



South Sudan

# Secondary ICT

Information Communication Technology  
Student's Book

# 2

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# Secondary ICT

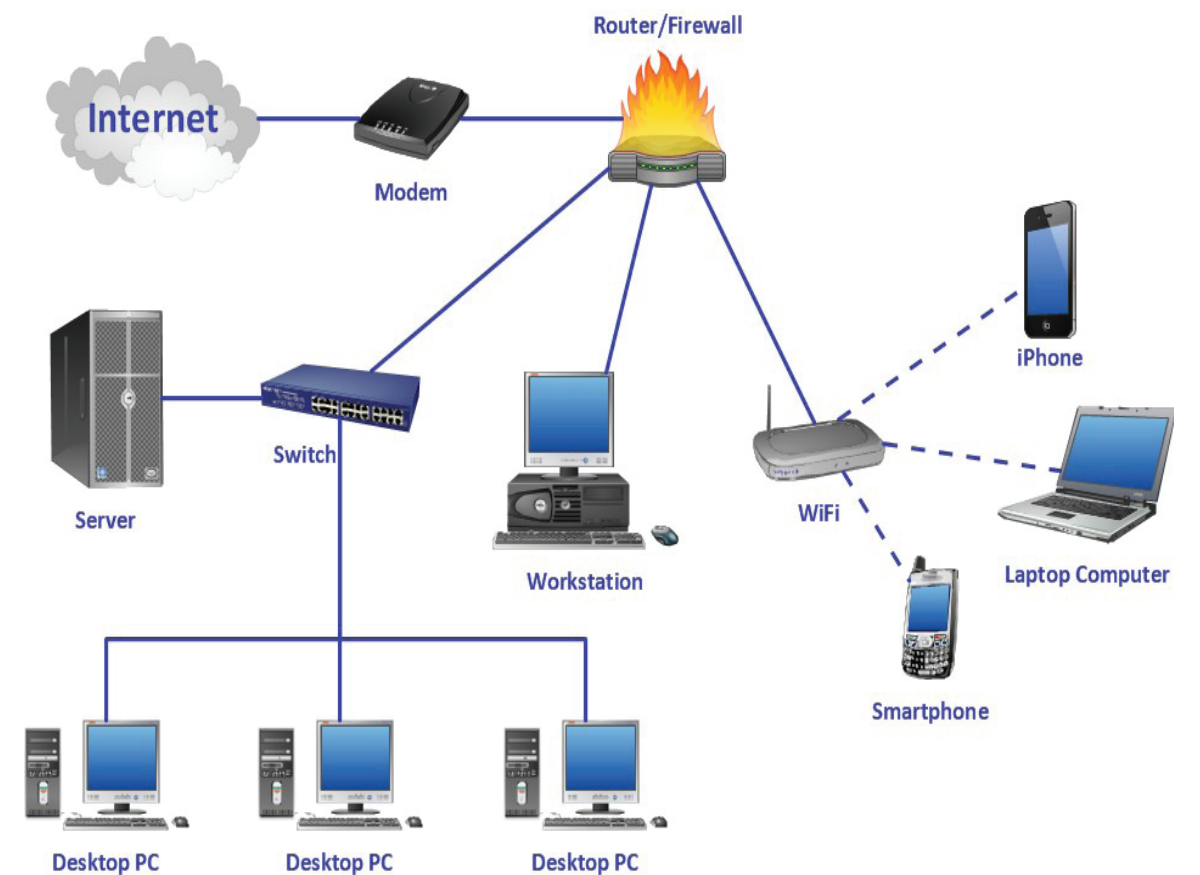
Information Communication Technology  
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# 2



Secondary Information Communication & Technology 2

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# ICT STUDENT'S BOOK 2

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## FOREWORD

I am delighted to present to you this textbook, which is developed by the Ministry of General Education and Instruction based on the new South Sudan National Curriculum. The National Curriculum is a learner-centered curriculum that aims to meet the needs and aspirations of the new nation. In particular, it aims to develop (a) Good citizens; (b) successful lifelong learners; (c) creative, active and productive individuals; and (d) Environmentally responsible members of our society. This textbook, like many others, has been designed to contribute to achievement of these noble aims. It has been revised thoroughly by our Subject Panels, is deemed to be fit for the purpose and has been recommended to me for approval. Therefore, I hereby grant my approval. This textbook shall be used to facilitate learning for learners in all schools of the Republic of South Sudan, except international schools, with effect from 4th February, 2019.

I am deeply grateful to the staff of the Ministry of General Education and Instruction, especially Mr Michael Lopuke Lotyam Longolio, the Undersecretary of the Ministry, the staff of the Curriculum Development Centre, under the supervision of Mr Omot Okony Olok, the Director General for Quality Assurance and Standards, the Subject Panelists, the Curriculum Foundation (UK), under the able leadership of Dr Brian Male, for providing professional guidance throughout the process of the development of National Curriculum and school textbooks for the Republic of South Sudan since 2013. I wish to thank UNICEF South Sudan for managing the project funded by the Global Partnership in Education so well and funding the development of the National Curriculum and the new textbooks. I am equally grateful for the support provided by Mr Tony Calderbank, the former Country Director of the British Council, South Sudan; Sir Richard Arden, Senior Education Advisor of DfID, South Sudan. I thank Longhorn and Mountain Top publishers in Kenya for working closely with the Ministry, the Subject Panels, UNICEF and the Curriculum Foundation UK to write the new textbooks. Finally, I thank the former Ministers of Education, Hon. Joseph Ukel Abango and Hon. Dr John Gai Nyuot Yoh, for supporting me, in my previous role as the Undersecretary of the Ministry, to lead the Technical Committee to develop and complete the consultations on the new National Curriculum Framework by 29 November 2013.

The Ministry of General Education and Instruction, Republic of South Sudan, is most grateful to all these key stakeholders for their overwhelming support to the design and development of this historic South Sudan National Curriculum. This historic reform in South Sudan's education system is intended to benefit the people of South Sudan, especially the children and youth and the future generations. It shall enhance the quality of education in the country to promote peace, justice, liberty and prosperity for all. I urge all Teachers to put this textbook to good use.

May God bless South Sudan. May He help our Teachers to inspire, educate and transform the lives of all the children and youth of South Sudan.



Deng Deng Hoc Yai, (Hon.)

Minister of General Education and Instruction, Republic of South Sudan

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## Learning Outcomes

The learners should share what they already know about computer networking, intranet and internet, file sharing and network application software such as MS Outlook.

In small groups and individually they should develop an understanding that a network is a set of computers connected together to share data, facilities and other resources.

They should learn individually and in small groups how to manage contacts, set up common events in the calendar (meeting schedules), create task lists and share common folders and files in an intranet environment (e.g. Microsoft Outlook).

As a class they should understand the opportunities that computer networks offer in communications and collaboration, and the risks associated with it. They should understand and contrast internet and intranet, describe how file sharing works in an intranet set up, and explain how network application works.

## Key inquiry questions

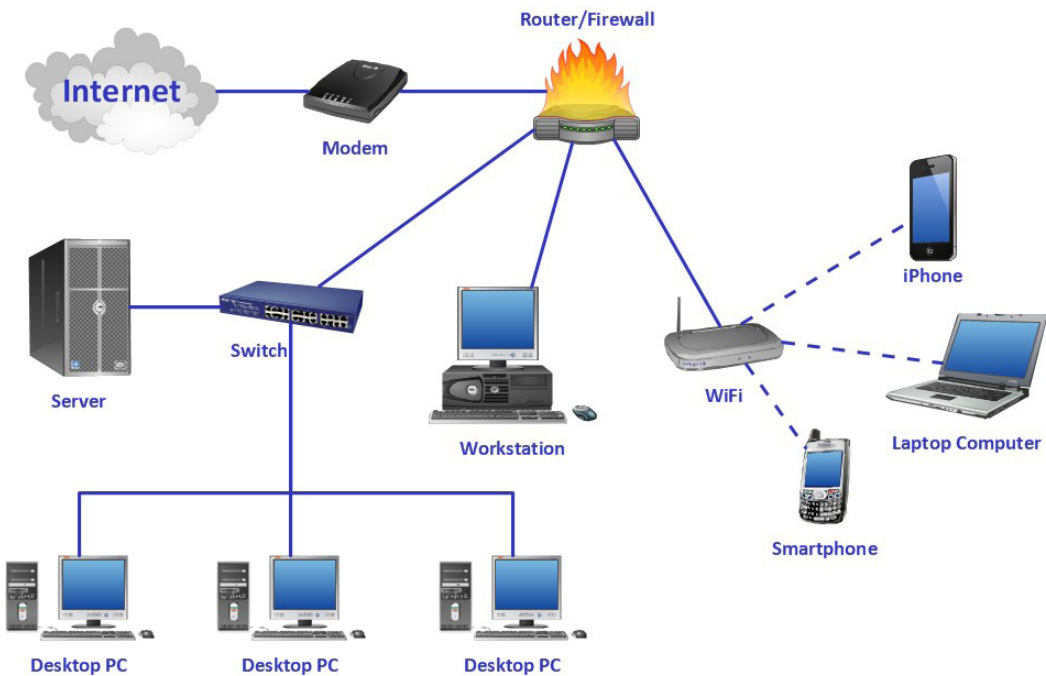
- Why are computer networks important now and in the future?
- Why do organizations and institutions develop and depend upon intranet?



# 1.0 Introduction to computer networks

A computer network is a collection of computers and other hardware components interconnected by communication channel that allow sharing of resources and information.

Computers on a network are called nodes. This is a device capable of sending or receiving data generated by other nodes on a network. Addresses on the other hand are numeric quantities that are easy for computers to work with. Each node has a unique address.



*Figure 1. A computer network illustration.*

Connection between computers can be done through cables, commonly the Ethernet cable or through radio waves. Networks are used to perform various functions. These functions include:

- Making information readily available among users in a network.
- Helping in sharing of files or documents across the network.

- A network enables the sharing of computer hardware e.g. Printers among the multiple users in a network.
- Makes it possible to share software on remote systems.
- Allows for communication via video, email, among many others.

A computer network is also called a data network. The most common form of a network is the internet. A network must be able to meet certain standards as outlined below:

1. **Performance** - this the speed at which a computer network operates.

Computer performance can be measured in two major ways:

- **Transit time** - This is the time taken to travel a message from one device to another. The shorter the transit time the better the performance of the computer network.
  - **Response time** -It is the time taken between enquiry and response. The faster a replay is gotten after it has been requested through a network then the more efficient a network is.
2. **Security:** This refers to the protection of data from access by unauthorized or unintended users. In a network data passes through many layers and can hence be tracked, therefore security in any computer network is paramount.
  3. **Reliability:** It is the ability to depend upon the computer network. This means that the frequency at which a computer network fails should be low making the network reliable.

### **History of earlier computer networks**

- The earliest examples of computer network was a network of communicating computers that functioned as part of the U.S military's semi-Automatic Ground Environment (SAGE) radar system.
- In 1969, the University of California at Los Angeles, the Stanford Research Institute, the University of California at Santa Barbara and the University of Utah were connected as part of the Advanced Research Projects Agency Network (ARPANET) project. It is this network that evolved to become what we now call the internet.
- In the 1980s access to the ARPANET was expanded. The internet protocol was suite (TCP/IP) was introduced as the standard networking protocol on

the ARPANET. Commercial internet service providers (ISPs) began to emerge in the late 1980s.

- In March 2000, Tele west launched home ADSL-asymmetric digital subscriber line. In 2002 there were fewer than 200,000 broad band users this grew to over 13 million some few years later.
- In 2005 an online file sharing and personal cloud content management service for business was launched.in 2011 fiber-optic broadband make broadband speeds reach 100mbps.This leads to end users needing better routers to match the broad speed. In 2014 the new WI-FI standards 802.11ac launches, offering faster speed of over 2 Gbps compared to 450mbps of the previous 802.1n standard.

Currently, the market has evolved and the demand for wireless continues to grow as smart home tech becomes more mainstream.

### ***Activity 1.1***

As computers networks evolved, the computers have at the same time become more complex. Find out what the technological changes were, that allowed for different computer generations. Work with your teacher.

In groups discuss and find out how these eras impacted on computer networks:

1<sup>st</sup> generation - vacuum tubes (1940-1956)

2<sup>nd</sup> generation – transistors (1956-1963)

3<sup>rd</sup> generation – integrated circuits (1964 -1971)

4<sup>th</sup> generation – microprocessor (1972-2010)

5<sup>th</sup> generation – artificial intelligence (2010 onwards)

## Benefits of computer networks

Networks make computers and their users capable of being connected together. Among the benefits of computer networking include:

- **Resource sharing**-Networks are capable of sharing one resource, such as a printer, for several computers. This allows many separate computers to access a single network resource. In the long run this saves money and space for the organization.
- **Data sharing** - Computer networks makes it easy to share documents. The type of server that stores files is called a file server. Data can be in the form of text, images, numbers or characters.
- **Cost efficiency** - Computer networking helps one to use software products available in the market by installing them in the server and sharing them among various workstations hence saving cost.
- **Flexibility** - Computer networking is known to be flexible as it gives users the chance to explore vital things like software without affecting their functionality. It also allows people to have the accessibility to all information they need to get and also share.
- **Management of data** - Computer networking helps in centralization of data from all the user systems to one system where it can be managed in an easier and better way.

### *Activity 1.2*

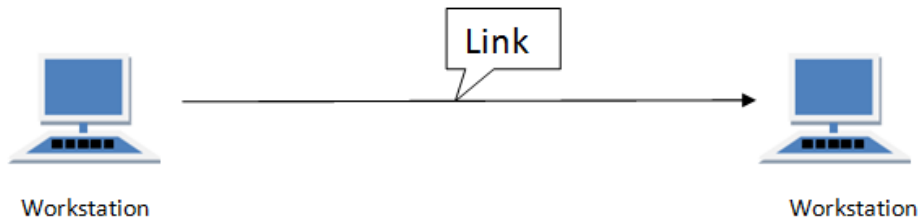
Discuss the challenges that small companies are likely to face while using computer networks in South Sudan. Give suggestions on how you can solve these challenges.

## Connecting devices in computer Networks

As stated when introducing the topic, a network is a connection made through joining links among two or more devices. These devices may range from a computer to a printer or any other device that is capable of sending or receiving data. There are two ways of connecting these devices in a network.

1) Point-to-point connection. (PPP)

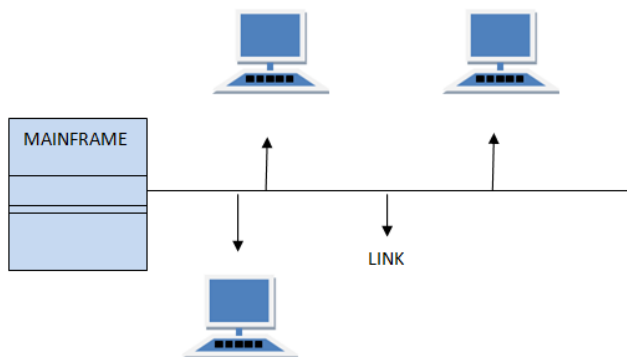
It is a communication which is used as a communication link between two devices. PPP connects two routers directly without any host in between. An example of ppp connection is a computer connected to a printer or connection between remote control and television for changing the channels.



*Figure 1. Point to point connection*

2) Multipoint connection.

Multipoint connection is a connection where two or more devices share a single link. In this connection all data sent by one user is received by all the other users. Multipoint connection is also referred to as multi-drop configuration.



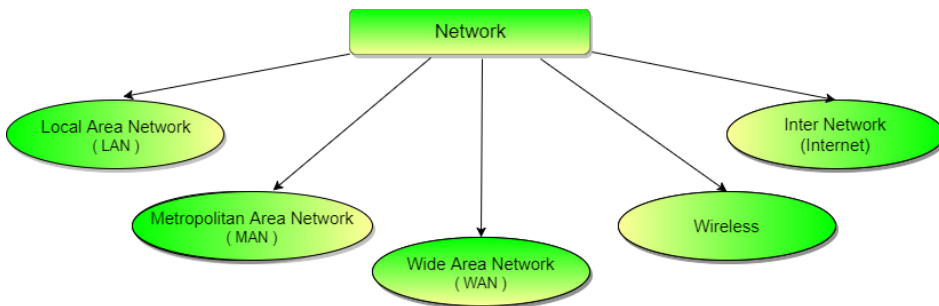
*Figure 1.3 Multipoint configuration.*

## 1.2 Types of computer networks

Networks are communication systems designed to convey information from the origin to a particular destination. Networks can be understood in two ways:

- **Local** -as in local area network, which covers a small area and have a relatively small number of users.
- **Global**- which cover long distance and have an unlimited number of users.

A computer network is interconnection of various computer systems located at different places. Two or more computers are linked together for the purpose of sharing resources and information.



*Figure 1.4 Computer Networks.*

### 1.2.1 Personal Area Network (PAN)

It is the smallest and the most common type of network. It consist of a wireless modem, a computer or two phones, a printer and it revolves around one person. PAN are mostly found in small offices or residences and they are mostly managed by one person from a single device.

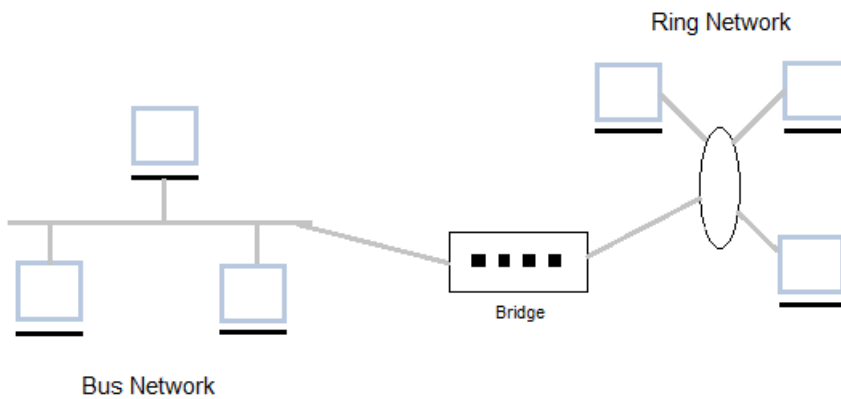
#### **Activity 1.3**

Create a personal area network in your class.

## 1.2.2 Local Area Network (LAN)

A local area network (LAN) connects a group of computers in close proximity to each other such as in an office building, a school, or a home to enable sharing of resources and information. LAN covers a small geographical area. The various devices in LAN are connected to the central devices. Most local area networks are built with hardware such as Ethernet cables, network adapters, and hubs. LAN may also be installed using wireless technologies.

Among the major difference between LAN and WAN is that LAN has a higher rate of data transfer and also it is limited in its geographical range.



*Figure 1.5. Different topologies interconnected in a LAN*

Every network, system or device has its advantages and disadvantages. LAN is no exceptional. Its benefits include:

- Easy and cheap communication as data can be transferred easily over networked computers.
- Helps in centralization of data since all the data in the network can be saved on the hard disk of the server computer.

- Helps in resource sharing where by computer resources like printers, modems and hard disks can be shared using LAN.
- Ensures security of data since it is stored on server computer which central this also helps in managing the data.
- Aids in sharing of applications software this proves cheaper instead of purchasing separate licensed software for each user in a network.
- LAN provides the facility to share a single internet connection among all the LAN users. Internet sharing helps save cost on internet expenses.

The major disadvantages of LAN are:

- The initial set up cost of installing LAN is high.
- The data may be accessed by unauthorized personnel especially if the centralized data is not managed properly.
- LAN is limited in terms of the geographical area that it can cover. It covers a small area like a building or office.
- It requires a lot of maintenance job since there are a lot of software or hardware failures.
- It has no privacy since the LAN administrator may check the personal data files for each and every LAN user.

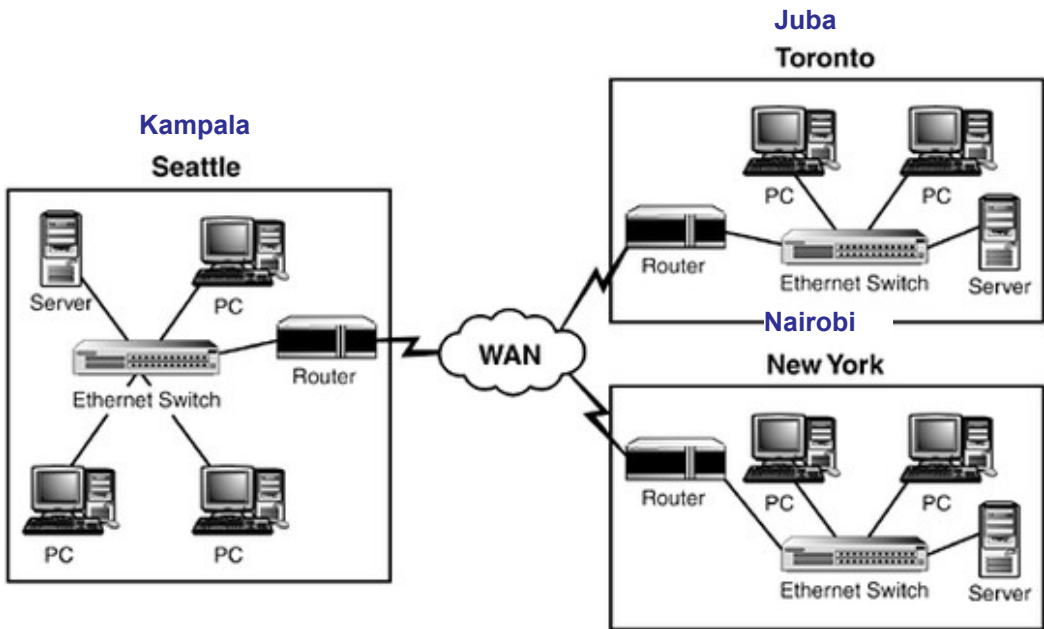
### 1.2.3 Wide Area Network. (WAN)

It usually refers to a network which covers a large geographical area, such as a state or a country. It operates on low data rates. A WAN can contain multiple smaller networks, such as LANs or MANs. The Internet is the best-known example of a public WAN.

#### **Activity 1.4**

In pairs, compare and contrast between local area networks LAN and wide area networks WAN.





WAN provides lots of benefits that help users to communicate with the world around them. These benefits include:

- Data can be shared on the Network. This ensures that no users get information before than others.
- Ensures messages are sent quickly to everyone on the network.
- It covers a large geographical area.
- It helps in sharing software and resources with those on the network.
- Expensive hardware like printers can be shared without having to buy for each computer.

Like any other network, WAN has some setbacks or disadvantages. Among these drawbacks are:

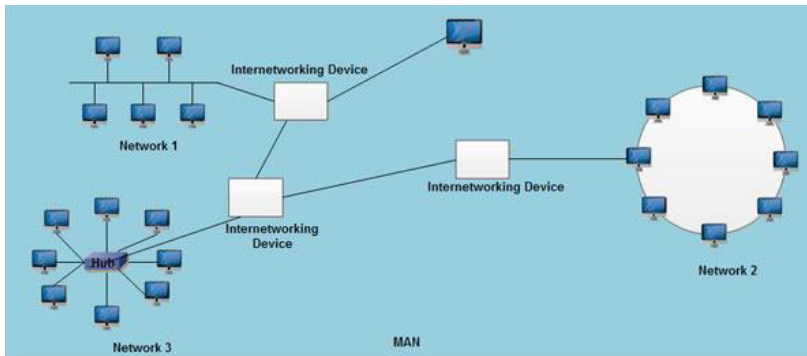
- Requires a lot of security to ensure that outsiders do not enter and disrupt the network.
- The initial cost of setting up a WAN is very high. The larger the network is the more expensive it is to set up.
- It also requires full time supervisors and technicians to maintain it once it has been set.
- It is more prone to hackers and viruses since it is available to many people.

### Activity 1.5

In groups, find out why WAN is not suitable for use in the rural areas of South Sudan, and propose an appropriate alternative. Prepare to defend your suggestion to the class based on what you know about various types of computer networks.

## 1.2.3 Metropolitan Area Network (MAN)

A MAN is a relatively new class of network. It consists of a computer network across an entire city, college campus or small region. Hence a MAN is basically bigger than a LAN even in terms of the geographical area though it rarely extends beyond 100 km. It can also be a means of connecting a number of LANs to form a larger network.



*Figure 1.6 Metropolitan area networkin.g*

This type of networking has many benefits. Among the advantages of Metropolitan Area Network include:

- It is efficient and provides fast communication.
- It can be used when transmitting information in both direction simultaneously.
- It covers a relatively larger area e.g. a city.
- It can be used to interconnect a number of local area networks.

Requiring a lot of cables and being difficult to secure the network from hackers are among some of the disadvantages of Metropolitan area network.

A wireless network is a computer network that uses wireless data connections between nodes. The wireless networks are becoming more important because the wired connection are limited. For instance they cannot be installed in cars or aero planes. Wireless networks can have many application s. A very common example is the portable office.

Wireless networks can be divided into three main categories. These include:

1. System interconnection:

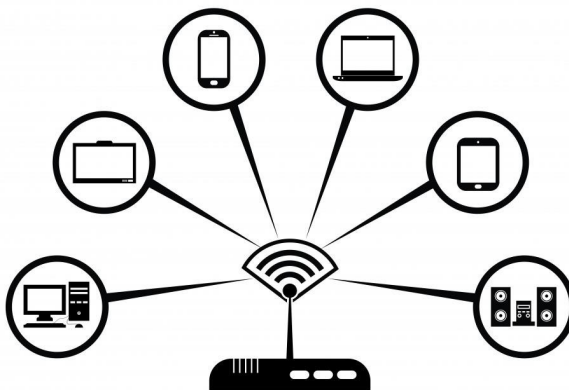
This involves interconnecting various components of the computer using short range radio. The most common is the use of Bluetooth. This helps connect various components such as the monitor, keyboard, printer, and also mouse without necessarily using wires. It is also able to connect cameras, scanners, headsets among many other devices to the computer by bringing them close to the computer.

2. Wireless LANs:

They provide wireless network communication over short distances using radio or infrared signals instead of traditional network cabling. In this case each computer has a radio modem and antenna with which it can communicate with other systems.

3. Wireless WANs:

Wireless WAN is a wide area network in which separate areas of coverage or cells are connected wirelessly to provide service to a large geographic area. An example of this kind of network is the radio network which is used for cellular phones.



*Figure 1.7 Wireless WAN.*

## Exercise 1

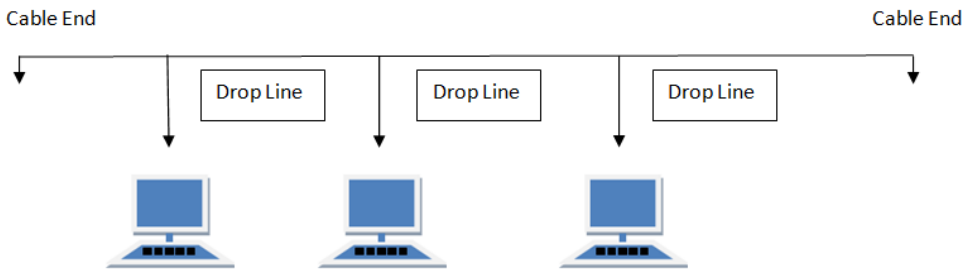
1. State, with reasons, two items of hardware that could be needed for a personal computer to connect to the Internet.
2. A company is having a sixteen-station Local Area Network (LAN) installed.
  - a) Describe what is meant by the term Local Area Network.
  - b) Give two suitable topologies for the LAN and, for each one, draw a labelled diagram to show its structure.
  - c) State three items of hardware and/or software that could be needed if the LAN is to be connected to the Internet.
3. There are ten employees in a local estate agent's office. Each employee uses a networked PC on a Local Area Network (LAN).
  - a) Give four benefits to the office of using a network rather than stand-alone PCs.
  - b) The office is part of a national chain that is connected together over a Wide Area Network (WAN). Explain the difference between a LAN and a WAN.

