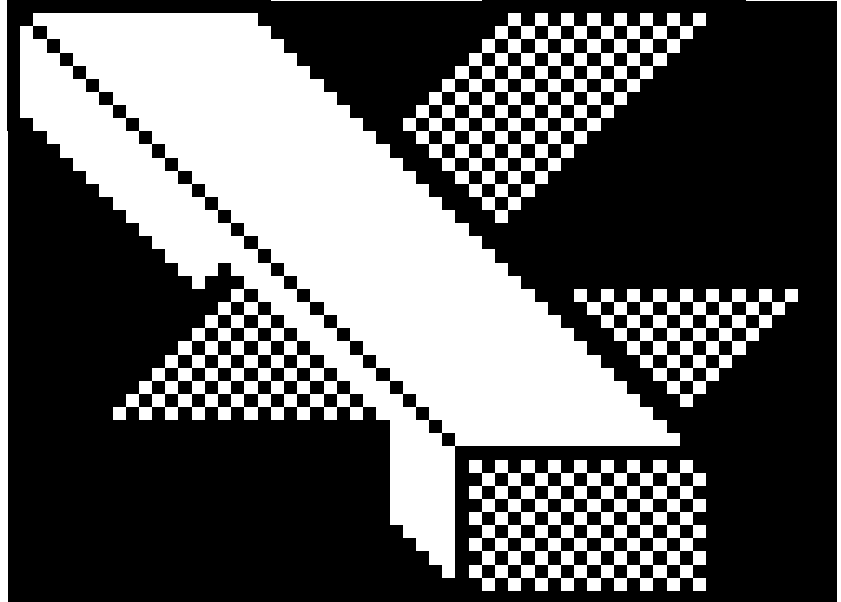


# Excel



## Lists/Databases

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These notes are for Excel 2002 but apply also to  
previous versions of Excel. Significant differences are  
indicated in the text

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## Introduction

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This document covers the use of lists in Microsoft Excel. It describes how to set up, modify, select from, sort and summarise a list and leads you through a series of practical exercises to help you get started in doing these things yourself. Extensive information on working with lists in Excel is available in on-line help, in numerous books and on the World Wide Web.

## Setting up a list

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In Excel, a *list* is data in columns so that each row has the same layout. Excel can work with a list as a simple database:

- The columns in the list are the fields in the database.
- The column labels in the list are the field names in the database.
- Each row in the list is a record in the database

### **Exercise 1**

- i) Open the file QUOTAS.XLS in the \STU\EXCEL folder
- ii) Save this file as QUOTAS in the My Documents folder
- iii) Switch to the sheet named Wednesday
- iv) Examine the contents of the sheet and notice that the Surplus column contains formulae

## Selecting a list to work with

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It is best to have no more than one list per worksheet and to have no data to its left or right. However, provided that the list has a continuous range of empty cells between it and any other data on the same worksheet, you can select it just by clicking in it. Otherwise you have to highlight the whole list.

## Using a form with a list

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### **Exercise 2**

Follow the steps below to display a data form for Wednesday's list

- i) Click anywhere in the list
- ii) **Data Form**. Displays a data form, which you can use to view, change, add, and delete records from a list or database, or to find specific records based on criteria you specify.

The column labels of your list become the **Field Names** in the data form. Computed fields such as Surplus cannot be edited

The screenshot shows a window titled "Wednesday" with a standard Windows-style title bar containing a question mark and a close button. The window is divided into two main sections. On the left, there are four data fields: "Country:" with a dropdown menu showing "Britain", "Crop:" with a text box containing "Carrots", "Actual:" with a text box containing "15", and "Surplus:" with a text box containing "0". On the right side, there is a vertical stack of buttons: "New", "Delete", "Restore", "Find Prev", "Find Next", "Criteria", and "Close". Above the "New" button, the text "1 of 5" is displayed. A vertical scrollbar is located between the data fields and the buttons.

The top right of the form shows which record is displayed and the number of records in the list.

The record number changes to *New Record* when you scroll past end of list.

## Adding and changing data using the form

### Exercise 3

- i) Use the form to add the following new records to the list for Wednesday. To see how to do this, read the information below.

