

## Chapter 18

# Filtering

Automatic filtering is a method that allows you to hide records that contain items that do not meet the specified filter criteria.

## Excel offers two filtering options

- ▣ **AutoFiltering** of a list according to one or more criteria.
- ▣ **Advanced filtering** according to complex criteria.

## Adding Icons to the Toolbar

Add icons from the **Data** category of the **Customize** dialog box to the toolbar to allow quick filtering and display of all data that was hidden.

**AutoFilter** icon



**Show All** icon



Once you have added the icon to the toolbar, filtering lists is easy. In the sheet, select the item in the field according to which data will be filtered, and click the **AutoFilter** icon.

To undo the automatic filter and display hidden rows, click the **Show All** icon.

To add an icon to the toolbar, select one of the toolbars and right-click. From **Customize**, select the **Commands** tab. From the **Data** category, drag the **AutoFilter** and **Show All** icons to the toolbar. Click **Close**.

# AutoFilter

Select a cell list of data. From the **Data** menu, select **Filter, AutoFilter**.

Running Number	Invoice Number	Date	Customer Name	Market	Quantif	Income
1	101	05/10/1996	MrExcel	USA	15	2,136.75
2	102	06/10/1996	Intel	USA	17	2,270.94
3	103	07/10/1996	Motorola	Asia	20	10,152.14
4	104	08/10/1996	Pacific Bell	Western Europe	50	11,111.11
5	105	09/10/1996	Motorola	Asia	100	8,717.95
6	107	11/10/1996	Amazon	Asia	15	29,280.00
7	108	12/10/1996	Microsoft	Asia	30	6,020.00
8	109	01/10/1997	AIG	Asia	40	8,040.00
9	110	02/10/1997	Cisco	Asia	50	37,065.81
10	111	03/10/1997	MrExcel	USA	67	15,452.00
11	112	04/10/1997	Pacific Bell	Asia	77	13,032.00
12	113	05/10/1997	Amazon	Africa	89	13,095.00
13	114	06/10/1997	Intel	USA	101	23,084.00
14	115	07/10/1997	Motorola	Asia	113	23,118.00
15	116	08/10/1997	Intel	USA	125	18,495.00
16	117	09/10/1997	Microsoft	Asia	138	23,506.50
17	118	10/10/1997	AIG	Africa	150	25,129.90
18	119	11/10/1997	Pacific Bell	Africa	162	26,753.30
19	120	12/10/1997	Microsoft	Asia	174	28,376.70

A drop-down filtering list is added to the name of every **field** in the table. To open the list, click the arrow on the right side of the cell. Clicking the arrow displays a unique list of items in the field. By selecting one of these items, you are actually setting the filter criterion.

After the item is selected and the list has been filtered, the color of the filter arrow in the active-filter field changes from black to blue.



## Note

**Filter on multiple fields** – you can select more than one criterion for filtering. After finishing the first filter, filter again by selecting an item from another column.

The number of items available for filtering is limited. Excel cannot filter columns in which the number of items exceeds 999 (not the number of rows). To filter when there are more than 999 items, use **Advanced Filter** (see below).

Be careful with formulas that have a relative reference. The result of the filter will distort the results of the calculation. Only perform a filter if the formulas have **Names** or absolute references.

## Printing data after AutoFilter

1. Select the data list, before or after performing **AutoFilter**, by using the shortcut **Ctrl+\***.
2. From the **File** menu, select **Page Setup**.
3. Set the **Print Area**.

The Print Area is the entire data list. After filtering, only the displayed data is printed.

## Saving AutoFilter criteria by using Custom Views

To save **AutoFilter** definitions as repeated criteria, add the **Custom Views** icon to the toolbar. It is located in the **View** category of the **Customize** dialog box for toolbars.

