336en08

8

Formulas, Functions and Charts

8.1 INTRODUCTION

In this leson you can enter formula and functions and perform mathematical calcualtions. You will also be able to create charts and graphics using the data. You can specify methametical relationship between the numbers using the formula. Formulas are used for simple addition, subtraction, multiplication and division as well as for complex calculations. Functions are built in formulaes. The users have to provide cell references and addresses only. These are called arguments of the function and are given between the left and right parenthesis.

8.2 OBJECTIVES

After going through this lesson you would be able to:

- use formulaes to get the desired result
- insert and edit picture from a file
- use functions
- create varioius charts
- draw graphics using clip art.

8.3 FORMULAS AND FUNCTIONS

To manipulate data and to extract useful information from Excel worksheets, formulas and worksheet functions play very important role. In Excel, formulas are used to calculate results from the worksheet data. When there is some change in the data, such formulas automatically calculate the updated results with no extra efforts on the part of the user. There is a new feature introduced by Excel 2007, which enables you to create formulas which use columns names from a table, when you are working with table. This feature helps the user to make formulas much easier to read.

A formula can have any or all of the following elements

- Must begin with the 'equal to' = sign.
- Mathematical operators, such as + (for addition) and / (for division) and logical operators such as <, >
- References of cell (including named ranges and cells)
- Text or Values
- Functions related to the worksheets, for example SUM or AVERAGE

The current cell in which you have entered a formula will display the result after the formula is completely entered. Also, when you select or click on a cell which is having some formula, the formula will appear in the formula bar.

In Excel 2007, the formulas are available in the Formulas Tab. If you click on the Formulas tab, you can see the corresponding ribbon display with available formulas, as shown below.

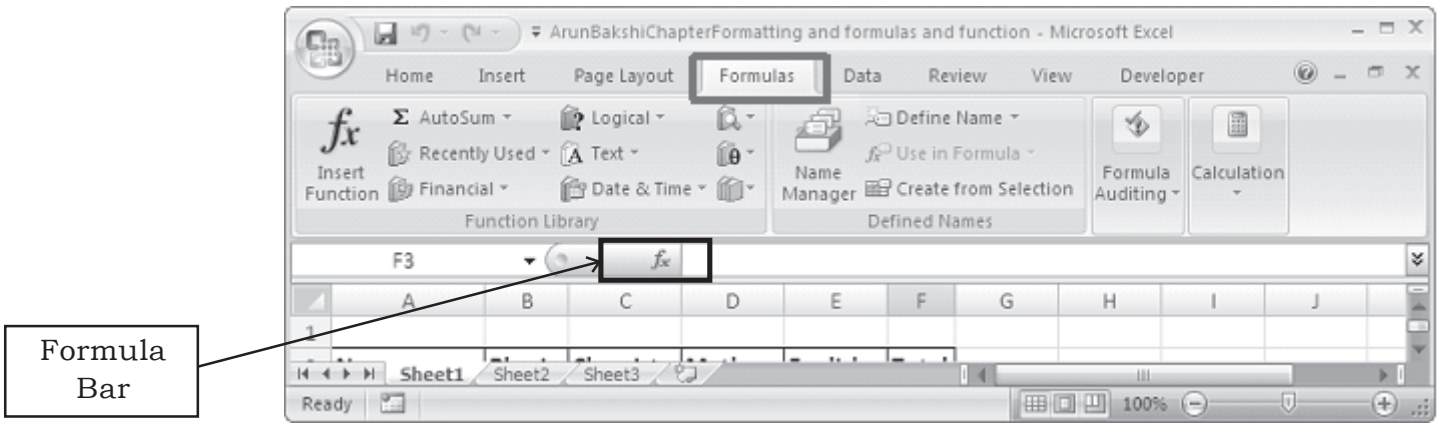
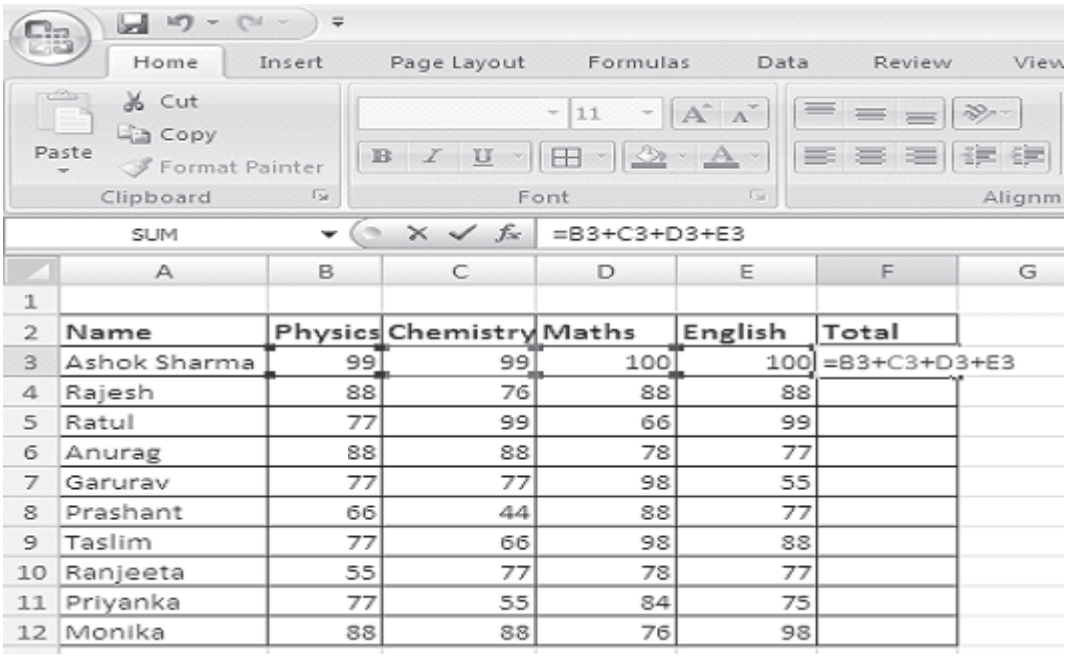


Fig. 8.1

Following are a few examples of formulas:



	A	B	C	D	E	F	G
1							
2	**Name**	**Physics**	**Chemistry**	**Maths**	**English**	**Total**	
3	Ashok Sharma	99	99	100	100	=B3+C3+D3+E3	
4	Rajesh	88	76	88	88		
5	Ratul	77	99	66	99		
6	Anurag	88	88	78	77		
7	Garurav	77	77	98	55		
8	Prashant	66	44	88	77		
9	Taslim	77	66	98	88		
10	Ranjeeta	55	77	78	77		
11	Priyanka	77	55	84	75		
12	Monika	88	88	76	98		

Fig. 8.2

In the above example, in the cell F3, just type = B3+C3+D3+E3. It will return sum of the marks in physics, chemistry, maths and English.

Name	**Physics**	**Chemistry**	**Maths**	**English**	**Total**
Ashok Sharma	99	99	100	100	398
Rajesh	88	76	88	88	
Ratul	77	99	66	99	
Anurag	88	88	78	77	
Garurav	77	77	98	55	
Prashant	66	44	88	77	
Taslim	77	66	98	88	
Ranjeeta	55	77	78	77	
Priyanka	77	55	84	75	
Monika	88	88	76	98	
Neelam	88	77	67	66	
Deepak	77	99	87	55	
Elakshi	99	88	87	66	
Sonakshi	66	77	56	77	
Gunjan	77	66	88	66	
Mohit	88	77	77	77	
Chhavi	99	88	66	88	
Kaku	77	99	88	99	

Fig. 8.3

Copying a formula

In above exaple just drag the handle and bring down to cover the remaining cells in the column total. This will automatically copy the formula and calculate the corresponding sum of the respective rows of the other students.

Name	Physics	Chemistry	Maths	English	Total
Ashok Sharma	99	99	100	100	398
Rajesh	88	76	88	88	340
Ratul	77	99	66	99	341
Anurag	88	88	78	77	631
Garurav	77	77	98	55	307
Prashant	66	44	88	77	275
Taslim	77	66	98	88	329
Ranjeeta	55	77	78	77	287
Priyanka	77	55	84	75	291
Monika	88	88	76	98	350
Neelam	88	77	67	66	298
Deepak	77	99	87	55	318
Elakshi	99	88	87	66	340
Sonakshi	66	77	56	77	276
Gunjan	77	66	88	66	297
Mohit	88	77	77	77	319
Chhavi	99	88	66	88	341
Kaku	77	99	88	99	363

Fig. 8.4

Some other examples of formulaes:

If A1 = 2, B1 = 3, C1 = 4, D1 = 5 then

(i) = B1 * C1 will give result as 3 * 4 = 12

(ii) = A1 * B1 – C1 + D1 will give result as 2 * 3 – 4 + 5 = 7

(iii) = ((A1 * B1) + C1)/D1 will give result as ((2 * 3) + 4)/5 = (6 + 4)/5 = 10/5 = 2

Auto sum feature

The sum of cell values can also be done with the help of AutoSum feature also.

Following steps explains how to do that.

- Click on the cell F3.
- Select the Formulas tab
- Click AutoSum from the function library group.

- Select Sum
- Press Enter

Alternatively, you can write = SUM(B3:E3) in the Cell F3 to get the sum of the Physics, Chemistry, Maths and English marks.

Pictorial illustration is shown below:

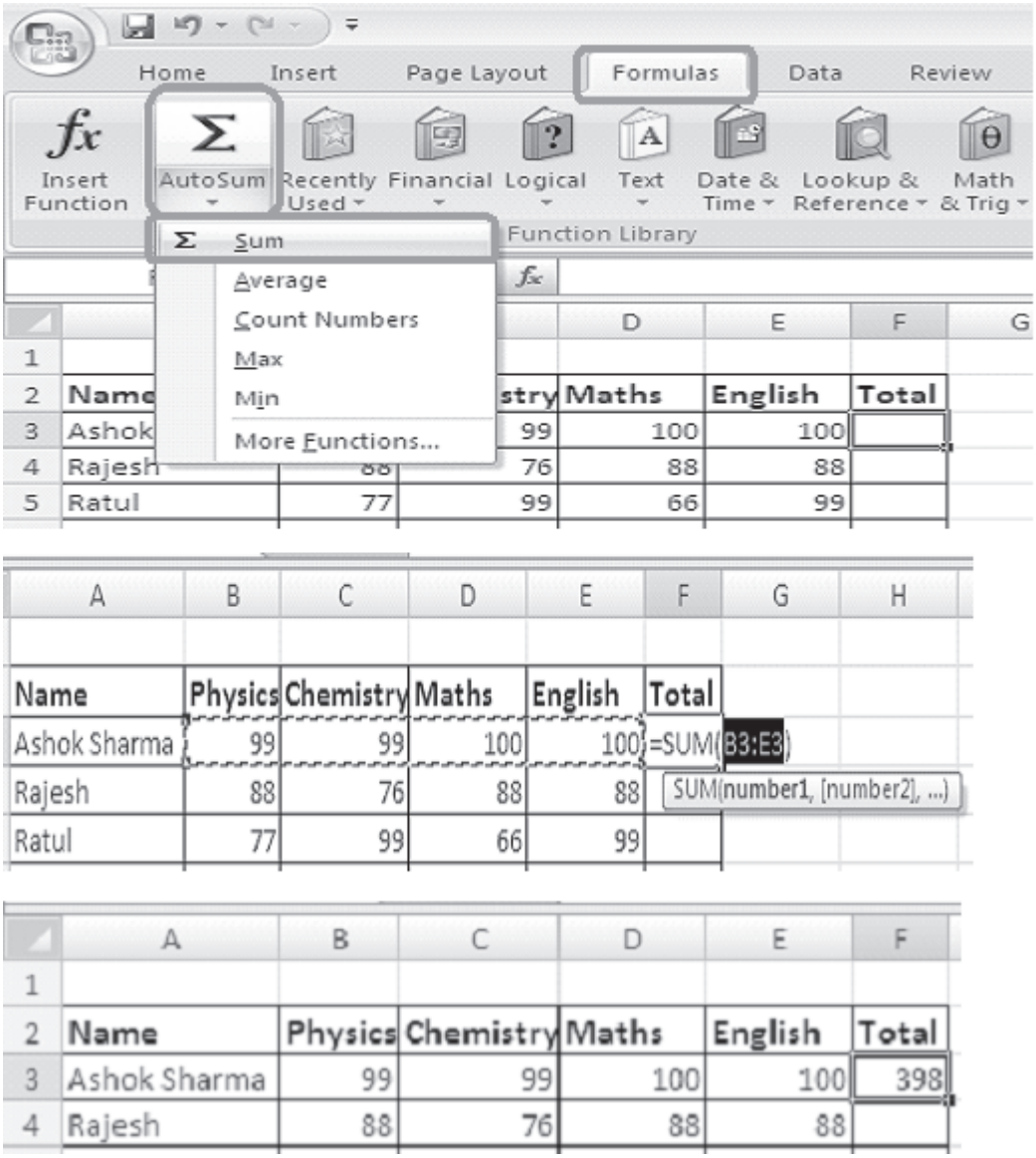


Fig. 8.5

Apart from sum there are other functions also, like average, Count Numbers, Max, Min and many other Functions.

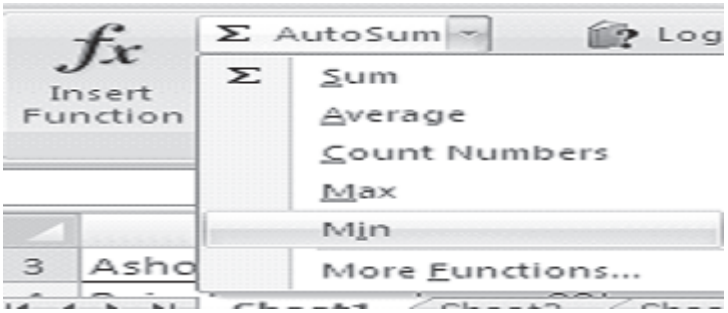


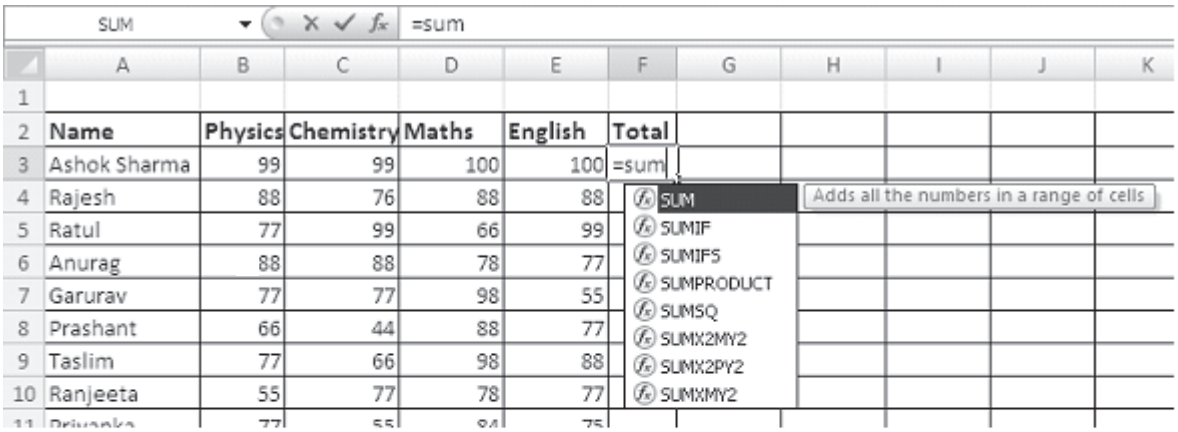
Fig. 8.6

Sum ( ) : Adds all the numbers in a range of cells.

Syntax SUM(number1,number2, ...)

Maximum number of arguments can be 255 i.e. number1, number2 ... number255.

Sum function is having different forms. You can choose as per your need.



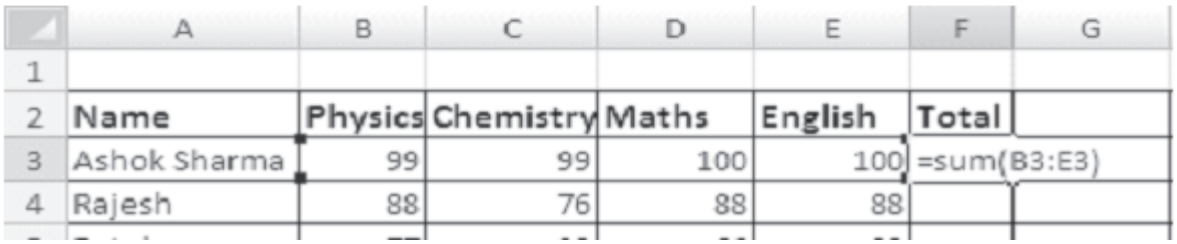


Fig. 8.7

SUMIF(range, criteria, sum_range) : This form of sum functions is used to add the cells with respective to a given criteria.

