL SEEK

- Open the **Analysis** workbook from C:\ExcelAdvanced
- Ensure that the **GS example** worksheet is selected

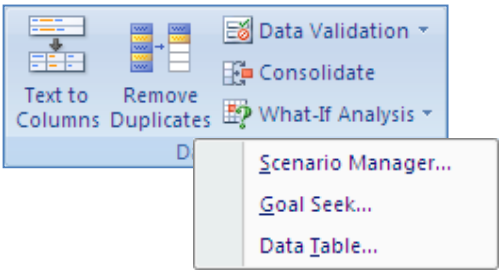
	A	B
1	Monthly deposit	£150
2	Annual interest rate	5%
3	Number of years	3
4	Final amount	£5,813.00

The formula in B4 uses the FV function to calculate the final amount that will be payable to you if you invested £150 monthly for 3 years at a rate of 5%.

However, you need the final amount to be £7,000. You therefore want to know how many years it will take to achieve this amount if the monthly deposit and annual rate remain the same.

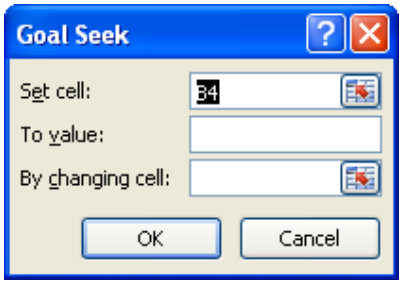
Goal Seek was designed to provide such an answer.

- Click into **B4** (this is the cell that you want to set)
- Click **What-If Analysis** from the **Data Tools** group on the **Data** tab



➢ Select **Goal Seek**

The Goal Seek dialog box is displayed.

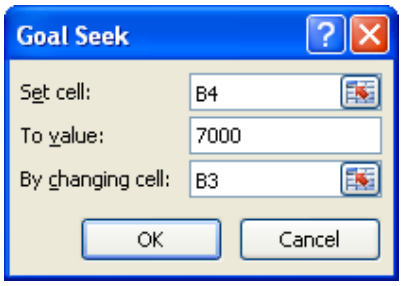


B4 is automatically inserted in the **Set cell** box.

➢ In the **To value box**, type **7000**

To achieve this value, you want Goal Seek to alter the number of years for the investment. This value is stored in B3.

➢ In the **By changing cell** box, type **B3**



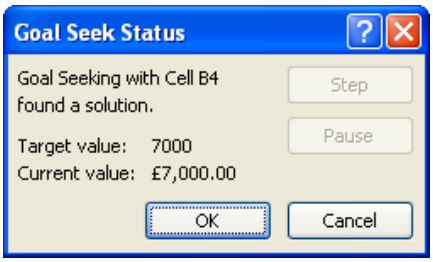
➢ Click **OK**

The worksheet displays the new figures.

	A	B
1	Monthly deposit	£150
2	Annual interest rate	5%
3	Number of years	3.561022
4	Final amount	£7,000.00

You can see from the figures that in just over 3½ years the investment will amount to £7,000.

The Goal Seek Status is also displayed. It shows that it has managed to achieve the target that was set.

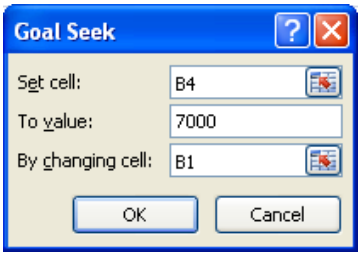


We do not want to keep this solution on the worksheet.

- Click **Cancel**

Instead, you want to leave the investment period as 3 years and see what amount you will need to deposit each month to achieve the £7,000.

- Ensure that **B4** is selected
- Select **What-If Analysis** on the **Data** tab
- Choose **Goal Seek**
- Enter **7000** as the value to achieve
- Enter **B1** as the cell to change



- Click **OK**

	A	B
1	Monthly deposit	£181
2	Annual interest rate	5%
3	Number of years	3
4	Final amount	£7,000.00

The figures show that £181 monthly deposit will achieve £7,000 after 3 years.

- Click **OK** to accept these figures in the worksheet

DATA TABLE

- Select the **1-D table** worksheet

	A	B
1	Monthly deposit	£150
2	Annual interest rate	5%
3	Number of years	3
4		Final amount
5	years	£5,813.00
6	1	
7	2	
8	3	
9	4	
10	5	
11	6	
12	7	

The formula in B5 uses the values in B1, B2 and B3 to calculate the final amount payable to you if you invest £150 each month for 3 years at 5% interest, as in the previous example.

This time however, you want to create a table to show the amounts you will receive for investments over different time periods.

The Data table tool will do this for you automatically.

