UNIT-II SPREAD SHEETS

Structure

2.1 Introduction

Modern spreadsheets (Electronic Worksheets) provide a rich environment for numerical calculation and the exploration of numerical models. These packages allow their users to set up calculations using formulas that are automatically updated when the relevant data in the spreadsheet changes. And formulas are easily constructed and edited as well. Adding to the power of the environment, spreadsheets provide a great many built-in functions to perform commonly used computations in the financial, statistical, and other problem domains. Once calculations are performed, spreadsheets offer the opportunity to explore graphical interpretations of the results through a number of built-in chart and graph types. These pictorial interpretations often provide insights into the meaning of a calculation that would otherwise be difficult to perceive or that may even go unnoticed. The particular spreadsheet we will learn about in this script is Microsoft Excel. However, modern spreadsheet packages are remarkably similar and what we learn about Excel will translate with little difficulty if we need to use Lotus 1-2-3, Quattro, or some other spreadsheet software. This unit will give you a basic introduction to Microsoft Excel.

2.2 Objectives

At the end of this unit students will be able to:

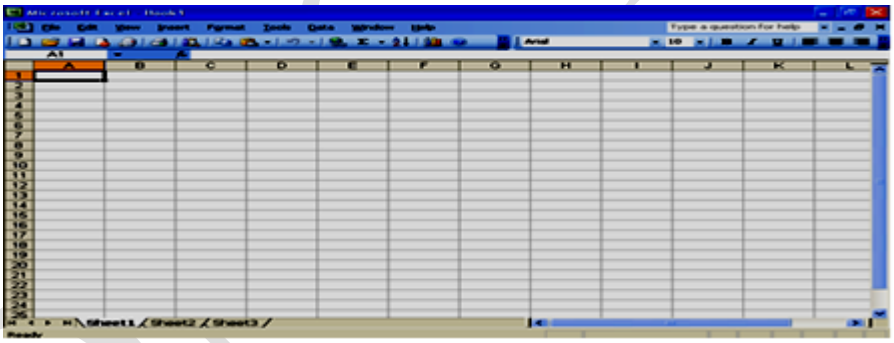
- Understand the basic concepts of spreadsheets
- Create, Save, Open and Close a workbook
- Enter different types of Data in a worksheet
- Edit data in cells and format worksheets
- Sort, filter and parse data
- Use in-built formulas and functions
- Convert data into graphs and charts
- Print the workbook

2.3 Overview of Excel

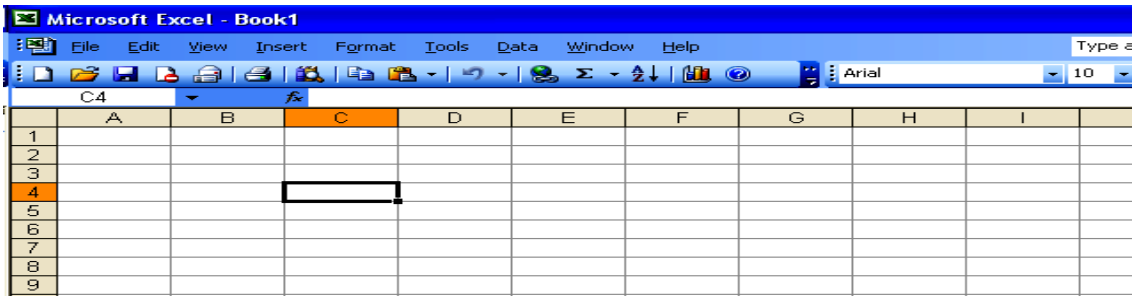
The Electronic version of "paper and Pencil workbook" is called a **Worksheet** and a three-dimensional stack of worksheets consisting of rows and columns forms an Excel **Workbook**.

When we access Microsoft Excel for the first time, a worksheet similar to the one shown below is displayed. At the top of the screen is the **File name indicator.** This shows the name of the file that is in use at any moment, the default name being ‘Book1’ until it is changed by the user. Below the file name indicator is the

Menu bar, which contains a number of programmed facilities or commands like Opening, Creating, Saving, Manipulating a worksheet. Below the Menu bar are different types of **Tool bars** containing shortcuts for almost all the commands contained in various Menus in the menu bar. Below and to the left of toolbars is the **Address bar** showing the address of the active cell. To the right of the address bar is the **Formula bar** where the contents of a cell are displayed and we type our formulas and functions in this bar.
Below this are shown the **Column letters** of the worksheet and then comes the actual worksheet in the form of grid lines showing cells, a **Solid white cross** showing the mouse pointer and a solid rectangular border showing the **Active cell**. Only when a cell is active can data be entered into it or its contents modified. To the left of the worksheet are shown the **Row numbers. Vertical and Horizontal Scroll bars** can also be seen to the right and below the actual worksheet. These are used to move up and down or left and right in a worksheet. To the left of the bottom scroll bar are the **Sheet tabs** used to select a particular sheet from the list. An active sheet is shown by the light background in the sheet tab. To the left of the sheet tabs are **Sheet scroll bars** that allow a user to display names of all the sheets in the workbook.
Finally, at the bottom of the screen is the **Status bar** displaying various messages about the tasks being carried out in the worksheet.

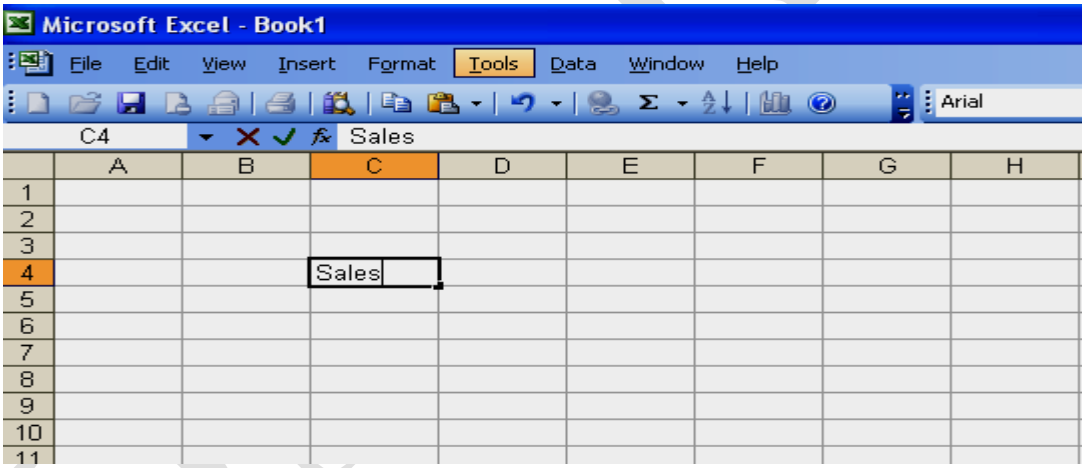


In any worksheet rows are labeled by numbers (1, 2, 3, ...) and columns are labeled with letters (A, B, C, … , AA, AB, AC, ...). Cells are then labeled with both the column letter(s) and row number in that order. For example, the highlighted cell in the figure below is cell C4. A cell is selected (highlighted) by clicking the cursor over it. Only one cell can be selected at a given time and this cell is referred to as the **active cell**.



2.3.1. Entering data in the active cell and saving the file

Remember that a worksheet cell is made active by clicking over it. Once this is done the cell is ready to accept data. In the figure below, we have selected cell C4 as the active cell and then typed in the word "Sales." As we can see the word appears both in the cell itself and in the formula bar. If we want to edit (or erase and replace) this word later, we simply click over the cell, then move the cursor to the formula bar where it becomes the standard text editing I-beam pointer. Editing takes place in the formula bar and is reflected in the cell when we click the Check box to the left of the formula bar or press the Enter key.



Once we have entered data into a worksheet, we can save the workbook in any of the following ways:

1) Go to File-> Save/Save As, highlight the option and press Enter or Click the option

2) Keep holding the ctrl key and press S

3) Click the shortcut icon in the tool bar (floppy icon)

In all these cases you will get a window asking for the file name, enter the proper name and press Enter or click the Save button and the file will be saved.

To Close a file click the Cross icon at the top right corner of the sheet or choose File->Close from the Menu bar.

2.3.2 Entering text and numerical data in the worksheet

If you closed the file at the end of the previous section after saving it then you need to open it before adding any new data or modifying the existing data in the file. The various ways of opening an existing file are given below:

1) Go to File-> Open, highlight the option and press Enter or Click the option

2) Keep holding the ctrl key and press O

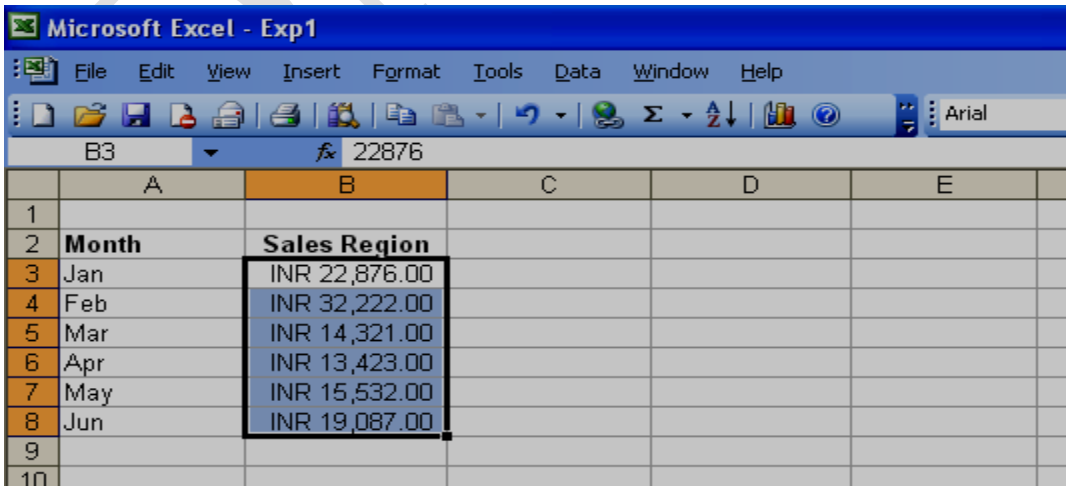
3) Click the shortcut icon in the tool bar (folder icon with an arrow)

In all these cases you will get a window asking for the file name to be opened, enter the proper name and press Enter or click the Open button and the file will open.

The following figure shows, after opening it, some text and numerical data entered into our example worksheet. Notice the blue line at the top of the figure which shows the name of our worksheet once we save it. The document has been saved and named Exp1 in the figure.

When entering data in multiple cells, we usually employ a quicker method than selecting every new cell individually. The *Enter* key completes entry in a cell and moves the active cell to the cell immediately below the current cell. The *Tab* key has a similar effect but moves the new active cell to the cell to the immediate right.

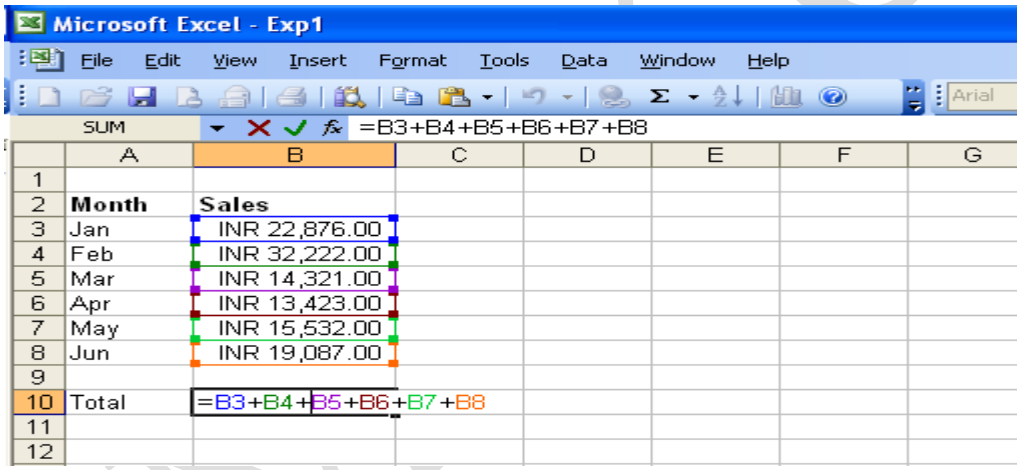
Let's format the numerical data that has been entered in the cells which is of type *currency*. We will see the effect of this in the next figure. The spreadsheet will automatically keep track of whether the data we have entered is textual or numerical (it will assume text except when the first character is a digit, a decimal point, or one of the algebraic signs + or -). Formulas are a third category and these always begin with an equals (=) sign. The formatting and other operations available will then be appropriate to the type of the data entered.



2.3.3 Entering a formula to calculate a result in the worksheet

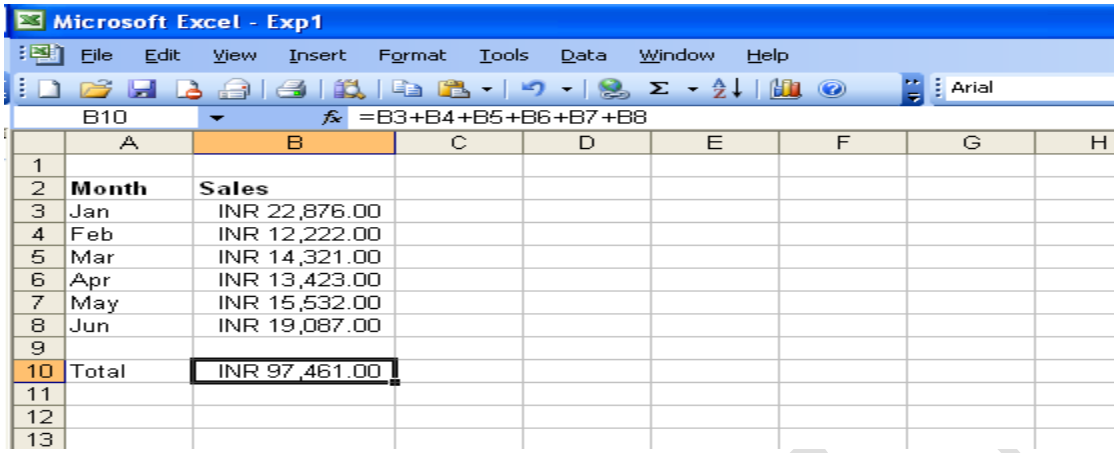
The following figure illustrates the process of entering a formula to compute the total sales for all six months shown. To enter a formula, we begin with the = symbol. Then we enter an algebraic formula, using the cell names (B3, B4, etc. in our example) instead of the actual data entered in those cells. The effect is the same. The worksheet will substitute the values entered in those cells when it does the arithmetic.

