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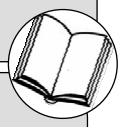

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Contents

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Quick reference: Excel shortcut keys

Command	Shortcut keys
Related to course topics/units	
Defining a named range	Ctrl+F3
Creating a named range from labels	Ctrl+Shift+F3
Paste a defined name into a formula	F3
Launch Insert Function wizard	Shift+F3
Select from dropdown list in a cell (including within a pivot table)	Alt+Down arrow; Down arrow+Enter to select item
Group selected items in a pivot table	Alt+Shift+Right arrow
Ungroup selected items in a pivot table	Alt+Shift+Left arrow
Create a pivot chart from a pivot table	F11
Display the Macros dialogue box	Alt+F8
Display the Visual Basic Editor	Alt+F11

Other general shortcuts	
Absolute/relative/mixed reference	F4
AutoSum	Alt =
Close	Ctrl-W
Copy	Ctrl-C
Cut	Ctrl-X
Show values/formulas	Ctrl-pipe key (below Esc)
Edit cell	F2
Find	Ctrl-F
Formula	=
Move left/right one screen	Alt-PgUp/PgDn
Move to beginning of worksheet	Ctrl-Home
Move to edge of region	Ctrl-Arrow
Move to end of row	End, Enter
Move to end of worksheet	Ctrl-End
New	Ctrl-N
Next worksheet	Ctrl-PgUp
Open	Ctrl-O
Paste	Ctrl-V
Previous worksheet	Ctrl-PgDn
Print	Ctrl-P
Repeat/Redo	Ctrl-Y
Replace	Ctrl-H
Save	Ctrl-S
Select worksheet	Ctrl-A
Spelling and Grammar check	F7
Underline	Ctrl-U
Undo	Ctrl-Z

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Notes

Using logical functions

This unit focuses on using the IF function, nesting IF functions and using IF in combination with other logical functions, AND and OR.

Unit objectives

By the end of this unit, you will be able to:

- Use the IF function to create conditional formulas
- Create a nested IF function to determine multiple outcomes for a single condition
- Use the IF function in combination with AND and OR functions to evaluate multiple criteria within a conditional formula
- Name ranges in a spreadsheet
- Used named ranges for the purposes of navigation and within formulas.

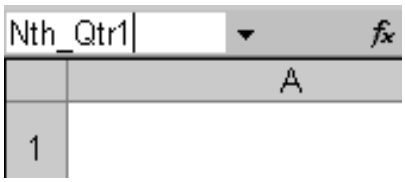
Working with named ranges

Naming ranges is useful for spreadsheet navigation, and when writing formulas. The focus here is on use for navigation purposes.

Creating a named range

To create a name for a cell or cell range:

- Select the cell/s from the spreadsheet
- Click in the Name box (above column A)
- Enter a name for the range – a name **cannot** contain spaces
- Press Enter



Navigating to/selecting a named range

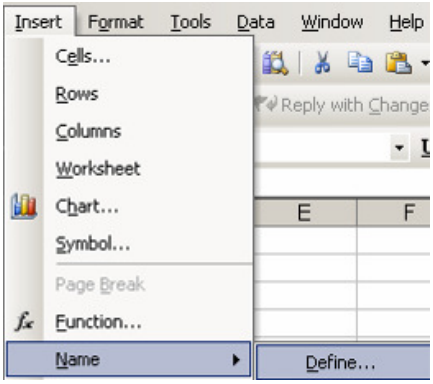
To automatically select cells in a named range:

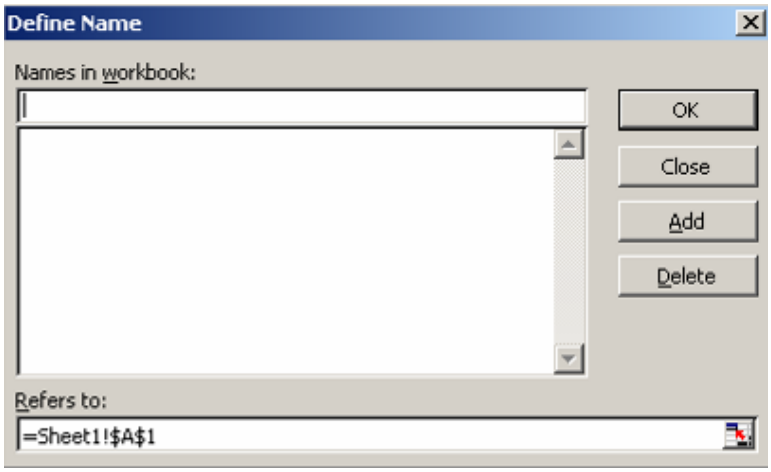
- Click the dropdown arrow to the right of the name box
- Select the name for the cell/cell range to automatically select it

Editing a named range

To change the cell range that a name refers to:

- Go to Insert-Name-Define
- Select the named range to be edited
- Under Refers to, click the cell selection button and reselect cells to be included in the range 
- Click OK





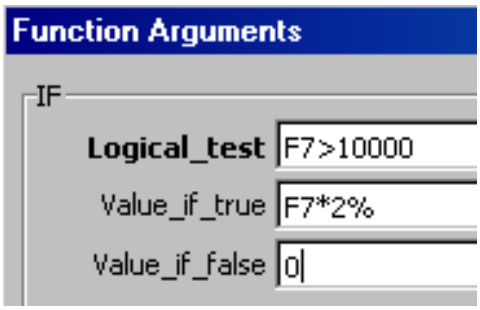
Using a named range within a formula

Once a range has been named, the name can be used in formulas in place of the usual cell references, e.g. if the range A2:A50 has been named as Qtr1sales, a formula to create a total for these sales could be input as =SUM(Qtr1sales) instead of =SUM(A2:A50).

The IF function

The IF function contains three parts or arguments:

- The logical test, which states which cell needs to be evaluated, and how (e.g. is it equal to/less than/greater than a certain value?)
- The value_if_true, what result is displayed if the result of the evaluation is true?
- The value_if_false, what result is displayed if the result of the evaluation is false?



The IF function arguments shown here would tell Excel:

"If the value in cell F7 is greater than 10000, then multiply the value in F7 by 2%, otherwise display 0."

The AND Function

The AND function can accept up to 30 arguments. It will return true if **all** of its arguments are true.

If **one** or more arguments are false, the AND function will return false.

The OR Function

The OR function can accept up to 30 arguments. It will return true if **at least one** of the arguments to the function are true.

If **all** arguments are false, the OR function will return false.

Nesting functions

It is possible to use a function as one of the arguments of another function. For example, the following formula uses nested AVERAGE and SUM functions:

=IF(AVERAGE(F2:F5)>50,SUM(G2:G5),0)

which translates to:

"If the average of the values in cells F2 to F5 is greater than 50, add the values in the cells G2 to G5, if not, then display 0."

In Excel 2003, a formula can contain a *maximum of 7 levels of nested functions*. The example above uses *2 levels* of functions, as the AVERAGE and SUM functions are used as part of the arguments within the IF function.

When working with nested functions, it is generally easier to type the formula directly into the spreadsheet. Each new function will require a set of brackets to open **(** and close **)** the function.

Examples of nested functions

=IF(F7>200,F7*5%,if(F7>99,F7*3.5%,0)))

> "If the value in F7 is greater than 200, multiply the value in F7 by 5%; if the value in F7 is greater than 99 but less than 200, multiply the value in F7 by 3.5%; otherwise if the value in F7 is less than or equal to 99, enter 0."

Nested functions can also be created using the IF and OR functions together; or the IF and AND functions together.

For example:

Function combination	**Why is this useful?**
IF function + AND function	Allows testing of multiple values within the logical test part of the IF function. If all values evaluated by the AND function return a TRUE result, then Excel performs the value_if_true part of the IF function.
IF function + OR function	Allows testing of multiple values within the logical test part of the IF function. If at least one of the values evaluated by the OR function return a TRUE result, then Excel performs the value_if_true part of the IF function.

=IF(AND(F7>45,G7="overdue"),"to debt collection","")

> "If the value in F7 is greater than 45, **and** cell G7 contains the word overdue, then enter the words to debt collection; otherwise leave the cell blank.

=IF(OR(F7>45,G7="overdue"),"to debt collection","")

> "If the value in F7 is greater than 45, **or** cell G7 contains the word overdue, then enter the words to debt collection; otherwise leave the cell blank.

Using logical functions Practice Activity

1. Open the file **Grade allocation.xls**.
2. We wish to determine whether a student qualifies for bonus marks.
   To qualify they must meet all the following criteria;
   - the average grade of the student is greater than 12;
   - student marks allocated in Test 2 exceed 8
   - student marks allocated in Test 4 exceed 19.

   Use the AND function to verify that the three conditions stated above in step (2) have all been met. The AND function will generate a TRUE response if all three conditions have all been met.

3. Place cursor in cell H2, to determine if Anna is eligible for a bonus.
4. Copy formula down for all students.
5. Create, in the column titled “Bonus Marks Awarded”, an IF calculation to show 10 bonus marks awarded if it is true they qualify for a bonus, and to show the text “None”, if they do not qualify for a bonus.
6. Copy formula down for all students
7. Create, in the column titled “At Least One Condition Met”, a calculation to determine if at least one of the conditions in step (2) has been met by any students.
8. Copy formula down for all students.
9. Create, in the column titled “Total”, a calculation to determine a student marks total inclusive of bonus.
10. Copy formula down for all students.
11. Create, in the column titled “Final grade”, a nested IF calculation to determine a student’s final grade. Please view the worksheet titled “Grade table” for information on grading levels.
12. Copy formula down for all students
13. Save and close **Grade allocation**.

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Working with lookup functions

This unit focuses on using the lookup functions, VLOOKUP and HLOOKUP.

Unit objectives

By the end of this unit, you will be able to:

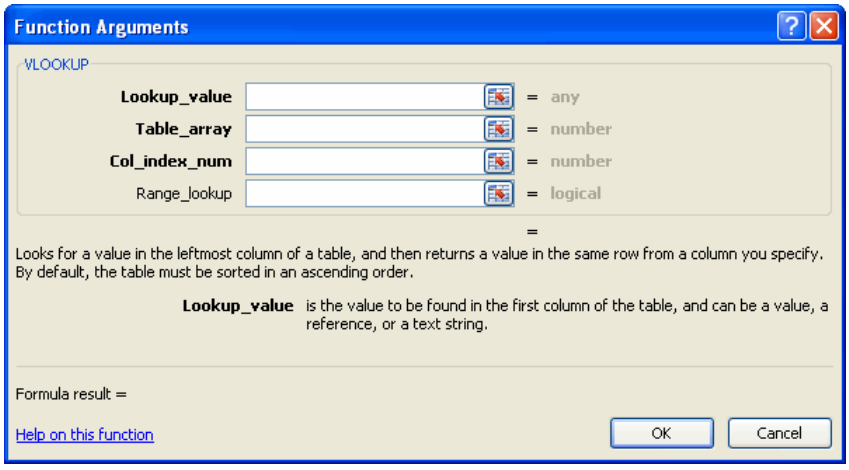
- Identify situations where use of VLOOKUP or HLOOKUP are appropriate
- Use the VLOOKUP function to extract a piece of data from a database
- Use the HLOOKUP function to extract a piece of data from a database.