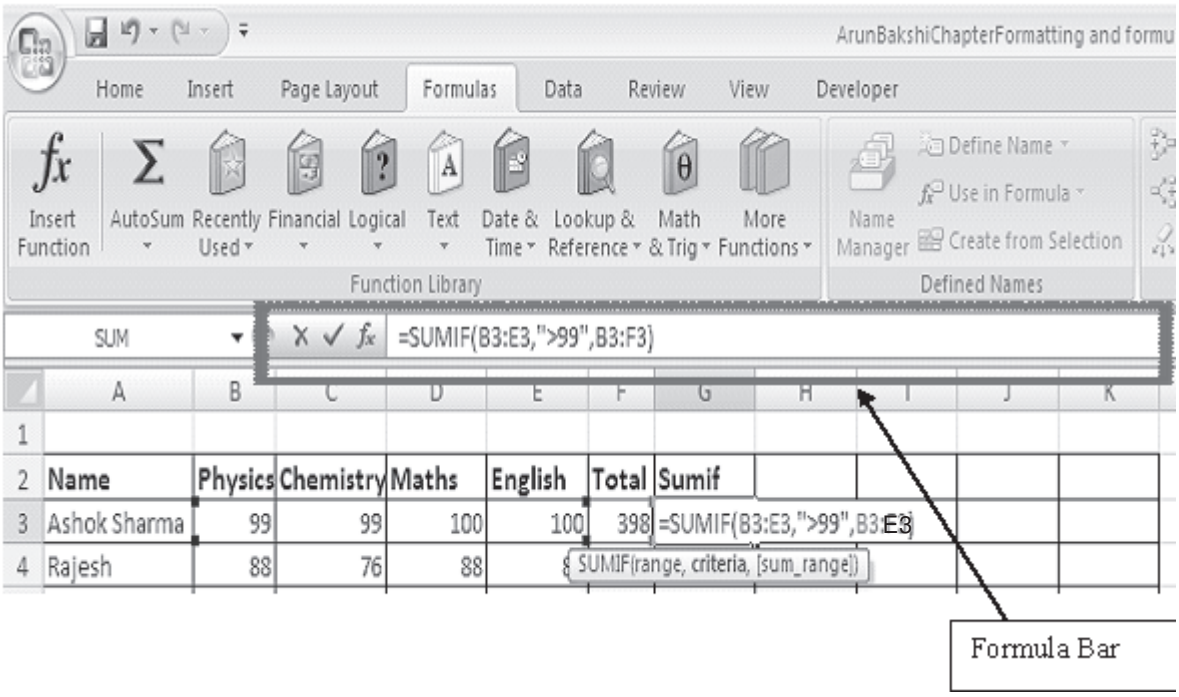
Range : A group of adjacent cells

Cells within a range must be numbers or names, arrays, or references which are having numbers. **In sumif function the blank and text values are ignored.**

Criteria: It can be a number, expression, or text to define which cells will be considered for the addition e.g. criteria can be fixed as 12, "12", ">12", or "mangoes".

Sum_range: These are the actual cells to be added if their corresponding cells in range match criteria. In case the sum_range is avoided, then the cells in range are both evaluated by criteria and added if they match criteria.

Example



In above examples, the function SUMIF adds only those values in the cells (B3, E3) which are greater than 99. i.e., it will add the values from cells D3 and E3 only and hence the result is 100 + 100 = 2000

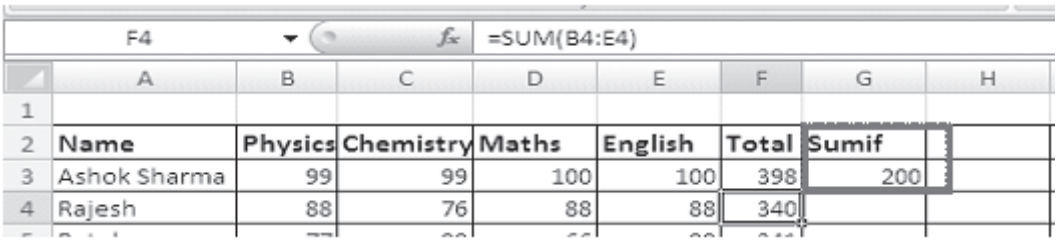


Fig. 8.8

Average function ( ) : It helps you to get the average of the numbers. It returns the average (arithmetic mean) of the arguments.

Syntax : AVERAGE(number, number2,...)

Maximum number of arguments can be 255 i.e. number1, number2 ... number255.

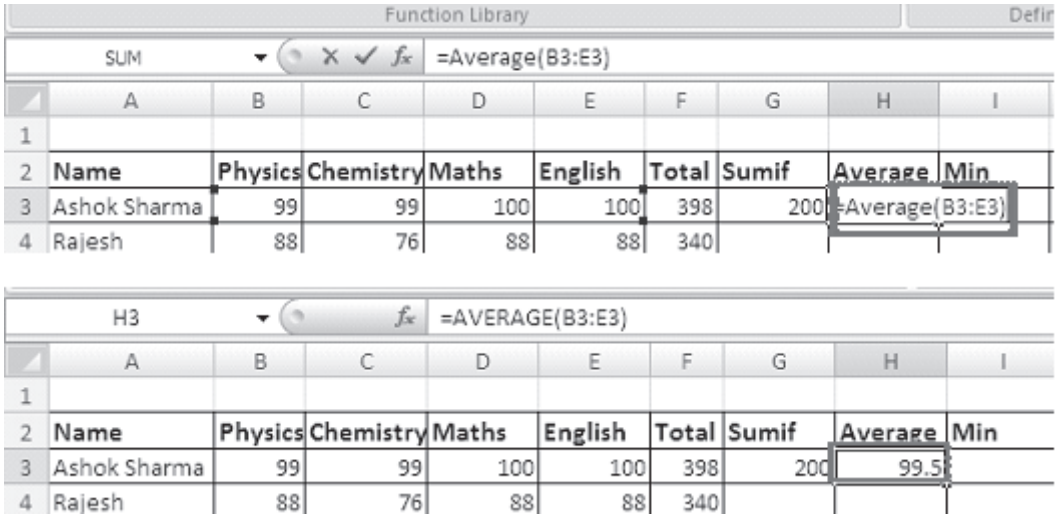


Fig. 8.9

Min function ( ) : It helps you to get the minimum of the numbers.Returns the smallest number in a set of values. Syntax MIN(number1,number2,...)

Maximum number of arguments can be 255 i.e. number1, number2 ... number255

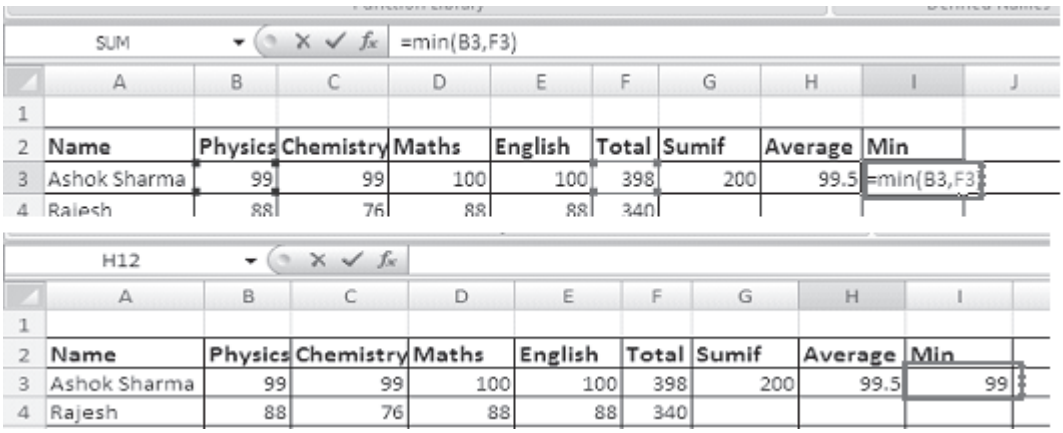


Fig. 8.10

Max function ( ) : It helps you to get the maximum of the numbers. Returns the largest number in a set of values. Syntax MAX(number1,number2,...)

Maximum number of arguments can be 255 i.e. number1, number2 ... number255.

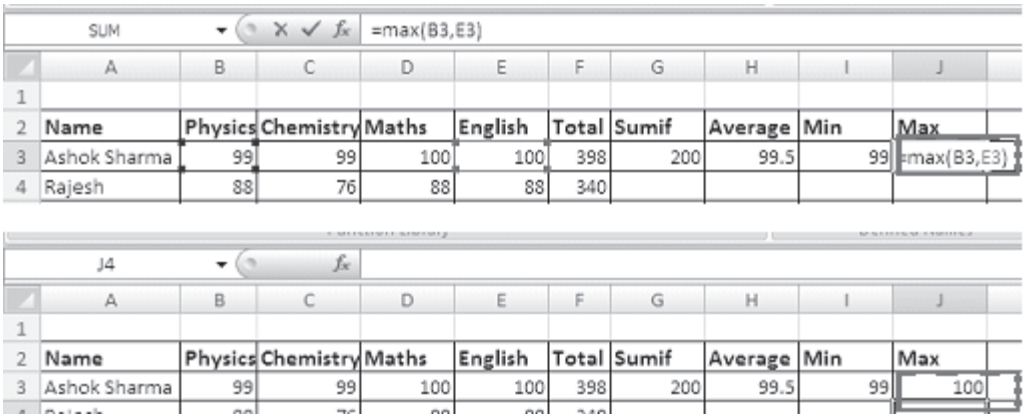
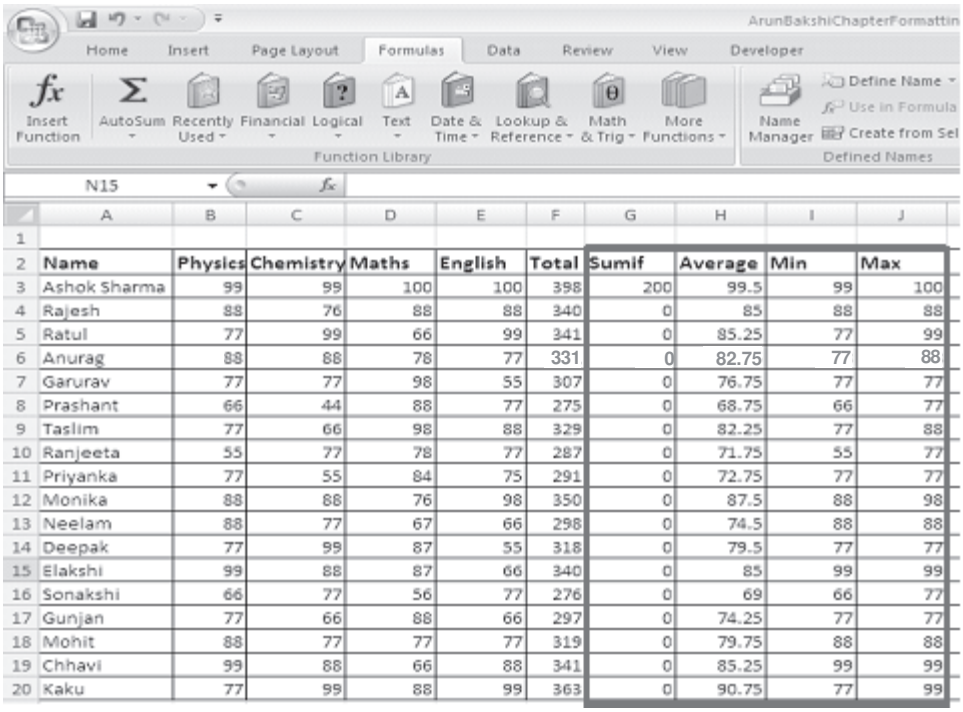


Fig. 8.11

Now drag the handle of cells G3,H3,I3,J3 to cover each row of the respective column. You can see the corresponding functions are automatically copied in the respective columns and automatically values are calculated. See the figure below.



	Name	Physics	Chemistry	Maths	English	Total	Sumif	Average	Min	Max
3	Ashok Sharma	99	99	100	100	398	200	99.5	99	100
4	Rajesh	88	76	88	88	340	0	85	88	88
5	Ratul	77	99	66	99	341	0	85.25	77	99
6	Anurag	88	88	78	77	331	0	82.75	77	88
7	Garurav	77	77	98	55	307	0	76.75	77	77
8	Prashant	66	44	88	77	275	0	68.75	66	77
9	Taslim	77	66	98	88	329	0	82.25	77	88
10	Ranjeeta	55	77	78	77	287	0	71.75	55	77
11	Priyanka	77	55	84	75	291	0	72.75	77	77
12	Monika	88	88	76	98	350	0	87.5	88	98
13	Neelam	88	77	67	66	298	0	74.5	88	88
14	Deepak	77	99	87	55	318	0	79.5	77	77
15	Elakshi	99	88	87	66	340	0	85	99	99
16	Sonakshi	66	77	56	77	276	0	69	66	77
17	Gunjan	77	66	88	66	297	0	74.25	77	77
18	Mohit	88	77	77	77	319	0	79.75	88	88
19	Chhavi	99	88	66	88	341	0	85.25	99	99
20	Kaku	77	99	88	99	363	0	90.75	77	99

Fig. 8.12

To use more functions

- Select Formula Tab
- Choose AutoSum from function library group, from formula ribbon
- Click on More Functions... as shown below.

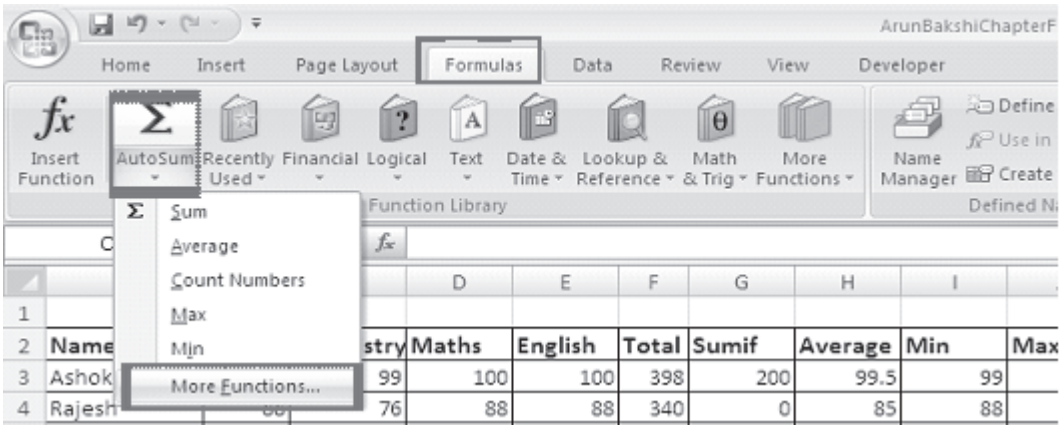


Fig. 8.13

When you click on more functions, a dialog box will appear as shown below. You can choose a function as per your need by the help of following dialog box.

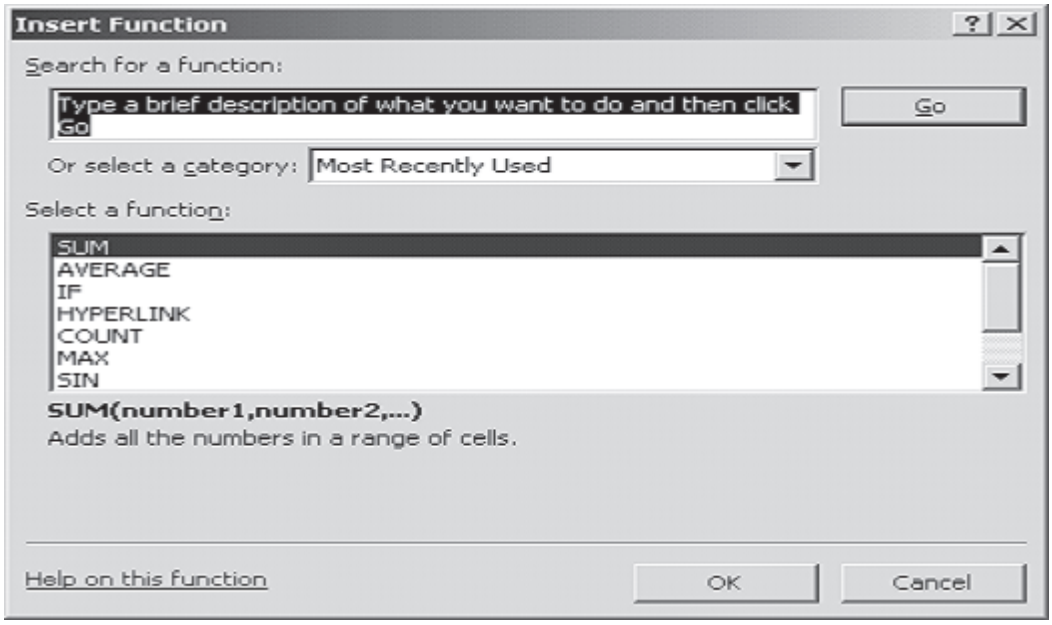


Fig. 8.14

8.4 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. This section explains how you can create simple charts from the data. Formatted charts come in various types for diverse goals, ranging from columns to pies, from lines to surfaces, etc.