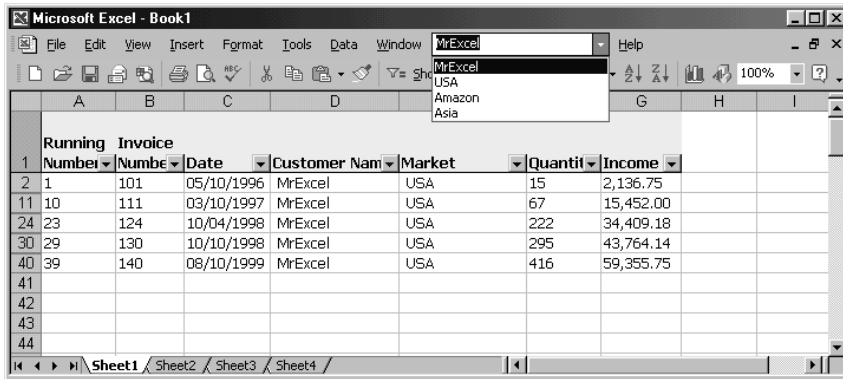
### Saving a custom view

1. Filter the database with the criteria you set.
2. In the icon itself, enter the name of the view you want to save.
3. Press **Enter**.



#### Note

Select and define the print area before saving the **Custom View**. See the explanation in the **Custom Views** section of **Chapter 11, Printing**. By using **Custom Views** to save filtering definitions, you can save complex definitions together with print definitions.



## Deleting a custom view

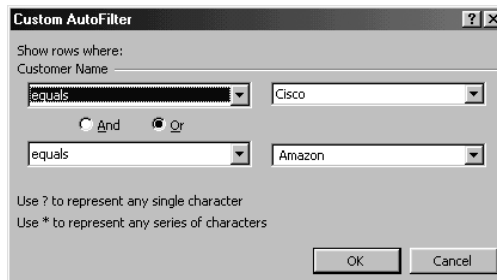
From the **View** menu, select **Custom Views**. Select the view you want to delete, and click **Delete**.

## Custom AutoFilter

**Custom AutoFilter** allows you to set complex criteria for **AutoFilter**.

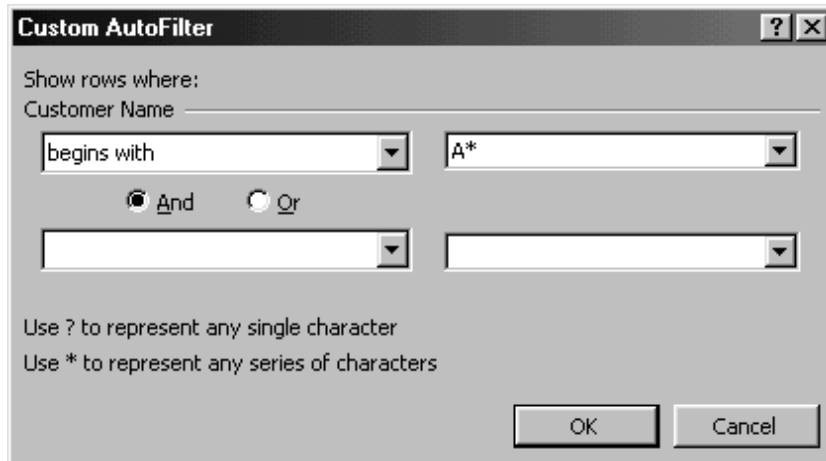
**Example: Selecting two customers with Custom AutoFilter.**

1. Open the filter list in the **Customer Name** field.
2. Select **Custom** (third from the top of the item menu for the field).
3. In **Show rows where: Customer Name**, select **equals**, and on the right side, select the customer Cisco.
4. Select the **Or** option (as opposed to the **And** option).
5. In the second field for **Show rows where: Customer Name**, select **equals**, and on the right side, select the customer Amazon.
6. Click **OK**.



## Filtering by wildcard text characters

For example, filter a customer list in which the first character is A. In the **Custom AutoFilter** dialog box, open the options from the list. Select **begins with**, and on the right side, type **A\***. Click **OK**.



## Filtering by the date field

Excel does not sort data according to cell format, but according to cell value. When sorting by date, Excel sorts the date according to its number. For example, the serial number of the date September 9, 2001 is 37164. If the cell format is changed to mmmm, the result of the format is **September**. When sorting the data list, Excel ignores **September** and only relates to the number 37164.