## 1.3 Networks topology

A Network Topology is the arrangement with which network devices are connected to each other. Topologies may define both physical and logical aspect of the network. Topologies can also be defined as the explanation of a network organization, linking various nodes through lines of connection. Network topologies are in many types. These may include:

### 1.3.1 BUS Topology

It is a network in which every computer is connected to a single cable or a common medium. It has two end points. Each communication device on the network transmits electronic messages to other devices. If these messages collide, the sending device waits and then tries to transmit again.



*Figure 1.8 Bus topology*

Bus topology has many benefits. Among these advantages are:

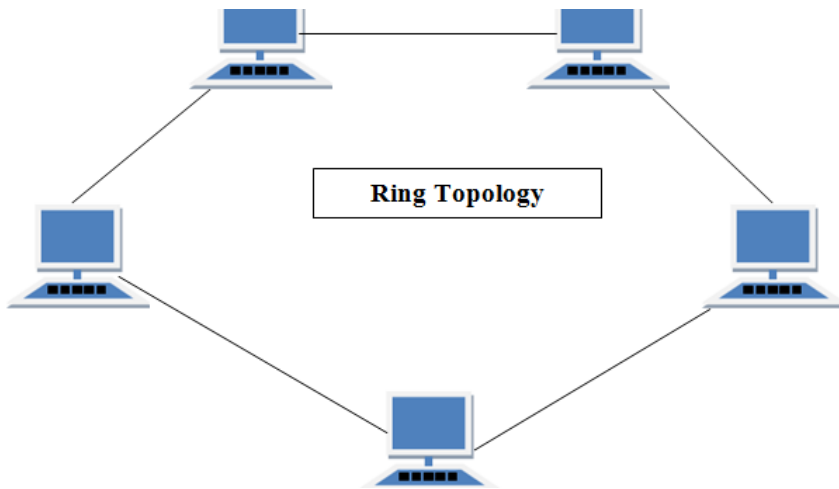
- It is cost effective.
- Suitable for use in small networks.
- It normally easy to expand by joining cables together.
- It requires a smaller cable as compared to other network topology.

Bus topology like any other network topology also has its challenges. These include:

- It is slower in comparison to ring topology.
- If the cable fails then the whole network fails.
- Its performance efficiency decreases with increase in nodes.

### **1.3.2 RING Topology**

In this case, each computer is linked to another computer, the last computer is then connected to the first one to form a continuous loop. Signals are hence sent around until they reach the accurate destination since there is no central server.



*Figure 1.9 Ring topology.*

Features of Ring Topology include:

- Data is transferred in a sequence manner.
- Transmission is one way but can be made to two way by having 2 connections between each node. This is called dual ring topology.
- In dual ring topology, there is two ring network where data flows in opposite direction.in case of one ring breaking down the second rings acts as back up and keeps the network running.
- Ring topology has a number of repeaters with large number of nodes. This helps prevent data loss as data moves through the nodes.

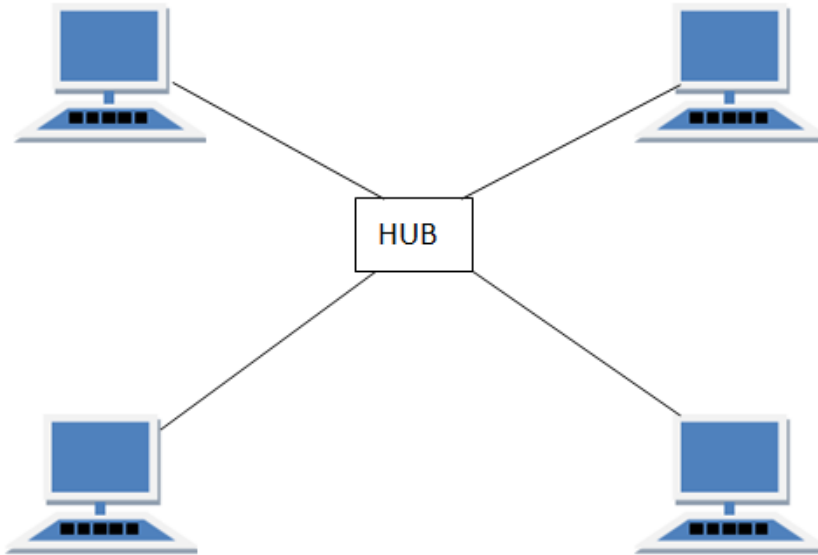
The advantages of using ring topology include

- It is cheap to install.
- It is not affected by high traffic.
- Good for handling high capacity traffic since every computer acts as a booster of the signal.

Adding computers in ring topology is cumbersome since failure in one computer affects the whole network. Troubleshooting in topology set up is also difficult to carry out.

### 1.3.3 Star topology

All computers are connected to a central device using the point to point connection. The central device is called the hub, switch or router.



*Figure 1.10 Star topology.*

In the star topology, the hub, switch or router acts as the repeater for data flow. Computers in star topology are connected independently to the central hub. These Computers are connected using optical fiber, twisted pair or coaxial cable. Among the advantages of star topology are:

- Startup costs are low.
- Easy to add new nodes to the network.
- Upgrading the hub is easy.
- Fast performance with few nodes and low network traffic.
- If one connection between a computer and the hub fails, the connections are not affected.

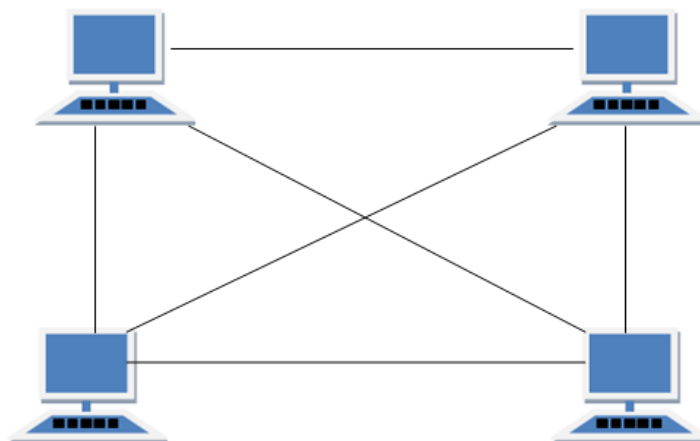
In star topology if the central hub fails, the entire network goes down since they are inter connected. Star topology also requires more cables in comparison to other topologies like the bus topology hence becoming more expensive.

### 1.3.4 MESH Topology

It is a point to point connection to other nodes. In this setup every node participating in the network is connected to every other node.

There are two major types of Mesh Topology:

1. **Partial mesh**-This is where some systems are connected as in the case of mesh topology but some devices are only connected to two or three devices.
2. **Full Mesh Topology** -In this set up each node is connected to each other.



*Figure 1.11 Mesh topology.*

In the mesh topology set up data takes the shortest path to reach its destination. Mesh topology presents many benefits these may include:

- It is robust hence if one connection fails, the others remain intact.
- Security and privacy is high since data travels through a dedicated connection.



- Can handle very high volume traffic due to presence of dedicated links.
- Fault identification is easy.

As in the case with any topology, mesh topology has shortcomings. Among the shortcomings are:

- Requires a lot of cables hence making it expensive.
- Most of the connections become redundant since there are several different paths for data to travel from one node to another.
- Installation and configuration is difficult.

### **Activity 1.6**

In groups, what conclusions can you draw on tree topology and hybrid topology? Can you make a distinction between the two?

### **Exercise 2**

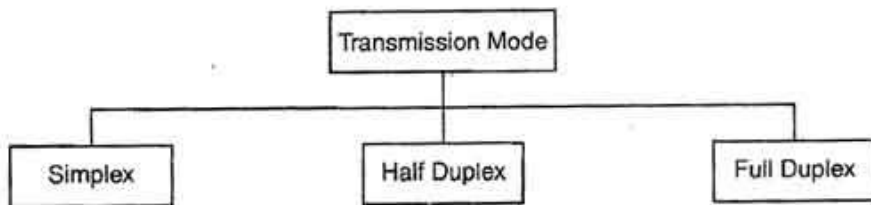
1. Physical or logical arrangement of network is called?
2. In which type of topology is there a central controller or hub?
3. Which type of topology requires multipoint connection?
4. List 6 different network topologies?
5. List the advantage and disadvantage of Bus topology?
6. List the advantage and disadvantage of Star topology?
7. List the advantage and disadvantage of Ring topology?
8. What are the advantage and disadvantage of mesh topology?

## 1.4 Data transmission Modes in Computer Networks

Data transmission mode defines the direction of the flow of information between two communication devices. It is also called communication mode. Networks are designed to allow communication to occur between individual devices that are interconnected.

Data transmission modes can be in three forms namely:

- Simplex Mode.
- Half-Duplex Mode.(HDX)
- Full-Duplex Mode.(FDX)



*Figure 1.12 Data transmission modes.*

The data is sent only in one direction. Only one of the two devices on a link can transmit, the other can only receive. This means that there is no mechanism for information to be transmitted back to the sender. The simplex mode uses the entire capacity of the channel to send data in one direction. An example of a simple mode is a Communication between a computer and a keyboard.

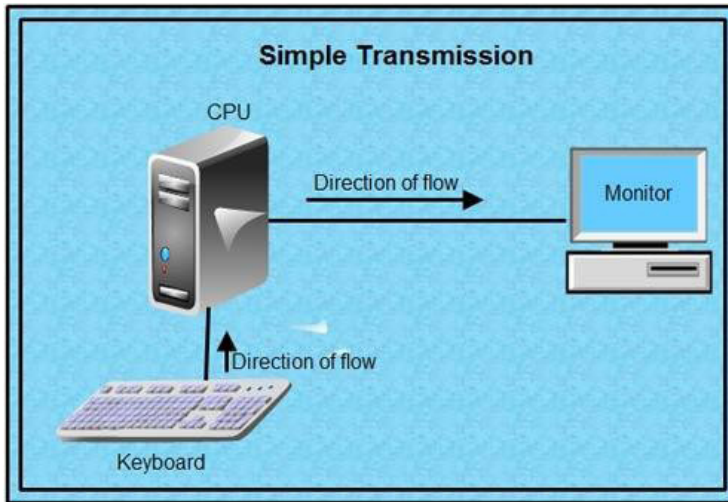


Figure 1.13 Simplex mode.

### 1.4.1 Half-Duplex Mode (HDX)

Half-duplex data transmission means that each station can transmit data in both directions, but not at the same time. That means that when one is sending the other device is receiving and vice versa. The half-duplex mode is suitable in cases where there is no need for communication in both direction at the same time. For example a walkie-talkie.

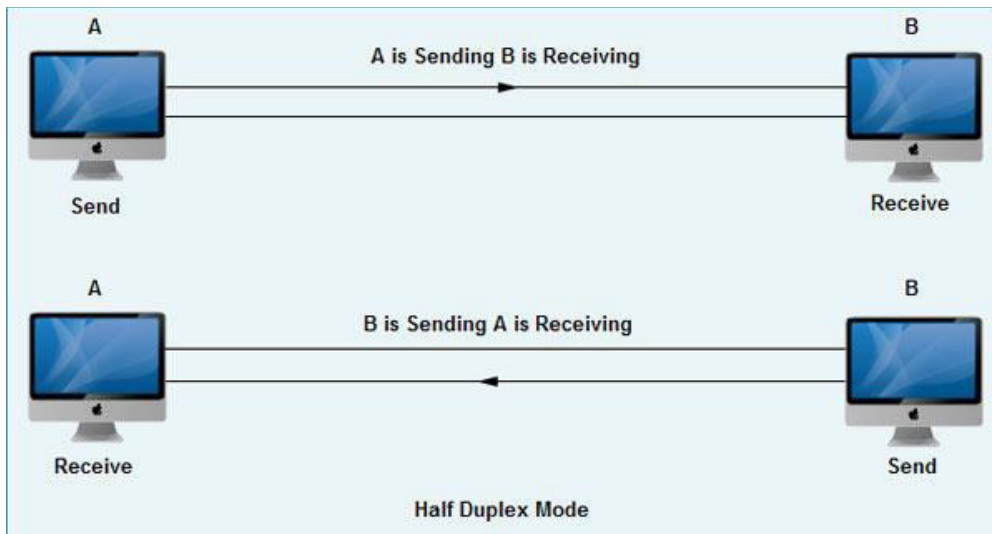


Figure 1.14 Half Duplex mode.

A full duplex system can send data at the same time in both directions on the transmission path. This means that it is bidirectional. This mode ensures that the entire capacity of the channel is utilized for each direction. It is more effective where communication is required in both directions and at the same time.

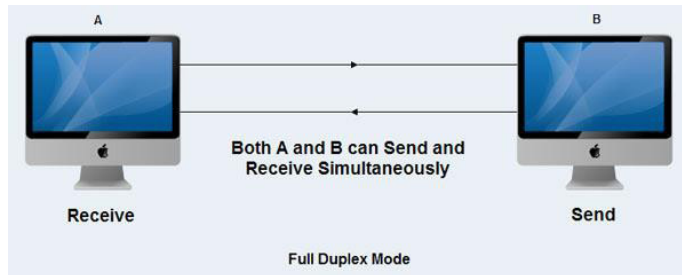


Figure 1.15 Full duplex mode.

## 1.5 Intranet

An intranet is a network that is restricted to one organization. Intranet consists of many interlinked local area networks and also use leased lines in the wide area network. An intranet can also be understood to be an internal or restricted access network. It is very similar to the Internet except it is used within organizations and businesses. The intranet uses the same types of web technologies that the normal Internet or extranet uses, only that the content and data that is transmitted and received occurs internally.

### 1.5.1 Comparison between internet and intranet

Internet	Intranet
Internet is wide network of computers and is open for all	Intranet is also a network of computers designed for a specific group of users.
Internet itself contains a large number of intranets.	Intranet can be accessed from Internet but with restrictions
The number of users who use internet is Unlimited.	The number of users is limited.
The Visitors traffic is unlimited.	The traffic allowed is also limited.
Internet contains different source of information and is available for all.	Intranet contains only specific group information

Therefore the Internet is an open, public space, while an intranet is designed to be a private space. An intranet may be accessible from the Internet, but it is protected by a password and accessible only to authorized users.

### **Intranet and internet also have similarities.**

- Both Internet and Intranet can be accessed using any browser.
- They use Internet Protocols for transferring data.
- Both of them are used to share information with the users over the network.

Hence, in conclusion both Internet and Intranet have some similarities and differences as well. The Internet is a collection of various LAN, MAN, and WAN whereas, Intranet mostly is a LAN, MAN or WAN.

### **Activity 1.7**

In groups, discuss how various international organizations working South Sudan could develop and depend upon intranet.

## **1.5.2 File sharing in an intranet set up**

The main purpose of an intranet is to share company information and computing resources among employees. An intranet can also be used to facilitate working in groups and for teleconferences

When using windows the following process is followed when one wants to share files:

1. Locate the folder you want to share and right click on it.
2. Choose “Share with” and then select “Specific People”.
3. A sharing panel will appear with the option to share with any users on the computer or your home group. You can also choose to share with “Everyone”, which means the files will be accessible on your local network. If you want to choose this option, you can find it by clicking on the drop down menu towards the top of the panel.
4. After making your selection, click Share.

After you have clicked Share, Windows will take a moment to set up your new shared folder and it will be accessible from other computers on your local network. To access it, simply look for your computer's name in the Network section on your other computer. When you choose it, you will have a new option to connect to this folder.

### **How file sharing works in a network.**

Sharing of files in network can be done in two ways:

1. Peer to peer file sharing.
2. File synchronization

#### **Peer to peer file sharing. (P2P)**

P2P file sharing is the process of sharing and transferring digital files from one computer to another using P2P software. In a P2P network, each 'peer' is an end- user's computer connected to the other 'peer' via the Internet, without going through an intermediary server. P2P programs can be an efficient way to share large files with others, such as personal video recordings or large sets of photos. P2P is also used to facilitate direct communications between computer or device users.



## Risks of Using P2P File Sharing

There are various risk associated with sharing files using p2p. These risks introduce security risks that may put your information or your computer in danger. These risks include:

- Exposure of sensitive or personal information -Vast amounts of personal information may be shared and stolen through P2P networks. These may include names, birthdates and Social Security numbers. Once information has been exposed to unauthorized people, it is difficult to know how many people have accessed it.
- Prosecution - Files shared. through P2P applications may include pirated software, copyrighted material, or pornography.
- Denial of service - Downloading files causes a significant amount of traffic over the network. This activity may reduce the availability of certain programs on your computer or may limit your access to the internet.
- Susceptibility to attack -The probability of exposure to Trojans and viruses found in shared files is high. They attack your computer by taking advantage of any vulnerabilities that may exist in the P2P application.

Reducing the risks when using P2P file sharing.

Only use legal file-sharing services. In order to avoid legal issues like sharing copyrighted materials like music always use legal downloading sites.

Be alert when installing file-sharing software. When installing a file sharing software ,it good to be cautious to ensure that you are not accidentally sharing your private content with the outside world.

Make sure you have up-to-date security software on your computer.

Close the P2P connection when you're finished. When you close a file-sharing software program's window, your connection to the P2P network may remain active. This could give others access to your shared files, which in turn may increase your security risks.

## Using file synchronization.

Syncing is the process of ensuring that **computer files** in two or more locations are updated via certain rules. It may be understood in two ways. The first way is

one-way file synchronization where the updated files are copied from a particular location to one or more target locations, but no files are copied back to the source location and second is the two-way file sync, where updated files are copied in both directions, usually with the purpose of keeping the two locations identical to each other. It is commonly used for home backups on external hard drives.

### 1.5.3 Using network application in resource sharing

Shared resources, also known as network resources, refer to computer data, information, or hardware devices that can be easily accessed from a remote computer through a local area network (LAN) or intranet. Successful shared resource access allows users to operate as if the shared resource were on their own computer. The most frequently used shared network environment objects are files, data, multimedia and hardware resources like printers, fax machines and scanners.

#### **Activity 1.8**

In pairs, find out how network application can be used to ease resource sharing within and among various organizations in South Sudan.

### 1.6 Microsoft outlook

Microsoft outlook is a personal information manager provided for by Microsoft office. Microsoft outlook can be used by multiple users in an organization, to share mailboxes and calendars, exchange public folders, SharePoint lists, and meeting schedules.



*Figure 1.18 Microsoft outlook icon.*



## 1.6.1 Opening Outlook

When using Microsoft windows, click the Start button, click All Programs, click Microsoft Office, and then click Microsoft Outlook.

## 1.6.2 Creating and managing contacts

For Microsoft Outlook to be useful, it should have contacts. It is advisable to have contacts already in Outlook, so as to send messages faster.

In order to manage contacts in Microsoft outlook, one requires to create an address book. If you don't have an address book to import, you can start adding contacts manually.

The screenshot below shows a portion of a new address book which is empty.

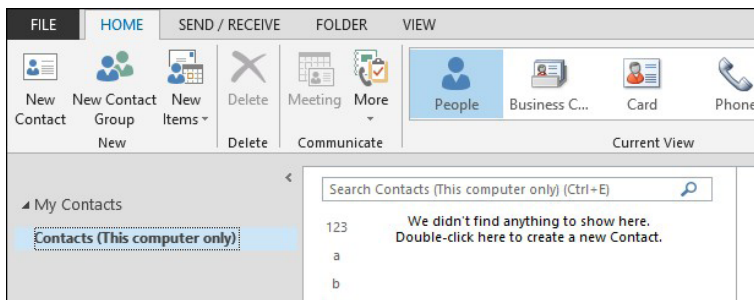
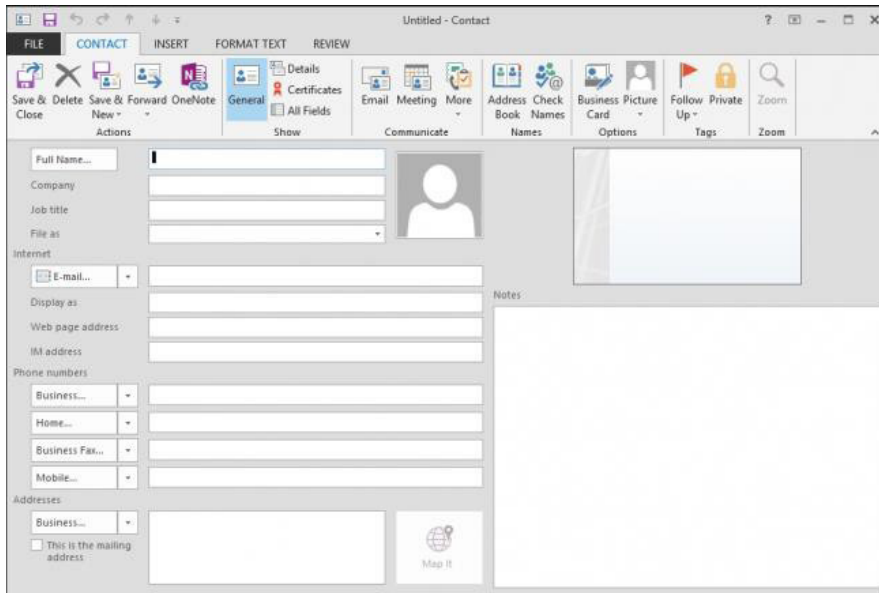


Figure 1.19 Address book

1. To start, click the “New Contact” button which will open a new contact window. Like the one in the next page.



2. Fill in the contact form.
3. After finishing entering the contact or contacts, you may either click “Save & Close” or you can click “Save & New” to generate another contact.

### How to edit a contact or contact list.

After saving a contact or a contact list one may require to make changes to the list. This can be done through editing the contact or the contact list. In order to edit a contact or a list a procedure has to be followed. The procedure involves:

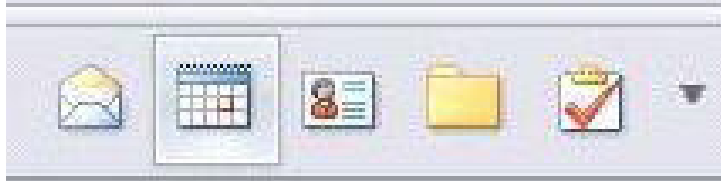
1. In Outlook, select the app launcher then the People tile.
2. Select the contact or contact list that you want to edit, and select Edit.
3. Make the changes that you want.
4. Select Save.

### 1.6.3 Setting up common events in the calendar

In order to set up common events in the calendar, one must be able to access calendar in the Ms Outlook.

Finding your Calendar: Outlook may open directly to your calendar, if not, click on the calendar icon in the lower left hand of the Navigation Pane.

Creating entries on your calendar: Entries will appear on Outlook calendar as appointments, meetings or events.

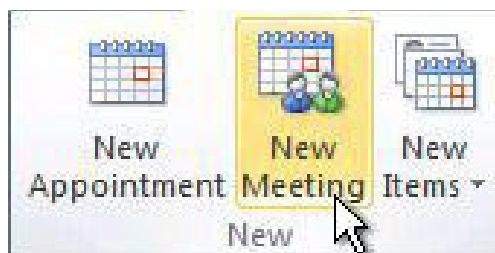


### 1.6.3 Meetings

A meeting is an appointment that includes other people. It can also mean an assembly of people for a particular purpose, especially for formal discussion. Replies of meeting requests appear in the Inbox. Outlook helps one find the earliest time when all the invitees, are free. When you send the meeting request by email, the invitees receive the request in their Inbox, where they can accept, tentatively accept, or decline your meeting by clicking a single button. If your request conflicts with an item on the invitees' Calendar, Outlook displays a notification. If allowed by the meeting organizer, invitees can propose alternate meeting times. If you are the meeting organizer, you can track who accepts or declines the request or who proposes another time for the meeting by opening the request.

### 1.6.4 How to schedule a meeting

1. Click new meeting in the group on the home tab in the calendar.



2. Type a description in the Subject box.
3. Type a description or location in the Location box. The location field is a text field that is not attached to resources entities.

4. In the Start time and End time lists, click the start and end time for the meeting. If you want to schedule meetings based on an alternate time zone, click Time Zones in the Options group on the Meeting tab.
5. In the meeting request body, type the information that you want to share with the recipients. You can also attach files.
6. Click Scheduling Assistant in the Show group on the Meeting tab. The Scheduling assistant helps you find the best time for your meeting.
7. Click Add Others, and then click add from Address Book.
8. Click on the Select Attendees and Resources dialog box, then in the Search box, enter the name of a person, to include at the meeting.
9. Click the name from the results list, click required or Optional and then click OK. Required and Optional attendees appear in the top box on the Meeting tab.
10. To set up a recurring meeting, on the Meeting tab, in the Options group, click Recurrence. Choose the options for the recurrence pattern you want, and then click OK.
11. To change the advance time of the meeting reminder, click reminder on the Meeting tab, in the Options group, and then click the time you want. Click none to turn off the reminder.

### ***Activity 1.9***

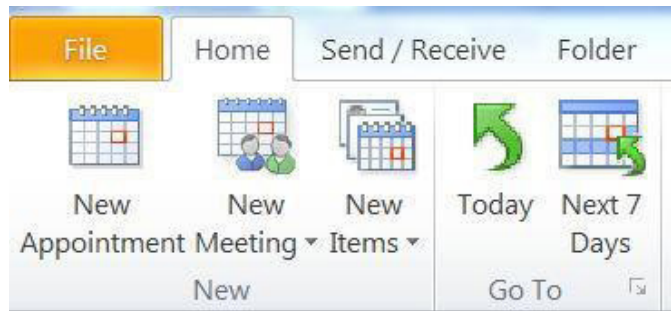
In groups, schedule a meeting of your school debate club using Microsoft outlook. Choose one member of your group to make notes and one to lead the group. After the discussion prepare to feedback main steps you used to schedule the meeting and demonstrate through demonstration.

## **1.6.5 Events**

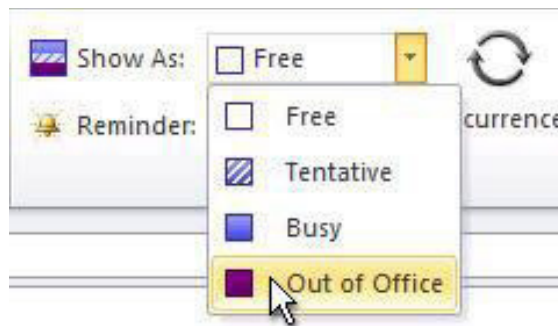
An event is an activity that lasts 24 hours or longer. Some examples of an event include a trade show, a vacation or a seminar. Usually, an event occurs once and can last for one day or several days. An annual event, such as a birthday or anniversary, occurs yearly on a specific date.

How to create an event.

1. On the Home tab of the calendar, click on the new group, click new Items, and then click All Day Event.



2. In the Subject box, type a description of the event.
3. In the Location box, enter the location.
4. To indicate to people who are viewing your calendar that you are out of office instead of free, on the Event tab, in the Options group, click Out of Office



5. If the event lasts longer than one day, change the values in the Start time and End time boxes.
6. Click Save and Close.

