

Using Functions to Summarize Data

Excel provides a wealth of statistical functions, several of which are useful in helping you create a summary of your data. In addition to the basic **SUM**, **COUNT** and **AVERAGE** functions there are functions that allow you to include criteria specifying *which* data should be calculated. The simplest of these are **SUMIF**, **COUNTIF** and **AVERAGEIF** (AVERAGEIF was introduced in Excel 2007 – in earlier versions the same result can be achieved by dividing SUMIF by COUNTIF). These functions all work in the same way. The syntax for **SUMIF** is:

`=SUMIF(range, criteria, [sum_range])`

The *range* is the range of cells to which the criteria will be applied.

The *criteria* is an expression that describes the items in the *range* that are to be considered (criteria must always be supplied within a pair of quote marks).

The *sum_range* is the range of cells to be summed (shown in square brackets because it is optional, you need only provide it if it is different from the *range*).

The SUMIF function adds the values in the column you specify based on the criteria you specify. The criteria can apply to the same column that is being added or to a different column, in which case the value added are those in the same row as those that satisfy the criteria.

In the first example the criteria apply to the same column that is being summed. The question is "What is the total tonnage for shipments exceeding 15,000 tonnes?" The function provides a total of all the numbers in column F that exceed 15000 (Fig.1) so no separate *sum-range* argument has been supplied.

=SUMIF(F:F,">15000")						
D	E	F	G	H	I	J
CountryTo	Commodity	Tonnes		Total Shipments over 15,000 tonnes		
United Kingdom	Wheat	16182		2,064,870		
United Kingdom	Rice	11398				

Fig.1 The criteria apply to the column being summed.

In the next example (Fig.2) the criteria apply to a different column from the one that is being summed. The question is "What is the total tonnage for shipments of Wheat?" The function provides a total of all the values in column F where the corresponding values in column E equal "Wheat".

=SUMIF(E:E,"Wheat",F:F)						
D	E	F	G	H	I	J
CountryTo	Commodity	Tonnes		Total Shipments of Wheat		
United Kingdom	Wheat	16182		1,459,123		
United Kingdom	Rice	11398				

Fig.2 The criteria apply to a different column from that being summed.

Excel 2007 introduced versions of these functions that could accept multiple criteria (up to 127 different criteria can be supplied). These functions are **SUMIFS**, **COUNTIFS** and **AVERAGEIFS**. Their syntax for each follows the same pattern, that for SUMIFS is:

`=SUMIFS(sum_range, criteria_range1, criteria1, [criteria_range2], [criteria2], ...)`

The *sum_range* is the range of cells to be summed (regardless of whether or not any criteria are applied to it). The *criteria* and *criteria_range* are then supplied in pairs, with a minimum of one pairs and a maximum of 127.

In this example (Fig.3) two sets of criteria have been applied. The question is "What is the total tonnage for shipments of Wheat to Italy?". The function provides a total of all the values in column F where the corresponding values in column E equal "Wheat" and in column D equal "Italy".

=SUMIFS(F:F,E:E,"Wheat",D:D,"Italy")						
D	E	F	G	H	I	J
CountryTo	Commodity	Tonnes		Total Shipments of Wheat to Italy		
United Kingdom	Wheat	16182		107,243		
United Kingdom	Rice	11398				

Fig.3 Two sets of criteria have been applied.