Chapter-XIII

Practical and Project work

Learning Objectives

After completion of this unit the students will be able to

- Know the origin and history of interest rate

- Learn various forms of interest rate

- Comprehend practical applications of interest rate in real life situation.

- Have an outlook of various economic theory associated with interest rate

Practical and Project work

To focus the applied nature of the subject, due emphasis be given for practical and project work.This shall be assessed internally. However this should not be considered in isolation of teaching units. The practical and project work has to be integrated with classroom transactions. Some additional practical works are also incorporated within the units to increase the effectiveness of the teaching learning process.

Weightage of Internal Assessment is of 20 marks. Internal Assessment can be a combination of activities spread throughout semester/ academic year. These include, projects and spreadsheet based practicals. Teachers can choose activities from the suggested list of practical or they can plan activities of similar nature related to the topics detailed in the syllabus. For data based practical, teachers are encouraged to use data from local sources to make it more relevant for students.

Weightage for each area of internal assessment may be as under:

Sr.No.	Area and weightage	Assessment Area	Marks allocated
1	Project work (10 marks)	Project work and record	5
		Year End Presentation/Viva of the Project	5
2	Practical work (10 marks)	Performance of practical and record	5
		Yearend test of any one practical	5
Total			20

Practical: Use of spread sheet

Learning outcomes:

● Students shall be able to :

● calculate average, interest (simple and compound)

● create pictographs

● draw pie chart and bar graphs

- calculate central tendency

- visualizing graphs

Suggested practical using spread sheet

1. Plot the graph of functions on spreadsheet; study the nature of function at various points, drawing lines of tangents;

2. Create budget of income and spending;

3. Create compare sheet of price, features to buy a product;

4. Prepare best option plan to buy a product by comparing cost, shipping charges, tax and other hidden cost;

5. Smart purchasing during sale season;

6. Prepare a report card using scores of last four exams and compare the performance;

7. Collect the data on weather, price, inflation, and pollution. Sketch different types of graphs.

About Project work:

Some suggested project works are given in the syllabus. You may refer the syllabus for details. While selecting the project, please ensure that students apply what they have learnt, in a practical situation. A student may select a topic related to the application of Mathematics in a professional field. The projects may involve, data analysis and conclusions, mathematical modelling, computer programme, Literature review, development of teaching learning tool for a particular concept, identifying applications of a topic, survey and analysis of the results, demonstration of mathematical tools like GeoGebra or simulations, mathematisation of life situations, contextualisation of mathematical results etc. It should not be simply collecting information from net or other sources and preparing a project report. Independent mathematical work should be reflected in the project work.

The project work may be done individually or in a small group. While forming the group it may be ensured that each member of the group contributes in the work.

Therefore a large project can be done by 2-3 students and small project may be completed by individual students. The roles and responsibilities in a group may be assigned clearly to ensure participation of all the members. The project work may be planned and executed in such a way that students will be able to communicate, collaborate and connect with the peer group. Opportunities may be given to individual learners to present their work before the class and teachers may promote open mildness through deliberations among the students. The group activities should be focussed on enhancing the life skills like, empathy, interpersonal relationship, communication, critical thinking and creative thinking.

A project report may be prepared and presented by each student after completion of the project. The report may comprise of title of the project, aim of the project, process/es involved, outcomes, limitations and bibliography. Students may refer authentic resources and same may be acknowledged in the report.

Assessment of the project work shall focus on the process involved and its educational value. The honest efforts taken by the students must be acknowledged and due credit may be given, even if the outcomes are not accurate. It may be kept in mind that the aim of project work is to enhance the competencies of the students and not accuracy ore mere completion of a mandatory task.

Introduction to Microsoft Excel

A spreadsheet is also called a worksheet. It is made up of rows and columns that help sort data, arrange data easily, and calculate numerical data. You can also analyse data and depict the same using different plots or graphs. Below is a list of spreadsheet programmes you can use.

- Google sheets (Free and online source)

- Libre office-Calc (Open Source)

- Open office-Calc (Open Source)

Overview

For the purpose of demonstration, MS-Excel functionality is used being most

common.These functionalities are equally available in all other applications. Infact, use of free and open source software may be promoted. Spreadsheet is a computer program which is used to create, store, analyzedata in a tabular form i.e.in the form of rows and columns. It performs various mathematical functions, logical and conditional operations in a very quick and accurate manner.Some of its main features include

- Perform Calculations

- Making Charts

- Graphing Tools

- Functions (SUM, AVERAGE, COUNT, etc.)

- Data Analysis

- Business Decision

- Record Expenditures and Income

Get Familiar with Interface

To start with any application you have to open it. Once you open a spreadsheet, you will see the main screen
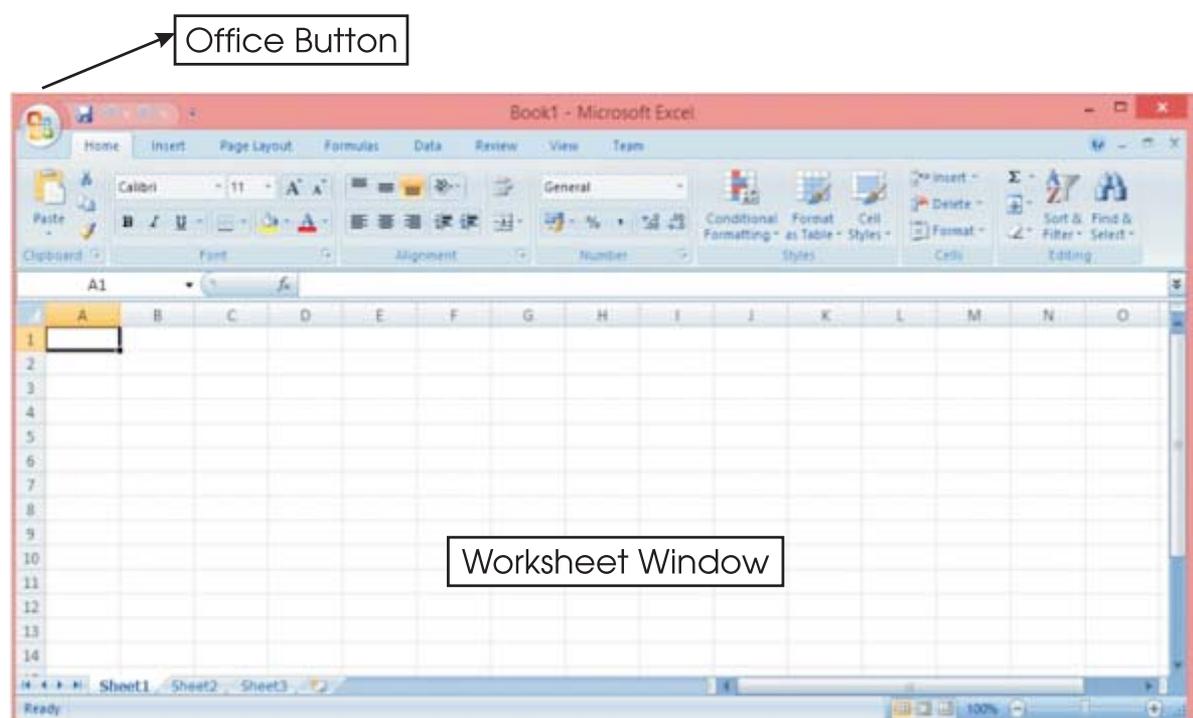
Fig 1: Microsoft Excel Main Screen

The spreadsheet file is called a Workbook and default title is Book1 and by default it opens a 3 spreadsheet or worksheets. The tabs at the bottom of the screen represent different worksheets i.e. Sheet1, Sheet2 etc .As you can see the worksheet window consists of several boxes known as cells. Each worksheet contains columns and rows and make like a grid type structure.
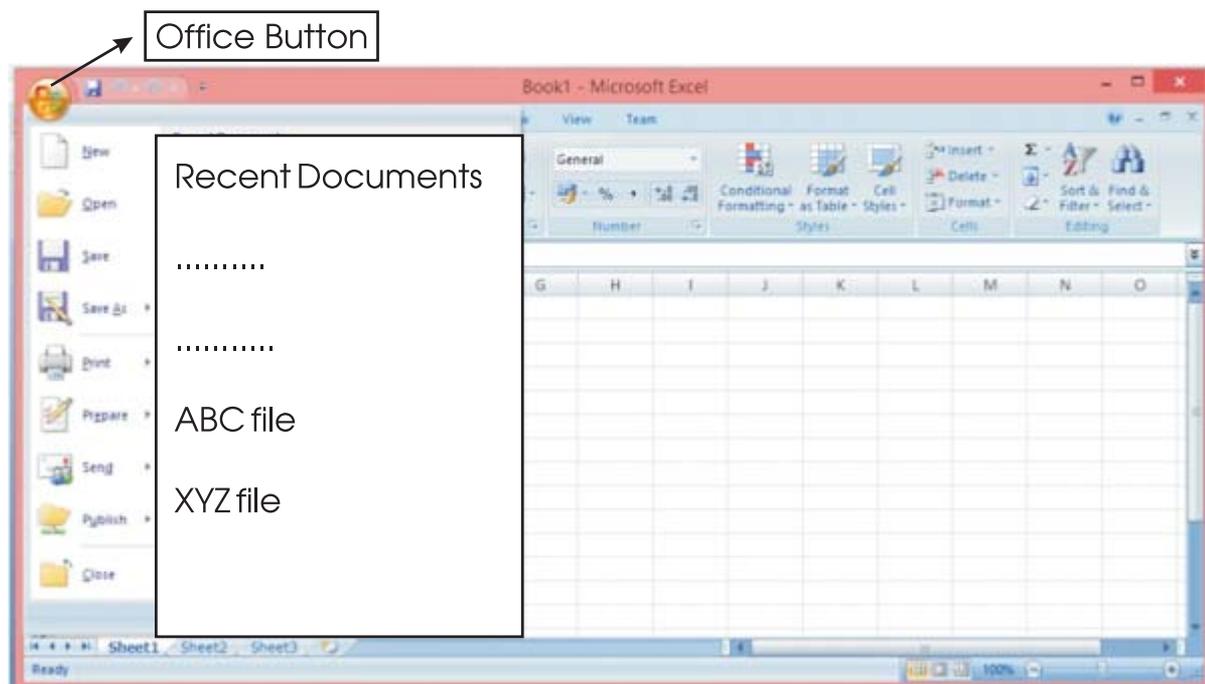
Fig 2: Office Button

Above picture shows Office button contains many options like you'd see in the File menu, such as New, Open, Save, Print, Close etc. Functions of the given menu options are:

1. **New:** To create any new file or new document in the spreadsheet, Word Document etc. Short cut Key to create a new File: **Ctrl+N.**

2   **Open:** To open any existing file from the computer.