➢ Select **A5:B12**

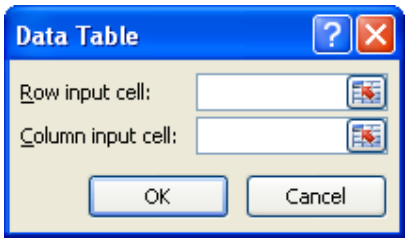
Note that this selection includes:

- The cell with the formula, B5
- The range containing the different values to take for the number of years
- A range of blank cells in which to display the answers

➢ Click **What-If Analysis** in the **Data Tools** group on the **Data** tab

➢ Select **Data Table**

The Data Table dialog box is displayed.



➢ In the **Column input cell** box, type **B3**

This is because in this example, the tool needs to fill in the results down the column, changing the value for the number of years, and in the formula, B3 is the cell reference for the number of years.

➢ Click **OK**

	A	B
1	Monthly deposit	£150
2	Annual interest rate	5%
3	Number of years	3
4		Final amount
5	years	£5,813.00
6	1	£1,841.83
7	2	£3,777.89
8	3	£5,813.00
9	4	£7,952.23
10	5	£10,200.91
11	6	£12,564.64
12	7	£15,049.30

This next exercise is an example of how to create a two dimensional Data Table.

- Select the **2-D table** sheet

	A	B	C	D	E	F	G	H	I
1	Monthly deposit	£150							
2	Annual interest rate	5%							
3	Number of years	3							
4	Final amount								
5	£5,813.00	1%	2%	3%	5%	8%		Interest rate	
6	1								
7	2								
8	3								
9	4								
10	5								
11	6								
12	7								
13									
14	Years								

The formula in A5 uses the values in B1, B2 and B3 to calculate the amount you will receive at the end of the investment.

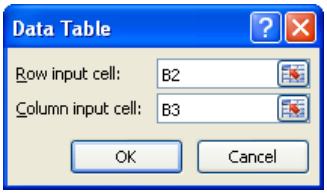
You will use the Data Table tool to complete the two dimensional table, showing the different amounts payable when you vary both the interest rate and the duration of the investment.

- Select the range **A5:F12**

The range selected must include:

- The cell with the formula, A5
- The different values to use for the number of years, arranged in a column
- The different values to use for the interest rate, arranged in a row

- Click **What-If Analysis** in the **Data Tools** group on the **Data** tab
- Select **Data Table**
- In the **Row input cell** box, type **B2**
- In the **Column input cell** box, type **B3**



- Click **OK**

	A	B	C	D	E	F	G	H	I
1	Monthly deposit	£150							
2	Annual interest rate	5%							
3	Number of years	3							
4	Final amount								
5	£5,813.00	1%	2%	3%	5%	8%		Interest rate	
6	1	£1,808.27	£1,816.59	£1,824.96	£1,841.83	£1,867.49			
7	2	£3,634.71	£3,669.85	£3,705.42	£3,777.89	£3,889.98			
8	3	£5,479.50	£5,560.52	£5,643.08	£5,813.00	£6,080.33			
9	4	£7,342.82	£7,489.34	£7,639.68	£7,952.23	£8,452.49			
10	5	£9,224.86	£9,457.10	£9,697.01	£10,200.91	£11,021.53			
11	6	£11,125.80	£11,464.58	£11,816.91	£12,564.64	£13,803.80			
12	7	£13,045.85	£13,512.58	£14,001.29	£15,049.30	£16,817.00			
13									
14	Years								

The table shows for example, that depositing £150 monthly for 6 years at a rate of 2% per annum will yield a final sum of £11,464.58.

- Save and close the Analysis workbook

MACROS

A macro is a series of commands that can be triggered by a keyboard shortcut, a button on the Quick Access Toolbar, or from the macro dialog box.

If you perform the same tasks on a regular basis you may consider creating a macro to automate the process.

In the Office applications, macros are written in Visual Basic for Applications (VBA). But for those who cannot write VBA code, Excel allows you to record a series of steps – using keyboard and mouse – that is then converted into VBA.

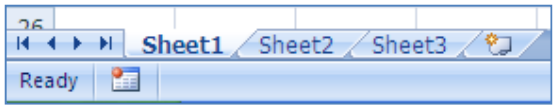
RECORDING A MACRO

You are going to record two macros: one that will unlock the cells in a selected range and another to protect the active worksheet.

- Open a new blank workbook

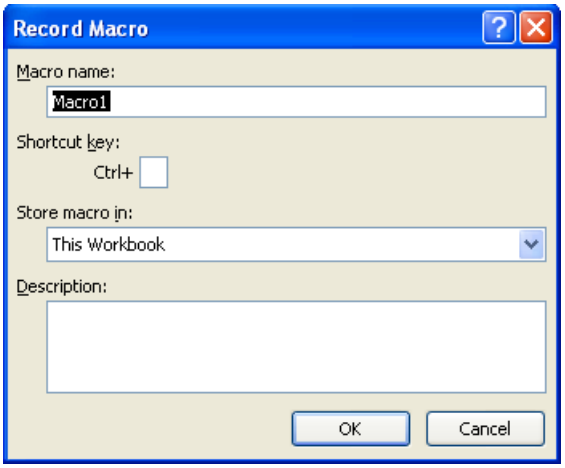
When you start the macro recorder, it records every action that you make and every instruction that you give, until you stop the recording.