The advantage of this scheme is that whenever we change the numerical data in any of these cells, the formula is still valid. The worksheet will simply pick up the new values when it makes its substitutions for the cell names in the calculation. This simple scheme of symbolically representing data in our formulas rather than entering the actual data is a major benefit of using a spreadsheet. This is because we can repeat and/or correct calculations without retyping the formula that captures the basic computation.



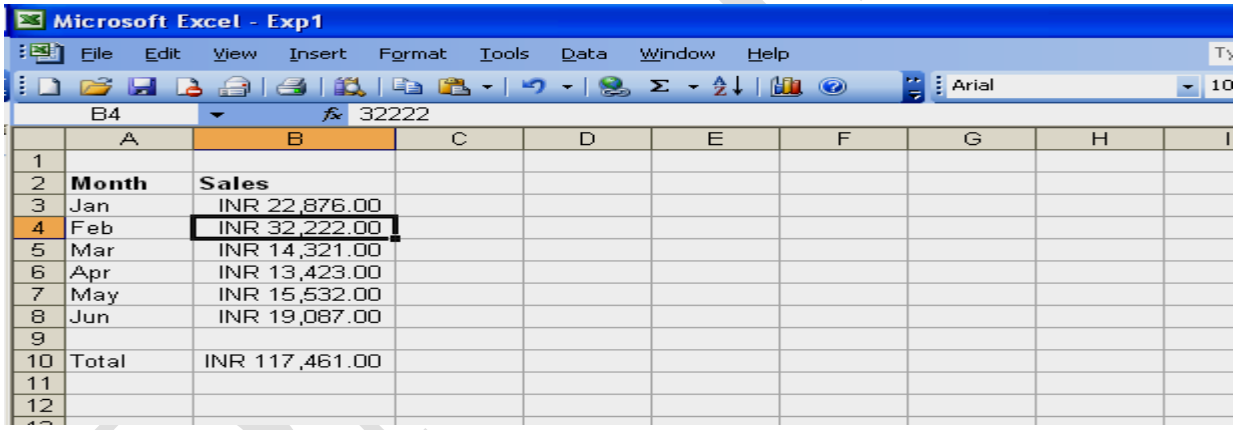
2.3.4 Calculating with a formula

The following figure illustrates the results of entering the above formula into cell B10. Notice that once we enter the formula, the result of the application of the formula appears *in the cell* and the formula itself appears *in the formula bar*. Once we check the results of the calculation in the cell itself, the formula can then be easily edited in the formula bar if necessary.



2.3.5 Altering the data used in a formula

The following figure illustrates the results of entering new data into cell B4. Notice that the result of the application of the formula is automatically updated in cell B10 when this occurs. Alter some additional data and observe the results.



2.4 Using Formulas for Excel Calculations

2.4.1 Expanding Exp1

Our previous worksheet (Exp1) computes the total sales for a six month period (see figure below). In this section we will expand this example to include sales from three separate sales regions and then compute

- six-month totals for each region,
- totals from all regions for each month, and
- an overall total sales figure

We begin by changing the column heading to reflect our intended addition of data for sales in three regions. To do this we simply click in the appropriate cell, then edit the text (see figure below).

Notice in the figure that we need to expand the available space for text in column B to accommodate the new label. To do that, we simply place the cursor at the boundary between column B and C in the column label row so that it becomes a double arrow icon. Then we just drag to the right to expand the column width.

2	**Month**	**Sales Region**
3	Jan	INR 22,876.00
4	Feb	INR 32,222.00
5	Mar	INR 14,321.00
6	Apr	INR 13,423.00
7	May	INR 15,532.00
8	Jun	INR 19,087.00
9		
10	Total	INR 117,461.00

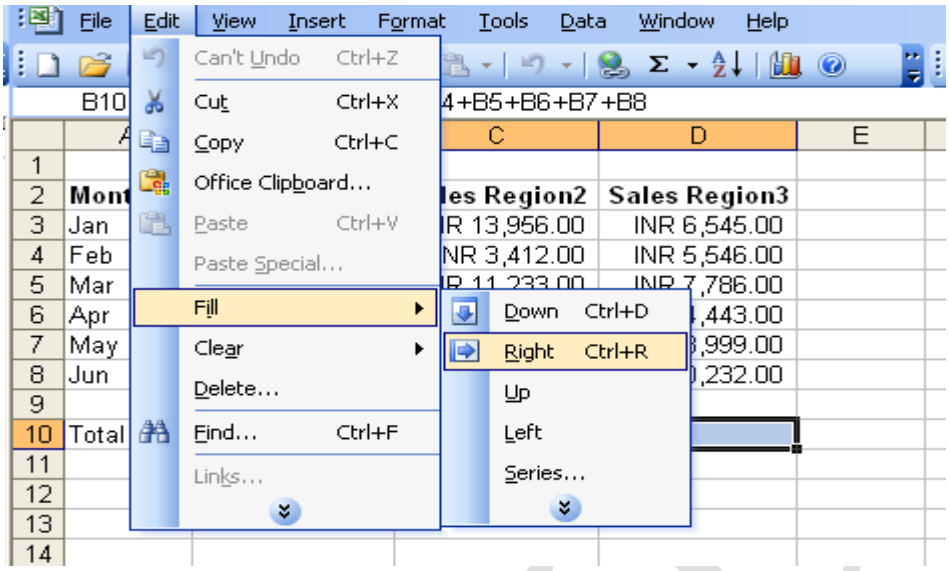
2.4.2 Adding additional data and expanding our six-month total formula

The following figure shows more text and numerical data entered into our example worksheet. Now we wish to compute the six-month sales totals for Regions 2 and 3. We could enter formulas in a way similar to the way we entered the formula to compute the total in column B. However, there is a much easier and less error-prone way to accomplish this.

Note that the formulas for cells C10 and D10 are very similar to the formula in cell B10. The calculation to be performed is the same except for the column in which it occurs. The spreadsheet makes it easy to exploit this similarity. We can simply duplicate the formula in cell B10 within cells C10 and D10, with appropriate changes to reflect the change in column. This process is called **formula replication**, and it is one of the most important and fundamental spreadsheet operations.

To accomplish the required formula replication, we first select the cell where the formula resides, then drag to the right selecting the "target" cells and they get filled with the appropriate values. Another way is to select the source cell and target cells and with the appropriate cell selection kept active, we choose the **Fill/Right** commands under the **Edit** menu. This is illustrated in the figures below.

2	**Month**	**Sales Region1**	**Sales Region2**	**Sales Region3**
3	Jan	INR 22,876.00	INR 13,956.00	INR 6,545.00
4	Feb	INR 32,222.00	INR 3,412.00	INR 5,546.00
5	Mar	INR 14,321.00	INR 11,233.00	INR 7,786.00
6	Apr	INR 13,423.00	INR 23,421.00	INR 4,443.00
7	May	INR 15,532.00	INR 11,233.00	INR 8,999.00
8	Jun	INR 19,087.00	INR 22,111.00	INR 10,232.00
9				
10	Total	INR 117,461.00	INR 85,366.00	INR 43,551.00
11				



2.4.3 The replicated formulas

The following figure illustrates the results of the formula replication described above. Cell D10 is selected there so you can observe the formula as it was "copied" to that cell. Notice that the basic structure of the formula is exactly the same as the original formula in cell B10, but the **cell references** have been changed to reflect the move from column B to column D. These changes in cell references are what makes such formula replication possible. The cell addresses in the original formula (= B3 + B4 + B5 + B6 + B7 + B8) are called **relative addresses.** This means that the formula in which they appear can be copied to another location with the new cell references having the same relative relationship to the new formula's home cell as did the original references to the original formula home cell.

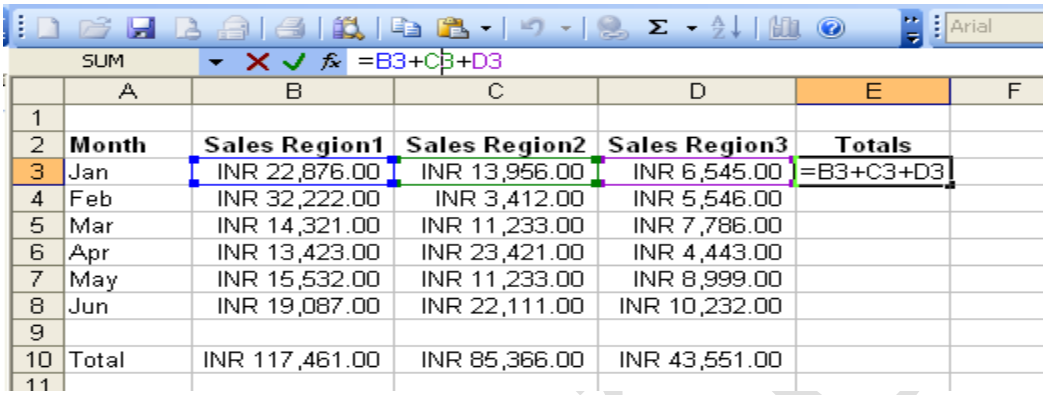
Hence when a formula is moved two cells to the right, all relative cell addresses in that formula will have their column label increased by two. If we moved a formula four cells downward, the relative cell addresses would have their row number increased by 4, and so on.

D10 =D3+D4+D5+D6+D7+D8

	A	B	C	D	E
1					
2	**Month**	**Sales Region1**	**Sales Region2**	**Sales Region3**	
3	Jan	INR 22,876.00	INR 13,956.00	INR 6,545.00	
4	Feb	INR 32,222.00	INR 3,412.00	INR 5,546.00	
5	Mar	INR 14,321.00	INR 11,233.00	INR 7,786.00	
6	Apr	INR 13,423.00	INR 23,421.00	INR 4,443.00	
7	May	INR 15,532.00	INR 11,233.00	INR 8,999.00	
8	Jun	INR 19,087.00	INR 22,111.00	INR 10,232.00	
9					
10	Total	INR 117,461.00	INR 85,366.00	INR 43,551.00	
11					

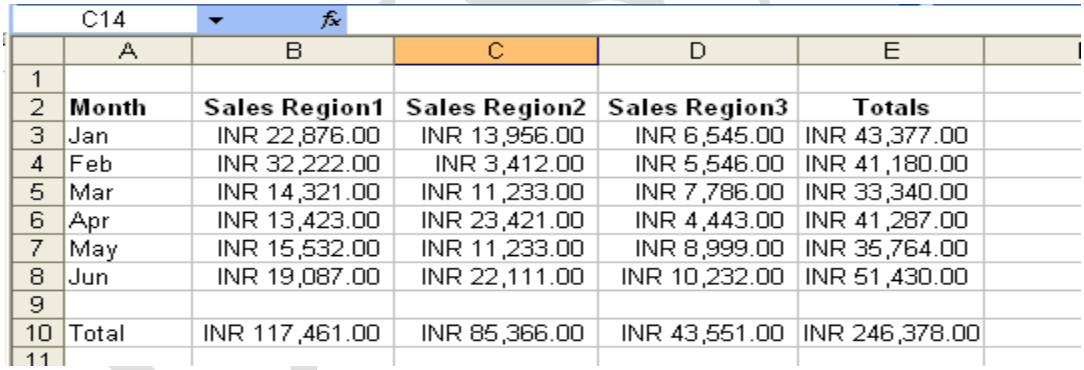
2.4.4 Summing monthly sales for all regions

Now we'll add formulas to calculate the total monthly sales for all three regions. The following figure illustrates entering the appropriate formula for computing the total sales for January.



	A	B	C	D	E	F
1						
2	**Month**	**Sales Region1**	**Sales Region2**	**Sales Region3**	**Totals**	
3	Jan	INR 22,876.00	INR 13,956.00	INR 6,545.00	=B3+C3+D3	
4	Feb	INR 32,222.00	INR 3,412.00	INR 5,546.00		
5	Mar	INR 14,321.00	INR 11,233.00	INR 7,786.00		
6	Apr	INR 13,423.00	INR 23,421.00	INR 4,443.00		
7	May	INR 15,532.00	INR 11,233.00	INR 8,999.00		
8	Jun	INR 19,087.00	INR 22,111.00	INR 10,232.00		
9						
10	Total	INR 117,461.00	INR 85,366.00	INR 43,551.00		
11						

Replicate the formula just entered in cell E3 to cells E4 through E8 by dragging the cell or highlight the source cell and destination cells and then use the **Fill/Down** command under the **Edit** menu to accomplish this. Now repeat this process to replicate the formula in cell D10 to cell E10 to compute the grand total of all sales (see figure below for final results).