3. **Save :** Save the changes to the current open file. If you are working on the existing file and at any point you want to save the file you can use the shortcut **Ctrl+S.**

4. **Save As:** Save a new file with a desired name using the correct file extension and save it to the desired location on the computer's hard drive. UseF12 key for saving any new file.

5. **Print:** It is used to print the hard copy of the document by using printer. You can use shortcut for print **Ctrl+P.**

6. **Close:** To close the current file. Shortcut: **Ctrl+W.** To quit use **Alt F4** on windows.

Interface Elements

1. **Workbook:** It is a collection of one or more worksheets or spreadsheets. Example: Sheet 1 is spreadsheet of workbook Book1.

2. **Ribbon:** It is divided into different Tabs (Home, Insert, Page Layout, Formulas…etc and tabs are divided into groups. Groups are the sets of related to commands that are displayed on tabs.

3. **Name box** (left) and **Formula bar** (**right**): Name Box shows the address of the current cell. Example: Intersection of column and row form a cell, like A1 is located where column A and row 1 meet. Formula bar shows the content of current cell.

4. **Column Headings:** They are denoted by letters and **Row headings** by Number.

5. **Worksheet Navigation Buttons:** It is denoted by Sheet 1, Sheet 2…… And so on. You can use the scrolling buttons on the left to bring other worksheets into view.

6. **Status Bar:** It displays various information like sum, count; average of the currently selected cells. It also displays information about current status of the worksheet etc.

Status Bar Modes

Ready mode. This means nothing is being entered or edited on the spreadsheet.

Enter mode. When you are doing data entry.

Edit mode. Edit the contents of the current cell. Double-click on a cell with data in it, or click inside the formula bar for this mode.

Point mode. Used when linking to cell addresses within a formula or from an spreadsheet.
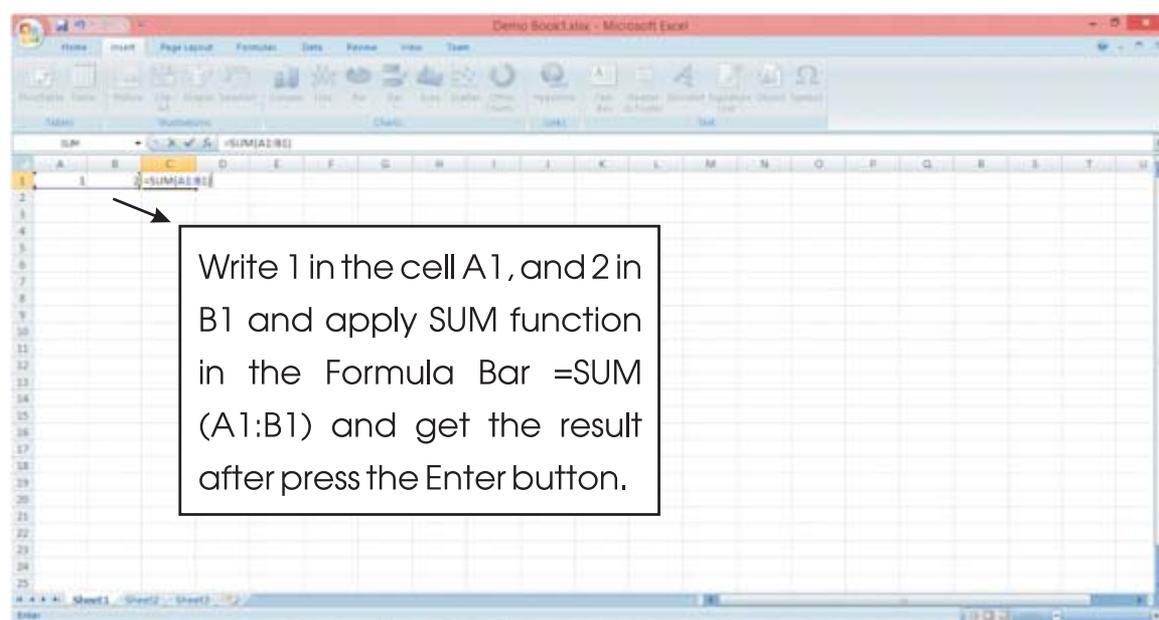
Dialog window.
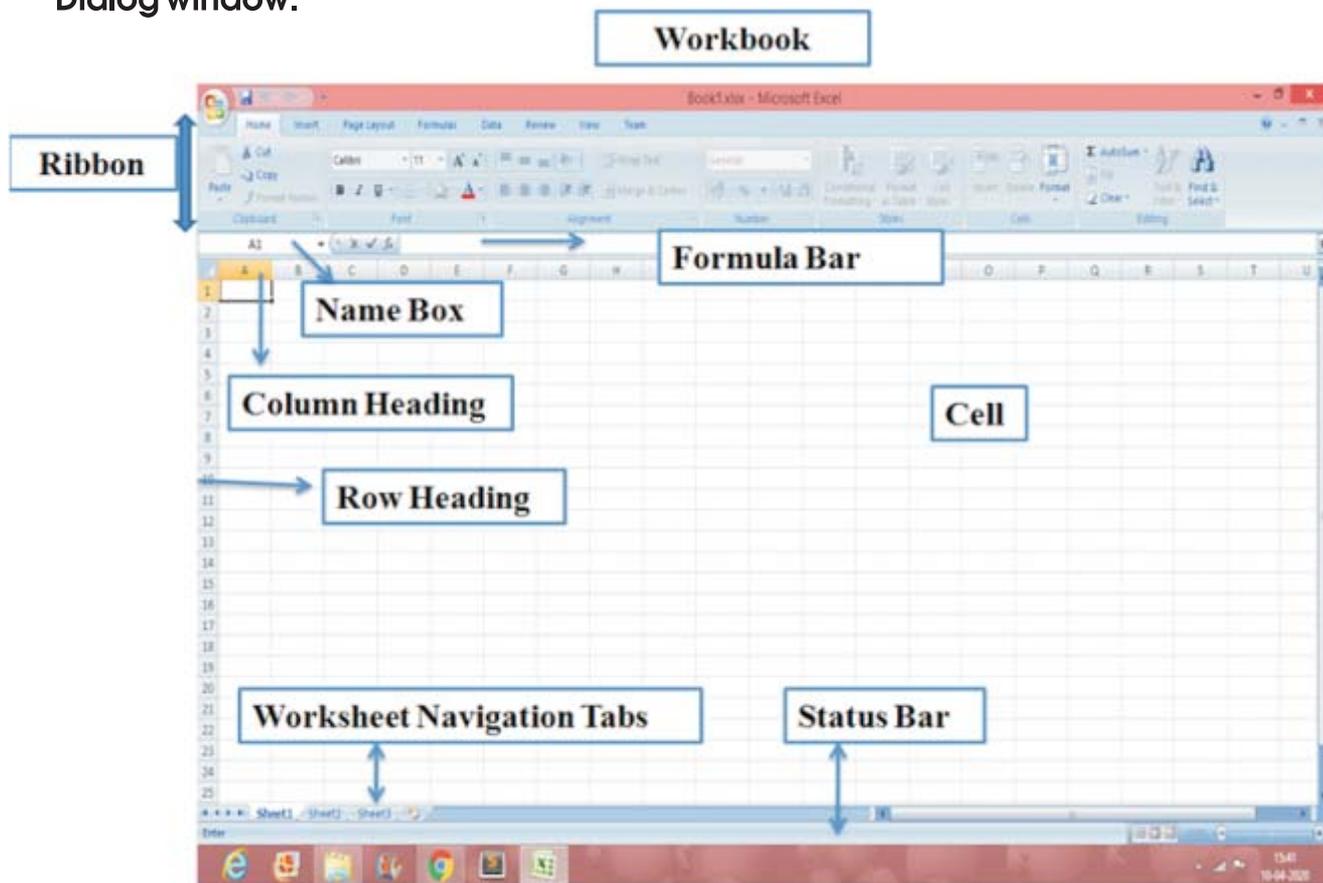
Fig 3: Interface Elements

Fig 4: SUM Function

After press the Enter button you'll get the result in C1 cell. I.e sum of 1 and 2 is equals to 3.
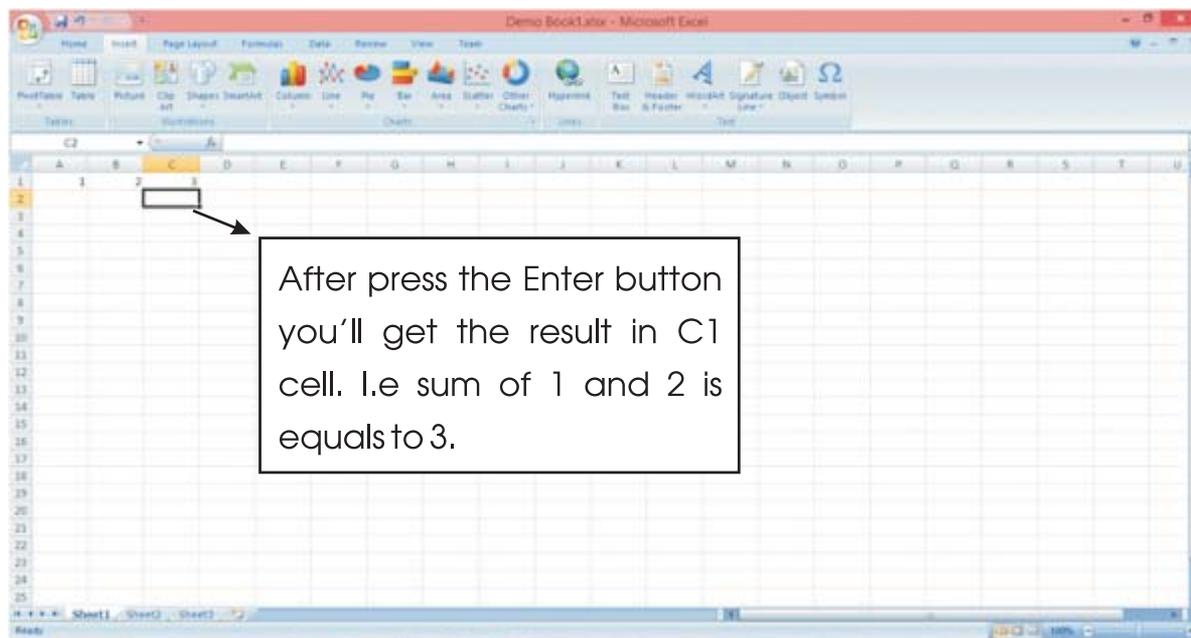
Fig 5: Result of SUM Function

Note: Above is an introduction on the use of spreadsheet. Students should be given practice in sorting and filtering data and use of functions and depicting graphs or plots before starting the practical work.