Country	Crop	Actual
Spain	Potatoes	22
France	Carrots	19
France	Onions	4
France	Potatoes	26

- ii) Note that the Surplus formula is replicated automatically.  
 iii) Check and correct all your data  
 iv) Save the workbook as EX3 in My Documents

**To add a new record using the form:**

Click **New**, type the data into the boxes, then click **New** again

**To delete a record:**

Move to it and click **Delete**

**To change a record**

Move to it, make changes and then move to another record

#### Button functions

- ← **New** Clears form ready for **New** record data. Click again to add data as new record
- ← **Delete** Deletes displayed record
- ← **Restore** Restores current record as it was before you started changing it
- ← **Find Prev** Find and Display **Previous/Next** record in list
- ← **Find Next** Find and Display **Previous/Next** record in list
- ← **Criteria** Displays a dialog box for you to enter **Criteria** and comparison operators for selecting records (you can try this later)
- ← **Close** Close form

## Moving around the data

**To move to**

**Do this**

Same field in next record

Click the scroll button,

Same field in previous record

Click

Last record

Drag to the bottom of the scroll bar

First record

Drag to top of the scroll bar

Press the TAB key, →|, to move forward through one field at a time, and then through the command buttons. Press SHIFT+TAB to move back one field or button at a time.

## Selecting records using Autofilter

One of the most useful aspects of using lists in Excel is that you can selecting records according to rules that you decide. The technical term for such rules is *criteria* and the process of selection is called *filtering*.

The easiest way to select records is called the **AutoFilter**. **AutoFilter** also allows you to combine criteria easily:

i) **Data Filter AutoFilter.**

Column headers sprout drop-down arrows.

- ii) Click arrows and choose values for criteria. If you choose one of the numbers in the list then you select records which match that number in that field

	A	B	C	D
1	Country	Crop	Actu	Surpl
2	Britain	Carrots		
3	Britain	Onions		
4	Britain	Potatoes		
5	Spain	Carrots		
6	Spain	Onions		
7	Spain	Potatoes		
8	France	Carrots		
9	France	Onions		
10	France	Potatoes	26	5

Choose (Custom...) to define criteria which are not just straight comparisons with list values

- To show all data again, choose (All) from the drop-down list
- To stop displaying field selector arrows, i.e. to remove the Autofilter, **Data Filter AutoFilter**

### Exercise 4

- Use AutoFilter to select all records with a Surplus of 0
- Redisplay all records then use AutoFilter to select records of Carrots in Spain

### Using (Custom...) as the criterion

If you choose (Custom...) the Custom AutoFilter dialog box is displayed. You can then make other comparisons such as:

- |              |                 |                          |
|--------------|-----------------|--------------------------|
| equal to     | is greater than | greater than or equal to |
| not equal to | less than       | less than or equal to    |
| begins with  | ends with       | contains                 |
| etc          |                 |                          |

There are some special characters you can use in criteria:

J?M finds Jim, Jam, Jom, Jpm etc

\* paint finds Blue paint, red paint etc

Click arrow and select a comparison operator from this list

Choose AND or OR to combine criteria for one field

Type or select a value here

### Exercise 5

- Redisplay all records then select records which have Actual greater than 15
- Redisplay all records then select records whose Surplus is equal to 0 or less than -1



Extract to a suitable location all records which are not for Potatoes

## Sorting lists

Use the Sort command to arrange rows in a list according to the contents of particular columns. The following order is used for ascending sorts:

Numbers    Text (including post codes, part numbers, etc)    Logical values    Error values    Blanks

A descending sort reverses the above order, except that blank cells are always sorted last.

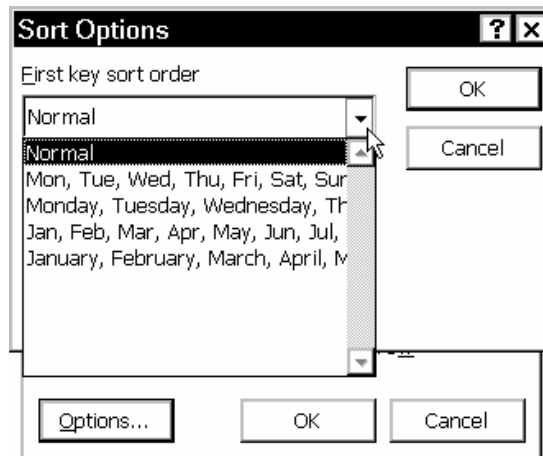
i) Click in list

ii) **Data** → **Sort** to get the **Sort** dialog box

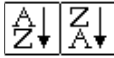


iii) In **Sort By** select the first field to sort on. In **Then By** select the second, and so on

iv) Click **Options** if you want to change the Key Sort Order to the days of the week for example:



To define a unique **First Key Sort Order** for your own use, **Tools** → **Options** and choose the **Custom Lists** tab

- For a simple sort on one field, click in the field then click one of the sort buttons: 
- To sort on more than 3 fields, do two or more sorts starting with the lowest levels.

### Exercise 9

- Show all records
- Sort Wednesday's list in ascending order of Surplus
- Sort the list in ascending order of Crop and descending order of Surplus


## Summarising data using subtotals

This facility calculates a subtotal for the columns you select and inserts subtotal rows in the current list. Excel inserts a subtotal row at each change in the column you select and a Grand Total row at the bottom of the list.

**NOTE:** You must sort your list using the Sort command before you use subtotals. Your list must have column labels in the first row

### Exercise 10

- i) Sort Wednesday's data on Country and Crop
- ii) Follow the steps below to produce a Subtotals summary of Surplus by Country

- i) Click in the list
- ii) **Data**  **Subtotals...** to display the **Subtotal** dialog box
- iii) Set the following fields in the dialog box:

**At Each Change In** The column that contains the groups you want subtotals for. Click the drop-down arrow to select another column. The column must be one that the list is sorted on

**Use Function** Calculates the subtotal using the function you select. Leave it set to Sum

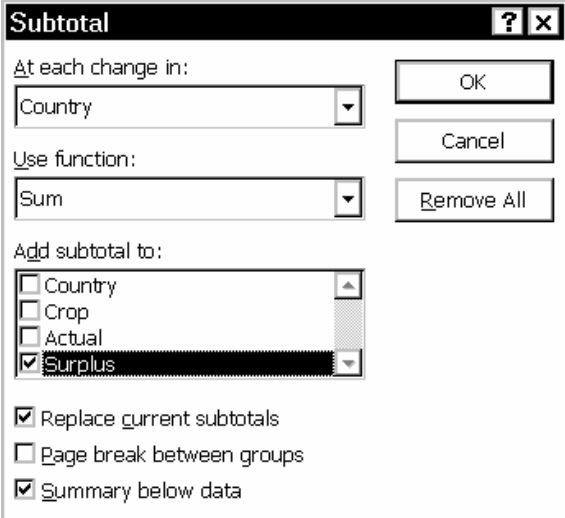
**Add Subtotal To** The column(s) in which you want the subtotal to appear. Select Surplus

**Replace Current Subtotals** Replaces all subtotals in the list with the new. Make sure this is set

**Summary Below Data** Places the summary rows and Grand Total row below the associated data. Make sure this is set

- iv) Click **OK**

**To remove all subtotals, Data**  **Subtotals...** and click **Remove All**



## Using Outlines

Once you have created subtotals, you can use the Outline buttons to collapse and expand the data that is displayed.

The outline buttons are the little buttons to the left of the sheet.

### **Exercise 11**

Try the different outline buttons and observe their effects

	A	B	C	D
1	<b>Country</b>	<b>Crop</b>	<b>Actual</b>	<b>Surplus</b>
2	Britain	Carrots	15	0
3	Britain	Onions	12	4
4	Britain	Potatoes	26	-2
5	<b>Britain Total</b>		53	
6	Spain	Carrots	13	-5
7	Spain	Onions	6	-3
8	Spain	Potatoes	22	0
9	<b>Spain Total</b>		41	
10	France	Carrots	19	2
11	France	Onions	4	-3
12	France	Potatoes	26	5
13	<b>France Total</b>		49	
14	<b>Grand Total</b>		143	

## Using database functions

There are 12 worksheet functions that you can use to do database (list) calculations. Each uses three arguments: *database*, *field*, and *criteria*. These arguments refer to the worksheet ranges used in the function.

*database* is the range of cells that make up the database.