With **AutoFilter**, as opposed to **Sorting**, Excel relates to the date format and allows you to filter data according to format.

## Filtering according to date by changing the format

1. Turn off the **AutoFilter**. From the **Data** menu, select **Filter, AutoFilter**.
2. Copy the **Date** column.

3. Select two columns to the right of **Date**, right-click, and from the shortcut menu, select **Insert Copied Cells** (pasting by inserting copied cells allows you to insert two columns and paste the copied column into them).
4. In Cell D1, type the heading **Month**, and in Cell E1, type the heading **Year**.
5. Select the **Month** field. To select it quickly, select Cell D2, and press **Ctrl+Shift+Down Arrow**.
6. Press **Ctrl+1 (Format Cells)**.
7. In the **Number** tab, select **Custom**.
8. In the **Type** box, enter the format, mmmm (full month format).
9. Click **OK**.
10. Select the **Year** field. To select it quickly, select Cell E2, and press **Ctrl+Shift+Down Arrow**.
11. Press **Ctrl+1**.
12. In the **Number** tab, select **Custom**.
13. In the **Type** box, enter the format, yyyy (year format).
14. Click **OK**.
15. Select one of the cells in the **Year** field, and click the **AutoFilter** icon.

The figure below illustrates the results.

Running Number	Invoice Number	Date	Month	Year	Customer Name	Market	Quantity	Income
1	101	05/10/1996	May	1996	MrExcel	USA	15	2,136.75
2	102	06/10/1996	June	1996	Intel	USA	17	2,270.94
3	103	07/10/1996	July	1996	Motorola	Asia	20	10,152.14
4	104	08/10/1996	August	1996	Pacific Bell	Western Europe	50	11,111.11
5	105	09/10/1996	September	1996	Motorola	Asia	100	8,717.95
6	107	11/10/1996	November	1996	Amazon	Asia	15	29,280.00
7	108	12/10/1996	December	1996	Microsoft	Asia	30	6,020.00
8	109	01/10/1997	January	1997	AIG	Asia	40	8,040.00
9	110	02/10/1997	February	1997	Cisco	Asia	50	37,065.81
10	111	03/10/1997	March	1997	MrExcel	USA	67	15,452.00
11	112	04/10/1997	April	1997	Pacific Bell	Asia	77	13,032.00
12	113	05/10/1997	May	1997	Amazon	Africa	89	13,095.00
13	114	06/10/1997	June	1997	Intel	USA	101	23,084.00
14	115	07/10/1997	July	1997	Motorola	Asia	113	23,118.00
15	116	08/10/1997	August	1997	Intel	USA	125	18,495.00
16	117	09/10/1997	September	1997	Microsoft	Asia	138	23,506.50
17	118	10/10/1997	October	1997	AIG	Africa	150	25,129.90
18	119	11/10/1997	November	1997	Pacific Bell	Africa	162	26,753.30
19	120	12/10/1997	December	1997	Microsoft	Asia	174	28,376.70
20	121	01/10/1998	January	1998	Cisco	Asia	186	30,000.10
21	122	02/10/1998	February	1998	Amazon	Africa	198	31,200.96

## Color rows according to criteria

You can use coloring to isolate data in lists and to differentiate between various types of data.

### Color lists according to the criteria 1996 and 1997 (years)

1. Make sure the list is set to **AutoFilter**.
2. Filter the year **1996** according to the following criterion – from the drop-down list for the **Year** field, select **1996**.
3. Select a cell in the list of data – press **Ctrl+\*** (select the current region).
4. From the **Formatting** toolbar, select **Fill Color**, and then select any color.
5. Filter the year **1997** according to the following criterion – from the drop-down list for the **Year** field, select **1997**.
6. Select a cell in the data list, and press **Ctrl+\*** (select the current region).
7. From the **Formatting** toolbar, select **Fill Color**, and then select a different color from the one you selected before.
8. Turn off **AutoFilter**.



## Caution

The color of the heading row in the list also changes. After coloring the data, select the heading row for the list and apply a different color.