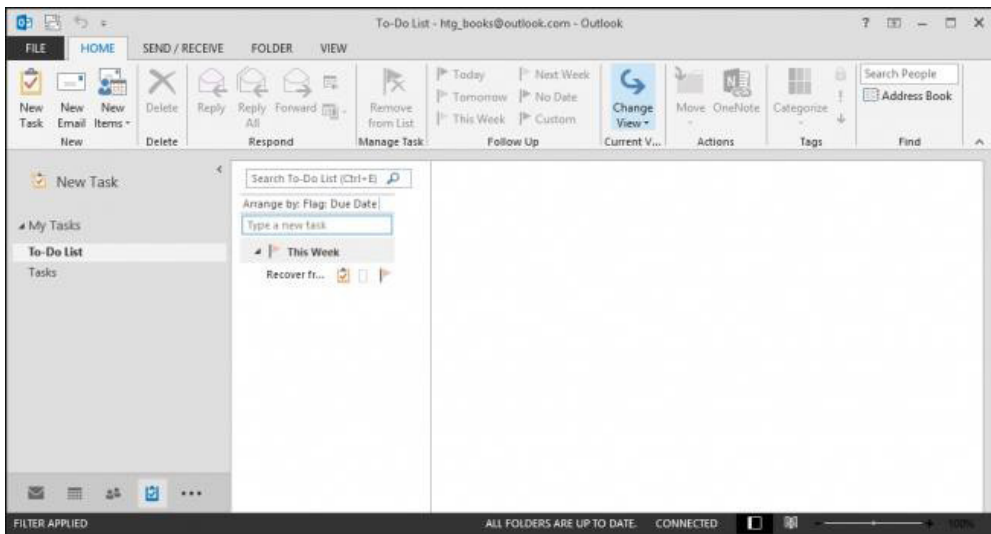
### **Activity 1.10**

Create a meeting invitation, inviting your teacher to a half-hour meeting with you tomorrow at 2:00 PM in your classroom, to discuss what you have learned in class. Send the meeting invitation

## 1.6.6 Creating a task list

MS Outlook helps one make to-do lists consisting of tasks, which you can do all sorts of things, such as setting due dates, reminders, categories, and more.

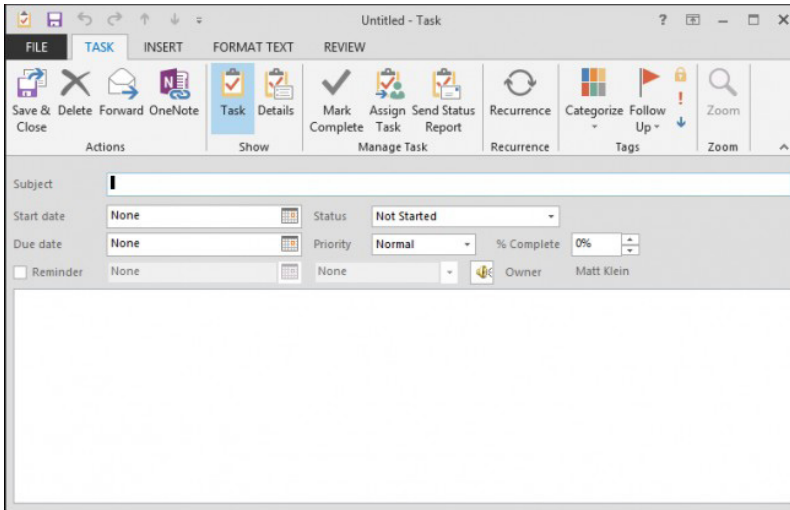
In order to create a task you must open Outlook up to the Tasks view. At the beginning the tasks view is empty if there is no event like the one shown below.



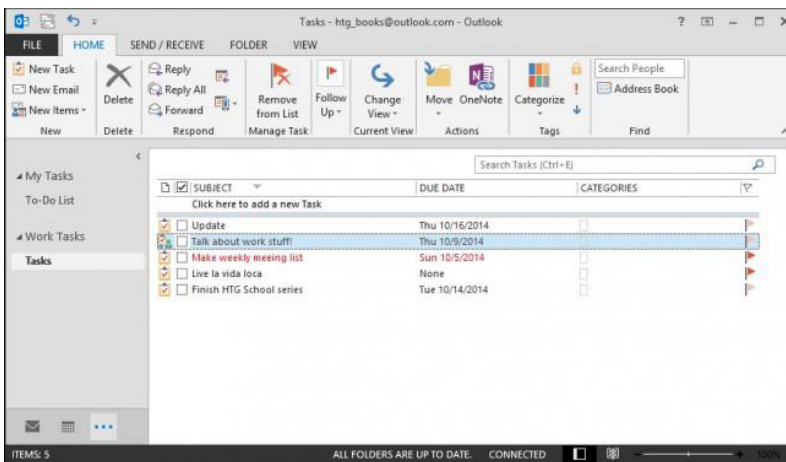
To start, in Ms Outlook there is one task folder group call My Tasks and two sub task folders: To-Do List and Tasks. When you right-click on the top-most folder, you can create a “New Folder Group”.

You can add a quick task by clicking on “Click here to add a new Task” or you can click “New Task” on the Home ribbon.

You then fill out your task and include some basic details and then click “Save & Close.”



After you have created a few tasks, you are able to see them listed in the Tasks view. MS Outlook allows one to do some modifications such as changing the due date or assigning a category. In order to view and edit you need to double-click to open it.



In order to make any changes, click on the “details” button.

Ms Outlook allows one to delete or forward a task if you decide. It also allows one to manage the task, such as marking it complete, assigning it, and sending a status report.

## Key points

### Practical exercise

Step 1: Quick overview of Outlook Menus and Toolbars

Log in to your outlook account.

Step 2: Create a Signature

Under Options, find Messaging Options, and click on “Edit Signature”. Create a basic Signature containing your name and contact information. Click Save and Close, and then check the box next to “Automatically include...” and click Save and Close.

Step 3: Read an email message

Double click on the mail message with the subject “Email etiquette” to read it.

Step 4: Reply to mail

Reply to my “Email etiquette” message. Reply to sender only.

Step 5: File mail message

While viewing the “Email etiquette” message, click on the Move/Copy icon ( ) and select “New” to create a new folder called “Outlook Exercise”. Move this message into this folder.

Step 6: Creating Rules

Create a new Rule named “Exercise” which will automatically file all messages from sender with the name “teacher” into your “Training” folder.

Step 7: Compose an email message and add an attachment

Send a message to your teacher email: with the file on your computer titled “discussion lists” included as an attachment. You may include any additional text, comments, etc. that you want.

Step 8: Creating a contact list



### Exercise 3

1. Under what conditions can two devices be said to be in a network.
2. What are computer network nodes?
3. Which device forwards packets between networks by processing the routing information included in the packet?
4. What is a Link in computer networks?
5. What is point to point link?
6. How does a network topology affect a company's decision in setting up a network?
7. What are the different ways of securing a computer network?



**Remember**

## **COMPUTER NETWORKS**

**Access** - Referring to the ability of a computing device to use data or resources beyond its native capabilities.

**Access List** - List kept by routers to control access to or from the router for a number of services. For example, the list can prevent packets with a certain IP address from leaving a particular interface on the router.

**Adapter** - Hardware that allows a computing device physical access to a network.

**Analog** - Referring to a system or component that uses a system of measurement, response or storage in which values are expressed as a magnitude using a continuous scale of measurement.

**Analog Transmission** - Signal transmission over wires or through the air in which information is conveyed through variation of some combination of signal amplitude, frequency, and phase.

**API** - Application Programming Interface. A set of tools and procedures provided by the programmer of an application so that other programmers can control, exchange data with, or extend the functionality of an application.

**Architecture** - The sum total of all of the specifications, protocols and implementations that define a particular networking system.

**ARCnet** - Attached Resource Computer Network. A 2.5-Mbps token-bus LAN developed in the late 1970s and early 1980s by Datapoint Corporation.

**ARP** - Address Resolution Protocol. The protocol for mapping IP addresses to physical addresses such as Ethernet or Token Ring.

**ARPANET** - Advanced Research Projects Agency Network. Landmark packet-switching network established in 1969. ARPANET was developed in the 1970s by BBN and funded by ARPA (and later DARPA). It eventually evolved into the Internet. The term ARPANET was officially retired in 1990.

**ASCII** - Referring to a standard 7-bit character system that includes the alphanumeric characters and printer control codes.

**Associative Memory**- Memory that is accessed based on its contents, not on its memory address. Sometimes called content addressable memory (CAM).

**Asymmetry** - In networking, a system in which the relationship between two entities is inherently unequal, with each entity restricted to a set of operations and prerogatives defined by its role in the relationship.

**Back End** - Node or software program that provides services to a front end. See also client, front end, and server.

**Bandwidth** - In analog communications, the difference between the highest and lowest frequencies available in the band. In digital communications, bandwidth is loosely used to refer to the information-carrying capacity of a network or component of a network.

**Binary** - 1. A numerical system using “2” as its base. 2. Data that is encoded or presented in machine-readable form (1’s & 0’s).

**BOOTP** -Bootstrap Protocol. An IP protocol used by diskless workstations to receive boot information from a boot server.

**Border Gateway** - Router that communicates with routers in other autonomous systems.

**Buffer** - A temporary memory storage area for information.

**Bus** - A type of network topology in which nodes are connected along a continuous path that is not a closed circuit. Also refers to a communications channel used by a single computer such as Nubus, SCSI, etc.

**Cable** - The transmission media of a network.

Cache - A group of memory locations set aside for temporary storage of data, especially frequently-used data or data needing high speed retrieval by the CPU.

**Catenet** - Network in which hosts are connected to diverse networks, which themselves are connected with routers. The Internet is a prominent example of a catenet.

**Cellular Radio** - Technology that uses radio transmissions to access telephone- company networks. Service is provided in a particular area by a low-power transmitter.

**Console** - In SNMP (Simple Network Management Protocol), a software program that has the capability of interacting with an agent, including examining or changing the values

of the data objects in the agent's Management Information Base (MIB).

**Data Base** - A collection of data that can be selectively retrieved by a type of application known as a Data Base Management System.

**Data Link** - The physical connection between two devices such as Ethernet, Local Talk or Token Ring that is capable of carrying information in the service or networking protocols such as AppleTalk, TCP/IP or XNS.

**Data Link Protocol** - The protocol that controls the network signaling and receiving hardware, performing data integrity checks and formatting information according to the rules of the data link.

**Domain** - 1. In the Internet, a portion of the spanning hierarchy tree that refers to general groupings of networks based on organization type or geography. 2. In SNA, an SSCP and the resources it controls. 3. In IS-IS, a logical set of networks.

**Fiber optic** - A transmission media that uses a light wave for signaling.

**Fiber-optic Cable** - Physical medium capable of conducting modulated light transmission. Compared with other transmission media, fiber-optic cable is more expensive, but is not susceptible to electromagnetic interference and is capable of higher data rates. Sometimes called optical fiber.

**Firewall** - Router or access server, or several routers or access servers, designated as a buffer between any connected public networks and a private network. A firewall router uses access lists and other methods to ensure the security of the private network.

**Hybrid Network** - Internetwork made up of more than one type of network technology, including LANs and WANs.

**Interface** - 1. Connection between two systems or devices. 2. in routing terminology, a network connection. 3. In telephony, a shared boundary defined by common physical interconnection characteristics, signal characteristics, and meanings of interchanged signals. 4. The boundary between adjacent layers of the OSI model.

**IP** - Internet Protocol. The Network Layer protocol in the TCP/IP stack offering a connectionless internetwork service. IP provides features for addressing, type-of-service specification, fragmentation and reassembly, and security.

**IP Address** - 32-bit address assigned to hosts using TCP/IP. An IP address belongs to one of five classes (A, B, C, D, or E) and is written as 4 octets separated with periods (dotted decimal format). Each address consists of a network number, an optional subnet work number, and a host number. The network and subnetwork

numbers together are used for routing, while the host number is used to address an individual host within the network or subnetwork. A subnet mask is used to extract network and subnetwork information from the IP address. Also called an Internet address. See also IP and subnet mask.

**LAN** - A communication infrastructure that supports data and resource sharing within a small area (<2 km diameter) that is completely contained on the premises of a single owner.

**Loop** - Route where packets never reach their destination, but simply cycle repeatedly through a constant series of network nodes.

**Mesh** - Network topology in which devices are organized in a manageable, segmented manner with many, often redundant, interconnections strategically placed between network nodes.

**Modem** - A device that can covert data signals between analog and digital signaling systems.

**NAP** - Network access point. Location for interconnection of internet service providers in the United States for the exchange of packets.

**Network** - The infrastructure that supports electronic data exchange.

**Network Adapter** - A hardware device that translates electronic signals between a computing device's native network hardware and the transmission media. A network adapter may also include memory or additional hardware or firmware to aid or perform the computing device's network operations.

**Network Address** - Network layer address referring to a logical, rather than a physical, network device. Also called a protocol address.

**Network Interface** - Boundary between a carrier network and a privately-owned installation

**Node** - A networked computing device that takes a protocol address and can initiate and respond to communication from other networked devices that employ similar protocols.

**Protocol** - In networking, a specification of the data structures and algorithms necessary to accomplish a particular network function.

**Server** - A device that is shared by several users of a network.

**Stub Network** - Network that has only a single connection to a router.

Token - Frame that contains control information. Possession of the token allows a network device to transmit data onto the network.

**Topology** - The arrangement of computing devices in a network.

**User Interface** - The collection of display symbols and other sensory stimuli made by a computer that present information to a human and the collection of physical action that a human can take to present data to a computer.

## Learning Outcomes

Learn how to use Microsoft Excel individually and in small groups by entering data into rows and columns to develop their understanding that a spreadsheet is a program with which data is processed.

They should have opportunities to investigate simple problems through calculations, graphs, and statistical analysis by using actual statistical data (e.g. students' heights versus weights).

For example, they might use statistical data from the last population census to understand how to store, organize, and manipulate different data categories (state, gender, education, age, etc.), create charts, sort and filter data.

Use functions and formulas in data manipulation by organising and producing e.g. a pay sheet.

They should learn how to import and export data.

## Key inquiry questions

- How is an Excel worksheet/workbook set up and managed?
- How is data processed in MS Excel?
- How can business accounts be recorded?
- How is data summarized to produce reports?
- How are files and data protected in spreadsheets?
- How can examination results or other data be recorded in a tabulated manner?
- How can spreadsheets be used to evaluate an investment?
- How can an inventory be managed?

## 2.0 Introduction to spreadsheets

A spreadsheet can also be defined as an application package designed to store, organize and manipulate numerical data and charts. Spreadsheet is also called electronic ledger. Examples of spreadsheet include MS Excel, Lotus 1-2-3.

Every spreadsheet consists of a large grid of cells to store data which can then be manipulated using formulae. Each cell has an address which consists of the column letter and row number. Many spreadsheet documents contain several individual sheets that can reference values in other sheets in the file. Spreadsheets can also produce graphs and other data visualizations.

### 2.0.1 Uses of Spreadsheets

1. **Accounting**-Spreadsheet are used when preparing budgets and also when calculating profits.
2. **Statistical analysis**-Spreadsheet also comes in handy when calculating statistical values e.g mean, median and mode.
3. **Data management**-They can also be used when organizing data in tabular manner. Spreadsheet is also used when doing operations such as sorting, filtering
4. **Tracking value of assets**-Spreadsheet are also used when calculating appreciation and depreciation of various assets and properties.
5. **Forecasting**-Its automatic recalculation feature enables 'what-if' analysis.

## 2.1 Setting up and managing excel worksheet.

Once a new worksheet is opened it comprises of a large number of cells which have a standard width and height. The following changes may be necessary:

- You may add, remove or rename worksheets.
- You may change the height of the rows.
- You may change the width of the columns.
- An extra rows or column may also be added.
- Remove one or more rows or columns.

### Renaming a worksheet

In order to rename a worksheet the following steps apply:



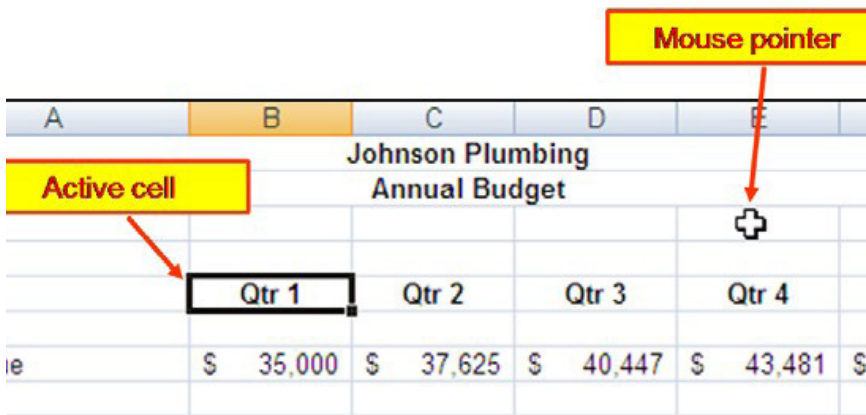
1. Right click on the worksheet tab which you want to rename
2. Select rename from the Pop Up menu
3. Type new name for the Worksheet.

### **Activity 2.1**

Create a new worksheet and rename it from sheet 1 to your name and save it into a folder on your desktop.

### **2.1.1 Navigating in a Worksheet**

It involves moving from one cell in a worksheet to another.



A	B	C	D	E
	Johnson Plumbing Annual Budget			
				+
	Qtr 1	Qtr 2	Qtr 3	Qtr 4
ie	\$ 35,000	\$ 37,625	\$ 40,447	\$ 43,481

*Figure 2.1 A worksheet*

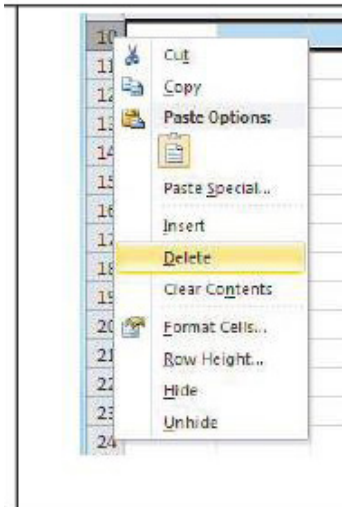
From the above screenshot, the home cell is cell A1. You can use the mouse pointer to navigate from one cell to another, thereby making the destination cell the active cell.

## 2.1.2 Inserting and removing rows and columns.

In Excel columns are named using letters for example A, B, C... while rows are named using numbers example 1, 2, 3....

In order to add or remove a row or a column, the following steps are followed:

1. Right-click on the row or column header.
2. Choose the appropriate action from the menu.



*Figure 2.2*

In case you want to delete more than one row or column, select the number you want to insert and remove then follow the procedure above.

## 2.1.3 Adjusting rows height and column width

To change the row height or column width you may right click on the row or column you want to adjust or you may drag to adjust height/width:

### **Activity 2.2**

On the worksheet that you renamed in the previous activity, follow the procedure above to insert a new row and column. Then adjust the height and width of the row and column you have added, finally remove the row and column that you had added. Save your work.

## 2.1.4 Saving a Workbook

1. From the Office Button, select Save As.
2. Select the file type i.e. Excel Workbook
3. Select the location or even folder where you would like to save the workbook.
4. Name the file. E.g. Use your last name as the file name.
5. Click Save.

## 2.2 Importing data in MS Excel

### 2.2.1 Importing data

Some text files contain lines of characters, including both numbers and letters. To divide these lines of text into columns of data, characters such as commas or tabs are inserted to separate each field or column of data. Text data can also be in a fixed width format, where the fields are aligned in columns with spaces between each field. Excel's Text Import Wizard can import both of these text file data formats. The Text Import Wizard takes the lines of characters and converts them into data contained within the columns and rows of an Excel file.

To import data: chose Data, Get External Data, and Import Text File from the menu bar. The import text dialog box appears. Choose the text file that you would like to import from Excel and double click on it or single click the file name, then click the Import button. Follow the instructions given by the Text Import Wizard dialog boxes that follow.

### 2.2.2 Exporting data

To export data from Excel to a text file, use the **Save As** command.

There are two commonly used text file formats:


- Delimited text files (.txt), in which the TAB character (ASCII character code 009) usually separates each field of text.

- Comma separated values text files (.csv), in which the comma character (,) usually separates each field of text.

You can change the separator character that is used in both delimited and .csv

text files. This may be necessary to make sure that the import or export operation works the way that you want it to.

You can convert an Excel worksheet to a text file by using the **Save As** command.

1. Click the **Microsoft Office Button** , and then click **Save As**. The **Save As** dialog box appears.
2. In the **Save as type** box, choose the text file format for the worksheet.

**NOTE** The different formats support different feature sets.

3. In the **Save in** list, browse to the location where you want to save the new text file.
4. In the **File name** box, review the name that Excel proposes for the new text file, and change it if necessary.
5. Click **Save**.
6. A dialog box appears, reminding you that only the current worksheet will be saved to the new file. If you are certain that the current worksheet is the one that you want to save as a text file, click **OK**. You may save other worksheets as separate text files by repeating this procedure for each worksheet.
7. A second dialog box appears, reminding you that your worksheet may contain features that are not supported by text file formats. If you are only interested in saving the worksheet data into the new text file, click **Yes**.

### **Activity 2.3**

Open Microsoft Excel and import and export data to and from Microsoft Access. What conclusions can you draw on importing and exporting data?

# 2.3 Cell References

The best way to construct a formula or a function is to use cell references i.e., use the cell addresses instead of typing actual numbers. In turn, this enables Excel to automatically update the results of the formulas and functions when you change the values in the cells referenced.

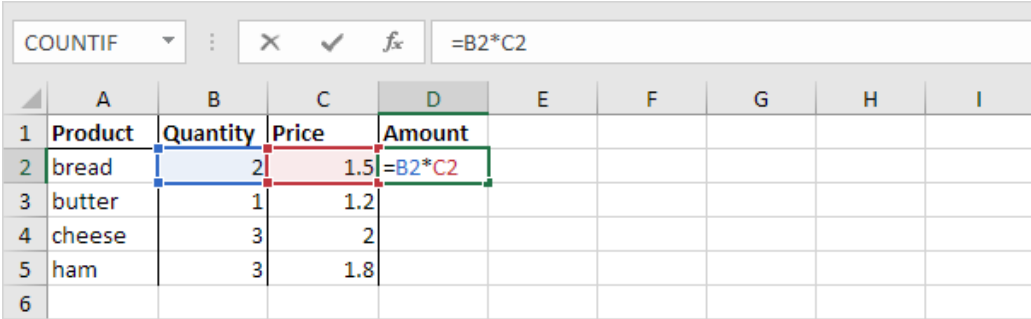
Using cell references in formulas and functions is also important when you copy a formula or function. When you copy the formula or function, the cell addresses will be copied in a particular way depending on how the cells are referenced. Ms Excel records cell addresses in formulas and functions in three different ways, these include:

## 2.3.1 Relative

The row and column references can change when you copy the formula to another cell. It is usually the default cell reference mode.

### Example 6.

See the formula in cell D2 below. Cell D2 references (points to) cell B2 and cell C2. Both references are relative.



	A	B	C	D	E	F	G	H	I
1	Product	Quantity	Price	Amount					
2	bread	2	1.5	=B2*C2					
3	butter	1	1.2						
4	cheese	3	2						
5	ham	3	1.8						
6									

Figure 2.17

Select cell D2, click on the lower right corner of cell D2 and drag it down to cell D5.

	A	B	C	D	E	F	G	H	I
1	Product	Quantity	Price	Amount					
2	bread	2	1.5	3					
3	butter	1	1.2	1.2					
4	cheese	3	2	6					
5	ham	3	1.8	=B5*C5					
6									

Figure 2.18

Cell D3 references cell B3 and cell C3. Cell D4 references cell B4 and cell C4. Cell D5 references cell B5 and cell C5. In other words: each cell references its two neighbors on the left.

### 2.3.2 Absolute

The row and column references do not change when you copy the formula. It is useful when there is a constant in a formula. Both the column letter and row number are preceded by the dollar (\$) sign.

#### Example 7.

To create an **absolute reference** to cell H3, place a \$ symbol in front of the column letter and row number of cell H3 (\$H\$3) in the formula of cell E3.

	A	B	C	D	E	F	G	H	I
1									
2		Length (cm)	Width (cm)		Length (inch)	Width (inch)		Conversion rate	
3		1	10		=B3*\$H\$3			0.3937008	
4		5	10						
5		4	8						
6		2	10						
7									

Figure 2.18

Now we can quickly drag this formula to the other cells.

	A	B	C	D	E	F	G	H	I
1									
2		Length (cm)	Width (cm)		Length (inch)	Width (inch)		Conversion rate	
3		1	10		0.3937008	3.937008		0.3937008	
4		5	10		1.968504	3.937008			
5		4	8		1.5748032	3.1496064			
6		2	10		0.7874016	=C6*\$H\$3			
7									

The reference to cell H3 is fixed i.e. when we drag the formula down and across. As a result, the correct lengths and widths in inches are calculated.

### 2.3.3 Mixed

In mixed reference either the row or column reference is relative, or the other is absolute.

#### Example 8.

See the formula in cell F2 below.

	A	B	C	D	E	F	G	H
1	Product	Price			Prices / Month	Jan	Feb	Mar
2	Jeans	80			Jeans	=B2*(1-B6)		
3	Shirts	30			Shirts			
4								
5	Month	Jan	Feb	Mar				
6	Reduction	20%	40%	80%				
7								

Figure 2.20

We want to copy this formula to the other cells quickly. Drag cell F2 across one cell, and look at the formula in cell G2.

COUNTIF								
=C2*(1-C6)								
	A	B	C	D	E	F	G	H
1	Product	Price			Prices / Month	Jan	Feb	Mar
2	Jeans	80			Jeans		64	=C2*(1-C6)
3	Shirts	30			Shirts			
4								
5	Month	Jan	Feb	Mar				
6	Reduction	20%	40%	80%				
7								

Figure 2.21

Observe what happens. The reference to the price should be a fixed reference to column **B**. Solution: place a \$ symbol in front of the column letter of cell B2 (\$B2) in the formula of cell F2.

In a similar way, when we drag cell F2 down, the reference to the reduction should be a fixed reference to row 6. Solution: place a \$ symbol in front of the row number of cell B6 (B\$6) in the formula of cell F2. The result are as shown below:

COUNTIF								
= \$B2*(1-B\$6)								
	A	B	C	D	E	F	G	H
1	Product	Price			Prices / Month	Jan	Feb	Mar
2	Jeans	80			Jeans	= \$B2*(1-B\$6)		
3	Shirts	30			Shirts			
4								
5	Month	Jan	Feb	Mar				
6	Reduction	20%	40%	80%				
7								

Figure 2.22

We do not place a \$ symbol in front of the row number of B2, this way we allow the reference to change from B2 (Jeans) to B3 (Shirts) when we drag the formula down.

In a similar way we don't place a \$ symbol in front of the column letter of B6, this way we allow the reference to change from B6 (Jan) to C6 (Feb) and D6 (Mar) when we drag the formula across. Now we can quickly drag this formula to the other cells.



		COUNTIF				X ✓ fx		= \$B3*(1-D\$6)	
	A	B	C	D	E	F	G	H	
1	Product	Price			Prices / Month	Jan	Feb	Mar	
2	Jeans	80			Jeans	64	48	16	
3	Shirts	30			Shirts	24	18	= \$B3*(1-D\$6)	
4									
5	Month	Jan	Feb	Mar					
6	Reduction	20%	40%	80%					
7									

Figure 2.23

The references to column B and row 6 are fixed.