8.4.1 Types of Chart

Microsoft Office Excel 2007 provides various types of charts to help you to display data in different ways as per the need of the viewers. You can create a new chart or can change the existing chart, from the wide range of chart subtypes available for each type of available chart types as given below

Column Charts

This type of chart is used to compare values across categories. They give very effective results to analyze the data of the same category on a defined scale.

Line Charts

Data represented in columns or rows in a worksheet can be plotted with the help of line chart. Line charts can be used to display continuous data over time with respect to a common scale. Thus Line Charts are best suitable for viewing data trends at equal intervals of time. The horizontal axis is used to represent the category data and all the value data is distributed uniformly along the vertical axis.

Pie charts

In a situation where one has to show the relative proportions or contributions to a whole, a pie chart is very useful. In case of pie chart only one data series is used. Small number of data points

adds more to the effectiveness of pie charts. Generally there should be maximum five or six data points or slices in a pie chart. If the points are more in number then it becomes very difficult to interpret the chart.

Also, it is very important to note that the values of to be used in the pie chart must be all positive. If there are some negative values, in that case the negative values will be automatically converted in to positive values, this will be desired.

Bar Charts

Bar charts are used to show comparisons between individual items. To make a bar chart the data should be arranged in the form of rows and columns on a worksheet.

Area Charts

The data which is arranged in the form of rows or columns on a worksheet can be plotted in an area chart. Area charts are used to highlight the degree of a change over time. Area charts are also used to draw attention to the total value across a trend.

XY (Scatter) charts

XY charts are also known by other names like scatter grams or scatter plots. The point of difference between XY charts and other types of charts is that in XY charts both axes display values i.e. they have no category axis. Such type of charts is generally used to show the relationship among two variables.

Stock charts

Stock chart can be used to plot data arranged in columns or rows in a particular order on a worksheet. As the name is self explanatory, this chart is used to demonstrate the fluctuations with respect to stock market prices. Even scientific data can be

plotted by stock chart, e.g., the fluctuation of daily or periodic temperature. The data must be arranged in a correct order to generate stock charts. Say, for example to make a simple high-low-close stock chart one should organize his/her data with High, Low and Closed entered as the headings of the columns in the respective order.

Surface charts

Such type of chart is used in situations where both categories and data series are numeric values. This type of chart is useful in situations where the optimum combinations are found among the two sets of data. Data should be arranged in columns or rows in a worksheet can be plotted in s surface chart. The colors and patterns indicate the areas which are in the same range of set of values, as it happens in case of a topographic map.

Doughnut charts

The conditions to draw doughnut charts is that the data has to be in the form of rows or columns. As in the case of a pie chart, the doughnut chart illustrate the relationship of parts to a whole, but it is able to get more than one data series.

Bubble charts

A bubble chart can be used to plot the data values which are arranged in the columns of a worksheet so that x values are listed in the first column and matching y values and bubble size values are listed in adjacent columns.

Radar charts

The radar charts compare the aggregate values of a number of data series. Radar chart can be plotted with the data which is arranged in columns or rows on a worksheet.

8.4.2 Components of a Chart

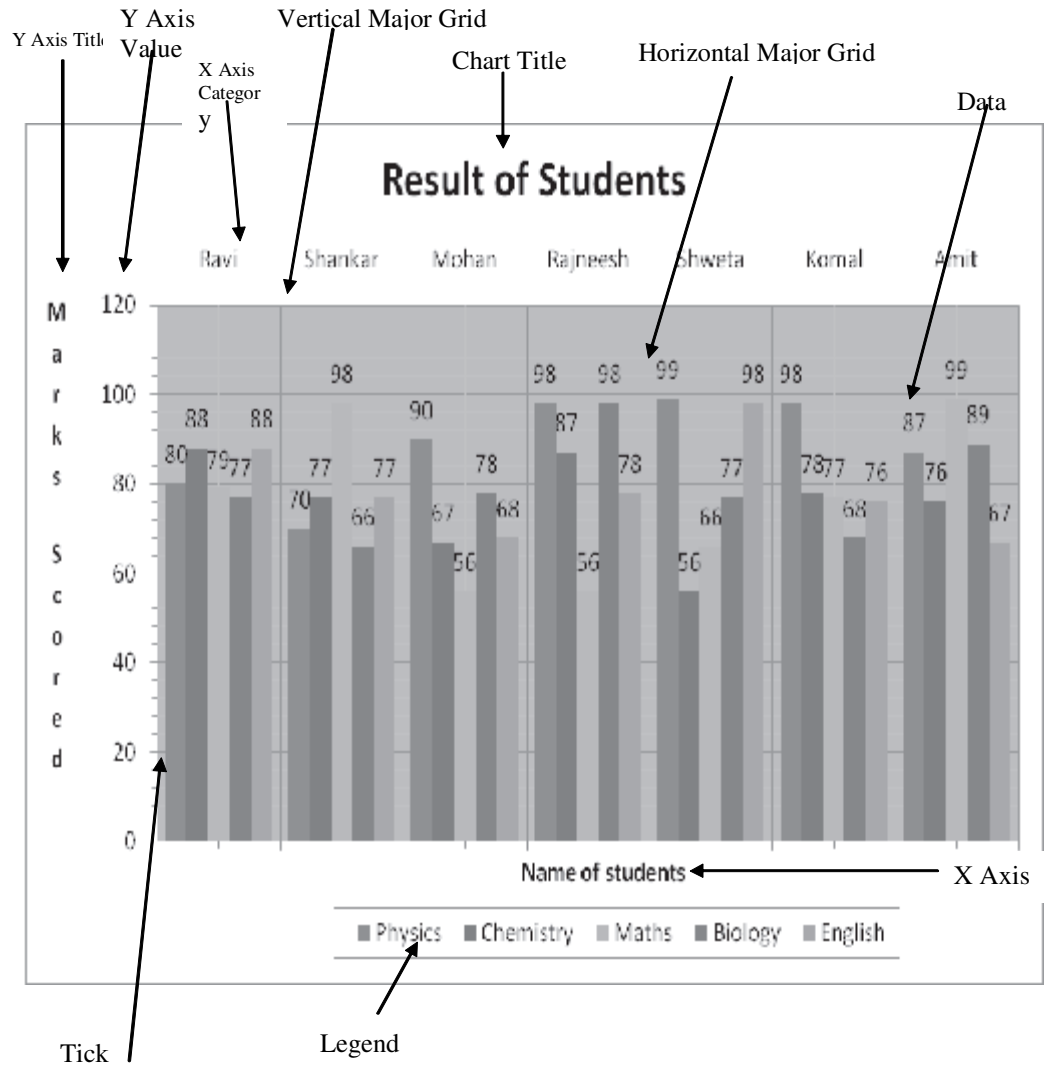


Fig. 8.15

Chart Title - A title given to the whole chart.

X-Axis Title - A title given to the X-axis data range.

Y-Axis Title - A title given to the Y-axis data range.

X-Axis Category - These are the categories of the data which have been plotted. These are taken from the first column or first row of your data range.

Y-Axis Value - This is the data range marked to plot the data series.

Data Labels - The values of the data series plotted.

Legends - Specifies the colour, symbol or pattern used to mark data series.

Tick Mark - These marks are used to show the scaling of X-axis and Y-axis.

Grid Lines - Displays lines at the major intervals on the category (x) axis and/or Y-axis

How to Draw a Chart in Excel 2007

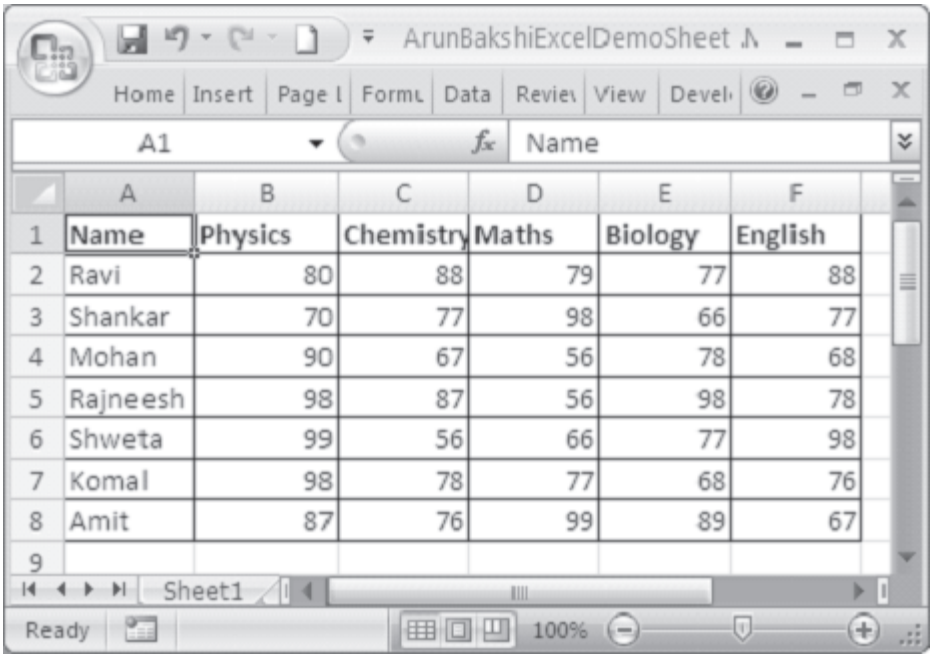
In Microsoft Excel 2007 chart wizard is removed and also not brought back in Excel 2010 also. Instead the ribbon is provided as a new place to get your chart related needs full filled. The buttons on the Insert tab of the ribbon are just the starting point to make a chart. After we get the ribbon it becomes very simple to start making a chart. Whenever we click on some component of chart, we observe that the Chart Tools are displayed to the ribbon. Three additional tabs which provide a variety of chart design, layout and formatting options, will also be added.

First, the Layout tab, is used to add all sorts of elements related to chart or change the way they are shown in the chart. Second, the format tab is used to apply special effects which were not available in the earlier versions of the Excel, such as the bevel effect etc. It may be little difficult to be acquainted with this new type of chart interface, but once you start working, you'll be proud to show off your professional looking results.

It is worth mentioning that you can right click on an element of the chart for quick access to specific features with respect to that particular element e.g. if you right click on any chart axis, you will get Format Axis dialog box.

Following steps are given to draw a Chart

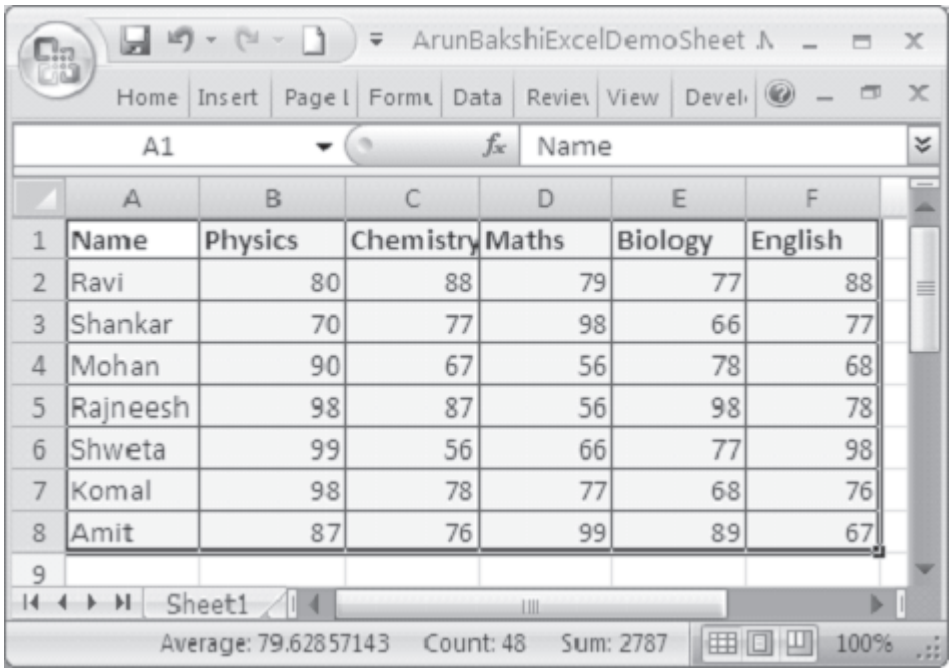
1. Enter data in the work sheet: Suppose you entered data as given in Fig. 8.16.



	A	B	C	D	E	F
1	Name	Physics	Chemistry	Maths	Biology	English
2	Ravi	80	88	79	77	88
3	Shankar	70	77	98	66	77
4	Mohan	90	67	56	78	68
5	Rajneesh	98	87	56	98	78
6	Shweta	99	56	66	77	98
7	Komal	98	78	77	68	76
8	Amit	87	76	99	89	67
9						

Fig. 8.16

2. Now select data range: By using the mouse high light the range of data you want to take (see Fig. 8.17).



	A	B	C	D	E	F
1	Name	Physics	Chemistry	Maths	Biology	English
2	Ravi	80	88	79	77	88
3	Shankar	70	77	98	66	77
4	Mohan	90	67	56	78	68
5	Rajneesh	98	87	56	98	78
6	Shweta	99	56	66	77	98
7	Komal	98	78	77	68	76
8	Amit	87	76	99	89	67
9						

Fig. 8.17

3. Click Insert Tab and select a chart type from the chart group

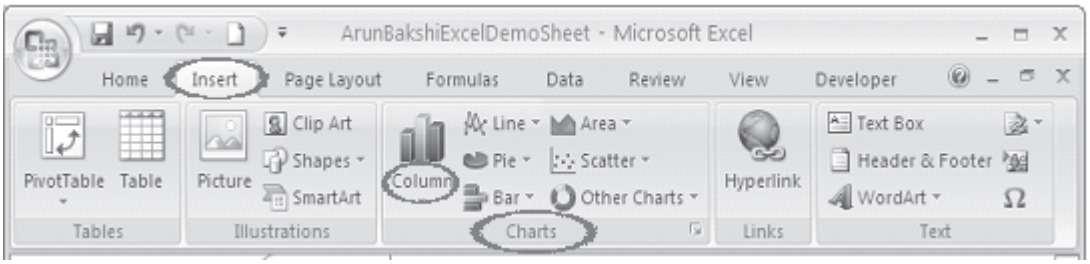


Fig. 8.18

4. Select the sub type of chart

Fig. 8.19

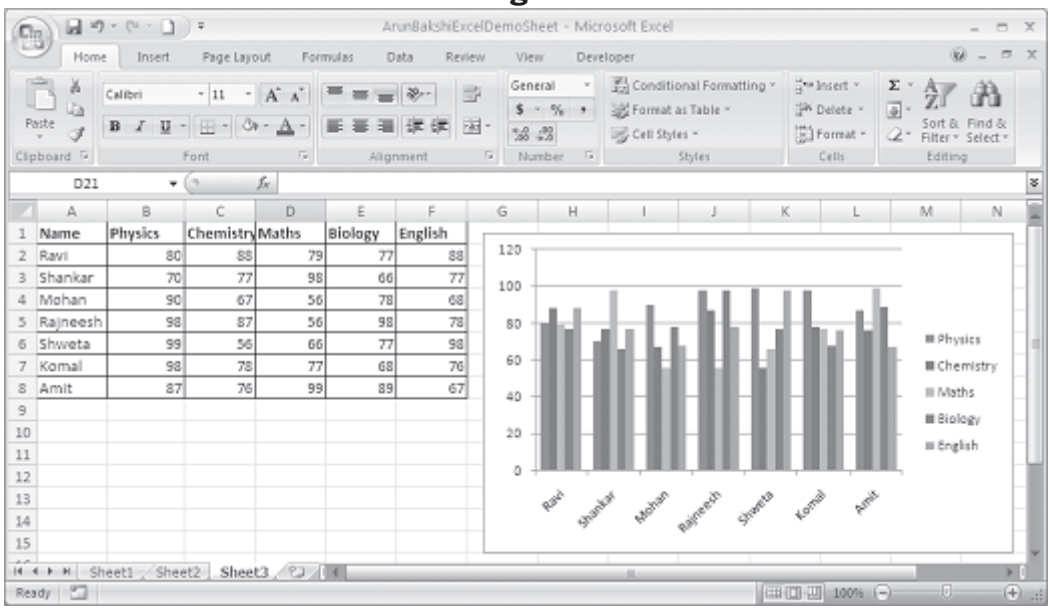


Fig. 8.20

5. Select the Title of the chart

   a. To give a title to a chart, click on the chart. Now you can see layout tab available. Click on Layout tab.