	A	B	C	D	E
1					
2	**Month**	**Sales Region1**	**Sales Region2**	**Sales Region3**	**Totals**
3	Jan	INR 22,876.00	INR 13,956.00	INR 6,545.00	INR 43,377.00
4	Feb	INR 32,222.00	INR 3,412.00	INR 5,546.00	INR 41,180.00
5	Mar	INR 14,321.00	INR 11,233.00	INR 7,786.00	INR 33,340.00
6	Apr	INR 13,423.00	INR 23,421.00	INR 4,443.00	INR 41,287.00
7	May	INR 15,532.00	INR 11,233.00	INR 8,999.00	INR 35,764.00
8	Jun	INR 19,087.00	INR 22,111.00	INR 10,232.00	INR 51,430.00
9					
10	Total	INR 117,461.00	INR 85,366.00	INR 43,551.00	INR 246,378.00
11					

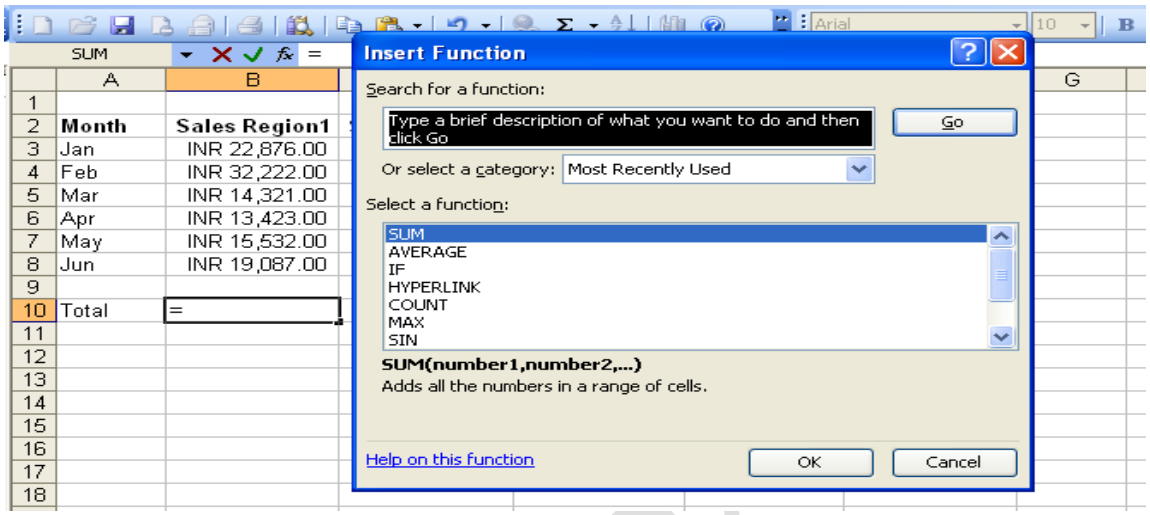
2.5 Using Excel's Built-in Functions

2.5.1 Employing the SUM function to compute sales totals

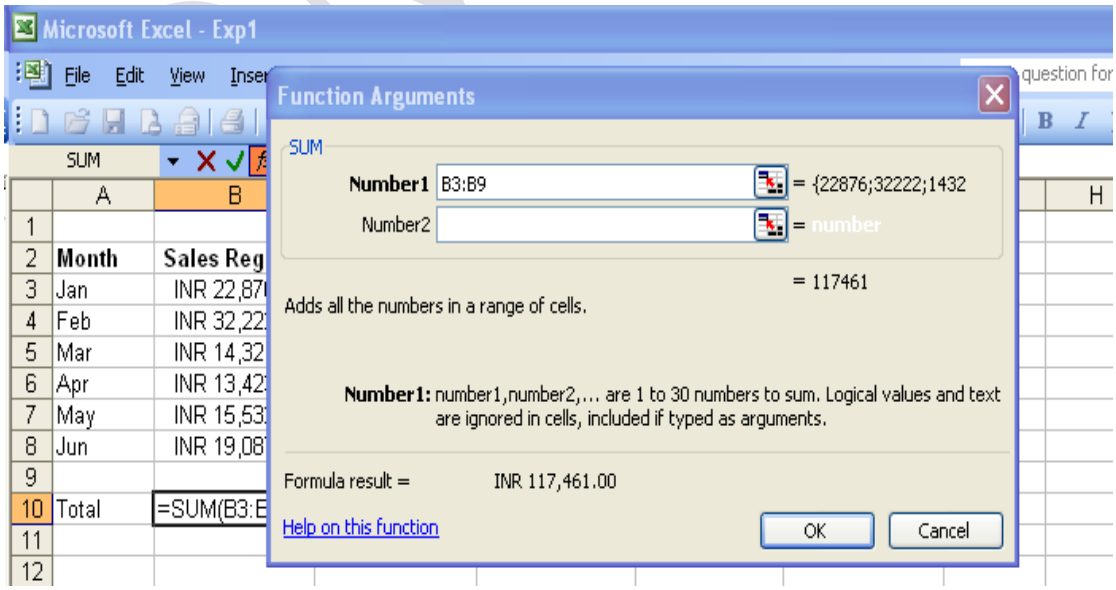
As our first example illustrating the use of an Excel built-in function, we will modify the Exp1 worksheet constructed previously. One of the built-in functions is the function SUM which, as its name suggests, computes sums of values in a range of cells.

To do this, we delete the formula in cell B10, type an = sign, then select the function selection dialog box (the symbol ***fx***) from the tool bar. The dialog box shown in the figure is then displayed and we can choose from among the many Excel built-in functions. In the figure, we have selected the SUM function from

the Most Recently Used function list. Once we make this selection we click to close the function selection dialog box.



When we close the function selection dialog box, a second dialog box appears, as shown below. The purpose of this dialog box is to help us set the arguments for the function we've chosen. In this example, the spreadsheet presumes that we wish to sum the cells immediately above the formula cell. In other words it selects for us the **range of cells** B3:B9. This is almost correct. We probably don't care to include the empty cell B9, so we edit the range to read B3:B8, then click OK.
The dialog box also has a brief explanation of what the function we've selected does and what its arguments stand for, and it even tells us what the result would be for the arguments it has pre-selected for us.

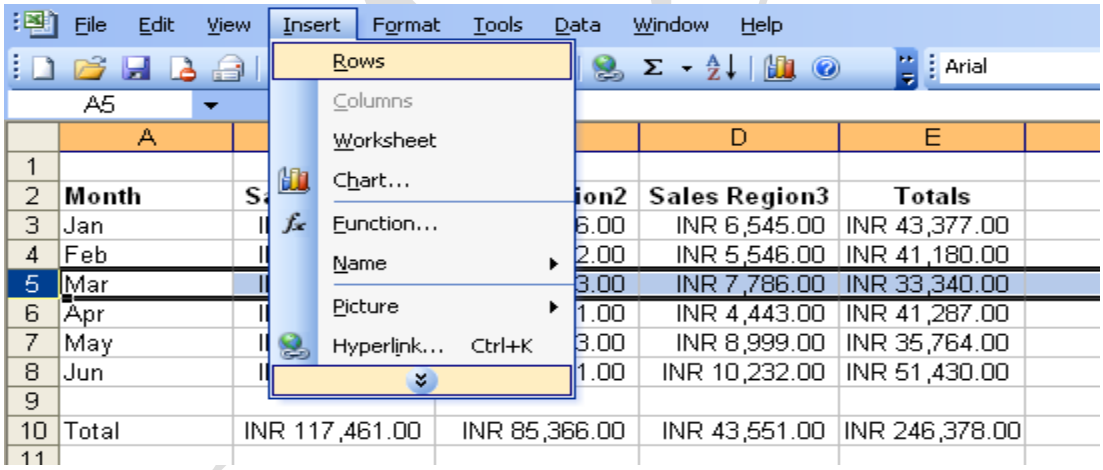


Once we adjust the arguments to be the range B3:B8 and click OK, we get the same result as we got earlier using formulas. We can now replicate the SUM function across the row to cells C10, D10, E10 as we did earlier. Now let's see how the SUM calculation differs from the previous calculation we made with the addition formula.

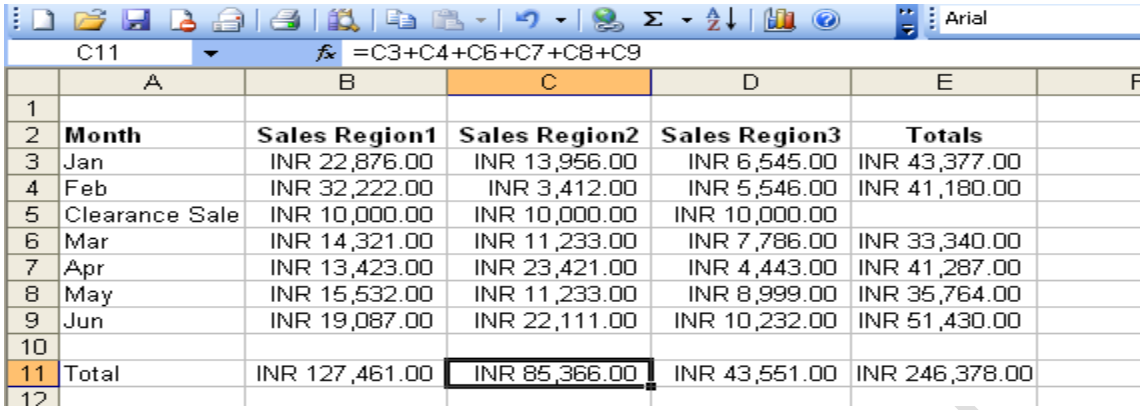
2.5.2 Difference between SUM function and a formula using the + operator

The SUM function is a convenient way to compute sums when we expect the amount of data in our spreadsheet to expand or contract in the future. The reason is that the SUM function automatically accounts for inserting and deleting data within the range of cells in its argument. The formula constructed with the + operator will not adjust for this accommodation. Let's modify our spreadsheet to illustrate this. Suppose for a moment we had a special clearance sale at the end of February and we now want to include these sales figures as a separate row in our data. It is easy to add more data in a spreadsheet by inserting rows or columns into the worksheet.

The figure below shows how we would add a row after the February sales figure row. First we select the row before which we wish to insert a new row. We do this by clicking the row number at the right of the worksheet -- the entire row will be highlighted. Next we select the **Rows** choice from the **Insert** menu as shown in the figure. A new blank row will be inserted before the selected row.



To complete our modification we add appropriate data to new row 5 (INR 10,000), as shown in the figure below. Now notice that the total for Region1 is automatically updated to include the additional INR 10,000 we just entered in cell B5. However, the total for Region 2 does not include the new amount in cell C5. The formula in cell C11 changes to keep exactly the same values in the sum as were there before the insertion of the new row. The new value is omitted altogether. The SUM function incorporates the new row as part of its new range.

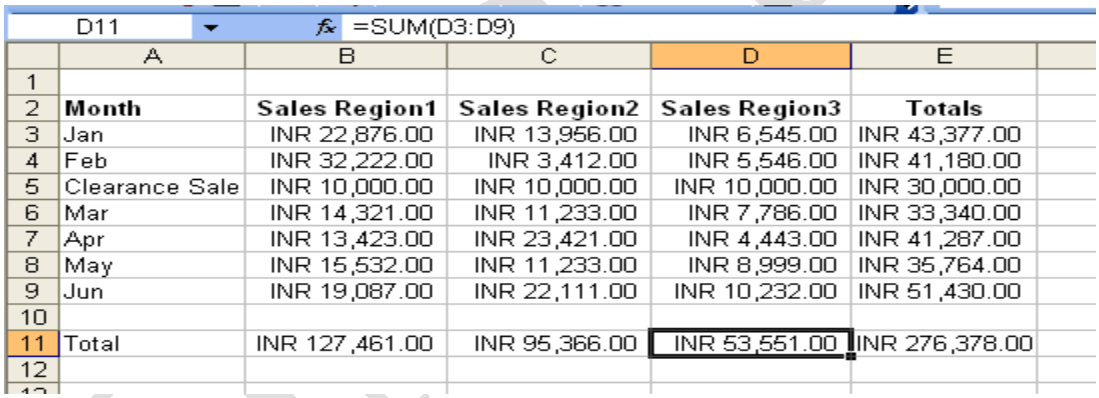


C11 =C3+C4+C6+C7+C8+C9

	A	B	C	D	E
1					
2	**Month**	**Sales Region1**	**Sales Region2**	**Sales Region3**	**Totals**
3	Jan	INR 22,876.00	INR 13,956.00	INR 6,545.00	INR 43,377.00
4	Feb	INR 32,222.00	INR 3,412.00	INR 5,546.00	INR 41,180.00
5	Clearance Sale	INR 10,000.00	INR 10,000.00	INR 10,000.00	
6	Mar	INR 14,321.00	INR 11,233.00	INR 7,786.00	INR 33,340.00
7	Apr	INR 13,423.00	INR 23,421.00	INR 4,443.00	INR 41,287.00
8	May	INR 15,532.00	INR 11,233.00	INR 8,999.00	INR 35,764.00
9	Jun	INR 19,087.00	INR 22,111.00	INR 10,232.00	INR 51,430.00
10					
11	Total	INR 127,461.00	INR 85,366.00	INR 43,551.00	INR 246,378.00
12					

Hence the SUM function and the + operator are adjusted in different ways for the insertion of new data. We added the new row just for the purpose of making this point. Let's delete it before proceeding. To do this we select row 5 again (remember, click the row number on the left side) and then select **Delete** from the **Edit** menu.

As a final adjustment to the worksheet in this step, replicate the SUM function formula in cell B10 to cells C10, D10, and E10.