## 2.4 Entering Data in MS Excel.

### Introduction

There are three types of data in cells: labels, values, and formulas.

- **Labels** (text) are descriptive pieces of information, such as names, months, or other identifying statistics, and they usually include alphabetic characters.
- **Values** (numbers) are generally raw numbers or dates.
- **Formulas** are instructions for Excel to perform calculations.

To enter data into your worksheet you must first have a cell or range selected. When you open an Excel worksheet, cell A1 is already active. An active cell will appear to have a darker border around it than other cells on the worksheet. When constructing or editing a spreadsheet you will need to be able to navigate between cells and enter content.

### Important points to note

- Click the navigation arrow or keys to move to a specific cell in the worksheet.
- Typing in a cell overwrites any existing content if it is not blank.
- To edit a cell that already contains data, double-click or select it and edit the content in the formula bar.
- Once data has been entered or edited, you should press Enter or Tab. This makes the spreadsheet to:

- Checks if your data makes sense and reports any errors.
- Decide how numerical values should be formatted.
- Update all calculated values.
- Clicking the Escape (Esc) key at any point during data entry will end the process.
- Clicking Delete (Del) key will clear the contents, leaving the format unchanged.

Pressing Enter after data entry moves to the next cell down. Pressing Tab will move to the right. Holding Shift when pressing either Enter or Tab will move the cursor in the opposite direction.

In MS excel a cell may contain either of the following:

- **Text data**- may be anything that is not a number or formula.
- **Numerical data**- this may include dates, percentages, currency and time.
- **Formula**-are user defined mathematical expression.

### 2.4.1 Entering numbers with fractions.

To enter a fractional value into a cell, leave a space between the whole number and the fraction. For example, to enter  $6\frac{7}{8}$ : enter 6, press spacebar then  $\frac{7}{8}$  and then press Enter.

If you have a fraction only e.g.  $\frac{1}{8}$ : you must enter a zero first, like this:  $0\frac{1}{8}$

Excel will likely assume that you are entering a date, excel automatically simplifies the fractions e.g.  $\frac{4}{8} = \frac{1}{2}$

#### Exercise 1

In groups follow the procedure to enter numbers with fractions.

1. Start a new workbook.
2. Create the worksheet as the one below.
3. Save it as Fractions in your folder

	A	B	C	D
1	Cake Recipe			
2		Ingredient	Amount	Metric Unit
3	1	Milk	1 1/3	litres
4	2	Sugar	1/4	KG
5	3	Salt	1/8	Grams
6	4	Flour	5 1/2	KG
7				

Figure 2.3

## 2.4.2 Entering Numbers as Text

Start by entering an apostrophe before the number (') e.g. '001, '002

### Exercise 2

1. Start a new workbook session.
2. Create the worksheet below.
3. Save it as text in your folder.

	A	B	C	D
1	<b>Students Admissin Details</b>			
2	<b>RegNum</b>	<b>Name</b>		
3	'001	John		
4	'002	Paul		
5	'003	Musa		
6	'004	Otieno		
7	'005	Ruto		
8	'006	Wekesa		

Figure 2.4

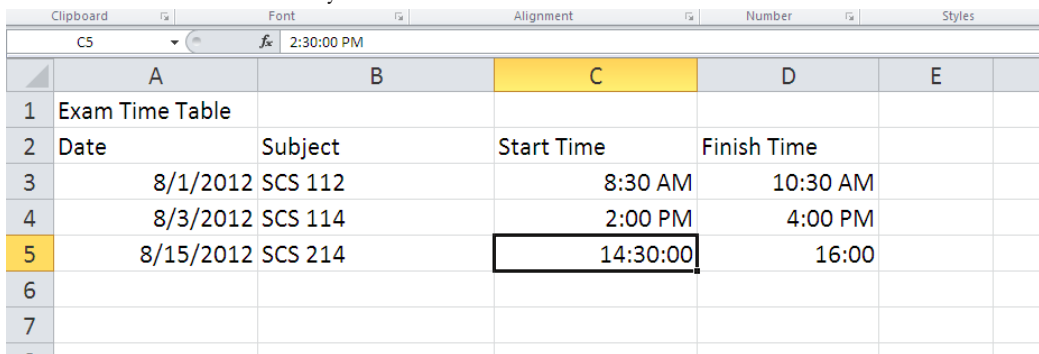
### 2.4.3 Entering Date and Time Data

Dates are stored as whole numbers, the number increase by 1 every day. Time data is stored as decimal values where '0.5' is midday. Both are then displayed using special formatting. This means a time and date can be stored as one decimal value.

Excel automatically recognizes valid date and time data type. Valid date formats may include: 11/6/05, 6-Nov-05, 6-Nov, Nov 05. Valid time formats may include: 21:41, 21:41:35, 9:41 AM, and 9:41:35 PM. There should be a space before AM/PM.

To enter date and time values, the following procedure should be followed:

1. Start a new workbook session.
2. Create the worksheet below.
3. Save it as date in your folder.



	A	B	C	D	E
1	Exam Time Table				
2	Date	Subject	Start Time	Finish Time	
3	8/1/2012	SCS 112	8:30 AM	10:30 AM	
4	8/3/2012	SCS 114	2:00 PM	4:00 PM	
5	8/15/2012	SCS 214	14:30:00	16:00	
6					
7					

Figure 2.5

### Using AutoFill to enter a series of values

It is a feature that inserts a series of values or text items in a range of cells.

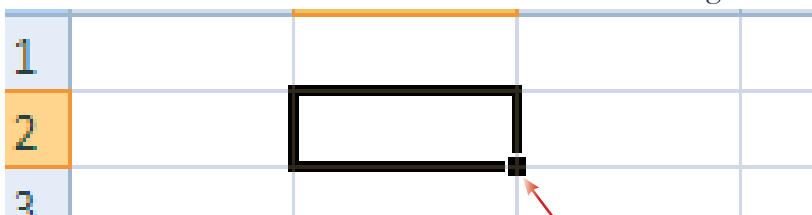


Figure 2.6

Auto-Fill Handle

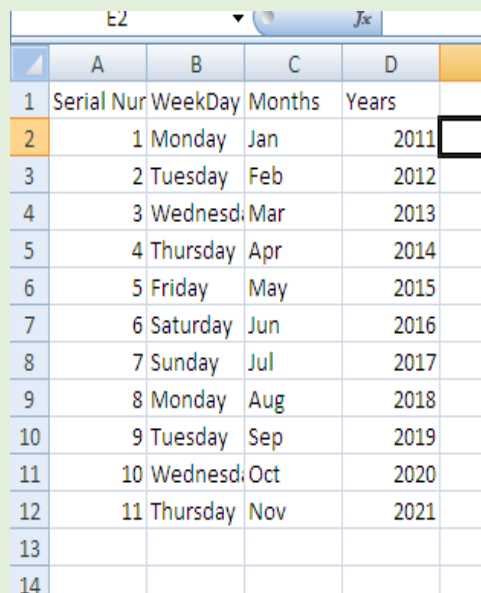
### Steps involved:

1. Enter the initial value e.g 1
2. Place the mouse pointer over the auto fill handle. It changes symbol from a white-plus-sign to a cross-hair
3. Drag the AutoFill handle using the right mouse button. Excel displays a shortcut menu with additional fill options.
4. Select Fill Series option from the shortcut menu.

### Exercise 3

In groups follow the procedure below on how to use the Auto-Fill Feature.

1. Start a new workbook session
2. Create the worksheet below by entering the initial value in each column and filling the rest of the values using auto-Fill Feature
3. Save it as auto-fill in your folder.



	A	B	C	D	E
1	Serial Nur	WeekDay	Months	Years	
2	1	Monday	Jan	2011	
3	2	Tuesday	Feb	2012	
4	3	Wednesd	Mar	2013	
5	4	Thursday	Apr	2014	
6	5	Friday	May	2015	
7	6	Saturday	Jun	2016	
8	7	Sunday	Jul	2017	
9	8	Monday	Aug	2018	
10	9	Tuesday	Sep	2019	
11	10	Wednesd	Oct	2020	
12	11	Thursday	Nov	2021	
13					
14					

Figure 2.7

## 2.4.4 Formatting Numbers

Values that are entered into cells are normally in general format so that they become easier to read for more consistency.

### 1. General

The General format is Excel's standard number format. Every cell starts out with the same number format. If a number has any decimal places, Excel displays them, provided they fit in the column. If the number's has more decimal places than Excel can display, it rounds up the last displayed digit, when appropriate. Excel also removes leading and trailing zeros. Thus, 004.00 becomes 4.

### 2. Number

The Number format is a General format with three modifications:

1. It uses a fixed number of decimal places which you can set
2. It allows you to use commas to separate between groups of three digits.
3. It is also able to show negative numbers displayed with the negative sign, in parentheses.

### 3. Currency

The Currency format displays the currency symbol before the number. Always includes commas. It also supports a fixed number of decimal places and allows you to customize how negative numbers are displayed.

Currency can be entered in two different ways:

1. Enter the sum, including the currency symbol, eg: £1.50. This will be recognized as currency and formatted appropriately
2. Enter the value only and then select the currency format.

Spreadsheets do not automatically convert currency values using number formatting for instance £1.50 + €1.50 will give a result of 3.00.

## Entering currency symbols:

1. Enter the numeric value in the cell or select the range of values
2. Choose Format > Number > More Formats > More Currencies... and select the currency you require.

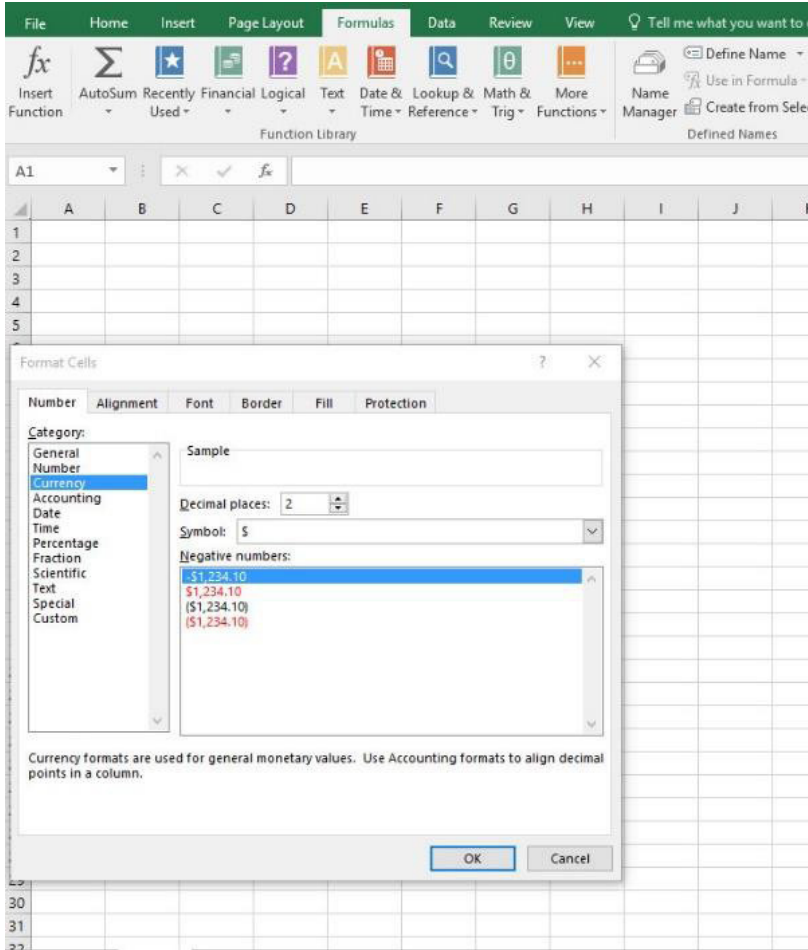


Figure 2.8

## 4. Accounting

The Accounting format is shown on the Currency format. It allows one to choose a currency symbol, use commas and has a fixed number of decimal places. The currency symbol's always at the far left of the cell and there's always an extra space that pads the right side of the cell. The Accounting format always shows negative numbers in parentheses, which is an accounting standard. The number 0 is never shown when using the Accounting format. Instead, a dash (-) is displayed in its place.

## 5. Percentage

The Percentage format displays fractional numbers as percentages. For instance, if you enter 0.5, that translates to 50%. You can choose the number of decimal places to display.

## 6. Fraction

The Fraction format displays your number as a fraction instead of a number with decimal places. The Fraction format doesn't mean you have to enter the number as a fraction.

## 7. Scientific

It displays the first non-zero digit of a number, followed by a fixed number of digits, and then indicates what power of 10 that number needs to be multiplied by to generate the original number. For example, 0.0003 becomes  $3.00 \times 10^{-4}$  which is displayed in Excel as 3.00E-04. A number like 300, becomes  $3.00 \times 10^2$  which is showed in Excel as 3.00E02.

## 8. Text

The Text format displays a number as though it were text, though you can still do calculations with it. Excel positions it against the left edge of the column.

### Steps for Formatting a Number

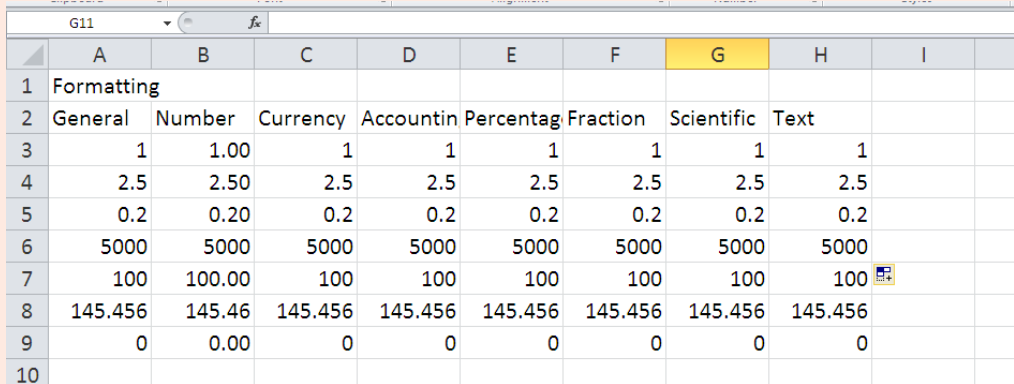
1. Select the cell or range of cells
2. Right-click the selection.
3. Choose Format Cells option from the context menu.
4. Choose a category.
5. Choose a format similar to the one you desire



## Activity 2.4

In groups follow the steps given below to format numbers:

1. Create the work sheet below.



	A	B	C	D	E	F	G	H	I
1	Formatting								
2	General	Number	Currency	Accountin	Percentag	Fraction	Scientific	Text	
3	1	1.00	1	1	1	1	1	1	
4	2.5	2.50	2.5	2.5	2.5	2.5	2.5	2.5	
5	0.2	0.20	0.2	0.2	0.2	0.2	0.2	0.2	
6	5000	5000	5000	5000	5000	5000	5000	5000	
7	100	100.00	100	100	100	100	100	100	
8	145.456	145.46	145.456	145.456	145.456	145.456	145.456	145.456	
9	0	0.00	0	0	0	0	0	0	
10									

2. Format it to appear as shown below
3. Save it as Format.

If a cell displays a series of hash marks (such as #####), it usually means that the column is not wide enough to display the value in the number format that you selected. Either make the column wider or change the number format.

## 2.5 Formula and function.

The distinguishing feature of a spreadsheet program such as Excel is that it allows you to create mathematical formulas and execute functions. In Excel, the calculation can be specified using either a formula or a function. Formulas are self-defined instructions for performing calculations, In contrast, functions are pre-defined formulas that come with Excel.

### 2.5.1 Formula

A formula is a mathematical expression that returns a value. A formula is written using operators that combine different values, returning a single value that is then displayed in the cell. The most commonly used operators are arithmetic operators.

Excel Arithmetic Operators: The Excel Operators perform actions on numeric values, text or cell references. The table below shows some of them and the results they give.

Operator	Name	Example	Result
+	Addition	=1+1	2
-	Subtraction	=1-1	0
*	Multiplication	=2*2	4
/	Division	=4/2	2
^	Exponentiation	=2^3	8
%	Percent	=20%	0.20

Figure 2.9

Operator Precedence: It's important to understand that when you create a formula with several operators, Excel evaluates and performs the calculation in a specific order. For instance, Excel always performs multiplication before addition. This order is called the order of operator precedence. The table below shows Ms excel operator precedence.

Symbol	Operator	Precedence
^	Exponentiation	1
*	Multiplication	2
/	Division	2
+	Addition	3
-	Subtraction	3
&	Concatenation	4
=	Equal to	5
<	Less than	5
>	Greater than	5

Figure 2.10

Excel reads a formula containing these operators from left to right and performs the calculations following strict rules of precedence:

1. Parenthetical calculations first.
2. Division or multiplication next in the order in which the calculations appear from left to right.
3. Addition or subtraction next in the order in which the calculations appear from left to right. For instance, consider the following formula:

$$=5 + 2 * 2 ^ 3 - 1$$

To arrive at the answer of 20, Excel first performs the exponentiation i.e. 2 to the power of 3).

$$=5 + 2 * 8 - 1$$

and then the multiplication:

$$=5 + 16 - 1$$

and then the addition and subtraction:

$$=20$$

To control this order, you can add parentheses as shown.

- $5 + (2 * (2 ^ 3)) - 1 = 20$
- $5 + 2 * 2 ^ (3 - 1) = 13$
- $(5 + 2) * 2 ^ 3 - 1 = 55$
- $(5 + 2) * 2 ^ (3 - 1) = 28$

## 2.5.2 Entering Formulas

After the equal sign, a formula includes the addresses of the cells whose values will be manipulated with appropriate operands placed in between. The operands are the standard arithmetic operators: Example

+ Addition =A7+A9

- Subtraction =A7-A9

\* Multiplication =A7\*A9

/ Division =A7/A9

^ Exponents =A7^A9

You can also enter formulas by using the point mode, where you either click on a cell with your left mouse button or you use the arrow keys. For example to enter '=B2+B3+B4+B5' into cell B6 using the point method:

- Left click on cell B6 to make it active.
- Type '='.
- Use the up arrow key to move to cell B5, or left click on cell B5.
- Type '+'
- Use the up arrow or mouse to add cells B4, B3, and B2 in the same fashion.
- Press Enter when you are finished entering the formula.

You will notice that the calculation executes immediately after the formula is typed into the cell and entered by pressing either the Enter or Tab key or by clicking the check mark in the formula bar. The result of the calculation is displayed in the cell i.e. in B6. While the formula itself is now visible in the formula bar.

#### Exercise 4

1. Start a new workbook
2. Create the work sheet below
3. Enter formula cell E3 as shown
4. Press enter to view the answer
5. Copy the formula to fill the Purchase Amount for the other items
6. Save it as **STOCK**

	A	B	C	D	E	F	G	H	I
1	<b>SALES FOR THE YEAR</b>								
2	No.	Item Sold	Buying Price	Qty purchase	Purchase Amount	Selling Price	Qty Sold	Sell Amount	StockLevel
3	1	Shoes	\$2,000.00	4	=C3*D3		2		
4	2	Jacket	\$1,500.00	5			1		
5	3	Shirt	\$500.00	7			5		
6	4	Blouse	\$4,000.00	9			6		
7		Sum							
8		Average							
9									
10									

Figure 2.11

7. Set the Selling Price in a way that a profit of 25% is realized. In Cell F3 enter the formula: =C3\*1.25.
8. Copy the formula to down to cell F6
9. Find the Sell amount for each Item. In Cell H3 enter the formula: =F3\*G3.
10. Copy the formula down to H6
11. Find the Stock level for each Item (Qty Purchased – Qty Sold)
12. Copy the formula down to H6.
13. Find the summation for all the values.
14. Find the average for all the values. Format the values appropriately e.g. quantity must be a whole number while monetary values should be to 2 decimal places.
15. Resave the workbook.
16. The worksheet you have created should look like the one below.

	A	B	C	D	E	F	G	H	I
1	<b>SALES FOR THE YEAR</b>								
2	No.	Item Sold	Buying Price	Qty purchase	Purchase Amount	Selling Price	Qty Sold	Sell Amount	StockLevel
3	1	Shoes	\$2,000.00	4	\$8,000.00	\$2,500.00	2	\$5,000.00	2
4	2	Jacket	\$1,500.00	5	\$7,500.00	\$1,875.00	1	\$1,875.00	4
5	3	Shirt	\$500.00	7	\$3,500.00	\$625.00	5	\$3,125.00	2
6	4	Blouse	\$4,000.00	9	\$36,000.00	\$5,000.00	6	\$30,000.00	3
7		Sum	\$8,000.00	25	\$55,000.00	\$10,000.00	14	\$40,000.00	11
8		Average	\$2,000.00	6	\$13,750.00	\$2,500.00	4	\$10,000.00	3
9									
10									

Figure 2.12

## 2.5.3 Common Formula Errors

#VALUE!	This occurs when the wrong data type has been used. E.g. one may have used a function or created a simple arithmetic formula with a cell that contains text instead of numbers.
#NAME?	Occurs when Excel cannot find the name of the function that has been used. This error code usually means that a function name has been misspelled.
NUM!	It appears when a calculation produces a number that is too large or too small for Excel to deal with.
#DIV/0	You tried to divide by zero. This error code also appears if you try to divide by a cell that's blank, because Excel treats a blank cell as though it contains the number 0 for the purpose of simple calculations with the arithmetic operators.
#REF!	It shows that your cell reference is invalid. This error often occurs if you delete or paste over the cells you were using.
#N/A	Shows that the value isn't available. This error can occur if you try to perform certain types of lookup or statistical functions that work with cell ranges.
#NULL!	Shows that the intersection operator has been used incorrectly. The intersection operator finds cells that two ranges share in common. This error results if there are no cells in common.
#####	Excel has successfully calculated your formula. However, the formula cannot be displayed in the cell using the current number format. To solve this problem, you can widen the column, or change the number format.

## 2.5.4 Functions

These are inbuilt MS Excel mathematical operations that returns a value given a range of values. A function can be identified by its name e.g. SUM (), PRODUCT ().

Functions differ from regular formulas in that, after the equal sign, you supply the cell addresses but not the arithmetic operators. Functions perform calculations by using specific values, called arguments, in a particular order called syntax. When using a function, remember the following:

- Use an equal sign to begin the function.
- Specify the function name.
- Enclose all of the function's arguments within parentheses.
- Use a comma to separate the function's individual arguments

## 2.5.5 Function Categories

Functions are grouped into wide classes by some common features amongst them. These categories include:

1. Financial - They are used to evaluate investments including appreciation or increase in value, depreciation or decrease in value, compound interest among many others.
2. Date & Time - These functions are used when manipulating date and time values.
3. Math & Trig - These may comprise of general mathematics and trigonometric functions.
4. Statistical - Are helpful when performing computations or calculations on list of values.
5. Lookup & reference - A lookup formula basically returns a value from a table by looking up another related value.
6. Database - It performs statistical calculations and queries on databases.
7. Logical - They are able to make a decision based on the outcome of a given expression.
8. Information - Gives information about a cell e.g. the formatting features applied to the cell.
9. Engineering - These includes common engineering calculations
10. Text - Helps in manipulation of text information.

## 2.5.6 General Mathematical functions

1. SUM()
2. PRODUCT()
3. EXP()
4. POWER()
5. ROUND()
6. SQRT()

### 1. SUM ( )

They add up a group of cells. They should be in the format: =SUM (range).  
Range can be stated in 2 ways:

- a) =SUM (A1, A2) – This function adds two cells, ie cell A1 and cell A2.
- b) =SUM (A2:A12) – This adds the range of 11 cells from A2 to A12.

### 2. PRODUCT ( )

This function takes a list of numbers, multiplies them together, and gives the result.  
For example:

- a) =PRODUCT (A1, A2, A3).
- b) =PRODUCT (A1:A10).

### Rounding Numbers: ROUND ( )

It rounds a numeric value to a specified number of significant figures e.g. decimal places. They should be in the format: ROUND (value, d.p.). For instance:

=ROUND (3.987, 2). The result is 3.99.

If you specify 0 for the number of d.p. Then Excel rounds to the nearest whole number.

### ROUNDDOWN ( )

It rounds numbers towards zero. The result of ROUNDDOWN (1.9, 0) is



### 1, ROUNDUP ()

It rounds numbers up, away from zero. The result of ROUNDUP (1.1, 0) is 2

### 3. POWER ()

It works out exponents. For instance =POWER (2, 3) => 8. It takes two arguments i.e. the base and the index.

### 4. SQRT ()

It finds the square root of a number. For example =SQRT (9) => 3. It takes a single argument.

## Statistical Functions

COUNT(), MAX(), MIN(), LARGE(), SMALL(), RANK(), AVERAGE(),  
MEDIAN(), MODE()

### 1. Counting Values.

- a) COUNT (). Returns the number of cells that contain a numeric value or date value. Format: = COUNT (Range). For example: =COUNT (A1:A10). This function ignores blank cells and cells with text data.
- b) COUNTA (). Returns the number of cells with any data type. It is used to determine the number of nonblank cells. It is usually in the format: = COUNT (Range). An example: =COUNTA (A1:A10). This function ignores blank cells.
- c) COUNTBLANK (). It returns the number of blank cells. It is usually in the format: = COUNT (Range) An example: =COUNTBLANK (A1:A10).

### 2. Maximum and Minimum Values.

The MAX(). It picks the largest value out of a series of cells. It is in the format: =Max (range). An example: =Max (A1:A10).

MIN(). Returns smallest value out of a series of cells. Usually in the format: format: =Min (range). An example: =Min (A1:A10)

The MAX () and MIN () functions ignore any non-numeric content, which includes text, empty cells, and Boolean (true or false) values. Excel includes dates in MAX ( ) and MIN ( ) calculations because it stores them internally as the number of days that have passed since a particular date.

### 3. Ranking Your Numbers

LARGE(). It returns the k-th largest value in a list e.g the 5<sup>th</sup> largest value in a list. An example: =Large (A1:A10, 5)

SMALL(). Returns the k-th smallest value in a list e.g the 5<sup>th</sup> smallest value in a list. An example: =SMALL (A1:A10, 5).It takes two arguments i.e. range and position in the list.

RANK(). This function finds where a specific value falls in the list. It's in the format, format: =RANK (number, range, [order type]).An example:

=RANK (A1, A1:A10) – ascending order, =RANK (A1, A1:A10, 1) – descending order

### 4. Measuring Central Tendency.

AVERAGE(). It finds the mean of a list of values. Usually in the format, format: =AVERAGE (A1:A10).It takes one argument i.e. the range of values. This function ignores all empty cells or text values.

MEDIAN(). Finds the median of a list of values. If the list is ordered in ascending order, the median is the value that lies in the middle position. Its format is, Format: =MEDIAN (A2:A12)

MODE(). Returns the value that appears the highest number of times in a list of values. Usually in the format, format: =MODE (A1:A10).It ignores text values and empty cells.

## Exercise 5

1. Create the spreadsheet as the one below
2. Use functions to fill the gaps.
3. Save it as Exam.

Clipboard		Font		Alignment		Number		Styles					
F21													
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Examination Results												
2	Maseno School												
3	Form Four Examination Results												
4	<b>RegNo</b>	<b>Name</b>	<b>Fee Paid</b>	<b>Eng</b>	<b>Grd</b>	<b>Kisw</b>	<b>grd</b>	<b>Math</b>	<b>grd</b>	<b>TOTAL</b>	<b>Posn</b>	<b>Remark</b>	
5	001	Lako	45000	45		66		44					
6	002	Achok	12000	56		54		30					
7	003	Deng	5000	40		55		56					
8	004	Achiro	40000	56		55		78					
9	005	Oluak	56000	54		67		55					
10	006	Keji	34000	78		89		66					
11	007	Kana	12000	23		78		34					
12	008	Tumalo	10000			23		33					
13	009	Abdi	20000	60		22		73					
14	010	Dilek	50000	68		45		60					
15	No. of std												
16	best score												
17	worst score												
18	2nd best												
19	3rd worst												
20	Mean												
21	Median												

Figure 2.13

## 2.5.7 Text Functions

CONCATENATE ( ) function

The CONCATENATE ( ) function lets you join together text in exactly the same way an operator does.