   b. Choose(click) on chart title option available in the Label group

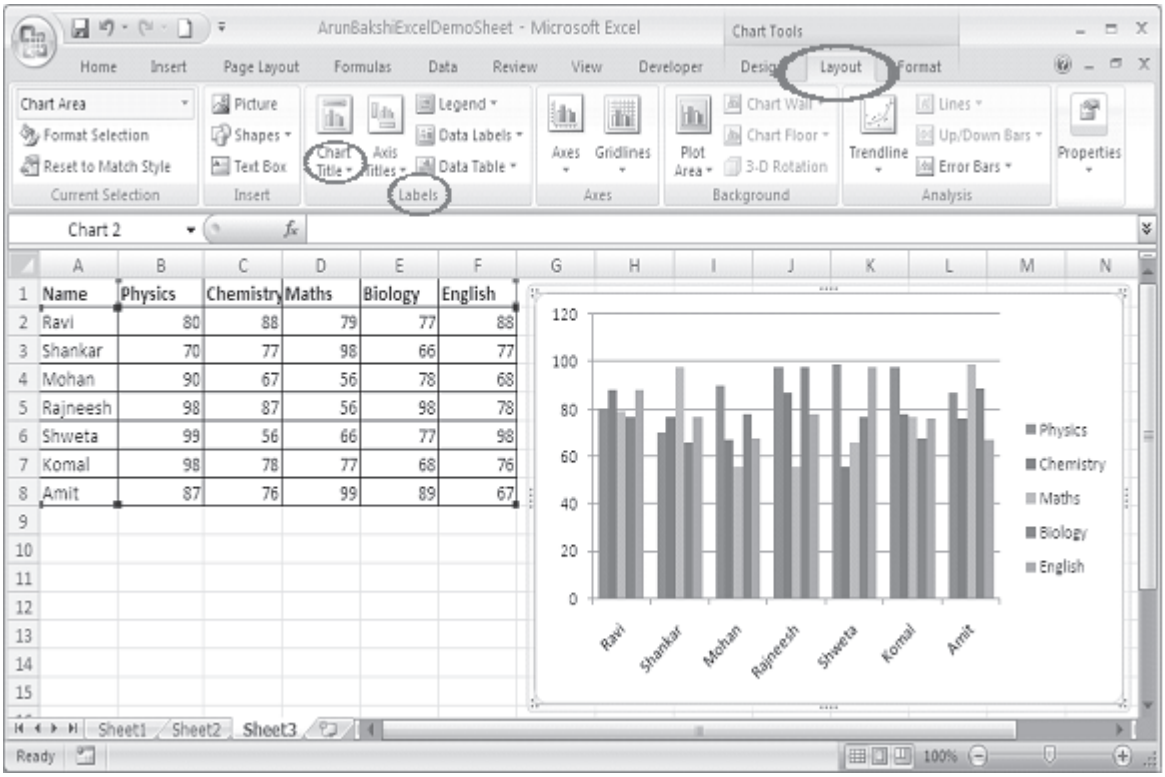


Fig. 8.21

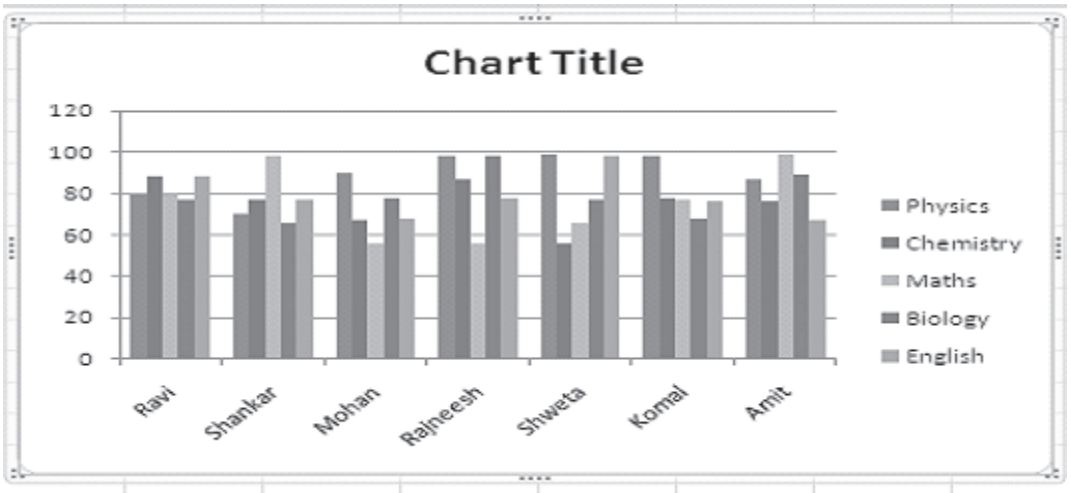


Fig. 8.22

c. Click on the chart title and write a title.

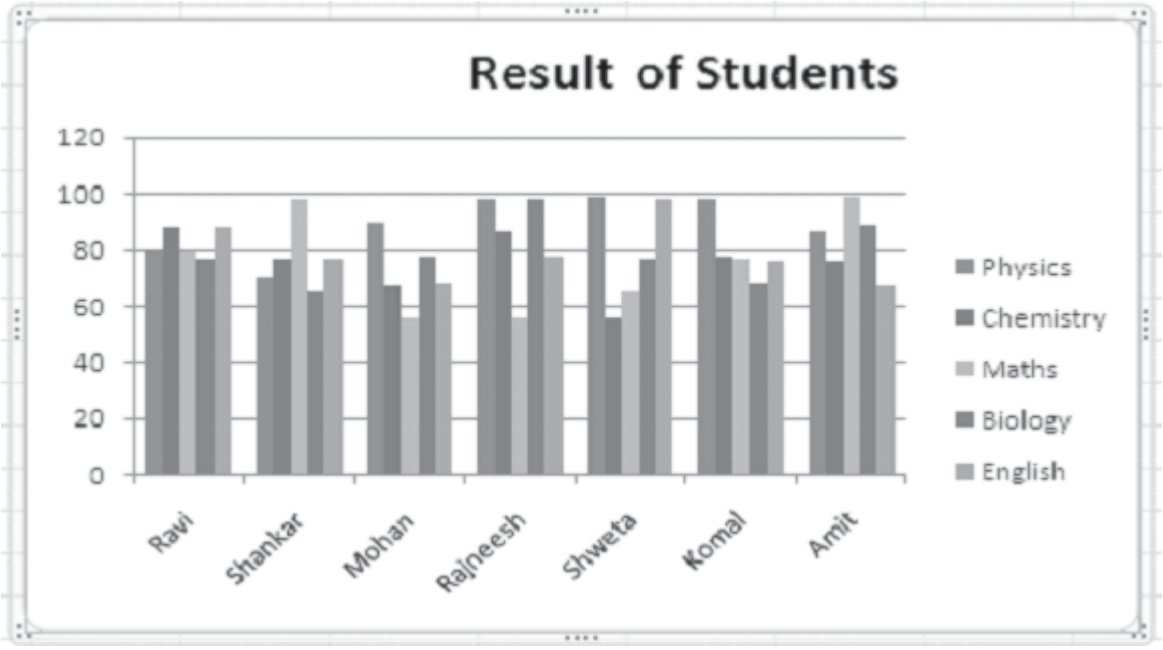


Fig. 8.23

6. Give a name to X-Axis

Click on Layout tab. Then select Axis Titles from Labels Group. Select Primary Horizontal Axis Title, as shown below.

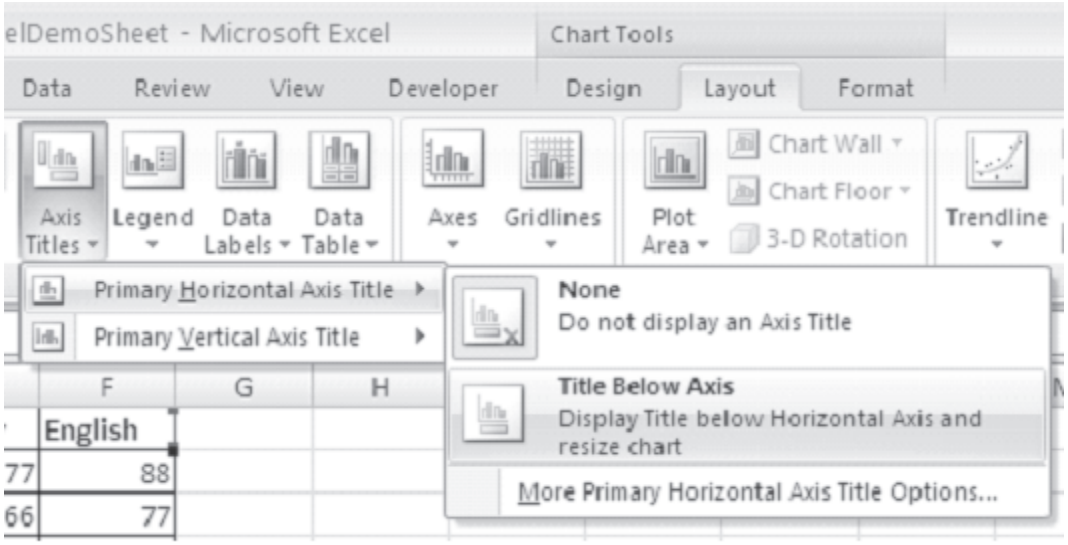


Fig. 8.24

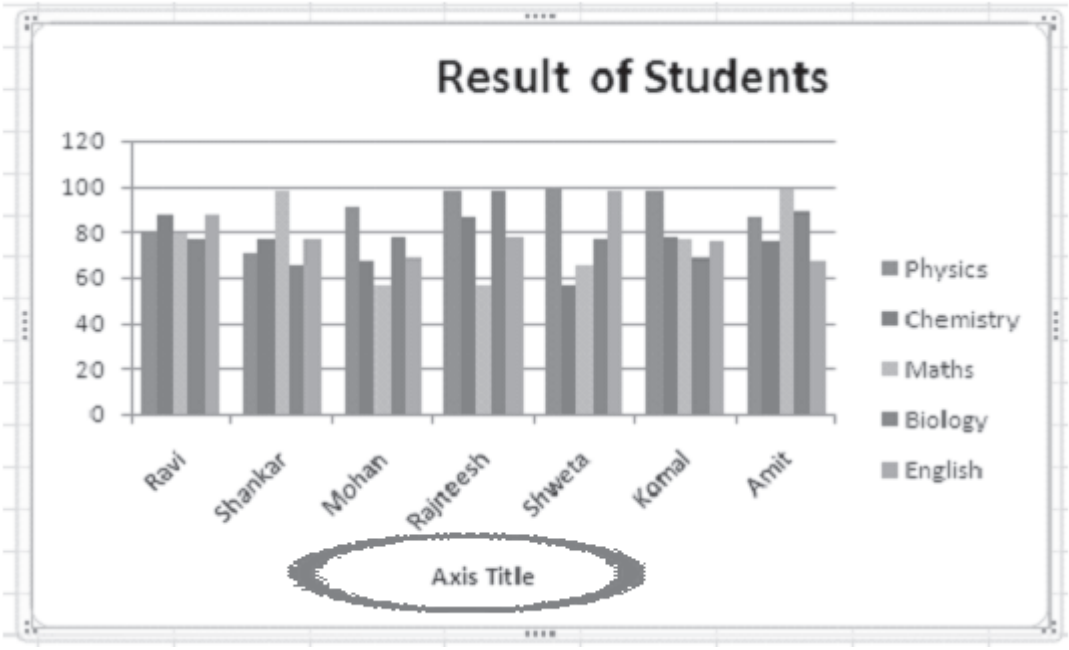


Fig. 8.25

Now, click on the Axis Title and write an X-axis title.

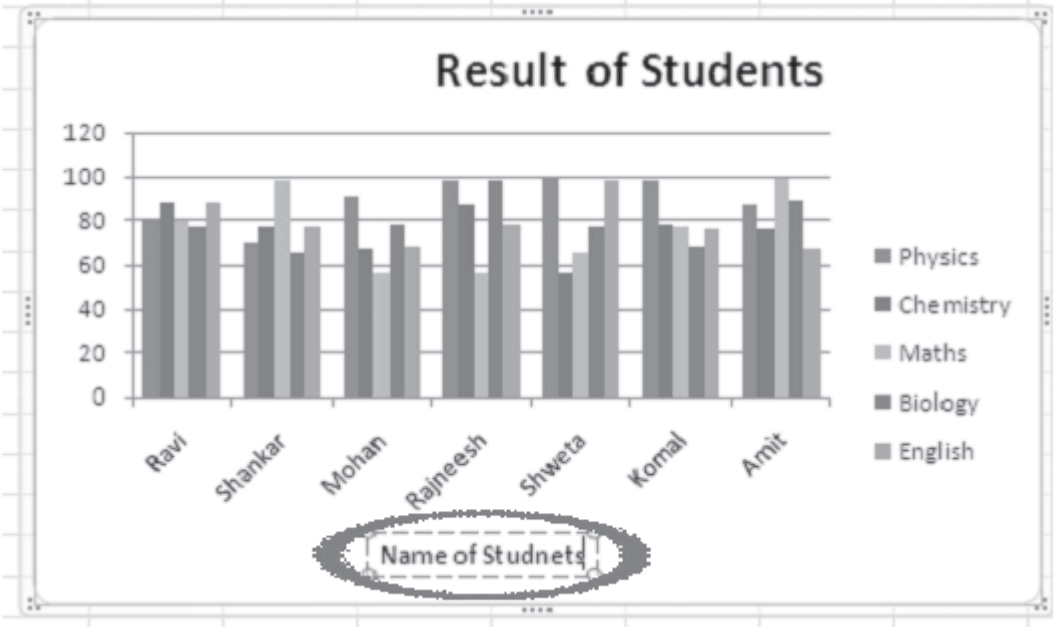


Fig. 8.26

Follow the same steps to give a title to Y-axis.

