

CHAPTER 9 Spreadsheet Software

Overview

People work with numbers every day. Corporations track profits and losses; economists generate graphs of growth of the country's economy; statisticians calculate probability of crashing the market; and women manage their household budgets. To perform all these tasks, people use spreadsheet programs.

A **Spreadsheet program** is a software tool for entering, calculating, manipulating and analyzing sets of numbers. The specialty of spreadsheet software is working with numbers. It can hold large amount of data arranged in rows and columns. It can manipulate numbers and present information in numerous ways.

9.1 Features of Spreadsheet Software

Like Word Processors, the Spreadsheet software also varies significantly e.g. LOTUS 123, MS Excel etc. But all of them have the following basic features:

- **Grid of Rows and Columns:** The spreadsheet is a grid of rows and columns. Each row is assigned a number and each column a letter. The intersection of a row and a column forms a **cell**. Each cell has a reference number that is formed by combining the column number and row number e.g. A1, G18 etc. A cell contains labels or values. A label is a text entry such as "Gross Salary" whereas a value can be a number, a date, a formula or a formula's result.
- **Formulas:** Formulas are used to express mathematical relationships between cells.
- **Functions:** Functions are used to perform certain tasks
- **Commands:** Commands are used to manipulate the worksheet or its contents
- **Text Manipulation:** Some simple text manipulation can also be performed.
- **Print:** Allows you to send a document to a printer to get a hardcopy.

9.1.1 Starting to Use Spreadsheet

To understand the functionality of spreadsheet software you should be familiar with its **interface**. The interface represents the way through which you can interact with the spreadsheet software.

9.2 The Spreadsheet's Interface

Like a word processor, a spreadsheet's interface consists of main document window, and set of various tools to manipulate data. In the document window the document is displayed. In a spreadsheet, you actually work in a grid of rows and columns called a **worksheet**. Collection of related worksheets forms a **workbook**. Spreadsheet software allows you to save the whole workbook, containing several worksheets, as a file.

In addition to document window, the spreadsheet's interface contains menu bar, toolbars, and a formula bar. Formula bar is used to apply certain formulas on different cells of the worksheet.

Unlike today's advance spreadsheet programs early spreadsheet programs provided only one worksheet at a time. The workbook could contain just one worksheet. New spreadsheets are rated as **3D-Worksheets**, which are like a pad of worksheets. It is due to this feature that the data in one worksheet can be used for calculations performed in another worksheet of the same or a different workbook.