## Summing filtered data

Every change you make when selecting criteria for filtering causes the number of rows displayed in the sheet to change (assuming that the number of records in each filter is different). The SUM function sums all rows, including hidden rows. Use the SUBTOTAL function to sum only the data in displayed rows.

1. Click the **Show All** icon.
2. Select a cell in the **Customer Name** or **Market** field, and click the **AutoFilter** icon.
3. Press **Ctrl+\*** (select the current region).
4. Click the **AutoSum** icon (sigma).

The SUBTOTAL function is automatically entered below the data column. The formula is =SUBTOTAL(9,F2:F42).

The digit 9 means the data displayed in the column is summed with the SUM function. To change the function of the calculation, change this digit.

You can use the formula list and the formulas' corresponding numbers in the SUBTOTAL function, as displayed in the figure below. The list was copied from the **Help** dialog box of the SUBTOTAL function (in the SUBTOTAL argument dialog box, click **Help**).

**Example:** in the formula =SUBTOTAL(1,F2:F42), the digit 1 represents the AVERAGE function and calculates the average of the totals in the range of cells displayed in the formula.

<u>Num Function</u>	<u>Function</u>
1	AVERAGE
2	COUNT
3	COUNTA
4	MAX
5	MIN
6	PRODUCT
7	STDEV
8	STDEVP
9	SUM
10	VAR
11	VARP

## Advanced Filter

The Advanced Filter options include:

- Filtering according to multiple criteria.
- Filtering without the limit of 999 items in a field.
- Filtering unique lists.

## Using advanced filter

1. Insert a few empty rows above the database.
2. Copy the heading row of the list, and paste it into Row 1 (see figure below).
3. In Row 2, under the name of the field, enter the filter criteria. See the figure below for an example. The filter criteria for the **Customer Name** field is **AIG Ltd.**, and the filter criteria for the **Quantity** field is **>100**.

4. Define a **Name** in the data table. Select one of the cells in the table, press **Ctrl+\***, and then press **Ctrl+F3**. Enter the **Name** in the **Names in workbook** box, and click **OK**. For example, define the **Name Data**.
5. Define a **Name** for the criteria range. Select the range A1:l12 (heading row + criteria row). Define a **Name** as explained in the paragraph above. For example, define the **Name CriteriaRange**.

Running Number	Invoice Number	Date	Customer Name	Market	Quantity	Income
			AIG		>100	
Running Number	Invoice Number	Date	Customer Name	Market	Quantity	Income
1	109	01/10/1997	AIG	Asia	40	8,040.00
2	118	10/10/1997	AIG	Africa	150	25,129.90
3	123	03/10/1998	AIG	Western Europe	210	32,850.02
4	133	01/10/1999	AIG	USA	331	48,941.63
5	138	06/10/1999	AIG	USA	392	56,237.43
6	104	08/10/1996	Pacific Bell	Western Europe	50	11,111.11
7	112	04/10/1997	Pacific Bell	Asia	77	13,032.00
8	119	11/10/1997	Pacific Bell	Africa	162	26,753.30
9	128	08/10/1998	Pacific Bell	USA	271	40,645.82
10	137	05/10/1999	Pacific Bell	USA	380	54,678.27
11	107	11/10/1996	Amazon	Asia	15	29,280.00

6. From the **Data** menu, select **Filter, Advanced Filter...**
7. Select the **List Range** box, press **F3**, and paste the name **Data**.
8. Select the **Criteria Range** box, press **F3**, and paste the name **CriteriaRange**.
9. Click **OK**.

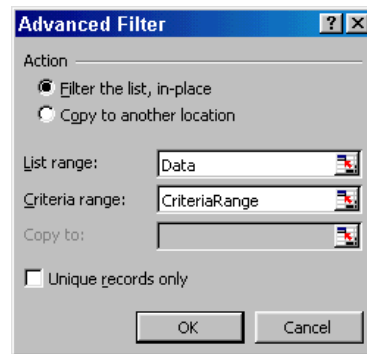
## Canceling advanced filter

Click the **Show All** icon, or from the **Data** menu, select **Filter, Show All**.