LEN ( ) Function

LEN ( ) usually short for Length. It counts the number of characters in a string of text. For example, the result of the following formula is 5:=LEN (“Hello”).

## DATE/TIME Functions

### . TODAY () Function.

This function displays the current date in a cell: It is in the format, format=TODAY ()

### *DAY () Function*

The function takes a date argument and returns a number representing the day i.e. 1 to 31.

### MONTH ()

This function takes a date argument and returns a number representing the month i.e. 1 to 12.

### YEAR ()

This function takes a date argument and returns a number representing the year 1900 to 9999. Example, if you place the date 1/1/2007 in cell A1, the following formula displays a result of 2007:=YEAR (A1).

### *The NETWORKDAYS () Function*

The NETWORKDAYS () function calculates the number of work days between two dates, excluding weekend days i.e. Saturdays and Sundays. As an option, one can specify a range of cells that contain the dates of holidays, which are also excluded. It is usually in the format: =NETWORKDAYS (Start Date, End Date,[Holiday Range])

An example: =NETWORKDAYS (A15, 16, B2:B11)

4	2/19/07	Presidents' Day	
5	5/28/07	Memorial Day	
6	7/4/07	Independence Day	
7	9/3/07	Labor Day	
8	11/11/07	Veterans Day	
9	10/8/07	Columbus Day	
10	11/22/07	Thanksgiving Day	
11	12/25/07	Christmas Day	
12			
13			
14	<b>First Day</b>	<b>Last Day</b>	<b>Working Days</b>
15	Monday 1/1/2007	Sunday 1/7/2007	4

Figure 2.14

WORKDAY () function.

The WORKDAY () function gives an offset work day. An example: function to determine the date that is ten working days from January 4, 2008: =WORKDAY (1/4/2008, 10)

The WEEKDAY () function.

The WEEKDAY () function accepts a date argument and returns an integer between 1 and 7 that corresponds to the day of the week. Sunday-1, Monday-2...Saturday-7

=WEEKDAY (11/1/2011)

## 2.5.8 Manipulating Dates and Times

To enter a date in Excel, use the “/” or “-” characters. To enter a time, use the “:” (colon). You can also enter a date and a time in one cell.

	A	B	C	D	E
1	6/23/2016	6:00	6/23/2016 6:00		
2					

Figure 2.15

Date and Time values can be involved in calculations like addition, subtraction, and so on. For example, consider this formula: =A2-A1+1. If A2 contains the value 10/30/2007, and A1 contains the value 3/20/2007, the result is 224, which is the number of days between these two dates.

## 2.5.9 Lookup Functions

### 1. HLOOKUP ()

It is the horizontal lookup function. It works by scanning the values in a single row from left to right. Once it finds the entry you're looking for, it can then retrieve other information from the same column. Has the Format: =HLOOKUP (Search Value, Table Range, row Number, [range Lookup])

### 2. VLOOKUP ()

It is the vertical lookup function. It works by scanning the values in a single column from top to bottom. Once it finds the entry you're looking for, it can then retrieve other information from the same row. Usually in the format: VLOOKUP (search for value, table range, column number)

	A	B	C	D	E	F	G
1	Taxation Table						
2				Income >=	Income <=		
3	Enter Income			0	2650	15%	
4	Tax Rate =	=VLOOKUP(B3, D3:F8,3)		2651	27300	28%	
5				27301	58500	31%	
6				58501	131800	36%	
7				131801	284700	39.60%	
8				284701		45.25%	
9							
10							

A	B	C	D	E	F	G
<b>Taxation Table</b>						
			Income >=	Income <=		
Income	78000		0	2650	15%	
Rate =	36%		2651	27300	28%	
			27301	58500	31%	
			58501	131800	36%	
			131801	284700	39.60%	
			284701		45.25%	

Figure 2.16

### 5.5.10 Financial Functions

These are functions that perform many of the common financial calculations, such as the calculation of yield, interest rates, duration, valuation and depreciation. Financial functions play a great role in evaluating an investment.

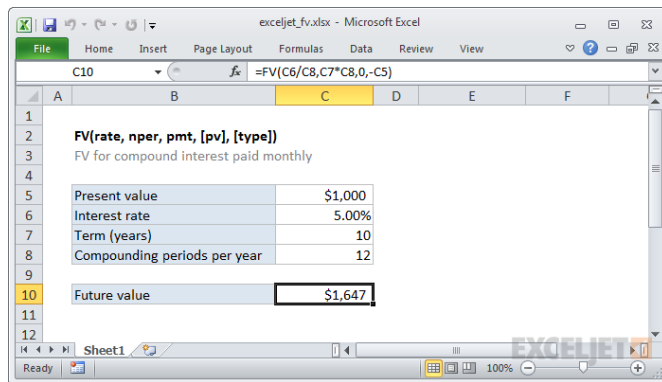
#### *Financial Concepts*

Present Value (PV). - The value of an investment or loan at the very beginning of its life. This number is also called the principal.

Rate - The rate at which an investment or loan will increase or decrease.

Future Value (FV) - The value of an investment or loan at some point in the future. Payment -An amount of money that is being contributed to an investment or loan.

Number of Payment Periods (NPER)-The total number of payment periods between the present value and the future value of an investment or loan.



### *FV ()*: Future Value Function

The FV () function lets one calculate the future value of an investment, assuming a fixed interest rate. It lets one factor in regular payments, which makes it perfect for calculating how money's accumulating in a retirement or savings account.

It is usually in the format: =FV (rate, nper, payment, [PV], [type]) i.e.

**Rate** -the interest rate your investment's earning

**Nper** -the number of interest payments. If your account receives interest once a year and you invest your money over a two-year period, then the nper will be 2.If you're making regular contributions, this value also specifies the number of contributions you're making. FV () assumes that every contribution's made on the same day as the interest's generated.

**Payment** -the amount of the contribution you want to make regularly. Set this to 0 if you don't want to add anything

**PV** -the present value, or the initial balance of your account. If you omit this value, then Excel assumes you start with nothing. As a result, you'll need to include something other than 0 for the payment.

**Type** - indicates the timing of the payment. If you specify 0 (or omit this value), then the payment is made at the end of the period.

Make sure both the payment and the initial balance (PV) are negative numbers or zero values. In Excel's thinking, the initial balance and the regular contributions are money you're handing over, so these numbers, consequently, need to be negative.



### *Loan Repayment*

FV ( ) works just as well on loan payments. Example -you take out a \$10,000 loan and decide to repay \$200 monthly. Interest is set at 7 percent and calculated monthly. FV ( ) can tell you your outstanding balance that is, the amount that you still owe, after three years as follows: =FV (7%/12, 3\*12, -200, 10000)

### *PV ( ): Present Value Function*

It calculates the initial value of an investment or a loan. This is also called the present value. It is usually in the format: =PV (rate, nper, payment, [fv], [type]).

The real purpose of PV ( ) is to answer hypothetical questions. Consider this formula: =PV(10%/12, 25\*12, 0, 1000000)

The question Excel answers here is: In order to end up with \$1,000,000, how much money do I need to invest initially, assuming a 10 percent annual interest rate (compounded monthly) and a maturation period of 25 years? The PV ( ) function returns a modest result of \$82,939.75.

You can supplement your principal with a regular investment. The following formula assumes a monthly payment of \$200, paid at the beginning of each month. Note that you should type in a negative number, because it is money you're giving up: =PV (10%/12, 25\*12, -200, 1000000)

### *PMT ( ) Function*

It calculates the amount of the regular payments you need to make, either to pay off a loan or to achieve a desired investment target.

You specify the present value and future value of the investment and the rate of interest over its lifetime, and the function returns the payment you need to make in each time period.

Here is how the function breaks down: Usually in the Format: =PMT (rate, nper, PV, [fv], [type]). If you don't specify a future value, then Excel assumes it's 0, which is correct if you are performing the calculation to see how long it will take to pay off a loan.

Once again, the type argument indicates whether you make payments at the beginning of the payment period (1) or at the end (0).

Example: - If you have a 7 percent interest rate compounded monthly and a starting balance of \$10,000, how much do you need to pay monthly to top it up to \$1,000,000 in 30 years? The PMT ( ) function provides your answer:  
=PMT (7%/12, 12\*30, -10000, 1000000).

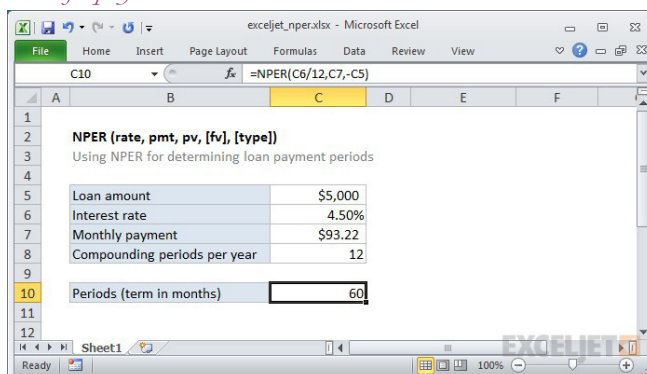
The result \$753.16 is a negative number because this is money that you're giving up each month.

A loan calculation is just as easy, although, in this case, the present value becomes positive, since it represents money you received when you took out the loan.

To determine the payments needed to pay back a \$10,000 loan (that comes with a 10 percent annual interest rate) over five years, you need this formula:  
=PMT (10%/12, 12\*5, 10000, 0)

Assuming you make payments at the end of each month, the monthly payment is \$212.47. If you add a type argument of 1 to pay at the beginning of the month, then this amount decreases to \$210.71.

### *NPER ( ): Number of payment Periods Function*



The NPER() function calculates the amount of time it will take you to pay off a loan or meet an investment target, provided you already know the initial balance, the interest rate, and the amount you're prepared to contribute for each payment.

They are usually in the Format: =NPER (rate, pmt, PV, [fv], [type]). Example: If you're ready to contribute \$150 a month into a savings account that pays 3.5 percent interest, you can use the following formula to determine how long it will take to

afford a new \$4500 plasma television.

Assuming you start off with an initial balance of \$500:  $=NPER(3.5\%/12, -150, -500,$

$4500)$ . The answer is 25.48 payment periods. Remember, a payment period in this example is one month, so you need to save for over two years. A similar calculation can tell you how long it'll take to pay off a line of credit.

Assuming the line of credit's \$10,000 at 6 percent, and you pay \$500 monthly, here's the formula you would use:  $=NPER(6\%/12, -500, 10000, 0)$  In this case, It'll take 21 months before you repay the debt.

## 2.6 Inventories in MS excel

Inventory is the goods or materials, work-in-process products and finished goods that are considered to be the portion of a business's assets that are ready or will be ready for sale. Inventories are also defined as assets owned by a firm business or company that are sold at a higher price than the one incurred when acquiring them.

Managing inventory through Excel makes it easy to organize inventory while saving monetary and time values. MS Excel is more preferable for small and medium sized businesses where inventory counts to fewer items. In small businesses, Excel is an excellent option to manage inventory and keep records of sales and purchases, ordering and delivering and data keeping.

Excel offers various different inventory formulas to help in maintaining daily or routine business activities. To get the maximum out of it, the user should first know

Click on cell B1 or press the "Tab" key on keyboard to move next cell on the right i.e. B1. Type "Receiving", "In Date", "Inventory In" or your preferred term to track when an item has been received.

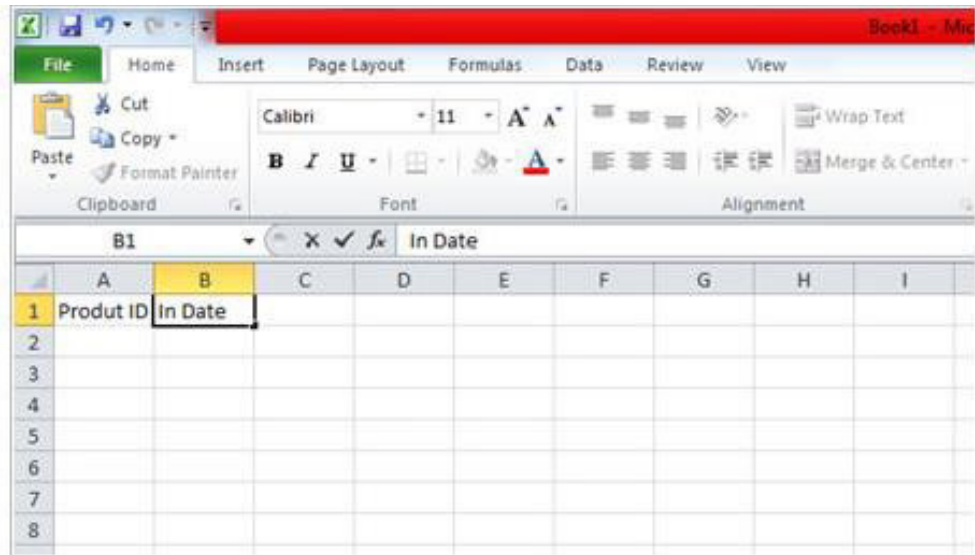


Figure 2.26

Enter header entries in our case we will enter, Shipped, Initials, Out Date and Comments in the cells C1, D1, E1 and F1 respectively. This will make the headers of inventory complete. That helps have the basic heads under which the inventory will be created.

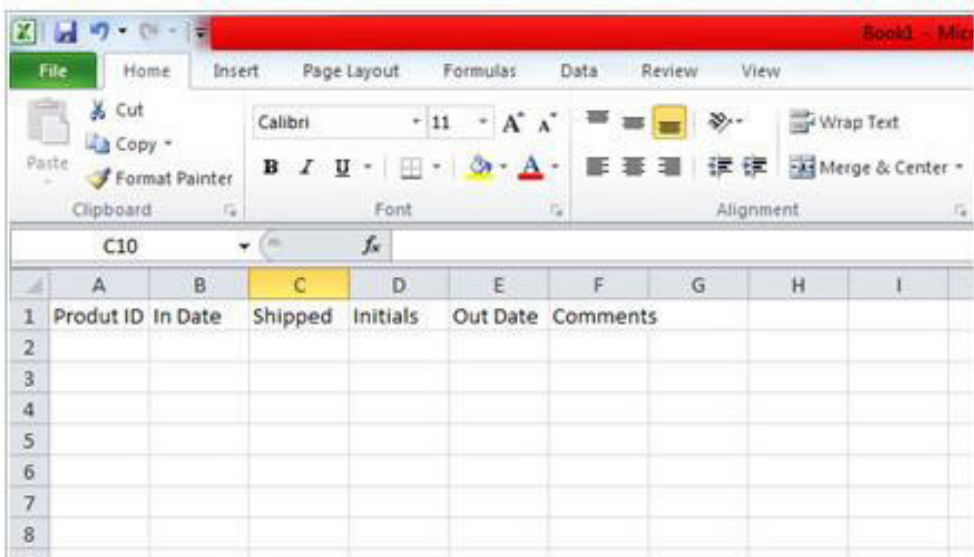


Figure 2.27

Place the cursor on columns on the line between columns A and B and click twice. This helps adjust the column width of column A to adjust the content of the cell. Repeat the same for all the columns. For the Comments column, place the cursor on the line between columns F and G, click and hold to increase column to your desirable width.

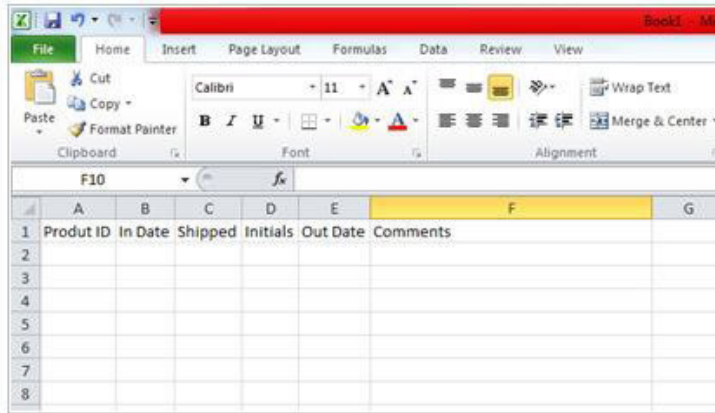


Figure 2.28

The next step is to do some formatting in order for the inventory to look professional. This may include adding a title. To do this place the cursor on row 1 and click to highlight the complete row. Right click on “1” and select “insert”. This will insert a blank row above the Headers. Type the name of inventory here.

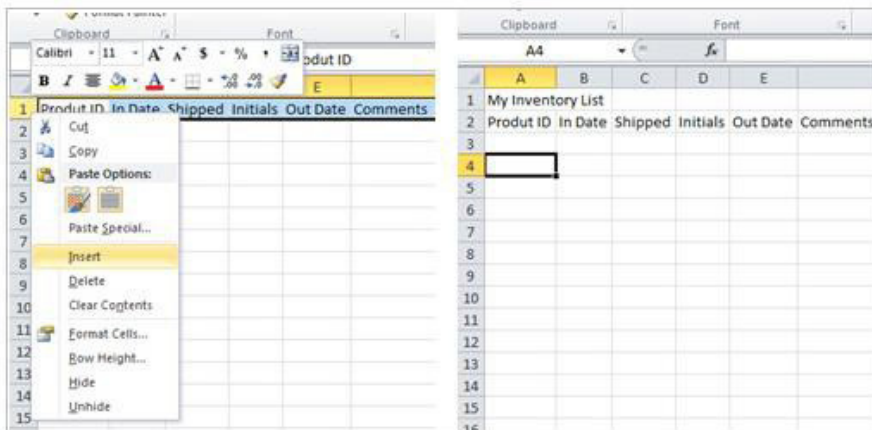


Figure 2.29

Highlight the title, increase the font size, in our case we have increased to 18. Place the cursor on cell A1 and drag it across to F1. Then click Merge & Center button in the Alignment group on Home tab. You can also give a shade to the title through fill color option in the Font group.

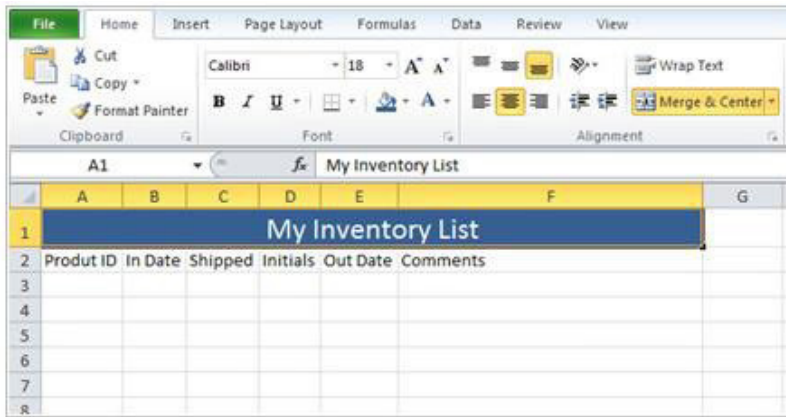


Figure 2.30

The header should be more prominent than the listed items. For this highlight all the header columns. Increase the font size, Click on “B” to give boldface to the headers. Next you can give the header and distinguished color and also further highlight them by add color to header cells through Fill Color option. All these formatting options are available in the Font group in Home tab. In case the cells and columns overlap, adjust by adjusting the width of columns.

You may add border to the inventory to give it a cleaner look. To do this highlight all the cells, select ‘All Borders’ from drop-down border list. Then select the Inventory List and select ‘Thick Box Border’ from the same list. This makes the inventory look more professional and neat.

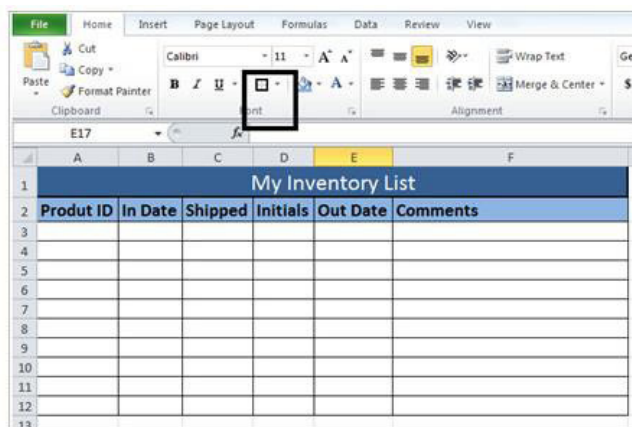


Figure 2.31

In our case select row 3. Go to “View” tab and then click “Freeze Panes.” Select “Freeze Panes” from the drop-down menu. This helps you see the header no matter how many inventories you will add or how far you go down the spreadsheet.

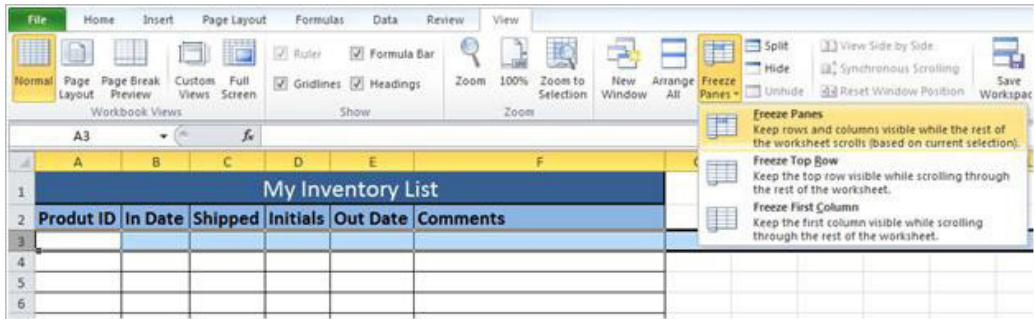


Figure 2.32

The inventory should be kept up to date by adding or amending records regularly and paying attention to accuracy.

Now the inventory worksheet is ready to be worked. Before start working on it, it is recommended to save the file.

MS Excel also has its own preset templates for inventory management. The user can pick an inventory template from his choice from this list as well. These are pre- made templates with complete formatting and formulae inserted.

### Activity 2.5

It would help to investigate preset templates and think about how each might be useful.

## 2.7 Charts

A chart is a visual or graphical representation of numeric values. Charts help us to quickly understand the data by plotting the data in graphs. MS Excel allows us to present data visually using charts.

### Types of Charts

	<b>Chart Type</b>	<b>Use</b>
1.	Column	Compares categories of data in vertical format.
2.	Bar	Compares multiple values in horizontal format.
3.	Line	Displays trends in data over time.
4.	Pie	Compares data as part of a contribution to a whole.
5.	Scatter	Plot Compares pairs of values in a dot format.
6.	Area	Compares the trend of values over time or categories.
7.	Doughnut	Compares multiple series of data in a percent format.
8.	Radar	Displays changes in values relative to a center point.
9.	Surface	Displays trends in values across two dimensions.
10	.Bubble	Compares sets of three values.
11	.Stock	Displays a chart to compare stock prices.
12	.Cylinder	Same as a column or bar chart, but a cylinder is used instead.
13	.Cone	Same as a column or bar chart, but a cone is used instead.
14	.Pyramid	Same as a column or bar chart, but a pyramid is used instead.



## 2.7.1 Creating a chart


For most charts, such as column and bar charts, you can plot the data that you arrange in rows or columns on a worksheet into a chart.

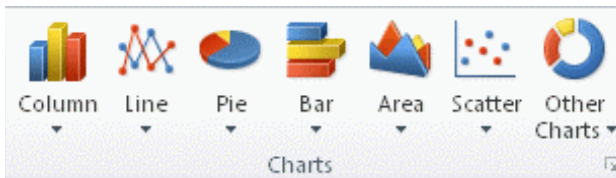
1. On the worksheet, arrange the data that you want to plot in a chart. The data can be arranged in rows or columns. MS Excel automatically determines the best way to plot the data in

2. Select any cell within the data range that you want to use for the chart. If you select only one cell, Excel automatically plots all cells that contain data that is adjacent to that cell. If the cells that you want to plot in a chart are not in a continuous range, you can select non-adjacent cells or ranges with Ctrl+Left-Click, as long as the selection forms a rectangle. You can also hide any rows or columns you don't want to plot in the chart.

To cancel a selection of cells, click any cell on the worksheet.

3. On the Insert tab, in the Charts group, do one of the following:

- Click the chart type, and then click a chart subtype that you want to use.
- To see all available chart types, click  to launch the Insert Chart dialog box, and then click the arrows to scroll through the chart types.



*Figure 2.33*

A ScreenTip displays the chart type name when you rest the mouse pointer over any chart type or chart subtype.

4. By default, the chart is placed on the worksheet as an embedded chart. If you want to place the chart in a separate chart sheet, you can change its location by doing the following:

Click anywhere in the embedded chart to activate it. This displays the Chart Tools, adding the Design, Layout, and Format tabs.

On the Design tab, in the Location group, click Move Chart.



Under Choose where you want the chart to be placed, do one of the following:

To display the chart in a chart sheet, click new sheet.

To display the chart as an embedded chart in a worksheet, click Object in, and then click a worksheet in the Object in box.

5. Excel automatically assigns a name to the chart, such as Chart1 if it is the first chart that you create on a worksheet. To change the name of the chart, do the following:

- a. Click the chart.
- b. On the Layout tab, in the Properties group, click the Chart Name text box.
- c. Type a new name.
- d. Press ENTER.

### ***Activity 2.6***

In pairs create a bar graph using in MS excel of your form one examination results. Once complete share your design with another pair so that you can compare and contrast your design with others. Prepare to demonstrate to the class what other ways you would design a bar graph in MS excel.

## **2.7.2 Adding chart elements**

Chart elements are the different parts that make up a chart. Chart items except the chart area once selected can be moved around and resized relative to other items.

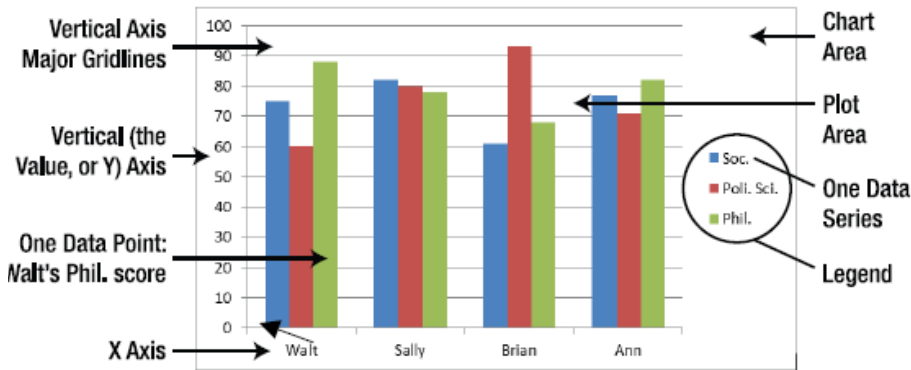


Figure 2.34

### Show or Hide a Chart Legend

When we have data for more than one item, we need to distinguish between the data. Chart legends are therefore used to show the differences between two categories. We can either show or hide a chart legend following the steps below.