D11 =SUM(D3:D9)

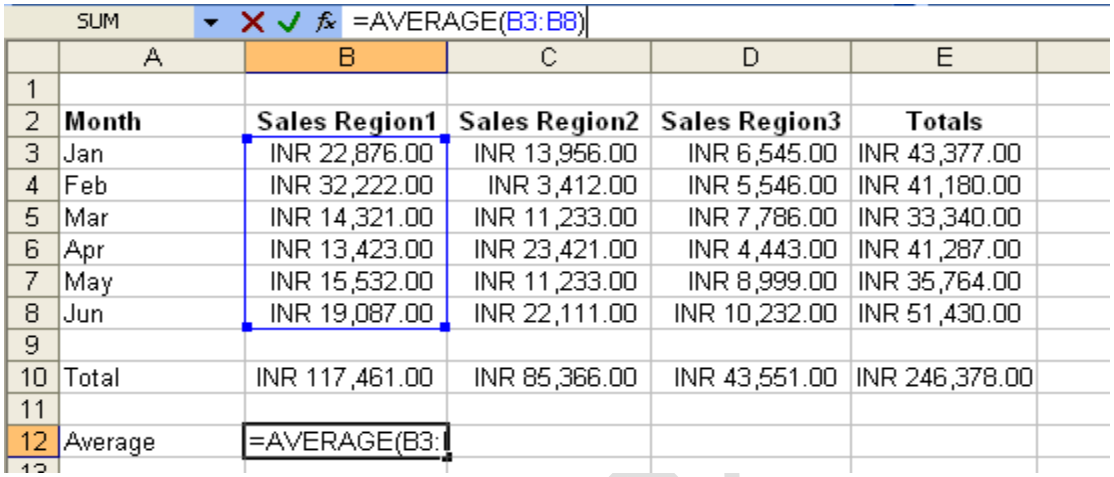
	A	B	C	D	E
1					
2	**Month**	**Sales Region1**	**Sales Region2**	**Sales Region3**	**Totals**
3	Jan	INR 22,876.00	INR 13,956.00	INR 6,545.00	INR 43,377.00
4	Feb	INR 32,222.00	INR 3,412.00	INR 5,546.00	INR 41,180.00
5	Clearance Sale	INR 10,000.00	INR 10,000.00	INR 10,000.00	INR 30,000.00
6	Mar	INR 14,321.00	INR 11,233.00	INR 7,786.00	INR 33,340.00
7	Apr	INR 13,423.00	INR 23,421.00	INR 4,443.00	INR 41,287.00
8	May	INR 15,532.00	INR 11,233.00	INR 8,999.00	INR 35,764.00
9	Jun	INR 19,087.00	INR 22,111.00	INR 10,232.00	INR 51,430.00
10					
11	Total	INR 127,461.00	INR 95,366.00	INR 53,551.00	INR 276,378.00
12					

2.5.3 Computing average sales per month for each region

Now let's add formulas to calculate the average monthly sales for all three regions. The following figure illustrates entering the appropriate formula for computing the Region1 monthly average. Note that we're employing a built-in function AVERAGE. If we know the function's name and purpose, we can simply type the formula. Or we could consult the function selection dialog box as we did for the SUM function earlier.

In the figure below, we're entering the formula directly. The figure also illustrates that instead of typing in the range B3:B8, we can drag over that range of cells (note the dotted box surrounding the selected range) to indicate the range when the time comes for the function's argument to be entered in the formula. We would complete the formula shown below by typing in the closing right parenthesis and then clicking the green check mark to the left of the formula bar. Once the average

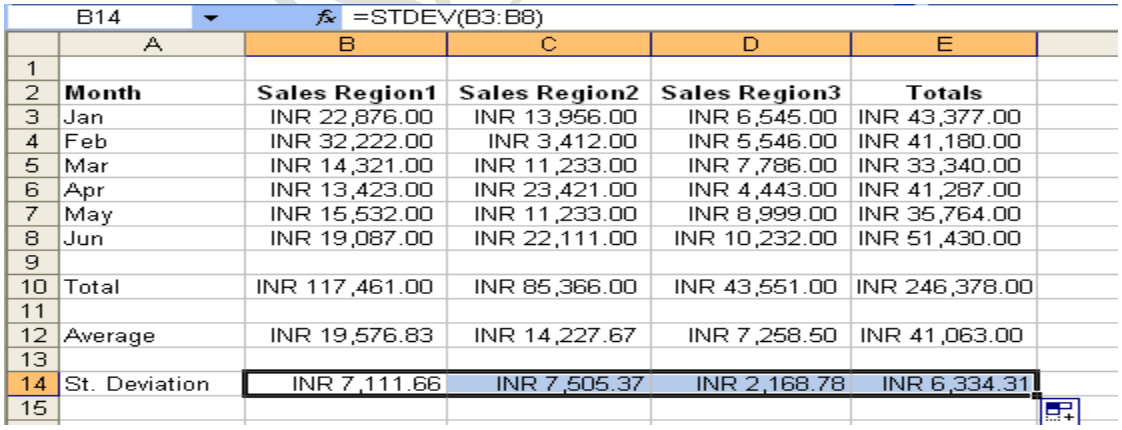
is computed for Region 1, we can replicate the formula to cells C12, D12, and E12 to compute monthly average sales for the other regions and for the total monthly sales.



	A	B	C	D	E
1					
2	**Month**	**Sales Region1**	**Sales Region2**	**Sales Region3**	**Totals**
3	Jan	INR 22,876.00	INR 13,956.00	INR 6,545.00	INR 43,377.00
4	Feb	INR 32,222.00	INR 3,412.00	INR 5,546.00	INR 41,180.00
5	Mar	INR 14,321.00	INR 11,233.00	INR 7,786.00	INR 33,340.00
6	Apr	INR 13,423.00	INR 23,421.00	INR 4,443.00	INR 41,287.00
7	May	INR 15,532.00	INR 11,233.00	INR 8,999.00	INR 35,764.00
8	Jun	INR 19,087.00	INR 22,111.00	INR 10,232.00	INR 51,430.00
9					
10	Total	INR 117,461.00	INR 85,366.00	INR 43,551.00	INR 246,378.00
11					
12	Average	=AVERAGE(B3:			

2.5.4 Computing the standard deviation of the averages

Let's suppose we wish to compute the standard deviation of the averages we calculated in the previous subsection. Follow the procedure given earlier and enter a formula employing the built-in function STDEV for computing the standard deviation for the Region1 monthly average (see figure below for any help).Now replicate the standard deviation calculation to cells C13, D13, and E13. The completed worksheet should have the following figures and function in cell B14 should be similar to the one shown in the formula bar.

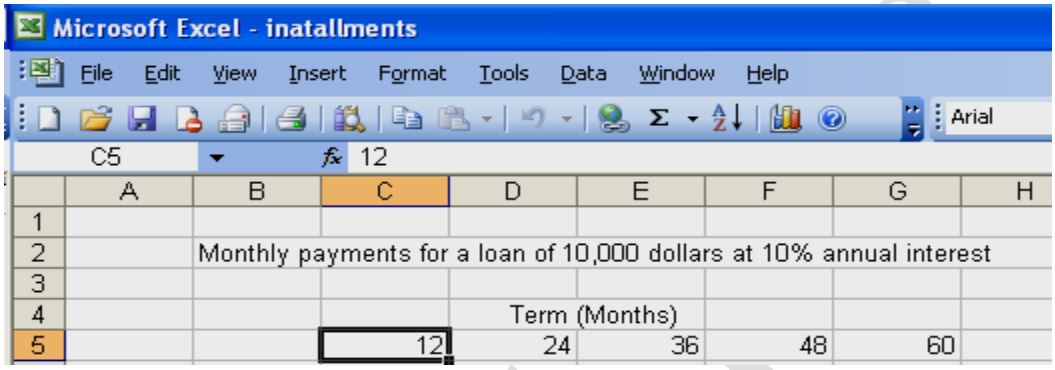


	A	B	C	D	E
1					
2	**Month**	**Sales Region1**	**Sales Region2**	**Sales Region3**	**Totals**
3	Jan	INR 22,876.00	INR 13,956.00	INR 6,545.00	INR 43,377.00
4	Feb	INR 32,222.00	INR 3,412.00	INR 5,546.00	INR 41,180.00
5	Mar	INR 14,321.00	INR 11,233.00	INR 7,786.00	INR 33,340.00
6	Apr	INR 13,423.00	INR 23,421.00	INR 4,443.00	INR 41,287.00
7	May	INR 15,532.00	INR 11,233.00	INR 8,999.00	INR 35,764.00
8	Jun	INR 19,087.00	INR 22,111.00	INR 10,232.00	INR 51,430.00
9					
10	Total	INR 117,461.00	INR 85,366.00	INR 43,551.00	INR 246,378.00
11					
12	Average	INR 19,576.83	INR 14,227.67	INR 7,258.50	INR 41,063.00
13					
14	St. Deviation	INR 7,111.66	INR 7,505.37	INR 2,168.78	INR 6,334.31
15					

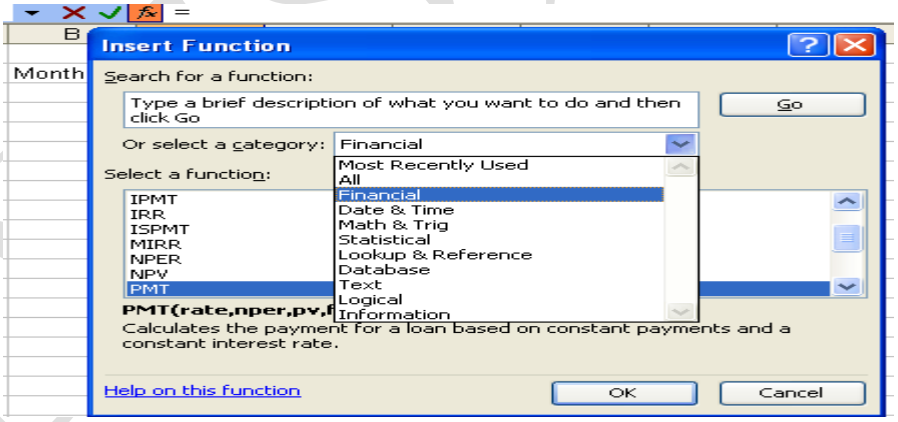
2.5.5 An Example of Financial Arithmetic-Computing Car Payments

In this section we will use an Excel built-in function that we didn't talk about yet. Suppose you wish to compute the monthly payments you would have to pay on a

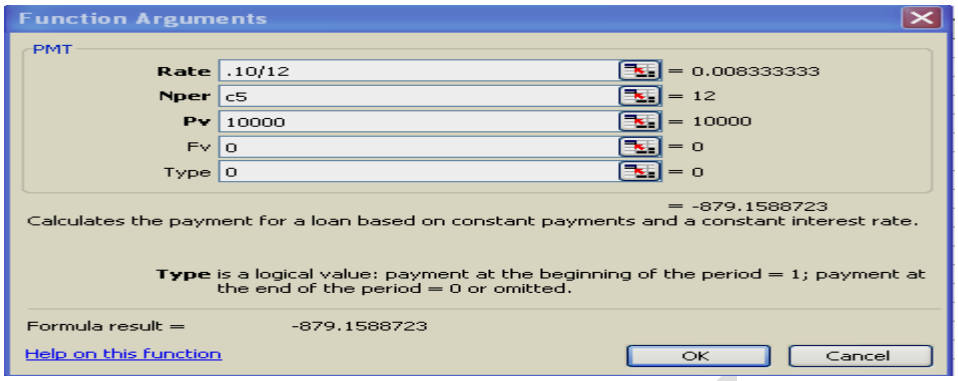
car you'd like to buy. Suppose the car costs 10,000 Dollars and you know you will have to pay a 10% annual interest rate for this amount.
You'd like to do an analysis to decide what number of terms (pay-back time) you should try to get. Of course the longer the term, the lower your monthly payments - but the more interest you pay over the life of the loan. You want the shortest term for which you can comfortably pay the installments. Prepare a worksheet like the one shown in the figure to calculate the various payments for different terms (the file has been named installments).



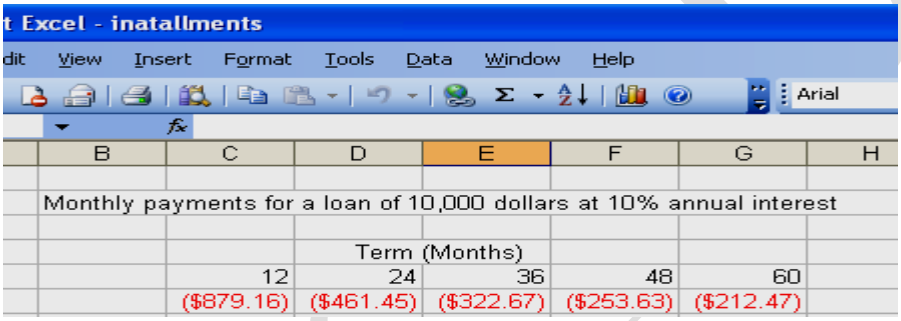
Excel has a built-in function for computing loan payments. It is called PMT and can be found in the financial function list as shown below.



The arguments for the PMT function hold the interest rate (**Rate**) for the period in which you're interested - a month in this case, the number of periods (**Nper**) you expect to pay, the present value (**Pv**) or amount of the loan, the future value (**Fv**) of the loan (this will be 0 if you intend to pay the loan off), and the type (**Type**) of payment to be made (this is 0 if your payments begin at the end of the month you get the loan; 1 if the payments begin immediately when you get the loan). The dialogue showing the arguments to the function is shown below.



The completed worksheet should have the following figures in it. The parentheses and red type face indicates that these numbers represent a payment (negative).



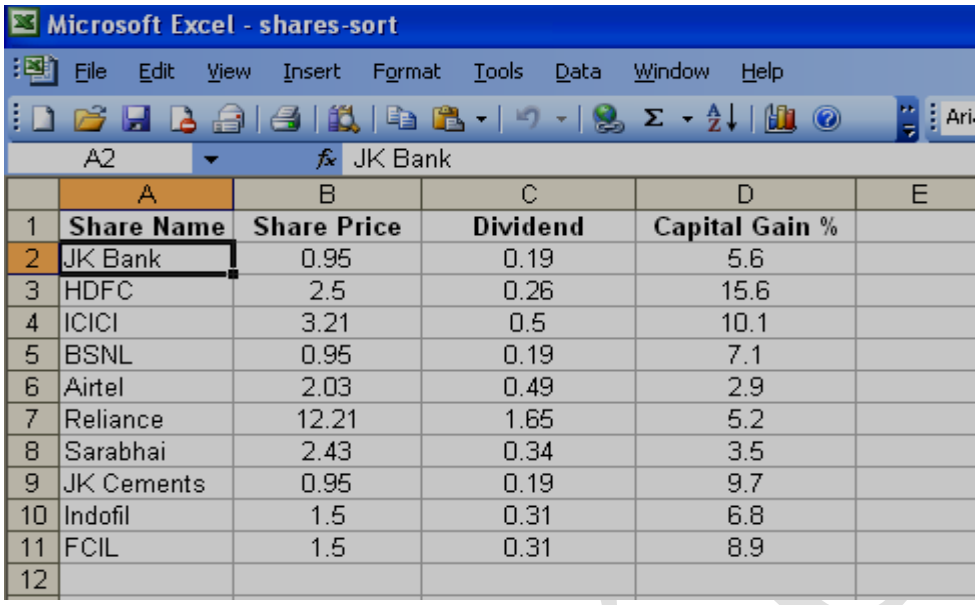
Similarly, you should wet your hands on other types of problems in finance, marketing, HR and other fields to gain more confidence in using Excel functions.