*field* indicates which field is used in the function. The field argument can be text, such as "Actual" or "Surplus" or a field number: 1 for the first field (Country), 2 for the second (Crop), etc

*criteria* is the range of cells that contains the database criteria. The criteria reference can be entered as a cell range, such as A9:F10 in the example database table below, or as a name assigned to a range.

### Exercise 12

- i) Remove the subtotals
- ii) Follow the steps below to calculate the average of Actuals that are greater than 15

- i) Select the Monday sheet. Enter the following:



A12 = Actual

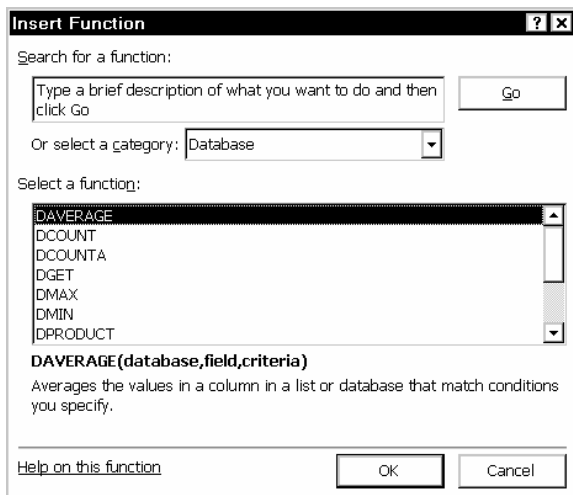
A13 = >15

E12 = Actual Average

	Country	Crops	0	1
10	France	Potatoes	20	-1
11				
12	Actual			Actual Average
13	>15			
14				
15				

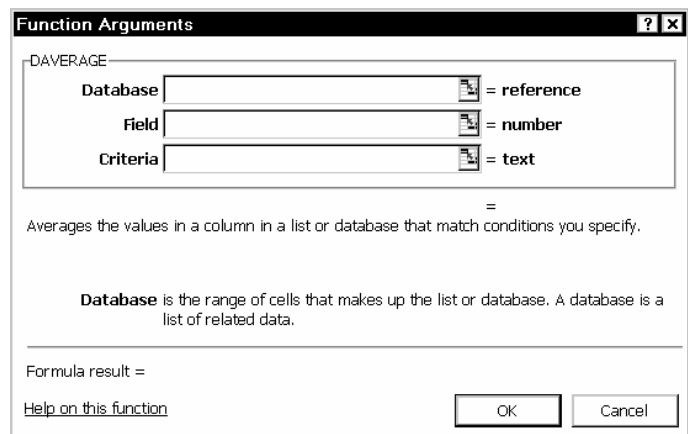
- ii) Make E13 the active cell



- iii) **Insert**  **Function** to display the **Insert Function** dialog box. (In Excel 97 and 2000, click  to display the **Paste Function** dialog box)



- iv) Choose **DAVERAGE** in the **Database Function Category**

- v) Click **Next** to display the **Function Arguments** dialog box:





- vi) With the flashing insertion point in the **Database** box (see diagram), click , drag through the database range on the sheet (A1:D10) to enter the range, click  again

- vii) With the insertion point in the **Field** box, click on the cell heading of the database field to calculate on (C1)

- viii) With the insertion point in the **Criteria** box, drag through the criteria range (A12:A13)

- ix) Click **Finish** to put the function into the cell

- x) Check the result. If you have made an error, click in the cell which contains the formula, **Insert**  **Function** (In Excel 97 and 2000, click ) , make corrections and click **Finish**.

## The complete set of database functions

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DAVERAGE	Returns the average of selected database entries
DCOUNT	Counts the cells containing numbers from a specified database and criteria
DCOUNTA	Counts nonblank cells from a specified database and criteria
DGET	Extracts from a database a single record that matches the specified criteria
DMAX	Returns the maximum value from selected database entries
DMIN	Returns the minimum value from selected database entries
DPRODUCT	Multiplies the values in a particular field of records that match the criteria in a database
DSTDEV	Estimates the standard deviation based on a sample of selected database entries
DSTDEVP	Calculates the standard deviation based on the entire population of selected database entries
DSUM	Adds the numbers in the field column of records in the database that match the criteria
DVAR	Estimates variance based on a sample from selected database entries
DVARP	Calculates variance based on the entire population of selected database entries

### Exercise 13

Use DMAX to find the maximum value of Actual for which the Surplus is less than 1

## Viewing a large list or extracts from a list

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You can split a sheet so that the top and side stay put as you move down or to the right. This is useful for lists which spread over more than window.