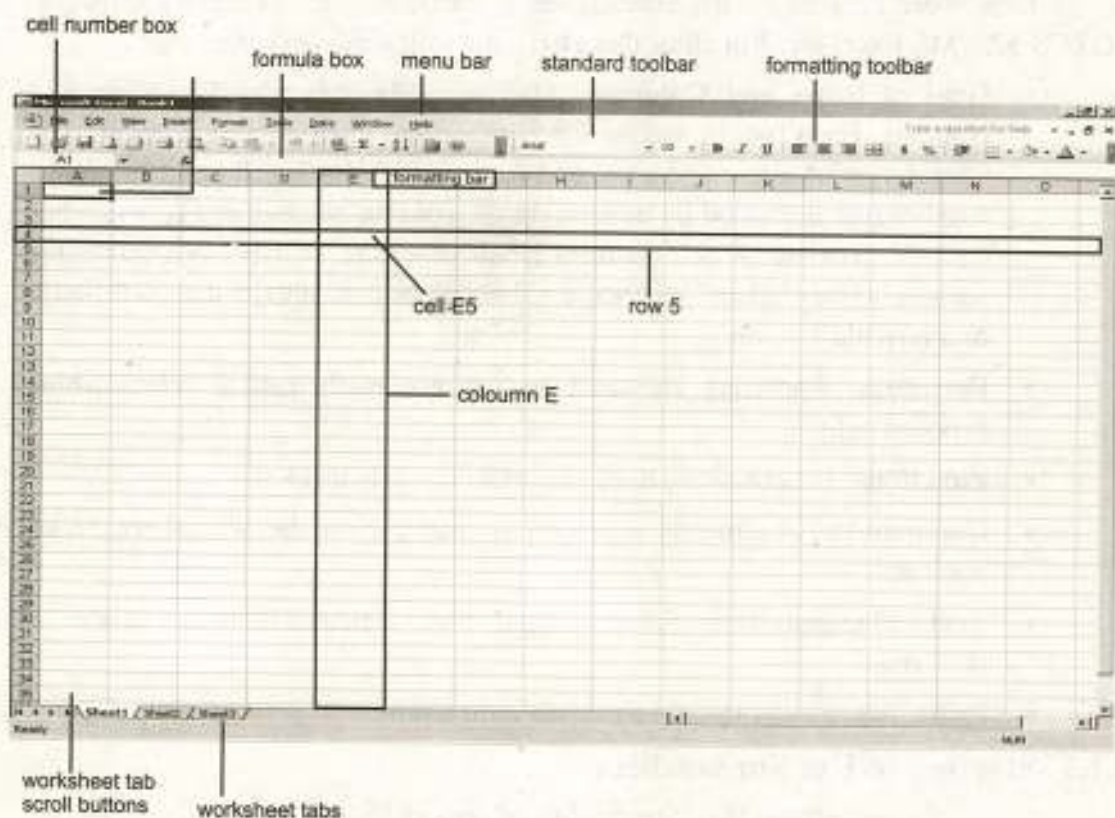


Figure 9.1: Spreadsheet Interface

9.3 Entering Data in a Worksheet

Cell is the basic unit where the data is entered in a worksheet. The data can take variety of forms i.e. text, numbers, dates, and formulas. The cell also can hold graphics, audio files, and video or animation files. There are two states of a cell i.e. active and passive. Before entering data, the cell must be activated. Using the mouse or arrow keys, you can select a cell to make it active. A bold rectangular border indicates an active cell. Every cell in the worksheet has an address (figure 9.1).

When a cell is selected you can enter data by simply typing on the keyboard. You can also enter the data in an active cell through the formula bar. Similarly you can edit the contents of a cell in the formula bar. When a cell containing a formula is activated, its formula appears in the formula bar, which you can edit there.

Like word processors, the basic operations of **cut**, **copy** and **paste** work in the same way here in Worksheets. You can move data between the worksheets of the same or different workbooks by using these operations.

9.4 Basics of Worksheet

As it has been discussed that the data entered in a cell can take variety of forms but the most common of these are:

- Labels (Simple text)
- Values (numbers)
- Formulas

Labels are used to identify a value or a series of values. Labels are helpful in making the worksheet meaningful. It is important to note that formulas can be applied only on values; these cannot be applied on labels.

Values are just numbers that you enter in different cells of a worksheet. These can be whole numbers, decimals, negative numbers, currency and other types of values including scientific notations.

Working with **Formulas** is the most powerful feature of a spreadsheet. Formula can be calculated on the basis of values or formulas in other cells. Formulas can involve basic arithmetic operators. More complex formulas can even evaluate logical conditions and perform certain calculations on the basis of the result of the evaluation. Conditions may evaluate to true or false.

9.4.1 Cell References and Ranges

A cell reference tells formula to look up the contents of the referenced cell. This increases the flexibility of the formula. The change in the contents of the referenced cell is quickly reflected to the result of the formula being

calculated on the basis of this cell. The cell is referred to by its address such as G8, AC5, and Y10 etc. there if you want to add values in cells G8 and Y10, your formula might look like $=G8 + Y10$

If your formula involves contiguous cells, you can refer to all the cells as **range**. The range is specified as follows:

address of the first cell : address of the last cell

For example, the cells D3, E3, F3, G3 can be referred to as **D3:G3**.