- Click the **Record Macro** button located at the bottom of the sheet



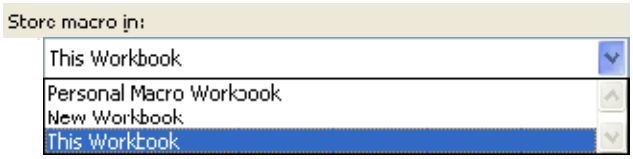
Record Macro button

The Record Macro dialog box is displayed.



- In the **Macro name** box type **UnlockSelection**
- Click the down arrow in the **Store macro in** box

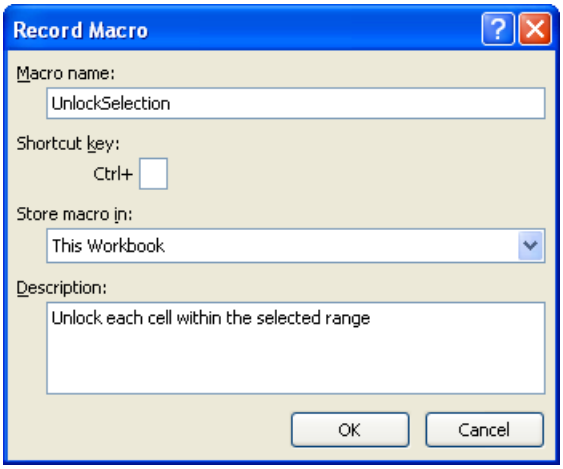
You have three choices:



Personal Macro Workbook	Stores the macro in a hidden workbook that opens automatically every time Excel is launched. Using this option makes the macro always available
New Workbook	Stores the macro in a new workbook
This Workbook	Stores the macro in the active workbook (the workbook you are currently using)

To decide where to store the macro, you need to realise that the macro can be used only when the workbook where it is stored is open.

- Select **This Workbook**
- In the **Description** box, type **Unlock each cell within the selected range**

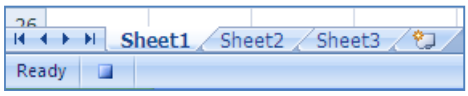


There is also a Shortcut key section on the dialog box. You will return to this later.

- Click **OK** to start the recorder

The Record Macro button changes to a Stop Recording button. Everything you do from now will be recorded as part of the macro until you stop the recording.

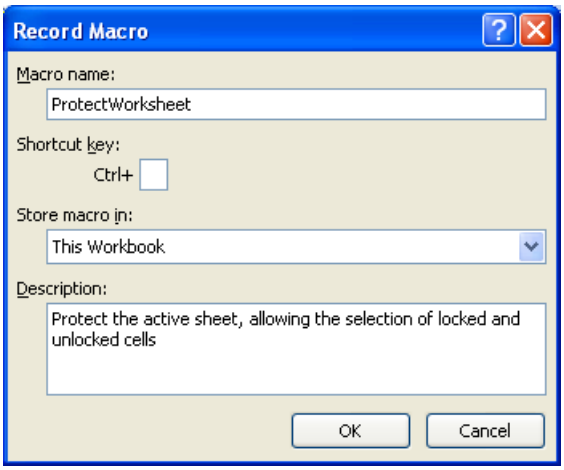
- Click **Format** in the **Cells** group on the **Home** tab
- Select **Lock Cell** to unlock the selected cell
- Click the **Stop Recording** button



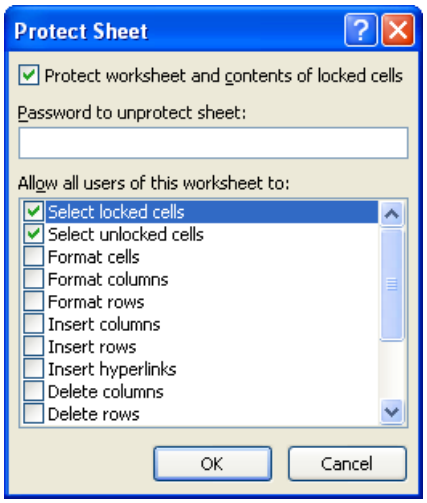
Stop Recording button

You will now create the second macro.