VLOOKUP function

The VLOOKUP function is designed to extract a single piece of information from within an Excel database.

The VLOOKUP function contains four parts or arguments:

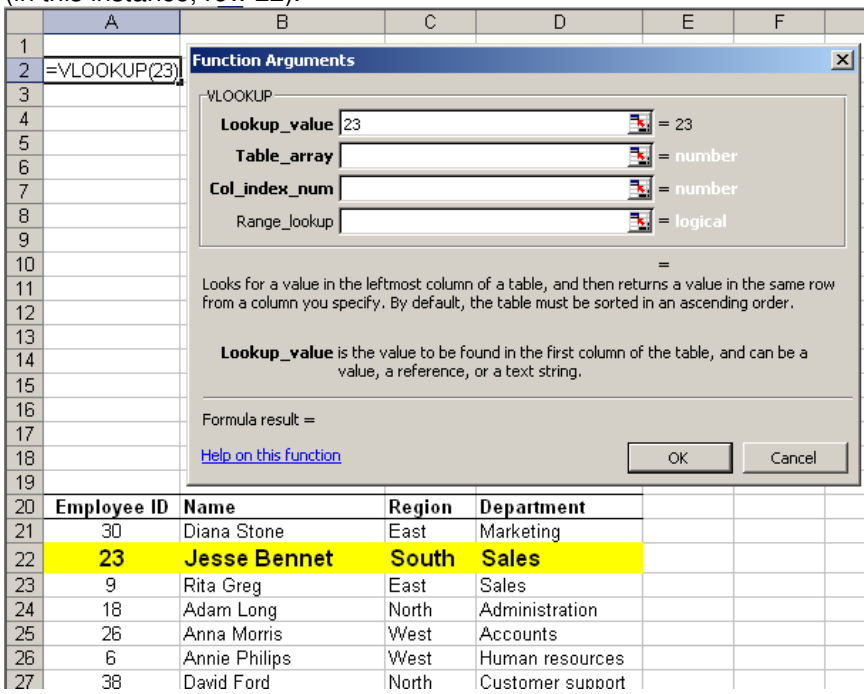
- The Lookup value, which is the piece of information or data Excel is required to locate firstly. The Lookup value must be unique within the table array, and must also be located within the left most column of the table array.
- The Table Array, which is a reference to the database/cell range within which Excel needs to find the lookup value; and the piece of data associated with the lookup value that will be extracted from the database.
- The Column Index Number, which is the number of the column within the table array that Excel needs to extract the piece of data from. The leftmost column in the table is given the index number of 1, and the other columns numbered 2, 3, 4 etc (depending how many columns there are in the table array).
- The Range Lookup, which is used to specify whether an exact match or an approximate match to the Lookup value is required. An exact match is denoted by entering false; an approximate match by entering true or leaving Range Lookup blank.



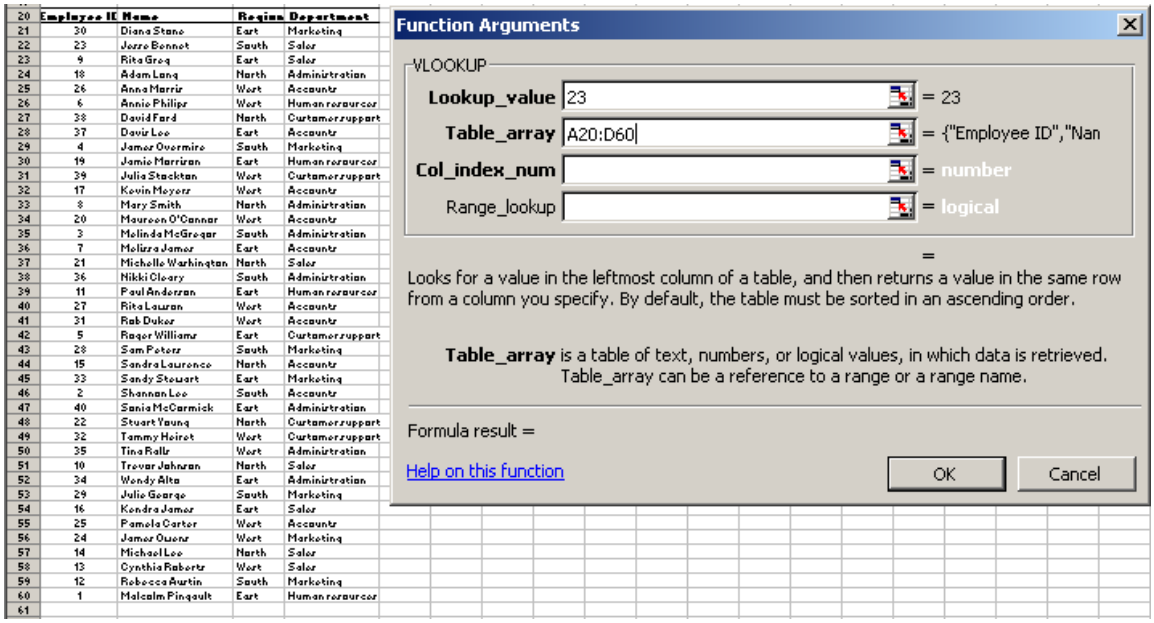
Example

Using VLOOKUP to locate information about an employee from a database.

- Lookup value – find the Employee ID number 23. This allows Excel to identify the **row** that it needs to extract data from (in this instance, row 22).

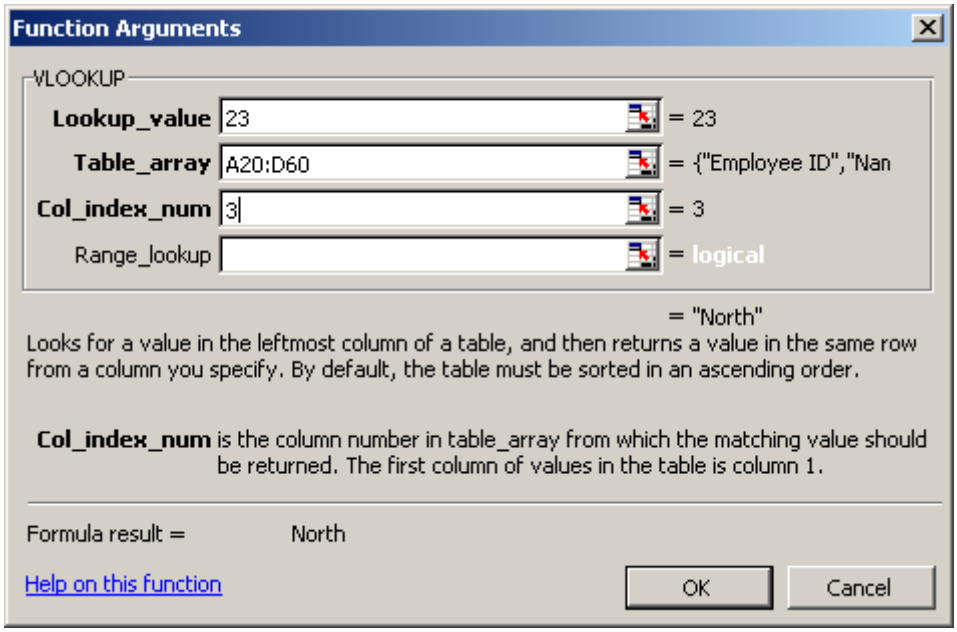


- Table array – this is the database within which the data to be extracted is stored. If the database has been named, the name can be entered here.



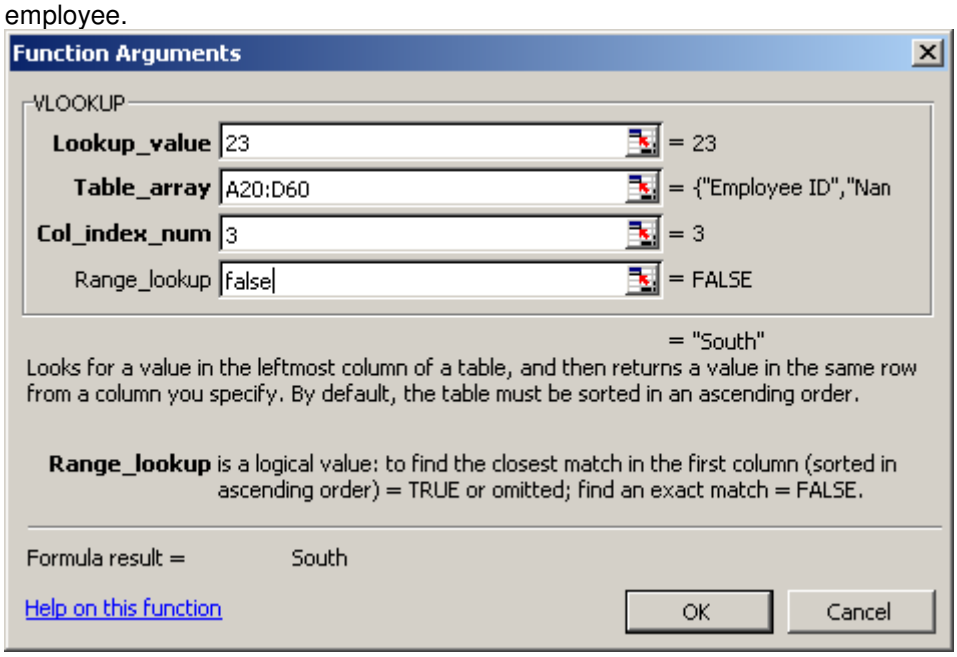
- Column index number – each column in the table array is given a number, starting at 1 from the left. The column index number allows Excel to identify which **column** in the database it needs to extract data from (in this instance, the column 3 in the table array).