How to calculate Average in Excel

In Excel, average can be calculated by using built in function "**AVERAGE**"**.** Instead of using "**AVERAGE**" function you can also use **SUM and COUNT** function.

1.   **Using AVERAGE Function**

The AVERAGE function below calculates the average of the numbers in cells A1 through A3.Take any three numbers 10,8,12 and calculate average it gives 10.Select the cell to display the result e.g. cell A4 in the image shown below. Now type "=" sign in the cell or in Formula Bar and type "AVERAGE" then use the parentheses to enclose the cell name ,then press the Enter key to get the result.
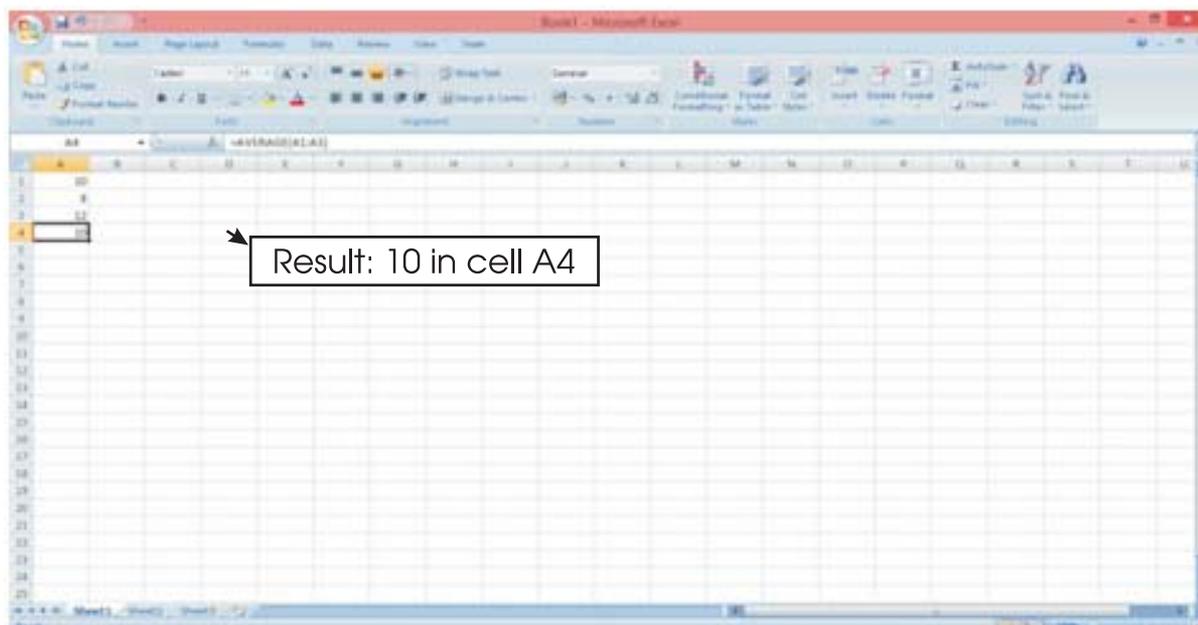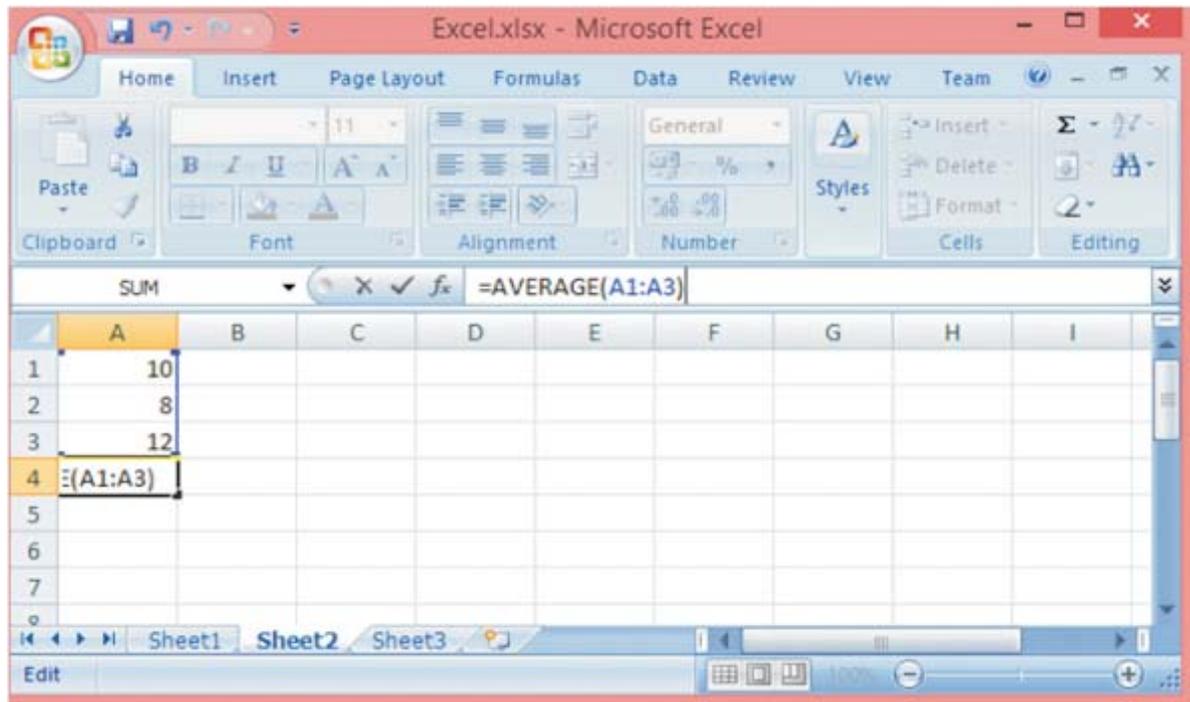
Fig 6: Result of AVERAGE Function

2. Using SUM and COUNT function:

The count function in Excel will count the number of cells containing numbers in a given range.It produces the same result i.e 10.

Write the Formula =SUM(A1:A3)/COUNT(A1:A3) in formula bar for calculating the average of three numbers 10,8 and 12 and press enter it will give the result 10 in the cell A4.
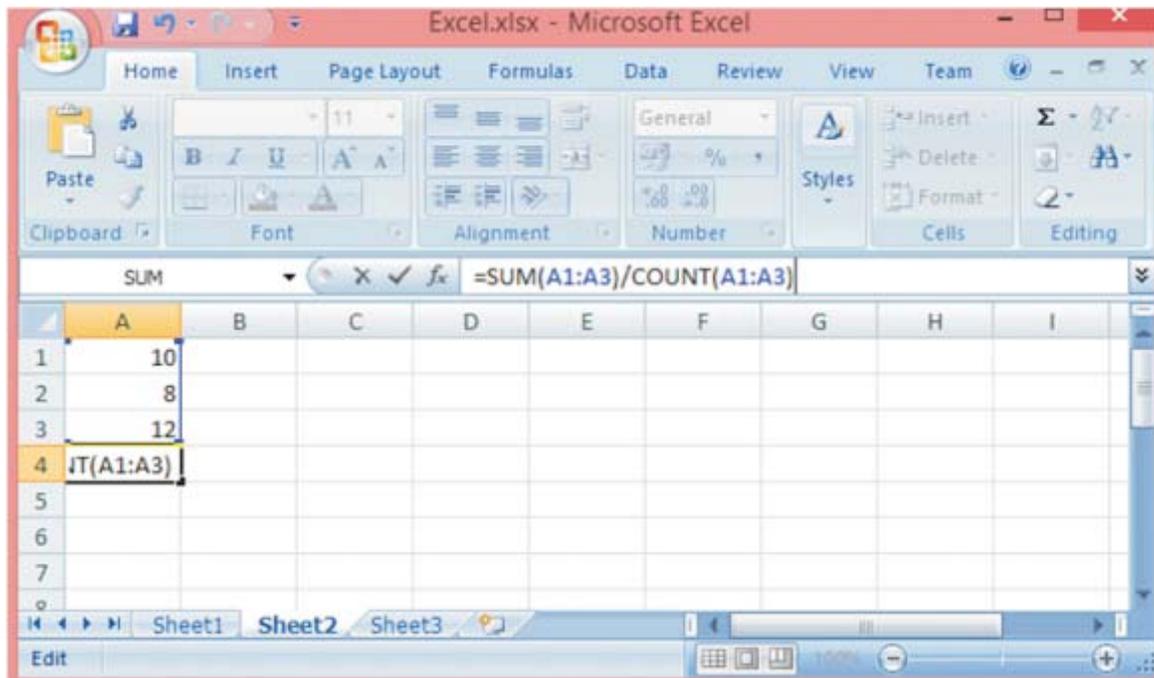
Fig 7: Result of AVERAGE Function using SUM and COUNT function

Let's take more examples to understand the application of using AVERAGE function in Excel. If you want to find the average number of days to complete a tasks by different employees. Or, you want to calculate the average temperature on a particular day over a 10-year time span etc.