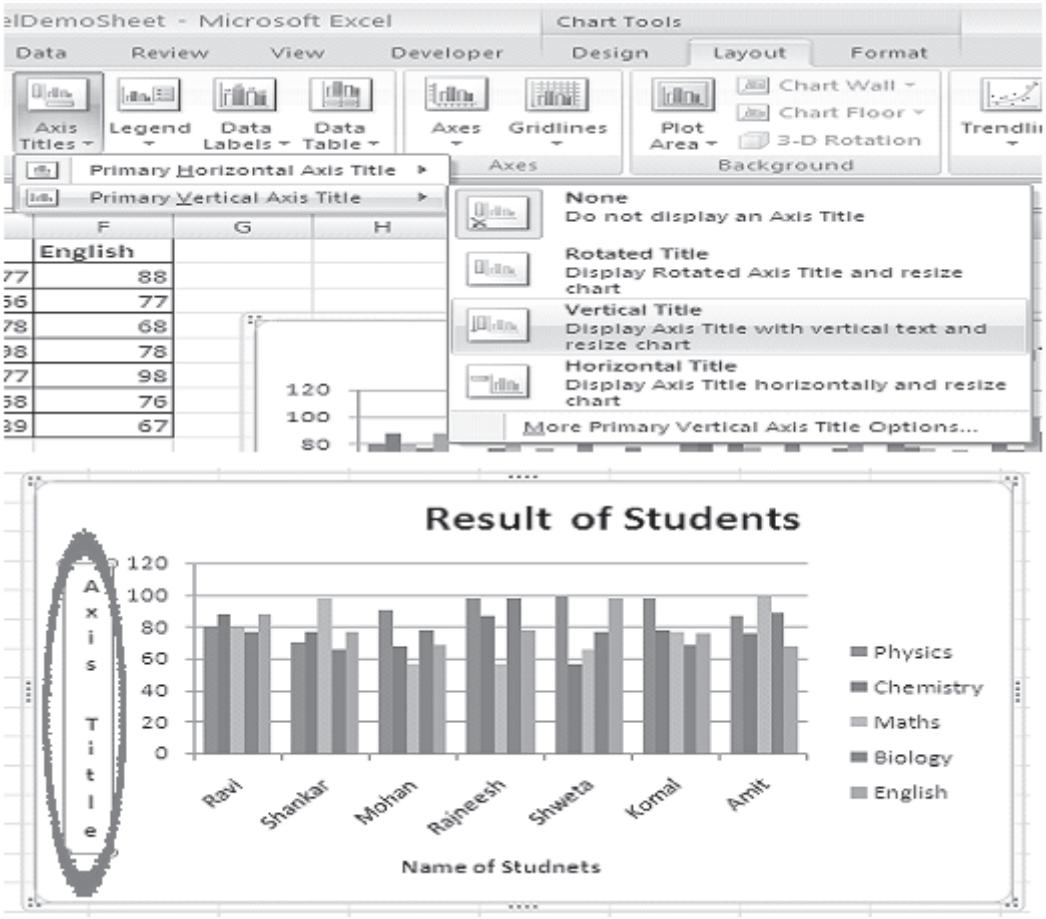


Fig. 8.27

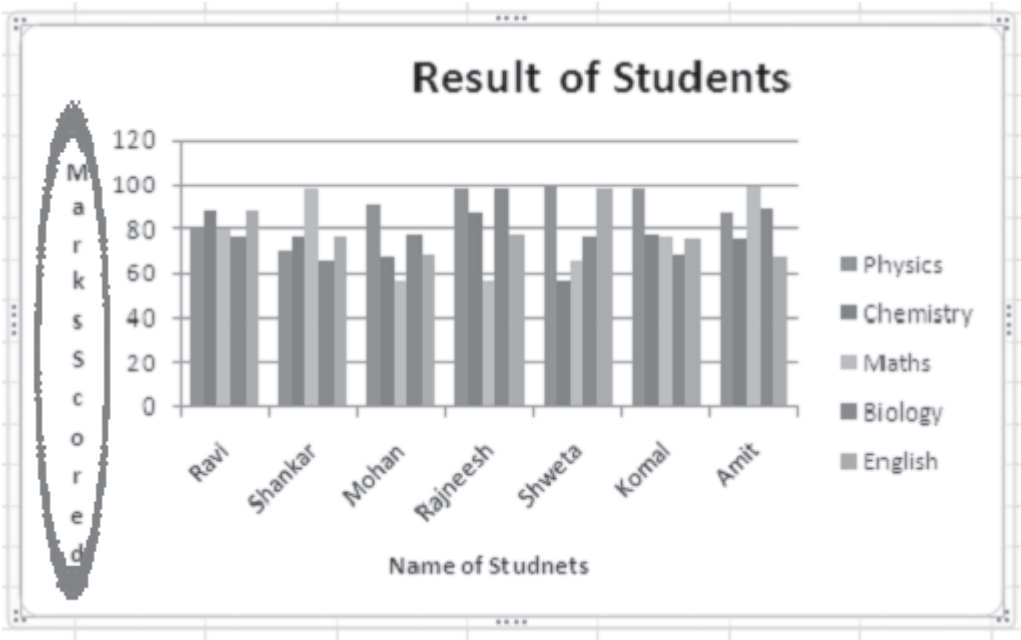


Fig. 8.28

Editing of a Chart

1. **How to change the legend position**

Click on Layout tab. Then click on Legend option available in Labels Group.

Now choose a position to show legend.

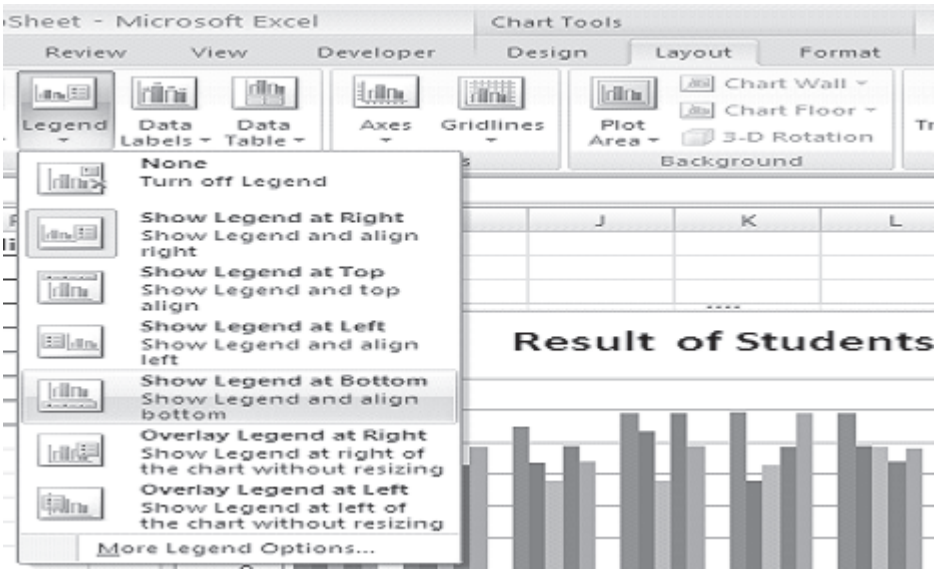


Fig. 8.29

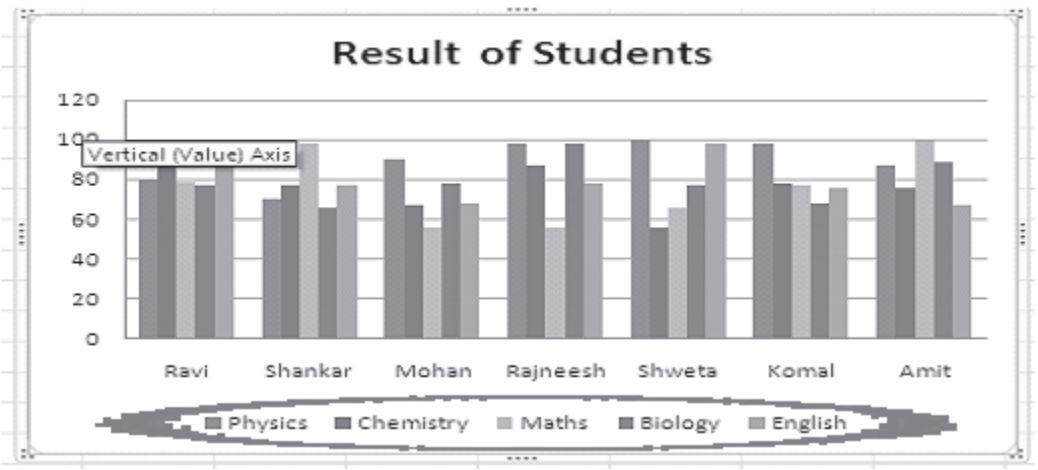


Fig. 8.30

2. **How to change the position of the Data Labels**

Click on Layout tab. Then click on Data Label option available in Labels Group.

Now choose a format to display data labels

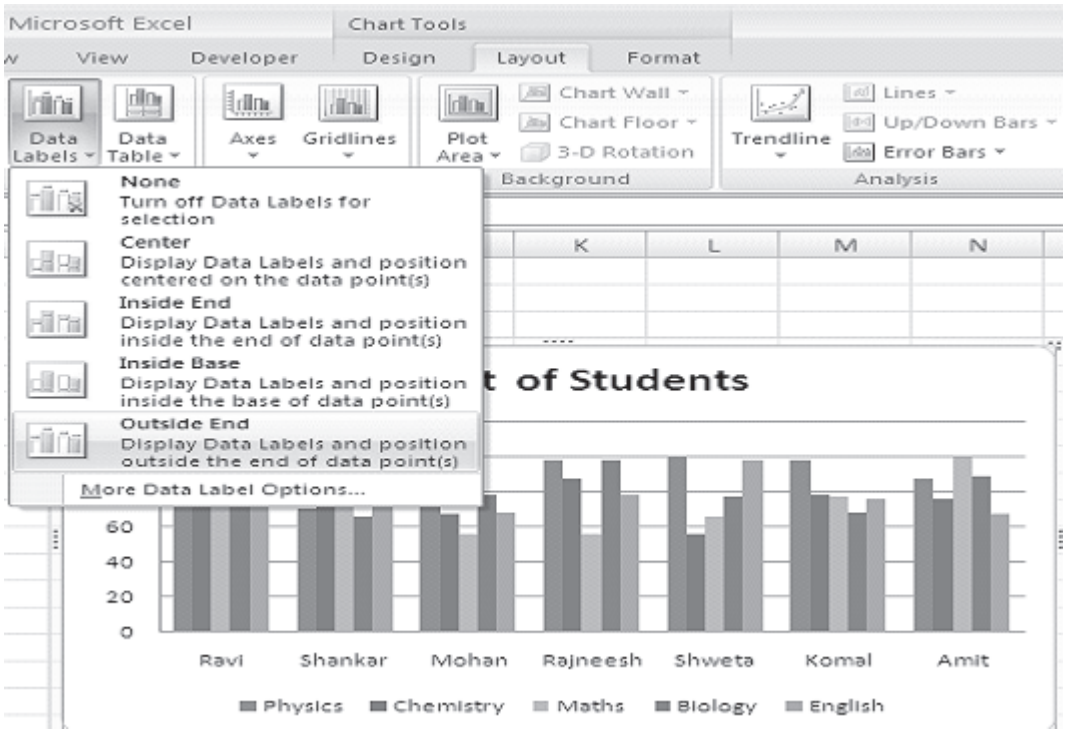


Fig. 8.31

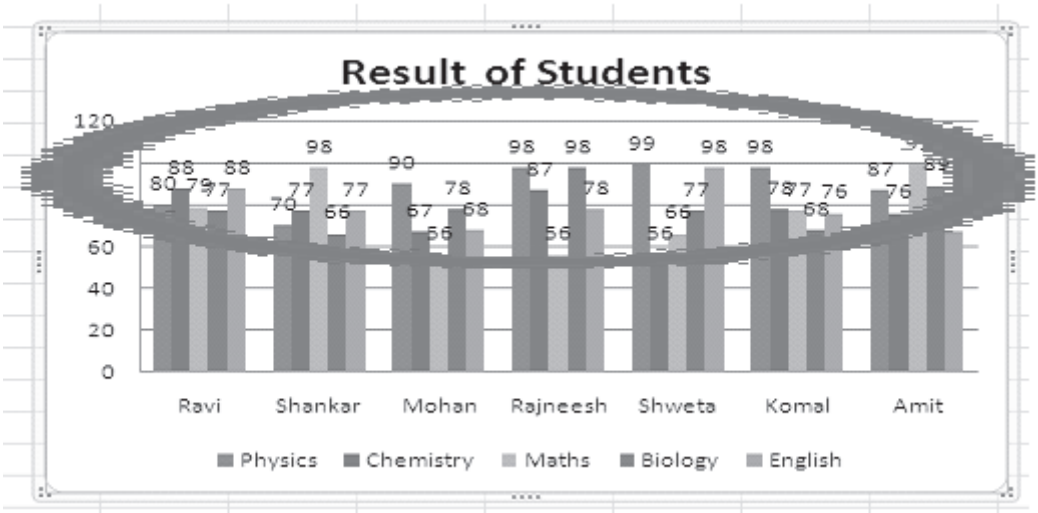


Fig. 8.32

3. **How to show Data Tables Along with Chart, with or without Legend Keys**

Click on Layout tab. Then click on Data Table option available in Labels Group.

Now choose a style to display data table

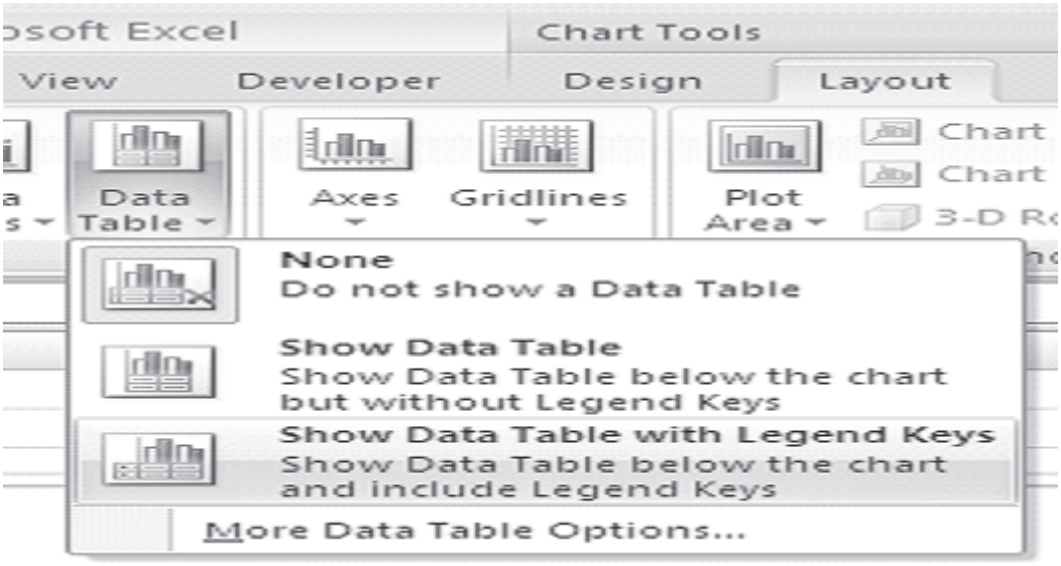


Fig. 8.33

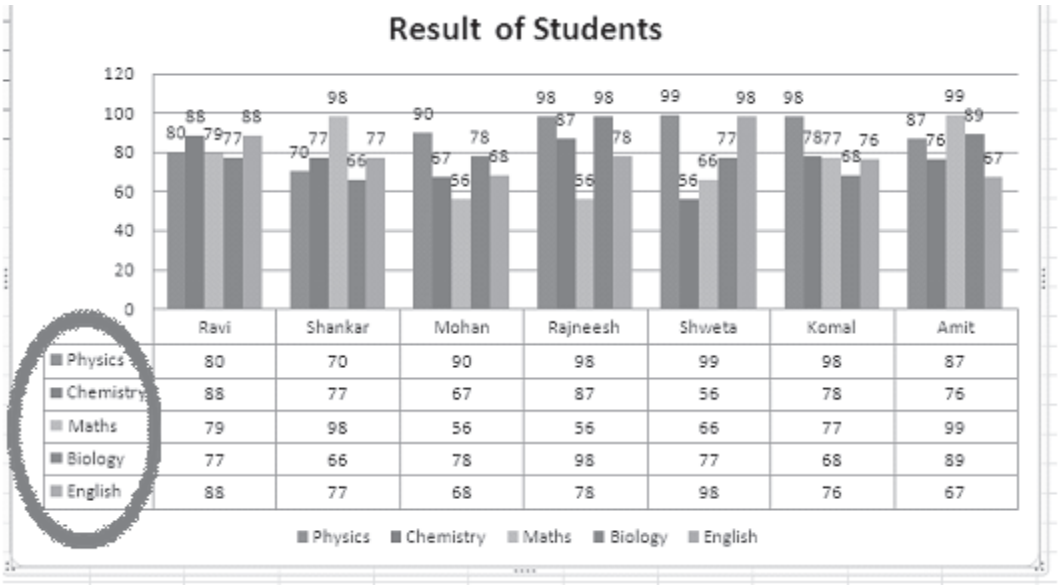


Fig. 8.34

Above diagram show the data table with legend option.