9.4.2 Relative and Absolute Referencing

Calling cells by just their addresses (such as "A1") is called **relative referencing**. When a formula contains relative referencing and it is copied from one cell to another, the spreadsheet does not create an exact copy of the formula. It will change cell addresses relative to the row and column they are moved to. For example, if a simple addition formula in cell C1 i.e. $=A1+B1$ is copied to cell C2, the formula would change to $=A2+B2$ to reflect the new row.

To prevent this change, cells must be called by **absolute referencing** and this is accomplished by placing dollar signs "\$" within the cell addresses in the formula. Continuing the previous example, the formula in cell C1 would read $=A$1+B1 if the value of cell C2 should be the sum of cells A1 and B1. Both the column and row of both cells are absolute and will not change when copied.

9.4.3 Named Ranges

Range names are names that you define to represent a cell or cell range on a worksheet. These range names can further be used in formulas instead of cell addresses or ranges. They also make it easier to use, maintain, and understand the formulas in the worksheet. e.g. the formula $=C10*100/C8$ calculate the percentage of marks. After giving names to cells, this can be expressed as $=\text{Marks_Obtained} * 100 / \text{Total_Marks}$

Defining Range Names

To define a name for a cell or range of cells select **Insert|Name|Define** from the menu bar. The following dialog box will appear.

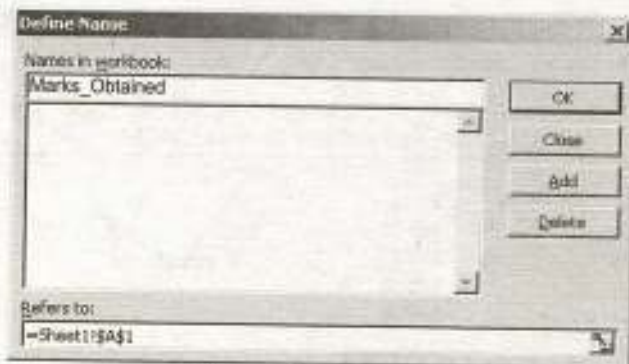


Figure 9.2: Range names

You can even give names to cells or cell ranges instead of using their address. After assigning names to cells or cell ranges you can use these names in formulas instead of the addresses, e.g. the above formula can be rewritten as = Value1 + Value2 after assigning the name Value1 and Value2 to cell G8 and Y10 respectively.

9.5 Working with Formulas

The distinguishing feature of a spreadsheet program is that it allows you to create mathematical formulas and execute functions. Otherwise, it is not much more than a large table for displaying text.

Formulas are entered in the worksheet cells and must begin with an equal sign "=". The formula is written in the formula bar. The formula includes the addresses of cells whose values will be manipulated (figure 9.3). After the formula is applied on the cell, the calculation executes immediately. See the example below to view the formula for calculating the sub total for a number of textbooks. The formula multiplies the quantity and price of each textbook and adds the subtotal for each book.

9.5.1 Linking Worksheets

While applying a formula in a worksheet, you may want to use the value from a cell in another worksheet within the same workbook. For example, the value of cell A1 in the current worksheet and cell A2 in the second worksheet can be added using the format "sheetname!celladdress". The formula for this example would be =A1+Sheet2!A2 where the value of cell A1 in the current worksheet is added to the value of cell A2 in the worksheet named "Sheet2".