- Click the **Record Macro** button
- Complete the Record Macro dialog box as illustrated below



- Click **OK** to start the recorder
- Click **Format** from the **Cells** group on the **Home** tab
- Select **Protect Sheet**
- Ensure that the check box to **Protect worksheet and contents of locked cells** is ticked
- Ensure also that the options to **Select locked cells** and **Select Unlocked cells** are ticked

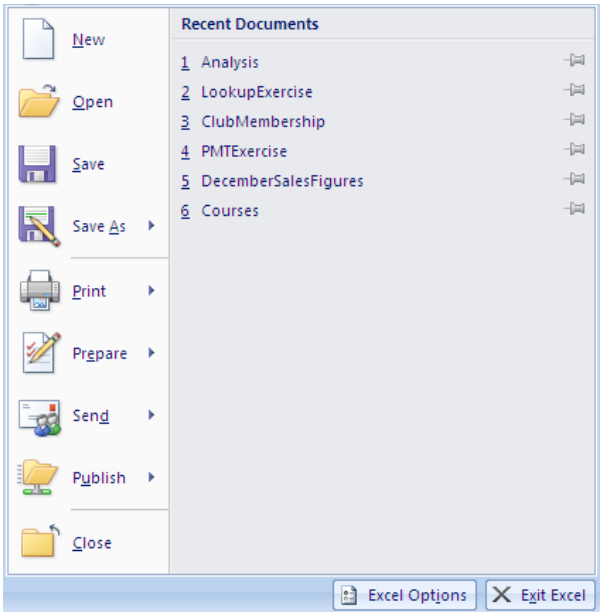


- Click **OK**
- Stop the recording

RUNNING A MACRO

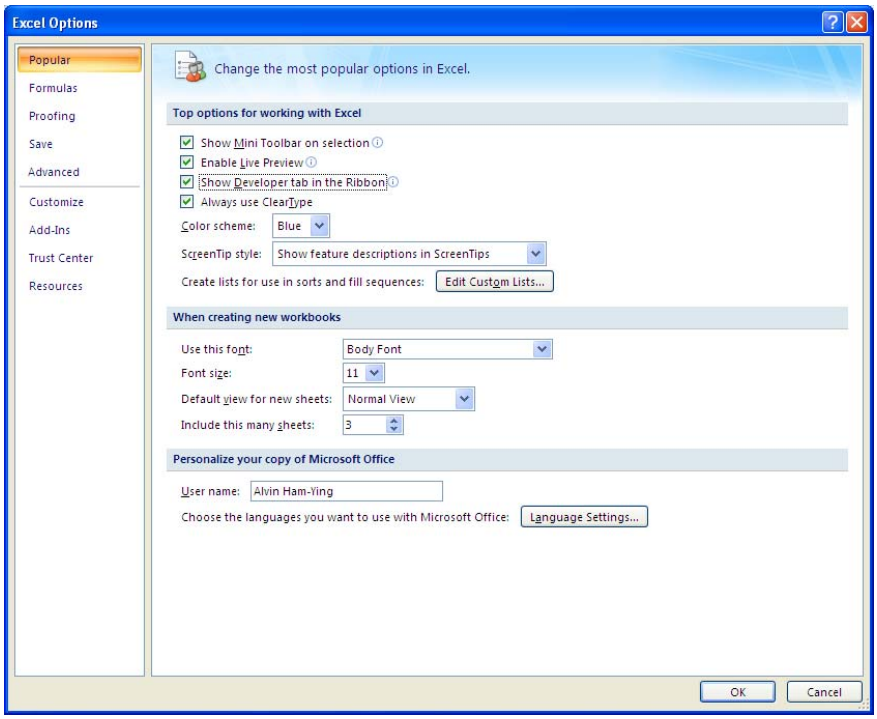
In order to see the list of available macros, you need to display the Developer tab.

- Click the **Office Button**
- Click the **Excel Options** button



The Excel Options dialog box is displayed.

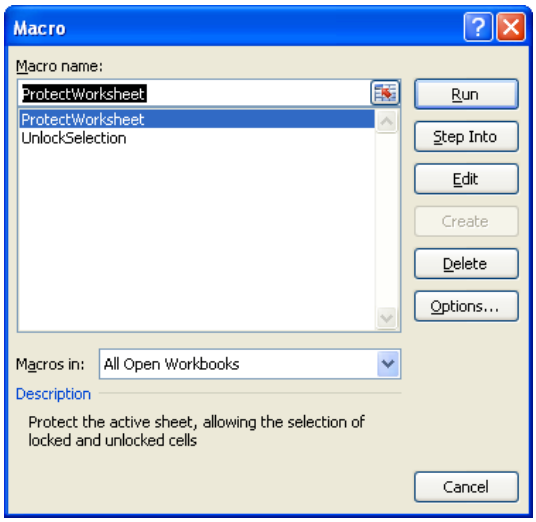
- Click on **Show Developer tab in the Ribbon** to put a tick in the check box



- Click **OK**

- Click **Macros** from the **Code** group on the **Developer** tab

The Macro dialog box is displayed and lists the two macros that you recorded.



You are not ready to run the macros yet.