4. **How to Hide/Unhide Grid Lines** (Horizontal and Vertical)

   Click on Layout tab. In the Axis Group, click on Gridlines option then choose Primary Horizontal Grid Lines. Now select appropriate style from the available options (None, Major Gridlines, Minor Gridline, Major and Minor Gridlines)

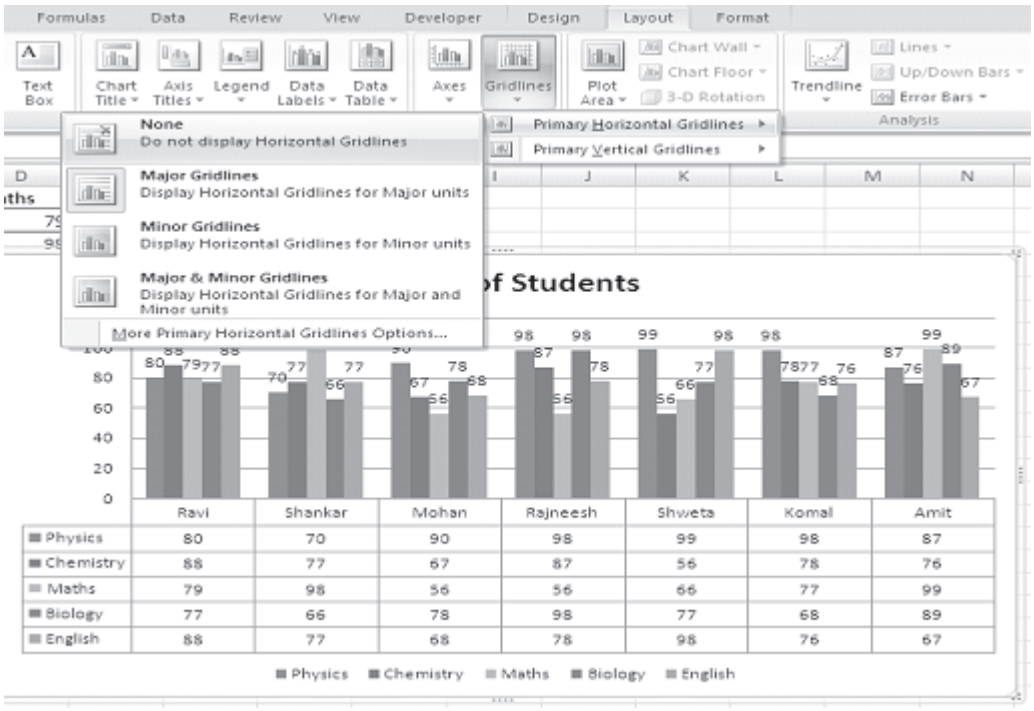


Fig. 8.35

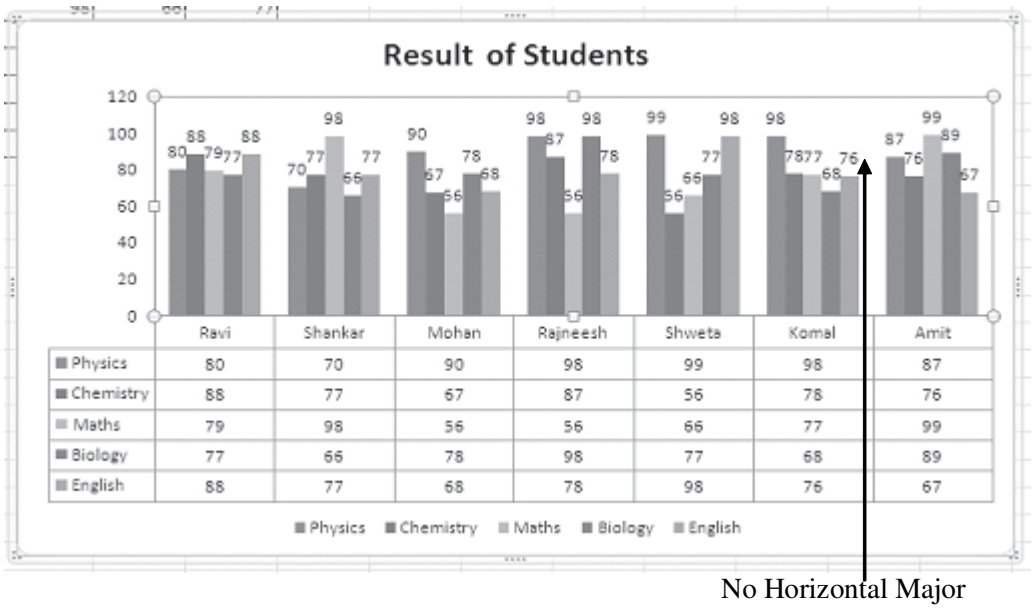
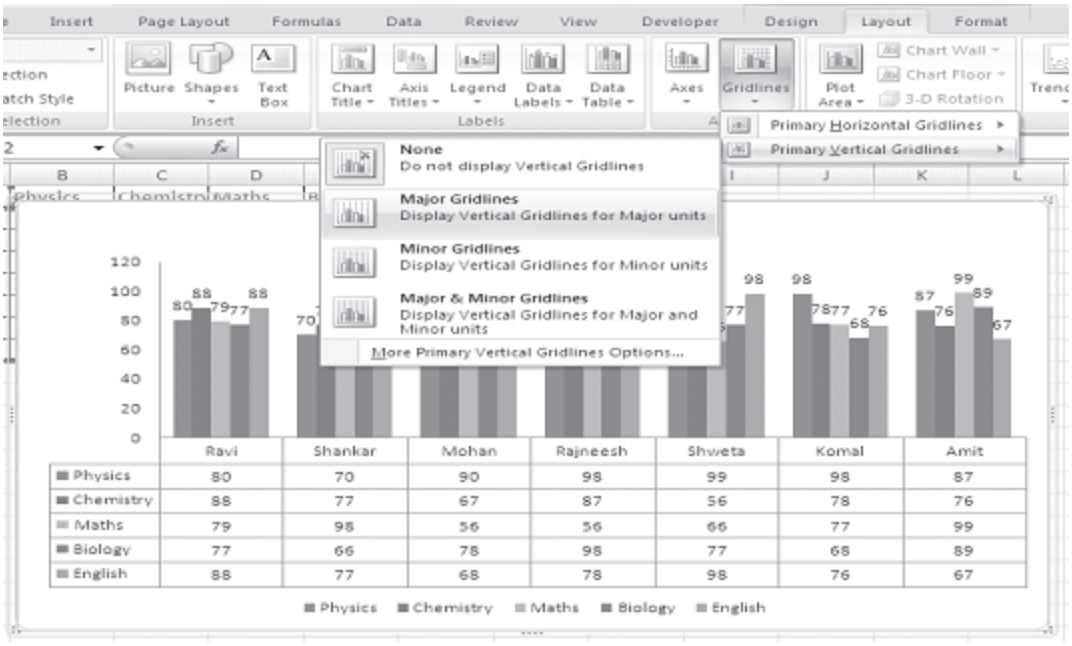


Fig. 8.36

Follow the same steps for Vertical Grid Lines also, as shown below.

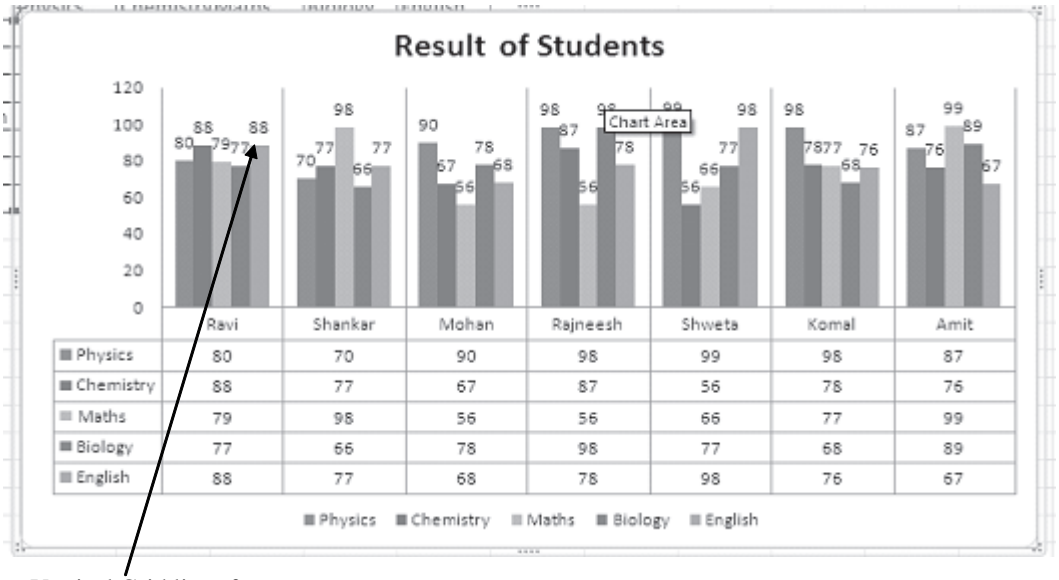
a) Click on Layout tab. In the Axis Group, click on Gridlines option then choose Primary Vertical Grid Lines.

b) Now select appropriate style from the available options (None, Major Gridlines, Minor Gridline, Major and Minor Gridlines)



	Ravi	Shankar	Mohan	Rajneesh	Shweta	Komal	Amit
Physics	80	70	90	98	99	98	87
Chemistry	88	77	67	87	56	78	76
Maths	79	98	56	56	66	77	99
Biology	77	66	78	98	77	68	89
English	88	77	68	78	98	76	67

Fig. 8.37



Vertical Grid lines for Major Units are added

Fig. 8.38

8.4.3 Resizing the Chart

To resize the chart, click on its border and drag any of the eight black handles to change the size. Handles on the corners will

resize the chart proportionally while handles along the lines will stretch the chart.

8.4.4 Moving the Chart

Select the border of the chart, hold down the left mouse button, and drag the chart to a new location. Elements within the chart such as the title and labels may also be moved within the chart. Click on the element to activate it, and use the mouse to drag the element to move it. Microsoft Excel automatically sizes titles with respect to the size of the text. One can move titles with the mouse but, cannot resize them.

8.4.5 Copying the Chart to Microsoft Word

A finished chart can be copied into a Microsoft Word document or power point slide. Select the chart and click **Copy**. Open the destination document in Word or a slide in power point and click **Paste**.

8.5 GRAPHICS – AUTOSHAPES AND SMART ART

The AutoShapes feature of Excel 2007 allows you to draw a number of geometrical shapes, arrows, flow chart elements, stars, and more on the worksheet.

The steps to activate and use AutoShapes are

1. Click on **Insert Tab.**
2. From Illustrations Group, Click on Shapes

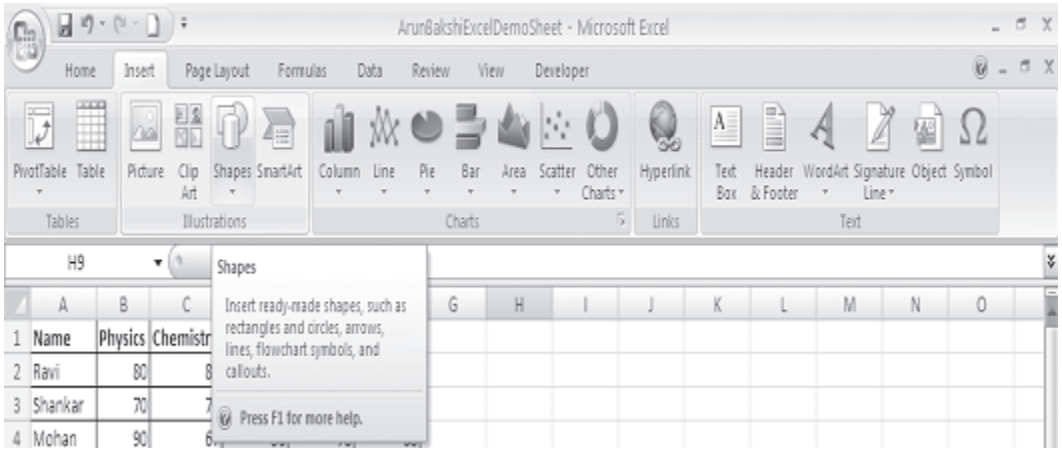


Fig. 8.39

Now Select the which you want to insert.

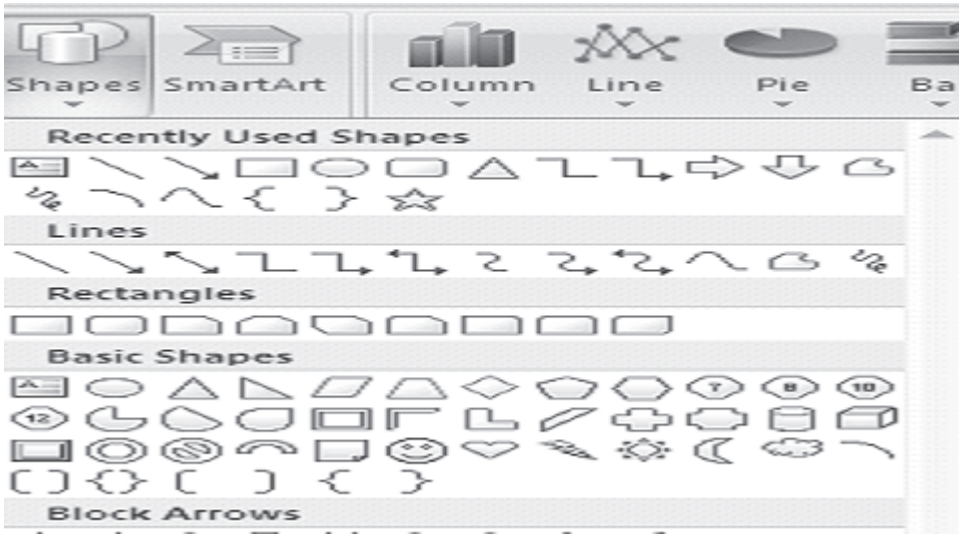


Fig. 8.40

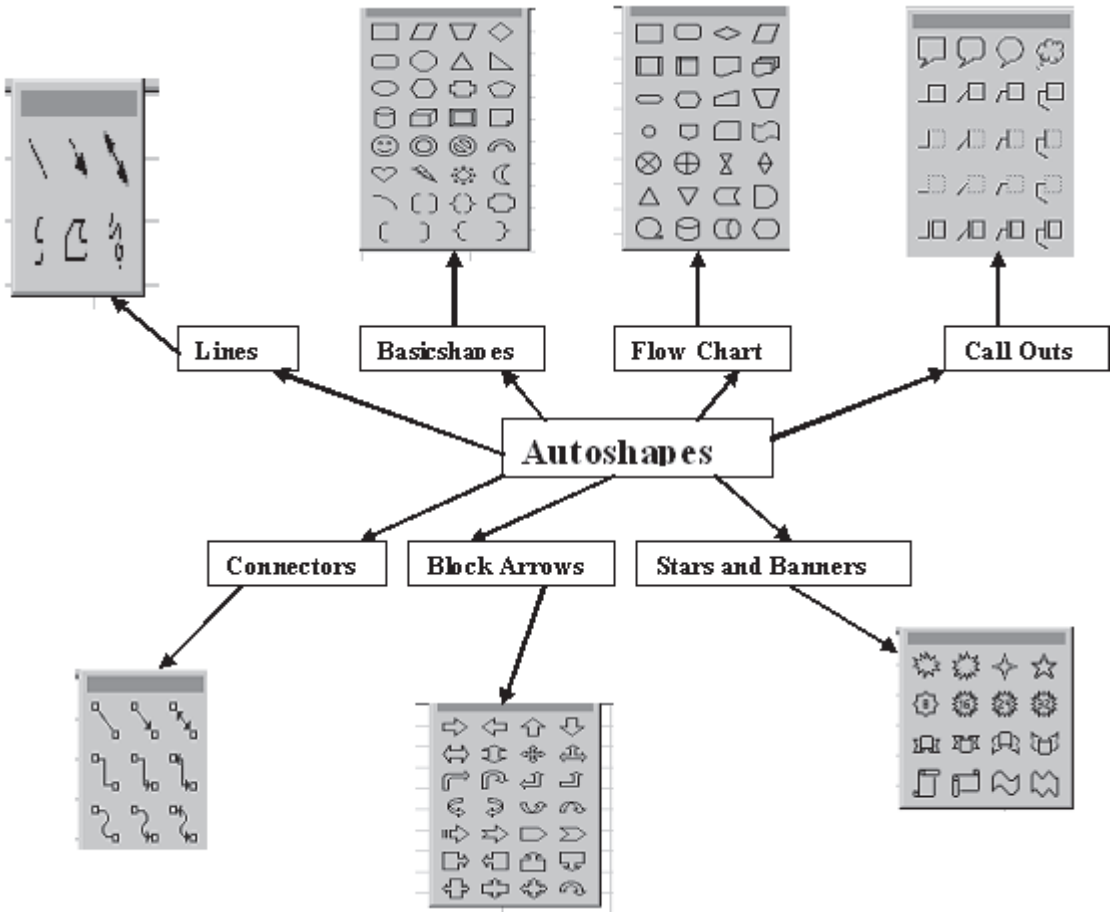


Fig. 8.41

Different categories of AutoShapes available in Excel 2007. We will briefly discuss some of the here.

1. **Lines -** After clicking the Lines button on the AutoShapes toolbar, draw a ***straight line***, ***arrow***, or ***double-ended arrow*** from the first row of options by clicking the respective button. Click in the worksheet where you would like the line to begin and click again where it should end. To draw a ***curved line*** or ***freeform shape***, select curved lines from the menu, click in the worksheet where the line should appear, and click the mouse every time a curve should begin. End creating the graphic by clicking on the starting end or pressing the **ESC** key. To ***scribble***, click the last button in the second row, click the mouse in the worksheet and hold down the left button while you draw the design. Let go of the mouse button to stop drawing.

2. **Connectors** - These lines can be used to connect flow chart elements.

3. **Basic Shapes** - Click the Basic Shapes button on the AutoShapes toolbar to select from many ***two- and three-dimensional shapes***, ***icons***, ***braces***, and ***brackets***. Use the drag-and-drop method to draw the shape in the worksheet. When the shape has been made, it can be resized using the open box handles and other adjustments specific to each shape can be modified using the yellow diamond handles.

4. **Block Arrows -** Select Block Arrows to choose from many types of ***two- and three-dimensional arrows***. Drag-and-drop the arrow in the worksheet and use the open box and yellow diamond handles to adjust the arrowheads.