Example 1: Suppose you want to calculate the average marks attained by students in all the exams; use the AVERAGE formula to calculate the average marks attained by each student.
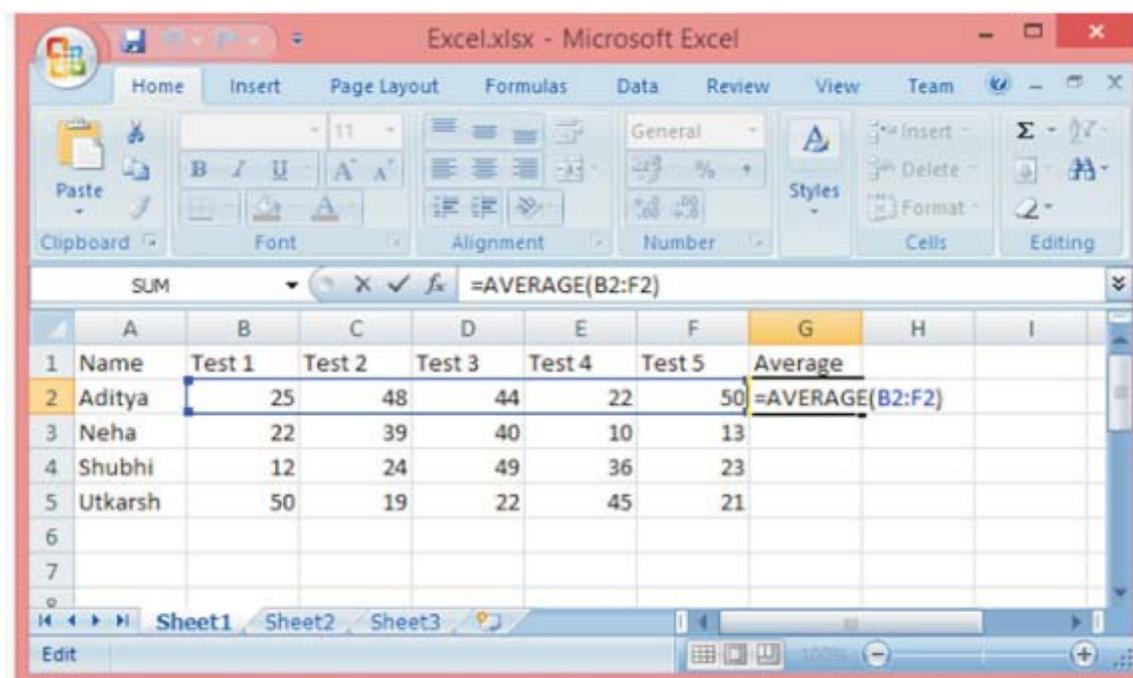
Fig 8: Average calculation of marks

In the above example, I have calculated the average marks for one student in 5 exams.
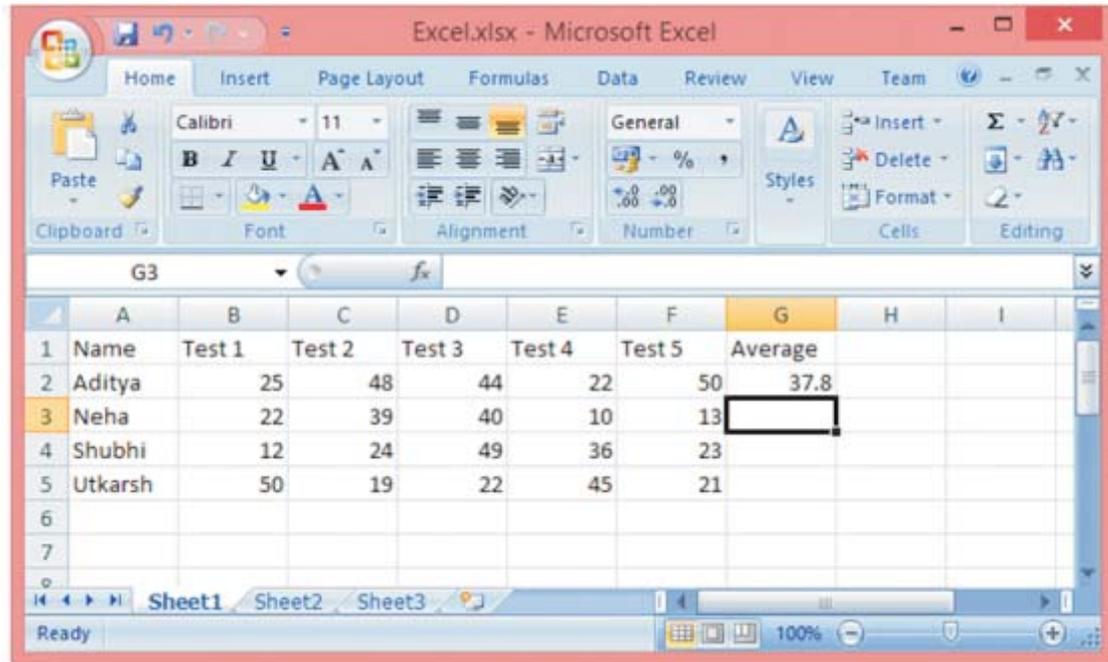
Fig 9: Result

As same as you can calculate the average marks for other students also.

Let's see some other options of Excel AVERAGE Function with examples.

1. **AVERAGEA Function:** The AVERAGE function ignores logical values TRUE or FALSE, empty cells and the cells containing text during calculation. Unlike AVERAGE function, AVERAGEA function will also evaluate the logical values, empty cells, text containing cells.

The above example ignores the logical values and text during calculation and gives the result 7.

Fig 10:

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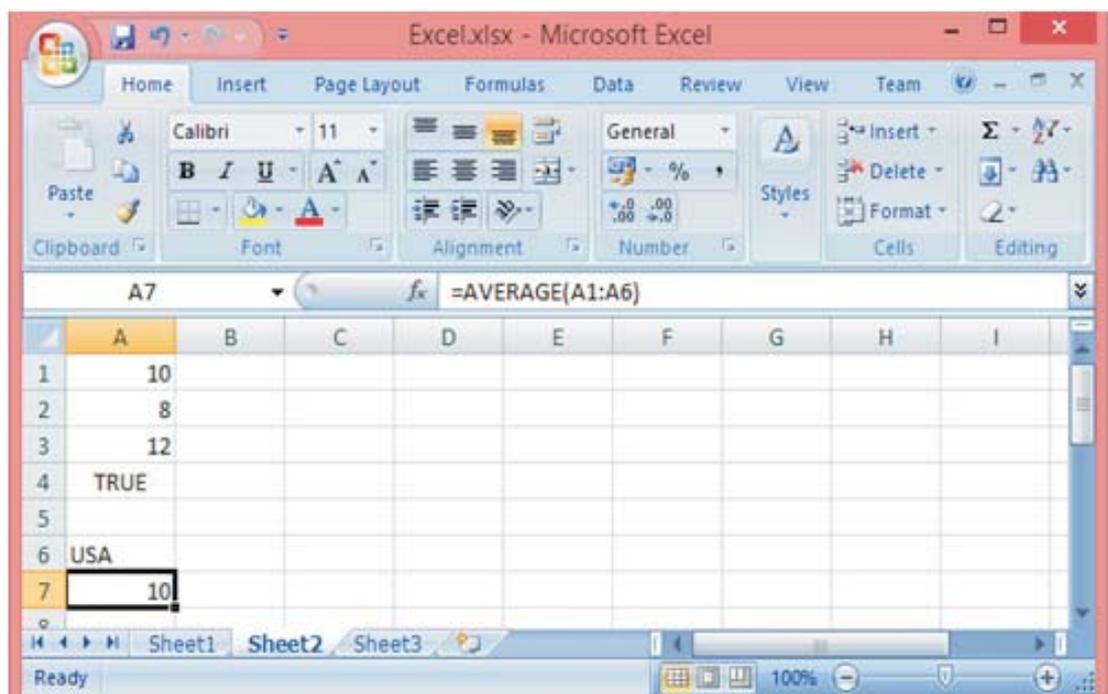
However, if you using AVERAGEA function the logical value FALSE and cells that contain text evaluate to 0 and the logical value TRUE evaluates to 1. Italso ignores empty cells.
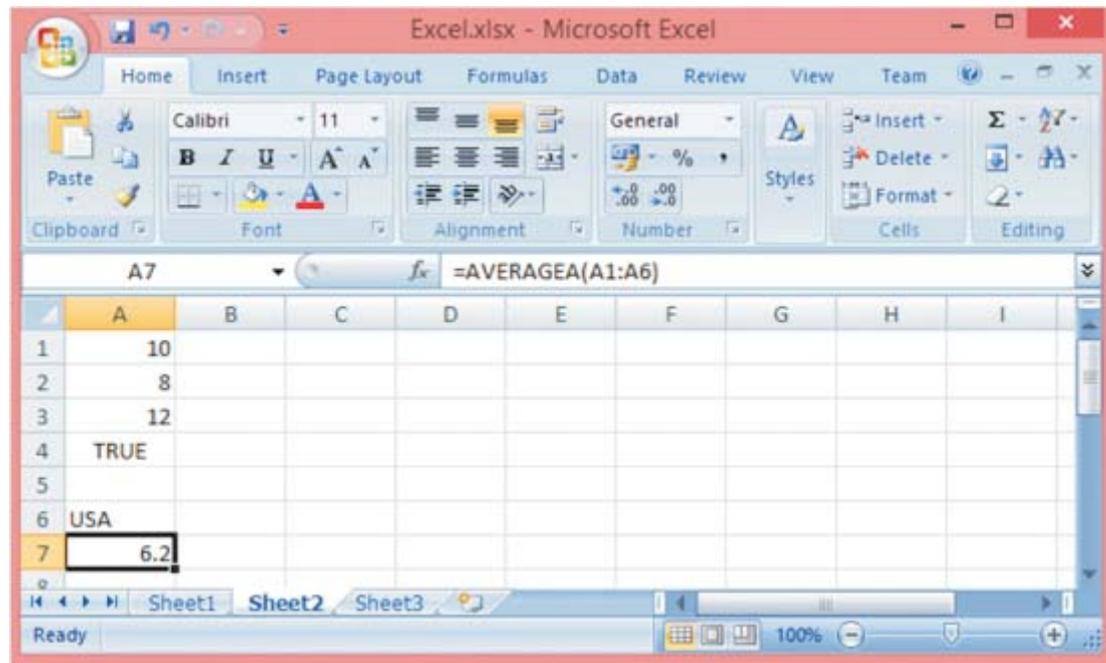
Fig 11: AVERAGEA Function