## Note

- ▣ Do not use text that is the same as the criteria field.
- ▣ Be careful with formulas that have relative references.
- ▣ You can use names to create the filter criteria in another sheet in the workbook. In this case, it is best if you copy the results of the filter to another location. See below.



## Copying the advanced filter results to another location

Excel lets you copy filter results to another location. This is excellent when you want to quickly copy the results of Advanced Filtering according to criteria.

In the **Advanced Filter** dialog box, select **Copy to another location**. In the **Copy to** box, select the reference in the worksheet into which the data will be copied.



## Using the Database Functions to Sum Data According to Criteria

The **Advanced Filter** technique hides rows that do not meet the specified criteria.

You can use the SUBTOTAL function together with the **Advanced Filter** technique to sum data after it has been filtered. Change the summing function by changing the function digit in the SUBTOTAL function.

The formulas in the **Database** category in the **Paste Function** dialog box (click the icon, or press **Shift+F3**) sum data according to criteria. The syntax of the formulas in this category is as follows:

=DSUM (Data, FieldName, Criteria)

The first argument contains the data range, the second argument contains the name of the criteria field, and the third argument contains the criterion.

All the **Database** functions begin with the letter D (Data): DAVERAGE, DCOUNT, DCOUNTA, DGET, DMAX, DPRODUCT, and DSUM. The DGET function is different from the others because it returns isolated data (like the VLOOKUP function).

### Disadvantage of using the Database functions

The **Database** functions require a large amount of memory. Using the **Database** functions frequently significantly reduces calculation speed.

**Example: the DSUM function**

Running Invoice									
1	Number	Number	Date	Customer Name	Market	Quantity	Income	VAT	Total
2				AIG		>100			
3									
4							169,930.80		
5									
Running Invoice									
6	Number	Number	Date	Customer Name	Market	Quantity	Income	VAT	Total
7	1	109	10/9/2003	AIG	Asia	40	18,881.20	3209.8	22,090.8
8	2	118	10/18/2003	AIG	Africa	150	70,804.50	12036.77	82,841.27
9	3	123	10/23/2003	AIG	Western Europe	210	99,126.30	16851.47	115,977.77
10	4	133	11/2/2003	AIG	USA	33	15,576.99	2648.09	18,225.08
11	5	138	11/7/2003	Amazon	USA	331	156,241.93	26561.13	182,803.06
12	6	107	10/7/2003	Amazon	Asia	392	185,035.76	31456.08	216,491.84
13	7	113	10/13/2003	Amazon	Africa	15	7,080.45	1203.68	8,284.13
14	8	122	10/22/2003	Amazon	Africa	89	42,010.67	7141.81	49,152.48

## Unique Records

A unique record is different from an ordinary record. Each item in a unique record appears only once.

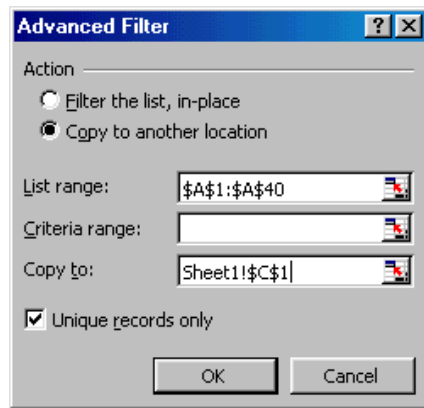
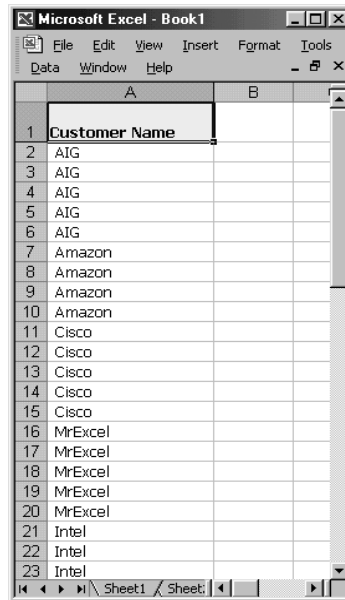
**Example:** a unique record of the company's customers

In order to prepare an aging report, you have transferred the list of invoices and receipts from the company's accounting system to a sheet in a workbook. The names of customers are repeated several times in invoices and receipts. The customer list in an earlier report that you had prepared is not up-to-date. New customers have been added in the period between the two reports. You want to prepare an aging report with an updated customer list, in which the name of each customer appears only once.