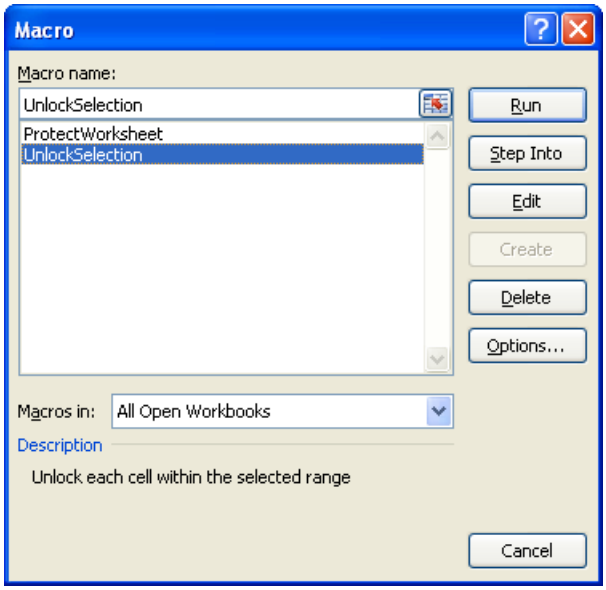
- Click **Cancel**

- Select **Sheet2**
- Type the following in the first four cells of Columns **A** and **B**

	A	B
1	a	1
2	b	2
3	c	3
4	d	4

You will now use the macros to unlock the cells in Column B and then protect the sheet.

- Select **Column B**
- Click **Macros** in the **Code** group on the **Developer** tab
- Select **UnlockSelection** from the list of macros



- Click **Run**

The commands in the macro are executed and the dialog box is closed.

- Run the **ProtectWorksheet** macro

If the macros worked correctly, you will be able to select any cell in Sheet2, but you can only edit the contents of the cells in Column B.

- Click into **B1**
- Change the value to **12**
- Click into **A3**
- Type your name

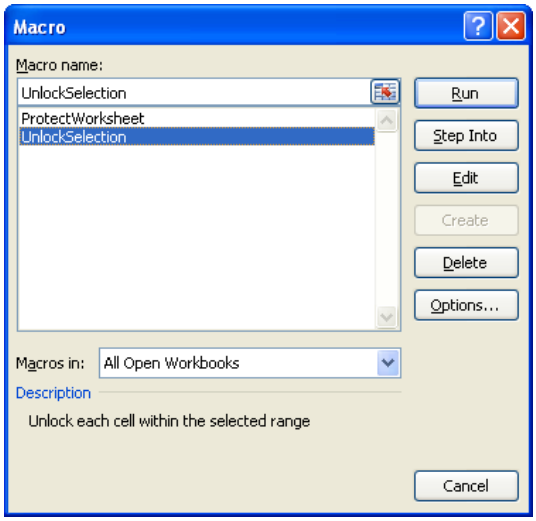
You are not able to type in A3 and a message is displayed, warning you that the cell is protected.

- Click **OK** to close the warning

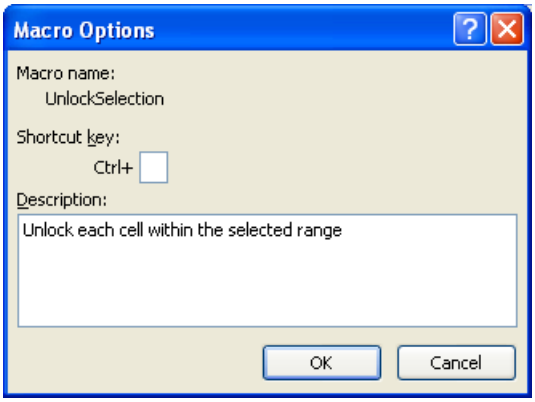
Using a shortcut key

The Macro dialog enables you to set a shortcut key, which when pressed will run the macro.

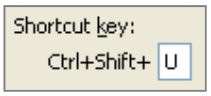
- Select **Macros** from the **Code** group on the **Developer** tab
- Select the **UnlockSelection** macro and click **Options**



The Macro Options dialog box is displayed.



- Click into the **Shortcut key** box
- Hold down the **Shift** key and tap **U**