2. **AVERAGEIF Function:** It calculates the average of cells that meet one criteria. For example, the AVERAGEIF function below (two arguments) calculates the average of all values in the range A1:A7 that are greater than 0.
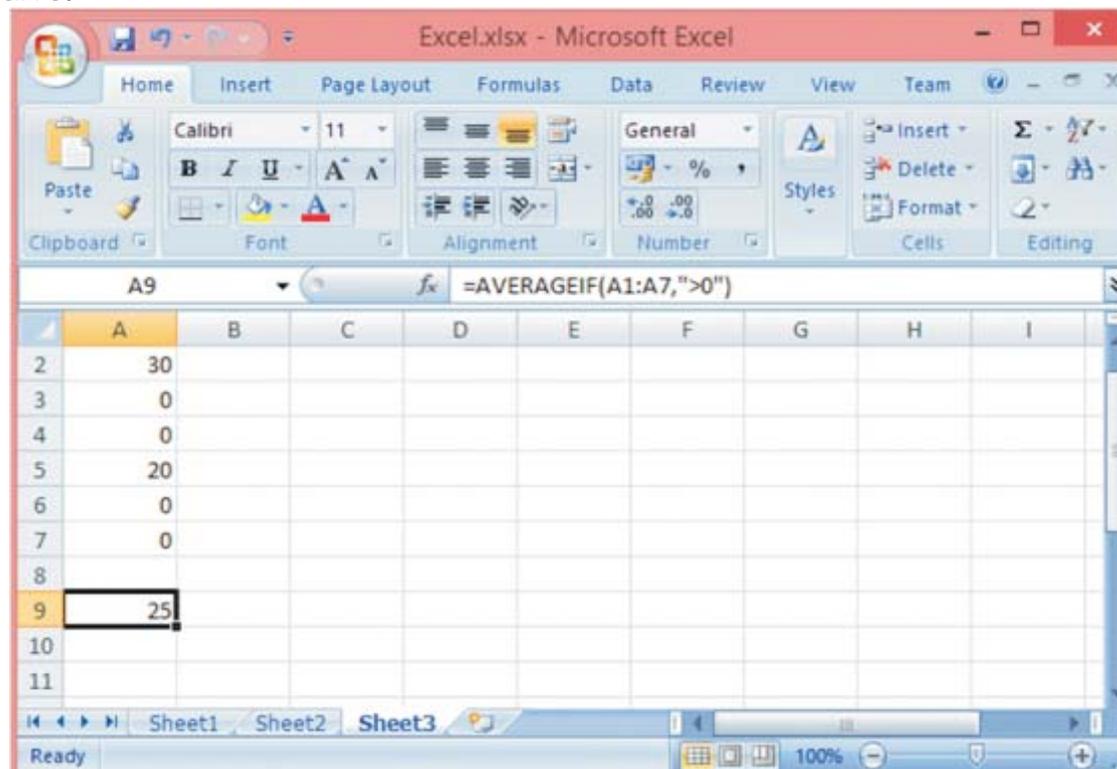

Fig 12: AVERAGEIF Function

Calculate Simple Interest

The general formula for calculating simple interest in Excel is shown below:

<div align="center">

Interest = Principal*Rate*Term

</div>

Let's take an example to understand that how do we calculate simple interest

Example1: Calculate the simple interest on $3000 invested at the rate of 10% per annum for 2 years.

In the example shown below, so using the cell references we have
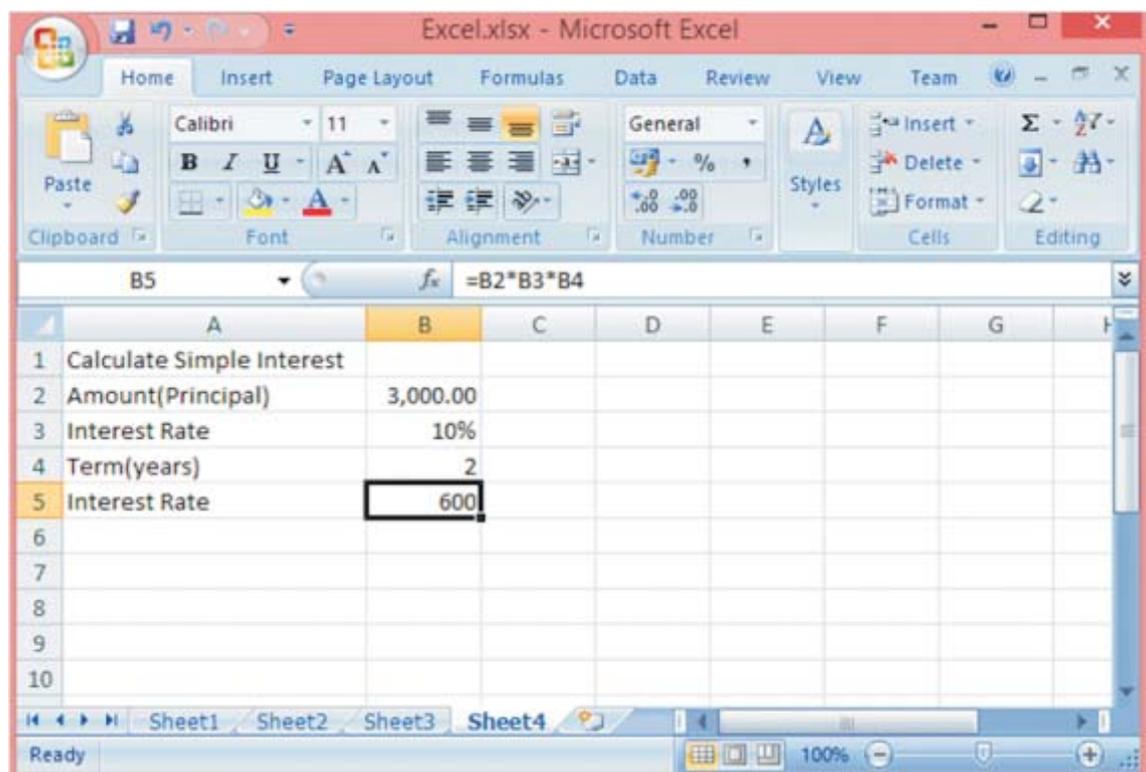
B5= B2*B3*B4

   = 3000*0.1*2

   =600

Fig 13: Simple Interest Calculation

Calculate Compound Interest

To calculate compound interest, we can use one of the Excel Formulas called FV. This function will return the future value of an investment on the basis of periodic, constant interest rate and payments. The syntax of this function is as follows:

FV (rate, nper, pmt, pv)

In order to calculate the rate, you will need to divide the annual rate by the number of periods i.e annual rate/ periods. No. of periods or nper is calculated by multiplying the term (no. of years) with the periods i.e term * periods. pmt stands for periodic payment and can be any value including zero.

Let's take an example

Calculate the Compound Interest for $500 at a rate of 10% for 5 years and assuming that the periodic payment value is 0. Please note I have used -B1 meaning, $500 has been taken from me.
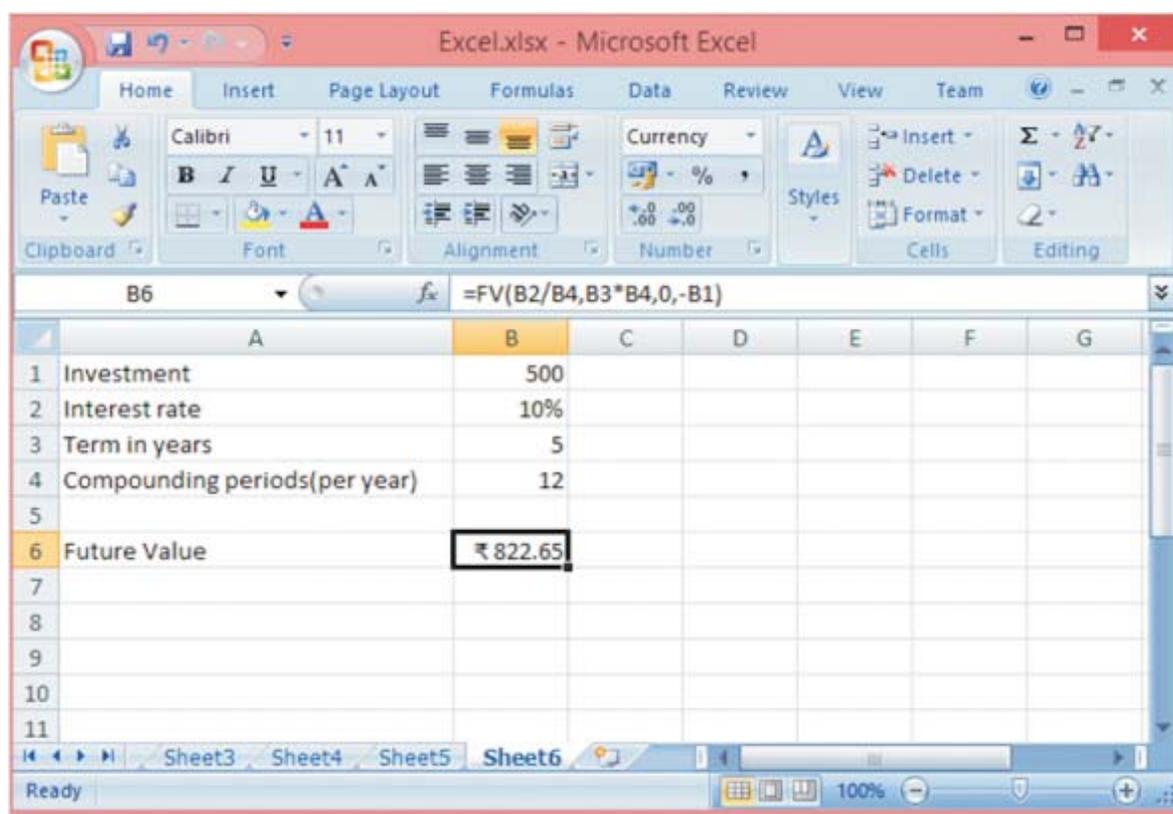
Fig:14 Compound Interest Calculation using FV Function

Note: The Excel FV function is a financial function that returns the future value of an investment. You can use the FV function to get the future value of an investment assuming periodic, constant payments with a constant interest rate.

Pictographs

A pictograph is the presentation of data using images. This is one of the easiest ways to represent statistical data. It helps in representing the large number of data in a simpler form and provides a data visualization by using visual elements like charts, graphs and maps.An example of a pictograph is the cigarette with a red circle and slashes around it means no smoking.

In spreadsheet, pictograph uses images to represent the numerical data in the form of chart or graph. The better we create pictograph, easier would be the visualization and data analysis.

How to create pictograph in Excel

Let's take an example to understand the procedure to create a pictograph .Suppose we have to draw pictograph for favourite fruits of grade 6 students.