2.6 Handling Data

People in Marketing, Finance or HR need to handle large volumes of data. Handling data involves operations like sorting, filtering or parsing it. How we accomplish such tasks in Excel is the theme of this section.

2.6.1 Sorting Data

Data sorting is one of Excel's most powerful features. Let's take an example of hypothetical shares as shown in the figure below (file named share-sort).The data in the shares-sort file is unsorted. The column headers identify **fields** and the individual share names form **records**. Each field contains information on all records and each record has information on all the fields.



	A	B	C	D	E
1	**Share Name**	**Share Price**	**Dividend**	**Capital Gain %**	
2	JK Bank	0.95	0.19	5.6	
3	HDFC	2.5	0.26	15.6	
4	ICICI	3.21	0.5	10.1	
5	BSNL	0.95	0.19	7.1	
6	Airtel	2.03	0.49	2.9	
7	Reliance	12.21	1.65	5.2	
8	Sarabhai	2.43	0.34	3.5	
9	JK Cements	0.95	0.19	9.7	
10	Indofil	1.5	0.31	6.8	
11	FCIL	1.5	0.31	8.9	
12					

Before proceeding to sort data in the file, it seems pertinent to mention that Capital Gain is a continuous variable that measures the difference between selling price and the purchase price of the share expressed as a percentage of the purchase price. All such values for capital gain can be obtained by using the formula as

((selling price- purchase price)/purchase price)

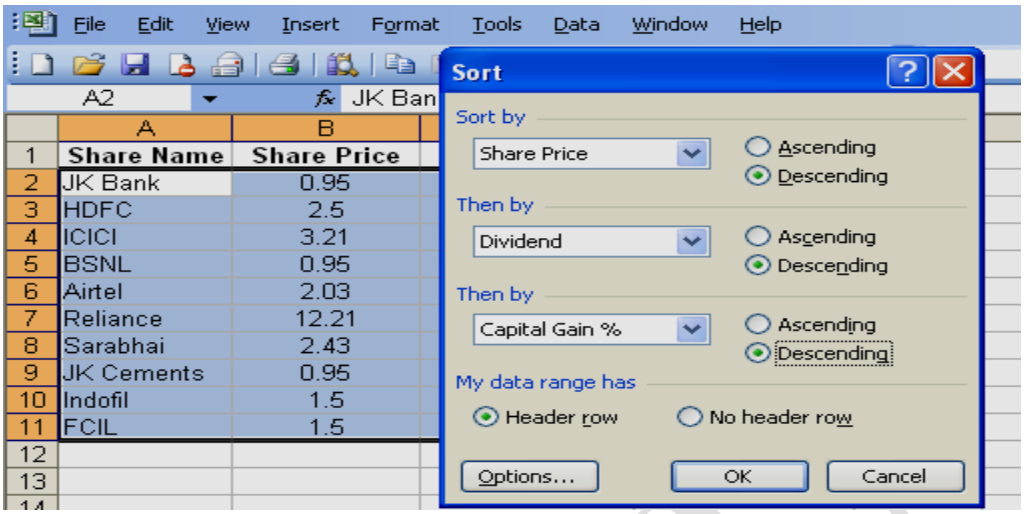
Which you can now easily work with (procedure discussed above in section 2.3), if you know the selling price of a share.

A look at the data indicates that there are some shares with the same price. We now want to sort the shares in descending order (or Ascending) of share price. Since some shares have same price, we then use dividend to break the tie. Again, since some shares tie on both price and dividend, we use capital gain to sort the share prices, again in descending order. The steps to sort the data are as under:

1) Select the area from A1 to D11 as the range to be sorted (including share names in sorting is important otherwise they will get detached from their field data values).

2) With the range selected, choose Data and then Sort from the menu bar. A dialogue screen as shown below will appear. Shortcut icon on the toolbar can also be used.

3) After choosing the values for various tabs and filling in the necessary information in the dialogue screen, press OK button and the data will be sorted.



	A	B
1	Share Name	Share Price
2	JK Bank	0.95
3	HDFC	2.5
4	ICICI	3.21
5	BSNL	0.95
6	Airtel	2.03
7	Reliance	12.21
8	Sarabhai	2.43
9	JK Cements	0.95
10	Indofil	1.5
11	FCIL	1.5
12		
13		

The dialogue was created by clicking on the **Sort By** tab and selecting share price as the basis of the **primary sort** from the list of available fields. Accordingly fields for **Secondary and tertiary sort** were chosen respectively to break the tie between shares with same price and those with same dividend also. Since our range includes headers, we make sure that the **Header Row** box is checked. The sorted workbook is shown below and you can check the results of this three-way sort.

	A	B	C	D
1	Share Name	Share Price	Dividend	Capital Gain %
2	Reliance	12.21	1.65	5.2
3	ICICI	3.21	0.5	10.1
4	HDFC	2.5	0.26	15.6
5	Sarabhai	2.43	0.34	3.5
6	Airtel	2.03	0.49	2.9
7	FCIL	1.5	0.31	8.9
8	Indofil	1.5	0.31	6.8
9	JK Cements	0.95	0.19	9.7
10	BSNL	0.95	0.19	7.1
11	JK Bank	0.95	0.19	5.6
12				

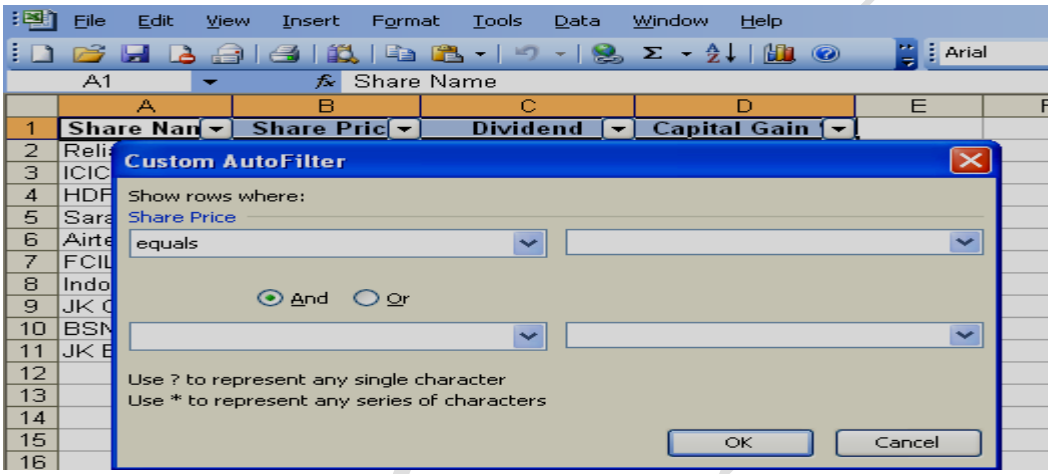
2.6.2 Filtering Data

Filtering data is the process of selecting those records from a list that meet certain criteria desired by the user. It might be all employed people, or all female records and the like. For this purpose we now use the sorted shares-sort worksheet obtained in the above section.

To start the filtering process we follow the steps given as under:

1) Identify all field names to Excel by highlighting them.

2) With the fields selected, choose Data and then Filter and then AutoFilter from the menu bar. Upon doing this, four arrow tabs will be inserted to the cells containing the field names.
3) To filter data, simply click on the arrow tab in the field that relates to the query that we want to answer (like for example, list all records where share price is greater than 1.2 and less than 10).
4) Choose custom option from the drop down list, a dialogue as shown below will appear.



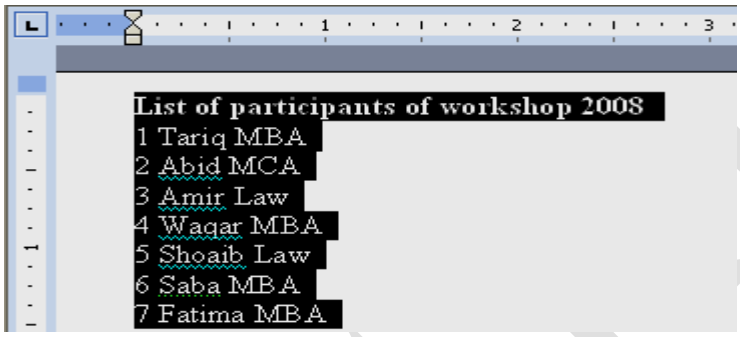
5) Click on different tabs to obtain a list of different arithmetic operators, values and from the lists choose appropriate operators and values or fill in your own values for your query.
6) Press Ok button and the data will be filtered.

	A	B	C	D
1	Share Nan	Share Pric	Dividend	Capital Gain
3	ICICI	3.21	0.5	10.1
4	HDFC	2.5	0.26	15.6
5	Sarabhai	2.43	0.34	3.5
6	Airtel	2.03	0.49	2.9
7	FCIL	1.5	0.31	8.9
8	Indofil	1.5	0.31	6.8
12				

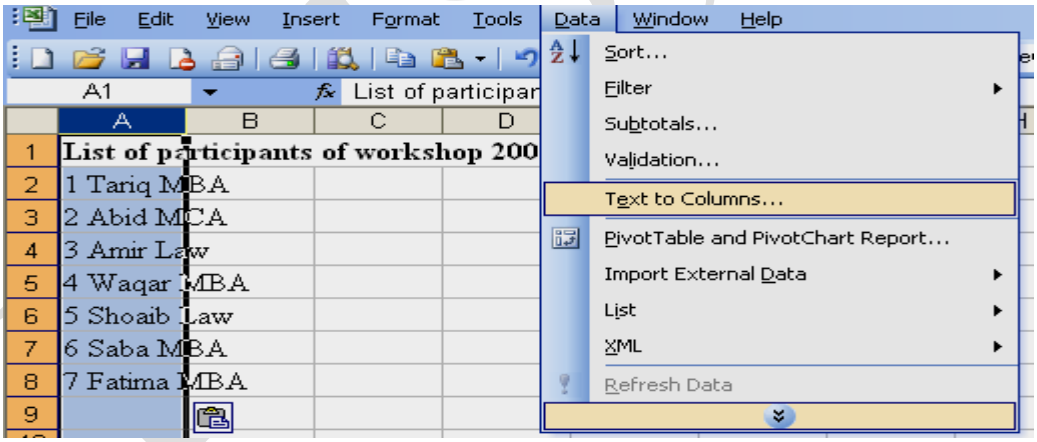
Notice that the arrow tab in B1 has turned from black to blue, indicating that it is a filtered list. The row numbers of the filtered records are also blue now. To restore the original list simply click on the blue arrow tab and select **All** from the drop down list.
Remember that filtering can be done on two or more fields also. For example, if we want a list of all shares with more than 10% capital gain and with a dividend payment of more than 0.5. The same can be done by first choosing the capital gain tab and then the dividend tab and setting the appropriate values.

2.6.3 Parsing Data

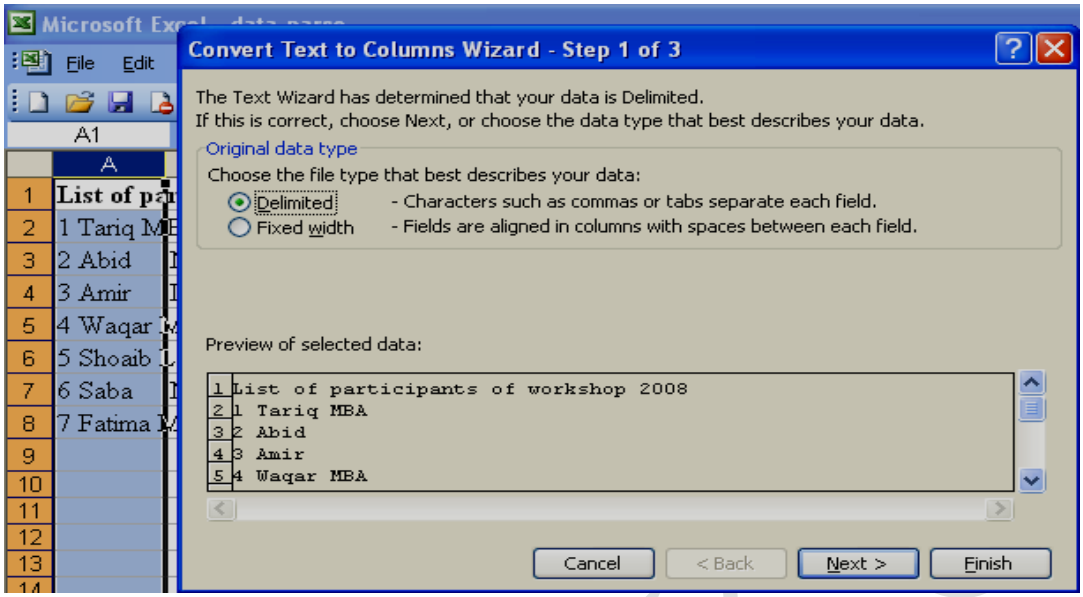
Sometimes researchers download data from Internet or import it from different sources. Mostly the data are not properly imported into Excel. The field columns of the original data are compressed into a single column. In simpler words, what appears to be three different columns in the source data, is imported as one single column containing each of the values separated by a space. In such situations Excel provides the **Data-> Text to Columns** command to redistribute data into separate columns. Let's illustrate this with an example. We use the data contained in a word document as shown below in the figure.