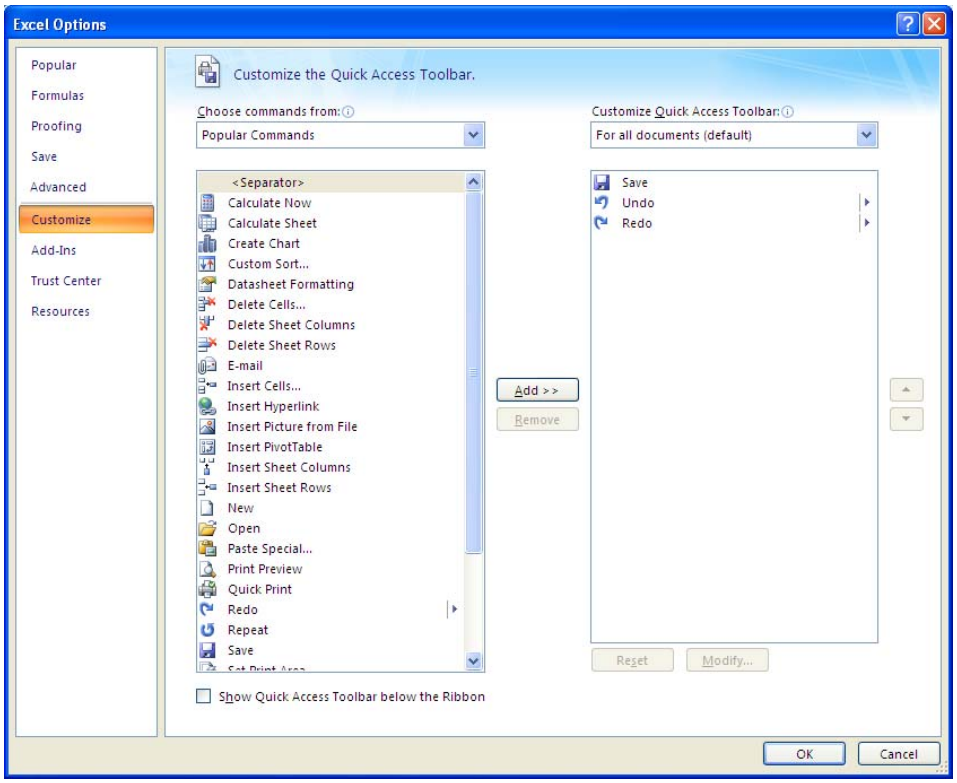
The dialog box records the Shortcut key as **Ctrl + Shift + U**

- Click **OK**
- For the **ProtectWorksheet** macro, set the Shortcut key as **Ctrl + Shift + P**
- Click **Cancel** to close the Macro dialog box
- Select **Sheet3**
- Select the range **B2:F4**
- Press **Ctrl + Shift + U** to run the UnlockSelection macro
- Press **Ctrl + Shift + P** to run the ProtectWorksheet macro
- Check that the macros were run successfully by checking that only the cells in the range B2:F4 can be edited

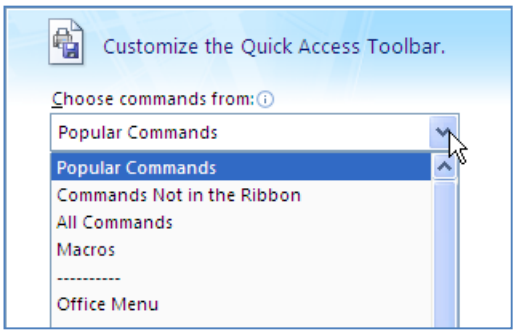
- With Sheet3 selected, create a macro to unprotect the worksheet (set the Shortcut key as Ctrl + Shift + W)
- Check that your macro works by using the shortcut key on Sheet2

Your macros can also be launched using Shortcut buttons on the Quick Access Toolbar.

- Click the **Office Button**
- Click **Excel Options**
- Select the **Customize** category

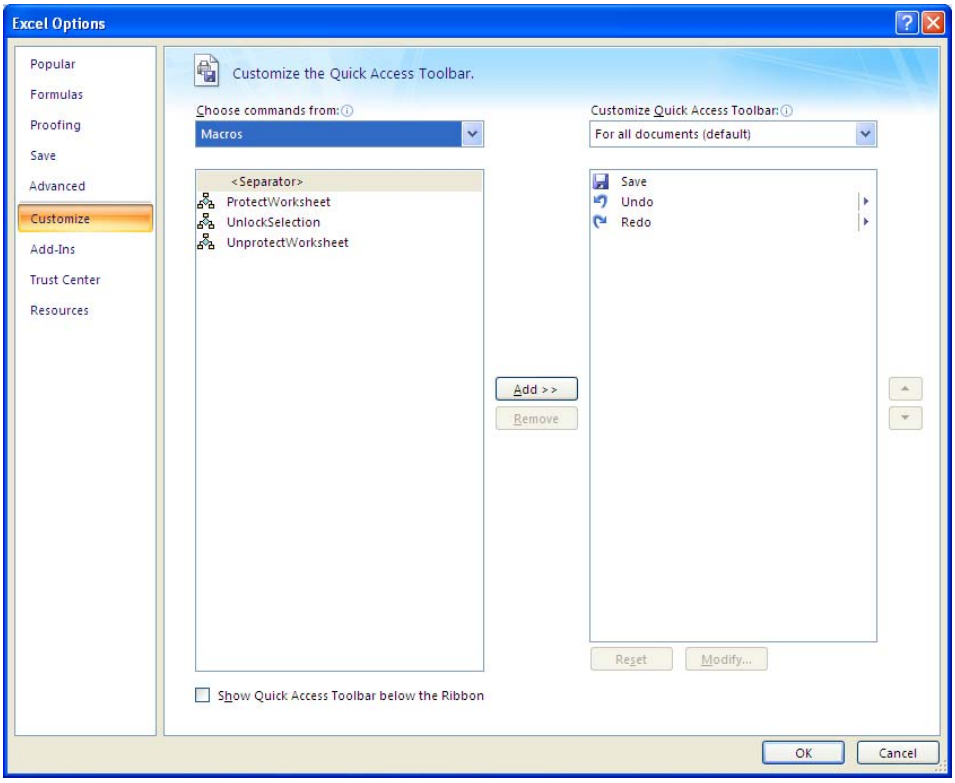


- Click the down arrow in the **Choose commands from** box



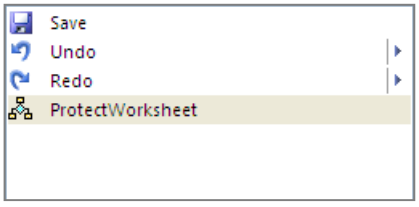
- Select **Macros**

The list of macros is displayed.