	1	2	3	4
20	Employee ID	Name	Region	Department
21	30	Diana Stone	East	Marketing
22	23	Jesse Bennet	South	Sales
23	9	Rita Greg	East	Sales
24	18	Adam Long	North	Administration
25	26	Anna Morris	West	Accounts
26	6	Annie Philips	West	Human resources

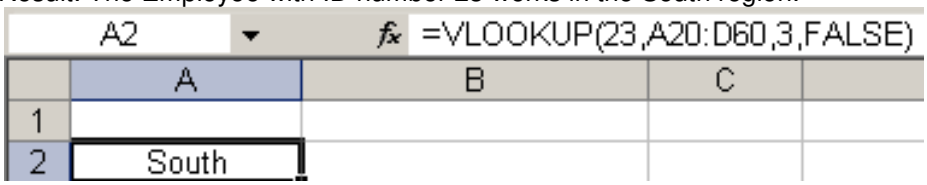


Excel now has the location of a cell to extract data from, since it has located the lookup value identifying the row, and the column index number identifying the column.

- Range lookup: entering false denotes that an exact match to the lookup value (the Employee ID number 23) is required. Otherwise the information that is extracted might be incorrect for that particular employee.



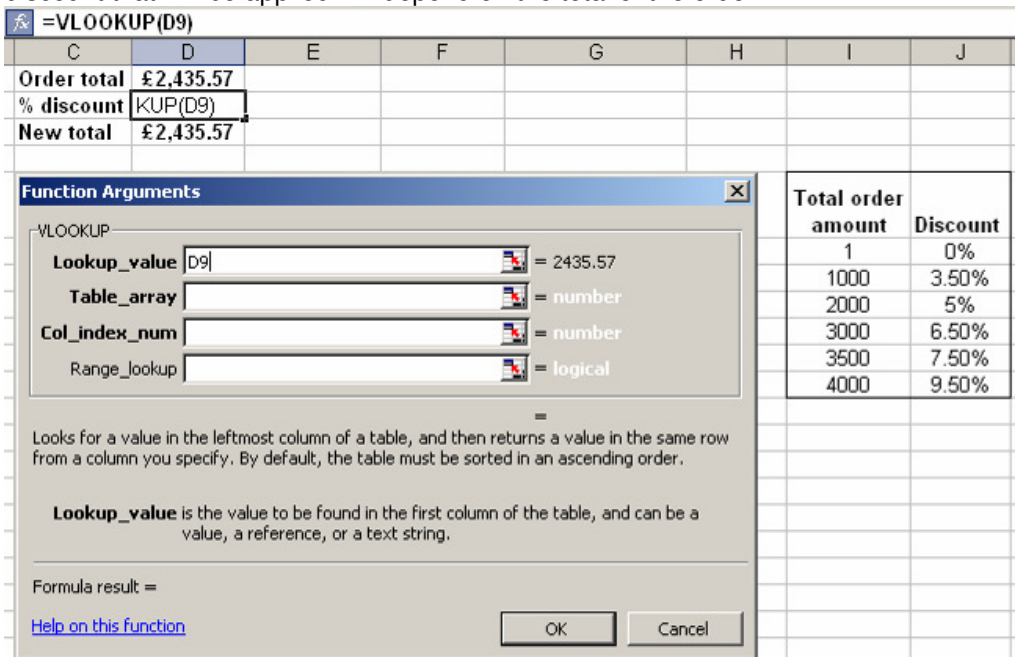
- Result: The Employee with ID number 23 works in the South region.



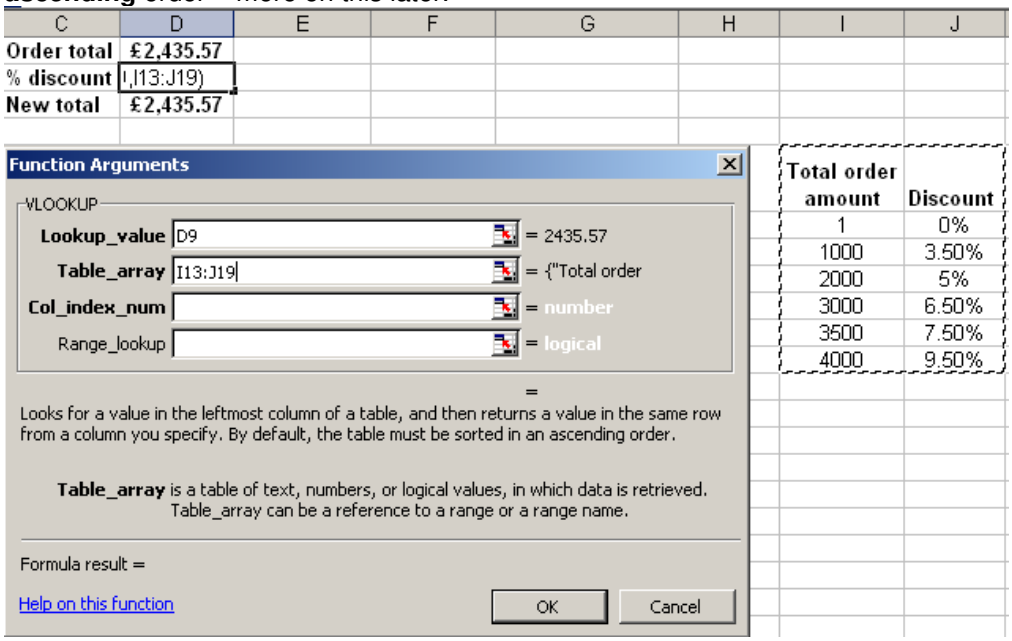
Example

Using VLOOKUP to calculate a discount for an order

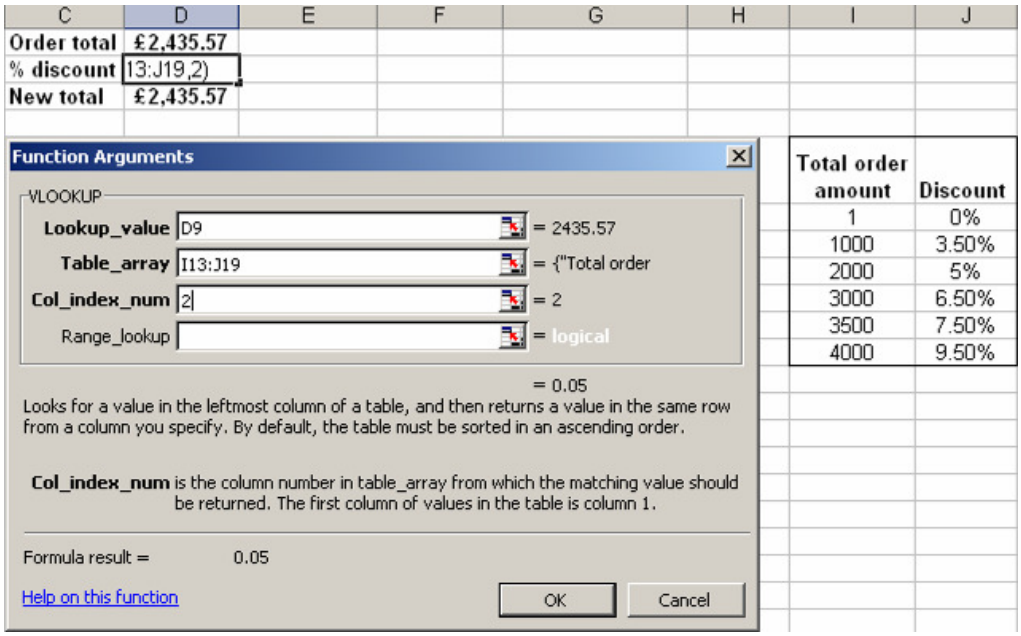
- The Lookup value is the Order total in cell D9, as the amount of discount that will be applied will depend on the total of the order.



- The Table array refers to the table containing the order amounts and respective discounts. Note that the Total order amounts are in **ascending** order – more on this later.



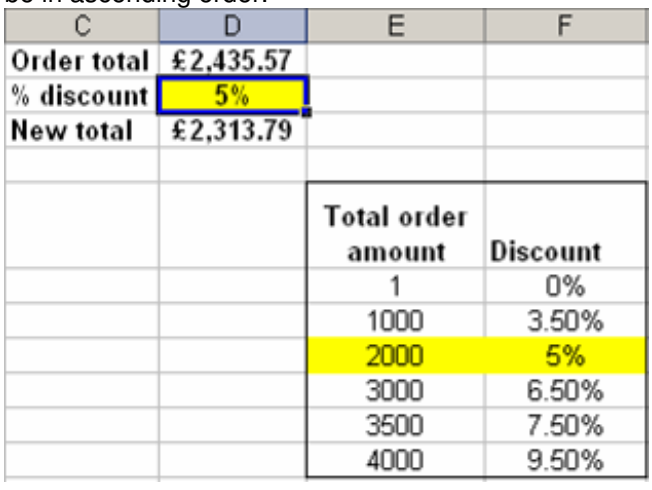
- The Column index number is 2, referring to the Discount column in the Table array. This is the column in which the piece of information to be extracted is stored.



- The Range lookup can be left blank, or true can be entered instead. This tells Excel to find an **approximate** match to the Lookup value.

  If an exact match to the Lookup value is not found, the next largest value that is **less** than the Lookup value is located instead. In this case, as the Order total is £2,435.57 Excel extracts the discount for an order of 2000, which is 5%.

  This is why it is important for the left most column in the Table array to be in ascending order.



HLOOKUP function

The HLOOKUP function requires the same arguments as the VLOOKUP function, but is used in cases where data is arranged across rows rather than down columns. Instead of using a Column Index Number, a Row Index Number is used. For example:

Row index number						
1	**Employee ID**	30	23	9	18	26
2	**Name**	Diana Stone	Jesse Bennet	Rita Greg	Adam Long	Anna Morris
3	**Region**	East	South	East	North	West
4	**Department**	Marketing	Sales	Sales	Administration	Accounts

Notes:

- The Lookup value must be unique within the table array, and must also be located within the top/first row of the table array.
- Be careful not to confuse the Row Index Number with the number of the row that the data is stored in within the spreadsheet.
- When using an approximate match with HLOOKUP, the top/first row must be in ascending order (left to right).

Using lookup functions Practice Activity

1. Open the file **Sales Invoice.xls**.
2. Select the **Product Code**, from the drop-down selection in column **A**.
3. Using a VLOOKUP on the **Product List** worksheet fill in the values for:

   No. of days, Description, Price Per Unit and **Commission**

   NB. Combine the **VLOOKUP** with an **IF** statement so that the cells remain empty until a **Product Code** is selected.

4. Copy the above formulas to all lines.
5. In Cell **A16** select Product Code **SAM30**
6. In Cell **A21** select Product Code **H78**
7. In Cell **A26** select Product Code **IT14**

   NB Only these lines should show data. All the others should remain blank.

Advanced list management

This unit focuses on using features that assist with data entry and analysing information stored within a database, using specific database functions.