1. Click on cell to split before

	A	B	C	D
1	Country	Crop	Actual	Surplus
2	Britain	Carrots	15	1
3	Britain	Onions	21	3
4	Britain	Potatoes	26	2
5	Spain	Carrots	13	4
6	Spain	Onions	12	2
7	Spain	Potatoes	22	5
8	France	Carrots	10	1

2. Window  Split

	A	B	C	D
1	Country	Crop	Actual	Surplus
2	Britain	Carrots	15	1
3	Britain	Onions	21	3
4	Britain	Potatoes	26	2
5	Spain	Carrots	13	4
6	Spain	Onions	12	2
7	Spain	Potatoes	22	5
8	France	Carrots	10	1

- You can freeze the split by Window  Freeze Panes.
- Remove the split by Window  Remove Split


### Exercise 14

Split the sheet as in figure 2 above

## Formatting a list or an extract

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The easiest way to format a list is as follows:

- Click in the list, then Format  AutoFormat...
- Choose the format you want and click OK

### Exercise 15


AutoFormat the list to your taste

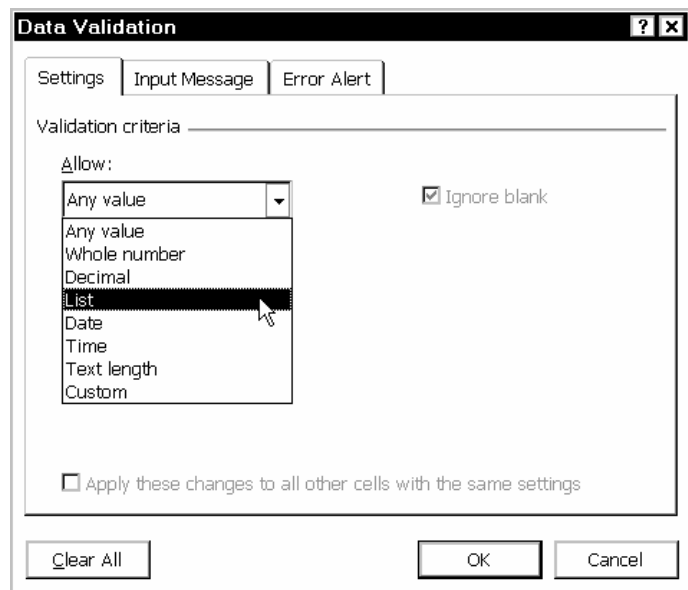
## Designating valid cell entries via a list

For each cell in a spreadsheet, you can set validation criteria to limit the allowed values. The following focuses on the ability to provide a list of values to choose from.

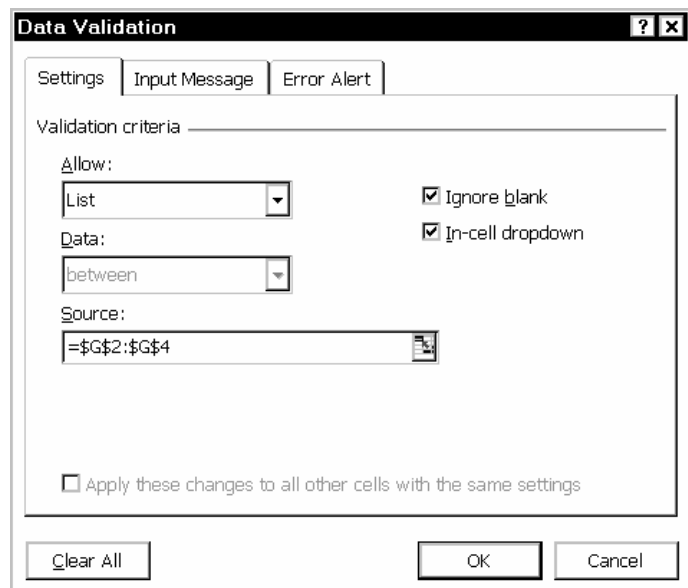
### Exercise 16

- i) Switch to the Tuesday sheet
- ii) Enter the allowable crops into a range of cells to the right of the table
- iii) Set the cells B11:B13 to validate against the allowable crops
- iv) Test that the validation works by entering some good and bad data