1. Click the chart you want to format.
2. Click the Layout tab.
3. Click Legend.
4. Click a legend display option.

### Add Titles

Chart title is the main title of the chart, which represents the chart and tell users what the chart is all about. To add chart titles:

1. **1** Click the chart you want to format.
2. **2** Click the Layout tab.
3. **3** Click Chart Title.
4. **4** Click the title display option you want.
5. **5** Click the title, and then type the new title for the chart.

## Add and Remove Data Labels

Data labels includes values categories, names, series names, legend keys and values from cells. One may choose all of them or a few as per his or her requirement. To add or remove data labels, one has to:

1. 1 Click the chart you want to format.
2. 2 Click the Layout tab.
3. 3 Click Data Labels.
4. 4 Click a data label option.

## Show or Hide Chart Gridlines

Gridlines helps to quickly understand the values or percentages of the data without looking for the exact values. By looking at the data series with grind lines, one is able to understand the approximate value of the data. To show or add grind lines:

1. 1 Click the chart you want to format.
2. 2 Click the Layout tab.
3. 3 Click Gridlines.
4. 4 Click the set of gridlines you want to change.
5. 5 Click a gridline display option.

### *Activity 2.7*

In the bar graph you created in the previous activity (7), add and hide a title, legend and gridlines. Save your work.

## 2.8 Statistical analysis using excel

Excel can perform several statistical tests and analyses. For Excel to perform these tasks, you should make sure you have Data Analysis Tool pack installed. The Data Analysis is normally on the far right side of the bar. If you donot see it go to file, option, add ins and add the Analysis Tool.

### 2.8.1 Using Excel for Correlation

To do correlation, choose Tools Data Analysis → Correlation. In the Correlation popup, you will have to specify:

The range containing the observed values; if the range includes the cells containing

the labels and if you check the box next to Labels in the popup, your results will include those labels.

Whether the grouping is by columns or rows; if, as recommended, you have entered the values of each variable into a column, you need to select the radio button for columns.

The upper left-hand corner of the range in which you want the output to appear or you can choose a different sheet in the workbook, or a different workbook.

Excel displays the results in a 2x2 table (for the 2-variable case), showing the correlation of each variable with itself and with the other variable.

## 2.8.2 Using Excel for Linear Regression

In doing regression Excel insists that the observations be placed in columns rather than rows, i.e. it insists that the independent and dependent variables have their respective observed values entered in columns.

To do regression, choose Tools → Data Analysis → Regression. In the Regression popup, you will have to specify:

The range containing the observed values of the dependent also called “Input Y” variable and of the independent called “Input X” variable.

The confidence level if you want to choose a level other than 95% which Excel provides you by default.

Whether you want to force the regression line to pass through the origin i.e., the point whose X and Y coordinates are both zero. If you do want to force the regression to pass through the origin, check the box next to “Constant is Zero”; otherwise leave this box unchecked.

The upper left-hand corner of the range in which you want the output to appear or you can choose a different sheet in the workbook, or a different workbook.

Finally whether you want the output to include displays of other related data.

### **Activity 2.8**

Collect data of the height of learners versus weight in your class and use Microsoft Excel to statistically analyze the data using linear regression. What are the major conclusions you come up with in the above analysis, and what information would you use to support the view.

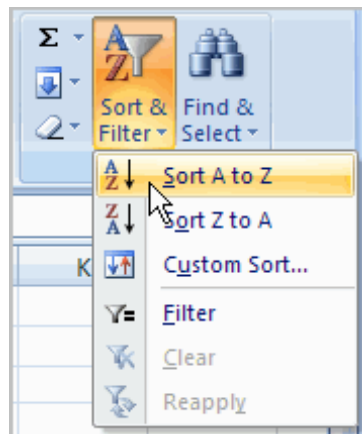
## 2.9 Sorting and filtering data.

### 2.9.1 Sorting data

As one adds more content to a worksheet, organizing this information becomes key. The quickest way to reorganize a worksheet is by **sorting** data. Sorting allows one to organize data based on some criteria, usually alphabetically i.e. A-Z or Z-A or numerically i.e. lowest to highest or highest to lowest.

Sorting in alphabetical order:

- Select a cell in the column you want to sort. In this example, let us choose a cell in column A.
- Click the Sort & Filter command in the Editing group on the Home tab.
- Select Sort A to Z. Now the information in the Category column is organized in alphabetical order.



*Figure 2.35*

You may also Sort in reverse alphabetical order by choosing Sort Z to A in the list.

To sort from smallest to largest:

- Select a cell in the column you want to sort (a column with numbers).
- Click the Sort & Filter command in the Editing group on the Home tab.
- Select From Smallest to Largest. Now the information is organized from the smallest to largest amount.

You can sort in reverse numerical order by choosing From Largest to Smallest in the list.

To sort multiple levels:

- Click the Sort & Filter command in the Editing group on the Home tab.
- Select Custom Sort from the list to open the dialog box.

Alternatively you can:

- Select the Data tab.
- Locate the Sort and Filter group.
- Click the Sort command to open the Custom Sort dialog box. From here, you can sort by one item or multiple items.

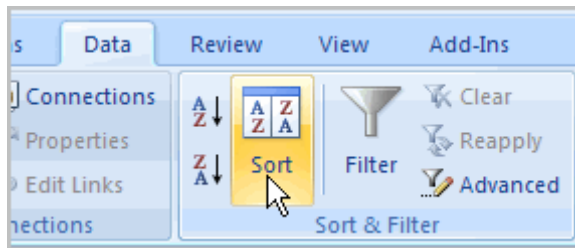


Figure 2.36

- Click the drop-down arrow in the Column Sort by field, then choose one of the options in this example, Category.

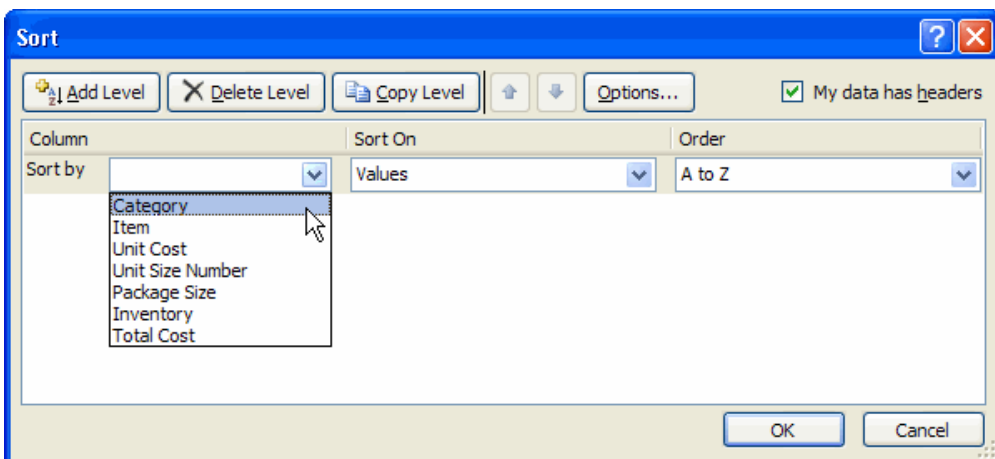


Figure 2.37

- Choose what to sort on. In this example, we will leave the default as Value.

- Choose how to order the results. In our case we leave it as A to Z so that it is organized alphabetically.

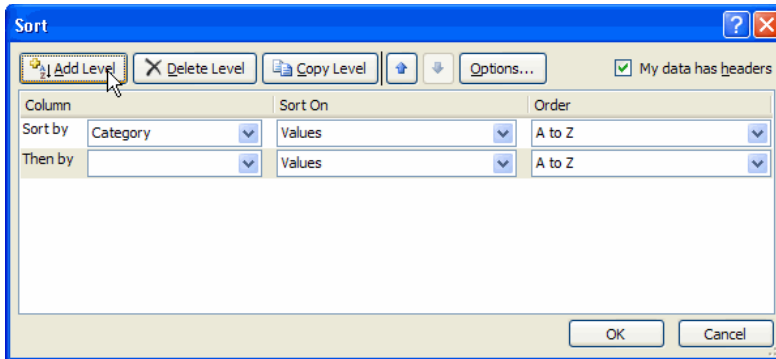


Figure 2.38

Click Add Level to add another item to sort by.

- Select an option in the Column Then by field. In this example, we chose Unit Cost.
- Choose what to sort on. In this example, we will leave the default as Value.
- Choose how to order the results. In our case we leave it as smallest to largest.
- Click OK.

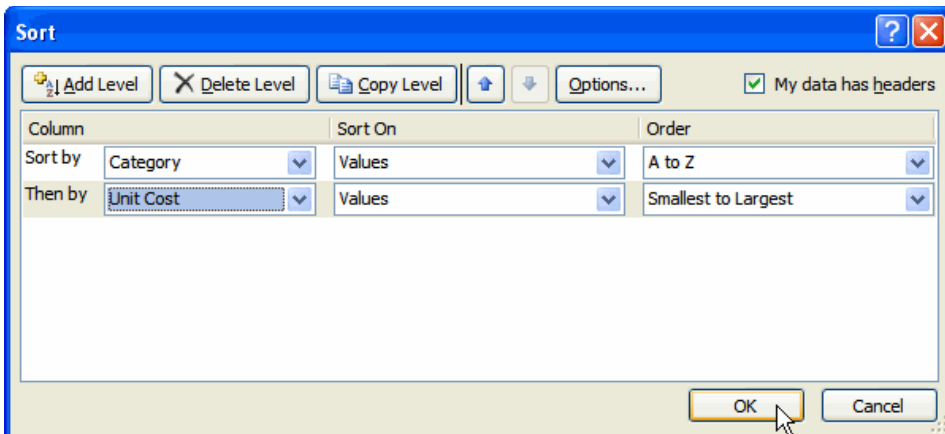


Figure 2.39



The spreadsheet has been sorted. All of the categories are organized in alphabetical order, and within each category the unit cost is arranged from smallest to largest. It is good to note that no data and information has been lost, it has only been arranged in a different order.

## 2.9.2 Filtering data

Filter is an important tool in Ms Excel that allows to filter and retrieve only the required data from a large pool of information. When data is filtered, only rows that meet the filter criteria will display, and other rows will be hidden. With data filtered, one can copy, format and print the data, without having to sort or move it first. To use a filter,

- Go to the Home Ribbon, click the arrow below the Sort & Filtering icon in the Editing Group and choose Filter.

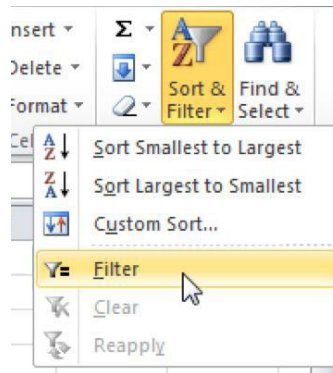
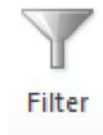


Figure 2.40

Alternatively

- Go to the Data Ribbon, and then click Filter in the Sort & Filter Group.



You will notice that all of your column headings now have an arrow next to the heading name. Click on the arrow next to the heading by which you want to filter, and you will see a list of all the unique values in that column. Check the box next to the criteria you wish to match and click OK. Click on the arrow next to another heading to further filter the data.

To clear the filter, choose one of these options:

- Click on Filter icon next to the heading and choose Clear Filter from “Name of Heading”.
- Go to the Data Ribbon and click the Clear icon in the Sort & Filter Group.
- Go to the Home Ribbon, click the arrow below the Sort & Filtering icon in the Editing Group and choose Clear.

## 2.10 What if analysis

One of the most appealing aspects of Excel is its ability to create dynamic models. A dynamic model uses formulas that instantly recalculate when you change values in cells that are used by the formulas. When you change values in cells in a systematic manner and observe the effects on specific formula cells, you are performing a type of what-if analysis.

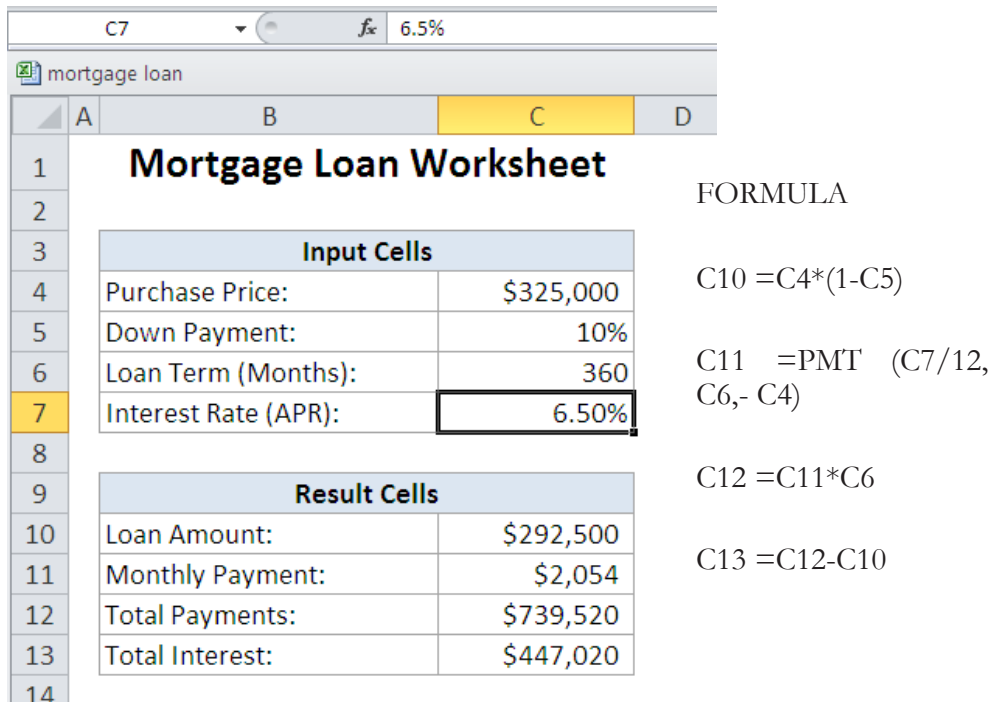
Types of What-If Analyses

- Manual what-if analysis: Plug in new values and observe the effects on formula cells.
- Data tables: Create a special type of table that displays the results of selected formula cell as you systematically change one or two input cells.
- Scenario Manager: Create named scenarios and generate reports that use outlines or pivot tables.

### 2.10.1 Manual what-if analysis

Manual what-if analysis is based on the idea that you have one or more input cells that affect one or more key formula cells. You change the value in the input cells and see what happens to the formula cells.

**Example:**



*Figure 2.41*

With this worksheet, you can easily answer the following what-if questions:

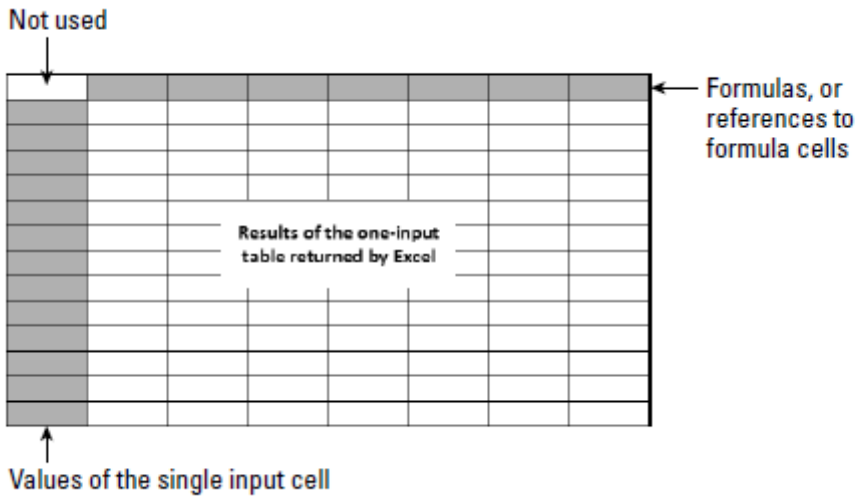
1. What if I can negotiate a lower purchase price on the property?
2. What if the lender requires a 20-percent down payment?
3. What if I can get a 40-year mortgage?
4. What if the interest rate increases to 7.0 percent?

You can answer these questions by simply changing the values in the cells in range C4:C7 and observing the effects in the dependent cells (C10:C13).

## 2.10.2 Data Tables

A data table is a dynamic range that summarizes formula cells for varying input cells. You can create a data table easily, but data tables have some limitations. In particular, a data table can deal with only one or two input cells at a time.

Creating a one-input data table



*Figure 2.42*

A one-input data table displays the results of one or more formulas for various values of a single input cell. The Figure below shows the general layout for a one-input data table.

You can place the data table anywhere in a worksheet. The left column contains various values for the single input cell.

The top row contains references to formulas located elsewhere in the worksheet. You can use a single formula reference or any number of formula references. The upper-left cell of the table remains empty. Excel calculates the values that result from each value of the input cell and places them under each formula reference. For example:

This example uses the mortgage loan worksheet done earlier. The goal of this exercise is to create a data table that shows the values of the four formula cells (loan amount, monthly payment, total payments, and total interest) for various interest rates ranging from 6 to 8 percent, in 0.25-percent increments.

## Solution

The Figure below shows the setup for the data table area. Row 3 consists of references to the formulas in the worksheet. For example, cell F3 contains the formula =C10, and cell G3 contains the formula =C11. Column E contains the values of the single input cell (interest rate) that Excel will use in the table.

The screenshot shows an Excel spreadsheet titled 'mortgage loan data table'. The worksheet contains the following data:

Input Cells	
Purchase Price:	\$325,900
Down Payment:	10%
Loan Term:	360
Interest Rate (Months):	6.50%

Result Cells	
Loan Amount:	\$293,310
Monthly Payment:	\$2,060
Total Payments:	\$741,567
Total Interest:	\$448,257

	Loan Amt	Mo Pmt	Total Pmts	Total Int
6.00%	\$293,310	\$2,060	\$741,567	\$448,257
6.25%				
6.50%				
6.75%				
7.00%				
7.25%				
7.50%				
7.75%				
8.00%				

Figure 2.43

- To create the table, select the data table range (in this case, E3:I12) and then choose:  
Data ⇌ Data Tools ⇌ What-If Analysis ⇌ Data Table.  
Excel displays the Data Table dialog box, as the one shown in Figure below.
- You must specify the worksheet cell that contains the input value. Because variables for the input cell appear in the left column in the data table, you place this cell reference in the Column Input Cell field. Enter **C7** or point to the cell in the worksheet. Leave the Row Input Cell field blank. Click OK, and Excel fills in the table with the calculated results.

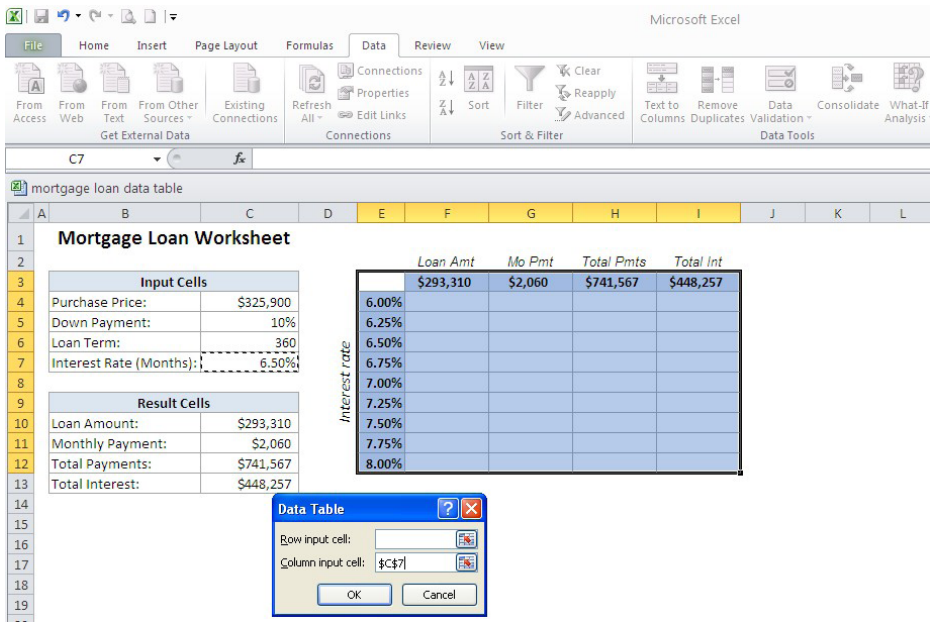


Figure 2.44

Using this table, you can now see the calculated loan values for varying interest rates. If you examine the contents of the cells that Excel entered as a result of this command, you'll see that the data is generated with a multi-cell array formula:  $\{=TABLE(C7)\}$

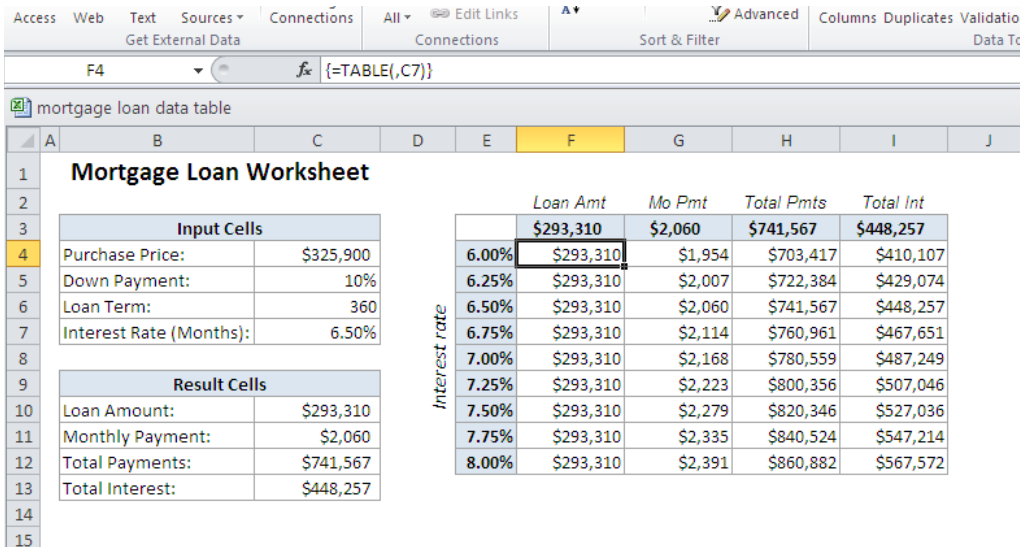


Figure 2.45

### 2.10.3 Scenario Manager

Data tables are useful, but they have a few restrictions. These include:

1. You can vary only one or two input cells at a time.
2. Setting up a data table is not very intuitive.
3. A two-input table shows the results of only one formula cell although you can create additional tables for more formulas.

In many situations, you may be interested in a few select combinations, not an entire table that shows all possible combinations of two input cells. The Scenario Manager Feature makes automating your what-if models easy. You can store different sets of input values usually called changing cells for any number of variables and give a name to each set.

You can then select a set of values by name, and Excel displays the worksheet by using those values. You can also generate a summary report that shows the effect of various combinations of values on any number of result cells. These summary reports can be an outline or a pivot table.

For example, your annual sales forecast may depend upon several factors. Consequently, you can define three scenarios: best case, worst case, and most likely case. You then can switch to any of these scenarios by selecting the named scenario from a list. Excel substitutes the appropriate input values in your worksheet and recalculates the formulas.

#### Defining scenarios

The figure below is an example that uses a simplified production model.

	A	B	C	D	E
1	<b>Resource Cost Variables</b>				
2	Hourly labor cost	30			
3	Material cost	57			
4					
5					
6		<b>Product A</b>	<b>Product B</b>	<b>Product C</b>	
7	Hours per unit	12	14	24	
8	Material per unit	6	9	14	
9	Cost to produce	\$702	\$933	\$1,518	
10	Sales price	\$795	\$1,295	\$2,195	
11	Unit profit	\$93	\$362	\$677	
12	Units produced	36	18	12	
13	<b>Total profit per product</b>	<b>\$3,348</b>	<b>\$6,516</b>	<b>\$8,124</b>	
14					
15	<b>Total Profit</b>	<b>\$17,988</b>			

$$B9:=(\text{Hourly labor cost} * B7) + (\text{Material cost} * B8)$$

$$B11: =B10-B9$$

$$B13$$

$$=B11 * B12$$

Figure 2.46

This worksheet contains two input cells: the hourly labor cost (cell B2) and the unit cost for materials (cell B3). The company produces three products, and each product requires a different number of hours and a different amount of materials to produce. Formulas calculate the total profit per product (row 13) and the total combined profit (cell B15).

A management is trying to predict the total profit, but uncertain what the hourly labor cost and material costs will be, they have identified three scenarios, listed in Table below

<b>Three Scenarios for the Production Model</b>		
<b>Scenario</b>	<b>Hourly Cost</b>	<b>Materials Cost</b>
Best Case	30	57
Worst Case	38	62
Most Likely	34	59

The Best Case scenario has the lowest hourly cost and lowest materials cost. The Worst Case scenario has high values for both the hourly cost and the materials cost. The third scenario, Most Likely Case, has intermediate values for both of these input cells. The managers need to be prepared for the worst case, however, and they are interested in what would happen under the Best-case scenario.

## **Solution**

- Choose Data ⇔ Data Tools ⇔ What-If Analysis ⇔ Scenario Manger to display the Scenario Manager dialog box.
- When you first open this dialog box, it tells you that no scenarios are defined — which is normal because you are just starting.
- As you add named scenarios, they appear in the Scenarios list in this dialog box.