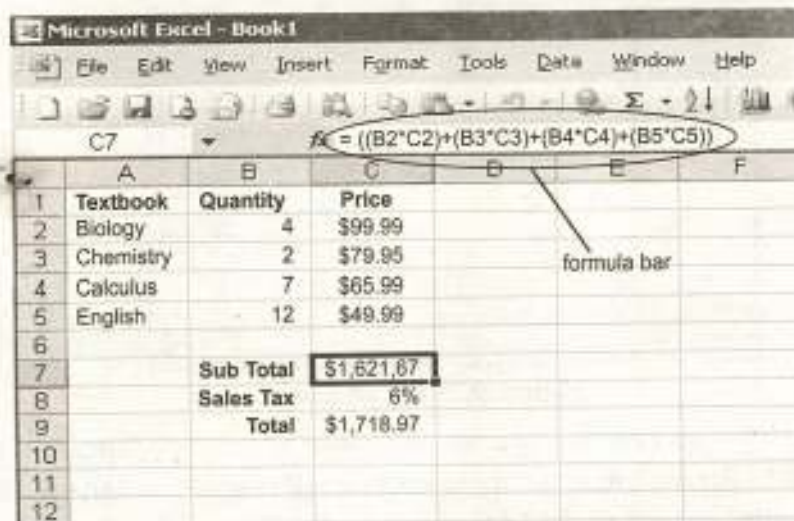


Figure 9.3: Calculating a Formula

9.6 Functions

In a spreadsheet, **Functions** are built-in formulas used to perform complex operations. Such as adding the contents of a range or finding the absolute value of a cell's contents. Every function returns a value and may accept one or more arguments. An argument is a value passed to the function to perform an operation. The arguments are passed to the functions within parenthesis. There are functions that are simple to execute whereas some are more complex.

Functions can be used in formulas. Functions can be a more efficient way of performing mathematical operations than formulas. For example, if you wanted to add the values of cells D1 through D10, you would type the formula $=D1+D2+D3+D4+D5+D6+D7+D8+D9+D10$. A shorter way would be to use the **SUM** function and simply type $=SUM(D1:D10)$. Some commonly used functions and examples are given in the table below:

Function	Example	Description
SUM	$=SUM(A1:A100)$	finds the sum of cells A1 through A100
AVERAGE	$=AVERAGE(B1:B10)$	finds the average of cells B1 through B10
MAX	$=MAX(C1:C100)$	returns the highest number from cells C1 through C100
MIN	$=MIN(D1:D100)$	returns the lowest number from cells D1 through D100
SQRT	$=SQRT(D10)$	finds the square root of the value in cell D10
TODAY	$=TODAY()$	Returns the current date (leave the parentheses empty)

9.6.1 Function Wizard

To view all functions available in MS Excel (a spreadsheet) and to apply any of them, the function wizard can be used. To activate the function wizard select **Insert|function**. The following dialog box will appear.

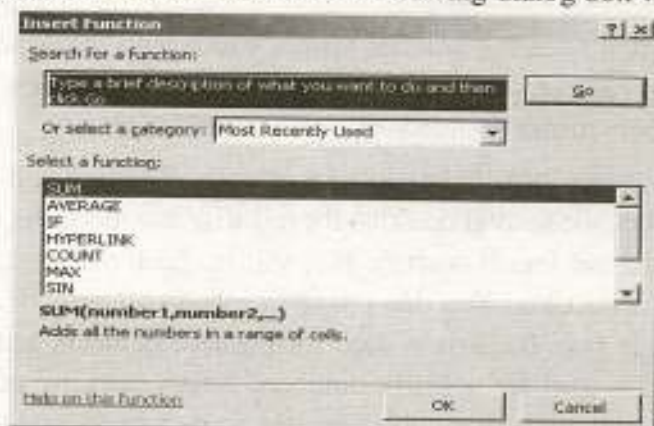


Figure 9.4: Function Wizard

You can select any function from the given list of functions. Click **Ok** to apply the selected function. The function wizard will ask you the argument(s) for the function. On supplying arguments the result will appear.

9.7 Formatting and Customizing Data

The contents of a highlighted cell can be formatted in many ways. Font and cell attributes can be added from shortcut buttons on the formatting bar (figure 9.5).