I. **To follow this example, open a new worksheet in Excel and enter the following data into the cells referenced.**

- Enter **Apple** into cell **A2.**
- Enter **Banana** into cell **A3.**
- Enter **Orange** into cell **A4.**
- Enter **Grapes** into cell **A5.**
- Enter **Peaches** into cell **A6.**
- Enter **12** into cell **B2.**
- Enter **10** into cell **B3.**
- Enter **8** into cell **B4.**
- Enter **5** into cell **B5.**
- Enter **6** into cell **B6.**

II. **The next step is to create a Bar Graph**

- Drag to select cells **A2 to B6.**
- Select **Insert.**
- Select **Insert Column or Bar Chart** in the **Chart** group.
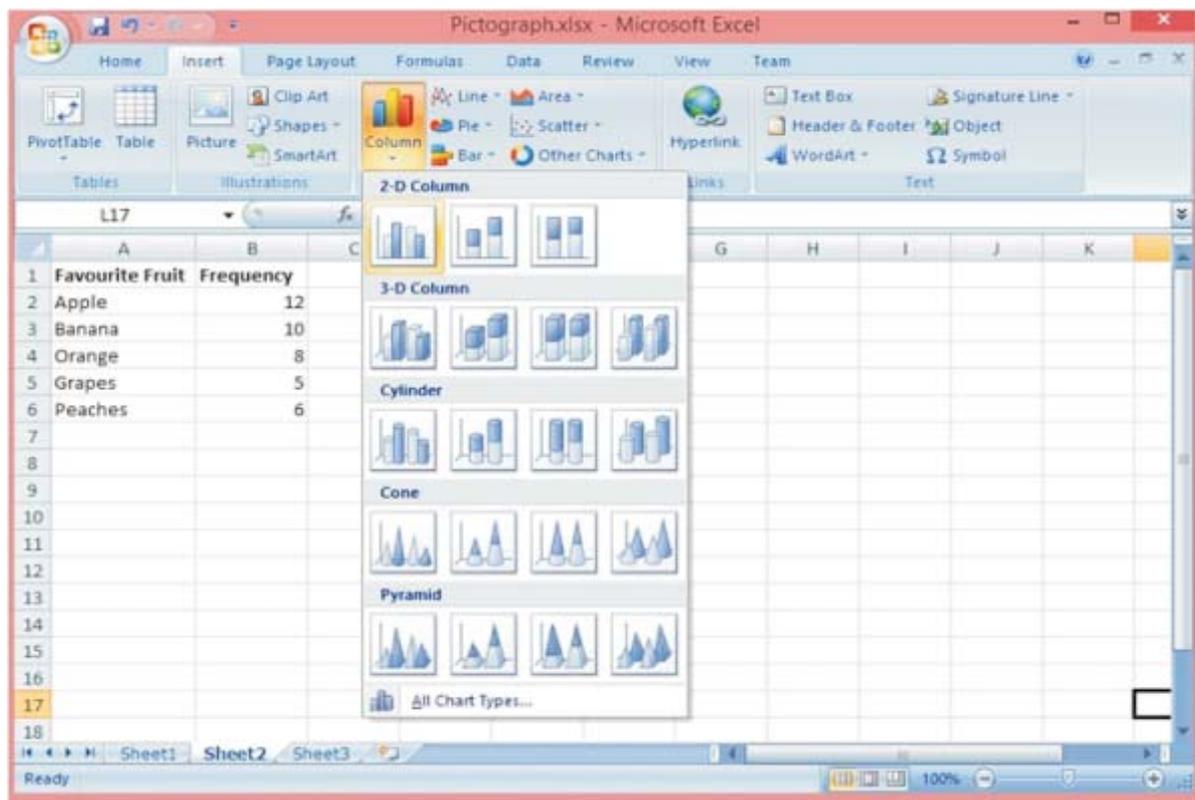- Select **2-D Clustered Column.**
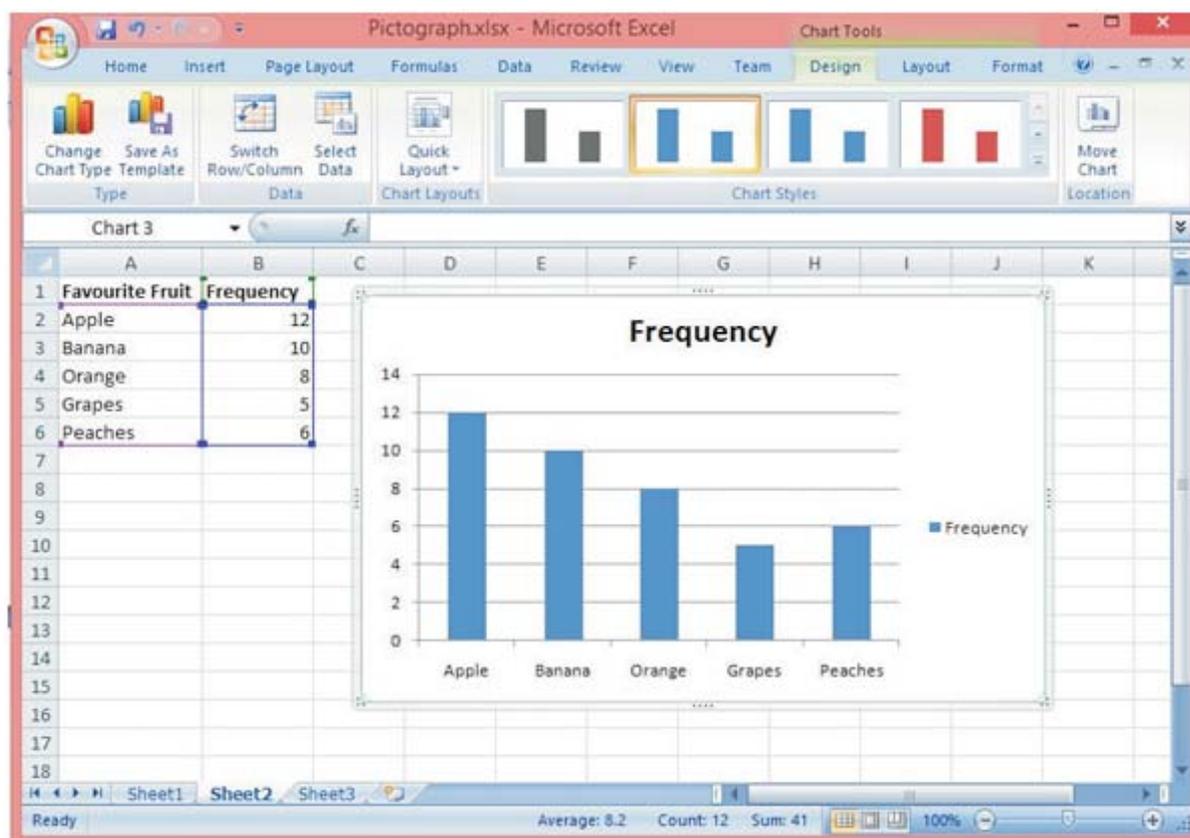
Fig 15: Insert Bar Graph

Fig 16: Standard Bar Graph

- A basic column chart is created and placed on your worksheet.

- Add data labels to the graph,select a data bar in the chart right click it and select **Add Data Labels** from the right-clicking menu.
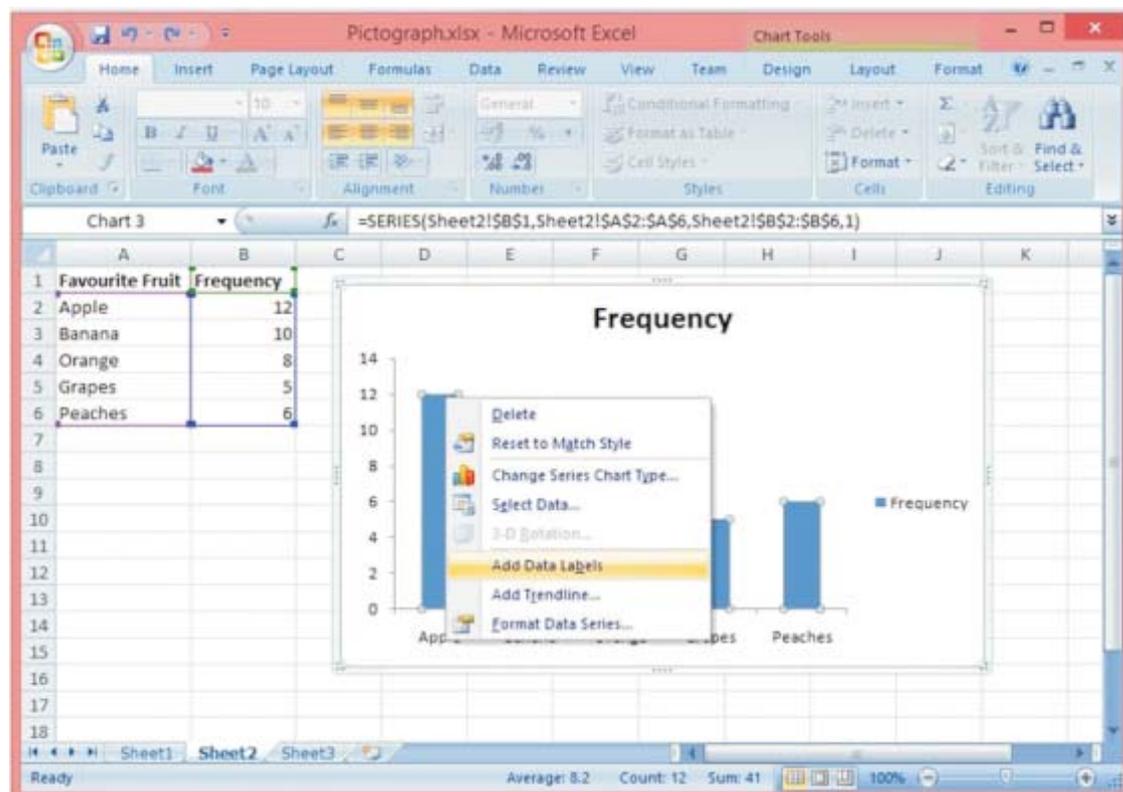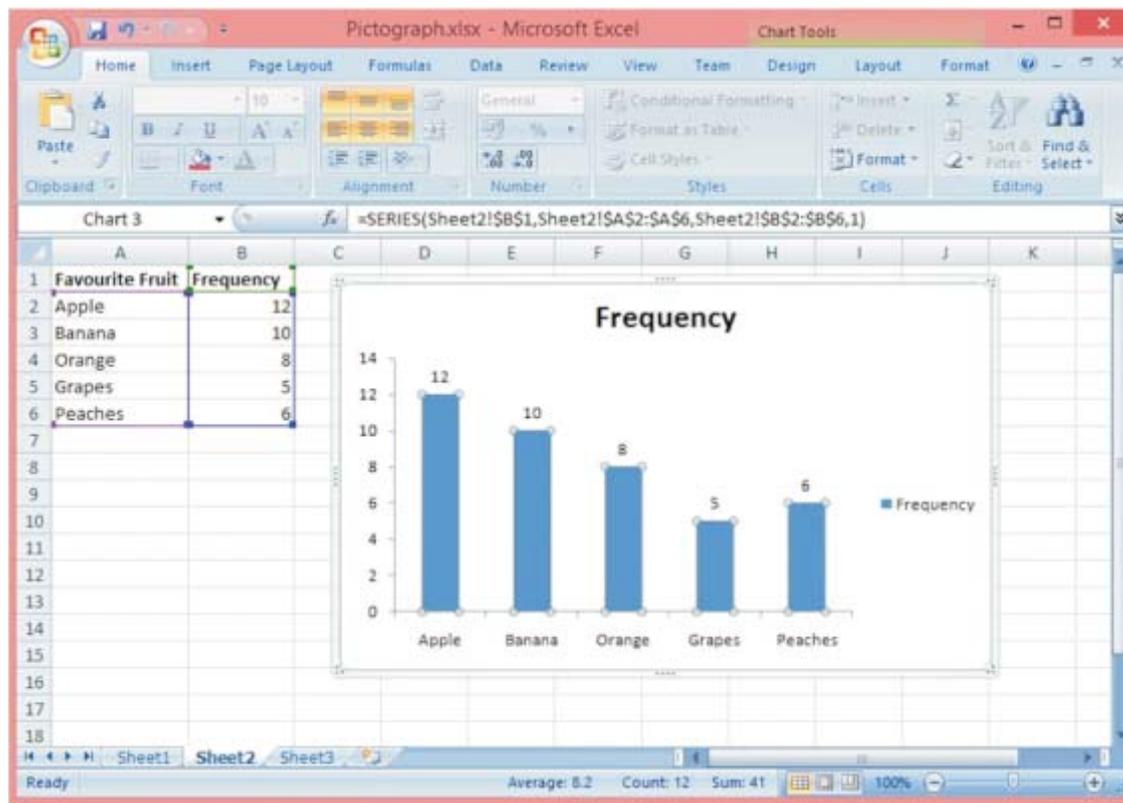