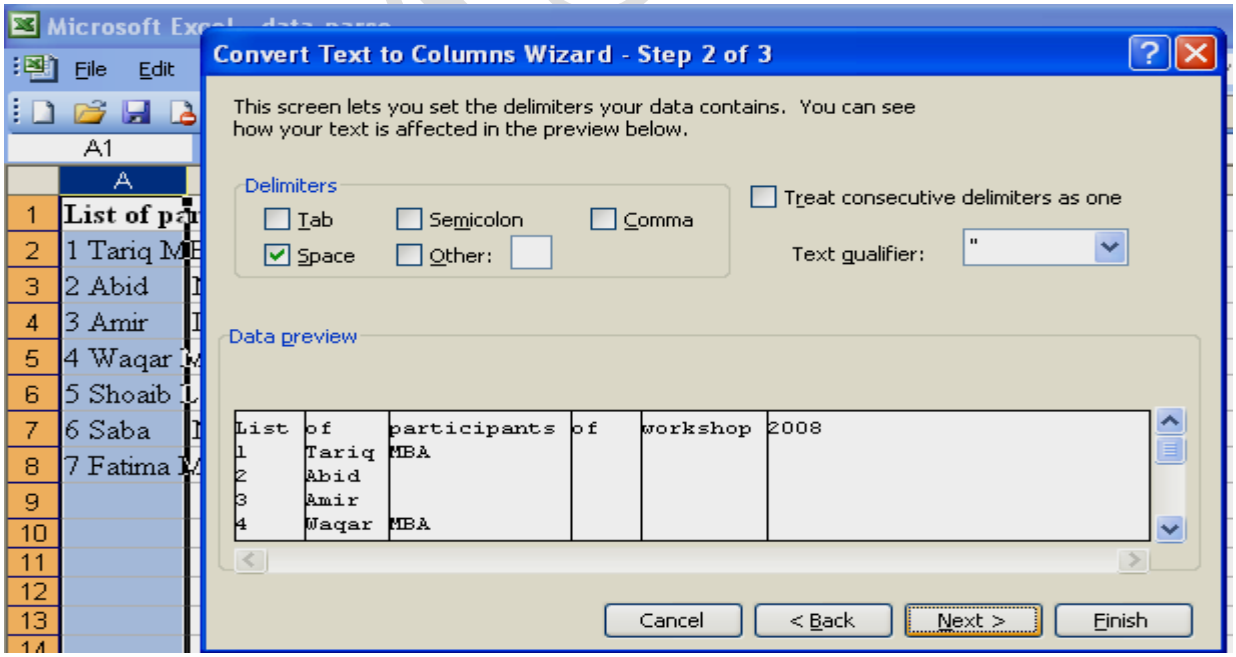
We simple copy this selected text into an Excel worksheet as shown below. As can be seen, the text gets compressed into a single column in the sheet.

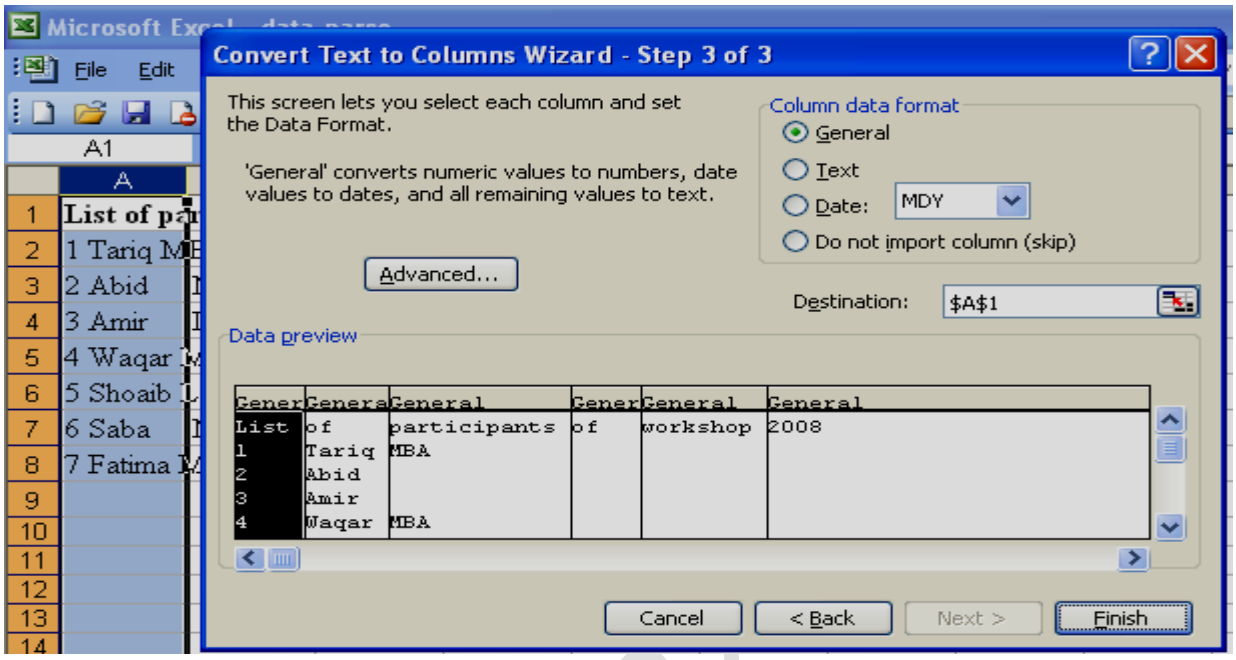


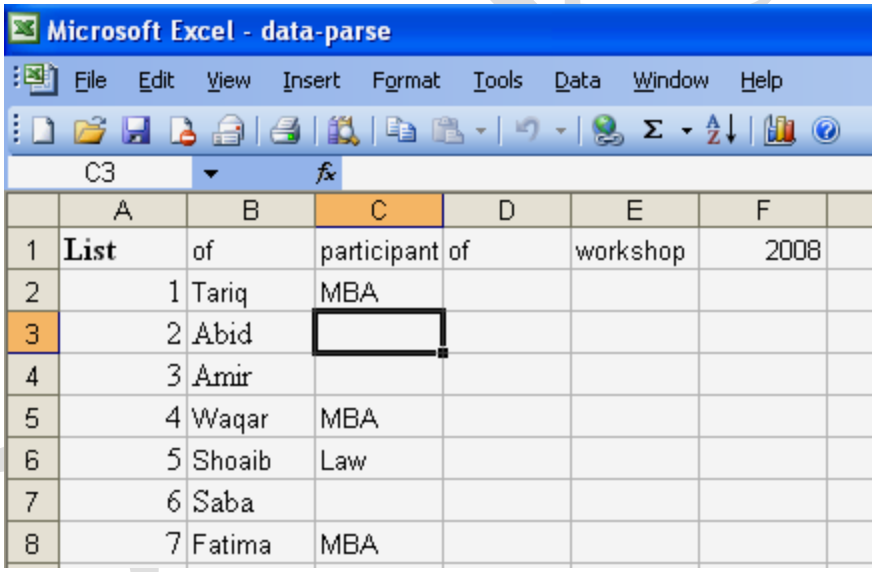
To parse this data we select the column containing the compressed data. Then we choose Data from menu bar and then Text to columns. A dialogue screen appears as shown below.



As the data is separated by a space, so the wizard shows it to be **Delimited** (data can be of fixed width also). Pressing Next brings to the next dialogue that shows a list of delimiters where we choose the delimiter that best describes the separator that best describes our data separator. Pressing Next brings us to the final dialogue that gives us the choice to describe the format of our data. Once the proper format is chosen, we click Next and our data gets parsed into separate columns as shown in the next figure.







There is one more way of copying downloaded data from websites or other sources into Excel sheets with proper formatting. First we select the data from the source, say a web page, then copy it from there. Once we are in Excel, we choose **Edit-> Paste special**. The dialogue that appears gives us several different options like paste the text as HTML or Unicode text.

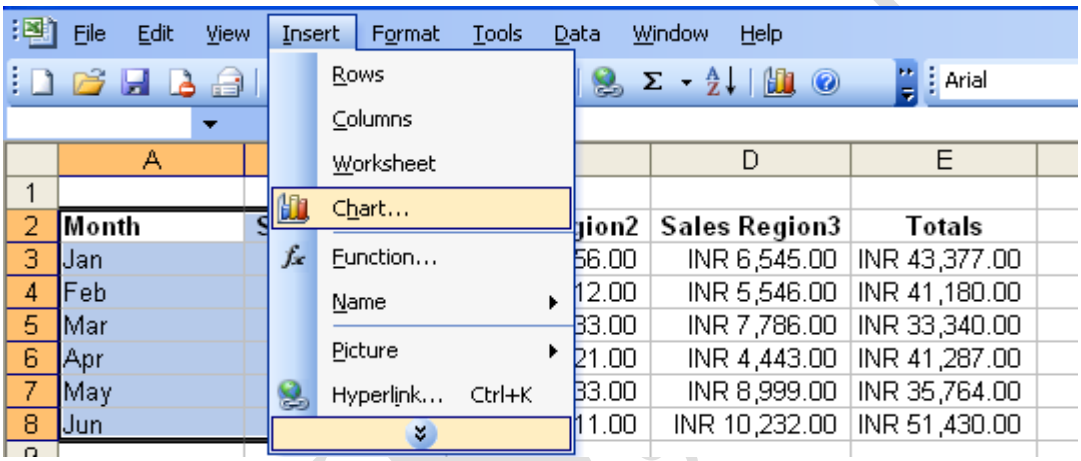
2.7 Charts and Graphs in Excel

There is a Chinese saying- A picture is worth thousand words. A chart or graph in Excel displays information in a precise and easy to understand form and conveys

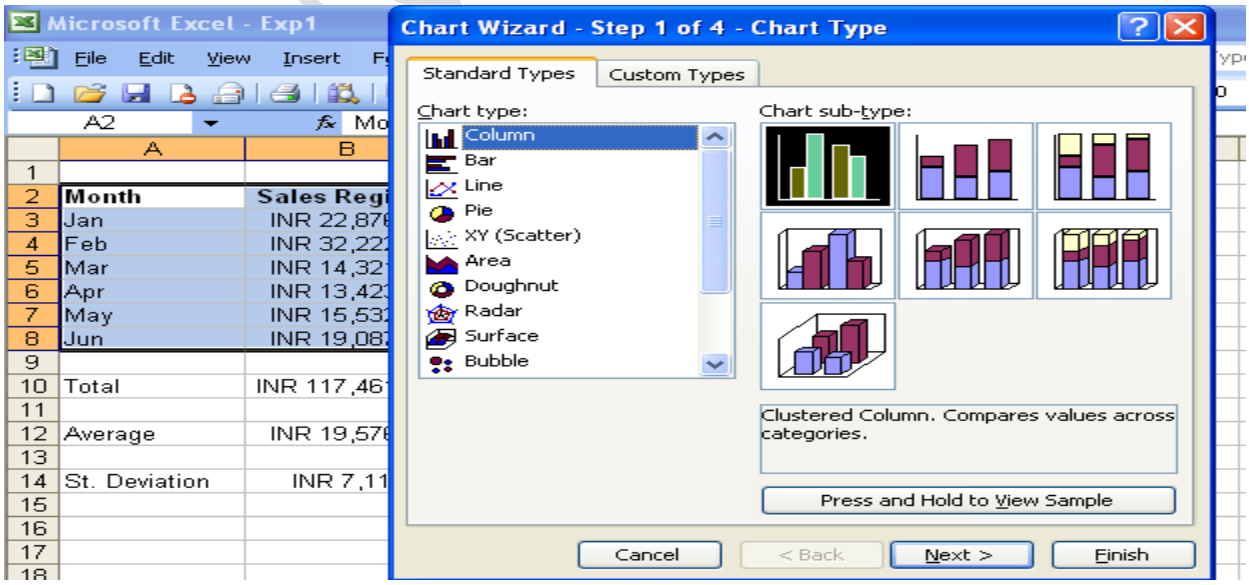
things in a glance that could otherwise be conveyed using many pages or files. This section gives a basic know how about this feature of Microsoft Excel.

2.7.1. Selecting data and constructing a chart

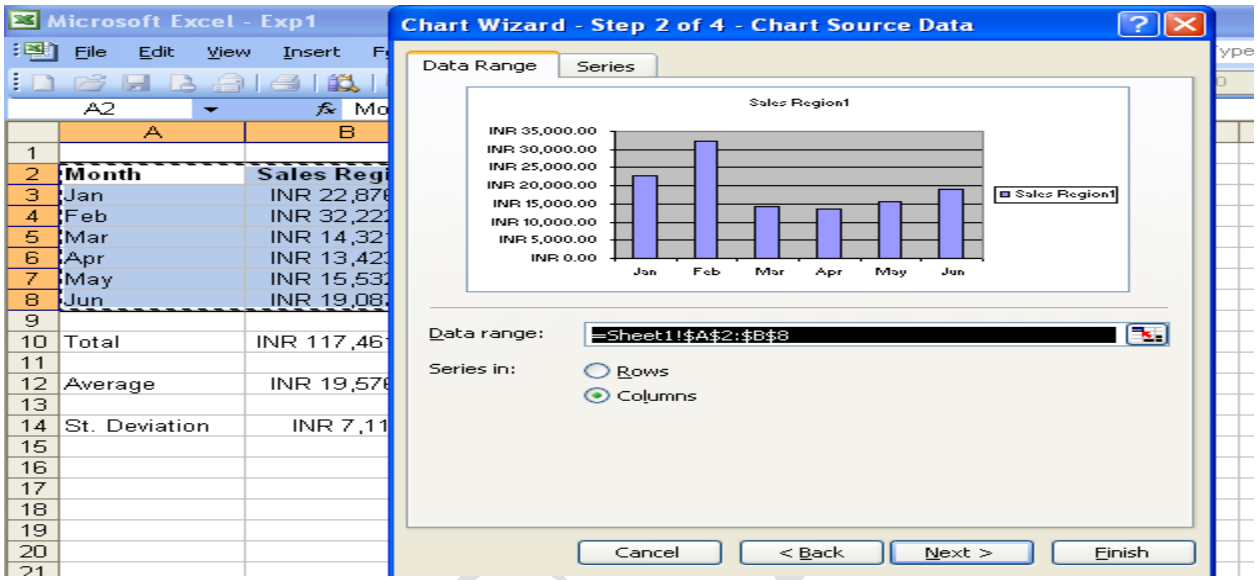
Let's now chart the sales figures for each month for Sales Region1. We start by selecting the data appropriate for such a chart. Technically this data resides in column B, rows 3-8. However, we'd like to include the labeling already present in our worksheet, so we add column A and row 2 where the sales region is identified. So we select the range A2 through B8 and then choose the **Chart** command from the **Insert** menu to construct a chart as illustrated below.