5. **Flow Chart** - Choose from the flow chart menu to add ***flow chart elements*** to the worksheet and use the lines menu to draw connections between the elements. We have drawn a flowchart using lines, flow chart elements and connectors.

6. **Stars and Banners -** Click the button to select ***stars***, ***bursts***, ***banners***, and ***scrolls***.

7. **Call Outs** - Select from the ***speech and thought bubbles***, and ***line call outs***. Enter the call out text in the text box that is made.

Smart Art Graphics

Visual representation of information and ideas is called SmartArt Graphics. They can be used to quickly, easily and effectively communicate a message. The facility to create a SmartArt Graphic is available in MS Excel 2007. You can copy and paste SmartArt graphics as images into other programs such as Word and Powerpoint.

To create a SmartArt graphic, one has to choose a type for example, Process, Cycle, Hierarchy or Relationship. A type represents a category of SmartArt graphic. Each type is having several different types of layouts.

Steps to Create a SmartArt

1. Click on **Insert Tab.**
2. From Illustrations Group, Click on SmartArt

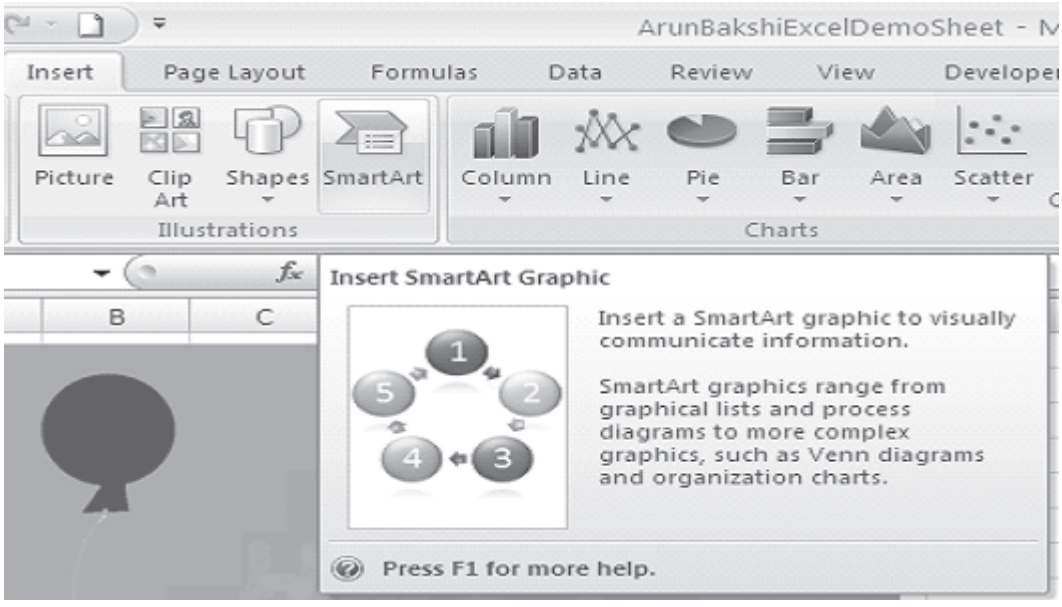


Fig. 8.42

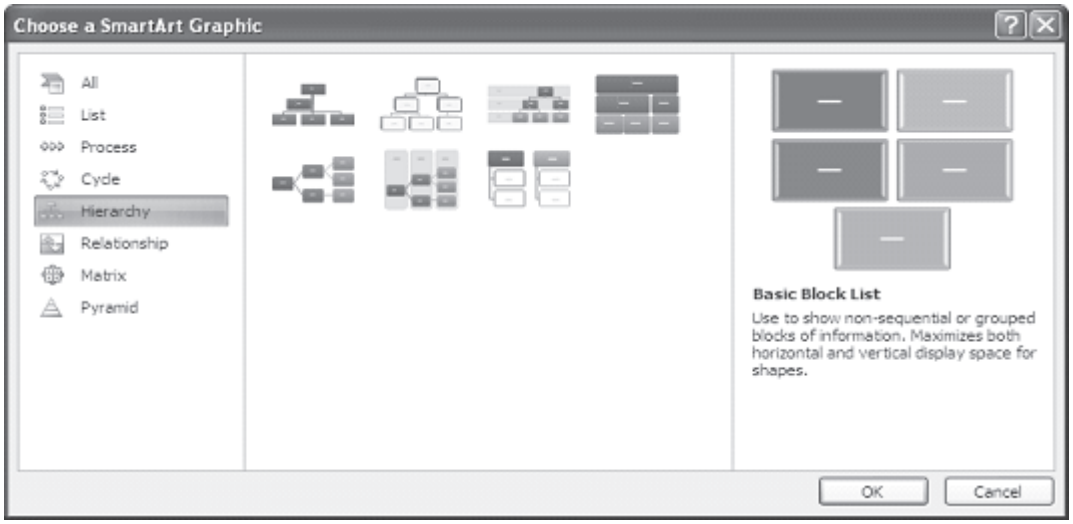


Fig. 8.43

3. Now choose a category (Say Hierarchy) and click OK.

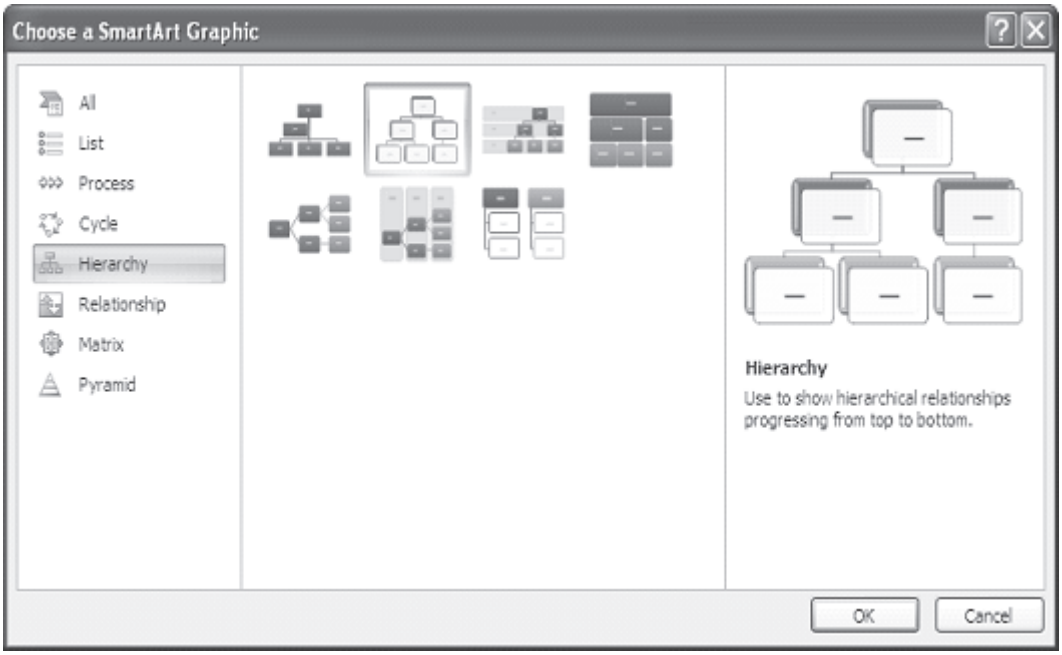


Fig. 8.44

4. Now you can enter the values as shown below. To enter values just click on the component where you want to enter text and write the text.

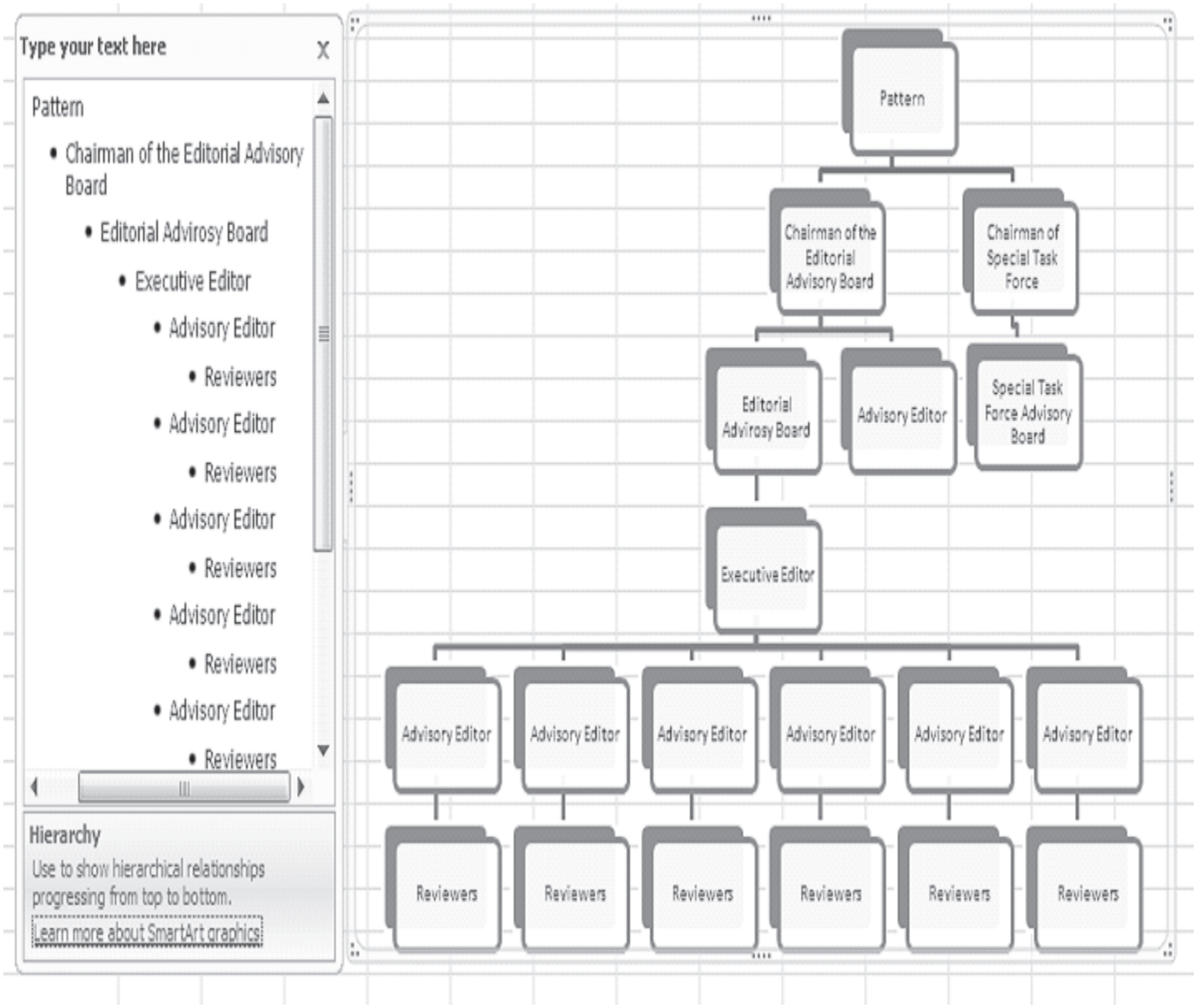


Fig. 8.45

You can apply different effects on the SmartArt, by the help of Design tab. Click on SmartArt. The Design tab will be visible with its ribbon. Select appropriate group from the ribbon and apply the desired effects.

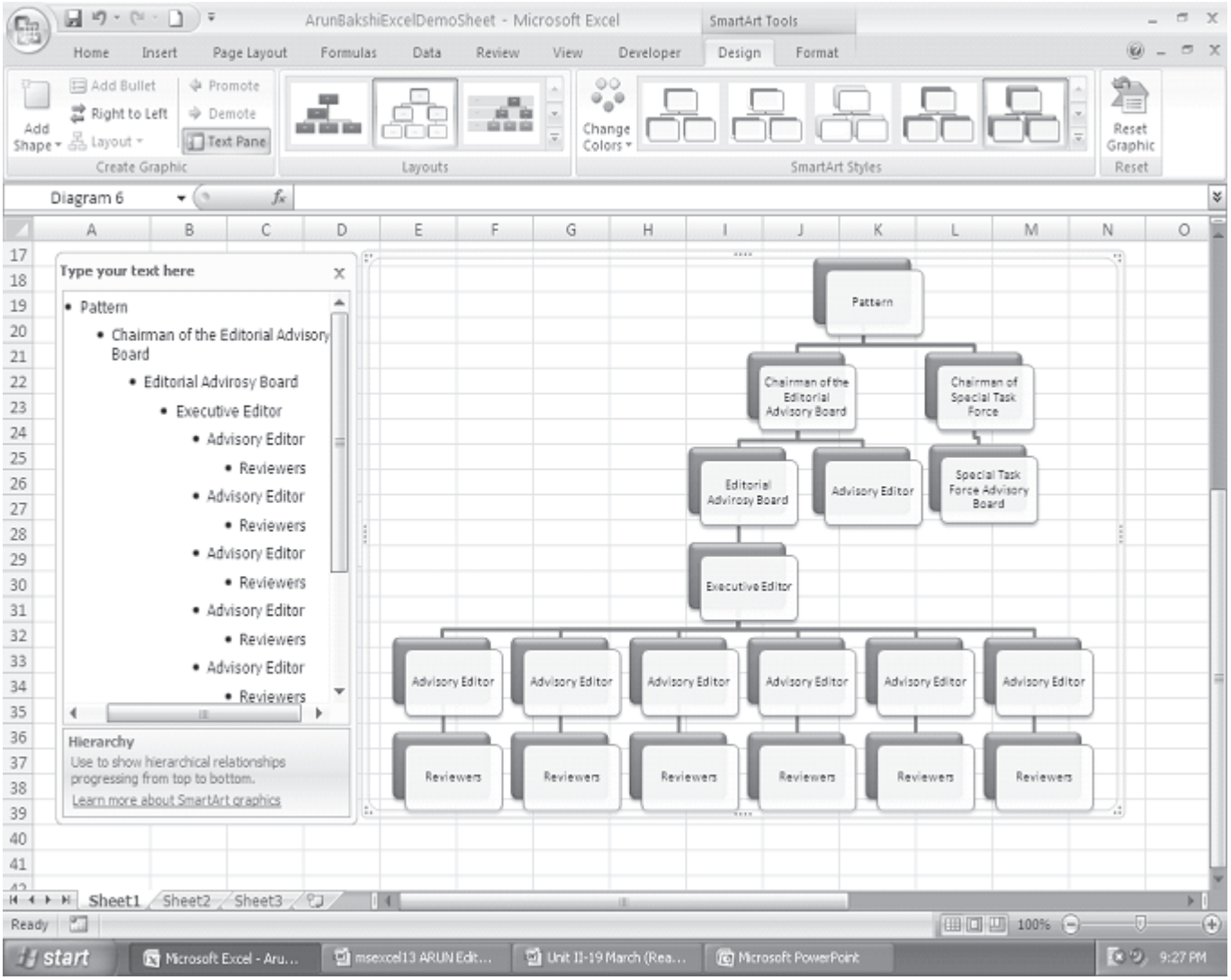


Fig. 8.46

8.5.1 Adding Clip Art

Clip is a single media file, including sound, animation, art or movie.