Fig 17: Add Data Labels

Fig 18: Data Labels in Bar Graph

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● Below given figure 18 shows the data labels on the apex of each bar .

III. Thenext step we'll add a picture to the pictograph

● Double-click on one of the blue data bars in the graph and choose **Format Data Series** from the context menu. The **Format Data Series**
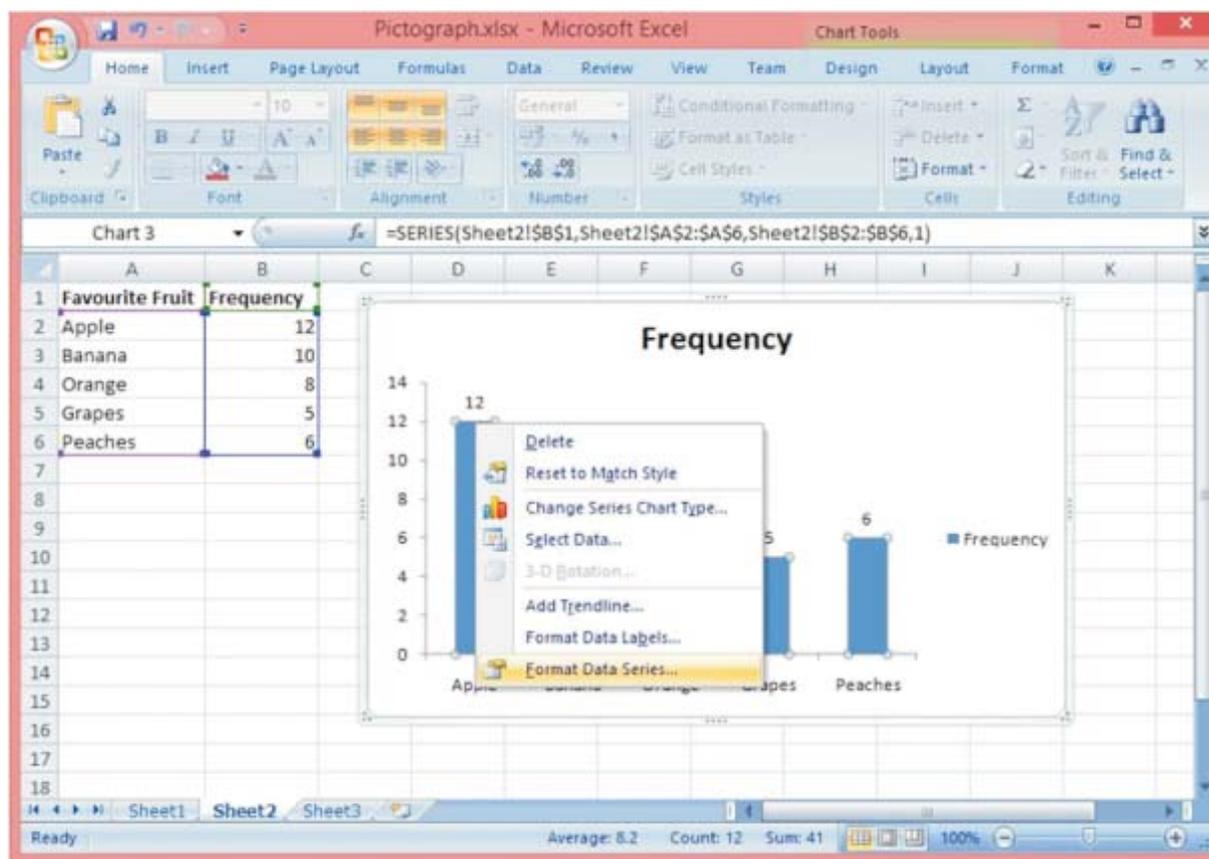
Fig 19: Format Data Series Pane

dialog box opens.

● In the **Format Data Series** pane, you need to select some options   as follows

(i)   Select **Fill Options** or the **Fill & Line** icon in the **Format Data Series** dialog box.

(ii)   Select **Picture or texture fill** under **Fill.**

(iii)   Select **File** if you want to use a picture saved on your computer.

(iv)   Select **Online** if you want to search online for a picture to use.

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(v)   Find and select the image you want to use.

(vi)   Select **Insert** to add the picture.

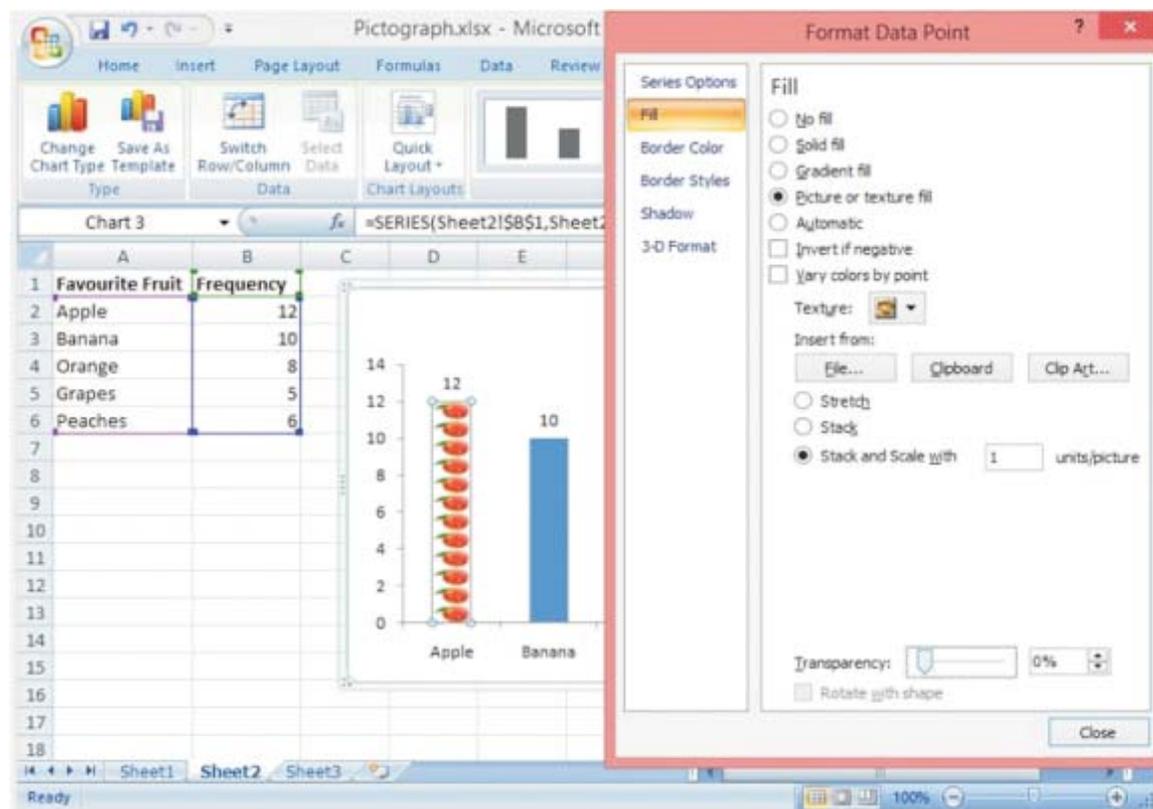(vii)   Click to select the **Stack and Scale with** option in the **Format Data Series** pane.

Fig 20: Format Data Points

(viii) Close the **Format Data Series** dialog box. The blue-colored bars in the graph is now replaced with the image selected.
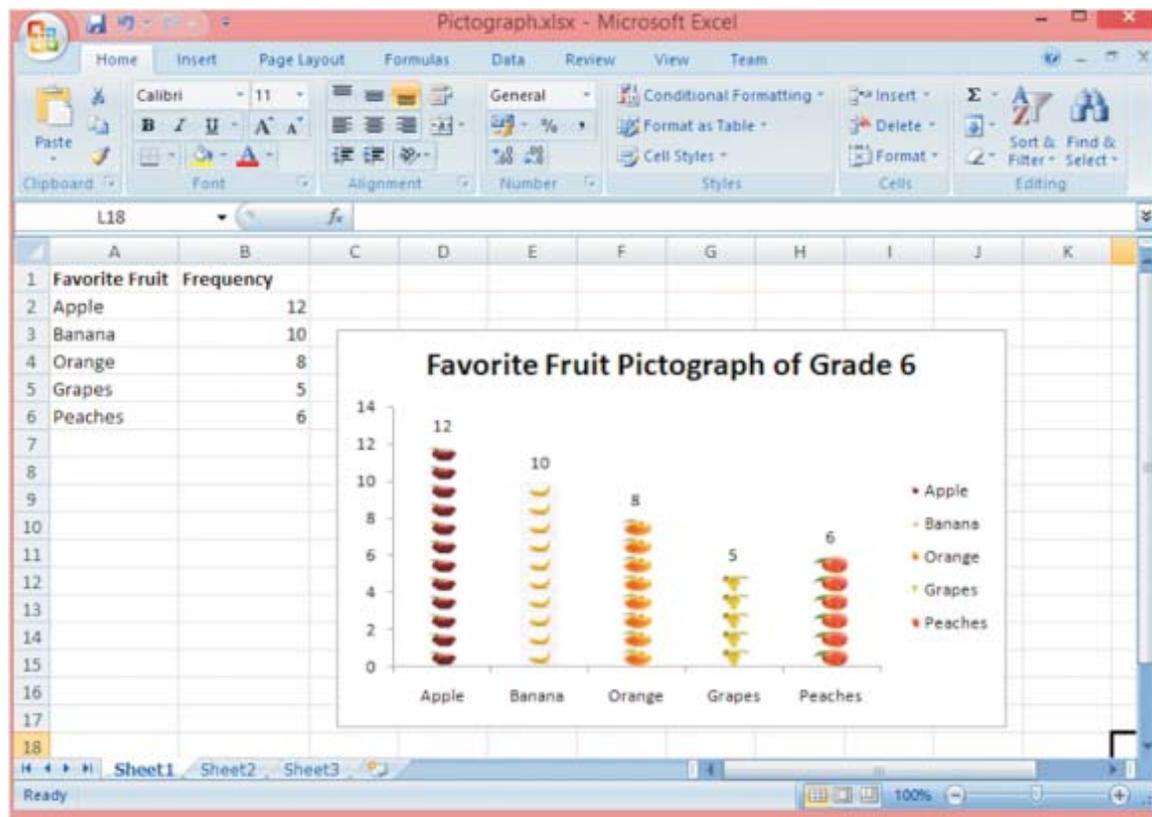
Fig 21: Pictograph