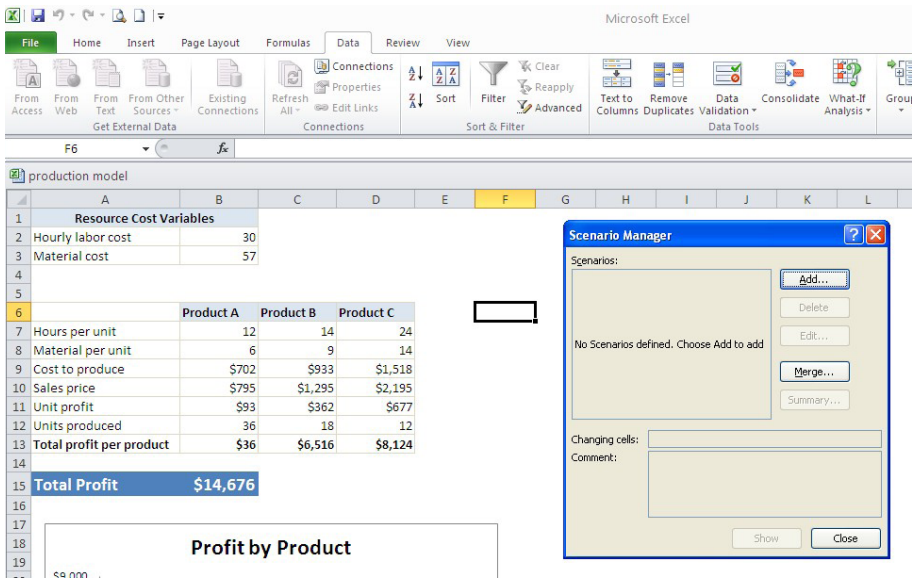


Figure 2.47

To add a scenario, click the Add button in the Scenario Manager dialog box. Excel displays its Add Scenario dialog box, shown in Figure below

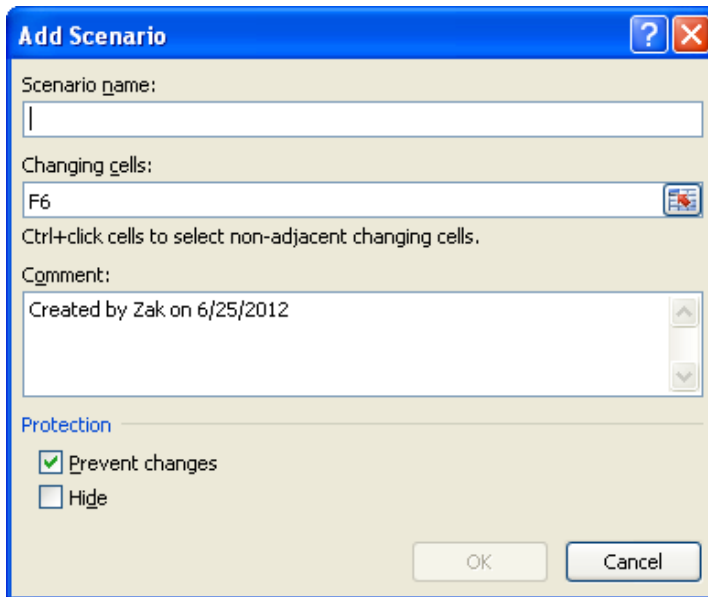
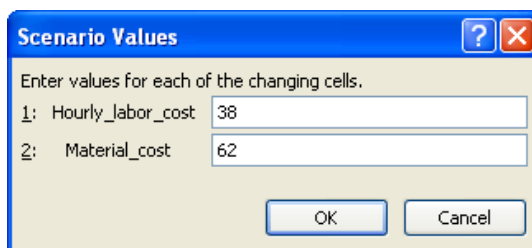


Figure 2.48

This dialog box consists of four parts, namely:

1. **Scenario Name:** You can give the scenario any name that you like, preferably something meaningful.
2. **Changing Cells:** The input cells for the scenario. You can enter the cell addresses directly or point to them. If you have created a name for the cells, type the name. The number of changing cells for a scenario is limited to 32.
3. **Comment:** By default, Excel displays the name of the person who created the scenario and the date when it was created. You can change this text, add new text to it, or delete it.
4. **Protection:** The two Protection options (preventing changes and hiding a scenario) are in effect only when you protect the worksheet and choose the Scenario option in the Protect Sheet dialog box. Protecting a scenario prevents anyone from modifying it; a hidden scenario doesn't appear in the Scenario Manager dialog box.

In this example, define the three scenarios that are listed in Table above. The changing cells are Hourly Cost (B2) and Materials Cost (B3). After you enter the information in the Add Scenario dialog box, click OK. Excel then displays the Scenario Values dialog box. This dialog box displays one field for each changing cell that you specified in the previous dialog box. Enter the values for each cell in the scenario.



*Figure 2.49*

If you click OK, you return to the Scenario Manager dialog box, which then displays your named scenario in its list. If you have more scenarios to create, click the Add button to return to the Add Scenario dialog box.

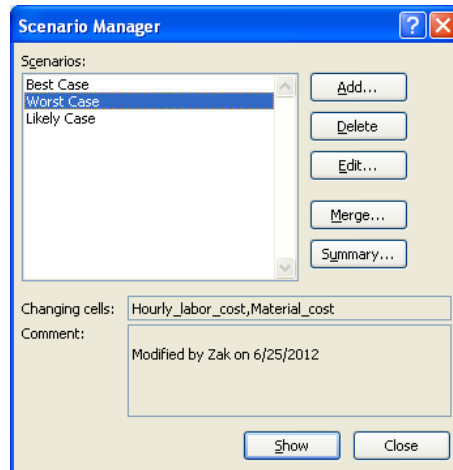


Figure 2.50

### Displaying scenarios

After you define all the scenarios and return to the Scenario Manager dialog box, the dialog box displays the names of your defined scenarios. Select one of the scenarios and then click the Show button. Excel inserts the corresponding values into the changing cells and calculates the worksheet to show the results for that scenario. Figure below shows an example of selecting worst case scenario.

	Product A	Product B	Product C
per unit	12	14	24
ial per unit	6	9	14
o produce	\$828	\$1,090	\$1,780
price	\$795	\$1,295	\$2,195
rofit	-\$33	\$205	\$415
roduced	36	18	12
profit per product	\$36	\$3,690	\$4,980
<b>Profit</b>	<b>\$8,706</b>		

**Profit by Product**

Figure 2.51

## 2.10.3 Reverse What-If Analysis

If you know what a formula result should be, Excel can tell you the values that you need to enter in one or more input cells to produce that result. In other words, you can ask a question such as “How much do sales need to increase to produce a profit of \$1.2 million?” Excel provides two tools that are relevant:

1. Goal Seek: Determines the value that you need to enter in a single input cell to produce a result that you want in a dependent formula cell.
2. Solver: Determines the values that you need to enter in multiple input cells to produce a result that you want. Moreover, because you can specify certain constraints to the problem, you gain significant problem solving ability.

## Goal Seek

In Single-cell goal seeking, Excel determines what value in an input cell produces a desired result in a formula cell. A goal-seeking example

The screenshot shows an Excel spreadsheet titled "mortgage loan" with the following data:

Input Cells	
Purchase Price:	\$409,000
Down Payment:	10%
Loan Term (Months):	360
Interest Rate (APR):	6.50%

Result Cells	
Loan Amount:	\$368,100
Monthly Payment:	\$2,585
Total Payments:	\$930,657
Total Interest:	\$562,557

*Figure 2.52*

The figure above shows the mortgage loan worksheet used in the previous sub- topic. This worksheet has four input cells (C4:C7) and four formula cells (C10:C13). This example demonstrates the opposite approach. Rather than supply different input cell values to look at the calculated formulas, this example lets Excel determine one of the input values that will produce the desired result.

Assume that you are in the market for a new home and you know that you can afford a \$1,800 monthly mortgage payment. You also know that a lender can issue a 30-year fixed-rate mortgage loan for 6.50%, based on an 80% loan-to-value i.e., a 20% down payment. The question is “What is the maximum purchase price you can handle?” In other words, what value in cell C4 causes the formula in cell C11 to result in \$1,800?

In the above example, you could plug values into cell C4 until C11 displays \$1,800. With more complex models, Excel can usually determine the answer much more efficiently. To answer the question posed, first set up the input cells to match what you already know. Specifically:

1. Enter **20%** in cell C5 (the down payment percent)
2. Enter **360** in cell C6 (the loan term, in months)
3. Enter **6.5%** in cell C7 (the annual interest rate)

Next, choose Data ⇨ Data Tools ⇨ What-If Analysis ⇨ Goal Seek. Excel displays the Goal Seek dialog box, shown in Figure below.

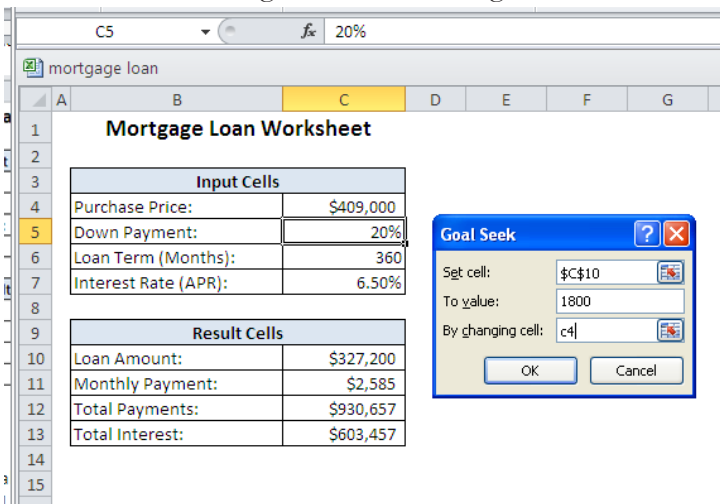


Figure 2.53

Completing this dialog box is similar to forming a sentence. You want to set cell C11 to 1800 by changing cell C4. Enter this information in the dialog box either by: Typing the cell references or by pointing with the mouse. Click OK to begin the goal-seeking process. In less than a second, Excel displays the Goal Seek Status box, which shows the target value and the value that Excel calculated. In this case, Excel found an exact value. The worksheet now displays the found value in cell C4 (\$355,974). As a result of this value, the monthly payment amount is \$1,800. At this point, you have two options:

1. Click OK to replace the original value with the found value.
2. Click Cancel to restore your worksheet to the form that it had before you chose Goal Seek.

	A	B	C	D
1	<b>Mortgage Loan Worksheet</b>			
2				
3	<b>Input Cells</b>			
4	Purchase Price:		\$2,250	
5	Down Payment:		20%	
6	Loan Term (Months):		360	
7	Interest Rate (APR):		6.50%	
8				
9	<b>Result Cells</b>			
10	Loan Amount:		\$1,800	
11	Monthly Payment:		\$14	
12	Total Payments:		\$5,120	
13	Total Interest:		\$3,320	
14				

*Figure 2.54*

## 2.10.4 Solver

The Excel Goal Seek feature is a useful tool, but it clearly has limitations. It can solve for only one adjustable cell, and it returns only a single solution.

Excel's powerful Solver tool extends this concept by enabling you to do the following:

- Specify multiple adjustable cells.
- Specify constraints on the values that the adjustable cells can have.
- Generate a solution that maximizes or minimizes a particular worksheet cell.
- Generate multiple solutions to a problem.

## No Solver Command?

You access Solver by choosing Data ⇨ Analysis ⇨ Solver. If this command isn't available, you need to install the Solver add-in. It's a simple process:

1. Choose File ⇨ Options.
2. In the Excel Options dialog box, click the Add-Ins tab.
3. At the bottom of the dialog box, select Excel Add-Ins from the Manage drop-down list and then click Go. Excel displays its Add-Ins dialog box.
4. In the Add-Ins dialog box, place a check mark next to Solver Add-In and then click OK.

After performing these steps, the Solver add-in loads whenever you start Excel.

## 2.11 Workbook protection

Ms Excel includes a Protect Workbook command that prevents others from making changes to the layout of the worksheets in a workbook. You can assign a password when you protect an Excel workbook so that only those who know the password can unprotect the workbook and change the structure or layout of the worksheets.

### 2.11.1 Setting a password for a workbook

1. Click the Microsoft Office Button, and then click Save As.
2. Click Tools, and then click General Options.
3. Do one or both of the following:
  - If you want reviewers to enter a password before they can view the workbook, type a password in the Password to open box.
  - If you want reviewers to enter a password before they can save changes to the workbook, type a password in the Password to modify box.
4. If you don't want content reviewers to accidentally modify the file, select the Read-only recommended check box. When opening the file, reviewers will be asked whether or not they want to open the file as read-only.
5. Click OK.
6. When prompted, retype your passwords to confirm them, and then click OK.
7. Click Save.
8. If prompted, click yes to replace the existing workbook.

## Exercise 6

1. What are the main features of MS Excel?
2. What is a cell?
3. Differentiate between a worksheet and a workbook?
4. How many data formats are available in Excel? Name some
5. Specify the order of operations used for evaluating formulas in Excel.
6. Explain few useful functions in Excel.
7. Explain workbook protection types in Excel.
8. Explain how cell reference is useful in the calculation?
9. Which function is used to determine the day of the week for a date?





**Remember**  
**SPREADSHEETS**

**Absolute Cell Reference:** An absolute cell reference is one that does not change when it is copied. To make a cell reference absolute, you must include a \$ before the reference (ex: \$C\$4). The other type of reference is a Relative Reference.

**Active Cell:** The active cell is the cell in the spreadsheet that is currently selected for data entry. You can change which cell is the active cell by clicking the left mouse button once or using the arrow keys on the keyboard. The current active cell can be identified as being the one that has a darker black border around it. Also, the active cell reference is listed in the Name Box directly above the spreadsheet's column headings.

**Anchor Cell:** The anchor cell is the first cell that is highlighted in a range. When a range of cells is selected, they appear as highlighted in black. The anchor cell, however, remains white. If only one cell is selected in the sheet, it is the anchor cell.

**Bar / Column Chart:** A bar or column chart is a style of chart that is used to summarize and compare categorical data. The length of each bar represents the aggregate value (ex: sum) of that particular category. Bars run horizontally and columns run vertically.

**Cell:** A cell is a rectangular area formed by the intersection of a column and a row. Cells are identified by the Cell Name (or Reference, which is found by combining the Column Letter with the Row Number. For example the cell in Column "C" in Row "3" would be cell C3. Cells may contain Labels, Numbers, Formulas or Functions.

**Cell Reference:** A cell reference is the name of the cell that is found by combining the Column Letter with the Row Number. For example the cell in Column "C" in Row "3" would be cell C3.

**Column:** Columns run vertically on the spreadsheet screen. An Excel spreadsheet contains 256 columns that are labeled with the letters of the alphabet. When the column labels reach letter "Z" they continue on with AA, AB, AC..... AZ and then BA, BB, BC.....BZ etc.

**Column / Bar Chart:** A column or bar chart is a style of chart that is used to summarize and compare categorical data. The length of each bar represents the aggregate value (ex: sum) of that particular category. Columns run vertically and Bars run horizontally.

**Data:** Data refers to the type of information that can be stored in the cells of a spreadsheet. Spreadsheet data types include values (numbers), labels, formulas and functions.

**Enter key:** The Enter Key on the keyboard is used to accept any data that has been typed in a cell and move the active cell down vertically to the next one in a column.

**Fill:** Fill is a feature that can be used to quickly copy data from the anchor cell to an adjoining range, updating the data if appropriate. This means that if the anchor cell contains a formula with relative cell references, those references will automatically update relative to their position when copied to a new location. Fill can also be used to automatically populate common lists of data such as days of the week or months. Fill can be used to copy data either horizontally or vertically in a range.

**Fill Handle:** The fill handle is the small bold square in the bottom right corner of a cell that can be used to copy (fill) data to adjacent cells in the same row or column. When you hover over the fill handle box, the mouse pointer will change to a black plus sign. You may then click the left mouse button, (and hold it down) while selecting the adjacent cells to copy to. Releasing the mouse button will then fill the content.

**Filter:** Filtering will allow you to quickly find the information that you are looking for in a spreadsheet. When you apply a filter, you control the data that is displayed on the screen by setting criteria. Data contained in rows that don't meet your criteria will temporarily disappear from view when the filter is applied. When the filter is cleared, all of the data will once again appear in the spreadsheet.

**Formula:** A formula is a spreadsheet data type that will calculate a result and display it in the active cell. A formula is written using cell references and must begin with an equal sign "=" to distinguish it from a label. An example of a formula would be: =A3+C3 which would take whatever value was entered into cell A3 and add it to the value that was typed into C3. After typing the formula and pressing the Enter key, the resulting value will be displayed.

**Formula Bar:** The formula bar appears directly above the column headings of a spreadsheet and will display what has been typed into the active cell. For example,

if you click on a cell that contains the formula =A3+C3, the cell itself will show the result of the formula. The formula bar, however, will display what has actually been typed into the cell which, in this case, is =A3+C3.

**Freezing Columns and/or Rows:** Freezing is a technique that can be used in larger spreadsheets to assist in viewing the information on the screen. If a spreadsheet contains many rows, you can freeze the rows containing your heading labels so that as you scroll down in the sheet the headings stay at the top and line up with the appropriate data. Likewise, if your spreadsheet contains many columns, the leftmost columns may be frozen so that they stay with the data as you scroll to the right.

**Function:** these are built-in formulas that are used to enter either commonly used or very complex formulas. Like formulas, functions begin with an equal sign “=” and use cell references in their format. One commonly used function is the Sum function, which will add up the values in a range. The function: =sum(H2:H25) would add all values contained in cells H2 through H25 and return the result when the enter key is pressed.

**Gridlines:** these are the horizontal and vertical lines on the screen that separate cells in a spreadsheet. Gridlines typically do not print unless the option is set in the layout options of the spreadsheet.

**Labels:** Labels refer to text that is typed into the cells of a spreadsheet. Labels have no numeric value and cannot be used in a formula or function.

**Name Box:** The name box appears to the left of the formula bar and displays the name of the current cell. Unless you define a cell or range of cells with a specific name, the name box will display the cell reference of the active cell.

**Pie Chart:** A pie chart is a circular chart that is divided up into sections, each of which represents the numerical proportion of the whole.

**Print Area:** The print area is used to specify a range of cells that will be printed, rather than printing an entire worksheet. This is particularly useful for very large worksheets with multiple columns and rows.

**Print Titles:** Print titles are used to repeat column or row titles on each page. That way, if a spreadsheet prints on multiple pages, each page will contain the appropriate headings to identify the data.

**Range:** A range is a group of cells in a spreadsheet that have been selected. If the

cells are all together in a rectangular or square shape, it is an adjacent range. An adjacent range is identified by the cell reference in the upper left and lower right corners of the selection separated by a colon. (Example: A3:B5). In this example, the range would include all cells in the rectangular area formed by beginning the highlighting in cell A3 and dragging down to B5. You can consider the colon as the word “through”. In this case, the range would include cells A3 through B5.

**Relative Reference:** A relative cell reference is one that changes when it is copied. For example, if a formula that contains the cell reference “C4” is copied to the next cell to the right, the reference will change to D4 (updating the column letter). If the same formula is copied down one cell, the reference will change to “C5” (updating the row number). The other type of reference is an Absolute Reference.

**Rows:** Rows run horizontally on the spreadsheet screen. An Excel spreadsheet contains 16,384 rows which are labeled numerically.

**Sheet Tabs:** In Microsoft Excel, the sheet tabs appear below the worksheet grid area and allow you to switch from one worksheet to another in a workbook.

**Sort:** Sorting is used to arrange information in a particular order. When sorting data, you may choose multiple levels of criteria and sort in either ascending or descending order. For example, a spreadsheet of data could be sorted first alphabetically in ascending order by last name and then by first name.

**Tab Key:** The tab key on the keyboard is used to accept any data that has been typed in a cell and move the active cell horizontally to the next one in a row

**Values:** Values are numeric data that is entered into a cell. When data is formatted as the value type, it can be referred to in formulas and functions and used in calculations.

**Workbook:** A workbook is a collection of worksheets that are saved together in one file. Individual worksheets can be given descriptive names and you can switch from one worksheet to another by using the sheet tabs that appear beneath the worksheet grid area.

**Worksheet:** A worksheet is the grid of columns and rows that information is inputted into. In many spreadsheet applications (such as Microsoft Excel) one file called a workbook -- can contain several worksheets. Worksheets can be named using the sheet tabs of the bottom of the spreadsheet window. The sheet tabs can also be used to switch from one worksheet to another within a workbook.

### Learning Outcomes

- They should learn about the importance of social media.
- They should develop individual expertise by creating personal accounts to join different social media.
- They should be able to communicate by posting messages, requesting friends, adding friends, posting images, tweeting news, etc.
- Learners should discuss and understand the power of social media.
- They should understand social media and their roles

### Key inquiry questions

- What are social media and how could they be classified and differentiated from traditional media?
- How do the virtual communities interact and exchange information?
- How could individuals and institutions benefit from social media?
- What impact has virtual social media on the traditional media institutions and on societies?
- What are the ethical and legal issues and risks relating to social media?

## 3.0 Introduction to social media

Social Media; This is media used in social interactions, using available and accessible publishing techniques. It uses web-based technologies to turn communication into interactive dialogues. According to Wikipedia, the free encyclopedia Social media are computer-mediated technologies that facilitate the creation and sharing of information, ideas, career interests and other forms of expression via virtual communities and networks.



*Figure 3.1 Social media icons*

### 3.0.1 Social media and traditional media

Traditional media is also called industrial media. It may include both print and electronic media. Social media is different from industrial or traditional media, such as newspapers and television. It is fairly cheap and are accessible to enable anyone access information, compared to industrial media, which generally require a lot of resources to publish or even access the information. One characteristic shared by both social media and industrial media is the capability to reach small or large audiences. For instance a message on say Twitter or an advertisement on television may attract a small or even millions of people. There are several properties that help describe the differences between social media and industrial media. These properties may include:

1. Accessibility - the means of production for industrial media are mostly owned privately or by government; social media tools are generally available to anyone at little or no cost.
2. Usability - industrial media production typically requires specialized skills and training. Most social media does not, or in some cases reinvent skills, so anyone can operate the means of production.

3. Recency - the time interval between communications produced by industrial media can be long it can take days, weeks, or even months compared to social media which can be capable of almost prompt replies, only the participants determine any delay in response.
4. Permanence - industrial media, once created, cannot be altered i.e. once a magazine article is printed and distributed, changes cannot be made to that same article while social media can be altered almost immediately by comments or editing.

### 3.0.2 Classification of social media

Social media can be classified into different categories. These may include:

1. Social networking sites-It is a platform where people interact with each other. The most popular example of this category is Facebook.
2. Blogging: It is a platform where discussions revolves around one topic. Normally the topic of discussion is termed to be trending.
3. Media Sharing: Media sharing is becoming inevitable nowadays. It involves sharing or the exchange of videos, audios or even pictures in video sharing some of the sites used include YouTube and vimeo, in the sharing of audios platforms such as sound cloud come in handy while in sharing of pictures Flickr is a perfect example.
4. Document Sharing: It is a platform that is used in sharing documents like spreadsheet or even presentations with other users. Websites such as google drive and slide share are some examples.
5. Social News: This is a platform which enables one to find all the news especially those related to social media. An example of this platform is Digg.

### 3.0.3 Benefits of using social media

#### 1. To institutions.

Social networking platforms may allow organizations to improve communication and productivity by distributing information among different groups of employees in a more efficient manner, resulting in increased productivity. Among the benefits of using social media by an institution include.

- Helps in open communication, leading to enhanced information delivery.
- Allows employees to discuss ideas, post news and ask questions.

- Provides an opportunity to widen business contacts.
- Targets a wide audience, making it a useful and effective recruitment tool.
- Improves business reputation and client base with minimal use of advertising.
- Expands market research, implements marketing campaigns, delivers communications and directs interested people to specific web sites.

## 2.To individuals.

The way people communicate has been changed in comparison to the previous years largely due to social media. For individuals the benefits of social media may include:

- **Personal use:** An individual may use social media for reasons such as keeping in touch with what is happening in the world, or get the latest news or even keep in touch with the developing technology. For instance it is common for people to use emails to keep in touch with friends. Social media also helps individuals to talk to people in real time, this has been made possible by use of skype.
- **Enhance creativity:** Individuals may also use social media to explore their creativity for instance a writer may create their own blogs and hence enhance their writing skills. One may also upload photos using the photo sharing sites and by so doing explore their talents in photography.
- **Social interactions:** Social media also helps people to interact with each other using highly accessible communication techniques like mobile phones. Other social networks like Facebook aid a lot in social interactions.

## 3.1 Common social media sites

### 3.1.1 Facebook



*Figure 3.2 Facebook icon*

It is a social network service and website launched in February 2004 that is operated and privately owned by Facebook, Inc. Users may create a personal profile, add



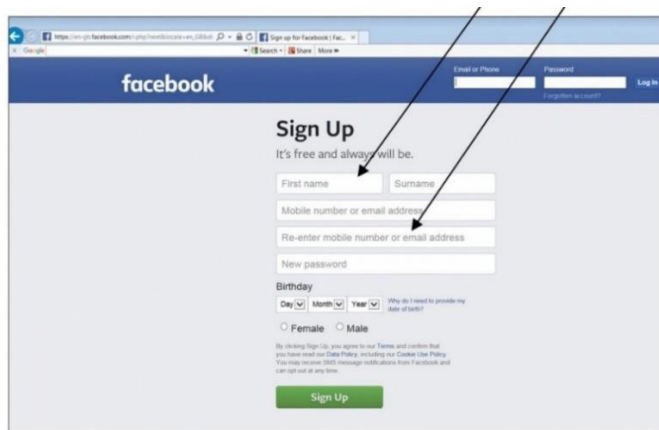
other users as friends and exchange messages, including automatic notifications when they update their profile. Additionally, users may join common interest user groups, organized by workplace, school, or college, or other characteristics.

The name of the service stems from the colloquial name for the book given to learners at the start of the academic year by university administrations in the US with the intention of helping learners to get to know each other better. Facebook allows anyone who declares themselves to be at least 13 years old to become a registered user of the website.

Creating a Facebook account is normally free, and it takes only take a few minutes. Once you have created an account, you have the ability to share exiting things with friends, upload pictures, and chat with friends, among many other things.

## Creating an account.

**1. Open the Facebook homepage;** you will need to be at least 13 years old to create a Facebook account. Facebook accounts are free. You can only create one Facebook account per email address.



*Figure 3.3*

**2. Enter in your information;** On the Facebook homepage, enter in your first name, last name, email address, password, birthday, and gender. You must use your real name for your account. Nicknames may be allowed as long as they are a variation on your real name for example Chris instead of Chrispine.

**3. Facebook** will send an email to the email address you provided. This is to ensure that you have given a real email address and one that you genuinely have access to. Click on the button **Confirm Your Account** . A numeric confirmation code is also

provided and you may be asked to type this it.

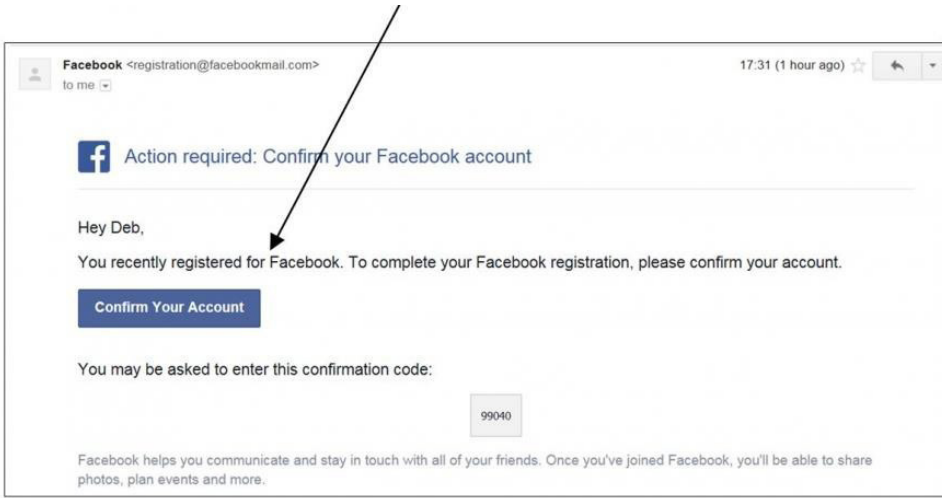


Figure 3.4

## Setting up your profile

**1. Add a profile picture;** you can use either a photograph that is on your computer or can be accessed from another device. Example a phone. Many people choose to put a picture of something other than themselves for their profile, for instance a cartoon or favorite pet. If you choose not to put a photo at this time your profile will appear with a head and shoulders outline

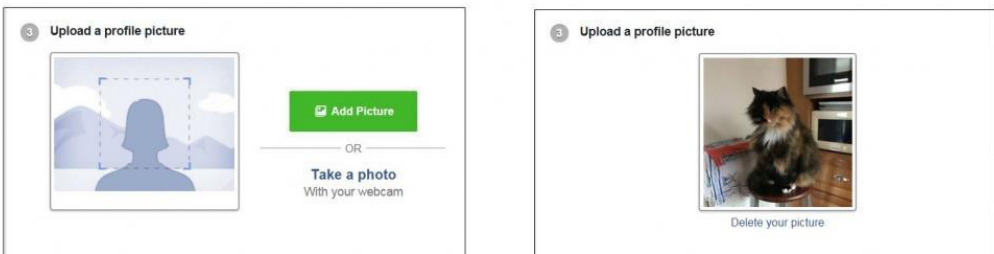
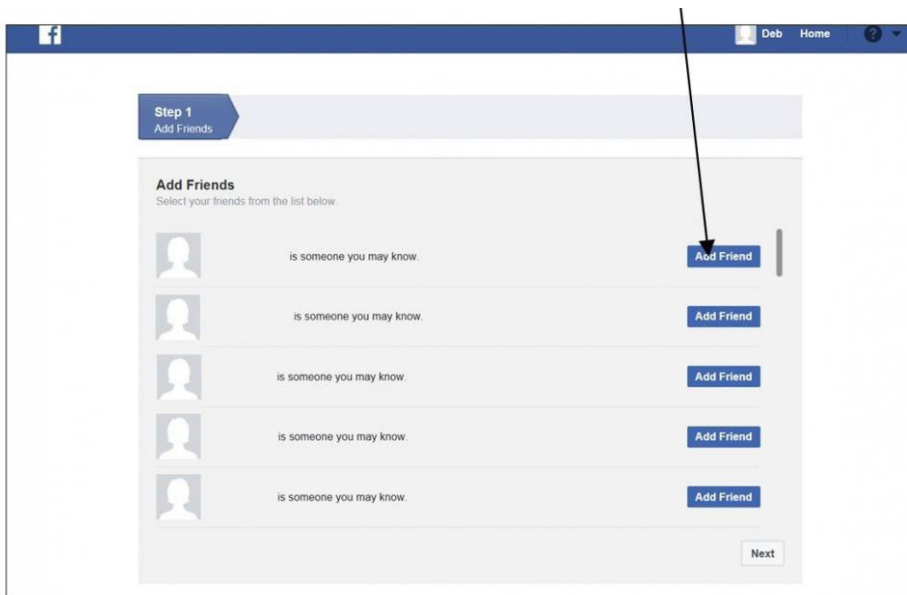


Figure 3.5

**2. Add friends;** Facebook is nothing if you don't have friends and family to share with. You can search for people by their name or email, import your contact lists, and invite friends that aren't currently using Facebook.