Steps to insert a Clip Art

1. Click on **Insert Tab.**
2. From Illustrations Group, Click on Clip Art
3. Then Select a Collection and press Go Button
4. Click on a clip from the collection

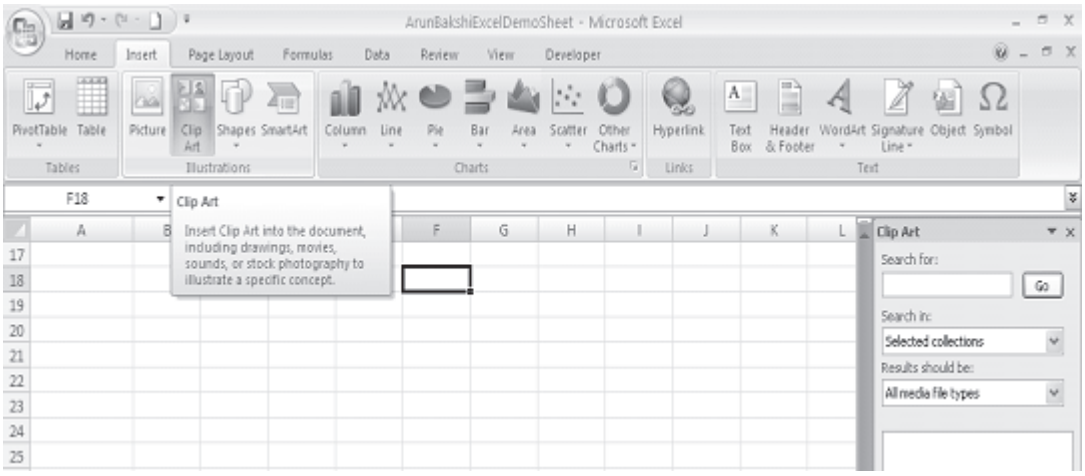


Fig. 8.47

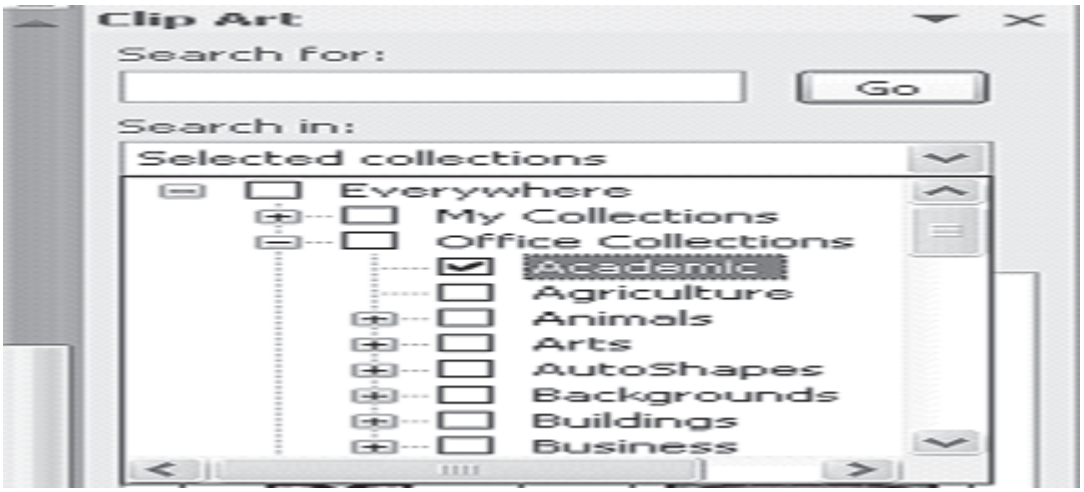


Fig. 8.48

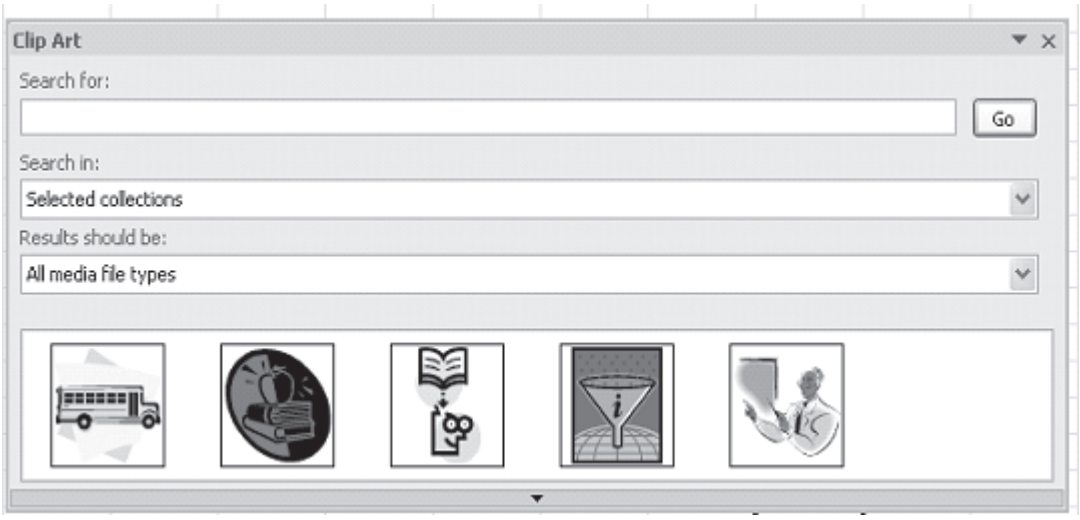


Fig. 8.49

5. Clip will be inserted in the worksheet.

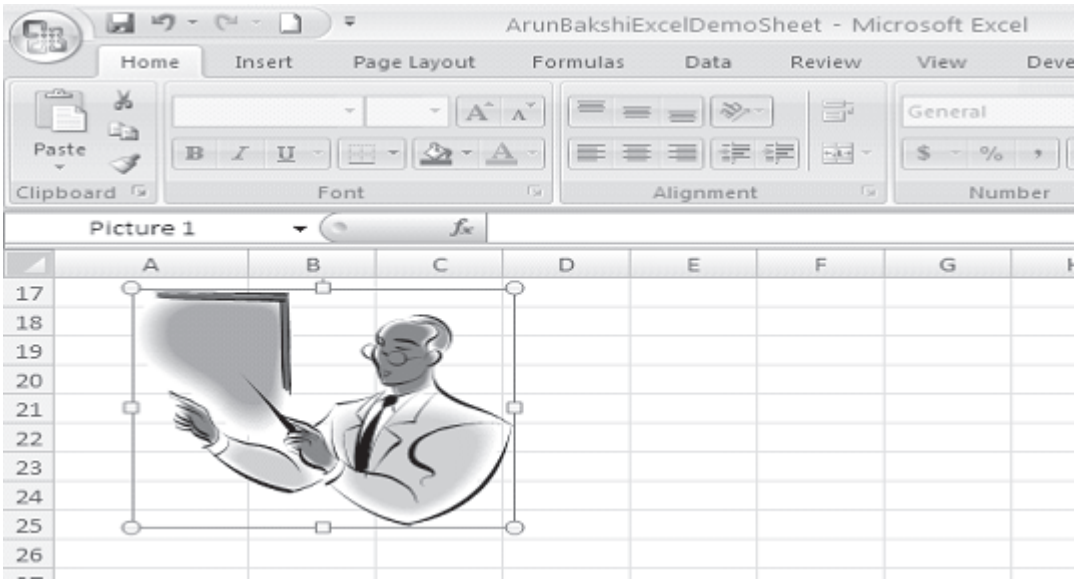


Fig. 8.50

6. To edit the clip, Just click on the clip. This will display Format tab. Choose the relevant group from the ribbon of Format tab and do the necessary changes.

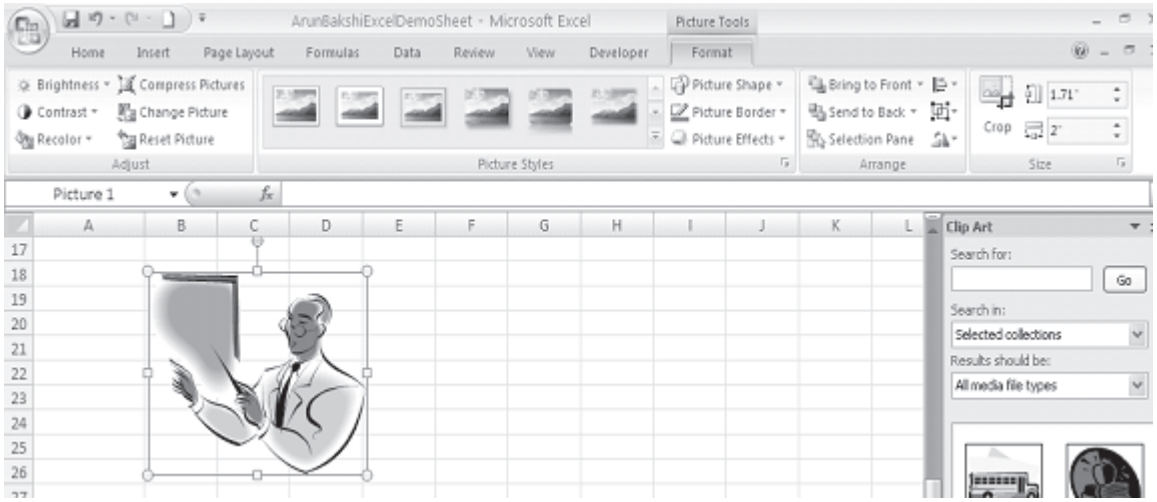


Fig. 8.51

8.5.2 Inserting and Editing a Picture from a File

Follow these steps to add a picture, photo or graphic from an existing file:

1. Click on **Insert Tab.**
2. From Illustrations Group, Click picture.

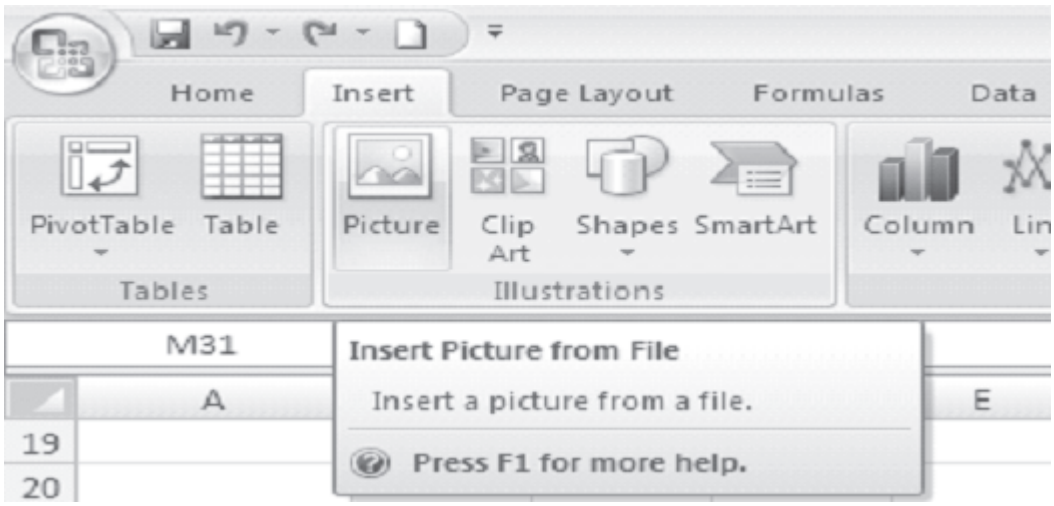


Fig. 8.52

3. Now select a picture from the location of the picture (where you have stored the picture) and press enter or click on insert button.

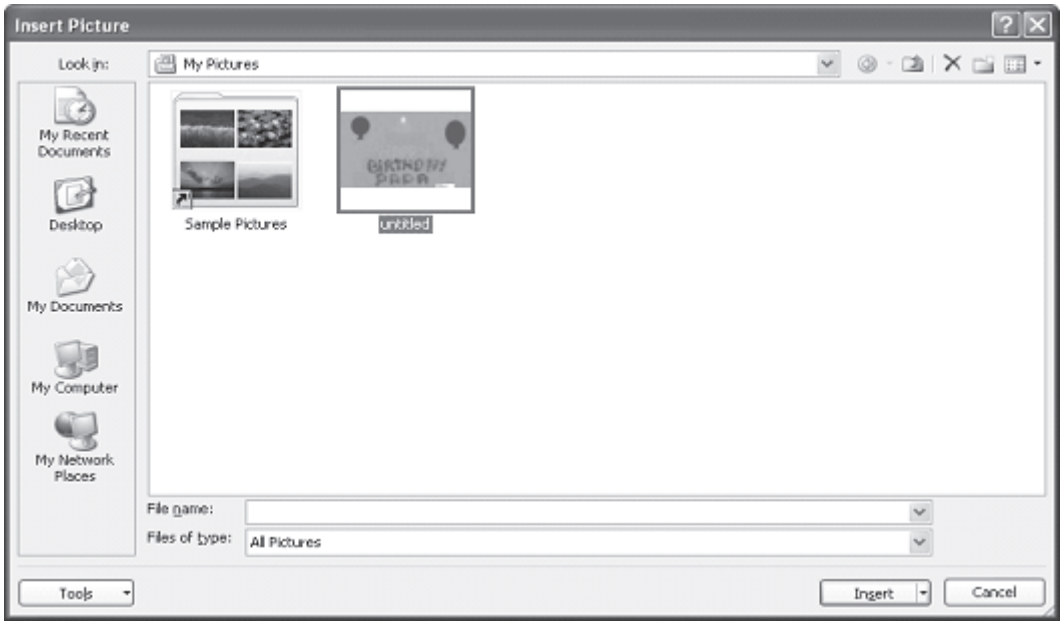


Fig. 8.53

4. The picture is added on the excel sheet. Click on the picture to activate Format tab as shown below along with

its ribbon showing groups like Adjust, Picture Styles, Arrange and Size. Use any of the groups to make necessary changes in the picture appearance.

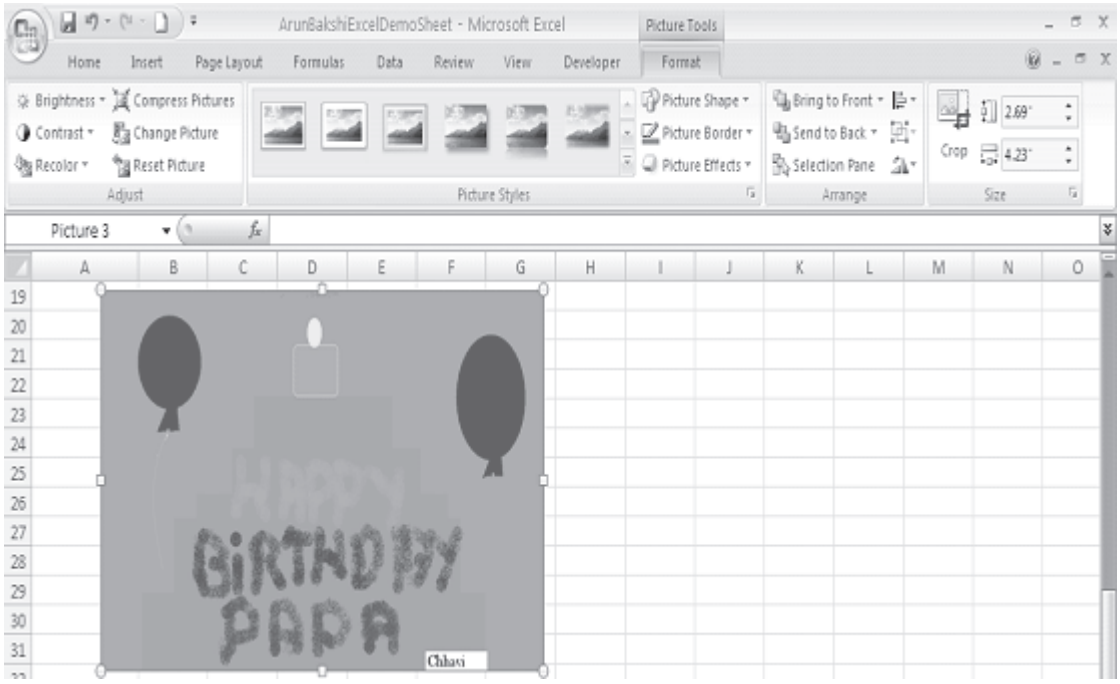


Fig. 8.54

INTEXT QUESTIONS

1. Write True or False for the following statements

   (a) Format picture displays all the images properties in a separate window.

   (b) Activate the image you wish to edit by clicking on it once with the mouse.

   (c) Line charts show the proportion of each component value to the total value in a data series.

   (d) Pie charts are useful to compare the trends over time.

2. Fill in the blanks

   (a) Each autoshape can be rotated by first clicking _____ button on the drawing tool bar.

   (b) More _____ effects can be changed using the picture toolbar.

(c) _____ displays all the image properties in a separate window.

(d) _____ show the relative contributions that each data series takes up.

(e) You have to enter the name of the chart and titles for _____.

8.6 WHAT YOU HAVE LEARNT

In this lesson you learnt about the creation of charts and graphics. On the basis of data entered in a worksheet you can create a bar chart, line chart or pie chart, you can add title, legend, data labels and grid lines to the chart. Moreover, you learnt about autoshapes and clip art also.

8.7 TERMINAL QUESTIONS

1. What is the importance of charts and graphics in providing information?
2. Briefly explain any five different components of a chart?
3. Explain the process of creating a chart using Chart Wizard dialog box.
4. Briefly explain the following:
   a. Bar charts,
   b. Pie charts,
5. List any four features of Chart Formatting toolbar.
6. How do you copy a chart to Word created in Excel 2007?
7. List any five categories of AutoShapes in Excel.
8. You are asked to prepare a flow chart. What kind of AutoShapes you would like to use?
9. Explain the steps in adding a Clip Art to your worksheet?
10. How do you add a photo or graphic to your worksheet from existing file?

11. What is the main differences between (a) a column chart and (b) a bar chart.

12. Write a note on SmartArt.

8.8 FEEDBACK TO INTEXT QUESTIONS

1. (a) True
   (b) True
   (c) False
   (d) False
2. (a) free rotate
   (b) picture
   (c) format picture
   (d) Area charts
   (e) X,Y axes