(ix) Repeat the above steps to change the other bars in the graph to pictures.

Create Pie Chart

● **Drag to select cells** A2 to D5.

● **Select** Insert.

● Click on Pie Chart in Chart group.

● Select 2-D Pie

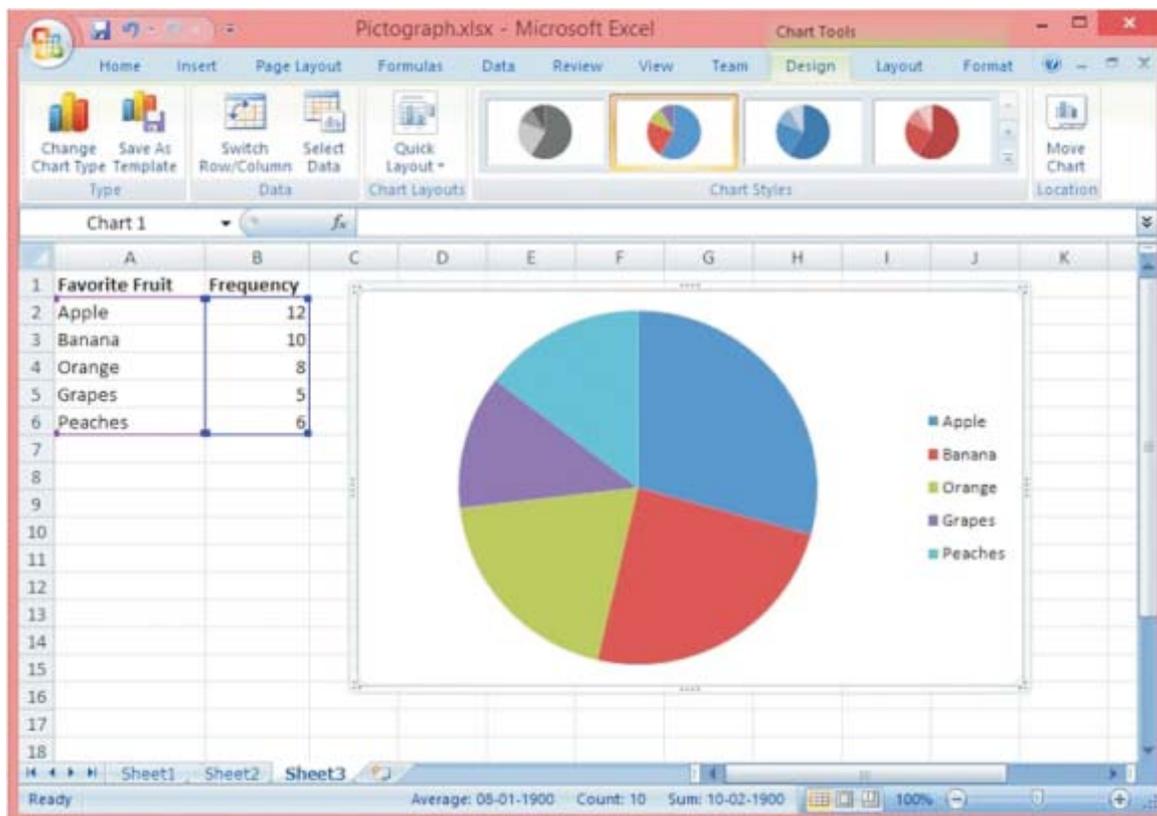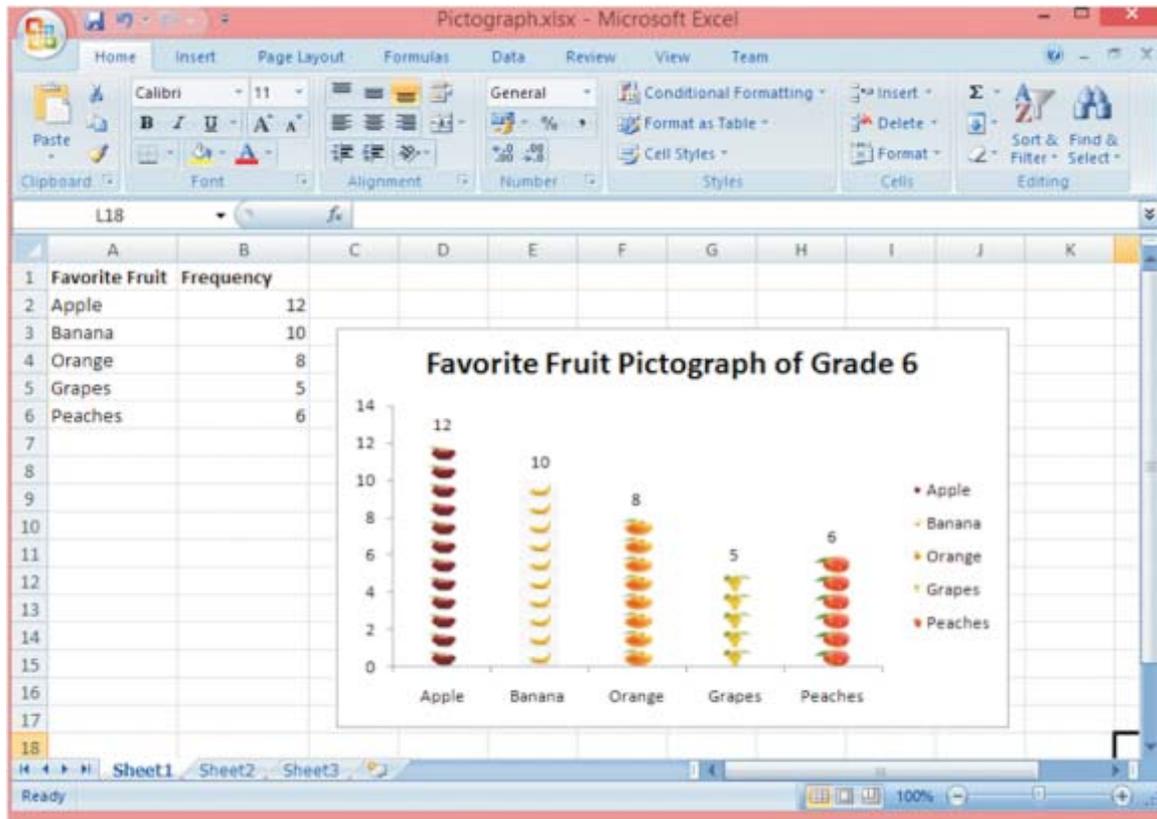● A basic Pie chart is created and placed on your worksheet.

Fig 22: Pie Chart

Calculate Central Tendency

There are three main measures of central tendency: Mean, Median and Mode

Arithmetic Mean : It is also referred to as average. The mean is calculated by adding up a group of numbers and then dividing the sum by the count of those numbers.

In Microsoft Excel, the mean can be calculated by using one of the following functions: AVERAGE, AVERAGEA, AVERAGEIFS, and AVERAGEIF.
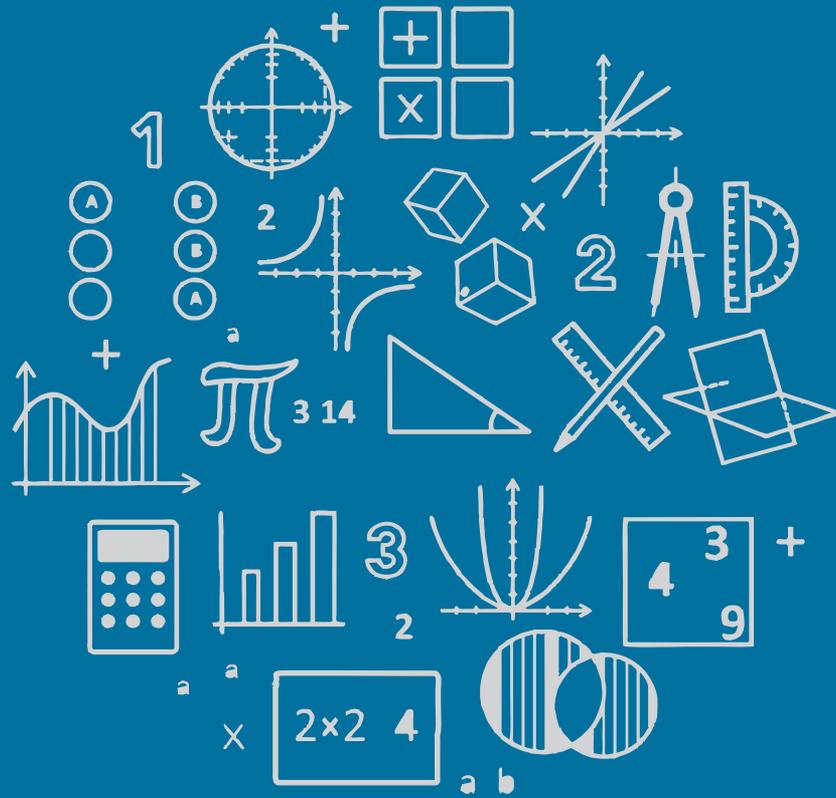
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