Unit objectives

By the end of this unit, you will be able to:

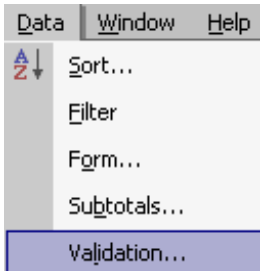
- Use data validation to create in-cell dropdown lists and rules for entering text, values and dates.
- Use DSUM, DAVERAGE and DCOUNT functions to analyse information stored in a database.

Data validation

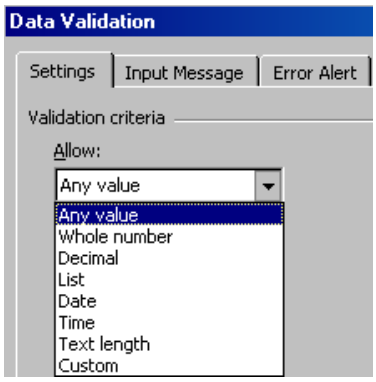
Data validation allows for creation of rules that limit what can be entered into cells within a spreadsheet.

To set up data validation for a cell:

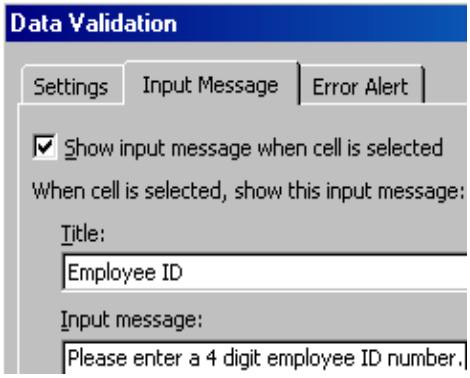
- Select the cell or cell range to apply validation settings to
- Go to Data-Validation



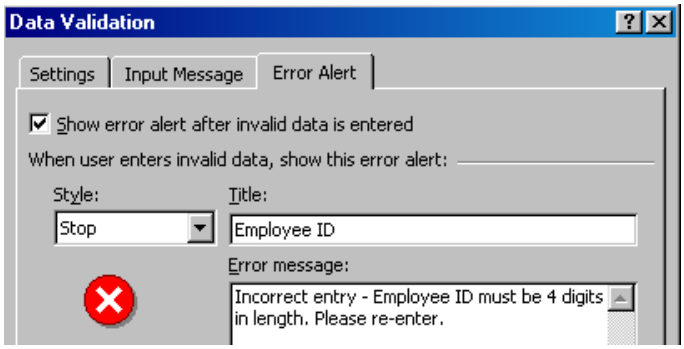
- Under the Settings tab, use the Allow drop list to select the type of data value that will be permitted in the cell/s.
- The other drop lists on the Settings tab can be used to set conditions and parameter values.



- The Input Message tab can be used to create a message that will appear when the validated cell is selected.



- The Error Alert tab can be used to specify an error message if the wrong type of data is entered into the cell. Note only the 'Stop' option under 'Style' will prevent users from entering data that does not match the validation rules.



- Click OK to apply your settings.

Using Database Functions

Database functions allow performance of operations on an Excel database that involve multiple fields, including counts, averages, or sums.

Some useful database functions are:

DSUM	Used to create total values in a field based on specified criteria
DAVERAGE	Used to average values in a field based on specified criteria
DCOUNT	Counts the cells that contain numbers and meet the specified criteria
DMAX/ DMIN	Return the largest and smallest values respectively from records that meet the specified conditions.

All of the database functions use the same argument format:

=FunctionName(Database range, Field to be returned or calculated, Criteria range).

Creating a criteria range

The first step in using a database function is to set up a criteria range.

To create a criteria range:

- Enter the headings of the fields that the criteria to be found are located in
- In the row/s under the field headings, enter the criteria Excel needs to locate from each of the fields.

	A	B
1	**Criteria**	
2	**Product**	**Region**
3	Annatto Seed	East

Entering the database function

The second step is to enter the function:

- Select the cell where the function is to be input, and click the function (fx) button near the formula bar
- In the Insert Function dialogue box, choose the Database function you wish to use from the Database category
- In the **Database** data area, select the entire list/database including the field headings
- In the **Field** data area, enter the name or index number of the field to be summed/averaged/counted etc.
- In the **Criteria** data area, select the entire criteria range (field headings and criteria underneath). Do not include entirely blank rows in the criteria range selection, otherwise Excel will effectively ignore the criteria that has been set. Also entries in the criteria range must exactly match entries in the database.
- Click OK.

Advanced list management Practice Activity

1. Open the file **Practice_Daily_Sales.xls**
2. Go to the **Data Validation** sheet.
3. Remove the validation from the cell range F4:F5.
4. Reset the validation for Column B as text only.
5. Name cells L3:L5 as My_List.
6. Add My_List to a Data Validation List.
7. Use My_List dropdown to change some cells in Column C.
8. Go to the sheet **Datafunctions.**
9. In cell N7**,** use a database function to calculate the totals for America sales.
10. In cell N8**,** use a database function to calculate the average for America sales.
11. Format the cells N7 and N8 to two decimal places, using the sterling currency.
12. Save as **My_Practice_Daily_Sales.xls** and close.

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Pivot Tables

A PivotTable is tool that creates a cross tabulation (cross tab) analysis, showing the joint distribution of two or more variables.

This analysis is carried out on data that is presented in the form of a list or database, where each column has a heading or field name.

Unit objectives

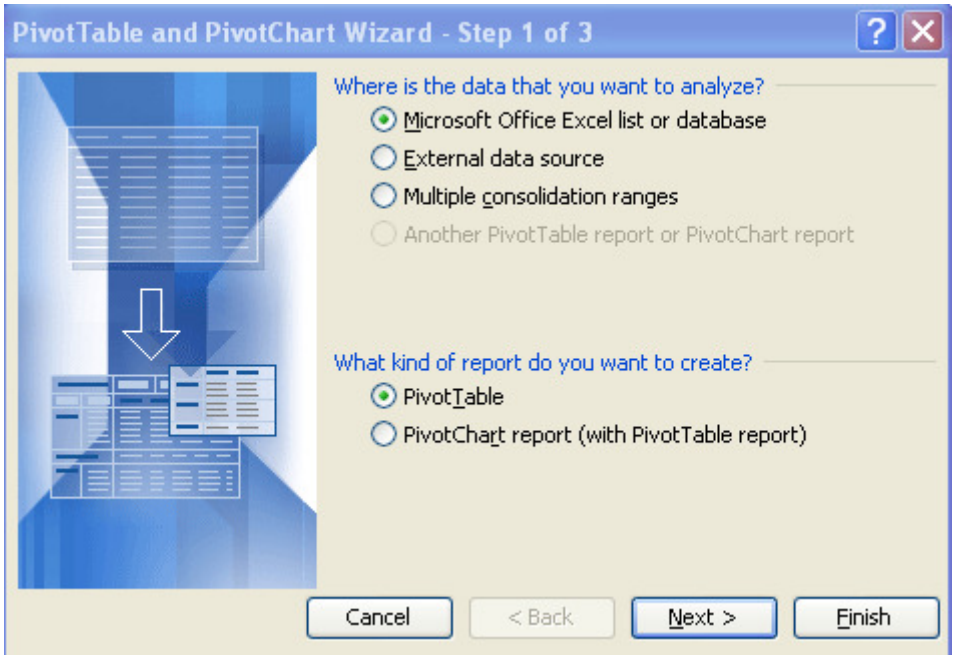
By the end of this unit, you will be able to:

- Create PivotTable and PivotChart reports.
- Change the display of PivotTable data using Field Settings, calculated fields and items, grouping and sorting.

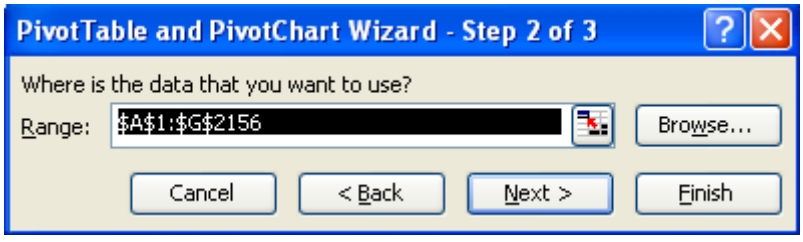
Creating a simple pivot table

To create a PivotTable from an Excel list/database:

- Select a cell within the database
- Click on the Data menu
- Select PivotTable and PivotChart Report
- Select the relevant options (MS Office database and PivotTable) and click Next



- Check the data range is correct, and click Next
  (Note if a cell within the database was selected before starting the wizard, this will automatically select the current region of that cell)



- Choose to put the PivotTable in a new or existing sheet and click Next

- The PivotTable areas will then appear in the workbook.
  Simply drag and drop fields from the PivotTable Field List into the Column, Row, Page and Data Items areas to analyse the data.

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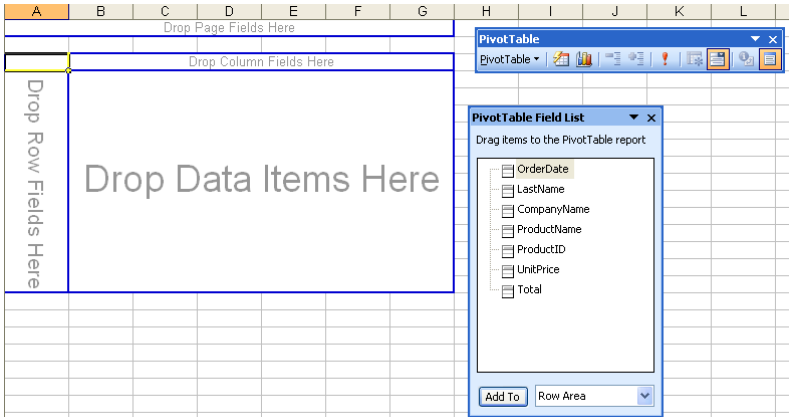

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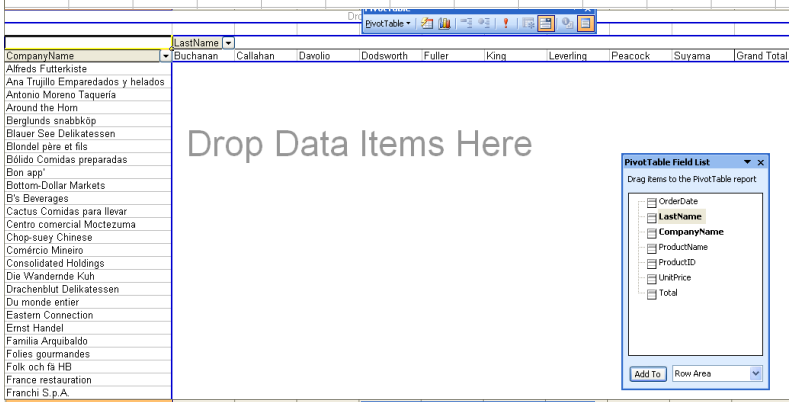
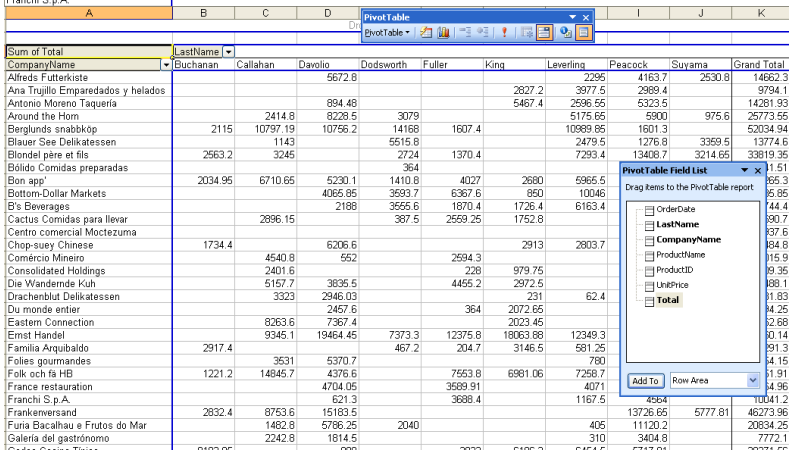


3



Show pages

Once a field has been added to the Page Fields area of the PivotTable, it is easy to generate a separate PivotTable for each individual item within that particular field using Show Pages.