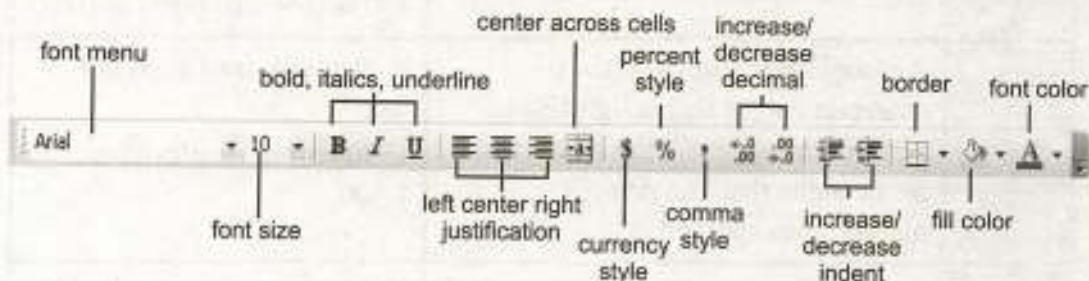


Figure 9.5: Formatting toolbar

9.7.1 Cell Formatting

The default number format assigned to a cell is the General format. General format displays whatever is entered in the cell with a couple of exceptions. If the cell is not wide enough to display a long decimal number, General format rounds off the number and uses scientific notation for especially large or small numbers. For example 0.0000000001 is displayed as 1E-10 in default column width cell.

To customize the format of the cell you can select **formatcells** command. If the data is number, you will be presented twelve categories of format options as shown in figure 9.6.

9.7.2 Creating Custom Format

If you don't see the number format you would like among the listed categories, you can create a custom format. Click custom in the category list to create a custom format (figure 9.6).

Each number format consists of four parts. The first part describes the positive numbers, the second describe the negative numbers, the third describe zero values, and the fourth describe text values. Each part is separated from the other by a semicolon. You don't have to specify all parts of the format. If you specify only two, the first is used for positive numbers and zero values, and the second is used for negative numbers. Text values use general format. If you specify only one, all numbers use the same format, and text value use General format (table 9.1).

Symbols used in Custom Format

Symbol	Meaning	Example
0	A placeholder that determines how many digits display on either side of a decimal number.	If the custom format is 0000 then 12 will be displayed as 0012 450 will be displayed as 0450
#	A placeholder similar to the 0 character except that insignificant zeros do not appear if the number has fewer digits than the number of placeholders specified.	If custom format is #,### then 1500 will be displayed as 1,500
?	A placeholder similar to the 0 character, except that space is left for insignificant zero characters on either side of a decimal point.	If the custom format is 0.??? then For 16.545 and 2.4, if displayed vertically, the decimal point of 16.545 will become under the decimal point of 2.4

(period)	Indicate how many digits appear to the right of a decimal point. The cell display will round to the number of placeholders to the right of the decimal point in the format.	If the custom format is ###.00 then 1.2 will be displayed as 1.20 and 58 will be displayed as 58.00
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Table 9.1: Symbols for custom format

You can choose any format for the cell. The contents of the cell will appear accordingly. For example, selecting a **Currency** format that displays the currency symbol followed by a two-decimal number will show the value of 547.55 as \$547.55. Similarly selecting date format for a cell as mm/dd/yy will convert the "January 16, 2005" to 1/16/2005 automatically.

9.7.3 Aligning Cell Contents

Alignment of the cell contents can be changed from the **Alignment tab** of the Cell Format dialog box (figure 9.6). The default alignment of text and numbers in a cell is **General**. However you can change the alignment to **Left**, **Right**, **Center**, **Justified**, or **Fill**.

Similarly you may control the orientation of the worksheet from the Alignment tab of the Cell Format dialog box. You can set the cell contents to an angle of up to 180 degrees. This allows you to show long text vertically or diagonally. You can do this by rotating the needle on the alignment tab (figure 9.6).