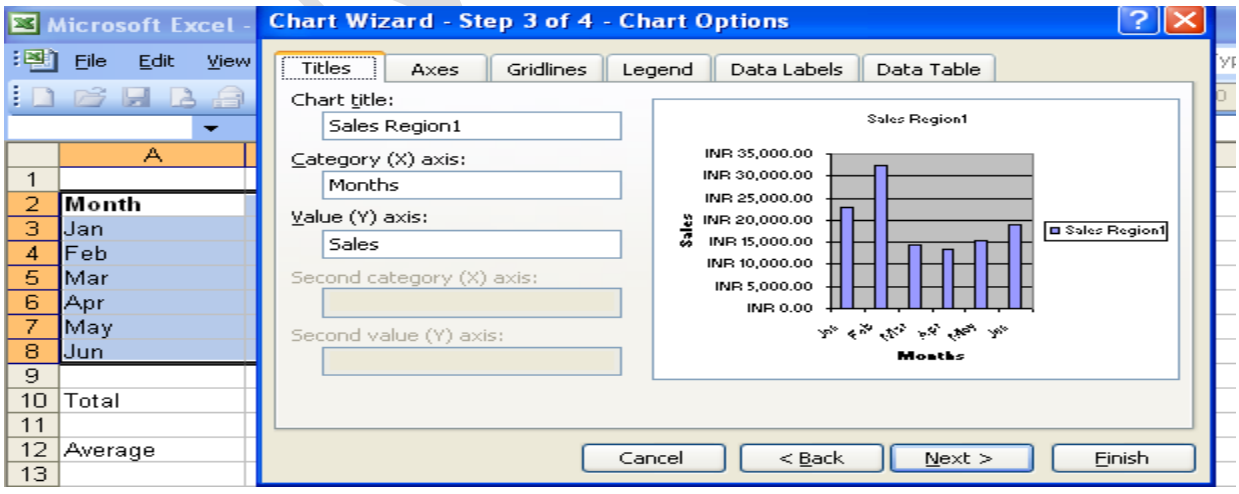
Excel has a chart wizard function to help in the construction of charts. The first chart wizard dialog box appears when we select the Insert/Chart command. This box is shown below. In this dialog box, we select the type of chart we wish to create.



Once we select the chart type and press the Next button, we get a second chart wizard dialog box, illustrated below for our example. In this box we can specify the range for our data. We also get a preview of the chart we're creating. Since we already preselected our data range, which is shown in this dialog box, we can just press the Next button here.

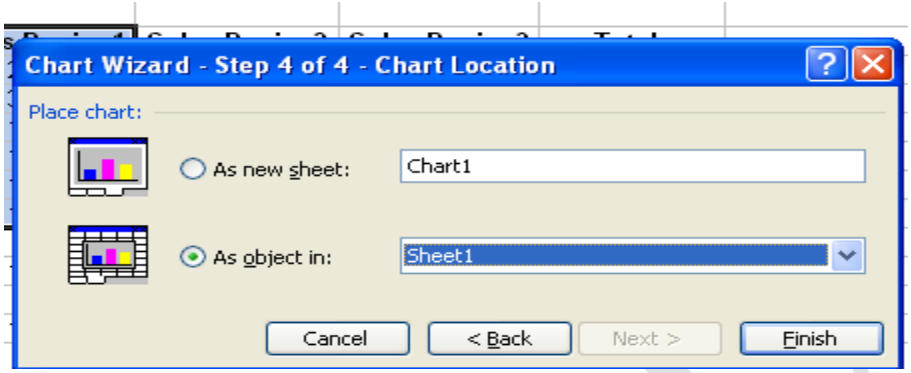


In the next dialog box, we can change the preselected chart title if we choose and add our own X-axis and Y-axis labels. Notice that we have entered a label for each axis. These changes are reflected in the preview chart to the right of the dialog box. We can also add data table, gridlines or legends to the chart as is reflected by different tabs in the figure. Once we make the necessary changes, we press Next button once again.



The final chart wizard dialog box asks us whether we wish to display the chart as an object (which we can resize and move around) in our current worksheet or

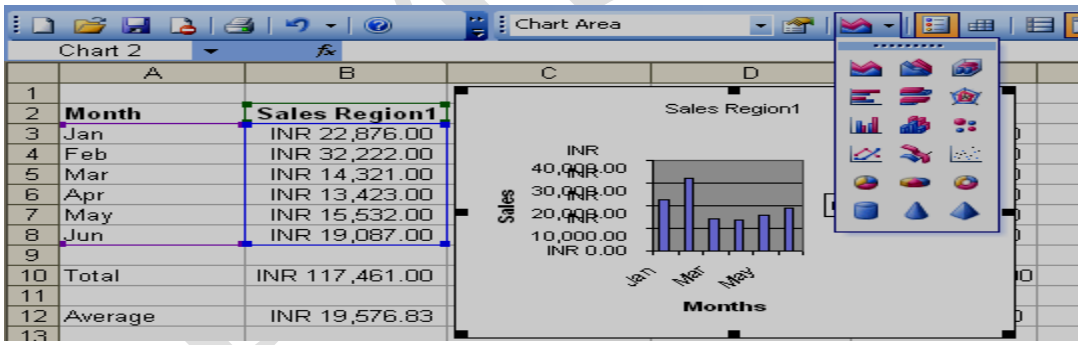
whether we'd prefer the chart to have its own worksheet. In either case, the chart is linked to data, meaning that when the data changes, the chart is automatically updated. We choose to display the chart as an object in our current worksheet.



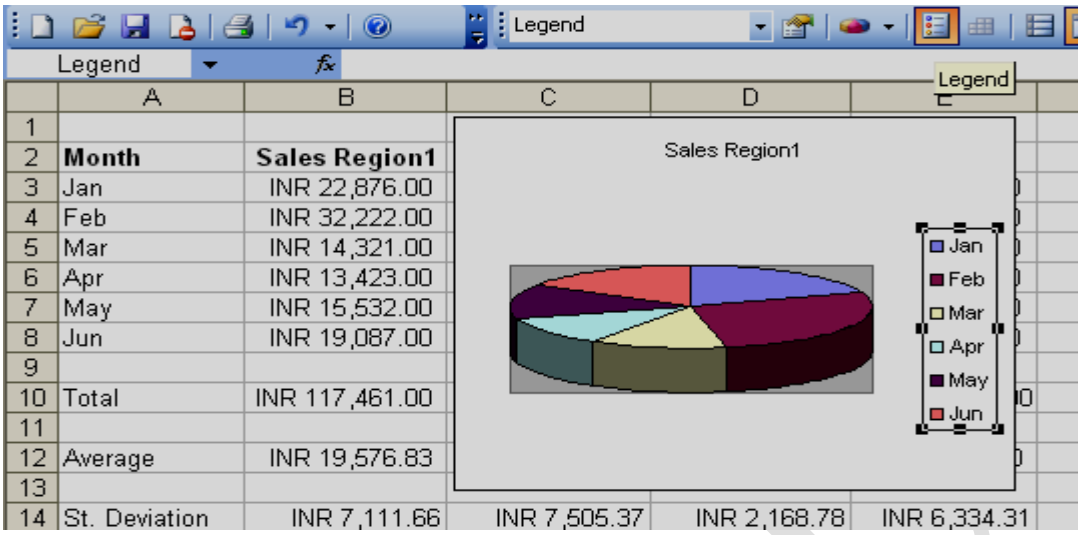
Once we click Finish, our chart is displayed. We can drag it to adjust at any position and also resize it as needed. In addition, a **Chart** tool bar is displayed which allows us to adjust various features of the chart.

2.7.2 Changing the chart type

One of the most useful tools in the **Chart** tool bar is the Chart Type tool. The figure below shows it as a pull-down menu showing a variety of different chart types. Selecting one of these types changes the chart immediately to that chart type.



The figure below shows the effect of choosing a pie chart type. Try some other chart types for this data. Some won't be very appropriate, but remember, you can switch to another chart type by selecting another choice from the pull-down Chart Type menu. In the figure we have used the Legends choice to display the legend at the right side.

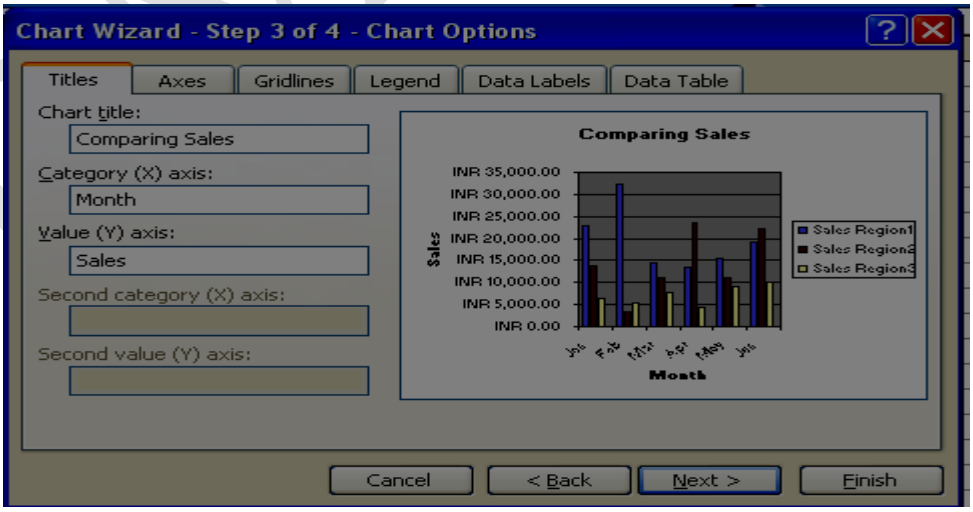


	A	B	C	D	E
1					
2	**Month**	**Sales Region1**			
3	Jan	INR 22,876.00			
4	Feb	INR 32,222.00			
5	Mar	INR 14,321.00			
6	Apr	INR 13,423.00			
7	May	INR 15,532.00			
8	Jun	INR 19,087.00			
9					
10	Total	INR 117,461.00			
11					
12	Average	INR 19,576.83			
13					
14	St. Deviation	INR 7,111.66	INR 7,505.37	INR 2,168.78	INR 6,334.31

2.7.3 Comparing Sales per Month for Various Regions

There are a great many possibilities for charting and graphing in Excel. We have just begun to let the exploration for much more to start. The best way to learn about many of these is to experiment them yourself. In this section you will create a chart that allows sales for the different regions to be easily compared month by month.

To get started, select the range of cells A2 through D8 to include sales data for all six months from all three regions. Then choose **Chart** from the **Insert** menu as we did before. This activates the chart wizard and gives you the first chart wizard dialog box, as shown below. Choose the column type chart. Continue with the chart wizard, supplying names for the chart title, X-axis, and Y-axis as shown in the third dialog box pictured below.



Remember that you can go Back in the chart wizard sequence if you forget to include a feature. You can also modify a chart once it is displayed in your worksheet as we saw earlier. Experiment to add some additional features of your

own if you like. Try changing the chart type to see if you find a more convenient way to display the above data.

2.8 Problem modeling and Decision making in Excel

This section takes care of two important aspects of Excel viz. that of modeling verbal statements/problems into Excel form and of decision making.

2.8.1 Problem modeling

To use full mathematical modeling power of Excel, many more basic principles need to be understood. One such principle is the Decision making which will be briefly discussed in the next section after we learn to model the problems into Excel format in this section. One important thing to remember is that most modeling problems are phrased in terms of verbal and arithmetic statements that first need to be put in symbolic or algebraic form and later converted into an equivalent spreadsheet symbolic form.

To put things in the proper perspective, let's wet our hands with a practical problem.

Suppose a store selling winter garments charges its customers a price of $p per unit. The store also offers a discount of d% of the value of any order if payment is made in cash. We are asked to calculate and send invoice to a customer who orders x units and pays in cash.

To start calculating the invoice, we first need to put the problem in algebraic form, which is given below

Value of the order = No. of units * price per unit

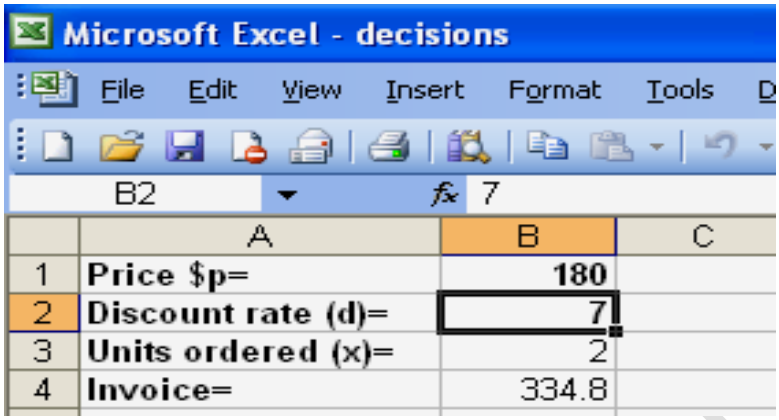
= x * $p = $px

Discount offered = d% of the value of the order = d% of $px = d/100 * $px = $dpx/100

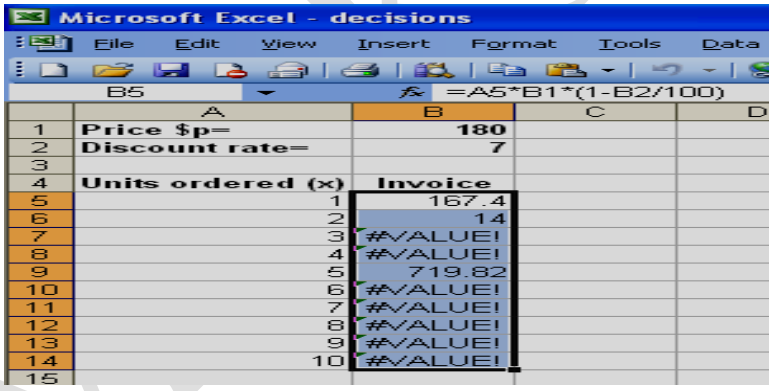
Invoice = order value – Discount offered = $px - $dpx/100

= $px(1-d/100) when the common term ($px) is factored out.