To use Show Pages:

- Add a field to the Page Fields area
- Select the PivotTable button on the PivotTable toolbar
- Select Show Pages
- Select the name of the field under 'Show all pages of'; and click OK.

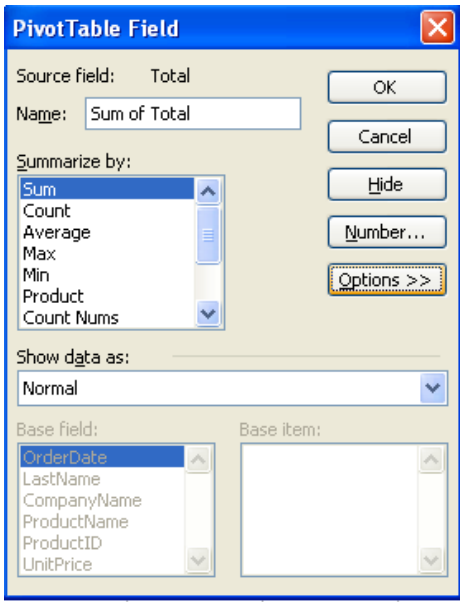
Formatting the data items area

The data items area will initially be based on the sum or count functions depending on the context.

Changing the function

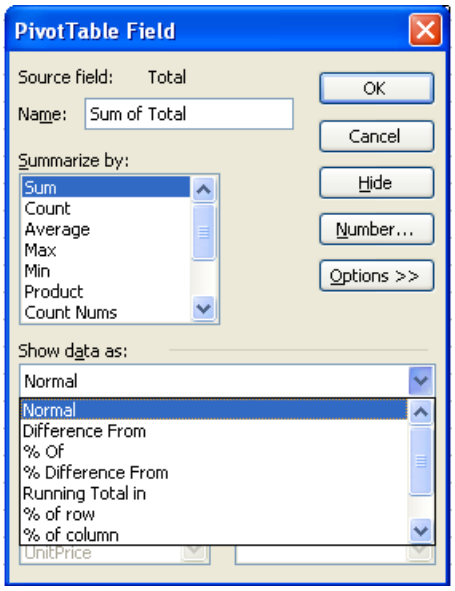
To change the function used in the data items area:

- Click on the Format Field button  on the PivotTable toolbar
- Select the required function under Summarize by



Using the Options button

In addition, clicking the Options button in the PivotTable Field dialogue box allows data to be analysed in comparison with other items in the list.

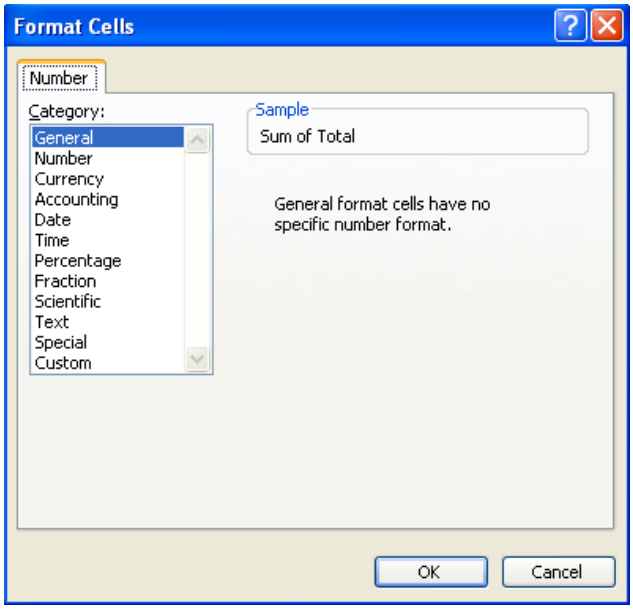


2		
3	Sum of Quantity	
4	Last Name	Total
5	Buchanan	5.92%
6	Callahan	11.52%
7	Davolio	15.22%
8	Dodsworth	5.20%
9	Fuller	11.80%
10	King	9.07%
11	Leverling	15.30%
12	Peacock	19.09%
13	Suyama	6.87%
14	Grand Total	100.00%
15		

For example selecting % of column shows the data with each data item analysed as a percentage of the column total. The example above shows total sales per individual as a percentage of all sales.

Using the Number button

Finally, clicking on the Number button in the PivotTable Field dialogue box opens the Format Cells dialog box.

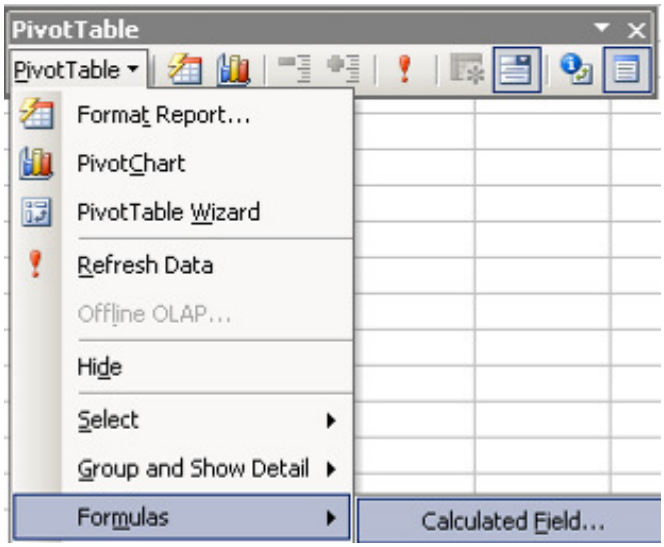


Inserting calculated fields

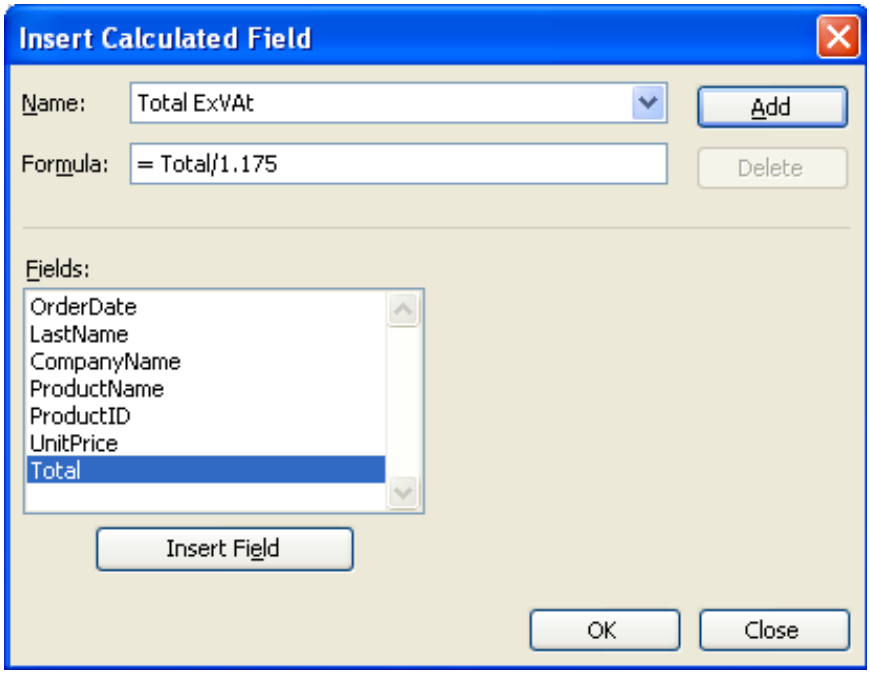
Additional calculated fields can be inserted into a pivot table.

To create a calculated field:

- Click on PivotTable on the Pivot Table toolbar and select Formulas-Calculated Fields.



- Give the field a name and enter the required formula, referring to the field or fields that will be used as a basis of the calculation.



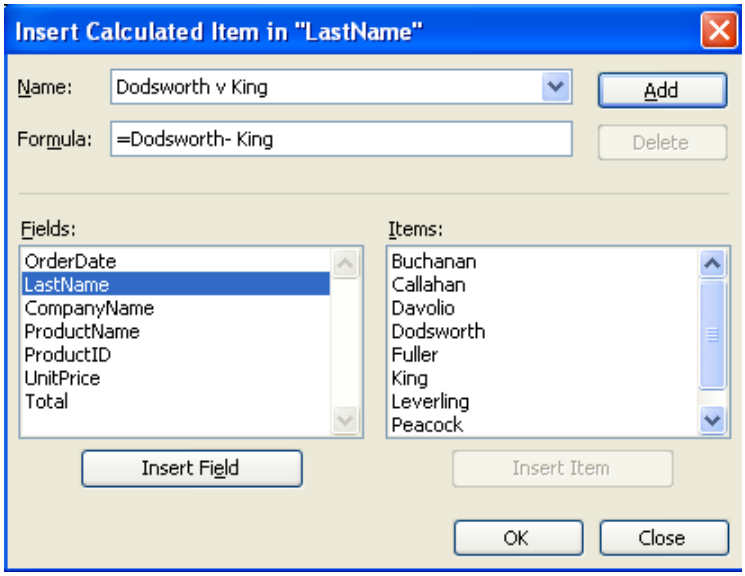
- Click OK. The new field will then be added to the data items area of the PivotTable.