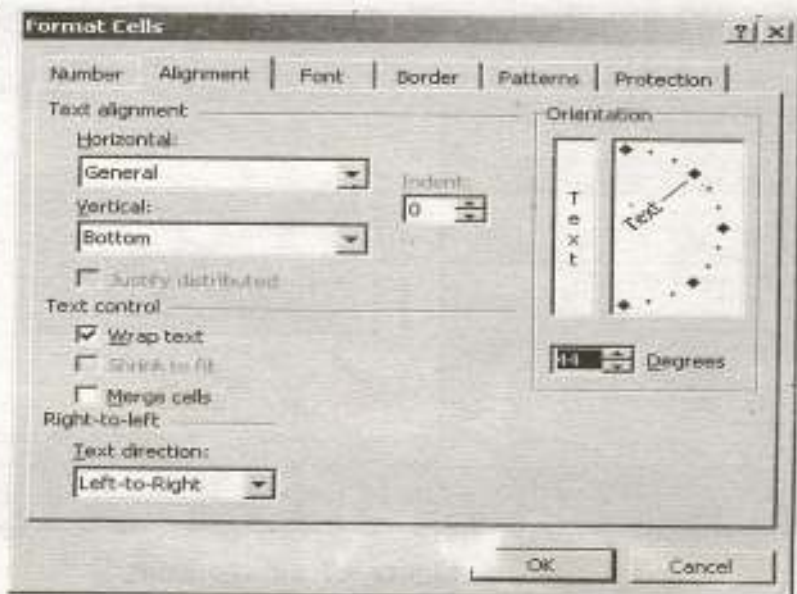


Figure 9.6: Cell Formatting Dialog Box

9.7.4 Merge Cells and Wrap Text

You can merge cells by first highlighting the cells to be merged and then just selecting the **Merge Cells** option from the Alignment tab of the Format Cells dialog box. In the same way, you may select the wrap text option from the alignment tab of the Format Cells dialog box to allow wrapping of text in a cell.

9.8 Introducing Charts

Charts allow you to present data entered into the worksheet in a visual format using a variety of graph types. Before you can make a chart you must first enter data into a worksheet. To generate a chart you can use chart wizard.

9.8.1 Chart Wizard

The Chart Wizard brings you through the process of creating a chart by displaying a series of dialog boxes.

- Enter the data into the worksheet and highlight all the cells (including headers) that will be included in the chart.
- Click the Chart Wizard button on the standard toolbar to view the first **Chart Wizard** dialog box. This will present you different chart types. You can choose any one e.g. PI Chart, Line, Bar, Radar etc. and Press the Next button.

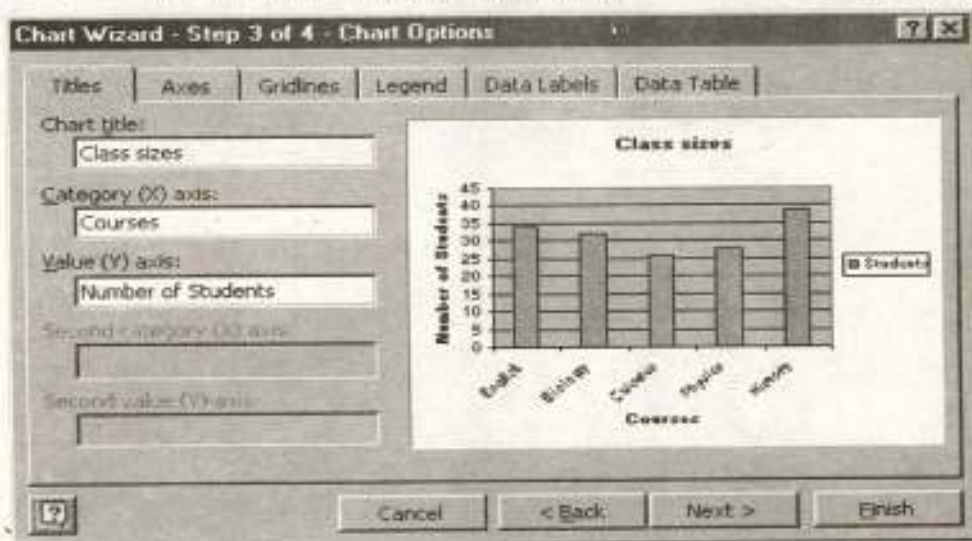


Figure 9.7: Chart options

- This will lead you to another dialog box where you have to specify the source data for the chart (if it is different from one that is selected). After specifying the source data press **Next** button.
- The following dialog box will appear. Enter the name of the chart and titles for the X- and Y-axes. Clicking on the tabs can change other options for the axes, grid lines, legend, data labels, and data table. Press **Next** to move to the next set of options.
- You may insert the chart as an object in the same worksheet or it can be displayed separately on another sheet.
- Click **Finish** to exit the chart wizard