Facebook will suggest people it thinks you may know and give you a list with

profile photos so you can recognize them. If you would like to connect with someone on this list click on the Add Friend button. This will send a Friend Request to them – it is their choice whether or not to accept your request.



*Figure 3.6*

**3. Manage your privacy settings;** there are countless shocking stories of people posting things that they don't want others to see, or losing a job because of something controversial they shared. Take some time to set up your privacy settings to prevent the wrong people from seeing what you post.

### Using Facebook.

**1. Share and post;** you can post to your own timeline or post to your friends' timelines. You can also share content from elsewhere on the internet, including links, images, and videos.

**2. Chat on Facebook;** Facebook allows you to chat with anyone on your friends list. If the person you are chatting with is not online, they will receive your message the next time they log in. You can also download the Messenger app for your phone to chat on the go.

**3. Upload photos;** Facebook allows you to upload your photos to post to your

profile and share with friends and family. You can upload single photos or organize your photos into albums. Make sure to not upload anything containing questionable content.

**4. Create an event;** you can use Facebook to create events and invite people. You can set the date and time, enter a location, make posts for people that will be attending, and invite specific people. Facebook events are quickly becoming one of the main ways that people organize gatherings.

### *Activity 3.1*

In groups discuss how Facebook can be used to promote peace in South Sudan. What information would you use to support your view?

## 3.1.2 Twitter



*Figure 3.7 Twitter logo*

It is a website, owned and operated by Twitter Inc. It offers a social networking and micro blogging service, enabling its users to send and read other users' messages called tweets. Tweets are text-based posts displayed on the user's profile page. Tweets are publicly visible by default, however senders can restrict message delivery to their friends list. Users may subscribe to other users' tweets. This is known as "following" and subscribers are known as "followers."

All users can send and receive tweets via the Twitter website, compatible external applications such as for smartphones, or by Short Message Service (SMS) available in certain countries. While the service is free, accessing it through SMS may incur phone service provider fees. The website is based in San Francisco, California. Twitter also has servers and offices in San Antonio, Texas and Boston, Massachusetts.

## Creating an account

Different social media has different uses, strengths, and advantages. Twitter can be understood as a real time social networking site, that enables sharing of information as it happens and for connecting with others in real time.



*Figure 3.8*

When creating an account, first and foremost go to **Twitter's homepage**. You should see options to either log in or sign up in the upper right of the screen. If you are on a tablet or smartphone, you could be redirected to the mobile website of Twitter.

**Click on Sign Up**; this will start the process of creating a new Twitter account. After clicking sign up, you will be redirected to the first step of the sign-up process.

**Enter your full name**; you may use your real name so that your friends can easily recognize your Twitter account.

**Enter a valid e-mail address**; any e-mails or news from Twitter will be sent to this e-mail address. This email is normally used for recovering the account if you ever forget your log in information. You can also use your mobile phone number if you want that option for account recovery.

**Enter in a username**; In addition to your real name, this will be shown on your profile and will be another way people can find you. If you have ever seen a @ symbol, followed by a name, it is likely a Twitter username. Twitter will also automatically suggest some names for you based off of your real name.

The username isn't too important, so any one of these options would be fine.

Check or uncheck the **“Tailor Twitter based on my recent website visits” option**. If checked, this option will allow Twitter to look through your browser history on websites with the Twitter widget and suggest people to follow based on your patterns. Many websites have this Twitter widget, so it could be helpful if you want some suggestions on interesting accounts to follow. However, if you would like more privacy online, do not check this box.

**Enter a strong password**; be sure that your password is not too easy to guess, but not so hard that you can't remember it. Note down the password somewhere so you don't forget it.

**Enter your phone number**; if you used an e-mail account in one of the previous steps, you will be prompted to enter a valid phone number. After registering your number, you will receive a text with a confirmation code. If you do not receive this text, you likely entered in the wrong number. Enter in the code after clicking “Next.” Now, if you forget your login credentials, Twitter can send them to this number.

**Confirm your e-mail address**; by this point, you should have received an e-mail from Twitter to the address you previously entered. Follow the instructions in the e-mail to confirm your address.

You can now use Twitter and all of its features. Search for and follow friends and your favorite celebrities and also organizations.

### How to communicate in twitter.

Communication and interactions in twitter are through short messages of 280 characters or less called tweets. You can post updates on Twitter, along with photos and videos, and you can interact with others by favoriting their post to indicate that you like it, retweeting a post so that it is broadcasted to your followers or private messaging.

### Sending a Tweet on Twitter.

After signing up to twitter, there is a box at the top right containing a feather. Click on that and a box will appear. This is where you type your message. You also have the option here to add a photo or video, share your location, or add a poll.

If you would like to reference someone in your tweet, add their Twitter handle beginning with the “@” symbol. If you want to establish a keyword that others can use to add to the conversation, add a hashtag (#).

### Reply to a Tweet.

When you want to reply to a tweet, hit the arrow which is located under and to the far left of the post that you want to reply to. Doing so will open a box in which you can enter your message. The handle(s) of the person or people that you are replying to will already be posted in the message box, ensuring that it will be directed to them when you hit the “Tweet” button.

### Retweet on Twitter.

At times you may read something funny or noteworthy that you would like to retweet. Twitter makes it easy by providing an icon just for this purpose. Tap or click the icon second from the left under the tweet. A box will appear with the original post and space for you to enter an additional comment. Click on “Retweet” and the post will appear on your profile page with your comment attached to it.

### *Activity 3.2*

In groups, discuss how twitter may be used for positive reason such as promoting environmental sustainability in South Sudan.

Also research and discuss any possible negative impact of Twitter.

Present your conclusions to the class.

### 3.1.3 YouTube



*Figure 3.9 Youtube logo*

It is a video-sharing website on which users can upload, share, and view videos. Three former PayPal employees created YouTube in February 2005. The company is

based in San Bruno, California, and uses Adobe Flash Video technology to display a wide variety of user-generated video content, including movie clips, TV clips, and music videos, as well as amateur content such as video blogging and short original videos. Most of the content on YouTube has been uploaded by individuals, although media corporations including CBS, BBC, VEVO and other organizations offer some of their material via the site, as part of the YouTube partnership program.

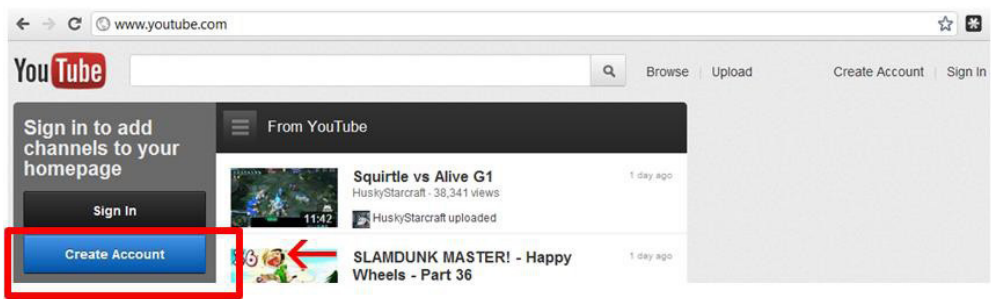
Unregistered users can watch the videos, while registered users are permitted to upload an unlimited number of videos. Videos that are considered to contain potentially offensive content are available only to registered users 18 and older. In November 2006, YouTube, LLC was bought by Google Inc. and now operates as a subsidiary of Google.

### **Creating an account.**

YouTube allows users to search and browse millions of community and comment, rate and make video responses to their favorite videos, upload and share your videos with millions of other users and save favorite videos to watch and share later. Steps for joining YouTube include:

**Visit the YouTube Web site in order to get started.** In creating a YouTube account, you are also creating a Gmail account. This will appear as [YouTube username]@gmail.com.

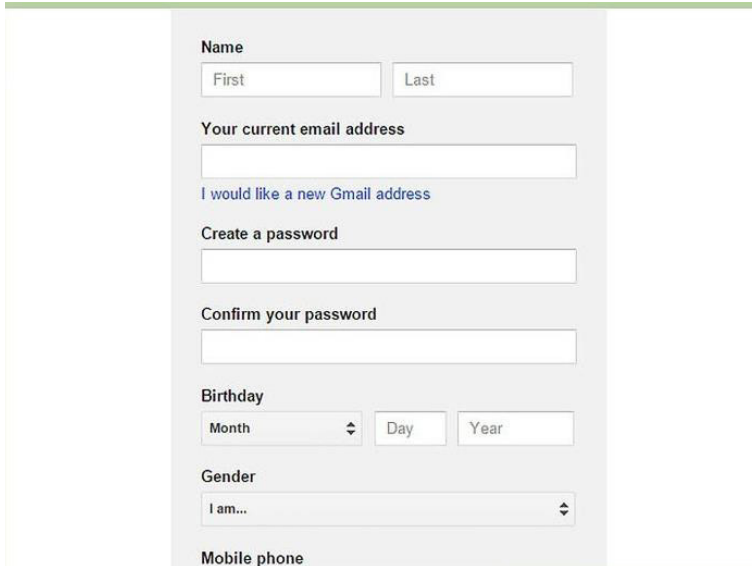
Click on the **“Create an account”** button under the login form on the login page. If you already have a Gmail account, you should have a YouTube account. Use your Gmail username and password to log into YouTube.



*Figure 3.10*



Fill out the requisite information. Fill out your e-mail address, user name, date of birth, gender and click “I Accept”.



The image shows a registration form with the following fields and labels:

- Name**: Two input boxes labeled "First" and "Last".
- Your current email address**: One input box.
- [I would like a new Gmail address](#): A blue link below the email field.
- Create a password**: One input box.
- Confirm your password**: One input box.
- Birthday**: A dropdown menu labeled "Month", and two input boxes labeled "Day" and "Year".
- Gender**: A dropdown menu labeled "I am...".
- Mobile phone**: A label for a field that is partially visible at the bottom.

*Figure 3.11*

Give a **phone number for verification** that you are not a machine. To cut down on fake accounts, Google sometimes will make you provide verification.

Click on the box “I agree to the Google Terms of Service and Privacy Policy “Click the Create My Account button. If you leave any fields empty or if you choose a username that’s taken already, YouTube refreshes the page with red warning notes identifying the fields that need to be corrected before you can register.

**Decorate your YouTube page;** on your profile page, you can add a main picture and your own background, among other things. Try to express yourself.

Among the benefits one enjoys by creating a YouTube account include:

- Making and adding videos to the YouTube community.
- Tracking your favorite users by subscribing to their channel.
- Manage your favorite tracks, videos, and online episodes.
- Commenting on videos and socializing with other members of the YouTube community.

## Uploading a video to YouTube

Uploading videos to YouTube is a quick process from either your mobile device or from your computer. Through uploading videos you are able to share your videos with friends and family. The steps involved include:

**Copy the video from your camera to your computer.** Before you upload the video to YouTube, make any edits that you would like, and then make sure that it is converted into a proper format. Some of the formats accepted by YouTube include: Audio Video Interleaved (AVI), 3rd Generation Partnership Project (3GPP), Motion Picture Experts Group Part 14 (MP4), Motion Picture Experts Group (MPEG or .MPG) among many other formats.

**Log in to your account.** Each account has its own channel attached to it. Sign in to the account that is associated with the channel that you want to upload the video to.

Click the **upload button and choose a video file.** Click the “Select files to upload” button to open a file browser. Find the file or files that you want to add.

**Click the open button then enter the details.** Some of the required information includes the title of the video, the description of the video, and any tags that you want to add. You may then **share** the video online.

### *Activity 3.3*

In groups create a YouTube channel and upload an authentic video showing some physical features in South Sudan. Prepare to demonstrate the steps your group used to upload the video.

Base on your knowledge on YouTube what are your main recommendations to new YouTube users?

### 3.1.4 Instagram



*Figure 3.12 Instagram logo*

Instagram is a social media app that allows users to share photos and videos from their lives, add captions, edit filters, engage with others, explore among many other things. Users can connect their Instagram account to other social media profiles, enabling them to share photos to those profiles as well.

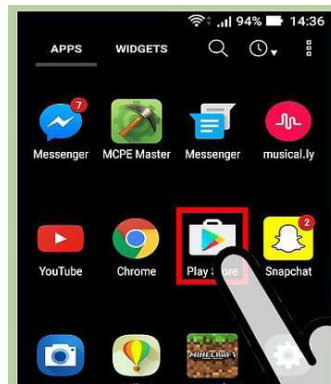
It was created by Kevin Systrom and Mike Krieger, and launched in October 2010 as a free mobile app exclusively for the iOS operating system. A version for Android devices was released two years later, in April 2012, followed by a feature-limited website interface in November 2012, and apps for Windows 10 Mobile and Windows 10 in April 2016 and October 2016 respectively.

#### Creating an account

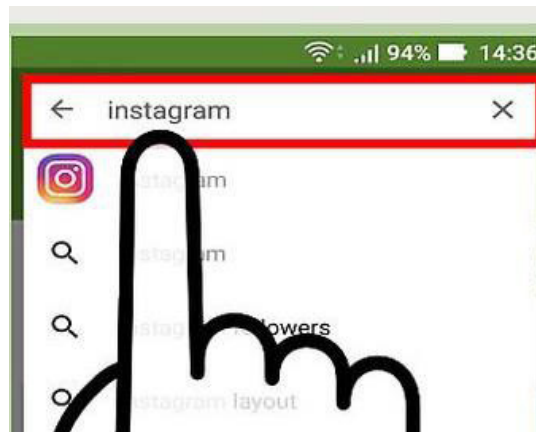
To join Instagram, you can create an account of your own for free. You can do this on your preferred mobile platform or, set your account up on a computer.

1. Using mobile.

**Tap your phone's app store app to open the app store.** You will need to download the Instagram app in order to create and access an account on your mobile platform. On iOS devices, this app is called "App Store"; while on Android phones and tablet it is known as the "Google Play Store".



*Figure 3.13*



*Figure 3.14*

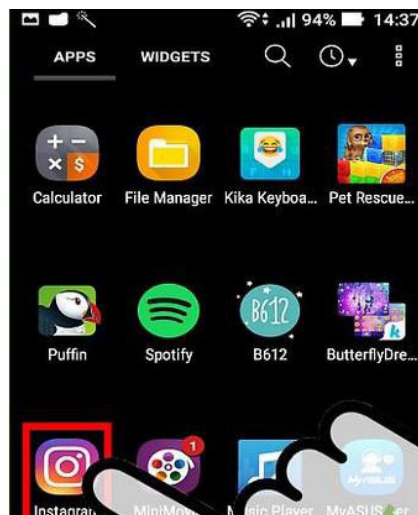
**Search for the “Instagram” app.** On both iOS and Android platforms, you can do this by tapping the magnifying glass icon in the app store app and then typing in your search query.

**Tap the relevant button to download Instagram.** Since Instagram is a free app, you will see a button next to the app that says either “Get” (iOS) or “Install” (Android). It may take a few minutes to download.



*Figure 3.15*

**Tap the Instagram app.** This will open Instagram.



*Figure 3.16*

**Tap the “Sign Up” button.** This will allow you to enter your preferred account information.



*Figure 3.17*

**Enter your preferred email address in the field provided.** Tap “Next” when you’re done. Make sure that this is a current email address to which you have access. You can also choose to log in with your Facebook credentials from here. If you tap the “Log in with Facebook” option, Instagram will ask you to log into your Facebook page if you aren’t already logged in.

**Enter a username and password.** You’ll need to enter the password twice in order to confirm its accuracy. Make sure you like your username before clicking “Next”.

**Enter optional account details.** These include a profile picture, or a bio for your account. You can add or change this information at any time from within your Instagram profile by tapping the “Edit Profile” option at the top of your page.



*Figure 3.18*

Tap **“Done”**. This will create your account.

## 2. Using computer

**Open your preferred browser.** While your Instagram browsing experience is limited in comparison to mobile when using a computer, you can still set up and access your account from Instagram’s site.

Navigate to **Instagram’s website**.

**Enter your sign-up information on the right side of the page.** This information includes the following:

- A current email address.
- Your full name.
- Your preferred username.
- Your preferred password.
- You can also click “Log in with Facebook” at the top of this information entry box to create an account with your Facebook name and password. This will link your Facebook and Instagram accounts.

**Click the “Sign Up” button.** This is at the bottom of the sign-up menu; doing so will create your account.

**Click the person icon in the top right corner of your screen.** This will take you to your account page.

**Click the “Edit Profile” option.** This should be to the right of your Instagram name at the top of your page.

**Add any information you wish to display.** This may include a bio for your account or a profile picture. When you are done, click the “Submit” button at the bottom of your page. With that your Instagram account is created.

### ***Activity 3.4***

Create and customize your Instagram profile. Demonstrate how to set your account as “private”, thereby requiring that you approve any new follower requests and Connecting your account to other social networking sites, enabling them to share uploaded photos to those sites.

## **3.2 Ethical and legal issues in social media**

Ethics can be understood as a set of rules or standards governing the conduct of a person or the members of a profession. While legal issues can be understood to mean enforceable by being in conformity with the law of the land and the public policy meaning it is not condemned as illegal.

Although there are many benefits in the use of social media, these benefits must be weighed against the potential shortcomings. These may include truthfulness and accuracy of posted information, the source of the posted information among many other issues. This means that when using social media as a communication tool there are many ethical and legal issues involved as well as risks.

The legal challenges faced when using social media involve user rights, whereas the ethical challenges concentrate on the responsible use of social media. It may also involve how the privacy of a user is maintained and protected as they use social media.



### 3.2.1 Legal issues

Legal queries raised over social media use center around issues of copyright and privacy. This is so because most countries do not have laws directly addressing issues of social media.

Intellectual property rights are among the pertinent issues that researchers, archivists, librarians, and others confront when harvesting social media data. Digital platforms have become increasingly complex, and social media use has escalated, creating new avenues of research data. Intellectual property can be understood as a means of protecting creative works on behalf of the owners. These exclusive rights for original works include the rights to reproduce, distribute, display, or prepare derivative works. This means that if one uses the original work of a person from the social media without the consent of the owner, then one can be sued in a court of law. This extends even to the use of photographs gotten from social sites like tweeter.

Privacy on social media concerns the boundaries between legal and ethical considerations. An increase in computer technology means that it is easier to accumulate data and connect various data points about an individual, which is more difficult to do with written records.

Privacy can be understood as the right “to be let alone”. Violation of one’s privacy may be understood in different dimensions these may include:

- The invasion upon a person’s private affairs,
- Public revelation of embarrassing private facts about a person.
- Publicity which places a person in a false light.
- Misappropriation or the use of a person’s name and image for commercial advantage without their prior consent.

In conclusion, social networking users do not enjoy immunities granted to social networking sites under the law, so they should be careful to always act appropriately when posting messages or files to the social sites.

#### **Activity 3.5**

In groups discuss find out the legal issues in major social media sites (Facebook, YouTube, twitter, Instagram). In your own opinion what would like to be a priority in ensuring online safety on social media sites. What information would you use to support your view?

### 3.2.2 Ethical issues

Despite of its functional and useful potential in social and development growth in human's communication, there are many ethical issues in social networking that should be taken into deep caution and consideration. Among them include:

#### Privacy

The internet contains wealth of data and it is always a serious subject of concern for privacy issues in social networking sites. The problems of data privacy have been made worse by the growing number of youth flocking into these online social networks without or paying little attention to privacy issues for themselves or others. Although term and conditions were always made to be seen and agreed during user's registration process, most of the time, users tend to ignore the policy and assume that everything would be in a good place without realizing that we might solely permit a gateway access of breach to our precious personal information.

#### Freedom of speech

Freedom of speech is a valid political pathway recognized as a human right. This means that everyone has the right to freedom of opinion and expression. Although free speech is always seen as modest to many and supported in democratic ideology, it is a dangerous weapon for specific group of people to manipulate the right to release or spark an unethical sentiment such as racial or religious hatred within the digital space through the social media.

#### Leakage of data

In social networking sites, data leakage problem can be traced back where it is most possibly to be caused by user's minimal awareness and understanding on the ethical privacy and protection value on the policies used by each respective social networking sites. Frequent updates on social networking's timeline such as current interest and location can be manipulated and compiled as a valuable data source of information in data leakage. Even though each of these social networking sites have been clearly mentioned their privacy policies, it is all up to the users to fully take control on what should be exposed and what should remain confidential.

#### Identity Theft

Identity theft is one from many examples of ethical issues in social networking. It is a form of technique used by criminals to impersonate someone's identity with

intention to pursue or commit a crime. The victim will be held responsible for the consequences of fraud or action done by the impersonators. Identity theft on the Internet can arise in two ways which are either creating a fake account or stealing and hacking the password of the victim.

### **Activity 3.6**

Kiden is a journalist working with a news agency in juba, What choice would you recommend her to make in order to make sure she respect people's privacy while adhering to ethical issues in major social media sites while still exercising her right to free speech?

### **Exercise 1**

1. What are the benefits of social media in marketing firms?
2. State five differences between traditional media and social media.
3. Outline the major legal and ethical issues associated with the use of social media.
4. How would you justify the need for strict regulation on privacy and security issues in social media sites?
5. Based on what you know about social media, how could you promote social wellbeing through social sites in your local community?
6. Taban is farmer, which social media sites would you recommend him to use to market, learn and share more knowledge about his produce? Justify your answer with the knowledge and experience you have gathered about social media.



Remember

## SOCIAL MEDIA

**Blog** - Blog is a word that was created from two words: “web log” Blogs are usually maintained by an individual or a business with regular entries of content on

a specific topic, descriptions of events, or other resources such as graphics or video. “Blog” can also be used as a verb, meaning to maintain or add content to a blog.

**Blogger** - Blogger is a free blogging platform owned by Google that allows individuals and companies to host and publish a blog typically on a subdomain. Example: yourblogname.blogspot.com.

**Bookmarking** - Bookmarking online follows the same idea of placing a bookmark in a physical publication -- you’re simply marking something you found important, enjoyed, or want to continue reading later. The only difference online is that it’s happening through websites using one of the various bookmarking services available, such as Pocket, or right within your browser.

**Chat** - Chat can refer to any kind of communication over the internet but traditionally refers to one-to-one communication through a text-based chat application, commonly referred to as instant messaging (IM) applications.

**Comment** - A comment is a response that is often provided as an answer or reaction to a blog post or message on a social network.

**Direct Message** - Direct messages -- also referred to as “DMs” -- are private conversations that occur on Twitter. Both parties must be following one another to send a message.

**Ebook** - An ebook is an electronic version of a book. However, most ebooks are not actually available in print (unless you print them). These are typically published in PDF form. For marketers, ebooks commonly serve as lead generating content -- people must fill out a form to receive their ebook copy.

**Forums** - Also known as a message board, a forum is an online discussion site. It originated as the modern equivalent of a traditional bulletin board, and a technological evolution of the dial-up bulletin board system.

**GIF** - GIF is an acronym for Graphics Interchange Format. In social media, GIFs serve as small-scale animations and film clips.

**Handle** - Handle is the term used to describe someone's @username on Twitter.

**Hashtag** - A hashtag is a tag used on a variety of social networks as a way to annotate a message. A hashtag is a word or phrase preceded by a “#” (i.e.

#InboundMarketing). Social networks use hashtags to categorize information and make it easily searchable for users.

**Instant Messaging** - Instant messaging (IM) is a form of realtime, direct text-based communication between two or more people. More advanced instant messaging software clients also allow enhanced modes of communication, such as live voice or video calling.

**Live streaming** - Live streaming is the act of delivering content over the internet in real-time.

**Meme** - A meme on the internet is used to describe a thought, idea, joke, or concept that's widely shared online. It is typically an image with text above and below it, but can also come in video and link form.

**News Feed** - A news feed is literally a feed full of news. On Facebook, the News Feed is the homepage of users' accounts where they can see all the latest updates from their friends. The news feed on Twitter is called Timeline.

**Search Engine Optimization** - Search engine optimization is the process of improving the volume or quality of unpaid traffic to a website from search engines.

**Selfie** - A selfie is a self-portrait that is typically taken using the reverse camera screen on a smartphone or by using a selfie stick (a pole that attaches to your camera). Selfies are commonly shared on social media networks like Instagram, Twitter, and Facebook using the hashtag #selfie.

**Tag** - Tagging is a social media functionality commonly used on Facebook and Instagram that allows users to create a link back to the profile of the person shown in the picture or targeted by the update.

**Trending Topic** - Trending topics refer to the most talked about topics and hashtags on a social media network. These commonly

appear on networks like Twitter and Facebook and serve as clickable links in which users can either click through to join the conversation or simply browse the related content.

**Troll** - A troll or internet troll refers to a person who is known for creating controversy in an online setting. They typically hang out in forums, comment sections, and chat rooms with the intent of disrupting the conversation on a piece of content by providing commentary that aims to evoke a reaction.

**User-Generated Content** - User-generated content is content -- blogs, videos, photos, quotes, etc. -- that is created by consumers. Marketers typically tap into their audience in an online setting to collect this type of content to support a campaign or initiative.

**Viral** - Viral is a term used to describe an instance in which a piece of content -- YouTube video, blog article, photo, etc. -- achieves noteworthy awareness. Viral distribution relies heavily on word of mouth and the frequent sharing of one particular piece of content all over the internet.

**Vlogging** - Vlogging or a vlog is a piece of content that employs video to tell a story or report on information. Vlogs are common on video sharing networks like YouTube.