Inserting calculated items

It is also possible to insert a calculated item. This is a row or column in the PivotTable that can be used to compare two other rows or columns.

To create a calculated item:

- Select the row or column field area
- Click on PivotTable on the PivotTable toolbar
- Select Formula, then Calculated Item
- Enter the item name and the required formula; and click OK.

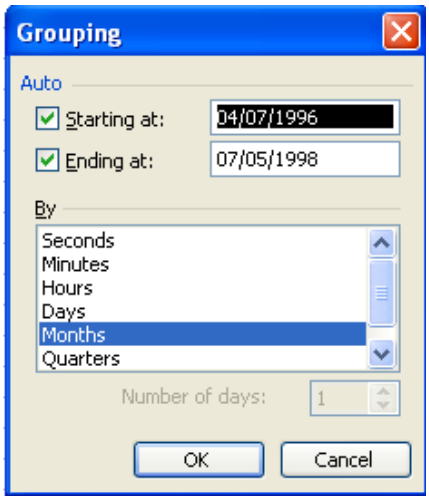


Grouping data

When working with date or numeric data as a row or column field it is often necessary to group the data.

To group data:

- Right-click in the field
- Select Group and Show Detail, then Group
- Select the grouping intervals as required
- Click OK.



Example of grouped data

Ungrouped data

Sum of Quantity	
Order Date	Total
04-Jul-1996	27
05-Jul-1996	49
08-Jul-1996	101
09-Jul-1996	105
10-Jul-1996	102
11-Jul-1996	57
12-Jul-1996	110
15-Jul-1996	27
16-Jul-1996	46
17-Jul-1996	121
18-Jul-1996	11
19-Jul-1996	142
22-Jul-1996	29
23-Jul-1996	184
24-Jul-1996	60
25-Jul-1996	50
26-Jul-1996	12
29-Jul-1996	135
30-Jul-1996	14
31-Jul-1996	80
01-Aug-1996	79
02-Aug-1996	70
05-Aug-1996	152
06-Aug-1996	27
07-Aug-1996	18
08-Aug-1996	25
09-Aug-1996	32

Data group by years and months

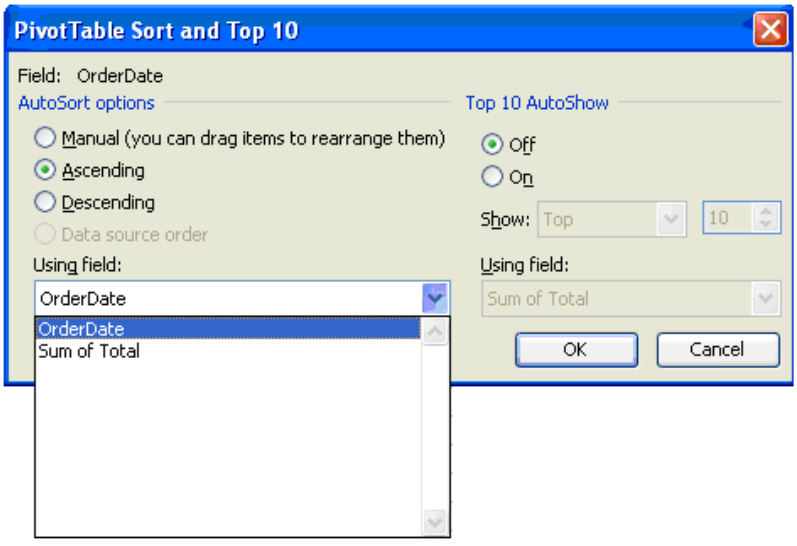
Sum of Quantity		
Years	Order Date	Total
1996	Jul	1462
	Aug	1322
	Sep	1124
	Oct	1738
	Nov	1735
	Dec	2200
1997	Jan	2401
	Feb	2132
	Mar	1770
	Apr	1912
	May	2164
	Jun	1635
	Jul	2054
	Aug	1861
	Sep	2343
	Oct	2679
	Nov	1856
	Dec	2682
1998	Jan	3466
	Feb	3115
	Mar	4065
	Apr	4680
	May	921
Grand Total		51317

Sorting data

It is possible to sort the column or row fields according to the size of the matching data field.

To sort in the row or column field area:

- Select the relevant field in the PivotTable
- Click on PivotTable on the PivotTable toolbar, and select Sort and Top Ten
- Select the required auto sort items. It is also possible to show only the top or bottom X number of items based upon the data field value.

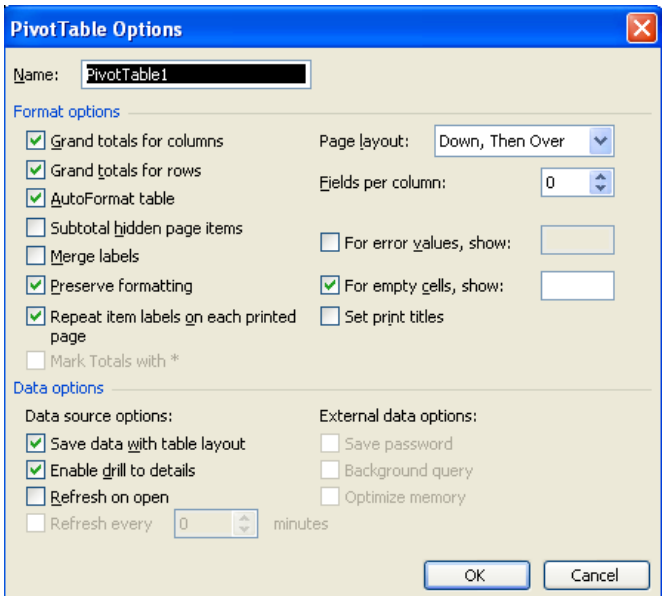


Setting PivotTable options

PivotTable Options are available by clicking on the PivotTable button on the PivotTable toolbar and selecting Table Options.

Key PivotTable options are:

- Grand Totals for Rows
- Grand Totals for Columns
- Enable Drill to Details

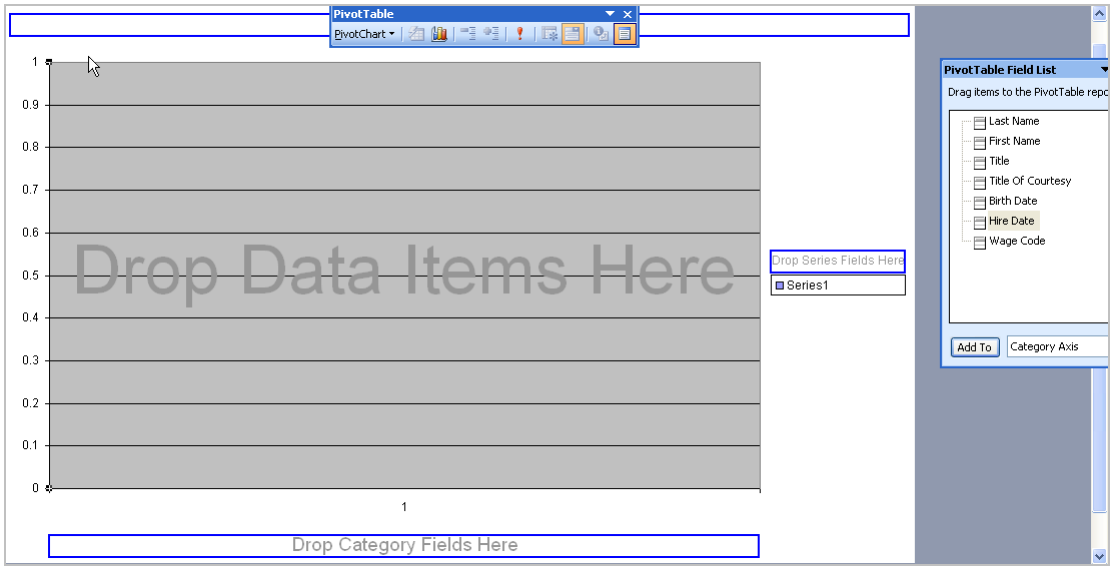


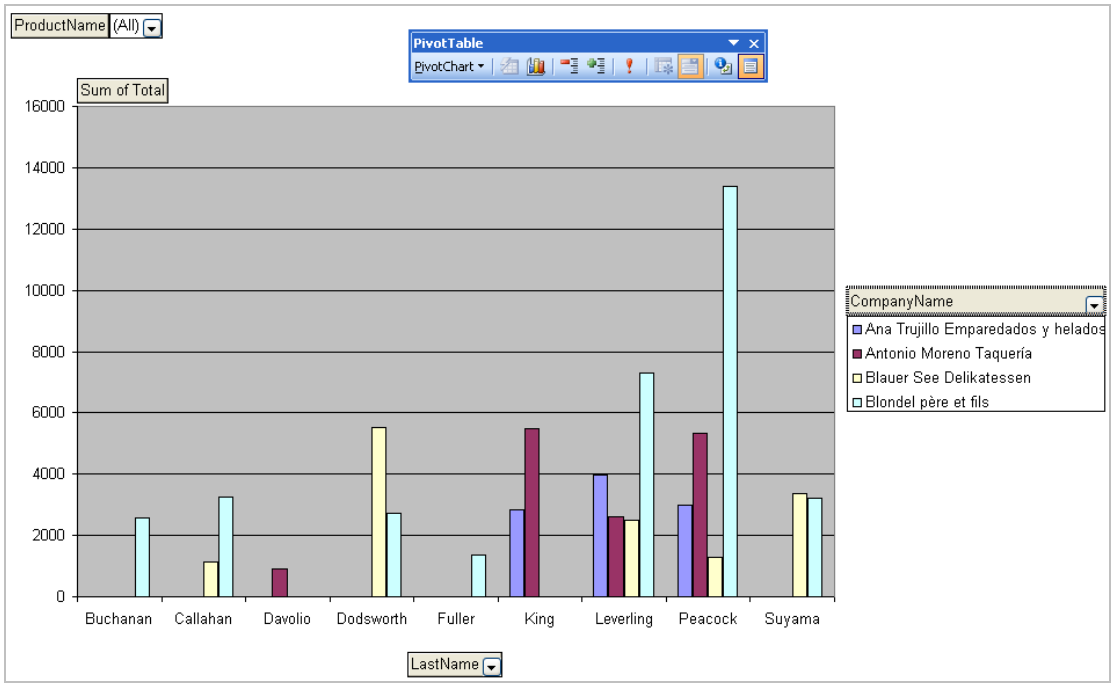
Grand Totals for Rows	When checked, displays totals for each item in the Row Fields area.
Grand Totals for Columns	When checked, displays totals for each item in the Column Fields area.
Enable Drill to Details	When checked, a figure within the Data Items area can be double-clicked; and a list of the records that make up that value will be displayed on a separate sheet.