9.9 Printing Worksheets and Charts

The chart can be printed in the same way as a work sheet. You have several options while printing a worksheet. Before printing the format of the page must be set. Selecting File/Page Setup can set the page format. Set orientation of the page from the **page** tab, set **margins** and **add headers and footers** (figure 9. 8)

9.9.1 Page Orientation

Select the **Orientation** under the **Page** tab in the Page Setup window to make the page Landscape or Portrait. The size of the worksheet on the page can also be formatting under **Scaling**. To force a worksheet to print only one page wide so all the columns appear on the same page, select **Fit to 1 page(s) wide**.

9.9.2 Margins

Change the top, bottom, left, and right margins under the **Margins** tab. Enter values in the header and footer fields to indicate how far from the edge of the page this text should appear. Check the boxes for centering horizontally or vertically on the page.

9.9.3 Header/Footer

Add preset headers and footers to the page by clicking the drop-down menus under the Header/Footer tab.

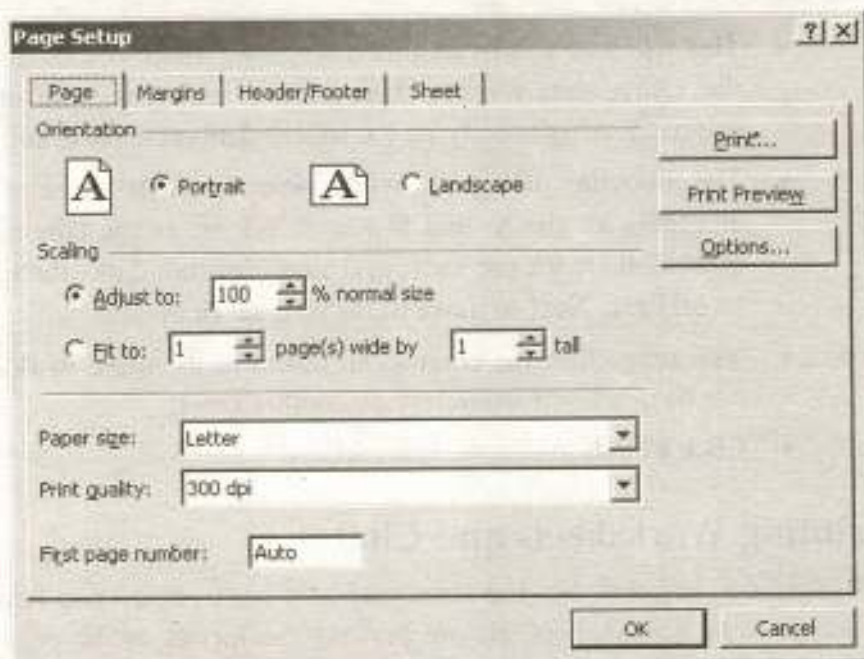


Figure 9.8: Page setup dialog box

9.9.4 Sheet

Check **Gridlines** if you want the gridlines dividing the cells to be printed on the page. If the worksheet is several pages long and only the first page includes titles for the columns, select **Rows to repeat at top** to choose a title row that will be printed at the top of each page.

After setting the page format, select **File|Print** option to print the worksheet. This is same as discussed in chapter 8 (word processing). You can take one or multiple copies of the worksheet.

