(3)   Searching Data: e.g. automatically producing reminder to members of a club whose subscription is overdue in a club secretary's spreadsheet based system.

Given a particular task it is therefore possible to customise the generic software so that it performs that task specifically. The macros provide data processing and input/output operations specific to the task while the template both stores the macros necessary for the task and provides a basic framework or layout for the document or spreadsheet.

Spreadsheets

Worksheets Workbooks Rows etc

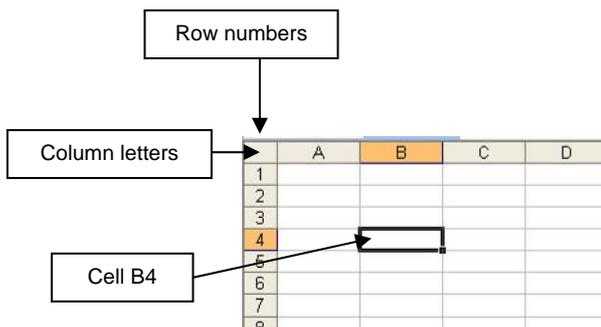Spreadsheet software is ideal for setting up mathematical models or handling any situation where calculations are an important element. Examples might include preparing financial accounts and dealing with examination statistics for a group of students. Some of the elements that allow spreadsheets to perform this type of task so well are outlined below.

Fig 13: Spreadsheet Layout

A spreadsheet appears as a grid made up of columns and rows. The columns are usually identified by letters and the rows by numbers. Each rectangle in the grid is called a cell and each cell is identified by its column letter and row number.

Figure 13 shows part of a spreadsheet with the cell B4 selected. An alternative way of identifying cells is to number both rows and columns in what is known as the row-column referencing system. In this case the selected cell would be identified as R4C2 (row 4 column 2).

A cell can store and display text or numerical data. Each cell can be formatted so that its contents are displayed in a particular way. Formatting can be used on numeric data to set the number of decimal places that will be displayed.

Fig 14: Spreadsheet Formatting

A cell containing numeric data can be formatted to display a currency value, in which case the £ sign will automatically be shown in front of the number. Cells may also be formatted to display various date and time formats.

Once a cell has been formatted then it will, if possible, display the data it contains in the required format. Figure 14 shows the same numeric value of 132.569 formatted in various different ways.

Each of the cells A1 to A7 in Figure 14 contains the number 132.5669. Each of them displays it in a different way, depending on what format has been applied to that cell. The actual format used is shown in column B beside each of the cells.

Columns and rows can be important, particularly in financial models where the layout of the model may need to match the layout used in, for example, company accounts. Even with non-financial models the data often naturally groups into rows or columns for clarity; days of the week, for example, being placed in adjacent columns. The software will supply easy ways of performing operations on a column or row of data. SUM(A1:A8), for example, will total any numeric values in rows 1 to 8 of column A.

The SUM example given used what is called a range of cells A1:A8. The ability to refer to a range of cells makes entering some formulae easier. SUM(A1:A8) is simpler than A1+A2+A3+A4+A5+A6+A7+A8, and just think if there were 500 rows to total!

The use of ranges has another important benefit. If the user needs to insert a row in the range A1 to A8 then the formula will automatically be adjusted to SUM(A1:A9) to accommodate the fact that there is now an extra row in the range. If the formula had been written out cell by cell then no automatic correction would be applied and the user would have to remember to manually correct it.

A range is any group of cells that the user cares to associate together. Normally a range will be groups of cells in a row, column or area of the spreadsheet. They can be acted on as a group using functions like SUM and AVERAGE.

A single spreadsheet that has been set up with text, data and formulae is often referred to as a worksheet. A worksheet will usually be designed to perform some particular specific task.

Sometimes several worksheets are needed. An example might be a sales representative keeping track of travel expenses. The representative might set up one worksheet for each month of the year. Rather than have twelve different files, the representative could group the separate worksheets into a single workbook containing the twelve separate worksheets.

A workbook is a collection of spreadsheets. Data from spreadsheets in a workbook is easily accessed by other spreadsheets in the same workbook and changes to values in one of the sheets will be propagated to the other worksheets in the workbook that reference those values. The sales representative could, for example, have a summary sheet which brought the totals from each of the twelve monthly sheets together to give an overall picture of travel expenses for the whole year.

Absolute and Relative Referencing
We have seen that a cell is identified by its column letter and row number. This combination is used to reference cells when creating formulae.

This simple explanation of how a cell is referenced hides an important fact. A cell reference can be either relative or absolute.

A relative cell reference refers to the position of the cell relative to where the cell containing the formula has been placed. This is best illustrated using the Row Column way of identifying cells. Using this method a relative reference (indicated by the square brackets) R[-1]C[1] would refer to a cell one row above and one column to the right of the cell containing the reference, while RC[-1] would refer to the cell in the same row but one column to the left of the current cell. The best way to illustrate this is with a simple example.
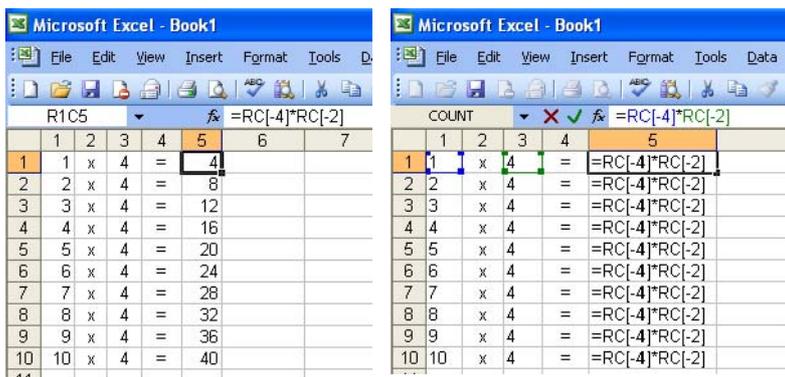

Fig 15:   Four Times Table Spreadsheet (Row Column formatting on)

The spreadsheet on the left (Figure 15) produces the four times table. Columns 1 to 4 contain data or text. Column 5 contains a formula which is displayed in Row Column format. (Notice that, since row column formatting has been turned on, the column letters have been replaced by numbers).

The formula in R1C5 (or E1 as it would be known in the more usual way of naming cells) is:

=RC[-4] * RC[-2]