Creating PivotCharts

To create a PivotChart:

- Select a cell in the PivotTable.
- Click the Chart Wizard button  on the PivotTable toolbar.
- Drag in page, category, series and data fields onto the chart to produce the graph.





PivotTables Practice Activity

1. Open the **Daily sales.xls** and select the **Pivot Table** sheet.
2. Click in cell A4.
3. Create a Pivot Table on a separate worksheet.
4. Change the PivotTable layout to the Classic layout.
5. Rename the sheet tab as **My pivot sheet**.
6. Drag over the fields of your choice from the Pivot Table Field List to the pivot table area.
   Try rearranging and removing fields from the pivot table area.
7. Save as **My_Daily_sales.xls** and keep open.

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Using analytical options

Sensitivity or What-If analysis involves studying how the value of a model or formula is affected by changes in the inputs or formula arguments.

It is particularly useful for testing the reliability of assumptions behind a particular model. An example would be a cash flow forecast, where there is some uncertainty about future revenue streams. Here the model might investigate the effect of increasing or decreasing the revenue streams on the overall cash flow.

Unit objectives

By the end of this unit, you will be able to:

- Use the Goal Seek tool to obtain a specific formula result, by identifying a single formula input for Excel to adjust
- Create and view scenarios showing different sets of values for the same spreasheet
- Use the Solver tool to obtain a specific formula result, by identifying multiple values for Excel to adjust, subject to constraints.

Goal Seek

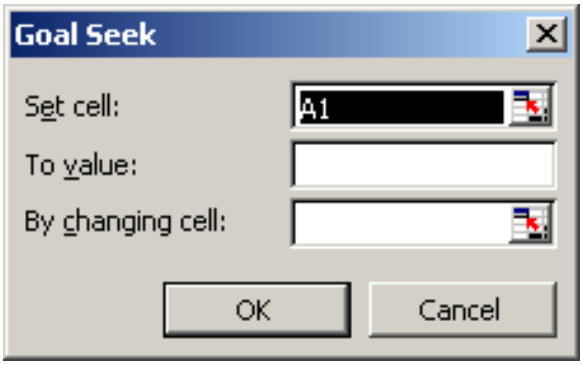
The Goal Seek tool allows us to specify the result of a formula by altering **one** of its input values.

For example if the PMT (Payment) function is used to work out repayments on a loan; given the interest rate, the initial amount of the loan and the number of repayments to be made.

It might be found that the proposed repayment of £3,000 per month is too high. Goal Seek could then be used to determine how much could be borrowed if only £2,500 per month were to be repaid, rather than £3,000.

To use Goal Seek:

- Click Tools-Goal Seek
- In the Goal Seek dialog box:
- Enter the cell that contains the formula to be changed using “Set Cell”
- Enter the desired formula result using “To Value”
- Enter the input cell of the formula that needs to be adjusted by Excel using “By Changing Cell”
- Click OK.



Goal Seek will then attempt to satisfy the above conditions.

If a solution is possible, it will display the result and give the user the opportunity to save or discard it.

Note it is sometimes impossible to solve a particular problem. In the above example, it would be impossible to reduce the payment to £500 per month by reducing the interest rate, as this would require a negative interest rate.

Working with scenarios

When working with a set of data, it is often the case that there is uncertainty about some of the actual values.

Typically, this would be the case with forecasts for company sales, commodity prices and economic variables in general.

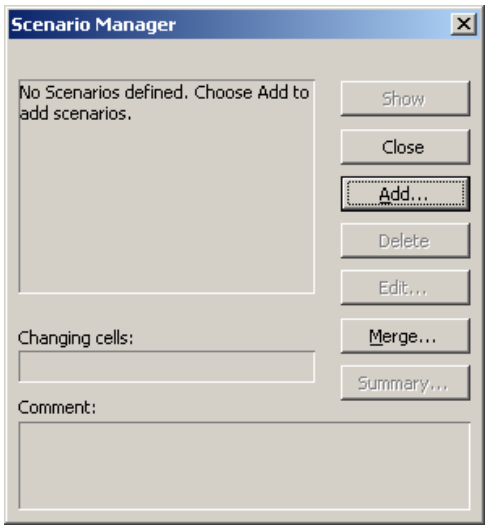
Excel allows the user to store multiple values for the same set of data as different **scenarios**. These scenarios can then be viewed in turn, and there wider impact understood.

Creating scenarios

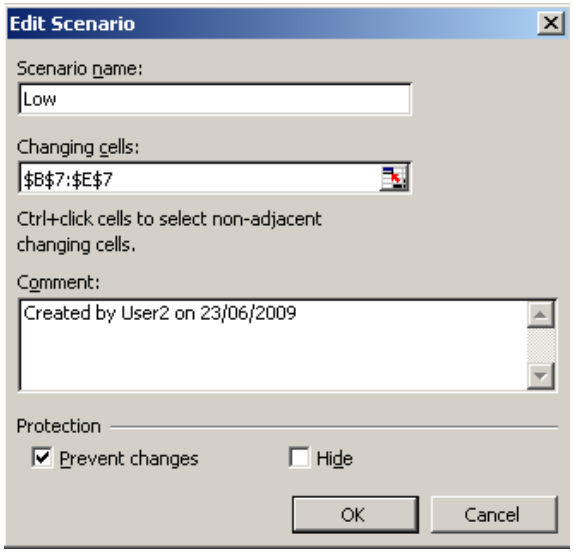
Scenarios are created by and stored in the Scenario Manager.

To activate the Scenario Manager

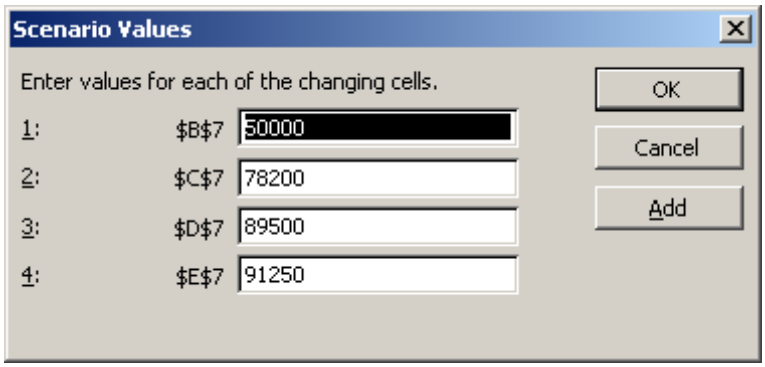
- Click on Tools-Scenarios
- In the resulting dialogue box click Add



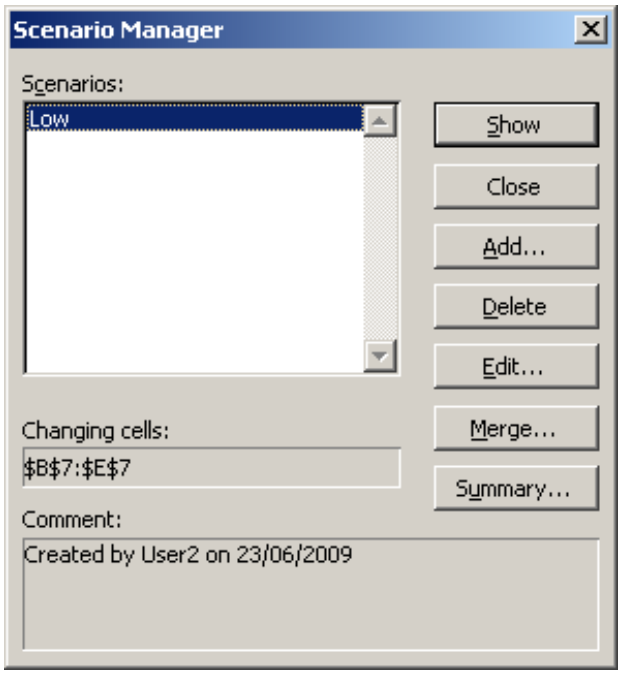
- Enter the name of the scenario, and the range of cells that contain the values to change
- Click OK.



- Enter the cell values for that particular scenario into the Scenario Values dialogue box



- Click OK
- Repeat the above steps for each additional scenario. The names of all scenarios created will be displayed in the Scenario Manager dialogue box.



Viewing existing scenarios

To view the results of a scenario that has been created:

- Click on Tools-Scenarios
- Select the required scenario from the Scenario Manager dialogue box.
- Click Show.

The Solver tool

The Solver Tool is a specialist tool for a technique known as linear programming. It allows the user to optimise a value in the face of various constraints.

Imagine a furniture manufacturer that makes two types of chair, the “Kingstone” and the”Scholar”.

Profit for the Scholar is three times the profit of the Kingstone. In normal circumstances the manufacturer would obviously devote all their capacity to production of the Scholar. However, there are constraints.

First they have an ongoing contract to provide a certain number of Kingstone chairs to an existing customer, so at the very least these must be produced. Further, the two makes of chair use differing amounts of wood and leather, and this is an issue because they are limited in the amount of wood and leather that can be used each week.

The problem the manufacturer has is to determine the mix of Scholar and Kingstone chairs that will **maximise profit**.

Using the Solver Tool

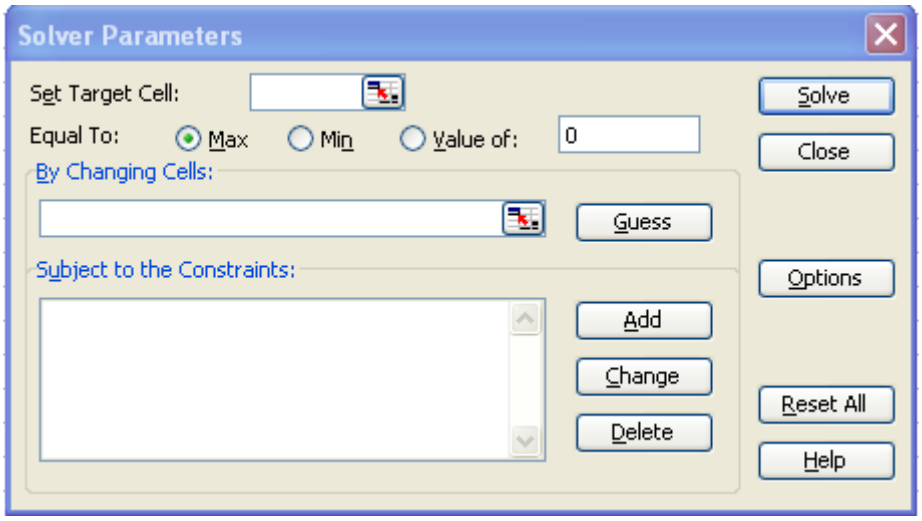
Building the model

First layout the model, showing the number of units produced, and from this cells that calculate profit and the amounts of wood and leather to be used (the example below is shown in Formula view).