The figure below illustrates a list of customer names that was copied from a tax receipts report.

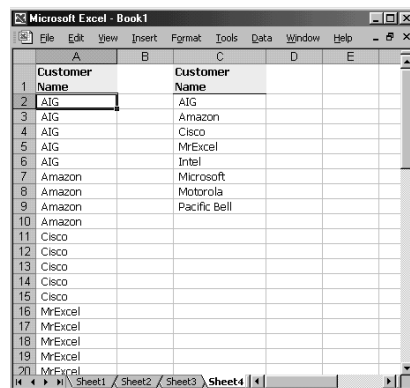
## Filtering a record into one unique record

1. Select Cell A1 (in the figure, Customer Name).
2. From the **Data** menu, select **Filter, Advanced Filter**.
3. Select **Copy to another location**.
4. In the **Copy to** box, select Cell C1.
5. Select the **Unique records only** box.
6. Click **OK**.



### Result

A unique record of customers in column C.



## Using the COUNTIF function to filter a record into a unique record

1. In Cell B1, enter the text **Unique Record**.
2. Select Cell B2, and enter the formula =IF(COUNTIF(\$A\$2:A2,A2)>1,1,0).
3. Copy the formula from Cell B2 to Cell B40 (the customer list in Column A extends through Cell A40).
4. From the **Data** menu, select **Filter**.
5. Open the filtering drop-down list in Cell B1 by clicking the arrow, and select **0**.
6. Notice the unique record in Column A.

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E
1	Customer Nam	Unique Records			
2	AIG	0			
7	Amazon	0			
11	Cisco	0			
16	MrExcel	0			
21	Intel	0			
26	Microsoft	0			
31	Motorola	0			
36	Pacific Bell	0			
41					
42					
43					
44					
45					
46					
47					
48					
49					

### Explanation

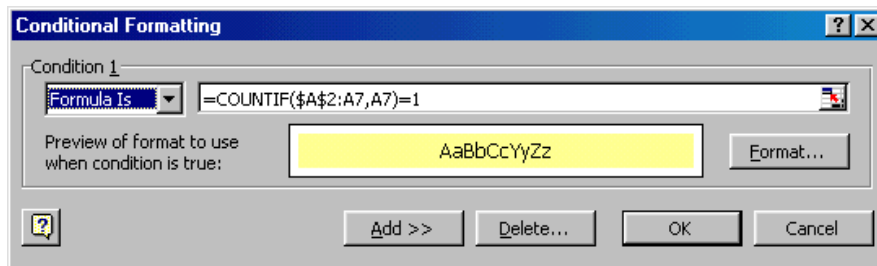
The COUNTIF function counts the number of cells within a range that meet the given criteria.

For example, the COUNTIF function returns the number of times a customer appears in a list. The IF function uses the results of the

COUNTIF calculation. If the result of the calculation is greater than 1, the result of calculating the formula is 1. If it is not, the result is 0.

Because the range runs from an absolute cell ( $\$A\$2$ ) to a relative cell (A2), the cell range checked by the COUNTIF functions changes when the formula is copied. With **AutoFilter**, you can filter the rows according to the criterion 0.

## Coloring a unique record



1. Select Cell A2.
2. Select the customer list before filtering. Press **Ctrl+Shift+Down Arrow**.
3. From the **Format** menu, select **Conditional Formatting**.
4. In the **Condition 1** box, select **Formula**.
5. Enter the formula `=COUNTIF($A$2:A2,A2)=1` (be careful about absolute and relative references).
6. Click **Format**, and select the **Pattern** tab.
7. Select any color.
8. Click **OK** twice.

### Explanation

The COUNTIF function returns 1 the first time a customer name appears. In conditional formatting, the formula is the first argument in the IF function, Logical\_text. If the condition exists, you can format the cell as desired.