This expression for the invoice is a completely general statement that adopts a specific numerical value once values are given for **p**, **x** and **d**. Now, before we can translate this algebraic expression into Excel form we need to design the same in a sheet shown as under (the sheet designed is also modeled for general problems).



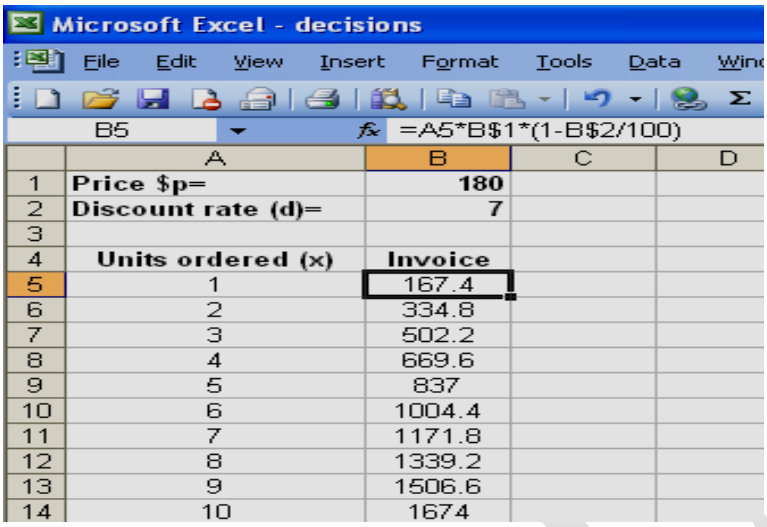
In the example shown above, p=180, d=7% and x=2. The model displayed then calculates the invoice (334.8) based on the values of the variables. The example assumes that the payment is made in cash. Remember if any of the variables p, d, x are changed, the value for invoice generated will also change automatically. This is shown in the next figure for a set of 10 values.



The reason for the difficulty noted in the worksheet (#VALUE) is that Excel automatically carries out copying of formulas in a **fully relative manner**. This means that when the entry in B5 (=A5*B1*(1-B2/100)) is copied into B6 it becomes =A6*B2*(1-B3/100) and when it is copied into B7it becomes =A7*B3*(1-B4/100) and soon for other copies below A7.

Although, this relative updating of column A cell is needed for 10 different values of x, it is not what we require for B1 and B2 cell references. They must always remain as B1 and B2 and must not update in the copying process. So what is the solution……..

The solution is what we call as '**dollar-fixing**'. Instead of writing B1 and B2 as the cell references for the price and the discount rate, we write B$1 and B$2 to keep them fixed with regard to their row numbers. This change to the formula in B5 is shown in the figure below.



	A	B	C	D
1	**Price $p=**	**180**		
2	**Discount rate (d)=**	**7**		
3				
4	**Units ordered (x)**	**Invoice**		
5	1	167.4		
6	2	334.8		
7	3	502.2		
8	4	669.6		
9	5	837		
10	6	1004.4		
11	7	1171.8		
12	8	1339.2		
13	9	1506.6		
14	10	1674		

2.8.2 Decision making

Now, the question arises when payment is not made in cash, no discount should be offered. How to solve such a problem, the answer is **Logical function IF** that helps us make decisions based on fulfilling certain conditions**.** If is a pre-programmed Excel statement or function that can make logical decisions of the True/False type. There are a number of logical functions in Excel but we will use only the If function here.
In verbal form can be put as:

=IF(condition, result if condition is true, result if condition is false)

For our problem defined in the previous section, the verbal form can be as:

=IF(pay in cash, discount offered, discount not offered)

Now, the concept involved should be clear and the verbal logic put into proper Excel format. To accomplish this we rephrase our worksheet to include the payment type (cash=1, other=0). Also in cell **C3** enter the If statement which should be of the form:

=IF(B3=1, i.e. if payment is in cash, then B2 (pay the discount), else 0 i.e. zero discount rate)

Now putting every thing right, the **C3** cell entry will be as:

=IF(B3=1,B2,0)

It is now clear that the **C3** cell contains either of the two values-the discount rate fed in from **B2** if payment is in cash or zero if it is not.

Lastly we have to modify the formula in **B5** since it looks to B2 for discount rate, whereas now it should now look to C3 to find whether discount is to be offered or not. Consequently the contents of B5 cell will change from

=A5*B$1*(1-B$2/100) to =A5*B$1*(1-C$3/100)

Copying this formula into B6 to B14 generates the two modified worksheets, depending upon whether discount is offered or not (i.e. on the value contained in B3), shown below.

B5 =A5*B$1*(1-C$3/100)

	A	B	C
1	Price $p=	180	
2	Discount rate (d)=	7	
3	Payment type (cash=0, other=1)	1	7
4	Units ordered (x)	Invoice	
5	1	167.4	
6	2	334.8	
7	3	502.2	
8	4	669.6	
9	5	837	
10	6	1004.4	
11	7	1171.8	
12	8	1339.2	
13	9	1506.6	
14	10	1674	

C3 =IF(B3=1,B2,0)

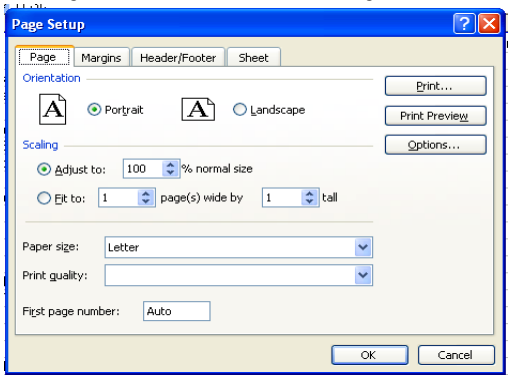
	A	B	C
1	Price $p=	180	
2	Discount rate (d)=	7	
3	Payment type (cash=0, other=1)	0	0
4	Units ordered (x)	Invoice	
5	1	180	
6	2	360	
7	3	540	
8	4	720	
9	5	900	
10	6	1080	
11	7	1260	
12	8	1440	
13	9	1620	
14	10	1800	

2.9 Printing in Excel

Finally, when a document is prepared, we may need to have a hard copy of it for different purposes. How printing of worksheets is carried out will be discussed in the following sections.

2.9.1 Setting page layout:

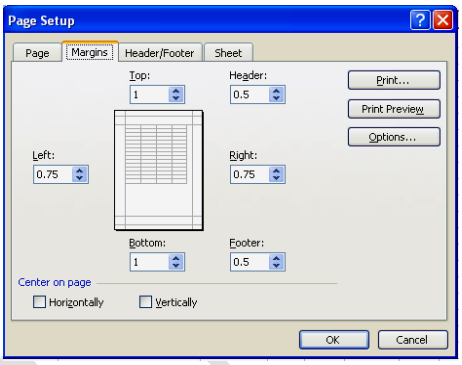
It is used to view existing page layout or to set a new layout. To set a new layout, you can choose **Page setup** from **File** menu to display the page setup dialogue box. The dialogue box contains four tabs: Page, Margins, Header/Footer, and Sheet.



Page tab Click on the page tab to make following changes to the layout.

1. **Orientation:** Select portrait or Landscape
2. **Scaling:** Used to reduce or enlarge the print.

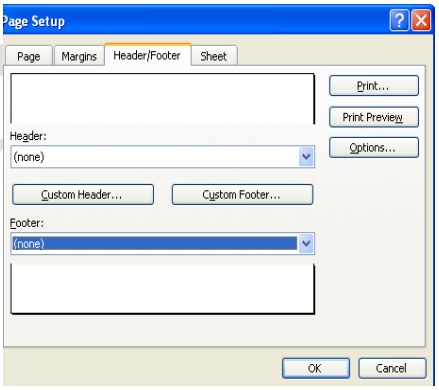
3. **Paper size:** Displays a drop down list to choose the required paper size.
4. **Print quality:** Choose high or low resolution as needed.
5. **Page number:** Enter the first page number to begin page numbering.
6. Click **OK** to apply these settings.



Margins tab Let's you set the margin space between the edges of the page and the text on the four sides of the paper. It also allows you to set space for Header and Footer.

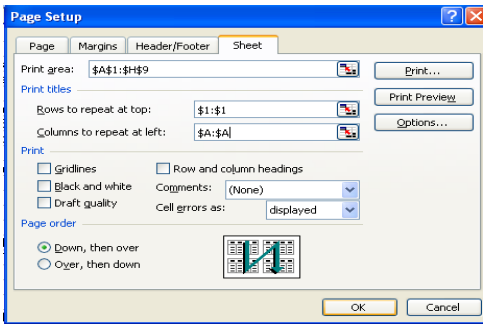
Header/Footer tab To create standard and customized headers and footers, you can make use of header/ footer tab.

To get a standard list of header and footer, click on the down arrow to the right of the header list box and footer list box. If you want to create a different (customized) header or footer then click on **Custom header** or **Custom footer** button to display the header or footer dialogue box. Fill in the three boxes to put text in the header or footer at the proper places. You can also add **Date** and **Time** to the header or footer by clicking on the respective icons.



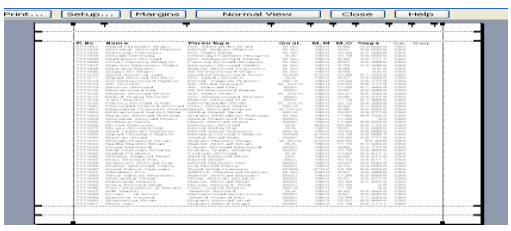
Sheet tab You can change the print range and elements to be printed such as headings, gridlines and comments and the order of pages in which the pages should be printed. The options available in this tab are:

1. **Print area:** enter or select the area/range to be printed.
2. **Columns or rows to repeat:** click appropriate icons to choose the rows to repeat at top and columns to repeat at left.
3. **Print elements:** select the elements to print like gridlines, comments, row column headings etc.
4. **Page order:** select any of the two options available there.

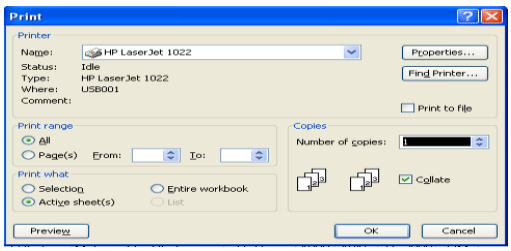


2.9.2 Print preview

Before printing the worksheet, you can review the appearance of the document on the screen. Previewing a document is a good way to identify formatting errors, such as incorrect margins, overlapping text etc. To view a document in print preview mode, choose **Print preview** from File menu or click the **print preview icon** on the standard toolbar.



2.9.3 Printing worksheet



When you have completed formatting worksheets, you can print the whole sheet, part of the sheet or whole workbook. To print choose **Print** from File menu or click **print icon** on the standard tool bar. From the dialogue that appears choose the options that best suit your requirements to print.

2.10 Exercise

Q1. Answer the following in about 10-20 words.

i) What is the indication that a cell is active?

ii) When can data be entered to a cell?

iii) Name various ways of making a cell active?

iv) How many columns and rows are there in a worksheet?

v) Where are the contents of an active cell displayed?

vi) What is the easiest way of making the VI200 cell active?

vii) What are the various ways of saving/opening a worksheet?

viii) Name different types of graphs and charts in Excel?

ix) How can we print only a selected part of a worksheet?

x) Write steps for adding header/footer to a worksheet?

Q2. Answer the following

i) Enter some data to A1-A10 cells and do the following

a) Format the range to bold underlined.

b) Move the range to C1-C10.

c) Draw a bar chart for the data.

d) Delete part of the range.

e) Undo the formatting done in a) above.

ii) In a new worksheet enter Sunday into cell A1 and then copy cell A1 down to A7 and see the effect.

iii) Use the copying facility to create the following series of numbers:

0,1,1,2,3,5,8,13,21 and so on.

iv) Create a worksheet as shown and perform the following:

	A	B	C	D	E	F
1	Marks obtained by Five students in five subjects					
2	Student Name	English	Science	S. Science	Math	Biology
3	Azhar	66	86	65	90	76
4	Abid	67	78	65	88	75
5	Madiha	70	77	58	92	80
6	Javeed	77	80	66	92	88
7	Fatima	70	77	60	78	82

a) Calculate total marks obtained by Azhar using a formula.

b) Copy the formula to get total marks for each student.

c) Assuming that maximum marks for each subject are 100, calculate percentage of marks obtained by each student.

d) Use in-built functions to calculate total marks for each student in column G.

e) Use in-built function to find out the students getting maximum and minimum marks.

f) Use appropriate chart type to represent the data in the sheet without the total column.

g) In column H against each student record, assign a grade to each student based on some logical statement to be evaluated.

2.11 Suggested Readings

1. Introduction to Information Technology, ITLES, Pearson Education
2. Introduction to Computer Science, ITLES, Pearson Education
3. PC software for Windows made simple, Taxali, R.K, TMH Publications
4. MS Excel in easy steps, NCPUL New Delhi