- Select **ProtectWorksheet**
- Click **Add**

The macro is added to the list in the right pane.

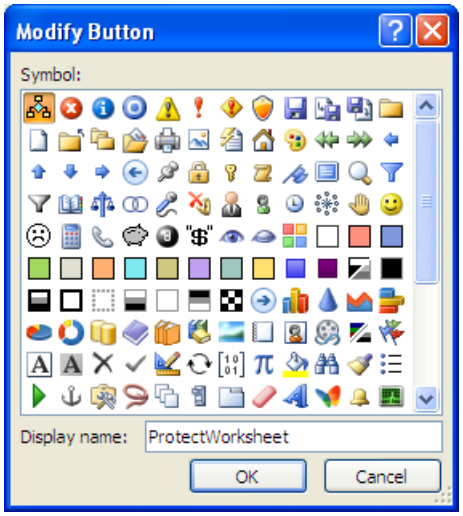


All of the macros have got the same icon, therefore it is advisable to change the icon for your macro.

To change the icon:

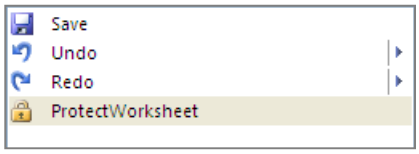
- Ensure that the **ProtectWorksheet** macro is selected in the right pane
- Click the **Modify** button

The Modify Button dialog box is displayed.



- Select any icon from the list (I selected the lock)
- Click **OK**

The new icon is displayed in the list.



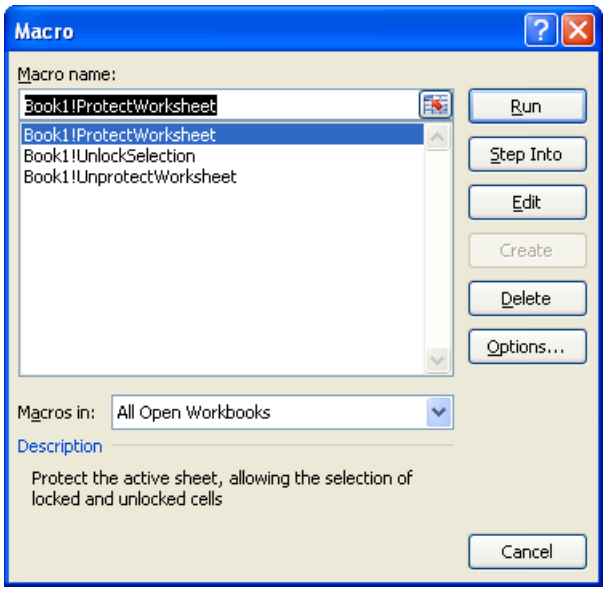
- Click **OK**

The Excel Options dialog box is closed and the macro is displayed on the Quick Access Toolbar.

- Add the **UnprotectWorksheet** and **UnlockSelection** macros to the Quick Access Toolbar
- Check that the macros work correctly from the Quick Access Toolbar

- Open the **LookupExercise** workbook (do not close the current workbook)
- Select **Macros** from the **Code** group on the **Developer** tab

The macros recorded in the other workbook are listed in the Macro dialog box, and are available for you to use in this workbook. Providing the workbook in which a macro is stored is open, it can be used in any other workbook.

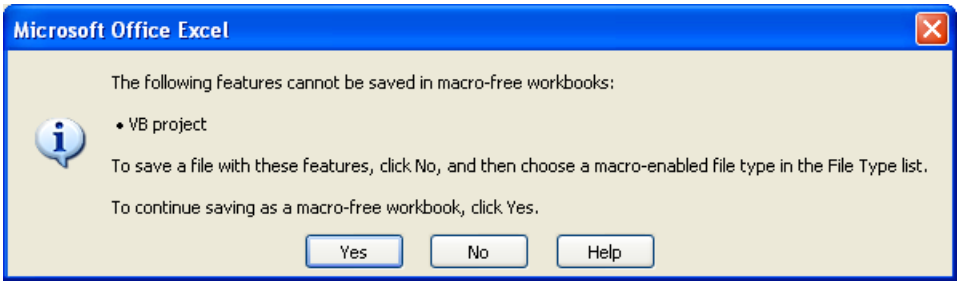


- Click **Cancel** to close the Macro dialog box
- Select the **Insurance** tab
- Select cells **B7** and **B8**
- Run the **UnlockSelection** macro
- Run the **ProtectWorksheet** macro
- Check that you can use the worksheet to display different insurance costs by changing the values in B7 and B8 but that you are not allowed to change the table or the formula in C10
- Close the LookupExercise workbook without saving

The workbook in which your three macros are stored should still be open.