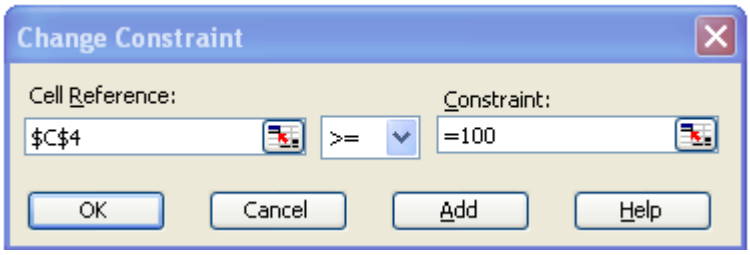
	A	B	C	D	E	F	G
1							
2						PROFIT	
3			Kingstone	Scholar		=(C4*2)+(D4*5)	
4			0	0			
5							
6							
7							
8			AMOUNTS USED				
9		Wood	=(3*C4)+(5*D4)				
10		Leather	=(3*C4)+(7*D4)				
11							

Setting the parameters

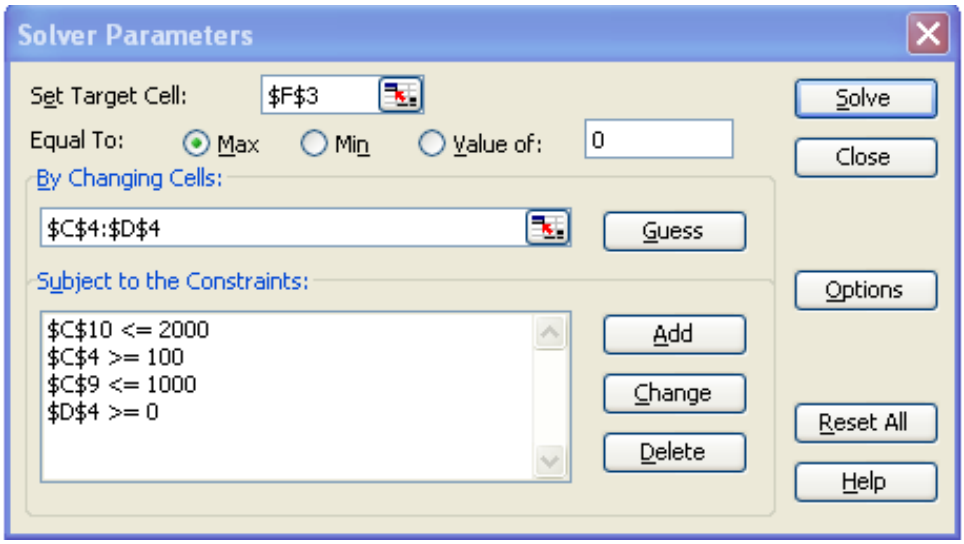
- Click on Tools-Solver to activate the solver tool



- In the **Set Target Cell** box, enter the cell to be maximised. In the example model, this is cell F3 which contains the formula calculating the profit.
- From the **Equal To** options, select Equal to Max, meaning the profit will be maximised.
- In **By Changing Cells**, cells whose values Solver will determine. In the example model, these are cells C4:D4, the number of each type of chair to be produced.
- To create constraints for the model, click the Add button next to **Subject to the Constraints**



- Enter the cell reference, the type of constraint (greater than, less than etc.) and the value to which it is constrained.
- To create additional constraint, click Add and repeat the above for each constraint
- After the final constraint has been set, click OK.

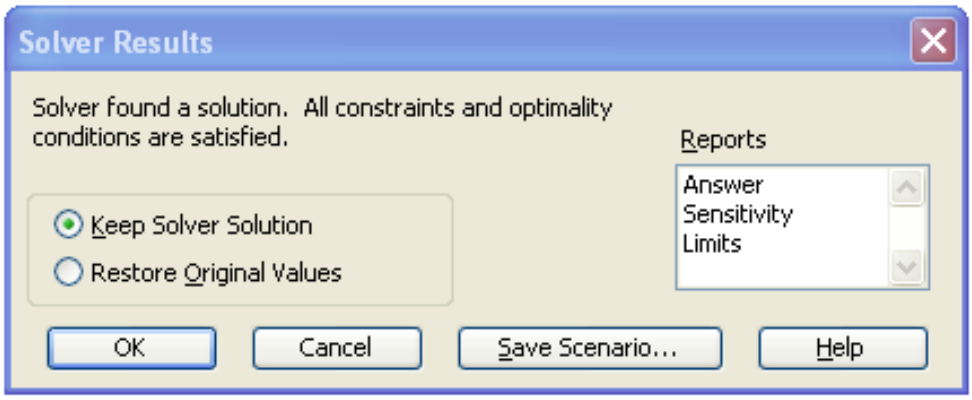


Finding a solution

- When all parameters have been set, click Solve.
- If the problem can be resolved Solver will display the production levels for each chair in the changing cells (C4 and D4).

	A	B	C	D	E	F
1						
2						PROFIT
3			Kingstone	Scholar		1040
4			100	140		
5						
6						
7						
8			AMOUNTS USED			
9		Wood	1000			
10		Leather	1280			

- The solution can be kept (values will be entered into the spreadsheet); saved as a scenario (by clicking the Save Scenario button); or the original values from the spreadsheet can be restored.



Using analytical options Practice Activity

1. Open **Analytical options practice.xls**.
2. Activate the Solver worksheet. Use Solver to calculate a total profit of 30% by adjusting the values for Total sales, Cost of sales, Overhead and Marketing. When adjusting values, you must ensure that the total overhead for the year can not be greater than £25,000 and the net profit for the year must be at least £100,000.
3. Save the file as **My Analytical options practice** and close the workbook.

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Macros

A macro can be described as a program that uses Visual Basic code to automate a sequence of actions or instructions. A macro can be simple and consist of only a few tasks or commands, or be quite complex, involving lots of data manipulation and calculations.

Simple macros are useful for any long sequence of steps that you find yourself repeating often, or for combinations of basic Excel actions that would be convenient to automate for a particular workbook.

Recording a macro

It is a good idea to practice the sequence of actions for a macro before it is recorded.

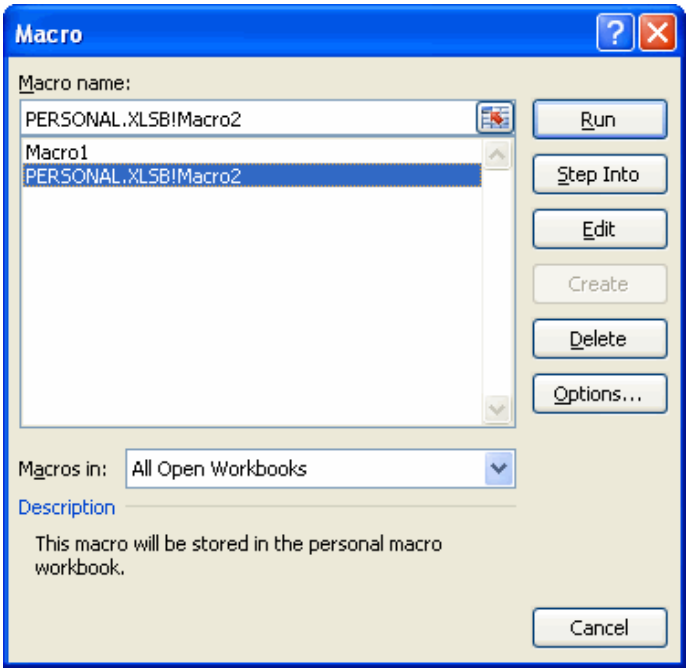
To record a macro:

- Go to Tools-Macro-Record New Macro
- Give the macro a name (do not use spaces) and choose the location where it should be stored.
- Optionally, enter a brief description of the macro in the Description area
- Click OK. Excel will start recording the macro.
- When finished, click the Stop Recording button on the Status bar; or go to Tools-Macro-Stop Recording.

Running a macro

To run a macro:

- Go to Tools-Macro-Macros
- Select the macro to be run from the Macro dialogue box.



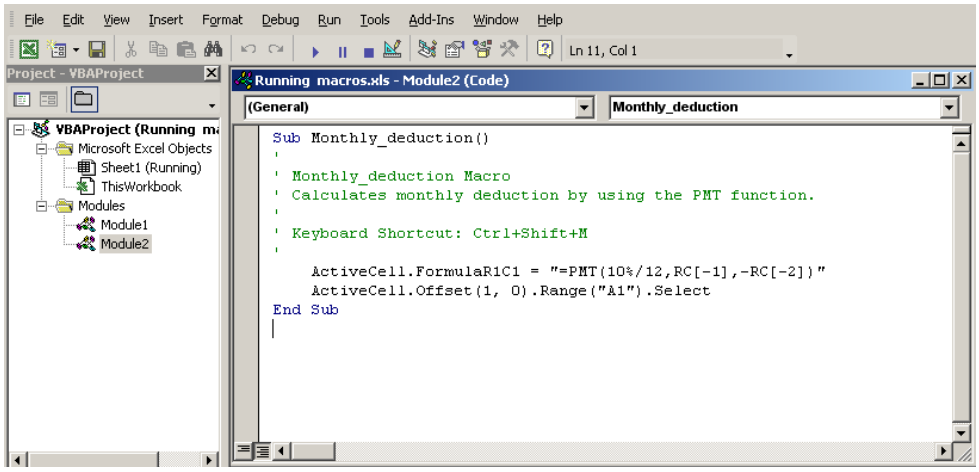
- Click Run.

Editing a macro

To edit a macro:

- Go to Tools-Macro-Macros
- Select the name of the macro to be edited
- Click Edit. This will launch the Visual Basic Editor.

  The Visual Basic Editor is another application/program, therefore it will open in a separate window to Excel.



- Make the desired changes/edits, and click the Save button in the Visual Basic Editor.
- Close the Visual Basic Editor to return to Excel.

Macros Practice Activity

1. Open **Macros practice.xls**.
2. Activate the Macros worksheet. This worksheet contains two scenarios: Original and Cost of sales.
3. Create a macro named Display_cost_of_sales that has Ctrl+Shift+C as its shortcut key. This macro should show the Cost of sales scenario.
4. Create a macro named Display_original that has Ctrl+Shift+O as its shortcut key. This macro should show the Original scenario.
5. Run the Display_cost_of_sales macro. Run the Display_original macro.
6. Change the name of the Display_cost_of_sales scenario to Decreased cost of sales.
7. Run the edited macro.
8. Save the Workbook as **My macros practice** and close.

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