- i) Enter the valid data values into a single row or column on the sheet containing the cells that you want to enter data
- ii) Select the cell or cells to validate
- iii) **Data**  **Validation** and then select the **Settings** tab
- iv) Select **List** from the **Allow** drop down list



- v) Click in the **Source** box
- vi) Drag through the valid data list on the sheet
- vii) Make any other settings required. If you want to select data to enter from the list, ensure that the **In-cell dropdown** check box is set
- viii) Set an **Input Message** and **Error Alert** if required
- ix) Click **OK**



## Other features to explore on your own

### Using a form to select data

#### **Exercise 17**

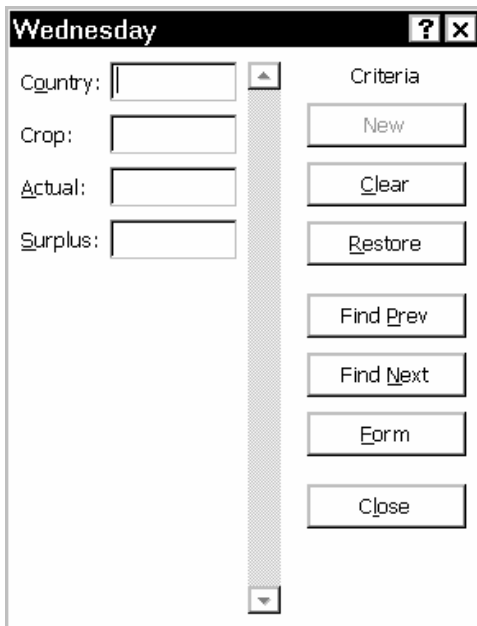
Refer to the details below and use a form to do the following selections:

all records for Potatoes

all records for Onions in Britain

all records for Carrots where the surplus is greater than 1

- i) Click the Criteria button to get a criteria form, in which you can put a criterion for each field, including calculated fields:



This tells you that you are now setting **Criteria**

These now **Clear** and **Restore** any criteria settings

These now **Find Previous/Next** record which matches criteria

Switch back to **Form**

**Close** the dialog box

- ii) Set the criteria

- iii) Click  and  to display the selected records.

## Specifying calculated criteria with the Advanced Filter

Using the Advanced Filter, you can select records against any computed criterion which results in a TRUE or FALSE value.

### Exercise 18

Follow the steps below to select records for which the Surplus is more than 10% of the Actual

- i) Add a field to the criteria whose name is not already used

	A	B	C	D	E
1	Country	Crop	Actual	Surplus	Calc
2					

- ii) In the required cell put the expression to calculate and the comparison you want to use. Any references in this expression to cells in the list must be to cells in the first data row of the list:

	A	B	C	D	E	F
1	Country	Crop	Actual	Surplus		
2					=d7>c7*10%	
3						
4						
5						
6	Country	Crop	Actual	Surplus		
7	Britain	Carrots	15	0		
8	Britain	Onions	12	4		
9	Britain	Potatoes	26	-2		

- iii) Click in the list itself, then **Data** → **Filter** → **Advanced Filter** to get the Advanced Filter form
- iv) Move to the **Criteria Range** field on the form and enter the criteria by dragging through the cells containing them
- v) Click **OK**

Records for which the comparison is TRUE will be selected.

**Note** that expressions in a computed criterion can include references to cells outside the list itself

## A harder extract exercise

### Exercise 19

Extract into a new area records for Spain for which the Actual is less than the Average of all Actuals. (**Hints:** calculate the AVERAGE (function) first in an empty cell. Also the reference to the average in the criterion must be *absolute*)

## Putting a list back into its original order after sorting it

If you want to be able to do this, you need to prepare in advance.

You must add, before you do any sorting, an indexing field with values in ascending order as in the example on the right.

After you finish sorting, you can then restore the original order by sorting on the index.

5			
6	Index	Country	Crop
7	1	Britain	Carrot
8	2	Britain	Onion
9	3	Britain	Potato
10	4	Spain	Carrot
11	5	Spain	Onion
12	6	Spain	Potato
13	7	France	Carrot