- Click the Save button on the Quick Access Toolbar
- In the **Save As** dialog box, change the File name to **ExcelAdvancedMacros** and click **Save**

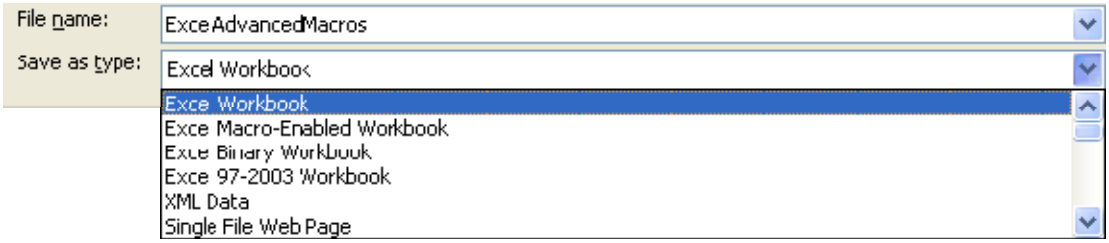
A message is displayed, informing you that your workbook has features that cannot be saved in Excel's standard macro-free workbook format.



If you click No, the saving process will be cancelled.

If you click Yes, the file will be saved as a macro-free workbook, meaning that the macros will not be saved with the workbook.

- Click **No**
- In the Save As dialog box, click the down arrow in the **Save as type** box



- Select **Excel Macro-Enabled Workbook** from the list of file types
- Click **Save**

This workbook is now saved with the macros embedded. If you wish to use any of these macros, then open this workbook and the macros will be available for use.

- Close the workbook

ERROR HANDLING

Sometimes error indicators are displayed in your spreadsheet even though no mistake was made when setting up the sheet. This can make your spreadsheet look rather unprofessional at best.

Usually you can predict instances when these errors will occur. For example, #N/A is displayed when a cell referenced in a formula does not have a value. Also, #DIV/0! is displayed when a formula is attempting to divide by zero.

To properly handle most of the errors that can occur, you will need to use the Visual Basic for Applications (VBA) programming language to write code for your spreadsheet. However, for those who do not know VBA, Excel has a few built-in functions that can help you to manage certain anticipated error indicators.

IFERROR

The IFERROR function can be used to prevent some of these error indicators from appearing, and in some cases provide useful information or instruction for the user.

- Open the **LookupExercise** workbook
- Select the **Products** tab
- Delete the value in **B2**

B4 and B5 both display the error #N/A.

	A	B	C	D	E
1			Product Number	Product Name	Unit Cost
2	Enter Product Number		1	Woollen Gloves	£1.25
3			2	Thermal Gloves	£2.25
4	Product Name:	#N/A	3	Felt Hat	£2.50
5	Unit Cost:	#N/A	4	Woollen Hat	£1.75
6			10	Long Woollen Socks	£2.25
7			12	Short Cotton Socks	£1.50
8			19	Cashmere Sweater	£60.00
9			25	Woollen Sweater	£40.00

- Click into **B4**

You know that the formula in B4 will produce the correct answer if a legitimate product number is typed in cell B2. Your aim therefore is to stop the error indicator, #N/A, from appearing and replace it with a useful message.

The syntax for the IFERROR function is:

=IFERROR(expression, value_if_error)

Where:

expression is your original formula that calculates the value for the cell
value_if_error is the alternative value that you want displayed in the cell if the expression generates an error of any type

- Edit the formula in **B4** to read:

  =IFERROR(VLOOKUP(B2,C2:E9,2), "Enter a product number in B2")

- Ensure that column B is wide enough to display the full text

- Select **B5**

You do not need any additional instruction in this cell, so you will edit the formula to display an empty cell if an error occurs.

- Edit the formula in **B5** to read:

  =IFERROR(VLOOKUP(pnumber,products,3), "")

The following display is achieved:

	A	B	C	D	E
1			Product Number	Product Name	Unit Cost
2	Enter Product Number		1	Woollen Gloves	£1.25
3			2	Thermal Gloves	£2.25
4	Product Name:	Enter a product number in B2	3	Felt Hat	£2.50
5	Unit Cost:		4	Woollen Hat	£1.75
6			10	Long Woollen Socks	£2.25
7			12	Short Cotton Socks	£1.50
8			19	Cashmere Sweater	£60.00
9			25	Woollen Sweater	£40.00

- Enter a legitimate product number in B2 to check that the original formula still works as expected

The formula in **C7** on the **Vehicles** sheet gives an error message if an exact match is not found.

- Edit the formula to display the message "**This information is not available**" if an exact match is not found

- Save and close the workbook