Exercise 9C

1. Fill in the blanks:

- (i) For the custom format ##.000, the number 242.59 will appear as _____
- (ii) The intersection of a row and a column forms a **cell**.
- (iii) In a spreadsheet _____ are built in formulas
- (iv) **Labels** are used to identify a value or a series of values
- (v) _____ are names that you define to represent a cell or cell range on a worksheet.

- (vi) Calling cells by just their addresses (such as "A1") is called **relative referencing**
- (vii) An _____ is indicated by a bold rectangular border.
- (viii) _____ is a software for manipulating numbers
- (ix) A _____ may contain multiple _____
- (x) **0** is a placeholder that determines how many digits to display on either side of a decimal number.

2. Choose the correct option:

- (i) Which of the following is a spreadsheet?
 - (a) MS Word
 - (b) MS Excel
 - (c) MS Powerpoint
 - (d) Both b a
- (ii) The actual working area in Microsoft Excel is
 - (a) Workbook
 - (b) Worksheet
 - (c) Spreadsheet
 - (d) Note sheet
- (iii) Which of the following is an absolute address?
 - (a) A1
 - (b) A1\$
 - (c) A\$1\$
 - (d) None of the above
- (iv) Formula can only be applied on
 - (a) Values
 - (b) Labels
 - (c) Unmerged cells
 - (d) None of the above
- (v) Which of the following function is used to get the current date?
 - (a) Exact()
 - (b) Today()
 - (c) Month()
 - (d) Year()

3. Write T for true and F for false statement:

- (i) Because Microsoft Excel is a spreadsheet, therefore it does not have a spellchecker component.
- (ii) Functions can be a more efficient way of performing mathematical operations than defining your own formulas.
- (iii) A formula can not manipulate labels.
- (iv) Worksheet is the basic unit where the data is manipulated in a workbook
- (v) Footnote can not be applied in a spreadsheet software.
- (vi) By default, the numbers as well as the text is aligned RIGHT in a cell.
- (vii) A formula containing relative referencing is not copied exactly.
- (viii) # is a place holder similar to the 0 character, except that space is left for insignificant zero characters on either side of a decimal point.
- (ix) A formula containing absolute referencing is not copied exactly.
- (x) In MS Excel, a worksheet can have maximum 65,536 rows.

4. Define spreadsheet and discuss its basic features.
5. Differentiate the following:
 - Workbook and Worksheet
 - Active Cell and Passive Cell
 - Word Processor and Spreadsheet
 - Function and formula
 - Labels and Values
6. Every cell in a worksheet has a reference number, how is it calculated? Discuss with examples the major differences between Relative and Absolute referencing.
7. Create a Pie chart for the marks obtained by your class fellows in SSC examination.
8. What do you understand by the term **named ranges**? Can it be helpful in simplifying the worksheet?
9. What are the advantages of using a spreadsheet program?
10. Insert another worksheet in the workbook of Q.4 to develop a Pie chart for the marks obtained by the students of your neighboring section in SSC examination. Calculate overall pass percentage, and average marks of the students of both sections in another (third) worksheet.

Hint: You have to insert three worksheets in a workbook. Construct a Pie chart for the marks of your class in sheet1. Similarly, construct another Pie chart in sheet2. In sheet3, you have to make the three worksheets linked. The data will be picked from sheet1 and sheet2 to calculate the average and pass percentage in the sheet3.

Answers

- | | | | | |
|----|--------------------|---------------------------|-----------------|-------------------|
| 1. | (i) 242.590 | (ii) Cell | (iii) Functions | (iv) Label |
| | (v) Named Ranges | (vi) Relative Referencing | | (vii) Active Cell |
| | (viii) Spreadsheet | (ix) Workbook, Worksheet | | (x) 0 |
| 2. | (i) b | (ii) b | (iii) c | (iv) a |
| | | | | (v) b |
| 3. | (i) F | (ii) T | (iii) T | (iv) F |
| | (vi) F | (vii) T | (viii) F | (ix) F |
| | | | | (x) T |